

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555

August 22, 1990

MEMORANDUM FOR: James M. Taylor
Executive Director for operations

William C. Parler, General counsel

FROM: Samuel J. Chilk, Secretary

SUBJECT: STAFF REQUIREMENTS AFFIRMATION/DISCUSSION
AND VOTE, 9:30 A.M. . THURSDAY, AUGUST 16,
1990, COMMISSIONERS' CONFERENCE ROOM, ONE
WHITE FLINT NORTH, ROCKVILLE, MARYLAND
(OPEN TO PUBLIC ATTENDANCE)

1. SECY-90-255 Final Rule on Informal Procedures for Reactor
Operator and Senior Reactor Operator Licensing Adjudications

The Commission, by a 4-0 vote, approved a final rule which provides procedures for the use of informal adjudication procedures in nonenforcement operator licensing proceedings. The rule also includes express permission for an applicant to include within the request for a hearing a request that the presiding officer recommend to the Commission that procedures other than those specified in Subpart L be used in the proceeding.

The Federal Register Notice should be revised to incorporate the attached changes (Attachment 1), reviewed by the Regulatory Procedures Branch ADM, for consistency with Federal Register requirements, and forward to SECY for signature and publication. (OGC) (SECY Suspense: 9/10/90)

II. SECY-90-209 - Final 1990 Waste Confidence Decisions and

Amendments to 10 CFR Part 51

The Commission, by a 4-0 vote, approved issuance of the final "Waste Confidence Decision Review" and final conforming amendments to 10 CFR Part 51 subject to the attached modifications (Attachment 2).

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The Federal Register Notice should be revised as noted, and forwarded for signature and publication.
(OGC/EDO) (SECY Suspense: 9/10/90)

Attachments:
As stated

cc: Chairman Carr
Commissioner Rogers
commissioner Curtiss
Commissioner Remick
GPA
ACRS
PDR - Advance
DCS - PI-24

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NUCLEAR REGULATORY COMMISSION

10 CFR Part 2
RIN 3150-AD17
Informal Hearing Procedures for
Nuclear Reactor Operator Licensing Adjudications

AGENCY: Nuclear Regulatory Commission

ACTION: Final rule.

SUMMARY: The Nuclear Regulatory Commission (NRC) is amending its regulations to provide rules of procedure for the conduct of informal adjudicatory hearings in nuclear reactor operator licensing proceedings. The Atomic Energy Act of 1954 requires that the NRC, in any proceeding for the granting,

suspending, revoking or amending of any license afford an interested person, upon request, a "hearing." This final rule would include reactor operator licensing proceedings under the informal hearing procedures already established for materials licensing proceedings.

EFFECTIVE DATE: [Insert the date of publication in the Federal Register]

FOR FURTHER INFORMATION CONTACT: Roger Davis, Senior Attorney, Office of the General Counsel, U.S. Nuclear Regulatory Commission, Washington, DC 20555, Telephone (301) 492-1600.

SUPPLEMENTARY INFORMATION:

I. Background

On April 26, 1989 (54 FR 17961-17962), the Nuclear Regulatory Commission published in the Federal Register proposed amendments to its Rules of Practice at 10 CFR Part 2. The amendments make the informal adjudicatory procedures set forth in 10 CFR Part 2, Subpart L, applicable in proceedings

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for the grant, renewal or licensee-initiated amendment of a reactor operator or senior reactor operator license. However, the amendments provide for the use of the formal adjudicatory procedures set forth in 10 C.F.R. Part 2, Subpart G, in any reactor operator licensing proceeding that is initiated by a notice of hearing under § 2.104, a notice of proposed action under § 2.105, or a request for hearing under Subpart B of 10 CFR Part 2 on an order to show cause, an order for modification of license or a civil penalty. On July 3, 1989, the NRC extended the date for submission of comments on the proposed amendments to August 10, 1989 [54 FR 28822].

Section 189a of the Atomic Energy Act of 1954 (AEA) (42 U.S.C. 2239(a)) provides that in any proceeding for the granting, suspending, revoking, or amending of any license, the NRC shall grant a hearing upon the request of any person whose interest may be affected by the proceeding. Among the licenses issued by the NRC are those for operators and senior operators of nuclear reactors (AEA Section 107, 42 U.S.C. 2137; 10 CFR Part 55).

The Commission's rules of practice generally provide for two types of hearing procedures for licensing proceedings -- formal and informal. Under 10 CFR Part 2, Subpart G, those requesting a hearing with respect to a reactor licensing action or any agency enforcement activity affecting a license are generally provided a formal, trial-type hearing conducted in accordance with the provisions of the Administrative Procedure Act, 5 U.S.C. 554-557 and 10 CFR Part 2, Subpart G. On the other hand, a request for a hearing regarding an NRC materials licensing action generally entitles an interested person to an informal, legislative-type hearing in accordance with 10 CFR Part 2, Subpart L.

NRC regulations currently do not specify the type of hearing to be

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afforded in the event that an interested Person, including an applicant for a reactor operator license or a licensee, a hearing with regard to agency action concerning a reactor operator license. Previously, the Commission has declared in individual orders responding to operator requests that an applicant for an operator license whose application is denied is entitled only to an informal hearing in accordance with procedures like those now embodied in Subpart L. David W. Held (Senior Operator license for Beaver Valley Nuclear Power Station, Unit 1), Docket No. 55-60402 (Comm. Aug. 7, 1987). In the wake of NRC's adoption of Subpart I (54 FR 8269), the Commission decided that the Commission's rules should reflect the practice followed in the individual orders.

II. Comments and Commission Responses

The Commission received seven comments representing a broad spectrum of interested persons. Commenters included three utilities, a law firm representing utilities, the Nuclear Management and Resources Council [NUMARRC], a licensed senior reactor operator and a law firm representing the Professional Reactor Operator Society [PROS]. All comments are available for inspection and copying in the agency's Public Document Room, 2120 L Street, N.W. [Lower Level] Washington, D.C.

One utility and a law firm representing five utilities expressed general support for specification of the informal adjudicatory procedures that will apply in reactor operator license proceedings, but deemed it necessary or desirable that the amendments explicitly grant applicants and licensees access to formal adjudication upon a showing of good cause or special circumstances. NUMARC affirmed the rationale for the proposed amendments, but nonetheless deemed desirable the application of Subpart G to hearings

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concerning the denial of an initial or renewal application. These commenters also suggested certain changes in provisions of the existing, informal adjudicatory rules under Subpart L insofar as they would apply to reactor operator licensing proceedings. One utility found the NRC's Statement of Consideration inadequate and urged renote either justifying the amendments more clearly or proposing adoption of formal procedures for all operator license proceedings. Two other commenters, a senior reactor operator and the law firm representing PROS, opposed the amendments as contrary to the due process rights of licensed reactor operators. One utility wholly endorsed the proposed amendments.

After considering all comments, the Commission is persuaded that with one exception the amendments should issue as proposed. In response to the comments, the Commission has explicitly extended to the initial or renewal applicant who is issued a notice of proposed denial or a notice of denial permission to include in his or her request for hearing a request that the presiding officer recommend authorization of other procedures for the proceeding. Such a request must include a statement of the special factual circumstances or issues supporting other hearing procedures.

At the outset, it is useful to note some of the highlights of the Commission's informal adjudicatory procedures. Within thirty days after a presiding officer's entry of an order granting a request for a hearing, NRC staff files in the docket a hearing file consisting of the application, and any relevant NRC report and correspondence between the applicant and the NRC. 10 CFR 2.1231. Thereafter, the parties are afforded an opportunity to submit written presentations of their arguments and supporting written evidence. 10 CFR 2.1233(a). These presentations are to be made under oath or affirmation.

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Id. In addition, the presiding officer is empowered to submit written questions to the parties to be answered in writing, *id.*, and to issue subpoenas for attendance and testimony at hearings and for production of documents or things. 10 CFR 2.1209(h). Upon determining that it is necessary to create an adequate record for decision, the presiding officer may also allow or require oral presentations, including testimony by witnesses, under oath and stenographically recorded. 10 CFR 2.1235(a)-(b). The presiding officer conducts examination of the witnesses and may allow the parties to propose questions for posing to the witnesses. *id.* Finally, the presiding officer may recommend to the Commission that procedures other than the specified informal procedures be used in the proceeding. 10 CFR 2.1209(k).

A. General Comments

1. Formal Hearings Are Required For Licensees If Requested

Two commenters opposed the proposed amendments on the ground that licensed operators are entitled to trial-type hearings under the Constitution. The licensed senior reactor operator viewed the proposed amendments as both permitting the revocation of a license for any reason or whim and eliminating the right to a formal hearing. The commenter apparently overlooked the specific standards in 10 CFR Part 55 under which licenses are issued, renewed, modified, suspended or revoked. The commenter also does not seem to appreciate that: 1) the proposed amendments provide for formal adjudication in proceedings that would involve revocation, suspension or modification of a license; and 2) Subpart L already authorizes a presiding officer's recommendation that the Commission approve other procedures in a particular proceeding otherwise conducted under Subpart L procedures.

The law firm representing PROS argued that the informal procedures are insufficient for actions that could deprive an operator of his or her property interest in the continued validity of the license and his or her liberty interest in pursuit of a career as reactor operator. PROS would support the amendments only if they were modified to make informal procedures available as an option to an operator in lieu of formal proceedings. Another commenter, NUMARC, believed that the codification and use of informal hearing procedures for the grant, renewal or licensee-initiated amendment of a reactor operator license would provide fair, efficient and effective adjudication. Nonetheless, NUMARC suggested that it would be desirable for the NRC to apply Subpart G to proceedings concerning the denial of an initial or renewal application because of the significance of such a denial for the operator. The Commission believes that these commenters similarly fail to give sufficient consideration or weight to the specification of circumstances in which formal procedures will apply and to the authorization of the presiding officer to recommend other than informal procedures in appropriate cases. Moreover, these commenters do not scrutinize closely the type of affected individual interests or the general types of inquiries in the adverse actions at issue.

A party's entitlement to a hearing is determined by the balancing of three factors: the private interest affected by official action; the probable value of additional or different procedures; and the Government's interest, including the function involved and the fiscal and administrative burdens of additional or different procedural requirements. *Mathews v. Eldridge*, 424 U.S. 319, 335 (1976). After reviewing and weighing these factors, the Commission remains convinced that the informal adjudicatory procedures set

forth in Subpart L are appropriate for the reactor operator licensing proceedings to be covered by this rule. This conclusion follows from a number of observations and findings, but in particular the following: 1) the nature of the interests at stake; 2) the Commission's provision of a meaningful hearing at a meaningful time ; 3) the appropriateness of informal procedures for resolution of the typical inquiries in the proceedings to be held under Subpart L; and 4) the opportunity to obtain other procedures when they are necessary for a fair resolution of critical factual issues.

The Commission recognizes that substantial personal interests may be affected by the decision to grant or deny an application for a reactor operator license. However, the nature of the affected interest is limited by virtue of the fact that reactor operator license applicants are subject to broad Commission powers to grant or deny, and operator licenses permit

performance of the licensed functions only in a specific facility, 10 CFR 55.53(b)-(c), where the licensee of the facility has certified to the need for the position and requested examination of the applicant for a license. 10 CFR 55.31(a)(3)-(4). The interest at issue is also somewhat limited by the fact that reactor operator licenses expire six years after issuance with no guaranteed right to renewal. 10 CFR 55.55. Moreover, the applicant for initial issuance of an operator or senior operator license does not face a deprivation of a vested or existing position or status. An individual seeking renewal of an existing license may feel that he or she has been deprived of a vested or existing position or status, but there is no guaranteed right of renewal. Therefore it is not certain that protected interests are always or generally at stake in proceedings concerning the issuance or renewal of a Part 55 license. However, the Commission will nonetheless assume for purposes of

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further discussion that they are.

The key question remains as to whether the Commission is providing less procedure than due process requires under the circumstances. The Commission is providing a hearing. And, it is clear that due process does not require full trial-type procedures in every such case. "The fundamental requirement of due process is the opportunity to be heard 'at a meaningful time and in a meaningful manner.'" *Mathews v. Eldridge*, 424 U.S. at 333 (quoting *Armstrong v. Manzo*, 380 U.S. 545, 552 (1965)). The Supreme Court has repeatedly emphasized that "[d]ue process,' unlike some legal rules, is not a technical conception with a fixed content unrelated to time, place and circumstances." *Id.* at 334 (quoting *Cafeteria Workers v. McElroy*, 367 U.S. 886, 895 (1961)). Thus, "[d]ue process is flexible and calls for such procedural protections as the particular situation demands." *Id.* (quoting *Morrissey v. Brewer*, 408 U.S. 471, 482 (1972)).

The nature of the relevant inquiry is central to the evaluation of the fairness and reliability of the existing procedures and the probable value, if any, of additional safeguards. *Id.* at 343. Arguing that the Commission should bolster initial and renewal applicants' access to formal adjudication, one commenter emphasized that the requirements for a Part 55 license necessitate subjective evaluations on such issues as health, and administration of the written examination and operating test. See Section II-B-2-a. The Commission does believe that the typical issues in reactor operator proceedings for the grant or renewal of licenses are likely to concern performance on a written examination or an operating test. As set forth in Part 55, however, these examinations test knowledge, skills and abilities pertaining to specific technical and scientific matters. See 10 CFR

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55.41(b), 55.43(b), 55.45, 55.57 and 55.59(a). In addition, the Commission has issued standards for examination and grading of the tests. See NUREG-1021.1 While some parts of these examinations may be less amenable to "objective evaluation than other parts, short answer as opposed to multiple choice questions, the subject matter still falls within the Commission's special expertise and judgment. Even when substantial factual issues arise regarding performance on a question or problem concerning technical or scientific knowledge or judgment, oral trial-type presentation may not be required. *Lee Kerr-McGee Corp. (West Chicago Rare Earths Facility)*, CLI-82-2, 15 NRC 232, 259-60 (1982), *aff'd sub nom. City of West Chicago v. NRC*, 701 F.2d 632 (7th Cir. 1983), and cases cited therein. Indeed, in such cases the right to cross-examination may serve little or no purpose, and result only in futility or delay. See *Buttrey v. United States*, 690 F.2d 1170, 1182 (Sth Cir. 1982). And, the possibility or existence of professional disagreement over an applicant's health, for example, does not suffice to create a specter of questionable credibility or veracity. See *Mathews v. Eldridge*, 424 U.S. at 344. Moreover, an applicant who is denied a license because of failure to pass the written examination or operating test, or both, may reapply two months after the date of denial, and make successive applications at other intervals thereafter. 10 CFR 55.35. These opportunities for reapplication in and of themselves may satisfy the purposes of a hearing if one is otherwise required. See *Tyler v. Vickery*, 517 F.2d

1/ Copies of NUREGS may be purchased from the Superintendent of Documents, U.S. Government Printing Office, P.O. Box 37082, Washington, D.C. 20012-7082. Copies are also available from the National Technical Information Service, 5285 Port Royal Road, Springfield, VA 22161. A copy is also available for inspection and/or copying at the NRC Public Document Room, 2120 L Street, N.W., Washington, D.C.

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1089 (5th Cir. 1975). For the renewal applicant, the risk of error and the need for other procedures it also reduced by the fact the Commission will permit the licensed operator to take the NRC requalification examination three times before denying the renewal application on the basis of the licensee's failure of the NRC requalification examination.²

Recommendation and approval of other procedures such as cross-examination may occur, for example, where resolution of substantial factual issues involving witness credibility, bias or veracity is essential to the determination of a license renewal. However, the Commission expects that the broad powers of a presiding officer in Subpart L proceedings will permit fair, correct and efficient decision-making in typical reactor, Operator licensing proceedings. In any

event, the Commission need not provide formal adjudication for all hearings requested by initial or renewal applicants simply because one hypothetical case not before the Commission arguably may require the use of formal procedures. See *FDIC v. Mallen*, 486 U.S. 230, 247-48 (1988).

The Commission's conclusion that Subpart L procedures are sufficient for proceedings concerning the granting and renewal of reactor operator licenses is not altered by the emphasis of one commenter, the law firm representing five utilities, on the rarity of hearings concerning Part 55 licenses and the relatively smaller volume of Part 55 licenses as compared to material licenses. Despite the history of a small number of reactor operator licensing hearings, reduced cost and delay while maintaining fair procedures should

2NUREG 1021, Rev. 6, ES-605 (June 1, 1990).

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remain important objectives for both the Commission and the parties. In addition, the cost of one or a group of formal hearings in reactor operator licensing cases could in fact prove substantial. In each formal proceeding, a three-member licensing board or an administrative law judge must be appointed, and with that would also generally, follow the costs of such procedures as formal discovery, prefiled testimony and a trial-type hearing with oral testimony of the witnesses and cross-examination. For instance, real costs associated with formal, trial-type adjudications arise from need for court reporters, transcripts, rent for hearing facilities,³ and travel expenses for necessary agency personnel. Moreover, the commenter conceded that it is difficult to generalize from the figures, considering the fact that the Commission did issue 798 Part 55 licenses and processed 17500 renewals during 1987.

2. Differences Between Challenges to Proposed Enforcement Action and Challenges to the Denial of the Grant or Renewal of a License

One commenting utility requested further justification of the Commission's decision to grant formal hearings in proceedings resulting from

proposed enforcement action but informal hearings in proceedings concerning the denial of the issuance or renewal of a license. It has been a longstanding Commission policy to provide the opportunity for formal adjudication regarding the Commission's enforcement actions affecting licenses. This should not come as a surprise in light of the severity and potential stigma of Commission-initiated action for revocation or suspension of a license, or a

3/ Pursuant to agency policy, the trial-level proceedings conducted in formal Subpart G adjudications are usually held near the applicant or licensee involved, and this often requires renting a hotel conference room or similar facility.

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civil penalty, as well as the propriety of formal procedures for adjudication of such underlying issues as a material false statement and willful violation of a rule or regulation. See 10 CFR 55.61. As noted above, the Commission does not contemplate that the typical grounds of denial of an initial or renewal application will generally involve such issues.

B. Comments Relating to Specific Provisions of Subpart L

1. Proposed § 2.1201--Scope of Subpart

The law firm representing PROS declared that it was not possible to discern the circumstances to which the proposed rule would and would not apply. In particular, this commenter felt that proposed § 2.1201(b) was extremely vague. Other commenters did not appear to have this difficulty. The Commission sees no need for any change in the proposed amendments, but will elucidate briefly the application of the amendments. Section 2.1201(a) clearly provides that the rules of Subpart L will govern procedures in an adjudication initiated by a request for a hearing in a proceeding for the grant, renewal, or licensee-initiated amendment of an operator or senior operator license. On the other hand, the proposed amendment of § 2.1201(b) provides that the formal procedures of Subpart G will govern an adjudication regarding an operator or senior operator license that arises from a request for hearing under Subpart B of 10 CFR Part 2 on an order to show cause, an order for modification of license, or a civil penalty. An order to show cause under Subpart B is the mechanism by which the Commission would generally act to revoke or suspend a license. Thus, the Commission contemplates that the formal procedures of Subpart G will govern proceedings to revoke or suspend an operator or senior operator license subject to Part 55. The proposed

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amendment of § 2.1201(b) also would make the formal procedures set forth in Subpart G applicable to an adjudication initiated by a notice of hearing issued under § 2.104, or a notice of proposed action under § 2.105. The Commission's construction of §§ 2.104 and 2.105 is set forth in West Chicago, 15 NRC at 244-46. Application of these provisions to reactor operator licensing under Part 55 would arise if the Commission determined that the public interest required a formal hearing on a particular application for, or amendment to, a reactor operator or senior operator license. Of course, this rulemaking record indicates that the Commission does not expect that it will be making the requisite determinations under §§ 2.104 and 2.105 with regard to reactor operator licensing proceedings.

2. Existing § 2.1205--Request for a Hearing;
Petition for Leave to Intervene

a. Requests for Formal Adjudication. One utility and the law firm representing five utilities urged that the Commission add a provision that explicitly permits an operator to request formal adjudication upon a showing of good cause or special circumstances. The latter commenter recommended specifically an amendment of existing § 2.1205(b) so as to provide explicitly to the Part 55 license applicant "who is issued a notice of proposed denial or a notice of denial" the opportunity to include in his request for hearing a specific request for formal adjudication. The amendment would require that the applicant include with the request an explanation of the circumstances requiring such formal procedures as discovery and cross-examination of witnesses. This commenter conceded that the procedures in Subpart L are generally appropriate for hearings on Part 55 licenses, but analyzed the balancing factors for determining administrative due process as warranting

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trial-type proceedings in many cases, particularly for renewal applicants. The Commission has responded to many of this commenter's views on due process in Section II-A-1, above. While the Commission differs with some of the commenter's views on the circumstances which are likely to warrant use of other procedures, explicit authorization of an early vehicle for the applicant's identification of case-specific needs for other procedures is desirable. Thus, the final rule amends § 2.1205(b) so as to authorize the applicant to request, within the request for a hearing, "that the presiding officer recommend to the Commission that procedures other than those authorized under this subpart be used in the proceeding, provided that the applicant identifies the special factual circumstances or issues which support the use of other procedures."

Under § 2.1209, the presiding officer already "has the duty to conduct a fair and impartial hearing according to law" and "has all power necessary to

those ends, including the power to ... [d]ispose of procedural requests or similar matters." And, nothing in Subpart L expressly prohibits the applicant who is subject to Subpart L procedures from asking within the request for hearing, or separately, that the presiding officer exercise the power to "[r]ecommend to the Commission that procedures other than those authorized under (Subpart L) be used in (the) proceeding." See 10 CFR 2.1209(k). Nonetheless, explicit recognition of an opportunity under Subpart L for applicants to request other procedures within their request for hearing clarifies the procedural scheme and thereby enhances the applicant's access to other procedures where appropriate. The Commission is not altering, however, the necessity of the Commission's authorization of the use of other procedures. Thus, the new provision only authorizes the applicant to request

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that the presiding officer, make the necessary recommendation to the Commission.

b. Standing for Intervention. One utility urged the specification of for Standing for intervention in operator license proceedings. Specifically, the commenter suggested that persons other than the operator licensee or applicant be required to demonstrate that it will present evidence that would materially alter the outcome of the NRC hearing decision. NUMARC also recommended a clarification that the threshold of standing for intervention in reactor operator licensing adjudications, under either Subpart L or Subpart G, will be very high. The Commission shares the concern that intervention not be indiscriminate, such as for the purpose of creating unnecessary delay. However, the Commission believes that the existing procedures and judicial standards for standing will provide fair and sufficient scrutiny of petitions for intervention. See 10 CFR 2.1205. Under Subpart L, for example, the petitioner for intervention must show how its interests will be affected by the proceeding and identify the concerns of the petitioner. 10 CFR 2.1205(d),(j). And, the presiding officer must determine that the specified areas of concern are germane to the subject matter of the proceeding, and that the petition is timely and meets the judicial standards for standing. 10 CFR 2.1205(g), (j)(3). Indiscriminate intervention is, in fact, likely to be difficult under the present standards inasmuch as such proceedings will generally focus on issues peculiar to the applicant's or operator's qualifications for the position.

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In promulgating Subpart L, the Commission indicated that the "distance standard" established by NRC case law for standing in Nuclear reactor licensing proceedings, whereby person residing within about fifty miles of a facility generally are considered to have standing, was not applicable to material licensing proceedings. [54 FR at 8272]. The Commission will take this opportunity to clarify that the "distance standard" is not automatically applicable to reactor operator license proceedings. The standing of a petitioner in each case should be determined upon the basis of the circumstances of that case as they relate to the factors set forth in § 2.1205(g).

c. Appeal of the Denial of a Request for Hearing. Section 2.1205(n) of Subpart L currently permits appeal of an order denying a request for a hearing (or petition for intervention) in its entirety within ten days of the service of the order.

The law firm representing five utilities requested that the Commission amend existing § 2.1205(n) so as to permit an immediate appeal of a presiding officer's denial of a request for a formal hearing. As discussed below, this commenter also recommended that the Commission give the presiding officer the power to grant a request for a formal hearing.

The Commission declines to accept recommendation for several the following reasons. The existing procedure for, an immediate appeal is premised upon the denial of any hearing as a final bar to adjudication. This is far different circumstance for appeal than a mere denial of a request to use formal procedures for a hearing that is in fact granted. Indeed, completion of the informal adjudication may resolve the requestor's concerns.

Additionally, the Commission sees no reason to carve out for reactor operator hearing questions a special exception to its existing procedures on interlocutory appeal and review.

3. Existing § 2.1209--Presiding Officer's Powers

The law firm representing five utilities recommended that the Commission amend existing § so as to authorize the presiding officer in a Part 55 hearing to grant a request to use other adjudicatory procedures. Currently, the presiding officer's power under § 2.1209(k) is limited to a recommendation that the Commission authorize the use of other procedures for a particular proceeding. The recommended change might slightly expedite decisionmaking on a request for other adjudication. However, the Coni-

mission believes that the small potential benefits of the charge are outweighed by the benefits of its retention of the ultimate determination. For instance, a decision by the Commission serves the interests of uniformity of decisionmaking, full consideration of the potential commitment of costs and resources, and administrative finality.

This commenter also recommended amendment of § 2.1209 so as to authorize the presiding officer to entertain a specific request for a formal adjudication or for certain formal procedures in the course of the hearing if the need for such procedures becomes apparent. A presiding officer, however, already has authority, to entertain such requests during the course of an informal hearing. Nothing in Subpart L prohibits any party from presenting such a motion to the presiding officer during an informal proceeding. See 10 CFR 2. 1237. Moreover, the Commission need not and probably could not specify

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all or even most types of procedural motions and supporting Circumstances that could be presented during the course of an informal hearing.

4. Existing § 2.1211--Nonparty Participation

NUMARC expressed concern about the application of § 2.1211 of Subpart L, which provides for, participation in a hearing by a person not admitted as a party, including a representative of an interested State, county, municipality or agency thereof. Section 2.715 of Subpart G contains similar provisions. The commenter recommends that the Commission clarify that such nonparties should not be able to use individual operator license proceedings to address an issue other than an issue that is the subject of the hearing. The Commission notes that § 2.1211 already states that "[t]he presiding officer may permit a person who is not a party to make a limited appearance in order to state his or her views on the issues." 10 CFR 2.1211(a) (emphasis added.). The rule also requires that the request for governmental participation "state with reasonable specificity the requestor's areas of concern about the licensing activity that is the subject matter of the proceeding." 10 CFR 2.1211(b) (emphasis added). Although the nonparty participant may not be required to take a position on the issues, the views to be expressed must relate to the issues that are properly subject to challenge in such a proceeding. As with the consideration of a petition for intervention, the presiding officer may determine that the views to be expressed are not germane to the proceeding and therefore may deny the request for nonparty participation. For these reasons, the Commission sees no need for other clarification of the limits on nonparty participation.

Environmental Impact: Categorical Exclusion

The NRC has determined that this final rule is the type of action

described in categorical exclusion 10 CFR 51.22(c)(1). Therefore, neither an environmental impact statement nor an environmental assessment has been prepared for this final rule.

Paperwork Reduction Review

This final rule contains no information collection requirements and therefore is not subject to the requirements of the Paperwork Reduction Act of 1980 (44 U.S.C. 3501 et seq.).

Regulatory Analysis

The Atomic Energy Act affords interested persons the right to a hearing regarding a reactor operator licensing proceeding. As the Commission previously indicated in its decision in West Chicago, 15 NRC at 241, the use of informal procedures generally involves less cost and delay for the parties and the Commission than the use of formal, trial-type procedures, the principal other procedural alternative. Also, procedures must be in place to allow for the orderly conduct of those adjudications. Codifying the informal hearing procedures for operator licensing proceedings is preferable to the present practice of establishing the procedures to be followed on a case-by-case basis. By codifying the procedures, the Commission will avoid the expenditure of time and resources necessary to prepare the individual orders that previously have been used to designate those procedures. This final rule is the preferred alternative and the cost entailed in its promulgation and application is necessary and appropriate. The foregoing discussion constitutes the regulatory analysis for this final rule.

Regulatory Flexibility Certification

The NRC hereby certifies that this final rule will not have a significant economic impact upon a substantial number of small entities. Many operator

license applicants or operator licensees fall within the definition of small businesses found in section 34 of the Small Business Act, 15 U.S.C. 632, or the Small Business Size Standards set out in regulations issued by the Small Business Administration at 13 CFR Part 121, or the NRC's size standards published December 9, 1985 (50 FR 50241). The final rule should reduce the litigation cost burden upon applicants or licensees because of the informal nature of the hearing, although submission of filings and documentary

information detailing contested legal and factual issues is still required. Cost reduction in comparison to the cost of participating in a formal adjudicatory hearing can be anticipated, although it cannot be estimated with certainty whether that reduction as a whole will be significant. It is clear that use of informal hearing procedures should not increase the burdens of a hearing upon an applicant or licensee.

Backfit Analysis

Because these amendments do not involve any provisions that would impose backfits as defined in 10 CFR 50.109(a)(1), the NRC has determined that the backfit rule, 10 CFR 50.109, does not apply to this final rule and, therefore, that a backfit analysis is not required.

List of Subjects in 10 CFR Part 2

Administrative practice and procedure, Antitrust, Byproduct material, Classified information, Environmental protection, Nuclear Materials, Nuclear power plants and-reactors, Penalty, Sex discrimination, Source material, Special nuclear material, Waste treatment and disposal.

For the reasons set out in the preamble and under the authority of the Atomic Energy Act of 1954, as amended, the Energy Reorganization Act of 1954, as amended, the Energy Reorganization Act of 1974, as amended, and 5 U.S.C.

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552 and 553, the NRC is adopting the following amendments to 10 CFR Part 2:

Part 2 -- RULES OF PRACTICE FOR DOMESTIC LICENSING PROCEEDINGS

1. The authority citation for Part 2 continues to read as follows:

AUTHORITY: Secs. 161, 181, 68 Stat. 948, 953, as amended (42 U.S.C. 2201, 2231); sec. 191, as amended, Pub. L. 87-615, 76 Stat. 409 (42 U.S.C. 2241); sec. 201, 88 Stat. 1242, as amended (42 U.S.C. 5841); 5 U.S.C. 552.

Section 2.101 also issued under secs. 53, 62, 63, 81, 103, 104, 105, 68 Stat. 930, 932, 933, 935, 936, 937, 938, as amended (42 U.S.C. 2073, 2092, 2093, 2111, 2133, 21234, 2135); sec. 102, Pub. L. 91-190, 83 Stat. 853, as amended (42 U.S.C. 4332); sec. 301, 88 Stat. 1248 (42 U.S.C. 5871). Sections 2.102, 2.103, 2.104, 2.105, 2.721 also issued under secs. 102, 103, 104, 105, 183, 189, 68 Stat. 936, 937, 938, 954, 955, as amended (42 U.S.C. 2132, 2133, 2134, 2135, 2233, 2239). Section 2.105 also issued under Pub. L. 97-415, 96 Stat. 2073 (42 U.S.C. 2239). Sections 2.200-2.206 also

issued under secs. 186, 234, 68 Stat. 955, 83 Stat. 444, as amended 42 U.S.C. 2236, 2282); sec. 206. 88 Stat. 1246 (42 U.S.C. 5846). Sections 2.600-2.606 also issued under sec. 102, Pub. L. 91-190, 83 Stat. 853, as amended (42 U.S.C. 4332). Sections 2.700a, 2.719 also issued under 5 U.S.C. 554. Sections 2.754, 2.760, 2.770, 2.780 also issued under 5 U.S.C. 557. Section 2.764 and Table IA of Appendix C also issued under secs. 135, 141, Pub. L. 97-425, 96 Stat. 2232, 2241 (42 U.S.C. 10155, 10161). Section 2.790 also issued under sec. 103, 68 Stat. 936, as amended (42 U.S.C. 2133) and 5 U.S.C. 552. Sections 2.800 and 2.808 also issued under 5 U.S.C. 553. Section 2.809 also issued under 5 U.S.C. 553 and sec. 29, Pub. L. 85-256, 71 Stat. 579, as amended (42 U.S.C. 2039). Subpart K also issued under sec. 189, 68 Stat. 955 (42 U.S.C. 2239); sec. 134, Pub. L. 97-425, 96 Stat. 2230 (42 U.S.C. 10154). Subpart L also issued under sec. 189, 68 Stat. 955 (42 U.S.C. 2239). Appendix A also issued under sec. 6, Pub. L. 91-560, 84 Stat. 1473 (42 U.S.C. 2135). Appendix B also issued under sec. 10, Pub. L. 99-240, 99 Stat. 1842 (42 U.S.C. 2021b, et seq.).

2. The heading of Subpart L of Part 2 is revised to read as follows:

Subpart L - Informal Hearing Procedures for Adjudications in
Materials and Operator Licensing Proceedings

3. Section 2.1201 is revised to read as follows:

2.1201 Scope of subpart.

(a) The general rules of this subpart govern procedure in any adjudication initiated by a request for a hearing in a proceeding for

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(1) The grant, transfer, renewal, or licensee-initiated amendment of a materials license subject to Parts 30, 32, through 35, 39, 40, or 70 of this chapter; or

(2) The grant, renewal, or licensee-initiated amendment of an operator or senior operator license subject to Part 55 of this chapter.

(b) Any adjudication regarding a materials license subject to Parts 30, 32 through 35, 39, 40, or 70, or an operator or senior operator license subject to Part 55 that is initiated by a notice of hearing issued under § 2.104, a notice of proposed action under 2.105, or a request for hearing under Subpart B of 10 CFR Part 2 on an order to show cause, an order for modification of license, or a civil penalty, is to be conducted in accordance with the procedures set forth in Subpart G to 10 CFR Part 2.

4. In § 2.1205, paragraph (b) is revised to read as follows:

(b) An applicant for a license, a license amendment, a license transfer, or a license renewal who is issued a notice of proposed denial or a notice of denial and who desires a hearing shall file the request for the hearing within the time specified in § 2.103 in all cases. An applicant may include in the request for hearing a request that the presiding officer recommend to the

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Commission that procedures other than those authorized under this subpart be used in the proceeding, provided that the applicant identifies the special factual circumstances or issues which support the use of other procedures.

Dated at Rockville, MD, this day of 1990.

For the Nuclear Regulatory Commission.

Samuel J. Chilk
Secretary of the Commission

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NUCLEAR REGULATORY
COMMISSION
10 CFR Part 51

Waste Confidence Decision Review

AGENCY: Nuclear Regulatory Commission

ACTION: Review and Final Revision
of Waste Confidence Decision

SUMMARY:

On August 31, 1984, the Nuclear Regulatory Commission (NRC) Issued a final decision on what has come to be known as its "Waste Confidence Proceeding." The purpose of that proceeding was "...to assess generically the degree of assurance now available that radioactive waste can be safely disposed of, to determine when such disposal or offsite storage will be available and to determine whether radioactive waste can be safely stored onsite past the expiration of existing facility licenses until offsite disposal or storage is available." (49 FR 34658). The Commission noted in 1984 that its Waste Confidence Decision was unavoidably in the nature of a prediction, and committed to review its conclusions "...should significant and pertinent unexpected events occur or at least every five years until a repository is available." The purpose of this notice is to present the findings of the Commission's first review of that Decision.

The Commission has reviewed its five findings and the rationale for them in light of developments since 1984. This revised Waste Confidence Decision supplements those 1984 findings and the environmental analysis supporting them. The Commission is revising the second and fourth findings in the Waste Confidence Decision as follows:

Finding 2: The Commission finds reasonable assurance that at least one mined geologic repository will be available within the first quarter of the twenty-first century, and that sufficient repository capacity will be available within 30 years beyond the licensed life for operation (which may include the term of a revised or renewed license) of any reactor to dispose of the commercial high-level radioactive waste and spent fuel originating in such reactor and generated up to that time.

Finding 4: The Commission finds reasonable assurance that, if necessary, spent fuel generated in any reactor can be stored safely and without significant environmental impacts for at least 30 years beyond the licensed life for

operation (which may include the term of a revised or renewed license) of that reactor at its spent fuel storage basin, or at either onsite or offsite independent spent fuel storage installations.

Analysis of Public Comments on the Proposed Waste Confidence Decision Review

1.0 Introduction

Comments were received from a Federal agency, the public interest sector, the nuclear industry, and one State as listed below in order of their receipt:

Duke Power Company
Public Citizen
Edison Electric Institute
Malachy Murphy (State of Nevada)
Yankee Atomic Electric Company
Department of Energy
Philadelphia Electric Company
Commonwealth Edison
Virginia Electric and Power Company
Marvin I. Lewis, Registered Professional Engineer
Florida Power & Light Company

The majority of the commenters were supportive of the Commission's proposed decision and rule. The comments were consolidated into a total of 19 issues to be addressed. Each of these issues is discussed under the Commission finding to which it relates. Two additional issues, not raised by commenters, are treated under the heading "Other Relevant Issues." The "Other Relevant Issues" section includes consideration of the petition by the State of Vermont to intervene in the consideration of the extension of the operating license for Vermont Yankee and the potential for non-payment of the one-time fee for spent nuclear fuel generated prior to April 1983 into the Nuclear Waste Fund.

2.0 Analysis of Issues Related to Commission Findings

2.1 The Commission's First Finding

"The Commission finds reasonable assurance that safe disposal of high-level radioactive waste and spent fuel in a mined geologic repository is technically feasible."

Issue No. 1: Technical Feasibility of Safe Disposal in a Mined Geologic Repository

Comment

The commenter representing Public Citizen (PC) stated that there is still not adequate assurance that permanent, safe disposal of high-level radioactive waste in a mined geologic repository is technically feasible. In support of this, the commenter indicated that a number of major scientific panels have pointed out that there is no technical or scientific basis for knowing for sure that geologic disposal is possible. As an example, PC stated that President Carter's Office of Science and Technology Policy (OSTP) found in 1979 a rather general consensus" among scientists that a technology base "sufficient to

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repository was assured, in the absolute sense, but that it had found reasonable assurance in the feasibility of mined geologic disposal on the basis of a thorough review of the technologies needed to achieve this disposal.

Issue No. 2: Difficulty in Evaluating Compliance with Repository Safety Standards Over Long Time Periods

Comment

The PC commenter also raised the issue of what he termed the "inability to predict with a reasonable degree of certainty that, once buried, the waste will remain contained [in the geologic repository] for the required time period." The commenter noted uncertainties related to geologic stability, engineered barriers, rock-waste interactions, and groundwater hydrology which contribute to the difficulty of evaluating compliance with safety standards over the long time periods involved in radioactive waste isolation. The commenter concluded that although these problems may be able to be resolved, there is not a basis for assurance that this will be the case.

NRC Response

The NRC believes that existing safety assessment techniques have the potential to provide a basis for deciding whether proposed radioactive waste disposal systems are acceptable. We recognized the difficulty of predicting with a high degree of accuracy the maximum impacts a repository would have on human health and the environment, especially in the very far future. It will likely not be possible to test empirically the ability of models to predict long-term repository performance to the same extent as models for short-term performance. However, we believe existing technology can provide a sufficient level of safety for present and future generations under certain conditions. These conditions include addressing the uncertainties inherent in projecting far into the future and in modelling complex heterogeneous natural systems, and acquiring and evaluating data on specific sites.

We also note that the language of the original Environmental Protection Agency's (EPA) Environmental Radiation Standards for Management and Disposal of Spent Nuclear Fuel, High-Level and Transuranic Wastes (40 CFR Part 191) does not require absolute assurance that containment requirements will be met. Rather, it recognizes the uncertainties involved in projecting repository performance far into the future, and states "Instead, what is required is a reasonable expectation, on the basis of the record before the implementing agency, that compliance with Sec.191.13(a) will be achieved."

Issue No. 3: Unanticipated Difficulties in Developing the WIPP Facility

Comment

PC also indicated that the Waste Isolation Pilot Plant (WIPP) has not opened because of numerous unanticipated difficulties, including leakage of salt water into the site. PC states that this leakage, which was not anticipated prior to the beginning of construction in the early 1980s, shows that even on a scale of

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a few years, geologic events in a repository are unpredictable--to say nothing of events on a time scale of hundreds of thousands of years.

NRC Response

Although the NRC does not have oversight responsibility for the WIPP project, the NRC does monitor DOE progress on WIPP insofar as it may offer valuable insight into efforts to license a repository for commercial high-level waste and spent fuel. For example, DOE must demonstrate compliance with the EPA standard in order to operate the WIPP facility. NRC cognizance of DOE efforts to implement the EPA Standard at WIPP could help provide information and consensus-building in the implementation of the EPA Standard for the commercial high-level waste repository.

The NRC does not consider the occurrence of brine pockets at the WIPP site as a factor that might diminish its confidence in the technical feasibility of a mined geologic repository. The Commission does not expect that site characterization of a candidate site will proceed free from all difficulty. We have urged DOE to establish a planning mechanism for timely development and implementation of contingency plans at Yucca Mountain to address problems during site characterization as they arise. DOE has announced a new focus on surface-based testing for the Yucca Mountain site in its Reassessment Report to Congress. Under this program, the primary goal of testing is to identify features of the site which would render it unsuitable for a repository. If such features are identified, DOE WOULD notify Congress and the State of Nevada, and terminate site specific activities. A finding that the Yucca Mountain site is unsuitable would likely lead to delays in repository availability while another candidate site is identified and characterized, however it would not diminish confidence in the technical feasibility of geologic disposal.

Issue No. 4: Impact of the BEIR V Report on the Commission's Decision

Comment

Marvin Lewis drew attention to the recent findings of the Committee on the Biological Effects of Ionizing Radiation (BEIR V) in their report on the Health Effects of exposure to Low Levels of Ionizing Radiation. The commenter stated that the BEIR V study indicated that the danger from radioactivity is four or more times higher than previously known. The commenter further stated that the BEIR V findings will require that the NRC change many of its radiation protection guidelines and rules. He also requested that the NRC stop all action on the Waste Confidence Decision Review until the Commission can determine the effect of the BEIR V report on the Decision.

NRC Response

The Commission has been aware for some time of the scientific data underpinning the estimate of risk from radiation exposure contained in the BEIR V report. Much of this information has been incorporated in the Commission's forthcoming revisions to its radiation protection requirements (10 CFR P For reasons stated below, however, the Commission does not foresee any impact of the BEIR V report on the Waste Confidence Decision.

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The BEIR V report is the latest in a series of reports dealing principally with the effects of low-LET radiation in humans, e.g. radiation such as beta particles and gamma photons. The report covers radiation carcinogenesis, genetic effects, and effects on the developing embryo/fetus. The report also includes new information related to the dosimetry of the Japanese atomic bomb survivors, and new epidemiological information. The NRC staff, other Federal agencies, and national and international organizations are currently reviewing both the BEIR V report and the report issued in 1988 by the United Nations Scientific Committee on the Effects of Atomic Radiation (UNSCEAR).

The estimates of risk due to low-LET radiation in the BEIR V report are based principally upon effects observed in populations exposed to high doses and at high dose rates. These effects are then extrapolated using statistical modeling to predict effects at low doses and dose rates. The extrapolations to low dose and dose rate lead to significant uncertainties in the estimates of risk in the BEIR V report. The estimates of risk for fatal cancer induction in the BEIR V report are from three to four times larger than the estimate from the preferred model of the BEIR III report in 1980. However, the new BEIR V estimate is within the overall range of risk estimates and uncertainties from the different models presented in BEIR III.

It is important to note that the BEIR V report only addresses the issue of risk estimates for radiation effects. The BEIR committee did not make any recommendations on acceptable risks or upon the potential

impacts of the risk estimates to dose limits or standards for radiation protection. Efforts are underway by the International Commission on Radiological Protection (ICRP), National Council on Radiation Protection and Measurements (NCRP), and the Committee on Interagency Radiation Research and Policy Coordination (CIPRPC) of the Executive Office of the President to reach some measure of consensus on the impacts of the revised risk estimates to radiation protection standards.

Under Section 121(a) of the Nuclear Waste Policy Act (NWPA), NRC is required to issue technical requirements and criteria that it will apply in approving or disapproving a repository. These requirements and criteria must be consistent with the high-level waste disposal standards promulgated by the Environmental Protection Agency. Demonstration of compliance with the EPA standard was discussed under the rationale for Finding 1 in the Commission's Proposed Waste Confidence Decision Review.

The NRC does not believe that numerical criteria for individual protection requirements are at issue in its Waste Confidence Proceeding. The broader issue of demonstrating compliance with EPA release limits using probabilistic analyses was a concern of the NRC staff and the NRC's Advisory Committee on Nuclear Waste in preparing the Proposed Waste Confidence Decision Review. As stated in the Proposed Waste Confidence Decision Review, the NRC staff is closely monitoring EPA's progress on issuing its revised standards to assure that EPA Methodologies for demonstrating compliance with them can be applied by NRC to evaluate DOE's demonstration of compliance. NRC will also monitor DOE efforts to demonstrate compliance with the EPA standard at the Waste Isolation Pilot Plant facility for Transuranic wastes.

for site characterization activities they wish to begin, and resolution of the impasse between DOE and the State of Nevada regarding permits for drilling. DOE has made significant progress in the development of a QA program for its site characterization activities. It is possible that this work will be completed and accepted by late 1990 or early 1991. Regarding the impasse with the State of Nevada, both DOE and the State of Nevada have filed lawsuits in Federal Court in an effort to resolve the question of site access. While any litigation of this matter has the possibility of an unfavorable outcome for DOE, the Commission believes that Congress has aggressively demonstrated in both the Nuclear Waste Policy Act of 1982 and the Nuclear Waste Policy Amendments Act of 1987 that it is committed to an orderly progression of the repository program and a resolution of the radioactive waste disposal problem. Accordingly, NRC believes that it is reasonable to assume that Congress will not allow the uncertainties related to the start of site characterization to continue for many more years.

For these reasons, NRC believes that the coming decade will be ample time for the DOE to determine whether or not Yucca Mountain is unsuitable and to begin work on an alternate site, if necessary. We believe that Congress is committed to a resolution of the waste problem and will take measures to bring this issue to a close.

We would also point out here that the Court decision that led to the Waste Confidence Proceeding did not require NRC to determine when a repository would be available. The Court remanded to NRC the question of "...whether there is reasonable assurance that an offsite storage solution will be available by the years 2007-2009, the expiration of [Prairie Island and Vermont Yankee's] operating licenses, and if not, whether there is reasonable assurance that the fuel can be safely stored at the reactor sites beyond those dates." NRC chose as a matter of policy not to confine itself to the storage-related questions in the Court's remand, but to address the broader issues of whether radioactive wastes could be safely disposed of, when such disposal would be available, and whether such wastes can be safely stored until they are disposed of. NRC was not requested to determine nor has it made a determination that a repository must be available by 2025 in order to protect public health and safety.

NRC does not find a reasonable basis for the argument that even if the Yucca Mountain site were found to be suitable, it might not be available by the year 2025. Surface-based and in-situ testing are expected to take approximately ten years. The NWPA provides that NRC's review of DOE's license application is to be completed in three years (with the possibility of an additional year). Construction is scheduled to take another six years. Even if each of these activities were to take several years longer than planned, a repository at Yucca Mountain could be available well before the year 2025. The limiting condition appears to be the timing of DOE's access to the site to begin testing.

Finally, we do not believe it is realistic to assume for conservatism that four candidate sites will be found unsuitable before an acceptable site is characterized, licensed and built. To date, no candidate site for a repository

The Commission evaluates applications for modifications of spent fuel storage at licensee's facilities or for transshipment from one site to another on an individual basis. Such a case-by-case consideration of the merits of each application ensures that all significant safety issues are addressed in a thorough manner and provides a conservative approach for arriving at a decision on the merits of the license application.

Issue No. 8: Appropriate Use of Nuclear Waste Fund Monies

Comment

Commonwealth Edison Company (CECO) refers to the NRC's statement that DOE could accept responsibility for management of spent fuel until a repository is available in the event that a licensee becomes insolvent prior to the time a geologic repository is ready to accept spent fuel. Funds from either the Nuclear Waste Fund (NWF) or from the utility itself could be used (54 FR 39767, at 39786 and 39790). CECO comments that the use of the NWF monies for this purpose would involve the solvent utilities funding the storage of spent fuel generated by the bankrupt licensees. CECO believes that it is not clear whether the Nuclear Waste Policy Act would allow NWF monies to be used for this purpose and suggests that NRC should seek and analyze comments on this issue. Until further evaluation and analysis has taken place, CECO believes NRC should delete this as a basis for confidence.

NRC Response

The Commission believes that there are two related issues presented in the above comment. The first is whether DOE can accept responsibility for spent fuel if a utility is insolvent or otherwise no longer capable of managing it. A second related issue is, given DOE's acceptance of responsibility for the spent fuel, where would DOE obtain the funds needed to pay the cost of this responsibility? The NRC continues to believe that DOE would accept responsibility for spent fuel management in the event that a licensee is unable to exercise its own responsibility. Further, the NRC believes that DOE would have sufficient resources to carry out any safety-related measures.

indicated in the discussion under Issue 21, because DOE is not precluded from accepting responsibility for the waste in those situations, default is an issue of equity rather than public health and safety. As such, the Commission does not believe that a licensee's potential default has a direct bearing on the Commission's Waste Confidence Decision.

the Proposed Decision Review, CECO concludes that three different dates could be derived to indicate the maximum time for onsite spent fuel storage. For Dresden 1, which was licensed to operate in 1959 and permanently shut down in 1978, 30 years after shutdown would yield a maximum date of 2008; 30 years after a full 40-year license term yields a maximum date of 2029; and 30 years after a full 40-year license term plus a 30-year extension of the operating license would yield a date of 2059.

NRC Response

The NRC believes that CECO has misinterpreted the discussion pertaining to the maximum term of onsite spent fuel storage in the Waste Confidence Decision and the bases and assumptions underlying that discussion as they pertain to the specific circumstances of Dresden 1. The generic discussion of the derivation of the maximum safe storage term for the purposes of the Waste Confidence Decision is contained in pp.39785-90 and pp.39783-96. The Commission concluded on a generic basis that "spent fuel generated in any reactor can be stored safely and without significant environmental impacts in reactor facility storage pools or independent spent fuel storage installations located at-reactor or away-from-reactor sites for at least 30.years beyond the licensed life for operation (which may include the term of a revised license) of that reactor at its spent fuel storage basin or at either onsite or offsite independent spent fuel storage installations" (proposed 10 CFR 51.23(a) at p.39968 (Finding 4) (emphasis added)). The discussion and findings were based on technical and institutional considerations that, for the sake of completeness, considered situations like those at Dresden 1 that differ from those with most reactors that are expected to operate to full term plus a possible extended license term. For Dresden 1, based on proposed §51.23(a), the applicable storage period would be 30 years beyond the licensed life of operation, or until 2029.

2.3 The Commission's Third Finding

"The Commission finds reasonable assurance that high-level radioactive waste and spent fuel will be managed in a safe manner until sufficient repository capacity is available to assure the safe disposal of all high-level waste and spent fuel."

Issue No. 11: Resolution of Contractual Conflicts Between DOE and Licensees

Comment

Commonwealth Edison Company (CECO) comments that the NRC has unnecessarily interjected itself into issues involved in the contracts between the DOE and licensees by NRC's statement that It would have more confidence if the DOE and licensees could resolve any uncertainties by reaching an early and amicable resolution as to how and when the DOE will accept responsibility for spent fuel. CECO believes that the implication in this statement is that licensees should amend their contracts with DOE to allow DOE additional time to perform

of this requirement. The commenter believes that such action would be in

keeping with NRC's responsibilities to the public and to nuclear utilities.

NRC Response

The standard contracts between DOE and generators of spent nuclear fuel or persons holding title to spent fuel currently provide that in return for payment to the Nuclear Waste Fund, DOE will dispose of high-level waste and spent fuel beginning no later than January 31, 1998. The Commission believes it would be inappropriate for NRC to take any position on the need for generators and those holding title to such material to provide interim storage for it beyond 1998. This is a matter that will have to be resolved between the parties to the standard contracts. NRC, in its original Waste Confidence Decision and in the Proposed Waste Confidence Decision Review, addressed the issue of storage of spent fuel until a repository becomes available and has expressed its confidence that spent fuel will be safely managed until a repository is available. Furthermore, in its original Waste Confidence Proceeding, NRC amended its reactor licensing rule, 10 CFR Part 50 to require each licensed reactor operator to submit, no later than five years before expiration of the operating license, plans for managing spent fuel at the reactor site until the spent fuel is transferred to DOE for disposal.

In the Nuclear Waste Policy Act (NWPA), Congress placed primary responsibility for interim storage of spent fuel on the nuclear utilities until disposal becomes available. Section 132 of the NWPA requires that DOE, NRC, and other authorized Federal officials take such actions as they believe are necessary to encourage and expedite the effective use of available storage, and necessary additional storage, at the site of each civilian nuclear power reactor. Sections 218(a) and 133 of the NWPA also provide that NRC by rule establish procedures for the licensing of any technology approved by NRC for use at the site of any civilian nuclear power reactor. NRC may by rule approve one or more dry spent fuel storage technologies for use at the sites of civilian power reactors without, to the maximum extent practicable, the need for additional site-specific approvals. Congress is eminently aware of the likely need for at-reactor storage of spent fuel and has taken legislative action with respect to this matter. Therefore, the NRC believes it is not necessary to inform Congress of this need. However, the NRC will continue to exercise its responsibility to assure that spent fuel is managed safely until a repository is available and will notify Congress of any actions it believes are necessary to provide this assurance.

2.4 The Commission's Fourth Finding

"The Commission finds reasonable assurance that, if necessary, spent fuel generated in any reactor can be stored safely and without significant environmental impacts for at least 30 years beyond the licensed life for operation (which may include the term of a revised or renewed license) of that reactor at its spent fuel storage basin, or at either onsite or offsite independent spent fuel storage installations."

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Comment

Public Citizen stated that there is not adequate assurance that spent fuel will be stored safely at reactor sites for up to 30 years beyond the expiration of reactor operating licenses. This is even more the case if license extensions of up to 30 years are included. Public Citizen further stated that "the (Waste Confidence) policy statement fails to recognize that spent fuel buildup at reactor sites poses a growing safety hazard. The pools are not well protected from the environment (in many cases they are outside the reactor's containment structure) and have leaked in the past. For example, in December 1986 at the Hatch nuclear power plant in Baxley, Georgia, 141,000 gallons of radioactive water leaked out of the plant's fuel pool. More than 80,000 gallons of the water drained into a swamp and from there into the Altamaha River near the plant." Public Citizen added that "More recently, on August 16, 1988, a seal on a fuel pool pump failed at the Turkey Point nuclear plant near Miami, FL, causing some 3,000 gallons of radioactive water to leak into a nearby storm sewer. The shoes and clothing of approximately 15 workers were contaminated."

Public Citizen also stated that the danger posed by an accident in which enough pool water escaped to uncover the irradiated fuel assemblies would be greater than the operational incidents described above. According to the commenter, if a leak or pump failure caused the water level in a spent fuel pool to drop to a level which exposed the fuel assemblies, the remaining water might be insufficient to provide adequate cooling. The pool water could then heat to the boiling point, producing steam and causing more water to boil away. The danger then is that heat could continue to build up even further until the cladding which encloses the irradiated fuel pellets catches fire. The commenter continued saying that the NRC itself, in the time since the original Waste Confidence Decision, has studied the issue of storage in reracked spent fuel pools and concluded in a 1987 report that the consequence of such a cladding fire could be a "significant" radiation release. The NRC report found:

- (1) the natural air flow permitted by high-density storage racks is so restricted that potential for self-sustaining cladding fire exists; and
- (2) with high-density racks providing "severely restricted air flow" the oxidation (burning) would be "very vigorous" and "failure of both the fuel rods and the fuel rod racks is expected."

Public Citizen states that nowhere in the Proposed Waste Confidence Decision Review does the NRC take into account the findings of this report, which should have been included.

NRC Response

The Commission

has addressed the safety of spent extended post-operational fuel storage at considerable length in the discussion of its proposed revised Fourth Finding. The

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Its findings were based on generic data on seismic hazards and the response of spent fuel pools, which resulted in calculated risk numbers with wide ranges of uncertainty. (See p. xiii.)

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The analyses reported in these studies indicate that the dominant accident sequence which contributes to risk in a spent fuel pool is cross structural failure of the pool due to seismic events. Risks due to other accident scenarios (such as pneumatic seal failures, inadvertent drainage, loss of cooling or make-up water, arid structural failures due to missiles, aircraft crashes and heavy load drops) are at least an order of magnitude smaller. For this study, older nuclear power plants were selected, since the older plants are more vulnerable to seismic-induced failures.

It should be noted that for a zircaloy cladding fire in a spent fuel storage pool, an earthquake or other event causing a major loss of cooling water would have to occur within two years after operation of a PWR or six months after operation of a BWR. (See NUREG-1353, p. 4-11.) Thus, during the decades of post-operational storage, even a major loss of cooling water would not be sufficient to cause a cladding fire. During the time the pool would be most vulnerable to a fire, the most-recently discharged fuel assemblies would have to be adjacent to other recently discharged assemblies for a fire to propagate to the older fuel. Considering that a third of the reactor core is typically unloaded as spent fuel each year, the probability of a file involving even the equivalent of a reactor core -- a small portion of a pool's capacity -- is quite remote.

It should also be noted that even if the timing of a spent fuel pool failure were conducive to fire, a fire could occur only with a relatively sudden and substantial loss of coolant -- a loss great enough to uncover all or most of the

fuel, damaging enough to admit from Outside the pool to keep a large fire going, and sudden enough to deny the operators time to restore the pool to a safe condition. Such a severe loss of cooling water is likely to result only from an earthquake well beyond the conservatively estimated earthquake for which reactors are designed. Earthquakes of that magnitude are extremely rare.

The plant-specific studies following the 1987 generic study found that, because of the large safety margins inherent in the design and construction of their

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spent fuel pools, even the more vulnerable older reactors could safely withstand earthquakes several times more severe than their design basis earthquake. Factoring in the annual probability of such beyond-design-basis earthquakes, the plant-specific and generic followup studies calculated that the average annual probability of a major spent fuel pool failure at an operating reactor was ten to thirty times lower than the average probabilities in the 1987 study. (See NUREG/CR-5176, p. xiii, and NUREG-1353, pp. ES-2-3. For either BWR or PWR designs, this probability was calculated at two chances in a million per year of reactor operation. (See NUREG-1353, pp. ES-3-4.

After evaluating several regulatory options for reducing the risk of spent fuel pool fires, the NRC regulatory analysis concluded that "[t]he risk [s] due to beyond design basis accidents in spent fuel pools, while not negligible, are sufficiently low that the added costs involved with further risk reductions are not warranted." (See NUREG-1353, pp. ES-6-8.)

Issue No. 16: Need for NRC Requirement for Dry Cask Storage Instead of Storage in Spent Fuel Pools

Comment

Public Citizen states that the use of dry cask storage for spent fuel would help address some of the concerns described above, but that NRC has no plans to require dry cask storage instead of storage in spent fuel pools. The commenter notes that NRC has explicitly stated in its Proposed Decision Review that storage in a reactor's "spent fuel storage basin" is considered safe, and (the commenter) apparently disagrees with this conclusion.

NRC Response

The record of operational experience with reactor spent fuel storage pools, as discussed in the Commission's Proposed Decision Review, and in response to the preceding comments, strongly supports the conclusion that reactor spent fuel pool storage, which has continued for decades,

is safe.

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lacks any merit. The commenter asked that the Commission arrive at the opposite conclusion, namely that "Due to the Department of Energy's lack of quality control of data and analysis, inability to qualify acceptable sites, accusation against subcontractors when data contradicts DOE's preconceived assumptions, and general adherence to the political solution instead of scientific veracity, the NRC cannot find that temporary storage at reactors will ensure that geological storage for spent fuel will be available and safe when needed."

NRC Response

The Commission believes there is an adequate basis from the record of Federal regulations, historical experience and current practice to support the Commission's finding regarding institutional controls over spent fuel storage activities.

The Environmental Protection Agency's standards for high-level waste disposal provide that "active institutional controls over disposal sites should be maintained for as long a period of time as is practicable after disposal; however, performance assessments that assess isolation of the wastes from the accessible environment shall not consider any contributions from active institutional controls for more than 100 years after disposal" (40 CFR 191.14(a)). The finding that repository licensing performance assessments can take credit for active institutional controls for 100 years is not one of the issues involved in the judicial action which vacated the EPA standard, and it is not expected that this section will be disturbed when the standard is reissued. It should also be noted that this language does not suggest that active institutional controls are unlikely for a period greater than 100 years. In the summary of the Final Rule (50 FR 38066, September 19, 1985), EPA noted that many commenters on the Proposed Rule felt that "a few hundred years" which was the proposed period for reliance on active institutional controls was too long. EPA agreed to limit the period to 100 years, noting that "this was the time period EEPAL, considered in criteria for radioactive waste disposal that were proposed for public comment in 1978 (43 FR 53262), a period that was Generally supported by the commenters on that proposal" (50 FR 38066, at p.38080).

NRC would add that there are abundant examples of institutions in human society which have maintained a continuity in institutional controls far exceeding 100 years. The government of the United States, which is relatively young, is over 200 years old. The governments of some European countries have been in existence

for time periods between 700 to 1000 years. While invading armies and civil wars have been disruptive, archival information of interest to the safety of the population can be expected to be preserved. In the United States today, real estate contracts are commonly executed to cover a period of 100 years, or a significant fraction thereof. One hundred-year land-lease agreements are common. Major civil construction projects such as harbors, bridges, flood control systems, and dams are often planned and executed--and investments made in them--with the view of recovering the benefits over a period of 100 years or more.

Congressional designation of the method of disposal of each type of waste was not dependent on the DOE's schedule for development of the repository; rather, Congress designated the method of disposal according to characteristics of the waste which are associated with its hazard (i.e., radioactive source strength, radioactive species of the emanating radiation, and half-life). It is not within the NRC's regulatory jurisdiction to change the directives provided v Congress in the NWPA and the LLWPA.

3.0 Consideration of Other Events Relevant to the Commission's Decision

Issue No. 20: Petition by the State of Vermont to Intervene in the Consideration of the Extension of the Operating License for Vermont Yankee

In the Commission's Proposed Waste Confidence Decision Review, it was stated that the basis for the 2007-2009 timeframe in the Court remand leading to the Waste Confidence Proceeding had changed since the original Decision. This discussion was based on the fact that it appeared likely that these dates no longer represented the expected expiration dates for the operating licenses of the Vermont Yankee and Prairie Island nuclear plants. The NRC staff has been granting extensions of the dates of expiration of nuclear plant operating licenses to reflect a 40-year period from the date of issuance of the operating license rather than from the date of the construction permit. The dates of expiration of the Prairie Island Units 1 and 2 had already been extended from the year 2006 to the years 2013 and 2014. The NRC staff anticipated that on the basis of the date of issuance of its operating license, Vermont Yankee would be eligible for an extension of its operating license to March 2012.

In the time since the drafting of the Proposed Decision Review, several pertinent events have occurred. NRC published a notice of consideration of amendment to the Vermont Yankee Operating License, a proposed "no significant hazards" consideration determination, and opportunity for a hearing (54 FR 31120, July 26, 1989). On August 2, 1989, the State of Vermont filed

a petition for leave to intervene. On October 30, 1989, Vermont filed a supplement to its petition to intervene proposing nine contentions for litigation on Vermont Yankee Nuclear Power Corporation's application to extend

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The NRC understands from OCRWM staff that, if a nuclear utility licensee were to default on its one-time contribution to the NWF, DOE is not precluded from accepting for disposal all spent fuel from that utility. Thus, the NRC does not view this issue as affecting its confidence that the spent fuel will be disposed of. Rather, the issue is one of equity--that is, will a utility and its customers and investors or U.S. taxpayers and/or other utilities ultimately pay for disposal of spent fuel generated prior to April 1983.

SUPPLEMENTARY INFORMATION:

Background

In November 1976, the Natural Resources Defense Council (NRDC) petitioned NRC for a rulemaking to determine whether radioactive wastes generated in nuclear power reactors can be subsequently disposed of without undue risk to the public health and safety. The NROC also requested that NRC not grant pending or future requests for operating licenses until the petitioned finding of safety was made.

On June 27, 1977, NRC denied the NRDC petition. The Commission said that in issuing operating licenses, NRC must have assurance that wastes can be safely handled and stored as they are generated. It also said that it is not necessary for permanent disposal to be available if NRC could be confident that permanent disposal could be accomplished when necessary. NRC added that Congress was aware of the relationship between nuclear reactor operations and the radioactive waste disposal problem, and that NRC would not refrain from issuing reactor operating licenses until the disposal problem was resolved. The Commission also stated 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."

Also in November 1976, two utility companies requested amendments to their operating licenses to permit expansion in the capacity of their spent nuclear fuel storage pools: Vermont Yankee Nuclear Power Corporation for the Vermont Yankee plant; and Northern States Power Company for its Prairie Island facility. In both cases, the utilities planned to increase storage capacity through closer spacing of spent fuel assemblies in existing spent fuel pools. The New England Coalition on Nuclear Power and the Minnesota Pollution Control Agency intervened. The NRC staff evaluated the requests and found that the modifications would not endanger public health and safety. The staff did not

consider any potential environmental effects of storage of spent fuel at the reactors beyond the dates of expiration of their operating licenses. NRC's Atomic Safety and Licensing Board Panel (ASLBP) adopted the staff's safety and environmental findings and approved the license amendments for the two plants. It too did not consider the effects of at-reactor storage beyond the expiration of the facility operating license.

The Board's decision was appealed to the Atomic Safety and Licensing Appeal Board (ASLAB). The ASLAB affirmed the Licensing Board's decision, citing the Commission's "...reasonable confidence that wastes can and will in due course

beyond expiration of any reactor operating license to dispose of existing commercial high-level radioactive waste and spent fuel originating in such reactor and generated up to that time.

(3) High-level radioactive waste and spent fuel will be managed in a safe manner until sufficient repository capacity is available to assure the safe disposal of all high-level radioactive waste and spent fuel.

(4) If necessary, spent fuel generated in any reactor can be stored safely and without significant environmental impacts for at least 30 years beyond the expiration of that reactor's operating license at that reactor's spent fuel storage basin, or at either onsite or offsite independent spent fuel storage installations.

(5) Safe independent onsite or offsite spent fuel storage will be made available if such storage capacity is needed.

On the day the Decision was issued, the Commission also promulgated two rulemaking amendments: (1) an amendment to 10 CFR Part 50, which required that no later than five years before expiration of reactor operating licenses, the licensee must provide NRC with a written plan for management of spent fuel onsite, until title for the spent fuel is transferred to the DOE; and (2) an amendment to 10 CFR Part 51 which provided that environmental consequences of spent fuel storage after expiration of facility licenses need not be addressed in connection with issuance of or amendment to a reactor operating license.

In issuing the Part 51 amendment, the Commission stated that although it had reasonable assurance that one or more repositories would be available by 2007-2009, it was possible that some spent fuel would have to be stored beyond those dates. The Part 51 amendment was based on the Commission's finding in the Waste Confidence Proceeding that it had reasonable assurance that no significant environmental impacts will result from storage of spent fuel for at least 30 years beyond expiration of reactor operating licenses.

Enactment of the NWPA contributed significantly to the basis for the Commission's 1984 Decision and companion rulemakings. The Act established a funding source and process with milestones and schedules for, among other things, the development of a monitored retrievable storage (MRS) facility and two repositories, one by early 1998 and a second, if authorized by Congress, at a later date, initially planned by DOE for 2006. For each repository, the Act required DOE to conduct in-situ investigations of three sites and recommend one from among them to the President and Congress for repository development. The NWPA also required DOE to recommend, from among alternative sites and designs, a site and design for an MRS for spent fuel and high-level waste management before disposal. The Commission's licensing and regulatory authority over both storage and disposal facilities was preserved by the Act.

In the four years after enactment of the NWPA, DOE met a number of the Act's early program requirements, but also encountered significant difficulties. It published a final Mission Plan for the overall NWPA program, and followed with

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- 4) the statutory suspension of site-specific activities for the second repository;
- 5) DOE's estimate that site screening for a second repository should start about 25 years before the start of waste acceptance; and
- 6) increased confidence in the safety of extended spent fuel storage, either at the reactor or at independent spent fuel storage installations.

The Commission is also issuing an amendment to 10 CFR Subsection 51.23(a) to conform with the revisions to Findings 2 and 4 elsewhere in this issue of the Federal Register.

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- (c) continued funding of the nuclear waste management program
- (d) DOE's schedule for repository development

B. Relevant Issues That Have Arisen since the Commission's Original Decision on Finding 2

1. Potential delay under the program of single site characterization
2. Potential limitations on timing of availability of disposal

capacity

(a) impact of possible limited disposal capacity at Yucca Mountain, indefinite suspension of second repository program

(b) impact of uncertainty in spent fuel projections on need to consider second repository program

3. Impact of slippages in DOE program on availability of a repository when needed for health and safety reasons

4. Effect of NRC emphasis on completeness and quality

C. Conclusion on Finding 2

III. Third Commission Finding

A. Issues Considered in Commission's 1984 Decision on Finding 3:

Licensee compliance with NRC regulations and license conditions;
Safe management of spent fuel past expiration of operating licenses;
Availability of DOE interim storage

B. Relevant Issues That Have Arisen since the Commission's Original Decision on Finding 3:

Responsibility for spent fuel storage beyond 1998;
Delay in second repository;
Potential for license renewals

IV. Fourth Commission Finding

A. Issues Considered in Commission's 1984 Decision on Finding 4:

Long-term integrity of spent fuel under water pool storage conditions;
Structure and component safety for extended facility operation for storage;
Safety of dry storage of spent fuel;
Potential risks of accidents and acts of sabotage of spent fuel storage facilities

B. Relevant Issues That Have Arisen since the Commission's Original Decision on Finding 4:

Reaffirmed Finding 1: The Commission finds reasonable assurance that safe disposal of high-level radioactive waste and spent fuel in a mined geologic

repository is technically feasible.

1.A. Issues Considered in Commission's 1984 Decision on Finding 1

1.A.1. The identification of acceptable sites

Under the Nuclear Waste Policy Act of 1982 (NWPA), the Department of Energy (DOE) had responsibility for identifying candidate sites for a geologic repository and for repository development. The first requirement leading to recommendation of candidate sites was formal notification of States with one or more potentially acceptable sites for a repository within 90 days of enactment of the NWPA. In February 1983, the DOE identified nine potentially acceptable sites for the first repository. Four of the sites were in bedded-salt formations, three were in salt domes, one in volcanic tuff, and one in basalt.

The NWPA required that each site nomination be accompanied by an environmental assessment (EA). In December 1984, DOE published Draft EAs (DEAs) for each of the nine sites identified as potentially acceptable and proposed the following sites for nomination: the reference repository location at Hanford, WA; Yucca Mountain, NV; Deaf Smith County, TX; Davis Canyon, UT; and Richton Dome, MS. In May 1986, DOE released Final EAs (FEAs) for the five sites nominated. At that time, DOE recommended that the Yucca Mountain, Hanford, and Deaf Smith County sites undergo site characterization. The President approved the recommendation.

The NRC staff provided extensive comments on both the DEAs and the FEAs. NRC concerns on the FEAs related primarily to DOE's failure to recognize uncertainty inherent in the existing limited data bases for the recommended sites, and the tendency of DOE to present overly favorable or optimistic conclusions. The primary intent of the comments was to assist DOE in preparing high-quality Site Characterization Plans (SCPS) for each site, as required under the NWPA, before excavation of exploratory shafts. NRC concerns can only be addressed adequately through the site characterization process, because one of the purposes of this process is to develop the data to evaluate the significance of concerns relative to site suitability.

NRC did not identify any fundamental technical flaw or disqualifying factor which it believed would render any of the sites unsuitable for characterization. Further, NRC did not take a position on the ranking of the sites in order of preference, because this could be viewed as a prejudgment of licensing issues. NRC was not aware of any reason that would indicate that any of the candidate sites was unlicenseable. Nor has NRC made any such finding to date with respect to any site identified as potentially acceptable.

In March 1987, Congress began drafting legislation to amend the repository program. NRC provided comments on a number of these draft amendments. In December 1987, the NWPA was enacted. In a major departure from the initial intent of the NWPA, the new law required that DOE suspend site characterization

not on the ability to identify technically acceptable sites, but on the timing of availability of technically acceptable sites. Because characterization of multiple sites appears to be more directly related to the timing of repository availability than to the feasibility of geologic disposal, consideration of the above statement in light of the NWPAA program redirection will be discussed under Finding 2.

Another question bearing on whether technically acceptable sites can be found is whether compliance with Environmental Protection Agency (EPA) environmental standards for disposal of spent fuel and high-level waste can be demonstrated. These standards, originally promulgated in final form in September 1985, were vacated in July, 1987, by the U.S. Court of Appeals, and remanded to EPA for further consideration (see *NRDC v. EPA*, 824 F. 2d 1258). As originally promulgated, the standards set limits on releases of radioactive materials from the site into the accessible environment over a 10,000-year period following disposal. They also required that there be less than one chance in ten that the release limits will be exceeded in 10,000 years, and less than one chance in 1,000 that releases will exceed ten times the limits over 10,000 years.

In past comments on draft and proposed EPA standards, and in related NRC rulemaking efforts, NRC has expressed concern that probabilistic analyses should not be exclusively relied on to demonstrate compliance with EPA release limits. NRC's comments said in part that "...[t]he numerical probabilities in [the standards] would require a degree of precision which is unlikely to be achievable in evaluating a real waste disposal system." The comments went on to explain that "... identification of the relevant processes and events affecting a particular site will require considerable judgment and will not be amenable to accurate quantification, by statistical analysis, of their probability of occurrence." NRC believed then, and continues to believe, that it must make qualitative judgments about the data and methodologies on which the numerical probabilities were based.

In response to NRC concerns, EPA incorporated language into its 1985 standards that appeared to allow flexibility to combine qualitative judgments with numerical probability estimates in a way that might have made implementation of the EPA standards practicable. The text of those standards recognized that "proof of the future performance of a disposal system is not to be had in the ordinary sense of the word" with the substantial uncertainties and very long performance period involved. The 1985 standards emphasized that a "reasonable expectation" -- rather than absolute proof -- is to be the test of compliance. "What is required," the text of the standards said, "is a reasonable expectation, on the basis of the record ..., that compliance ... will be achieved." In an additional attempt to provide flexibility for implementation of the standards, EPA also provided that numerical analyses of releases from a repository were to be incorporated into an overall probability distribution

only "to the extent practicable." This phrase appeared to allow some discretion for NRC to incorporate qualitative considerations into its license decision-making, rather than having to rely solely on numerical projections of repository performance. On the strength of these and other EPA assurances, the Commission did not object when the final standards were published in 1985.

system of multiple barriers in the design of the repository and such restrictions on the retrievability of waste as NRC deems appropriate. The system of multiple barriers includes both engineered and natural barriers.

The waste package is the first engineered barrier in the system of multiple barriers to radionuclide escape. The waste package is defined as the "waste form and any containers, shielding, packing and other absorbent materials immediately surrounding an individual waste container." Before sinking an exploratory shaft for site characterization, DOE is required to prepare an SCP including a description of the waste form or packaging proposed for use at the repository, and an explanation of the relationship between such waste form or packaging and the geologic medium of the site.

The multiple barrier approach to radioactive waste isolation in a geologic repository is implemented in NRC requirements by a number of performance objectives and by detailed siting and design criteria. The NRC performance objective for the waste package requires substantially complete containment for a period of not less than 300 years nor more than 1000 years after permanent closure of the repository. The technical design criteria for the waste package require that interaction of the waste package with the environment not compromise performance of the package, the underground facility, or the geologic setting. Therefore, the waste package design must take into account the complex site-specific interactions between host rock, waste package, and ground water that will affect waste package and overall repository performance.

Under the NWPAA, DOE was required to suspend site characterization activities at sites other than the Yucca Mountain, NV site. Consequently, DOE has narrowed the range of waste package designs to a design tailored for unsaturated tuff at the Yucca Mountain site. This aspect of the high-level waste program redirection may facilitate and expedite the waste package design process insofar as it enables DOE to concentrate its efforts on developing a single design for a single site instead of three designs for sites in bedded salt, basalt, and unsaturated tuff.

Currently, DOE is evaluating uncertainties in waste package design related to waste form, container type, and environment. The current conceptual design for

the waste package is based on several assumptions. The waste form is presumed to be ten-year-old spent fuel or high-level waste in the form of borosilicate glass in stainless-steel canisters. (In addition to spent fuel and high-level waste, the waste form may include greater-than-Class C (GTCC) low-level waste. This waste is not routinely acceptable for near-surface disposal under NRC regulations for disposal of low-level wastes, but is acceptable for disposal in a repository licensed for disposal of spent fuel and high-level wastes. This waste might include such materials as sealed sources and activated metals from the decommissioning of reactors and production facilities.)

Six materials are being considered for fabrication of containers, including austenitic steel (316L), nickel-based alloys (Alloy 825), pure copper (CDA 102), copper-based alloys (aluminum-bronze, CDA-613, and 70-30 Cu-Ni, CDA-715), and a container with a metal outer shell and ceramic liner. The reference

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the year 2020. (This estimate is based on a "no new orders" assumption for commercial nuclear reactors and a 40-year reactor lifetime.) Also, approximately 9400 MTHM of reprocessed defense waste and a small amount of commercial reprocessed waste from the West Valley Demonstration Project is estimated to be available for disposal by 2020. The decision to locate the defense high-level waste in the repository for wastes from commercial power reactors resulted from the requirement in Section 8 of the NWPA that the President evaluate the possibility of developing a defense-waste-only repository. In February 1985, DOE submitted a report to the President recommending a combined commercial and defense repository. In April 1985, the President agreed that no basis appeared to exist for a defense-only repository and directed DOE to dispose of defense waste in the commercial repository.

About 8750 MTHM of reprocessed high-level waste from defense facilities at Savannah River, SC, Hanford, WA, and Idaho Falls, ID will be available by 2020 for disposal in the repository, according to the Draft 1988 Mission Plan Amendment. This waste will likely be solidified into a borosilicate glass matrix. About 640 MTHM of reprocessed high-level waste will come from the West Valley Demonstration Project, a facility for wastes from discontinued commercial reprocessing of spent fuel at that site. This reprocessed waste also will be solidified, probably in a borosilicate glass waste form.

Waste-form testing for the Yucca Mountain site is focusing on both spent fuel and reprocessed high-level waste. The performance of the waste form in providing the first barrier to radionuclide migration is being evaluated on the basis of the physical and chemical environment of the waste form after disposal, the performance of the waste container, and the emplacement configuration.

A major limitation on glass waste-form testing is that the actual waste glasses to be disposed of are not available, and their exact composition will not be established until-after further testing. Reference waste-glass compositions are being used for studies on the effect of variation in glass composition on performance. (These glass compositions are designed by Savannah River Laboratory (SRL) for defense high-level waste, and by Pacific Northwest Laboratory (PNL) for the commercial high-level wastes to be vitrified under the West Valley Demonstration Project Act.) The reference compositions will be revised when better analyses of the composition of the wastes at SRL and West Valley are available. The test program will seek to establish upper bounds on leaching of important radionuclides, and the extent to which glass fracturing increases leach rate. Other factors influencing leach rate are temperature, pH of the leaching solution, formation of solid layers on the surface of the waste glass, irradiation, water volume, and chemistry.

It is possible that renewed reprocessing of spent fuel from nuclear power reactors may result in a greater proportion of reprocessed waste to spent fuel than is-currently anticipated. Although such a departure from the current plan to dispose of mostly unreprocessed spent fuel in the repository does not appear likely at this time, the Commission believes it is important to recognize the possibility that this situation could change.

will be backfilled with coarse tuff excavated for the facility. In the conceptual design provided in the SCP, the selection of coarse tuff as backfill material is based on numerical simulations performed by DOE which suggest that coarse tuff would be a more effective barrier to capillary flow in the backfill matrix than fine materials.

DOE's design for the engineered barrier system submitted with the license application will have to contain information sufficient for NRC to reach a favorable conclusion regarding the overall system performance objective. Backfill or packing around waste containers is not required by NRC regulations if DOE can demonstrate that applicable performance objectives can be met without it. If, on the basis of testing and experiments during site characterization, DOE decided that backfill would enhance engineered barrier system performance, the design would have to reflect this conclusion. DOE has already conducted research on a wide variety of candidate materials for backfill around waste packages in a variety of geologic media. The Commission continues to have confidence that backfill or packing materials can be developed as needed for the underground facility and waste package to meet applicable NRC licensing criteria and performance objectives.

1.A.3.b. borehole and shaft seals

The engineered barrier system described above is limited to the waste package and the underground facility as defined in 10 CFR Part 60. The underground facility refers to the underground structure, including openings and backfill materials, but excluding shafts, boreholes, and their seals. Containment and release-rate requirements are specified for the engineered barrier system, but not for the borehole and shaft seals. Seals are covered under 10 CFR Section 60.112, the overall post-closure system performance objective for the repository. Among other things, this provision requires that shafts, boreholes and their seals be designed to assure that releases of radioactive materials to the accessible environment following permanent closure conform to EPA's generally applicable standards for radioactivity. Although the criteria for seals given in 10 CFR Part 60 do not specifically mention seals in ramps and the underground facility, it is reasonable to consider them together with borehole and shaft sealants, because the seals and drainage design in ramps and the underground facility could also affect the overall system performance of the geologic repository.

Construction of the exploratory shaft facility (ESF) will be the first major site characterization activity at the repository horizon. Currently, DOE is reviewing its plans for construction of exploratory shafts. According to the 1989 "Reassessment Report," DOE is reevaluating the "locations chosen for the two exploratory shafts, the method chosen (drilling and blasting) for the construction of the shafts, the means of access (ramps or shafts) to the repository horizon, the need for additional exploratory drifts, and the design of the shafts and other components of the exploratory shaft facility." This reevaluation of plans for the shaft facility is in response to concerns from the NRC staff and the Nuclear Waste Technical Review Board (NWTRB).

1.B.1. In support of its argument on technical feasibility, the Commission stated in its 1984 Waste Confidence Decision that " ... DOE's program is providing information on site characteristics at a sufficiently large number and variety of sites and geologic media to support the expectation that one or more technically acceptable sites will be identified." The NWPAA required, however, that DOE suspend site-specific site characterization activities under the Nuclear Waste Policy Act of 1982 at all sites other than the Yucca Mountain, NV site.

Under the NWPAA, the DOE program has been redirected to characterize candidate repository sites in sequence rather than simultaneously. If the Yucca Mountain site is found to be unsuitable, DOE must terminate site characterization activities there and provide Congress with a recommendation for further action, such as the characterization of another site. Because characterization of multiple sites now appears to be more directly related to the timing of

repository availability than to the technical feasibility of geologic disposal as a concept, consideration of the Commission's aforementioned 1984 statement In light of the NWPAA will be discussed under Finding 2.

1.B.2. What is the relationship, if any, of the "S-3 Proceeding" to the current review of the Commission's 1984 Waste Confidence Findings? Would the planned revision of the S-3 rulemaking be affected if the Commission had to qualify its current confidence in the technical feasibility of safe disposal?

In its decision to remand to NRC the questions of whether safe offsite storage would be available by 2007-2009, or, if not, whether spent fuel could be safely stored onsite past those dates, the U.S. Circuit Court of Appeals observed that the issues of storage and disposal of nuclear waste were being considered by the Commission in an ongoing generic proceeding known as the "S-3" Proceeding.

The S-3 Proceeding was the outgrowth of efforts to address generically the NEPA requirement for an evaluation of the environmental impact of operation of a light water reactor (LWR). Table S-3 assigned numerical values for environmental costs resulting from uranium fuel cycle activities to support one year of LWR operation. NRC promulgated the S-3 rule in April 1974. In July 1976, the U.S. Circuit Court of Appeals found that Table S-3 was inadequately supported by the record regarding reprocessing of spent fuel and radioactive waste management, in part because the Commission, in reaching its assessment, had relied heavily on testimony of NRC staff that the problem of waste disposal would be resolved.

When the U.S. Circuit Court of Appeals issued the remand on what were to become the "Waste Confidence" issues in May 1979, NRC had pending before it the final amended S-3 rule. The Court regarded the resolution of the issue of waste disposal in the S-3 proceeding as being related to the issue raised by the petitioners in the appeals of the NRC decisions on the expansion of spent fuel storage capacity. The Court said that the "...disposition of the S-3

with boiling water reactor (BWR) spent fuel, whereas the Canadian studies focus on spent fuel from that country's CANDU reactors, which use unenriched uranium in a core immersed in "heavy" water made from deuterium. BWR and CANDU fuel, like pressurized water reactor (PWR) fuel, are uranium dioxide fuels clad in zircaloy. However, the burnup rates for these three fuel types vary considerably. Ongoing research studies on spent fuel include: work on the characterization of spent fuel as a waste form; the corrosion of spent fuel and its dissolution under oxidizing and reducing conditions; the radiolysis of ground water in the near vicinity of the spent fuel, and its effects on the dissolution of the fuel; and the development of models to predict the leaching

of spent fuel over long time periods. The results of this work are steadily increasing our understanding of spent fuel as a waste form.

High-level radioactive waste, whether it is spent reactor fuel or waste from reprocessing, must be enclosed in an outer canister as part of the waste package. The canister surrounding the waste is expected to prevent the release of radioactivity during its handling at the repository site before emplacement. After emplacement in the repository, it is expected to prevent the release of radioactivity for a specified period of time after the repository is closed, by providing a barrier to protect the waste from coming into contact with ground water.

For practical reasons, canister materials may be divided into the following classes: 1) completely or partially thermodynamically stable materials such as copper; 2) passive materials such as stainless steel, titanium, Hastelloy, Inconel, and aluminum; 3) corroding or sacrificial materials such as lead and steel; and 4) non-metallic materials such as alumina and titanium dioxide ceramics and cement.

Sweden has been conducting an extensive canister research program over the past several years. The main canister material of interest is copper, but titanium, carbon steel, and alumina and titanium dioxide are also being studied as reasonable alternatives, should unexpected problems be discovered with using pure copper.

One of the Swedish canister designs is a 0.1-m thick copper container (as described previously in Section I.A.2.a.), which is claimed to provide containment, in conjunction with an appropriate backfill material, for a period on the order of one million years. The critical factors for the isolation period for copper canisters are: (1) the presence of corrosive substances such as sulphide ions in the ground water; (2) the possibility of these substances reaching the canister surface; and (3) the degree of inhomogeneity, or pitting, of the resulting corrosion. Studies are continuing to obtain more information on pitting corrosion of copper and on techniques for welding thick-walled copper containers.

Several conceptual designs for canisters for the safe disposal of unprocessed spent fuel have also been developed in Canada. One canister design option is the supported-shell, metal-matrix concept, which involves packing the spent fuel bundles into a thin corrosion-resistant shell and casting the remaining

SYNROC was initially developed in Australia as an alternative material to borosilicate glass. It is composed primarily of three minerals (hollandite, zirconolite, and perovskite) which collectively have the capacity to accept the

great majority of radioactive high-level waste constituents into their crystal lattice structure. These three minerals, or closely related forms, occur naturally, and have been shown to have survived for many millions of years in a wide range of natural environments. SYNROC has the property of being extremely resistant to leaching by ground water, particularly at temperatures above 100 degrees C. In addition, the capacity of SYNROC to immobilize high-level wastes is not markedly impaired by high levels of radiation damage.

The high leach-resistance of SYNROC at elevated temperatures increases the range of geologic environments in which it may be used, such as deep geologic repositories in both continental and marine environments.

Research and development work on-improving SYNROC production technology is currently being done jointly in Australia and Japan. New methods of using metal alkoxides in the fabrication of SYNROC to obtain high homogeneity and lowered leachability have recently been developed in Australia. The Japanese have recently developed a new method that uses titanium hydroxide, as a reducing agent to produce SYNROC with a high density and low leach rate. A pilot facility for the production of non-radioactive SYNROC is now in operation in Australia, and a small pilot facility for producing SYNROC with radioactive constituents is being completed in Japan.

On the basis of current information from the foreign studies just described on canisters, spent fuel as a waste form, backfill materials, and alternatives to borosilicate glass waste forms, the Commission concludes that there is no basis for diminished confidence that an acceptable waste package can be developed for safe disposal of high-level waste and spent fuel.

1.C. Conclusion on Finding 1

The Commission has reexamined the basis for its First Finding in the 1984 Waste Confidence Decision in light of subsequent program developments, and concludes that Finding 1 should be reaffirmed.

The technical feasibility of a repository rests initially on identification of acceptable sites. At this time, the Commission is not aware of any evidence indicating that Yucca Mountain is not acceptable for site characterization. There are many outstanding questions regarding the licenseability of the site, however, and they must be answered satisfactorily in order for NRC to issue a construction authorization for that site. If data obtained during site characterization indicate that the Yucca Mountain site is not suitable for a repository, DOE is required by the NWPAA to terminate site characterization activities and report to Congress. Within six months of that determination, DOE must make a recommendation to Congress for further action to assure the safe, permanent disposal of spent fuel and high-level waste. DOE could recommend, for example, that Congress authorize site characterization at other

DOE's reference design for the waste package in the December 1988 Site Characterization Plan does not include backfill or packing around waste containers in the emplacement boreholes. Neither is required under NRC rules so long as DOE can show that applicable regulatory criteria and objectives will be met. An air gap between the container and the host rock is currently one of the barriers in DOE's design for meeting the performance objective. DOE has conducted investigations on a variety of candidate materials for backfill in a variety of geologic media, and the Commission finds no basis to qualify its past confidence that backfill materials can be developed, if needed, to meet applicable NRC requirements.

The December 1988 reference design for sealing boreholes, shafts, ramps and the underground facility at the Yucca Mountain candidate site employs crushed tuff and cement. Regardless of the geologic medium of the candidate site, DOE will have to show that the license application design meets NRC post-closure performance objectives. The Commission continues to have reasonable assurance that DOE's program will lead to identification of acceptable sealant materials for meeting these objectives.

No major breakthrough in technology is required to develop a mined geologic repository. NRC will not be able to license a repository at a particular site, however, until there is sufficient information available for that site. The information needed to license a site includes site characterization data, data on repository design, and waste package design sufficient for performance assessment of the entire waste disposal system. Further, the Commission recognizes the challenge posed by the need to predict impacts of a repository on human health and the environment over very long periods of time. It will not be possible to test the accuracy of long-term repository performance assessment models in an absolute sense. The NRC does believe that existing performance assessment models have the potential to provide a basis for deciding whether a system for geologic disposal of high-level waste is acceptable, and can provide a sufficient level of safety for present and future generations under certain conditions. These conditions include addressing uncertainties, and gathering data from specific sites.

Overall, from its reexamination of issues related to the technical feasibility of geologic disposal, the Commission concludes that there is reasonable assurance that safe disposal of high-level waste and spent fuel in a mined geologic repository is technically feasible.

program to single-site characterization (or, if necessary, sequential site

characterization if the Yucca Mountain site is found to be unsuitable) will permit DOE to concentrate its efforts and resources on information gathering at a single site, as opposed to spreading out its efforts over a range of sites. The possible schedular benefits to single-site characterization, however, must be weighed for the purposes of this Finding against the potential for additional delays in repository availability if the Yucca Mountain site is found to be unsuitable. By focusing DOE site characterization activities on Yucca Mountain, the NWPAA has essentially made it necessary for that site to be found suitable if the 2007-2009 timeframe for repository availability in the Commission's 1984 Decision is to be met. Clearly, the Commission cannot be certain at this time that the Yucca Mountain site will be acceptable.

Although the Commission has no reason to believe that another technically acceptable site can not be found if the Yucca Mountain site proves unsuitable, several factors raise reasonable doubts as to the availability of even one repository by 2007-2009. These include: (1) the current reliance on a single site with no concurrently available alternatives; (2) the probability that site characterization activities will not proceed entirely without problems; and (3) the history of schedular slippages since passage of the NWPA. For example, DOE's schedule for the first repository slipped five years (from 1998 to 2003) between January 1983, when the NWPA was enacted, and January 1987, when the first Draft Mission Plan Amendment was issued. The schedule for excavation of the exploratory shaft for the Yucca Mountain site has slipped by more than five years since the issuance of the POS in March 1986. In the past several years, DOE has cited numerous reasons for program slippages, including the need for a consultation process with States and Tribes, Congressional actions (e.g., the barring of funds in the 1987 budget appropriation for drilling exploratory shafts), and DOE's recognition that the EIS and license application would require more technical information than previously planned.

In the November 1989 "Report to Congress on Reassessment of the Civilian Radioactive Waste Management Program," DOE announced a further extension of three years until 1992 for sinking the exploratory shaft, and extensions until 2001 for submittal of the license application and 2010 for repository availability.' DOE attributes the causes for these delays to prolonging the schedule for site characterization and repository development activities, and to the unwillingness, to date, of the State of Nevada to issue the permits required for DOE to begin testing. In the "Reassessment Report," DOE proposes to focus the repository program on the evaluation of features of the site that can be studied through surface-based testing, beginning in January 1991. The aim of this surface-based testing program is to make an early determination as to whether there are any features of the site that would render it unsuitable for development as a repository. Of course, the site may be found unsuitable or unlicenseable at any time during the site characterization or licensing process. The NRC supports DOE's efforts to reach an early determination that this may be the case. If the Yucca Mountain site is unsuitable, it will be necessary to begin work to identify and characterize another candidate site for a repository. The sooner this determination is made, the sooner DOE will have an alternative site available for disposal of high-level waste.

repository conditions well before the turn of the century under current DOE schedules, and improvements in the modelling of spent fuel behavior within waste canisters can be applied in performance assessments largely irrespective of the geology of a site. It may also be pertinent that when DOE made its 25-year estimate for the second repository program in mid-1987, the law at the time required the simultaneous characterization of three sites, so that DOE could not proceed to develop one site for a repository until the completion of characterization at the site that required the most time.

In view of DOE's new schedule, it no longer appears feasible for repository operation to commence prior to 2010. As stated in the Proposed Decision Review, the Commission does not believe it would be prudent to reaffirm the Agency's 1984 finding of reasonable assurance that the 2007-2009 timetable will be met. As the Court of Appeals noted in remanding this issue to NRC, the ultimate determination of whether a disposal facility will be available when needed" ... can never rise above a prediction." The Commission is in the position of having to reach a definitive finding on events which are approximately two decades away. We believe that the institutional timescale for this question can more realistically be framed in decades than in years. As the program proceeds into the next century, it will become easier for NRC to make more definitive assessments, if necessary, of the time a repository will be available.

In light of all these considerations, the Commission believes it can have reasonable assurance that at least one repository will be available within the first quarter of the twenty-first century. This estimate is based on the time it would take for DOE to proceed from site screening to repository operation at a site other than Yucca Mountain, if this should prove necessary. Assuming for the sake of conservatism that Yucca Mountain would not be found suitable for repository development, it is reasonable to expect that DOE would be able to reach this conclusion by the year 2000. This would leave 25 years for the attainment of repository operations at another site.

NRC will reassess progress towards attaining repository operation by 2025 prior to 2000 during its next scheduled review of its Waste Confidence Findings, if not sooner. DOE's current focus on surface-based testing as an early indicator of repository suitability should help provide a strong basis for evaluating the likelihood of meeting the 2025 estimate of repository availability.

2.A.2. Timely Development of Waste Packages and Engineered Barriers

The November 1989 Reassessment Report announced that "major activities related to the design of a repository at the Yucca Mountain site and waste package are being deferred. They will be resumed when more information is available concerning the suitability of the site. This approach will conserve resources

and allow the DOE to concentrate efforts on scientific investigations." Prior to the Reassessment Report, DOE's most recent conceptual design for the waste package was discussed in the Site Characterization Plan (SCP) for the Yucca Mountain site. As information is obtained from site characterization activities and laboratory studies, the conceptual design will evolve in

2.A.3.a. Measures for dealing with Federal-State-local concerns

In its 1984 Waste Confidence Decision, the Commission found that the NWPA should help to minimize the potential that differences between the Federal Government and States and Indian tribes will substantially disrupt or delay the repository program. The Commission noted that the NWPA reduced uncertainties regarding the role of affected States and tribes in repository site selection and evaluation. The Commission also said that the decision-making process set up by the NWPA provides a detailed, step-by-step approach that builds in regulatory involvement, which should also provide confidence to States and tribes that the program will proceed on a technically sound and acceptable basis. Despite the expected and continuing State opposition to DOE siting activities, the Commission has found no institutional developments since that time that would fundamentally disturb its 1984 conclusions on this point.

NRC regulatory involvement, for example, has indeed been built into the process. DOE has continued its Interactions with NRC regarding repository program activities since the Commission's 1984 Waste Confidence decision was issued. NRC provided comments to DOE on major program documents such as the Siting Guidelines and the POS as required by the NWPA, and NRC concurred on those documents. NRC also reviewed and provided comments to DOE on the DEAs and FEAs. In the December 22, 1986 letter to DOE on the FEAs, the NRC staff noted that "... significant efforts were made by DOE to respond to each of the NRC staff major comments on the DEAs, and In fact, many of these comments have been resolved." NRC provided comments to DOE on the 1987 Draft Mission Plan Amendment, and DOE responded to most of these comments in the Final Mission Plan Amendment provided to Congress on June 9, 1987.

Since enactment of the NWPA in December 1987, DOE-NRC interactions have focused on-the Yucca Mountain site. In January 1988, DOE issued the Consultation Draft Site Characterization Plan (COSCP) for the Yucca Mountain site. The NRC staff provided comments in the form of draft and final "point papers" on the COSCP. The NRC comments included several objections related to: (1) the failure to recognize the range of alternative conceptual models of the Yucca Mountain site; (2) the status of the quality assurance (QA) plans for site characterization activities; and (3) concerns related to the exploratory shaft facility. Although the December 1988 SCP shows Improvement over the COSCP, NRC continues to have an objection involving the need for Implementing a baselined

QA program before beginning site characterization and an objection involving the need for DOE to demonstrate the adequacy of both the ESF design and the design control process. Prior to the November 1989 Reassessment Report, DOE had committed to having a qualified QA program in place before sinking the exploratory shaft at the Yucca Mountain site.

This commitment has not changed. However, in view of the extension in the schedule for shaft sinking from November 1989 to November 1992, qualified QA plans are needed in the near term for meeting the January 1991 schedule for surface-based testing. In addition to having a qualified QA program in place, DOE must also have issued the pertinent study plans for site characterization activities they wish to begin.

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Indian tribe would be willing to host a repository or MRS facility at a technically qualified site. Among the duties of the Negotiator is consultation with Federal agencies such as NRC on the suitability of any potential site for site characterization.

Secretary of Energy James Watkins has emphasized the importance of the Negotiator to the success of the repository program by providing an alternative site to the Yucca Mountain site that would still have to be technically acceptable, but that would enjoy the advantage of reduced institutional uncertainties resulting from opposition of State or affected Indian tribes. The President nominated and the Senate recently confirmed David Leroy to be the Negotiator.

An additional measure which may facilitate documentation and communication of concerns related to a repository is the Licensing Support System (LSS). The LSS is to provide full text search capability of and easy access to documents related to the licensing of the repository. Although the primary purpose of the LSS is to expedite NRC's review of the construction authorization application for a repository, it will be an effective mechanism by which all LSS participants, including the State and local governments, can acquire access to documents relevant to a repository licensing decision. DOE is responsible for the design, development, procurement and testing of the LSS. LSS design and development must be consistent with objectives and requirements of the Commission's LSS rulemaking and must be carried out in consultation with the LSS Administrator and with the advice of the Licensing Support System Advisory Review Panel. NRC (LSS Administrator) is responsible for the management and operation of the LSS after completion of the DOE design and development process.

Procedures for the use of the LSS are part of revisions to 10 CFR Part 2, NRC's Rules of Practice for the adjudicatory proceeding on the application to receive and possess waste at a repository. These revisions were the result of a "negotiated rulemaking" process in which affected parties meet to reach consensus on the proposed rule. The members of the negotiating committee included: DOE; NRC; State of Nevada; coalition of Nevada local governments; coalition of industry groups; and a coalition of national environmental groups. The coalition of industry groups dissented on the final text of the proposed rule, but the negotiating process enabled NRC to produce a proposed rule reflecting the consensus of most of the interested parties on an important repository licensing issue.

NRC is committed to safe disposal of radioactive waste and the protection of public health and safety and the environment. Any State with a candidate site for a repository should be assured that a repository will not be licensed if it does not meet NRC criteria. NRC has its own program for interaction with the State of Nevada and affected units of local government, and will continue to provide information to Nevada and consider State concerns as requested.

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organization. In particular, the report indicated that a public corporation would be stable, highly mission-oriented, able to maintain credibility with stakeholders, and more responsive to regulatory control than a Federal executive agency.

Commenting on the AMFM Panel's report in April 1985, DOE recommended retaining the present management structure of the waste program at least through the siting and licensing phase of the program. Congress did not take action to implement the Panel's recommendations, and DOE's management of the waste program has remained uninterrupted.

By enacting the NWPAA, Congress effectively reaffirmed DOE's continued management of the waste program. Congress did not revise DOE's role as the lead agency responsible for development of a repository and an MRS. Congress did establish several new entities for the purpose of advising DOE on matters related to the waste program, such as the NWTRB and the Review Panel, to be established if DOE and a State or tribe enter into a benefits agreement under Section 170 of the NWPAA. Congress provided further indication of its intent that DOE maintain management control of the waste program for the foreseeable future in requiring, under Section 161, that the Secretary of DOE "...report to the President and to Congress on or after January 1, 2007, but not later than January 1, 2010, on the need for a second repository."

This is not to say, however, that there have been no management problems in the DOE program. Since the enactment of the NWPA in 1983, only one of the five Directors of DOE's Office of Civilian Radioactive Waste Management (OCRWM) has

held the position on a permanent basis. Inadequate progress toward an operating repository has concerned several Congressional observers, including Senator J. Bennett Johnston, Chairman of the Senate Energy and Natural Resources Committee. In February 1989 confirmation hearings for then-Secretary-of-Energy-designate James Watkins, Senator Johnston strongly criticized mounting cost projections and lack of progress in the program, and called for new and stronger management.

In the November 1989 Reassessment Report, DOE discussed several new initiatives for improving its management of the repository program. The initiatives include "direct-line" reporting from the Yucca Mountain Project Office to the Office of Civilian Radioactive Waste Management (OCRWM), and an independent contractor review of OCRWM management structures, systems and procedures to identify program redundancies, gaps, and strengths. The OCRWM is also implementing improvements in the overall Program Management System, the QA program, and establishment of program cost and schedule baselines.

Whether the management structure of the repository development program should in fact be changed is a decision best left to others. The Commission believes that a finding on the likely availability of a repository should take management problems into account, but finds no basis to diminish the degree of assurance in its 1984 conclusion on this issue. Events since the submission of the AMFM Panel report do not indicate that there will be a fundamental change in the continuity of the management structure of the program any time soon. In

management and disposal. It is expected that the new report may reflect a recent Court decision which found that fees paid into the Nuclear Waste Fund be adjusted to reflect transmission and distribution losses.

The Commission recognizes the potential for program cost increases over estimates in the 1987 Nuclear Waste Fund Fee Adequacy Report. If there is a significant delay in repository construction, for example, it is reasonable to assume that construction costs will escalate. There may also be additional costs associated with at-reactor dry cask storage of spent fuel, if DOE does not have a facility available to begin accepting spent fuel by the 1998 date specified in the NWPA. These costs-would be further increased if one or more licensee was to become insolvent and DOE was required to assume responsibility for storage at affected reactors before 1998.

In the event of insolvency, DOE would still have sufficient funds to take over responsibility for managing spent fuel until a repository is available. Because spent fuel disposal costs are directly related to the amount of electricity generated, with contributions to the NWF based on a kilowatt-hour surcharge that must be paid in short-term installments, utilities can be

presumed to be mostly up-to-date with their contributions. It is highly unlikely that a utility would jeopardize its contract for spent fuel disposal with DOE by defaulting on a periodic payment to save a few million dollars. Even if a utility were to default, it would not be much in arrears for its spent fuel before it would trigger close DOE scrutiny and mitigative action.

Larger amounts in default could possibly occur with those relatively few utilities that have not paid their full share of pre-1983 collections. This issue arises because several utilities elected to defer payment for spent fuel generated prior to April 1983 into the fund and, instead, themselves hold the money that was collected from ratepayers for the one-time fee. DOE's Inspector General believes that some of those utilities may not be able to make their payments when due. The NRC understands from OCRWM staff that, if a nuclear utility licensee were to default on its one-time contribution to the NWF, DOE is not precluded from accepting for disposal all spent fuel from that utility. Thus, the NRC does not view this issue as affecting its confidence that the spent fuel will be disposed of. Rather, the issue is one of equity--that is, will a utility and its customers and investors or U.S. taxpayers and/or other utilities ultimately pay for disposal of spent fuel generated prior to April 1983. The Commission does not believe that a licensee's potential default has a direct bearing on the Commission's Waste Confidence Decision.

The full impact of the program redirection resulting from the NWPAA and the outlook for the timing of repository availability will continue to be assessed annually. If it does appear that costs will exceed available funds, there is provision in the NWPA for DOE to request that Congress adjust the fee to ensure full-cost recovery. Thus, the Commission finds no reason for changing its basic conclusion that the long-term funding provisions of the Act should provide adequate financial support for the DOE program.

quarter of 1988 as the new date for exploratory shaft construction at the Yucca Mountain site. When the final 1987 Mission Plan Amendment was submitted to Congress in June 1987, the schedule for shaft sinking at the Yucca Mountain site had slipped six months to the fourth quarter of 1988. Congress did not take action to approve the June 1987 Mission Plan Amendment as DOE had requested.

On December 22, 1987, the NWPAA was enacted. The NWPAA had its major impact on the repository program in suspending site characterization activities at the Hanford and Deaf Smith County sites and authorizing DOE to characterize the Yucca Mountain site for development of the first repository.

DOE subsequently issued the Draft 1988 Mission Plan Amendment in June 1988, to apprise Congress of its plans for implementing the provisions of the NWPAA. In

the Draft 1988 Mission Plan Amendment, DOE's schedule for shaft sinking at Yucca Mountain had slipped another six months to the second quarter of 1989. Since the NRC published the Proposed Waste Confidence Review (54 FR 39767) for comment, the schedule for shaft sinking has been changed from November 1989 to November 1992. Issues requiring DOE attention before site characterization can begin have been identified, and it is possible that additional issues affecting DOE's readiness will come to light. However, DOE has made progress in completing QA plans since September 1989, and it is reasonable to expect that study plans and technical procedures needed for surface-based testing will be ready in time for testing to begin by January 1991.

Heretofore, the repository schedule has always been aggressive and highly success-oriented. In comments on the Draft 1988 Mission Plan Amendment, the Commission noted that the schedule has not allowed adequately for contingencies, and that, given the compression in the schedule for near-term program milestones, DOE had not shown how it would be able to meet the 2003 milestone for repository operation. The revised schedule announced in the November 1989 Reassessment Report includes a new reference schedule for the restructured repository, MRS, and transportation programs. Under the restructured program, the schedule for submittal of a construction authorization application to NRC has been extended from 1995 to 2001, and the schedule for repository operation at Yucca Mountain, if that site is found to be suitable, is 2010. DOE believes that this reference schedule is the first repository program schedule since passage of the NWPA that is based on a "realistic assessment of activity duration and past experience." The new schedule allows more time for scientific investigations than earlier schedules. NRC believes that the restructured program has been responsive to NRC concerns that the quality and completeness of site investigations were being compromised in order to satisfy unrealistic schedule requirements.

Another potential source of delay in repository availability may arise from NRC regulations. Given the revised schedule, however, the NRC does not believe this is likely. The Commission believes that current NRC rules are fully adequate to permit DOE to proceed to develop and submit a repository license application, but further clarification of these rules is desirable to reduce the time needed to conduct the licensing proceeding itself. In order to meet

standard is set. Considering the importance of developing the repository for waste disposal as early as safely practicable, it would be inappropriate for DOE to suspend work on development of engineered barriers pending reissuance of the standards, unless EPA had given clear indications of major changes in them.

Another possibility is that, regardless of any changes in the repromulgated EPA

standards, they will be litigated in Federal court. Even if this proves to be the case, however, the Commission believes that any such litigation will still permit EPA to promulgate final standards well within the time needed to enable DOE to begin repository operations at any site within the first quarter of the twenty-first century.

Given the current DOE program schedule, and assuming that the QA program can be qualified and surface-based testing begun within the next year, the Commission finds that although it is not impossible that a repository at Yucca Mountain will be available by 2007-2009, it is more likely that the earliest date for a repository there is 2010. If DOE determines that the Yucca Mountain site is unsuitable, and if DOE makes this determination by the year 2000, the NRC believes that a repository at another site could be available within the first quarter of the next century. The Commission will reevaluate these dates during the next scheduled Waste Confidence Review in 1999.

2.B. Relevant Issues That Have Arisen since the Commission's Original Decision

2.B.1. NRC stated in 9-14-87 correspondence to Sen. Breaux on pending nuclear waste legislation that under a program of single site characterization, "...there may be a greater potential for delay of ultimate operation of a repository than there is under the current regime where three sites will undergo at-depth characterization before a site is selected." To what extent does the NWPAA raise uncertainty about the identification of a technically acceptable site and potential delay in repository availability by limiting site characterization to a single candidate site (Yucca Mt.) and by raising the possibility that a negotiated agreement might influence repository site selection? Does this uncertainty affect confidence in the availability of a repository by 2007-2009?

In providing comments to Congress on proposed amendments to the NWPA, NRC took the position that simultaneous site characterization of three sites, as required by the NWPA, was not necessary to protect public health and safety. NRC further stated that the adequacy of a site for construction authorization would ultimately be determined in a licensing proceeding, and that NRC would only license a site that satisfied NRC licensing requirements. As described next, the Commission believes that the NWPAA contains numerous provisions to ensure that a technically acceptable site will be identified.

The NWPAA does not reduce the scope of site characterization activities that DOE is authorized to undertake. The Amendments Act establishes a Nuclear Waste Technical Review Board composed of individuals recommended by the National

suitability of Yucca Mountain. The Commission does not want its findings here to constrain in any way its regulatory discretion in a licensing proceeding. Therefore, the Commission declines to reaffirm the 2007-2009 timeframe in the original decision or to affirm the current 2010 date for repository operation.

2.B.2. In the Draft 1988 Mission Plan Amendment, DOE stated that " ... the data indicate that the Yucca Mountain site has the potential capacity to accept at least 70,000 MTHM [metric tons heavy metal equivalent] of waste, but only after site characterization will it be possible to determine the total quantity of waste that could be accommodated at this site."

a. Do the issues of limited spent fuel capacity at Yucca Mountain, indefinite suspension of the second repository program, and the likelihood that no more than one repository will be available by 2007-2009 undermine the NRC's 1984 assurance that "sufficient repository capacity will be available within 30 years beyond expiration of any reactor operating license to dispose of existing commercial high level radioactive waste and spent fuel originating in such reactor and generated up to that time?"

b. Is there sufficient uncertainty in total spent fuel projections (e.g., from extension-of-life license amendments, renewal of operating licenses for an additional 20 to 30 years, or a new generation of reactor designs) that this Waste Confidence review should consider the institutional uncertainties arising from having to restart a second repository program?

2.B.2.a.

Although it will not be possible to determine whether Yucca Mountain can accommodate 70,000 MTHM or more of spent fuel until after site characterization, the Commission does not believe that the question of repository capacity at the Yucca Mountain site should be a major factor in the analysis of Finding 2. This is because it cannot be assumed that Yucca Mountain will ultimately undergo development as a repository. The generic issue of repository capacity does add to the potential need for more than one repository, however.

As noted earlier, the NWPA established deadlines for major milestones in the development of the first and the second repository programs. The Act also required NRC to issue a final decision on the construction authorization application by January 1, 1989 for the first repository, and January 1, 1992 for the second (or within three years of the date of submission of the applications, whichever occurred later). The July 1984 Draft DOE Mission Plan set January 1998 and October 2004 as the dates for commencement of waste emplacement in the first and second repositories, assuming that Congressional authorization was obtained to construct the second repository.

For all but a few licensed nuclear power reactors, OLs will not expire until some time in the first three decades of the twenty-first century. Several utilities are currently planning to have their OLs renewed for ten to 30 years beyond the original license expiration. At these reactors, currently available spent fuel storage alternatives effectively remove storage capacity as a potential restriction for safe operations. For these reasons, a repository is not needed by 2007-2009 to provide disposal capacity within 30 years beyond expiration of most OLs. If work is begun on the second repository program in 2010, the repository could be available by 2035, according to DOE's estimate of 25 years for the time it will take to carry out a program for the second repository. Two repositories available in approximately 2025 and 2035, each with acceptance rates of 3400 MTHM/year within several years after commencement of operations, would provide assurance that sufficient repository capacity will be available within 30 years of OL expiration for reactors to dispose of the spent fuel generated at their sites up to that time.

There are several reactors, however, whose OLs have already expired or are due to expire within the next few years, and which are now licensed or will be licensed only to possess their spent fuel. If a repository is not available until about 2025, these reactors may be exceptions to the second part of the Commission's 1984 Finding 2, which was that sufficient repository capacity will be available within 30 years beyond the expiration of any reactor OL to dispose of the commercial high-level waste and spent fuel originating in such reactor and-generated up to that time.

The basis for this second part of Finding 2 has two components: 1) a technical or hardware component; and 2) an institutional component. The technical component relates to the reliability of storage hardware and engineered structures to provide for the safe storage of spent fuel. An example would be the ability of spent fuel assemblies to withstand corrosion within spent fuel storage pools, or the ability of concrete structures to maintain their integrity over long periods. In the 1984 Decision, the Commission found confidence that available technology could in effect provide for safe storage of spent fuel for at least 70 years.

The Commission's use of the expression "30 years beyond expiration of any reactor operating license" in the 1984 Finding was based on the understanding that the license expiration date referred to the scheduled expiration date at the time the license was issued. It was also based on the understanding that, in order to refuel the reactor, some spent fuel would be discharged from the reactor within twelve to eighteen months after the start of full power operation.

Thus, the Commission understood that, depending on the date of the first reactor outage for refueling, some spent fuel would be stored at the reactor

site for most of the 40-year term of the typical OL. In finding that spent fuel could be safely stored at any reactor site for at least 30 years after expiration of the OL for that reactor, the Commission indicated its expectation that the total duration of spent fuel storage at any reactor would be about 70 years.

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No such development is likely. No licenses for currently operating commercial nuclear reactors are scheduled to expire until the year 2000, and most such licenses will expire during the first two decades after 2006. (See Nuclear Regulatory Commission 1989 Information Digest, NUREG-1350, Vol. 1, P. 33.) The availability of the first repository by 2025, and of a second repository within one or two decades thereafter, would provide adequate disposal capacity for timely removal of the spent fuel generated at these reactors.

There are several licensees, however, whose authority to operate their commercial reactors has already been terminated. These are Indian Point 1, Dresden 1, Humboldt Bay, and Lacrosse. They are also the only licensed power reactors that are retired with spent fuel being stored onsite. Assuming conservatively that a repository does not become operational until 2025, it appears likely that spent fuel will remain at these sites for more than 30 years beyond the time their reactors were indefinitely shut down, at which point their operating licenses could be considered to have effectively expired, although they will continue to hold a possession license for the storage of the spent fuel.

In considering the means and motivation of the owner of an indefinitely retired reactor to provide safe long-term storage, the Commission believes it is useful to distinguish between the owner with only one reactor, and the owner of a reactor at a multi-unit site or an owner with operating reactors at other sites. In the case of a retired reactor at a multi-unit site, the owner would have a clear need to maintain the safety of storage at the retired reactor sufficiently to permit continued generation at the site. If the owner of the retired reactor also owned other reactors at other sites, the spent fuel at the retired reactor could be transferred, if necessary, to the storage facilities of other units still under active management. Of the four reactors just cited, Indian Point 1 and Dresden 1 fit this description, and the sibling reactors at their sites are operating under licenses that do not expire until well beyond the year 2000 -- that is, well within the post-OL period during which the Commission has found that spent fuel could be safely stored pending the availability of a repository.

For the Lacrosse and Humboldt Bay reactors, the Commission is confident that, even if a repository is not available within 30 years following their retirement, the overall safety and environmental acceptability of extended

spent fuel storage will also be maintained for these exceptional cases. Because there will still be an NRC possession license for the spent fuel at these facilities, the Commission will retain ample regulatory authority to require any measures, such as removal of the spent fuel remaining in storage pools to passive dry storage casks, that might become necessary until the time that DOE assumes title to the spent fuel under contracts pursuant to the NWPA. It should also be borne in mind that Humboldt Bay and Lacrosse are both small early reactors, and their combined spent fuel inventory totals 67 metric tons of initial heavy metal. See Spent Fuel Storage Requirements (DOE/RL 88-34) October 1988, Table A.3b., pp. A.15-A.17.) If for any reason not now foreseen, this spent fuel can no longer be managed by the owners of these reactors, and DOE must assume responsibility for its management earlier than currently

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Although it is clear that there is uncertainty in projections of total future spent fuel discharges, it is not clear that the institutional uncertainties arising from having to restart a second repository program should be considered in detail in the current Waste Confidence Decision review.

License renewals would have the effect of increasing requirements for spent fuel storage. The Commission understands that some utilities are currently planning to seek renewals for 30 years. Assuming for the sake of establishing a conservative upper bound that the Commission does grant 30-year license renewals, the total operating life of some reactors would be 70 years, so that the spent fuel initially generated in them would have to be stored for about 100 years if a repository were not available until 30 years after the expiration of their last OLS.

Even under the conservative bounding assumption of 30-year license renewals for all reactors, however, if a repository were available within the first quarter of the twenty-first century, the oldest spent fuel could be shipped off the sites of all currently operating reactors well before the spent fuel initially generated in them reached the age of 100 years. Thus, a second repository, or additional capacity at the first, would be needed only to accommodate the additional quantity of spent fuel generated during the later years of these reactors' operating lives. The availability of a second repository would permit spent fuel to be shipped offsite well within 30 years after expiration of these reactors' OLS. The same would be true of the spent fuel discharged from any new generation of reactor designs.

In sum, although some uncertainty in total spent fuel projections does arise from such developments as utilities' planning 'renewal of OLS for an additional 20 to 30 years, the Commission believes that this Waste Confidence review need

not at this time consider the institutional uncertainties arising from having to restart a second repository program. Even if work on the second repository program is not begun until 2010 as contemplated under current law, there is sufficient assurance that a second repository will be available in a timeframe that would not constrain the removal of spent fuel from any reactor within 30 years of its licensed life for operation.

2.8.3. Are early slippages in the DOE repository program milestones significant enough to affect the Commission's confidence that a repository will be available when needed for health and safety reasons?

The 2007-2009 timeframe imposed on the Commission by the May 23, 1979 remand by the Court of Appeals was based on the scheduled expiration of the OLS for the Vermont Yankee and Prairie Island nuclear reactors. The specific issues remanded to the Commission were: 1) whether there is reasonable assurance that an offsite storage solution will be available by the years 2007-2009 (the expiration of the plants' operating licenses); and, if not, 2) whether there is

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followed by a number of reactors licensed for operation in 1962. The OLS for all of the III power reactors now licensed to operate are currently scheduled to expire sometime within the first three decades of the twenty-first century, which is also the period in which their currently licensed life for operation would end. (See Nuclear Regulatory Commission 1989 Information Digest, NUREG-1350, Vol. 1, P. 33.) Thus, conservatively assuming here that there will be no license renewals, the earliest timeframe when a repository might be needed to dispose of spent fuel from the majority of reactors is 2029-2050.

As proposed In the first part of Finding 2, the Commission has reasonable assurance that a repository will be available within the first quarter of the twenty-first century. Even if a repository were not available until 2025, this would be several years before the beginning of the earliest timeframe within which, based on an assumed 30-year storage after an assumed 40-year licensed life of reactor operation, a repository might be needed for spent fuel disposal. Thus, early slippages In DOE's program milestones do not affect the Commission's confidence that a repository will be available within that timeframe.

2.8.4. NRC has stated that the 3- to 4-year license application review schedule is optimistic, and that for NRC to meet this schedule, DOE must submit a complete and high-quality license application. In the September 16, 1988 NRC comments to DOE on the Draft 1988 Mission Plan

Amendment, the Commission requested that DOE acknowledge its commitment to develop this complete and high-quality application, "even if this would result in longer times to collect the necessary information and subsequent delays in submitting the license application."

Will NRC's emphasis on the completeness and quality of the license application have a significant effect on the timing of the submittal of the license application and subsequent licensing proceeding to grant construction authorization in time for repository availability by 2007-2009?

As the NRC indicated to DOE in NRC's October 25, 1985 comments on the draft PDS, the three-year statutory schedule for the NRC licensing proceeding on the application for construction authorization is optimistic. The Commission has sought ways to improve the prospects for meeting this schedule, for example by developing the LSS for expedited document discovery during the licensing proceeding.

In the same correspondence on the POS, NRC also stated that the adequacy of the three-year review period depends on DOE's submittal of a complete and high-quality application. A license application supported by inadequate data may lead to findings during the licensing proceeding that the results of certain tests cannot be admitted as part of the license application. If it is not possible to repeat the tests in question, NRC may have no alternative but

At the time of the 1984 Decision, the Commission said that timely attainment of a repository did not require DOE to adhere strictly to the milestones set out in the NWPA, and there would be delays in some milestones. It did not appear to the Commission at the time that delays of a year or so in meeting any of the milestones would delay the date of repository availability by more than a few years beyond the 1998 deadline specified in the Act.

Since then, however, several developments have made it apparent that delays of more than a few years are to be the norm rather than the exception in the early years of this program. There has been a twelve-year slip in DOE's estimate of repository availability from 1998 to 2010, and DOE has been unable to meet such near-term repository program milestones as excavation of the exploratory shaft and the start of in-situ testing. There remains the possibility that potential repository availability at the Yucca Mountain site will be further delayed due to unforeseen problems during site characterization.

In predicting the timing of repository availability, the suitability of Yucca Mountain should not be assumed. Yucca Mountain is now the only candidate site

available; the NWPAA required that DOE terminate site characterization activities at all sites other than the Yucca Mountain site. In effect, the 2007-09 schedule for repository availability in the original Waste Confidence Decision could have been met only if Yucca Mountain survived the repository development process as a licensed site without major delays in site characterization and licensing. If this site were found to be unlicenseable or otherwise unsuitable, characterization would have to begin at another site or suite of sites, with consequent further delay in repository availability. The final decision on the suitability of the site to proceed to licensing and repository development will rest with DOE, but the position of the NRC staff will figure in that decision. The staff will not be able to make a recommendation to a licensing board to authorize repository construction at Yucca Mountain until all site characterization activities have been completed. DOE might thus be unable for several more years to determine whether there will in fact have to be a delay to find and characterize another site.

Another reason the Commission is unwilling to assume the suitability of Yucca Mountain is that NRC must be mindful of preserving all its regulatory options -- including a recommendation of license application denial -- to assure adequate protection of public health and safety from radiological risk. In our view, it is essential to dispel the notion that for scheduler reasons there is no alternative to the currently preferred site. This view is consistent with past Commission statements that the quality of DOE's preparations for a license application should take precedence over timeliness where the two conflict. It is also consistent with the view that because we are making predictions about completion dates for a unique and complex enterprise at least some 20 years hence, it is more reasonable to express the timescale for completion in decades rather than years.

In order to obtain a conservative upper bound for the timing of repository availability, the Commission has made the assumption that the Yucca Mountain site will be found to be unsuitable. If DOE were authorized to initiate site,

stored safely and without significant environmental impact at these reactors for at least 100 years. If a repository were available within the first quarter of the twenty-first century, the oldest spent fuel could be shipped off the sites of all currently operating reactors well before the spent fuel initially generated in them reached the age of 100 years.

The need to consider the institutional aspects of storage beyond 30 years after OL expiration was not in evidence in 1984 because the Commission was confident that at least one repository would be available by 2007-2009. On that schedule, waste acceptance of spent fuel from the first reactor whose operating

license had expired (Indian Point 1, terminated in 1980) could have begun within 30 years of expiration of that license. If a repository does not prove to be available until 2025, however, it would not be available within 30 years of the time that OLs could be considered effectively to have expired for Indian Point I and the three other plants with spent fuel onsite that were retired before the end of their licensed life for reactor operation. The same would be true of any additional reactors prematurely retired between now and 1995, when the 30-year clock starts for the availability of a repository by 2025. Premature shutdowns notwithstanding, the Commission has reasons to be assured that the spent fuel at all of these reactors will be stored safely and without significant environmental impact until sufficient repository capacity becomes available.

Considering first the technical reasons for this assurance, it is important to recognize that each of these reactors and its spent fuel storage installation were originally licensed in part on the strength of the applicant's showing that the systems and components of concern were designed and built to assure safe operation for 40 years under expected normal and transient severe conditions. All of the currently retired reactors have a significant portion of that 40-year expected life remaining, and all have only small quantities of spent fuel onsite in storage installations that were licensed to withstand considerably larger thermal and radiation loadings from much greater quantities of spent fuel. Of the four reactors currently retired with spent fuel onsite, the two with far the longest terms of operation, Lacrosse and Dresden, were operated for 19 and 18 years, respectively.

For the continued safe management of the spent fuel in storage installations at any existing or potential prematurely retired plant, the Commission believes it can reasonably rely on the continued structural and functional integrity of the plant's engineered storage installations for at least the balance of its originally licensed life as if the OL were still in effect. This is to say that for the purposes of Finding 2, no foreseeable technical constraints have arisen to disturb the Commission's assurance that spent fuel storage at any reactor will remain safe and environmentally acceptable for at least 30 years after its licensed life for operation, regardless of whether its OL has been terminated at an earlier date.

The Commission also sees no insurmountable institutional obstacles to the continued safe management of spent fuel during the remainder of any shutdown reactor's initially licensed life for operation, or for at least 30 years

Indeed, the Commission sees important NRC mission-related grounds for avoiding any statement that repository operation by 2007-2009 is required. Geologic disposal of high-level radioactive wastes is an unprecedented endeavor. It

requires reliable projections of the waste solution performance of natural and engineered barriers over millennia. After the repository is sealed, retrieval of the emplaced wastes will no longer be practicable, and the commitment of wastes to that site will, by design, be irreversible. In DOE's testing, both in the laboratory and at the candidate repository site, in its development of facility and waste-package designs, and in all other work to demonstrate that NRC requirements will be met for a repository at Yucca Mountain, the Commission believes that the confidence of both NRC and the public depends less on meeting the schedule for repository operation than on meeting safety requirements and doing the job right the first time. Thus, given the Commission's assurance that spent fuel can safely be stored for at least 100 years if necessary, it appears prudent for all concerned to prepare for the better-understood and more manageable problems of storage for a few more years in order to provide additional time to assure the success of permanent geologic disposal.

This is not to say that the Commission is unsympathetic to the need for timely progress toward an operational repository. It is precisely because NRC is so confident of the national commitment to achieve early repository operation that the Commission believes it no longer need add its weight to the considerable pressures already bearing on the DOE program. There is ample institutional impetus on the part of others, including Congress, the nuclear power industry, State utility rate regulatory bodies, and consumers of nuclear-generated power, toward DOE achievement of scheduled program milestones. With continuing confidence in the technical feasibility of geologic disposal, the Commission has no reason to doubt the Institutional commitment to achieve it in a timeframe well before it might become necessary for 'safety or environmental reasons. Indeed, the Commission believes it advisable not to attempt in this review a more precise NRC estimate of the point at which a repository will be needed for radiological safety or environmental reasons, lest this estimate itself undermine the commitment to earlier achievement of repository operations.

To find reasonable assurance that a repository will be available by 2007-2009, however, is a different and more consequential proposition in the context of this review. In light of the delays the program has encountered since its inception, and the regulatory need to avoid a premature commitment to the Yucca Mountain site, the Commission could not prudently describe a basis for assurance that the previous DOE schedule for repository operation in 2003 would not slip another four to six years under any reasonably foreseeable If circumstances. The NRC believes it is more realistic to expect that a repository at the Yucca Mountain site could be available by the year 2010 or a few years thereafter, if the Yucca Mountain site is found to be suitable. This revised estimate, however, could too easily be misinterpreted as an NRC estimate of the time at which continued spent fuel storage at these sites would be unsafe or environmentally significant. The Commission's enhanced confidence in the safety of extended spent fuel storage provides adequate grounds for the view that NRC need not at this time define more precisely the period when, for

Reaffirmed Finding 3: The Commission finds reasonable assurance that high-level radioactive waste and spent fuel will be managed, in a safe manner until sufficient repository capacity is available to assure the safe disposal of all high-level waste and spent fuel.

3.A. Issues Considered in Commission's 1984 Decision on Finding 3

In the Commission's discussion of Finding 3 in its Waste Confidence Decision (49FR 34658, August 31, 1984), in Section 2.3 'Third Commission Finding,' the Commission stated,

Nuclear power plants whose operating licenses expire after the years 2007-09 will be subject to NRC regulation during the entire period between their initial operation and the availability of a waste repository. The Commission has reasonable assurance that the spent fuel generated by these licensed plants will be managed by the licensees in a safe manner. Compliance with the NRC regulations and any specific license conditions that may be imposed on the licensees will assure adequate protection of the public health and safety. Regulations primarily addressing spent fuel storage include 10 CFR Part 50 for storage at the reactor facility and 10 CFR Part 72 for storage in independent spent fuel storage installations (ISFSIs). Safety and environmental issues involving such storage are addressed in licensing reviews under both Parts 50 and 72, and continued storage operations are audited and inspected by NRC. NRC's experience-in more than 80 individual evaluations of the safety of spent fuel storage shows that significant releases of radioactivity from spent fuel under licensed storage conditions are extremely remote.

Some nuclear power plant operating licenses expire before the years 2007-09. For technical, economic or other reasons, other plants may choose, or be forced to terminate operation prior to 2007-09 even though their operating licenses have not expired. For example, the existence of a safety problem for a particular plant could prevent further operation of the plant or could require plant modifications that make continued plant operation uneconomic. The licensee, upon expiration or termination of its license, may be granted (under 10 CFR Part 50 or Part 72) a license to retain custody of the spent fuel for a specified term (until repository capacity is available and the spent fuel can be transferred to DOE under Sec. 123 of the Nuclear Waste Policy Act of 1982) subject to NRC regulations and license conditions needed to assure adequate protection of the public. Alternatively, the owner of the spent fuel, as a last resort, may apply for an interim storage contract with DOE, under Sec. 135(b) of the Act, until not later than 3 years after a repository or monitored retrievable storage facility is available for spent fuel. For the reasons discussed above, the Commission is confident that in every case the spent fuel generated by those plants will be managed safely during the period between license expiration or termination and the availability of a mined

waste repository for disposal.

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Pursuant to the NWPA, the Commission issued in final form 10 CFR Part 53, "Criteria and Procedures for Determining Adequacy of Available Spent Nuclear Fuel Storage Capacity," addressing the determination of need, if any, for DOE interim storage. No applications were received by the June 30, 1989 NWPA deadline incorporated into the Commission's rule, and it seems unlikely that any applications will be made to NRC for interim storage by DOE. Even if NRC had made an exception for a late application, a determination would have to have been made before January 1, 1990 to comply with the NWPA.

3.B. Relevant Issues That Have Arisen since the Commission's Original Decision on Finding 3.

Although a DOE facility may not be available to enable the Department to begin accepting spent fuel in 1998, as currently provided in the contracts under the NWPA, the Commission's confidence in safe storage is unaffected by any potential contractual dispute between DOE and spent fuel generators and owners as to responsibility for spent fuel storage. In the event that DOE does not take title to spent fuel by this date, a licensee under either 10 CFR Part 50 or Part 72 cannot abandon spent fuel in its possession.

The Commission recognizes that the NWPA limitation of 70,000 MTHM for the first repository will not provide adequate capacity for the total amount of spent fuel projected to be generated by all currently operating licensed reactors. The NWPAA effectively places a moratorium on a second repository program until 2007-2010. Either the first repository must be authorized and able to provide expanded capacity sufficient to accommodate the spent fuel generated, or there must be more than one repository. Since Congress specifically provided in the NWPAA for a first repository, and required DOE to return for legislative authorization for a second repository, the Commission believes that Congress will continue to provide institutional support for adequate repository capacity.

The Commission's confidence about the availability of repository capacity is not affected by the possibility that some existing reactor licenses might be renewed to permit continued generation of spent fuel at these sites. Because only two reactor licenses are scheduled to expire before 2003, the impact of license renewals (a matter not considered in the Commission's 1984 Decision) will have no significant effect within the first quarter of the twenty-first century on scheduling requirements for a second repository. Renewals may slightly alleviate the need for a second repository in the short term, because spent fuel storage capacity will be expanded for extended storage at these

reactor sites. Over the longer term, renewals might increase spent fuel generation well into the latter half of the twenty-first century. Nonetheless, nothing in this situation diminishes the Commission's assurance that safe storage will be made available as needed.

In summary, the Commission finds no basis for changing the Third Finding in its Waste Confidence Decision. The Commission continues to find " ... reasonable assurance that high-level radioactive waste and spent fuel will be managed in a

Original Finding 4: The Commission finds reasonable assurance that, if necessary, spent fuel generated in any reactor can be stored safely and without significant environmental impacts for at least 30 years beyond the expiration of that reactor's operating license at that reactor's spent fuel storage basin, or at either onsite or offsite independent spent fuel storage installations.

Revised Finding 4: The Commission finds reasonable assurance that, if necessary, spent fuel generated in any reactor can be stored safely and without significant environmental impacts for at least 30 years beyond the licensed life for operation (which may include the term of a revised or renewed license) of that reactor at its spent fuel storage basin, or at either onsite or offsite independent spent fuel storage installations.

4.A. Issues Considered in Commission's 1984 Decision on Finding 4.

In the Commission's discussion of Finding 4 in its Waste Confidence Decision (49 FR 34658, August 31, 1984) Section 2.4 "Fourth Commission Finding," the Commission said that:

Although the Commission has reasonable assurance that at least one mined geologic repository will be available by the years 2007-09, the Commission also realizes that for various reasons, including insufficient capacity to immediately dispose of all existing spent fuel, spent fuel may be stored in existing or new storage facilities for some periods beyond 2007-09. The Commission believes that this extended storage will not be necessary for any period longer than 30 years beyond the term of an operating license. For this reason, the Commission has addressed on a generic basis in this decision the safety and environmental impacts of extended spent fuel storage at reactor spent fuel basins or at either onsite or offsite spent fuel storage installations. The Commission finds that spent fuel can be stored safely and without significant environmental impacts for at least 30 years beyond the expiration of reactor operating licenses. To ensure that spent fuel which remains in storage will be managed properly until transferred to DOE for disposal, the Commission is proposing an amendment to its regulations (10 CFR Part 50). The amendment will require

the licensee to notify the Commission, five years prior to expiration of its reactor operating license, how the spent fuel will be managed until disposal.

The Commission's finding is based on the record of this proceeding which indicates that significant releases of radioactivity from spent fuel under licensed storage conditions are highly unlikely. It is also supported by the Commission's experience in conducting more than 80 individual safety evaluations of storage facilities.

The safety of prolonged spent fuel storage can be considered in terms of four major issues: (a) The long-term integrity of spent fuel under water pool storage conditions, (b) structure and component safety for extended

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have gained experience with dry storage which confirms the Commission's 1984 conclusions. NRC staff safety reviews of topical reports on storage-system designs, the licensing and inspection of storage at two reactor sites, and NRC promulgation of the Part 72 amendment for MRS, have significantly increased the agency's understanding of and confidence in dry storage.

Under NWPA Section 218(a), DOE has carried out spent fuel storage research and development as well as demonstration of dry cask storage at its Idaho National Engineering Laboratory. Demonstration has been carried out for metal casks under review or previously reviewed by NRC staff. DOE has also provided support to utilities in dry storage licensing actions (see Godlewski, N.Z., "Spent Fuel Storage -- An Update," Nuclear News, Vol. 30, No. 3, March 1987, pp.47-52).

Dry storage of spent fuel has become an available option for utilities, with at-reactor dry storage licensed and underway at three sites: the H. B. Robinson Steam Electric Plant, Unit 2, in South Carolina, and the Surry Nuclear Station in Virginia. A license was recently granted for a modular system at Duke Power Company's Oconee Nuclear Station site. New applications have been received in 1989 for CP&L's Brunswick site, for the Baltimore Gas and Electric Company's Calvert Cliffs site, and in 1990 for Consumer Power Company's Palisades site. Based on utility statements of intent, and projections of need for additional, storage capacity at reactor sites, the NRC staff expects numerous applications from utilities over the next decade (see "Final Version Dry Cask Storage Study," DOE/RW-0220, February 1989).

Since the original Waste Confidence finding, the Commission has reexamined long-term spent fuel storage in issuing an amendment to 10 CFR Part 72 to address the storage of spent fuel and high-level radioactive waste in an MRS, as envisioned by Congress in Section 141 of the NWPA. Under this rule, storage

in an MRS is to be licensed for a period of 40 years, with the possibility for renewal. The Commission determined not to prepare an environmental impact statement for the proposed amendments to 10 CFR Part 72, however. (See 53 FR 31651, P. 31657, August 19, 1988.) An environmental assessment and finding of no significant impact were issued because the Commission found that the consequences of long-term storage are not significant. The environmental assessment for 10 CFR Part 72, "Licensing Requirements for the Independent Storage of Spent Fuel and High-Level Radioactive Waste," NUREG-1092, assessed dry storage of spent fuel for a period of 70 years after receipt of spent fuel from a reactor:

The basis chosen for evaluating license requirements for the long-term storage of spent nuclear fuel and high-level radioactive waste in an MRS is an installation having a 70-year design lifetime and a 70,000 MTU storage capability. This assessment focuses on the potential environmental consequences for a long-term storage period, a period for which the Commission needs to assure itself of the continued safe storage of spent fuel and high-level radioactive waste and the performance of materials of construction. This means the reliability of systems

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least 100 years, in the case of a reactor with a 70-year licensed life for operation.

Under the environmental assessment for the MRS rule, the Commission has found confidence in the safety and environmental insignificance of dry storage of spent fuel for 70 years following a period of 70 years of storage in spent fuel storage pools. Thus, this environmental assessment supports the proposition that spent fuel may be stored safely and without significant environmental Impact for a period of up to 140 years if storage in spent fuel pools occurs first and the period of dry storage does not exceed 70 years.

The Commission has also found that experience with water-pool storage of spent fuel continues to confirm that pool storage is a benign environment for spent fuel that does not lead to significant degradation of spent fuel integrity. Since 1984, utilities have continued to provide safe additional reactor pool storage capacity through reracking, with over 110 such actions now completed. The safety of storage in pools is widely recognized among cognizant professionals. Specifically, the Commission notes one expert's view that:

During the last 40 years there has been very positive experience with the handling and storing of irradiated fuel in water; thus wet storage is now considered a proved technology. There is a substantial technical basis for allowing spent fuel to remain in wet storage for several decades. For the past two decades, irradiated Zircaloy-clad fuel has been handled and

stored in water. There continues to be no evidence that Zircaloy-clad fuel degrades significantly during wet storage -- this includes: fuel with burnups as high as 41,000 MWd/MTU; continuous storage of low-burnup fuel for as long as 25 years; and irradiation of fuel in reactors for periods up to 22 years. Cladding defects have had little impact during wet storage, even if the fuel is uncanned. [References omitted.] [See Bailey, W.J. and Johnston, Jr. A.B., et al., "Surveillance of LWR Spent Fuel in Wet Storage," NP-3765, Electric Power Research Institute (EPRI), October 1984, pp. 2-10.]

This last conclusion has been reaffirmed by the same authors, who recently wrote: "There continues to be no evidence that LWR spent fuel with Zircaloy or stainless steel cladding degrades significantly during wet storage CEPRI 1986; International Atomic Energy Agency (IAEA) 1982]." (See "Results of Studies on the Behavior of Spent Fuel in Storage," Journal of the Institute of Nuclear Materials Management," Vol. XVI, No. 3, April 1988, p. 27.IV A).

In addition to the confidence that the spent fuel assemblies themselves will not degrade significantly in wet storage, there is confidence that the water pools in which the assemblies are stored-will remain safe for extended periods:

As noted in the recent IAEA world survey, the 40 years of positive experience with wet storage illustrates that it is a fully-developed technology with no associated major technological problems. Spent fuel storage pools are operated without substantial risk to the public or the plant personnel. There is substantial technical basis for allowing spent

The NRC staff has spent several years studying in detail catastrophic loss of reactor spent fuel pool water possibly resulting in a fuel fire in a dry pool, and recently participated in litigation over this issue relative to Vermont Yankee. The 1987 report, "Severe Accidents in Spent Fuel Pools in Support of Generic Safety Issue 82" (NUREG/CR-4982), referred to in Public Citizen's comment represents an early part of the NRC's study. Subsequent study of the consequences and risks due to a loss of coolant water from spent fuel pools was conducted by the NRC, and the results were published in NUREG/CR-5176, "Seismic Failure and Cask Drop Analysis of the Spent Fuel Pools at Two Representative Nuclear Power Plants," January 1989, and NUREG-1353, "Regulatory Analysis for the Resolution of Generic Issue 82, 'Beyond Design Basis Accidents in Spent Fuel Pools,'" April 1989. These reports were cited in the Commission's Proposed Waste Confidence Decision Review (54 FR 39767-39797, at p.39795, September 28, 1989). Also issued in 1989, as part of the NRC staff's study, was "Value/Impact Analyses of Accident Preventive and Mitigative Options for Spent Fuel Pools" (NUREG/CR-5281).

The primary concern regarding accidents in spent fuel pools is the loss of water and its capability to cool the radioactive fuel. Without sufficient water cooling, some performance assessment models suggest that the fuel's zircaloy cladding may initiate and sustain rapid oxidation (fire) that may spread to adjacent fuel assemblies, with the potential of releasing large amounts of radioactivity.

The analyses reported in these NUREGs indicate that the dominant accident sequence which contributes to risk in a spent fuel pool is gross structural failure of the pool due to seismic events. Risks due to other accident scenarios (such as pneumatic seal failures, inadvertent drainage, loss of cooling or make-up water, and structural failures due to missiles, aircraft crashes and heavy load drops) are at least an order of magnitude smaller. For this study, older nuclear power plants were selected, since the older plants are more vulnerable to seismic-induced failures. The selected plants included the Vermont Yankee and the H.B. Robinson plants..

Although these studies conclude that most of the spent fuel pool risk is derived from beyond design basis earthquakes, this risk is no greater than the risk from core damage accidents due to seismic events beyond the safe-shutdown earthquake. Because of the large inherent safety margins in the design and construction of the spent fuel pool analyzed, it was determined that no action was Justified to further reduce the risk (NUREG-1353). As stated in the Preface to NUREG-1353:

"This report presents the regulatory analysis, including decision rationale, for the resolution of Generic Issue 82, 'Beyond Design Basis Accidents in Spent Fuel Pools.' The object of this regulatory analysis is to determine whether the use of high density storage racks for the storage of spent fuel poses an unacceptable risk to the health and safety of the public. As part of this effort, the seismic hazards for two older spent fuel pools were evaluated. The risk change estimates, value/impact and cost-benefit analyses, and other insights gained during this effort, have

[and safety] of the public shows dry storage technology options do not significantly impact the environment.' The assessment concludes that, among other things, there are no significant environmental impacts as a result of promulgation of these revisions of 10 CFR Part 72.

Based on the above assessment, the Commission concludes that the rulemaking action will not have a significant incremental environmental impact on the quality of the human environment. [53 FR 31651 at pp. 31657-31658, August 19, 1988.]

Thus, the 1988 amendments to 10 CFR.Part 72 provide the basis for the Commission to conclude that the environmental consequences of long-term spent fuel storage, including non-radiological impacts, are not significant.

Finally, no considerations have arisen to affect the Commission's confidence since 1984 that the possibility of a major accident or sabotage with offsite radiological impacts at a spent-fuel storage facility is extremely remote. NRC has recently reexamined reactor pool storage safety in two studies, "Seismic Failure and Cask Drop Analyses of the Spent Fuel Pools at Two-Representative Nuclear Power Plants" (NUREG/CR-5176) and "Beyond Design Basis Accidents in Spent Fuel Pools" (NUREG-1353). These studies reaffirmed that there are no safety considerations that justify changes in regulatory requirements for pool storage. Both wet- and dry-storage activities have continued to be licensed by the Commission. In its recent rulemaking amending 10 CFR Part 72 to establish licensing requirements for an MRS, the Commission did choose to eliminate an exemption regarding tornado missile impact " ... to assure designs continue to address maintaining confinement of particulate material." (53 FR 31651, P. 31655, August 19, 1988). However, NRC staff had previously considered tornado missile impacts in safety reviews of design topical reports and in licensing reviews under 10 CFR Part 72.

4.B. Relevant Issues That Have Arisen since the Commission's Original Decision on Finding 4

In its original Finding 4, the Commission found reasonable assurance of safe storage without significant environmental impacts for at least 30 years beyond reactor OL expiration. Delays and uncertainties in the schedule for repository availability since the 1984 Decision have convinced the Commission to allow some margin beyond the scheduled date for repository opening currently cited by DOE. As noted in Finding 2, the Commission has reasonable assurance that at least one repository will be available within the first quarter of the twenty-first century. For all currently operating reactors, this would still be within the period of 30 years from expiration of their OLs, which the Commission previously found to be the minimum period for which spent fuel storage could be considered safe and without significant environmental impact.

Under the NWPA as amended, DOE is authorized to dispose of up to 70,000 MTHM in the first repository before granting a construction authorization for a second. Under existing licenses, projected spent fuel generation could exceed 70,000 MTHM as early as the year 2010. Possible extensions or renewals of OLs also

The Commission believes that its 1984 Finding 4 should be revised to acknowledge the possibility and assess the safety and environmental impacts of

extended storage for periods longer than 70 years. The principal reasons for this proposed revision are that: (1) the long-term material and system degradation effects are well understood and known to be minor; (2) the ability to maintain the system is assured; and (3) the Commission maintains regulatory authority over any spent fuel storage installation.

On the basis of experience with wet and dry spent fuel storage and related rulemaking and licensing actions, the Commission concludes that spent fuel can be safely stored without significant environmental impact for at least 100 years, if necessary. Therefore, the Commission is revising its original Fourth Finding thus: "The Commission finds reasonable assurance that, if necessary, spent fuel generated in any reactor can be stored safely and without significant environmental impacts for at least 30 years beyond the licensed life for operation (which may include the term of a revised or renewed license) of that reactor at its spent fuel storage basin, or at either onsite or offsite independent spent fuel storage installations."

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unequivocal Federal policy. The Nuclear Waste Policy Act of 1982 has now provided that policy.

The Nuclear Waste Policy Act defines public and private responsibilities for spent fuel storage and provides for a limited amount of federally-supported interim storage capacity. The Act also includes provisions for monitored retrievable storage facilities and for a research development and demonstration program for dry storage. The Commission believes that these provisions provide added assurance that safe Independent onsite or offsite spent fuel storage will be available if needed. [References omitted]

The policy set forth in the NWPA regarding interim storage remains in place.

Therefore, the Commission's confidence remains unchanged. The only policy change affecting storage involves long-term storage in an MRS. The NWPA sets schedule restrictions on an MRS by tying it to the repository siting and licensing schedule. These restrictions effectively delay implementation of an MRS. Consequently, its usefulness in providing storage capacity relief to utilities is likely to be lost.

The NWPA established a Monitored Retrievable Storage Review Commission tasked with preparing a report on the need for an MRS facility as part of the national nuclear waste management system (Section 143(a)). In its November 1989 report "Nuclear Waste: Is There a Need for Federal Interim Storage?", the MRS Commission reached the following conclusion:

"An MRS linked as provided in current law would not be justified, especially in light of uncertainties in the completion time for the repository. Consequently, the Commission does not recommend a linked MRS as required by current law and as proposed by DOE."

In the November 1989 Reassessment Report, DOE stated that

"Current linkages between the repository and MRS program make it impossible for the DOE to accept waste at an MRS facility on a schedule that is independent from that of the repository. Therefore, the DOE plans to work with the Congress to modify the current linkages between the repository and the MRS facility and to embark on an aggressive program to develop an integrated MRS facility for spent fuel. The DOE believes that if the linkages are modified, it is likely that waste acceptance at an MRS facility could begin by 1998 or soon thereafter."

Although the Commission's confidence in its 1984 Decision did not depend on the availability of an MRS facility, the possibility of such a facility, as provided for in the NWPA, was one way in which needed storage could be made available. The NWPA makes an MRS facility less likely by linking it to repository development, unless Congress is willing to modify these linkages. The potential impact of the uncertainty surrounding an MRS on the Commission's confidence is, however, more than compensated for by operational and planned spent fuel pool expansions and dry-storage investments by utilities themselves

conservative upper bound of commercial nuclear power growth (see "Integrated Data Base for 1989: Spent Fuel and Radioactive Waste Inventories, Projections, and Characteristics," DOE/RW-0006, Rev. 5, November 1989). Although estimates may show an increase at some date well into the twenty-first century if licenses of some reactors are renewed or extended, this possibility does not affect the Commission's confidence in the availability of safe storage capacity until a repository is operational. The industry has made a general commitment to provide storage capacity, which could include away-from-reactor (AFR) storage capacity. To date, however, utilities have sought to meet storage capacity needs at their respective reactor sites. Thus, a new industry application for AFR storage remains only a potential option, which currently seems unnecessary and unlikely.

Utilities have continued to add storage capacity by reracking spent fuel pools, and NRC expects continued reracking where it is physically possible and represents the least costly alternative. Advances in dry-storage technologies and utility plans both have a positive effect on NRC's confidence. At the time the Commission reached its original findings, dry storage of LWR spent fuel was, as yet, unlicensed under 10 CFR Part 72, and DOE's dry-storage

demonstrations in support of dry-cask storage were in progress at the Idaho National Engineering Laboratory (INEL).

Today, DOE's demonstration efforts have been successful (See Godlewski, N. Z., "Spent Fuel Storage-An Update," Nuclear News, Vol. 30, No. 3, March 1987, pp.

47-52, at p. 47.) Dry storage has been licensed at three reactor sites, and three new applications are under review. Dry cask storage is licensed at Virginia Electric Power Company's Surry Power Station site (see License, SNM 2501 under Docket No. 72-2), and dry-concrete module and stainless-steel canister storage is licensed at Carolina Power and Light Company's (CP&L's) H. B. Robinson, Unit 2, site (see License SNM 2502, under Docket No. 72-3). A license was recently granted for a similar modular system at Duke Power Company's Oconee Nuclear Station site. New applications have been received in 1989 for CP&L's Brunswick site, the Baltimore Gas and Electric Company's Calvert Cliffs site, and in 1990 for Consumer Power Company's Palisades site. Applications are also expected for CP&L's Robinson 2 site (at another onsite location to allow for greater storage capacity) and Wisconsin Electric Power Company's Point Beach site. The Tennessee Valley Authority has indicated that it will apply for a licensed dry storage installation at its Sequoyah plant site.

Thus, the successful demonstration by DOE of dry cask technology for various cask types at INEL, utilities' actions to forestall spent fuel storage capacity shortfalls, and the continuing sufficiency of the licensing record for the Commission to authorize increases in at-reactor storage capacity all strengthen the Commission's confidence in the availability of safe and environmentally sound spent fuel storage capacity.

Renewal of reactor OLS will involve consideration of how additional spent fuel generated during the extended term of the license will be stored onsite or

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NUCLEAR REGULATORY COMMISSION

10 CFR Part 51

RIN 3150-AD26

Consideration of Environmental Impacts of Temporary Storage of Spent Fuel After Cessation of Reactor Operation

AGENCY: Nuclear Regulatory Commission

ACTION: Final rule

SUMMARY: The Nuclear Regulatory Commission is revising its generic

determinations on the timing of availability of a geologic repository for commercial high-level radioactive waste and spent fuel and the environmental impacts of storage of spent fuel at reactor sites after the expiration of reactor operating licenses. These revisions reflect findings of the Commission reached in a five-year update and supplement to its 1984 "Waste Confidence" rulemaking proceeding, which are published elsewhere in this issue of the Federal Register. The Commission now finds that spent fuel generated in any reactor can be stored safely and without significant environmental impacts in reactor facility storage pools or independent spent fuel storage installations located at reactor or away-from-reactor sites for at least 30 years beyond the licensed life for operation (which may include the term of a revised or renewed license). Further, the Commission believes there is reasonable assurance that at least one mined geologic repository will be available within the first quarter of the twenty-first century, and sufficient repository capacity will be available within 30 years beyond the licensed life for operation of any reactor to dispose of the commercial high-level waste and spent fuel originating in such reactor and generated up to that time.

ENCLOSURE 2

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the reactor operating license expiration either at or away from the reactor site was feasible, safe, and would not result in a significant impact on the environment.

Consequently, the Commission adopted a rule, codified in 10 CFR 51.23, providing that the environmental impacts of at-reactor storage after the termination of reactor operating licenses need not be considered in Commission proceedings related to issuance or amendment of a reactor operating license. The same safety and environmental considerations applied to fuel storage installations licensed under part 72 as for storage in reactor basins. Accordingly, the rule also provided that the environmental impacts of spent fuel storage at independent spent fuel storage installations for the period following expiration of the installation storage license or amendment need not be considered in proceedings related to issuance or amendment of a storage installation license.

Amendment to Part 51

At the time of issuance of its Waste Confidence decision and the adoption of 10 CFR 51.23, the Commission also announced that while it believed that it could, with reasonable assurance, reach favorable conclusions of confidence, it also recognized that significant unexpected events might affect its decision. Consequently, the Commission stated that it would "review its conclusions on waste confidence should significant and pertinent unexpected events occur, or

at least every 5 years until a repository for high-level radioactive waste and spent fuel is available." The Commission has now completed a five-year review

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Summary of Comments

The Commission received 11 comments on its proposed revision to 10 CFR 51.23(a) from the following entities listed in the order of receipt of comments:

Duke Power Company
Public Citizen
Edison Electric Institute
Malachy Murphy (State of Nevada)
Yankee Atomic Electric Company
Department of Energy (DOE)
Philadelphia Electric Company
Commonwealth Edison
Virginia Electric and Power Company
Marvin I. Lewis, Registered Professional Engineer

Florida Power & Light

The revision to this rule was supported by Duke Power Company, Edison Electric Institute, Yankee Atomic Electric Company, Department of Energy, Philadelphia Electric Company, and Virginia Electric and Power Company and generally supported by Commonwealth Edison.

Malachy Murphy, for the State of Nevada, suggests that 10 CFR 51.23(a) be amended to reflect reasonable assurance that spent fuel can be stored safely and without significant environmental risk in dry casks at reactor sites for up

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at least 30 years beyond the licensed life for operation of any reactor which may include the term of a "revised license". As the discussion in the notice made explicit, the term "revised" license was intended to embrace a "renewed" license. To reflect more accurately the inclusion of the term of a renewed license, the parenthetical phrase which refers to this subject is being revised to read: "which may include the term of a revised or renewed license."

The necessity for the proposed revisions to the Waste Confidence decision and to 10 CFR 51.23(a) is based on the timing of repository availability, and premised on the following factors: The potential for delays in DOE's program;

the mandate of the Nuclear Waste Policy Act Amendments of 1987 to characterize only the Yucca Mountain site which means that if that site is found unsuitable, characterization will have to begin at another site or suite of sites with consequent delay in repository availability; the regulatory need to avoid premature commitment to the Yucca Mountain site; and the questionable value of making predictions about completion of a project as complex and unique as the repository in terms of years when decades would be more realistic. But even with this change the Commission has concluded that it has reasonable assurance that on such a schedule for repository availability, sufficient repository capacity will be available within 30 years beyond the licensed life for operation of reactors. Adequate regulatory authority is available to require any measures necessary to assure safe storage of the spent fuel until a repository is available. In addition, the Commission has concluded that even if storage of spent fuel were necessary for at least 30 years beyond the licensed life of reactors, which in the case of a reactor whose operating license is renewed for 30 years would mean for a period of at least 100 years,

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Environmental Impact

This final rule amends 10 CFR part 51 of the Commission's regulations to modify the generic determination currently codified in part 51 which was made by the Commission in the Waste Confidence rulemaking proceeding. That generic determination was that for at least 30 years beyond the expiration of a reactor's operating license no significant environmental impacts will result from the storage of spent fuel in reactor facility storage pool or independent spent fuel storage installations located at reactor or away-from-reactor sites. The modification provides that, if necessary, spent fuel generated in a reactor can be stored safely and without significant environmental impacts for at least 30 years beyond the licensed life for operation of any reactor. The licensed life for operation of a reactor may include the term of a revised or renewed license. The environmental analysis on which the revised generic determination is based can be found in the revision and supplement to the Waste Confidence findings published elsewhere in this issue. This final rulemaking action formally incorporating the revised generic determination in the Commission's regulations does not have separate independent environmental impact. The supplemental assessment and revisions to the Waste Confidence findings are available for inspection at the NRC Public Document Room, 2120 L Street, Lower Level, NW., Washington, DC.

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Business Administration at 13 CFR part 121, or in the NRC's size standards published December 9, 1985 (50 FR 50241).

Backfit Analysis

This proposed rule does not modify or add to systems, structures, components or design of a facility; the design approval or manufacturing license for a facility; or the procedures or organization required to design, construct or operate a facility. Accordingly, no backfit analysis pursuant to 10 CFR 50.109(c) is required for this proposed rule.

List of Subjects in 10 CFR Part 51

Administration practice and procedure, Environmental impact statement, Nuclear materials, nuclear power plants, and reactors. Reporting and recordkeeping requirements.

For the reasons set out in the preamble and under the authority of the Atomic Energy Act of 1954, as amended, the Energy Reorganization Act of 1974, as amended, and 5 U.S.C. 553, the NRC is adopting the following amendment to 10 CFR part 51.

PART 51 -- ENVIRONMENTAL PROTECTION REGULATIONS FOR DOMESTIC LICENSING AND RELATED REGULATORY FUNCTIONS

1. The authority citation for part 51 continues to read as follows:

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there is reasonable assurance that at least one mined geologic repository will be available within the first quarter of the twenty-first century, and sufficient repository capacity will be available within 30 years beyond the licensed life for operation of any reactor to dispose of the commercial high-level waste and spent fuel originating in such reactor and generated up to that time.

Dated at Rockville, Maryland this
For the Nuclear Regulatory Commission.

John C. Hoyle