

NRC PUBLIC DOCUMENT ROOM

NUCLEAR REGULATORY COMMISSION

[10 CFR PART 72]

LICENSING REQUIREMENTS FOR THE STORAGE OF SPENT FUEL IN AN  
INDEPENDENT SPENT FUEL STORAGE INSTALLATION (ISFSI)

AGENCY: U.S. Nuclear Regulatory Commission.

ACTION: Proposed rule.

SUMMARY: The proposed new regulation specifies procedures and requirements for issuance of licenses to store spent fuel in an independent spent fuel storage installation (ISFSI). In addition to general provisions, the proposed regulation contains requirements for the siting, general design criteria and certain operational aspects of such an activity.

DATE: Comment period expires JAN 4 1979

ADDRESSES: Written comments should be submitted to the Secretary of the Commission, U.S. Nuclear Regulatory Commission, Washington, D.C. 20555, Attention: Docketing and Service Branch. Copies of comments on the proposed new regulation may be examined in the Commission's Public Document Room at 1717 H Street NW., Washington, D.C.

The Commission is particularly interested in comments on Subpart E, "Siting Criteria" and Subpart F, "General Design Criteria."

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FOR FURTHER INFORMATION CONTACT: Russell E. L. Stanford, Office of Standards Development, U.S. Nuclear Regulatory Commission, Washington, D.C. 20555 (phone 301-443-5910).

SUPPLEMENTARY INFORMATION: The present policy of the United States is to store commercial reactor spent fuel without reprocessing pending a decision to reprocess it or to dispose of it directly as high level waste. As a result of this policy, spent fuel is accumulating in storage basins throughout the U.S. The Nuclear Regulatory Commission has evaluated the environmental impacts of the accumulation of spent fuel and recently published a draft Generic Environmental Impact Statement (GEIS) on this subject.<sup>1</sup> The GEIS concludes that there is a need for independent spent fuel storage installations (ISFSI), or as these are sometimes called, away-from-reactor (AFR) storage installations, to accommodate some of the accumulating spent fuel. The GEIS also recognizes the need for a more definitive regulatory basis for future licensing of facilities of this type. The GEIS identifies the development of 10 CFR Part 72, as coming to meet that need.

The Nuclear Regulatory Commission has under consideration this new regulation covering the requirements for extended spent fuel

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<sup>1</sup>NUREG-0404 Draft Generic Environmental Impact Statement on Handling and Storage of Spent Light Water Reactor Fuel - March 1978. Copies may be obtained from the Director, Division of Technical Information and Document Control, U.S. Nuclear Regulatory Commission, Washington, D.C. 20555



storage at installations built specifically for this purpose that are not coupled to either a nuclear power plant or a fuel reprocessing plant.

The present regulations covering the possession of source, byproduct and special nuclear materials are largely designed for relatively short-term possession in conjunction with operations involving such materials. The Nuclear Regulatory Commission recognizes that there is a need for a new regulation covering the requirements for extended spent fuel storage under static storage conditions involving no operations on such materials. The proposed new regulation specifies procedures and requirements for the issuance of licenses to store spent fuel in an independent spent fuel storage installation. To ensure adequate protection of the public health and safety, the proposed regulation establishes siting, design, operation and records requirements for away-from-reactor spent fuel storage. Specific features of licensing under Part 72 are:

1. Single License - Part 72 provides for issuance of a single license as early as practical in the licensing process - before the start of construction of any physical facilities involved. This license would contain a provision that it be reevaluated by NRC and its "license conditions" be updated prior to the receipt of spent fuel at an ISFSI.

2. Safety Analysis Report - A single safety analysis report will be submitted with the license application. This will be updated as the project progresses and changes submitted to the NRC, with any final changes submitted at least 90 days prior to the receipt of spent fuel at an ISFSI.

3. Licenses covering the storage of spent fuel in an ISFSI will not be issued by Agreement States because of the significant quantities of special nuclear materials involved. Agreement States are prohibited by Section 274b(3) of the Act from licensing special nuclear material in quantities sufficient to form a critical mass.

4. Such licenses are limited to the temporary storage only of spent fuel; no license under this part will be granted for the later permanent storage or disposal of spent fuel.

An opportunity for public hearings will be provided before issuing a license for an ISFSI. Appropriate amendments to the regulations to include ISFSIs in the public hearing procedures will be issued for public review and comment.

Underwater storage of spent fuel has been standard practice in the nuclear industry for more than 30 years. The basic technology involved is well established and readily lends itself to the contemplated extended storage of spent fuels under water for periods of more than 10 years.

However, the storage of spent fuels in an ISFSI is not limited to underwater storage. Although many of its specific requirements apply to water pool installations, the storage of aged spent fuel under dry storage conditions is also covered by this regulation. The storage of spent fuels under water is only necessary for those fuels which have not undergone sufficient aging since their discharge from a reactor to make cooling by some other means feasible.

The proposed rule is applicable only to "aged" fuel, with more than one year's decay since reactor shutdown. Aged spent fuel, having lost the short-lived radionuclides by decay, need not have a high degree of protection from weather extremes, tornadoes, or tornado generated missiles.

The large inventory of radionuclides in an ISFSI represents a potential hazard to public health and safety. Storage conditions must provide an environment which will ensure the long-term integrity of the fuel cladding as the primary containment for the radioactive materials contained in spent fuel. For underwater storage, the pool water is also an effective medium for the containment of the small amounts of radioactive materials, primarily cesium, that may escape from defective fuel.

To assure the long-term integrity of the stored spent fuel, the storage racks, and other important components of an ISFSI, there must be provisions for periodic inspection and surveillance of critical components.



The rationale underlying the siting requirements is that although the potential risk is small due to the relatively inert nature of aged spent fuel, sound sites should be selected for such installations. An ISFSI could be located on the site of another licensed facility or a separate site. The population distributions at licensed reactor sites would be acceptable for the location of an ISFSI.

The Commission is considering whether a new seismic siting approach for an ISFSI should be adopted which recognizes that the simple static nature of an ISFSI makes seismic risk less serious than it is for a reactor. The Commission also recognizes from experience that substantial resources can be expended in investigation work to establish site-specific seismic design values and further resources on debate of the exact values and review of different viewpoints to meet these site-specific values. By including requirements in the proposed regulations which limit the location of an ISFSI to sites with an earthquake ground motion potential of no more than 0.25g (with a recurrence interval of 500 years)<sup>2</sup> and which specify that all ISFSI's shall be designed to withstand a 0.25g acceleration, the integrity of the ISFSI can be assured without the need for costly seismic site investigations, analyses and review unless some unusual geologic characteristic is identified. The limiting

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<sup>2</sup>As demonstrated by authorities such as Algermissen and Perkins, USGS, Open File Report 76-416, 1976, "A Probabilistic Estimate of Maximum Acceleration in Rock in the Contiguous United States."

earthquake ground motion potential of 0.25 g with a recurrence interval up to 500 years is not considered unduly restrictive. It rules out sites of high seismic potential as being generally unsuitable. However, if special circumstances and special design treatment are shown, exemption from this site restriction is possible. The imposition of this site restriction does raise the possibility that a small amount of additional transportation of spent fuel might be necessary to reach an acceptable ISFSI site from a few reactors in the U.S. Based on previous evaluations of the impact of transporting spent fuel,<sup>3,4</sup> the savings achieved by the site restriction are justified.

For underwater storage, the pool structure and the spent fuel storage racks within the pool must be designed and constructed to resist potential seismic forces to ensure sub-critical geometry at all times.

Spent fuel in storage under water requires a cooling system for the removal of decay heat. However, the heat capacity of the large volume of water in a spent fuel storage pool allows adequate time to take corrective action if the cooling system fails, provided there is an assured source of makeup water and some means of getting it to the storage pool, if needed. Therefore, the cooling system need not be designed to withstand the extremes of natural phenomena. Likewise,

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<sup>3</sup>WASH-1238, "Environmental Survey of Transportation of Radioactive Materials to and From Nuclear Power Plants."

<sup>4</sup>NUREG-0170, "Final Environmental Statement on the Transportation of Radioactive Material by Air and Other Modes."

the emergency water supply system need not be permanently installed, provided it is available within the time span needed.

The activity level of the pool water must be kept within control and equipment such as the pool water cleanup system and the waste treatment system must be designed to meet ALARA objectives for operating personnel.

Experience has shown that the level of radioactive materials in the ambient air in the spent fuel storage area of an ISFSI is normally about 5% of 10 CFR 20 limits for occupied areas. However, there is a potential for the release of radioactive materials in the venting of shipping casks before these are unloaded, hence cask unloading must be handled under controlled conditions.

The proposed Part 72 includes an operational dose limit to any member of the general public of 25 mrem per year from the uranium fuel cycle in accordance with the regulations of the Environmental Protection Agency (40 CFR Part 190). The EPA regulations were prepared with a reprocessing fuel cycle in mind, but the Commission considers it reasonable to apply them to the ISFSI since the storage of fresh spent fuel at reactors and reprocessing plants was already envisioned and the storage of aged spent fuel at an ISFSI entails much lower potential releases.

Part 72 also sets a limit of 5 Rem in 2 hours for the calculated dose to individuals off the ISFSI site from design basis accidents.



With such a limit, an ISFSI, if located on a reactor site, will not add substantially to the risk to the public off site. Accident analyses for an ISFSI presented in the GEIS and in previous licensing cases show that this limit is reasonably achievable.

With spent fuel committed to storage for an indefinite period of time, and its ultimate disposition unknown, there is a need for the maintenance of adequate records of the identity and history of the spent fuel in storage.

It is the Commission's judgment that an NRC review of the licensee's training program and a certification by the licensee that his operators are adequately trained are adequate. The provisions of Section 107 of the Atomic Energy Act, as amended, which provide for licensing of operators, do not apply to ISFSI personnel.

Although the proposed regulation does not contain specific requirements relating to financial protection and responsibility for public liability, the Commission is considering the question of whether it should exercise its discretionary authority under the Price-Anderson Act to prescribe such requirements and would be interested in any comments or views which might be offered on this issue. The question is also undergoing review in the context of a broad study by the NRC staff of whether, and if so in what manner, the Commission should exercise its discretionary authority to impose financial protection requirements on its materials licensees.

Pursuant to the Atomic Energy Act of 1954, as amended, the Energy Reorganization Act of 1974, as amended, and section 553 of title 5 of the United States Code, notice is hereby given that adoption of the following new regulation 10 CFR Part 72 is contemplated.

A new Part 72 is added which reads as follows:

PART 72 "LICENSING REQUIREMENTS FOR THE STORAGE OF  
SPENT FUEL IN AN INDEPENDENT SPENT FUEL STORAGE  
INSTALLATION" (ISFSI)

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Authority

The provisions of this Part 72 are issued under the Atomic Energy Act of 1954, as amended, secs. 51, 53 as amended, 62, 63, 65, 81, 161b, h, i, o, 182a as amended, 183 as amended, 184 as amended, 186, 187, Pub. L. 83-703, 68 Stat. 929, 930 as amended by 71 Stat. 576, 72 Stat. 632 and 79 Stat. 602, 932, 933, 935, 948, 953 as amended by 70 Stat. 1069, 954 as amended by 78 Stat. 602, 955, 42 U.S.C. 2071, 2073, 2092, 2093, 2095, 2111, 2201(b), (h), (i), (o), 2232, 2233, 2234, 2236, 2237; sec. 234, Pub. L. 91-161, 83 Stat. 444, 42 U.S.C. 2282; sec. 274c, Pub. L. 86-273,

73 Stat. 688, 42 U.S.C. 2021(c); under sec. 102(2)(C) of the National Environmental Policy Act of 1969, Pub. L. 91-190, 83 Stat. 853, 42 U.S.C. 4332, and under the Energy Reorganization Act of 1974, as amended, sec. 201, as amended, 202, and 206, Pub. L. 93-438, 88 Stat. 1242, as amended by 89 Stat. 413, 1243, 1246, 42 U.S.C. 5841, 5842, 5845.

#### Subpart A - General Provisions

##### § 72.1 Purpose.

The regulations in this part establish requirements, procedures and criteria for the issuance of licenses to receive title to, own, acquire, receive, or possess special nuclear material, byproduct material, and source material in spent fuel for the purpose of storage in the United States in an independent spent fuel storage installation (ISFSI) as defined in § 72.3 of this part and establish and provide for the terms and conditions under which the Commission will issue such licenses. Such licenses are limited to the temporary storage only of spent fuel; no license under this part will be granted for the later permanent storage or disposal of spent fuel.

##### § 72.2 Scope.

The regulations in this part apply to all persons in the United States, including persons in Agreement States. The regulations in this part are limited to spent fuel. This includes the byproduct, special nuclear and source materials in the spent fuel to be stored

or in storage in an independent spent fuel storage installation as defined by § 72.3 of this part.

With respect to licenses covering the storage of spent fuel in an ISFSI issued prior to the effective date of this regulation, such licenses will not be renewed unless the operating requirements of this Part 72 are met.

§ 72.3 Definitions.

As used in this part:

(a) "Act" means the Atomic Energy Act of 1954 (68 Stat. 919) including any amendments thereto.

(b) "As low as is reasonably achievable" means as low as is reasonably achievable taking into account the state of technology, and the economics of improvements in relation to benefits to the public health and safety.

(c) "Byproduct material" means any radioactive material (except special nuclear material) yielded in or made radioactive by exposure to the radiation incident to the process of producing or utilizing special nuclear material.

(d) "Commission" means the Nuclear Regulatory Commission or its duly authorized representatives.

(e) "Commencement of construction" means any clearing of land, excavation or other substantial action that would adversely affect the natural environment of a site, but does not mean:



(i) Changes desirable for the temporary use of the land for public recreational uses, necessary borings or excavations to determine subsurface materials and foundation conditions or other pre-construction monitoring to establish background information related to the suitability of the site or to the protection of environmental values;

(ii) Construction of environmental monitoring facilities;

(iii) Procurement or manufacture of components of the installation.

(f) "Confinement system" means those systems, including ventilation, between areas containing radioactive substances and the environment.

(g) "Controlled area" means that area immediately surrounding the ISFSI complex, the use of which is controlled by the licensee.

(h) "Design basis" means the parameter values associated with that level of severity of an external event or combination of events selected for design of all or any part of an ISFSI to ensure that the structures, systems and components important to safety (in relation to that event or combination of events) will maintain their integrity and will not suffer loss of function during or after the event or before completing its design function. These values may be (1) restraints derived from generally accepted "state-of-the-art" practices for achieving functional goals, or (2) requirements derived from analysis (based on calculation and/or experiments) of the

effects of a postulated event under which a structure, system, or component must meet its functional goals.

(i) "Historical data" means a compilation of the available information concerning a particular type of event derived from human history.

(j) "Independent spent fuel storage installation (ISFSI)" means a self-contained installation designed for the storage of spent fuel and capable of independent operation with all necessary supporting services.

(k) "Neighboring area" means that area immediately surrounding the controlled area in which population distribution and density and land and water uses are considered with respect to the possibility of implementing contingency measures.

(l) "NEPA" means the National Environmental Policy Act of 1969 including any amendments thereto.

(m) "Person" means (1) any individual, corporation, partnership, firm, association, trust, estate, public or private institution, group, Government agency other than the Department of Energy (DOE), except that the DOE shall be considered a person within the meaning of the regulations of this part to the extent that its facilities and activities are subject to the licensing and related regulatory authority of the Commission pursuant to Section 202 of the Energy Reorganization Act of 1974 (88 Stat. 1244), any State or any political subdivision of, or any political entity within a State, any

foreign government or nation or any political subdivision of any such government or nation, or other entity; and (2) any legal successor, representative, agent, or agency of the foregoing.

(n) "Region" means a geographical area surrounding and including the site sufficiently large to contain all the features related to a phenomenon or to the effects from a particular event.

(o) "Site" means the real property on which the ISFSI is located. The site includes the controlled area.

(p) "Source material" means (1) uranium or thorium, or any combination thereof, in any physical or chemical form or (2) ores which contain by weight one-twentieth of one percent (0.05%) or more of (i) uranium, (ii) thorium, or (iii) any combination thereof. Source material does not include special nuclear material.

(q) "Special nuclear material" means (1) plutonium, uranium 233, uranium enriched in the isotope 233 or in the isotope 235, and any other material which the Commission, pursuant to the provisions of section 51 of the Act, determines to be special nuclear material, but does not include source material; or (2) any material artificially enriched by any of the foregoing but does not include source material.

(r) "Spent fuel" suitable for storage in an ISFSI means irradiated light water reactor nuclear power plant fuel which has undergone at least one year's decay since reactor shutdown.

(s) "Structures, systems and components important to safety" means those items whose function is to (1) maintain the required



spent fuel storage conditions, (2) prevent damage to the spent fuel during transfer and storage, (3) protect plant personnel from exposure to radiation in excess of design objectives.

§ 72.4 Communications.

Except where otherwise specified, all communications and reports concerning the regulations in this part and applications filed under them should be addressed to:

The Nuclear Regulatory Commission  
Division of Fuel Cycle and Material Safety  
Washington, D.C. 20555

Communications, reports, and applications may be delivered in person at the Commission's Offices at

7915 Eastern Avenue  
Silver Spring, Maryland

or 1717 H Street, N.W.  
Washington, D.C.

§ 72.5 Interpretations.

Except as specifically authorized by the Commission in writing, no interpretation of the meaning of the regulations in this part by any officer or employee of the Commission other than a written interpretation by the General Counsel will be recognized to be binding upon the Commission.

§ 72.6 License Required.

(a) No person may receive title to, own, acquire, receive, or possess special nuclear material, byproduct material, or source

material in spent fuel for the purpose of storage in an independent spent fuel storage installation except as authorized by the general license in § 72.7 of this part, or as authorized in a specific license issued by the Commission in accordance with the regulations in this part.

(b) Licenses for special nuclear material are of two types: General and specific. Any general license provided in this part is effective without the filing of applications with the Commission or the issuance of licensing documents to particular persons. Specific licenses are issued to named persons upon applications filed pursuant to the regulations in this part.

§ 72.7 General License to Own Spent Fuel.

A general license is hereby issued to receive title to and own source material, special nuclear material and byproduct material contained in spent fuel without regard to quantity. Regardless of any other provision of this chapter, a general licensee under this section is not authorized to acquire, deliver, receive, or possess source material, special nuclear material and byproduct material contained in spent fuel, except as authorized in a specific license.

§ 72.8 Specific Exemptions.

The Commission may, upon application by any interested person or upon its own initiative, grant such exemptions from the requirements of the regulations in this part as it determines are authorized

by law and will not endanger life or property or the common defense and security and are otherwise in the public interest.

§ 72.9 Denial of Licensing by Agreement States.

Licenses covering the storage of spent fuel in an ISFSI will not be issued by Agreement States.

Subpart B - License Application, Form, Contents

§ 72.11 Filing of Applications for Licenses; Oath or Affirmation.

(a) Place of filing. Each application for a license under this Part, or amendment thereof, should be filed with:

The Director, Division of Fuel Cycle and  
Material Safety  
U.S. Nuclear Regulatory Commission  
Washington, D.C. 20555

Applications, communications, reports and correspondence may be delivered in person at the Commission's offices at 7915 Eastern Avenue, Silver Spring, Maryland, or 1717 H Street, N.W., Washington, D.C.

(b) Oath or affirmation. Each application for a license or license amendment, including amendments to such applications, should be executed in three signed originals by the applicant or duly authorized officer thereof under oath or affirmation.

(c) Number of copies of applications. Each filing of an application for a license or license amendment under this part (including amendments to such applications) shall include in addition



to three signed originals the required documents listed in Table I in the number of copies specified.

(d) Fees. The application, amendment and inspection fees applicable to a license covering the storage of spent fuels in an ISFSI are those shown in § 170.31 of this chapter.

#### § 72.12 Elimination of Repetition.

In any application, under this Part, the applicant may incorporate by reference information contained in previous applications, statements or reports filed with the Commission: Provided, that such references are clear and specific.

#### § 72.13 Public Inspection of Applications.

Applications and documents submitted to the Commission in connection with applications may be made available for public inspection in accordance with provisions of the regulations contained in Part 2 and Part 9 of this chapter.

### CONTENTS OF APPLICATION

#### § 72.14 Contents of Application: General and Financial Information.

Each application shall state:

- (a) Full name of applicant:
- (b) Address of applicant:
- (c) Description of business or occupation of applicant:
- (d) (1) If applicant is an individual, state citizenship and

age.

TABLE I  
REQUIRED LICENSING DOCUMENTS

<u>Section</u>	<u>Document</u>	<u>No. of Copies</u>
72.11	License Application	25 <sup>1/</sup>
72.15	Safety Analysis Report	70
72.19	Emergency Plan	25
72.20	Environmental Report	150
72.34	Report of Installation and Procedures Changes	12 <sup>2/</sup>
72.36	Application for Transfer of License	25 <sup>2/</sup>
72.38	Application for Termination of License	25 <sup>2/</sup>
72.39	Amendment to License	25 <sup>1/</sup>
72.75	Quality Assurance Program	25
72.81(a)	Physical Security Plan <sup>3/</sup>	10
72.81(c)	Safeguards Contingency Plan	10
72.94	Personnel Training Program	10

<sup>1/</sup> Plus 3 signed originals.

<sup>2/</sup> Plus 1 signed original.

<sup>3/</sup> Physical protection plans should be held exempt from public disclosure pursuant to 10 CFR 2.790(d).

(2) If applicant is a partnership, state name, citizenship and address of each partner and the principal location where the partnership does business.

(3) If applicant is a corporation or an unincorporated association, state:

(i) The state, where it is incorporated or organized and the principal location where it does business;

(ii) The names, addresses and citizenship of its directors and principal officers.

(4) If the applicant is acting as an agent or representative of another person in filing the application, identify the principal and furnish information required under this paragraph with respect to such principal.

(e) Information sufficient to demonstrate to the Commission the financial qualifications of the applicant to carry out, in accordance with the regulations in this chapter, the activities for which the license is sought. This information shall state the place at which the activity is to be performed, the general plan for carrying out the activity and the period of time for which the license is requested. The information shall show that the applicant either possesses the necessary funds or that the applicant has reasonable assurance of obtaining the necessary funds, or that by a combination of the two, the applicant will have the necessary funds available to cover the following:



- (1) Estimated construction costs.
- (2) Estimated operating costs over the planned life of the installation.
- (3) Estimated shutdown and decommissioning costs and the necessary financial arrangements prior to licensing that will ensure shutdown, decontamination and decommissioning will be carried out.

§ 72.15 Contents of Application: Technical Information.

Each application for a license under this Part shall include:

(a) Safety Analysis Report describing the proposed installation (ISFSI) for the storage of spent fuel, including how the ISFSI will be operated. The minimum information to be included in this report shall consist of the following:

(1) A description and safety assessment of the site on which the ISFSI is to be located, with appropriate attention to features affecting installation design. Such assessment shall contain an analysis and evaluation of the major structures, systems and components of the ISFSI which bear on the suitability of the site assuming that the installation will be operated at the ultimate capacity<sup>1</sup> which is contemplated by the applicant.

(2) A description and discussion of the ISFSI structures with special attention to design and operating characteristics, unusual or novel design features, and principal safety considerations.

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<sup>1</sup>"Capacity" in this context refers to the quantity in metric tons of spent fuel, its contained radioactivity (curies) and heat generation rate (Btu/hr).

(3) The preliminary design of the installation including:

(i) The principal design criteria for the installation pursuant to Subpart F of this part, with any additions to or departures from the general design criteria identified and justified.

(ii) The design bases and the relation of the design bases to the principal design criteria;

(iii) Information relative to materials of construction, general arrangement, and approximate dimensions, sufficient to provide reasonable assurance that the final design will conform to the design bases with an adequate margin for safety; and

(iv) Applicable codes and standards.

(4) A preliminary analysis and evaluation of the design and performance of structures, systems, and components of the ISFSI with the objective of assessing the risk to public health and safety resulting from operation of the installation and including determination of

(i) the margins of safety during normal operations and expected operational occurrences during the life of the installation and

(ii) the adequacy of structures, systems, and components provided for the prevention of accidents and the mitigation of the consequences of accidents, including natural and man-made phenomena and events.

(5) The means for controlling and limiting occupational radiation exposures to meet the objective of as low as is reasonably achievable and the limits shown in Part 20 of this chapter.

(6) The features of ISFSI design and operating modes to minimize waste volumes generated by the facility.

(7) An identification and justification for the selection of those variables, conditions, or other items which are determined as the result of the safety analysis and evaluation to be probable subjects of license conditions, with special attention given to those items which may significantly influence the final design of the installation.

(8) A preliminary plan for the applicant's organization, training of personnel pursuant to § 72.91, and conduct of operations, including the planned managerial and administrative controls system.

(9) An identification of those structures, systems or components of the installation, if any, which require research and development to confirm the adequacy of their design; an identification and description of the research and development program which will be conducted to resolve any safety questions associated with such structures, systems or components; and a schedule of the research and development program showing that such safety questions will be resolved prior to the initial receipt of materials to be stored at the ISFSI.

(10) The technical qualifications of the applicant to engage in the proposed activities as required by § 72.17 of this part.

(11) A description of the applicant's plans for coping with emergencies as required by § 72.19 of this part.



(12) A description of the equipment to be installed to maintain control over radioactive materials in gaseous and liquid effluents produced during normal operations and expected operational occurrences. The description shall identify the design objectives, and the means to be employed, for keeping levels of radioactive material in effluents to unrestricted areas as low as reasonably achievable and within the limits shown in Part 20 of this chapter. The description shall include:

(i) An estimate of;

(a) The quantity of each of the principal radionuclides expected to be released annually to unrestricted areas in liquid effluents produced during normal ISFSI operations; and

(b) The quantity of each of the principal radionuclides expected to be released annually to unrestricted areas in gaseous effluents produced during normal ISFSI operations.

(ii) A general description of the provisions for packaging, storage, and disposal of solid wastes containing radioactive materials resulting from treatment of gaseous and liquid effluents and from other sources.

(iii) A description of the equipment and procedures for the maintenance and use of equipment installed in radioactive waste systems.

(iv) Prior to the first receipt of material to be stored, a revised estimate of the information required in paragraph 12(i)(B)

of this section if the expected releases and exposures differ significantly from the estimates submitted in the application.

(v) A description of the measures taken to control the quantities of radioactive wastes for offsite disposal to as low as reasonably achievable levels.

(13) A conservative analysis of the potential dose to an individual off site from accidents and natural phenomena which result in (i) criticality, (ii) release of radioactive materials to the site and surrounding areas, and (iii) the loss of water for water pool type installations. The calculations of dose from any pathway may be limited to direct exposure, inhalation or ingestion occurring within 24 hours of the postulated event.

(b) Periodically during design and normally prior to construction, with final completion at least 90 days prior to the planned receipt of materials to be stored, and annually thereafter, the safety analysis report (SAR) will be updated and submitted to the Commission for approval and shall include the following:

(1) All current information relating to applicable site evaluation factors, including the results of environmental monitoring programs.

(2) A description and analysis of changes in the structures, systems, and components of the installation, with emphasis upon performance requirements, the bases, with technical justification therefor, upon which such requirements have been established, and

the evaluations required to show that safety functions will be accomplished.

(i) Such items as the instrumentation and control systems, ventilation and filter systems, electrical systems, auxiliary and emergency systems, and radioactive waste handling systems shall be discussed insofar as they are pertinent.

(3) A final analysis and evaluation of the design and performance of structures, systems, and components taking into account any pertinent information developed since the submittal of the license application.

(c) A description of the quality assurance program to be applied to the design, fabrication, construction, testing and operation of the safety-related structures, systems, and components of the ISFSI as required by § 72.75 of this part. The description of the quality assurance program shall identify safety-related structures, systems and components and shall show how the criteria in Appendix B of Part 50 of this chapter will be applied to such identified safety-related components, systems and structures in a manner consistent with their importance to safety.

(d) A description of the detailed security measures for physical protection, including design features and a plan as required by § 72.81 of this part.

(e) A description of the planned program covering preoperational testing and initial operations.



(f) The decommissioning plan required under § 72.18 of this part.

§ 72.16 Contents of Application: License Conditions.

Each application under this part shall include proposed license conditions in accordance with the requirements of § 72.33 of this part together with a summary statement of the bases or reasons for such conditions.

§ 72.17 Contents of Application: Technical Qualifications.

An application under this part shall include:

(a) The technical qualifications, including training and experience of the applicant and members of the applicant's staff to engage in the proposed activities in accordance with the regulations in this chapter.

(b) A description of the personnel training program required under Subpart I of this part.

(c) A commitment by the applicant to have an adequate complement of trained and certified plant personnel prior to the receipt of spent fuel for storage.

§ 72.18 Decommissioning Plan, Including its Financing.

(a) Each application under this part shall include a decommissioning plan which shall contain information on proposed procedures for the disposal of radioactive material, decontamination of the site and other procedures, sufficient to provide reasonable assurance

that the dismantling and disposal of the ISFSI at the end of its useful life will not be inimical to the common defense and security or to the health and safety of the public. This plan shall include an evaluation of the ISFSI design features which have been selected to facilitate to the maximum degree reasonable its decontamination and decommissioning at the end of its useful life. This plan shall include provisions for minimizing the amounts of solid, airborne and liquid wastes generated during decommissioning.

(b) The decommissioning plan will include the financial arrangements for its execution.

§ 72.19 Emergency Plan.

An application to store spent fuel in an ISFSI, will include plans for coping with emergencies. These plans shall contain the elements that are listed in Section IV, "Content of Emergency Plans," of Appendix E to Part 50 of this chapter.

§ 72.20 Environmental Report.

Each application for a license under this part shall be accompanied by an Environmental Report which meets the requirements of Part 51 of this chapter; 150 copies are required.

Subpart C - Issuance and Conditions of Licenses

§ 72.31 Issuance of Licenses.

(a) The Commission will issue a license under this part and updated prior to the receipt of spent fuel in such form and containing

such conditions and limitations as it deems appropriate or necessary upon a determination that an application for a license meets the standards and requirements of the act and regulations, that the applicant's proposed site, installation and equipment for the storage of spent fuel are adequate to protect health and minimize danger to life or property; and that:

(1) The proposed site complies with the requirements of § 72.66 of this part.

(2) The applicant is qualified by reason of training and experience to conduct the operation covered by the regulations in this part.

(3) The applicant's personnel training program complies with Subpart I of this part.

(4) The applicant's proposed operating procedures to protect health and to minimize danger to life or property are adequate.

(5) The applicant is financially qualified to engage in the proposed activities in accordance with the regulations in this part.

(6) The applicant's physical security plan complies with § 72.81 of this part.

(7) The applicant's quality assurance plan complies with § 72.75 of this part.

(8) The applicant's emergency plan complies with § 72.19 of this part.

(9) The applicant's decommissioning plan and its financing pursuant to § 72.18 of this part are adequate.



(10) Before commencement of construction of the installation, the Director of the Office of Nuclear Materials Safety and Safeguards or his designee, has concluded, or after a public hearing, the Atomic Safety and Licensing Board has made the finding that on the basis of information filed and evaluations made pursuant to Part 51 of this chapter, and after weighing the environmental, economic, technical and other benefits against environmental costs and considering available alternatives, that the action called for is the issuance of the proposed license, with any appropriate conditions to protect environmental values. Commencement of construction prior to such conclusion or finding may be grounds for denial of a license to store spent fuel in an ISFSI.

(11) No license will be issued by the Commission to any person within the United States if the Commission finds that the issuance of such a license would be inimical to the common defense and security or would constitute an unreasonable risk to the health and safety of the public.

§ 72.32 Duration of License; Renewal.

Each license will be issued for a fixed period of time to be specified in the license but not to exceed 20 years. Licenses may be renewed by the Commission upon expiration of that period, upon application of the licensee.

§ 72.33 License Conditions.

(a) Each license issued under this part will include license conditions. The license conditions will be derived from the analyses and evaluations included in the safety analysis report, and amendments thereto, submitted pursuant to § 72.15, and from the proposed license conditions submitted by the applicant pursuant to § 72.16. The Commission may also include such additional license conditions as the Commission finds appropriate.

(b) License conditions will include items in the following categories:

(1) Functional and operating limits and monitoring instruments and limiting control settings. (i) Functional and operating limits for an ISFSI are limits upon fuel handling and storage conditions which are found to be necessary to protect the integrity of the stored fuel and guard against excessive occupational exposures and the uncontrolled release of radioactive materials. (ii) Monitoring instruments and limiting control settings for an ISFSI are settings for alarms or mechanical devices related to those fuel handling and storage conditions having significant safety functions.

(2) Limiting conditions. Limiting conditions are the lowest functional capability or performance levels of equipment required for safe operation.

(3) Surveillance requirements. Surveillance requirements are requirements relating to tests, calibrations, and inspections to assure that the necessary integrity of required systems, components

and the fuel in storage is maintained, that operation of the installation will be within the required safety limits, and that the limiting conditions required for safe storage will be met.

(4) Design features. Design features to be included are those features of the installation such as materials of construction and geometric arrangements, which, if altered or modified, would have a significant effect on safety and are not covered in categories described in subparagraphs (1), (2), and (3) of this paragraph (c).

(5) Administrative controls. Administrative controls are the provisions relating to organization and management procedures, recordkeeping, review and audit, and reporting necessary to assure that the operations involved in the storage of spent fuel in an ISFSI are performed in a safe manner.

(c) In addition to the conditions described in paragraph (a) of this section, every license issued under this part shall be subject to the following conditions, whether stated therein or not:

(1) Neither the license, nor any right thereunder, shall be transferred, assigned, or disposed of in any manner, either voluntarily or involuntarily, directly or indirectly, through transfer of control of the license to any person, unless the Commission shall, after securing full information, find that the transfer is in accordance with the provisions of the Atomic Energy Act and give its consent in writing.

(2) The license shall be subject to revocation, suspension, modification, or amendment as provided in the Atomic Energy Act and



Commission regulations, in accordance with the procedures provided by the Atomic Energy Act and Commission regulations.

(3) The licensee shall at any time before expiration of the license, upon request of the Commission, submit written statements, signed under oath or affirmation, to enable the Commission to determine whether or not the license should be modified, suspended, or revoked.

(4) Prior to the receipt of spent fuel for storage at an ISFSI, the licensee shall have in effect an NRC approved program covering the training and certification of ISFSI personnel which shall meet the requirements of Subpart I of this part.

(5) The licensee shall not permit the manipulation of the safety-related equipment and controls of the installation by any one whom the licensee has not certified as being adequately trained to perform such manipulations.

(d) Effluent Controls. Effluent controls are operating controls, including monitoring and testing controls and systems, and procedures required to keep releases of radioactive materials to unrestricted areas during normal operations and expected operational occurrences within the limits stated in EPA regulation, 40 CFR Part 190, "Environmental Radiation Protection Standards for Nuclear Power Operations," as an upper limit. Each license authorizing the storage of spent fuels under this part will include license conditions that, in addition to requiring compliance with the limits and the as low as reasonably achievable provisions of Part 20 of this chapter and the

design objective included (or referenced) in paragraph (2) below, require:

(1) That operating procedures for control of effluents be established and followed and equipment installed in the radioactive waste system be maintained and used as to meet the requirements of 40 CFR Part 190 as established in the license conditions.

(2) The submission of a report to the Commission within 60 days after June 30 and December 31 of each year specifying the quantity of each of the principal radionuclides released to unrestricted areas in liquid and in gaseous effluents during the previous 6 months of operation, and such other information as may be required by the Commission to estimate maximum potential annual radiation doses to the public resulting from effluent releases. If quantities of radioactive materials released during the reporting period are significantly above design objectives, the report shall cover this specifically. On the basis of such reports and any additional information the Commission may obtain from the licensee or others, the Commission may from time to time require the licensee to take such action as the Commission deems appropriate.

(e) Maintenance of safeguards contingency plan procedures pursuant to § 72.81(d) of this part.

#### § 72.34 Changes, Tests and Experiments.

(a) (1) The holder of a license issued under this Part may  
(i) make changes in the installation as described in the safety

analysis report, (ii) make changes in the procedures as described in the safety analysis report, and (iii) conduct tests or experiments not described in the safety analysis report, without prior Commission approval, unless the proposed change, test or experiment involves a change in the license conditions incorporated in the license or an unreviewed safety question.

(2) A proposed change, test, or experiment shall be deemed to involve an unreviewed safety question (i) if the probability of occurrence or the consequences of an accident or malfunction of equipment important to safety previously evaluated in the safety analysis report may be increased; or (ii) if a possibility for an accident or malfunction of a different type than any evaluated previously in the safety analysis report may be created; or (iii) if the margin of safety as defined in the basis for any license condition is reduced.

(b) The licensee shall maintain records of changes in the installation and of changes in procedures made pursuant to this section, to the extent that such changes constitute changes in the installation as described in the safety analysis report or constitute changes in procedures as described in the safety analysis report. The licensee shall also maintain records of tests and experiments carried out pursuant to paragraph (a) of this section. These records shall include a written safety evaluation which provides the bases for the determination that the change, test or experiment does not involve an unreviewed safety question. The licensee shall furnish



to the Commission, or the appropriate regional office, annually or at such shorter intervals as may be specified in the license, a report containing a brief description of such changes, tests and experiments, including a summary of the safety evaluation of each. Any report submitted by a licensee pursuant to this paragraph will be made a part of the public record of the licensing proceeding. In addition to a signed original, 12 copies of each report of changes shall be filed. The records of changes in the installation and of changes in procedures and records of tests shall be maintained for the lifetime of the installation.

(c) The holder of a license issued under this Part who desires (1) a change in license conditions or (2) to make a change in the installation or the procedures described in the safety analysis report or to conduct tests or experiments not described in the safety analysis report, which involve an unreviewed safety question or a change in license conditions, shall submit an application for amendment of his license pursuant to § 72.39.

(d) The licensee shall make no change which would decrease the effectiveness of the physical security plan prepared pursuant to § 72.81 without the prior approval of the Commission. A licensee desiring to make such a change shall submit an application for an amendment to his license pursuant to § 72.39. The licensee shall maintain records of changes to the plan made without prior Commission approval, for a period of two years from the date of the change, and

shall furnish the Commission a report containing a description of each change within two months after the change is made.

TRANSFERS OF LICENSES--CREDITORS' RIGHTS--SURRENDER OF LICENSES §

72.36 Transfer of Licenses.

(a) No license issued under this Part or any right thereunder, shall be transferred, assigned, or in any manner disposed of, either voluntarily or involuntarily, directly or indirectly, through transfer of control of the license to any person, unless the Commission shall give its consent in writing.

(b) (1) An application for transfer of a license shall include as much of the information described in §§ 72.14, 72.15 and 72.16 with respect to the identity and technical and financial qualifications of the proposed transferee as would be required by those sections if the application were for an initial license. One signed original of the application executed under oath or affirmation plus 25 copies shall be submitted.

(2) The Commission may require additional information such as data respecting proposed protection from radioactive materials and the applicant's qualifications in this technology. The application shall include also a statement of the purposes for which the transfer of the license is requested and the nature of the transaction necessitating or making desirable the transfer of the license.

(3) The Commission may require any person who submits an application for license pursuant to the provisions of this section

to file a written consent from the existing licensee or a certified copy of an order or judgment of a court of competent jurisdiction attesting to the person's right subject to the licensing requirements of the Act and these regulations to possession of the spent fuel and the storage installation involved.

(c) After appropriate notice to interested persons, including the existing licensee, and observance of such procedures as may be required by the Act or regulations or orders of the Commission, the Commission will approve an application for the transfer of a license, if the Commission determines:

(1) That the proposed transferee is qualified to be the holder of the license; and

(2) That transfer of the license is otherwise consistent with applicable provisions of law, regulations, and orders issued by the Commission pursuant thereto.

#### § 72.37 Creditor Regulations.

(a) Pursuant to section 184 of the Act, the Commission consents, without individual application, to the creation of any mortgage, pledge, or other lien upon special nuclear material contained in spent fuel not owned by the United States which is the subject of a license or upon any interest in such special nuclear material in spent fuel: Provided:

(1) That the rights of any creditor so secured may be exercised only in compliance with and subject to the same requirements and



restrictions as would apply to the licensee pursuant to the provisions of the license, the Atomic Energy Act of 1954, as amended, and regulations issued by the Commission pursuant to said Act; and

(2) That no creditor so secured may take possession of the spent fuel pursuant to the provisions of this section prior to either the issuance of a license from the Commission authorizing such possession or the transfer of the license.

(b) Any creditor so secured may apply for transfer of the license covering such spent fuel by filing an application for transfer of the license pursuant to § 72.36(b). The Commission will act upon such application pursuant to § 72.36(c).

(c) Nothing contained in this regulation shall be deemed to affect the means of acquiring, or the priority of, any tax lien or other lien provided by law.

(d) As used in this section, "Creditor" includes, without implied limitation, the trustee under any mortgage, pledge or lien on spent fuel in storage made to secure any creditor, any trustee or receiver of such spent fuel appointed by a court of competent jurisdiction in any action brought for the benefit of any creditor secured by such mortgage, pledge or lien, any purchaser of such spent fuel at the sale thereof upon foreclosure of such mortgage, pledge, or lien or upon exercise of any power of sale contained therein, or any assignee of any such purchaser.

§ 72.38 Applications for Termination of Licenses

(a) Any licensee may apply to the Commission for authority to surrender a license voluntarily and to dismantle the installation and dispose of the materials stored therein. The Commission may require information, including information as to proposed procedures for the disposal of radioactive material, decontamination of the site, to provide reasonable assurance that the decommissioning and disposal will be performed in accordance with the regulations in this chapter and will not be inimical to the common defense and security or to the health and safety of the public. The application for termination of a license issued under this part shall be submitted as one signed original plus 25 copies.

(b) If the application demonstrates that the decommissioning of the installation and disposal of the materials stored therein will be performed in accordance with the regulations in this chapter and will not be inimical to the common defense and security or to the health and safety of the public, and after notice to interested persons, the Commission may issue an order authorizing such decommissioning and disposal, and providing for the termination of the license upon completion of such procedures in accordance with any conditions specified in the order.

AMENDMENT TO LICENSE AT REQUEST OF HOLDER AND  
REVOCATION, SUSPENSION AND MODIFICATION OF LICENSES

§ 72.39 Application for Amendment of License.

Whenever a holder of a license desires to amend the license, an application for an amendment shall be filed with the Commission, fully describing the changes desired, and the reasons for such changes, and following as far as applicable the form prescribed for original applications.

§ 72.40 Issuance of Amendment.

In determining whether an amendment to a license will be issued to the applicant, the Commission will be guided by the considerations which govern the issuance of initial licenses to the extent applicable and appropriate.

72.41 Revocation, Suspension and Modification of Licenses

(a) The terms and conditions of all licenses are subject to amendment, revision, or modification by reason of amendments to the Atomic Energy Act of 1954, or by reason of rules, regulations or orders issued in accordance with the Act or any amendments thereto.

(b) Any license may be revoked, suspended or modified in whole or in part for any material false statement in the application or any statement of fact required under Section 182 of the Act, or because of conditions revealed by such application or statement of fact or any report, record, or inspection or other means which would



warrant the Commission to refuse to grant a license on an original application, or for failure to operate an installation in accordance with the terms of the license, or for violation of, or failure to observe any of the terms and conditions of the Act, or any regulation, license or order of the Commission.

(c) Upon revocation, suspension or modification of a license, the Commission may immediately cause the retaking of possession of all special nuclear material contained in spent fuel held by the licensee. In cases found by the Commission to be of extreme importance to the national defense and security, or to the health and safety of the public, the Commission may take possession of any spent fuel held by the licensee prior to any of the procedures provided under sections 551-558 of title 5 of the United States Code.

§ 72.42 Backfitting.

(a) The Commission may require the backfitting of an ISFSI if it finds that such action will provide substantial, additional protection which is required for either occupational or public health and safety. As used in this section, "backfitting" means a change in storage conditions which may require the addition, elimination or modification of structures, systems or components of an ISFSI, after the license has been issued.

(b) Nothing in this section shall be deemed to relieve a holder of a license from compliance with the rules, regulations, or orders of the Commission.

(c) The Commission may at any time require a holder of a license to submit such information concerning the backfitting or the proposed backfitting of the installation as it deems appropriate.

Subpart D - Records, Reports, Inspections and Enforcement

§ 72.51 Material Balance, Inventory, and Records Requirements for Stored Materials.

(a) Each licensee shall keep records showing the receipt, inventory (including location), disposal, acquisition, and transfer of all spent fuel in storage regardless of its origin or method of acquisition.

(b) Each licensee shall conduct a physical inventory of all spent fuel in storage at intervals not to exceed twelve months or as otherwise directed by the Commission.

(c) Each licensee shall establish, maintain and follow written material control and accounting procedures which are sufficient to enable the licensee to account for the spent fuel in storage under license.

(d) Records of spent fuel in storage shall be kept in duplicate for as long as the spent fuel is in storage at an ISFSI. The duplicate set of records shall be kept at a separate location far enough removed from the original records so that a single event would not destroy both sets of records. Records of spent fuel transferred out of an ISFSI shall be preserved for a period of five years after the date of transfer.

§ 72.52 Reports of Accidental Criticality or Loss of Special Nuclear Material.

Each licensee shall report immediately to the Director of the appropriate Nuclear Regulatory Commission Inspection and Enforcement Regional Office by telephone, and telegram, or teletype, any case of accidental criticality and any loss of special nuclear material contained in spent fuel.

§ 72.53 Material Status Reports.

Each licensee shall complete and submit to the Commission Material Status Reports on Form NRC-742, in accordance with printed instructions for completing the form, concerning special nuclear material contained in spent fuel possessed, received, transferred, disposed of or lost by the licensee. All such reports shall be made as of March 31 and September 30 of each year and shall be filed with the U.S. Department of Energy, P.O. Box E, Oak Ridge, Tennessee, 37830, within thirty (30) days after the end of the period covered by the report. The Commission may permit a licensee to submit Material Status Reports at other times when good cause is shown.

§ 72.54 Nuclear Material Transfer Reports.

Each licensee who transfers and each licensee who receives spent fuel shall complete and distribute a Nuclear Material Transaction Report on Form NRC-741, in accordance with printed instructions for completing the form, whenever he transfers or receives spent fuel. Each licensee who transfers spent fuel shall submit a copy of



Form NRC-741 to the U.S. Department of Energy, P.O. Box E, Oak Ridge, Tennessee 37830, and three copies to the receiver of the material promptly after the transfer takes place. Each licensee who receives spent fuel shall submit a copy of Form NRC-741 to the Department of Energy and to the shipper of the material within 10 days after the spent fuel is received.

§ 72.55 Inspections and Tests.

(a) Each licensee shall afford to the Commission at all reasonable times opportunity to inspect spent fuel in storage and the premises and installation wherein such spent fuel is stored.

(b) Each licensee shall make available to the Commission for inspection, upon reasonable notice, records kept by the licensee pertaining to his receipt, possession, or transfer of spent fuel.

(c) Each licensee shall perform, or permit the Commission to perform, such tests as the Commission deems appropriate or necessary for the administration of the regulations in this part, including tests of (a) spent fuel during handling and storage, (b) spent fuel handling and storage facilities, (c) radiation detection and monitoring equipment, and (d) other equipment used in connection with spent fuel storage.

§ 72.56 Maintenance of Other Records and Reports.

(a) Each licensee shall maintain such records and make such reports in connection with the licensed activity as may be required

by the conditions of the license or by the rules, regulations, and orders of the Commission in effectuating the purposes of the Act.

(b) Each licensee shall, upon each issuance of its annual financial report, including the certified financial statements, file a copy thereof with the Commission.

(c) Records which are required by the regulations in this part or by the license conditions shall be maintained for the period specified by the appropriate regulation or license condition. If a retention period is not otherwise specified, such records shall be maintained until the Commission authorizes their disposition.

(d) Records which must be maintained pursuant to this part may be the original or a reproduced copy or microform if such reproduced copy or microform is duly authenticated by authorized personnel and the microform is capable of producing a clear and legible copy after storage for the period specified by Commission regulations.

(e) If there is a conflict between the Commission's regulations in this part, license condition, or other written Commission approval or authorization pertaining to the retention period for the same type of record, the retention period specified in the regulations in this part for such records shall apply unless the Commission, pursuant to § 72.8, has granted a specific exemption from the record retention requirements specified in the regulations in this part.

#### § 72.57 Violation.

An injunction or other court order may be obtained prohibiting any violation of any provision of the Atomic Energy Act of 1954, as



amended, or Title II of the Energy Reorganization Act of 1974, as amended, or any regulation or order issued thereunder. A court order may be obtained for the payment of a civil penalty imposed pursuant to section 234 of the Atomic Energy Act for violation of section 53, 57, 62, 63, 81 or 82 of the Atomic Energy Act, or section 206 of the Energy Reorganization Act of 1974, or any rule, regulation, or order issued thereunder, or any term, condition, or limitation of any license issued thereunder, or for any violation for which a license may be revoked under section 186 of the Atomic Energy Act. Any person who willfully violates any provision of the Atomic Energy Act, or any regulation or order issued thereunder, may be guilty of a crime and, upon conviction, may be punished by fine or imprisonment or both, as provided by law.

#### Subpart E - Siting Criteria

##### § 72.61 General Criteria.

(a) Site characteristics which may directly affect the safety of the ISFSI shall be investigated and assessed.

(b) Proposed sites for the ISFSI shall be examined with respect to the frequency and the severity of external natural and man-induced events that could affect the safe operation of the installation.

(c) Design basis external events shall be determined for each combination of proposed site and proposed installation design.



(d) Proposed sites with design basis external events for which adequate protection cannot be provided through installation design shall be deemed unsuitable for the location of the ISFSI.

(e) For each proposed site, the potential for radiological consequences in the region shall be evaluated with due consideration of the characteristics of the population, including its distribution.

(f) For each proposed site, pursuant to Part 51 of this chapter, the potential for environmental impact to the region shall be evaluated with due consideration of the characteristics of the regional environs, including its historical and aesthetic value.

§ 72.62 Criteria for Design Basis External Natural Events.

(a) Natural phenomena which may exist or can occur in the region of a proposed site shall be identified and assessed according to their potential effects on the safe operation of the installation. The important natural phenomena for which design bases should be derived shall be identified.

(b) Historical records of the occurrence and severity of those important natural phenomena shall be collected for the region and evaluated for reliability, accuracy and completeness.

(c) Appropriate methods shall be adopted for establishing the design basis natural events for important natural phenomena. The methods should be justified as being compatible with the characteristics of the region and the current state of knowledge.

§ 72.63 Criteria for Design Basis External Man-Induced Events.

(a) The region shall be examined for man-made facilities and activities that might endanger the proposed ISFSI. The important man-induced phenomena for which design basis external man-induced events should be derived shall be identified.

(b) Information concerning the occurrences and severity of those important man-induced phenomena shall be collected and analyzed for reliability, accuracy and completeness.

(c) Appropriate methods shall be adopted for establishing the design basis external man-induced events for those phenomena. The methods should be justified as being compatible with the characteristics of the region and the current state of knowledge.

§ 72.64 Criteria for Defining Potential Effects of the ISFSI on the Region.

(a) The proposed site shall be examined with respect to the effects on people in the region resulting from the release of radioactive materials under normal and accident conditions; in this evaluation unusual regional and site characteristics shall be taken into account.

(b) Each site shall be examined with respect to the effects on the regional environment resulting from construction, operation and decommissioning of the ISFSI; in this evaluation unusual regional and site characteristics shall be taken into account.



(c) Effects which would otherwise be unacceptable shall be compensated for by the ISFSI design or the site shall be deemed unsuitable.

§ 72.65 Criteria for Regional Distribution of Population.

(a) The proposed site shall be evaluated with respect to the present and future character and distribution of the human population of the region. Such evaluation, which should include consideration of present and projected future uses of land and water within the region, shall also take into account any special characteristics which may influence the potential consequences of a release of radioactive material during the operational lifetime of the ISFSI.

(b) A controlled area and a neighboring area shall be established for each site.

(c) The licensee shall have authority within the controlled area to determine all activities including exclusion or removal of personnel and property from the area.

(d) The neighboring area of a proposed site shall be evaluated from the perspective of the potential for adverse consequences to the human population or environment and of the capability of implementing protective measures as may be necessary to mitigate the immediate effects of a release of radioactive material.

(e) The distribution of the human population in the region surrounding the site shall be evaluated with respect to both the potential for adverse consequences to regional populations from



normal and potential accidental releases of radioactive material during operations and decommissioning of the ISFSI.

(f) Effects which would otherwise be unacceptable shall be compensated for by the ISFSI design or the site shall be deemed unsuitable.

§ 72.66 Criteria for Defining Acceptable Seismic Characteristics.

(a) A peak horizontal ground acceleration of not greater than 0.25g with a recurrence interval of at least 500 years (equivalent to a 90% probability of not being exceeded in 50 years) shall be deemed suitable for an ISFSI site and require only the foundation engineering and geologic hazards investigations covered in the following paragraph (b). However, as an alternative approach the applicant has the option of establishing a site specific "g value" by the procedures of Part 100 of this chapter.

(b) An ISFSI founded on bedrock (and meeting criterion "a") is acceptable, and no detailed site-specific earthquake analysis is required unless some unusual geologic characteristic is identified (e.g., active faulting, mass wasting, cavernous or karst terrain, subsidence collapse or uplift potential, etc.). If not founded on bedrock and where a potential exists for soil liquefaction or other soil instability due to vibratory ground motion or other anomaly, it must be shown by site-specific investigations and laboratory analysis that soil failure could not occur in the foundation materials during the operating life of the installation.

(c) For ISFSI designs other than the water basin type proposed sites will be evaluated on the basis of a site-specific investigation and analysis.

§ 72.67 Criteria for Defining Potential Radiological Consequences.

(a) During normal operations and anticipated occurrences, the annual dose equivalent shall not exceed 25 mrem to the whole body, 75 mrem to the thyroid and 25 mrem to any other organ of an actual individual located outside the controlled area as a result of planned discharges of radioactive materials to the general environment.\* In this evaluation unusual regional and site characteristics shall be taken into account.

(b) Under accident conditions, the calculated exposure from the controlling design basis accident shall not exceed 5 Rem in 2 hours at the outside boundary of the controlled area.

Subpart F - General Design Criteria

72.71 General Design Criteria.

§ Pursuant to the provisions of § 72.15, an application to store spent fuel in an ISFSI must include the principal design criteria for the proposed storage installation. The principal design criteria establish the design, fabrication, construction, testing, and performance requirements for structures, systems, and components important to safety, as defined in § 72.3. The general design criteria identified in this section establish minimum requirements for the

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\* 40 CFR 190.11



principal safety-related design criteria for an ISFSI. Any omissions in these general design criteria do not relieve the applicant from the requirement of providing the necessary safety features in the design of this installation.

#### OVERALL REQUIREMENTS

##### (1) Quality Standards

Structures, systems, and components important to safety shall be designed, fabricated, erected, and tested to quality standards commensurate with the importance of the function to be performed.

##### (2) Protection against Environmental Conditions and Natural Phenomena.

(i) Structures, systems, and components important to safety shall be designed to accommodate the effects of and to be compatible with site characteristics and environmental conditions associated with normal operation, maintenance and testing of the ISFSI, and with postulated accidents.

(ii) Structures, systems, and components important to safety shall be designed to withstand the effects of natural phenomena such as earthquakes (with a horizontal ground motion acceleration of at least 0.25g), tornadoes (excluding tornado missiles), lightning, hurricanes, floods, tsunamis, and seiches without impairing their capability to perform safety functions. The design bases for these structures, systems, and components shall reflect: (A) appropriate



consideration of the most severe of the natural phenomena reported for the site and surrounding area, with appropriate margins to take into account the limitations in the quantity of the historical data and the period of time in which the data have been accumulated; and (B) appropriate combinations of the effects of normal and accident conditions and the effects of natural phenomena.

(iii) Capability for determining the intensity of natural phenomena which may occur for comparison with design bases of structures, systems, and components important to safety shall be provided.

(iv) If an ISFSI is located over an aquifer, measures must be taken to preclude the transport of radioactive materials to man and the environs through this potential pathway.

### (3) Protection Against Fires and Explosions

Structures, systems, and components important to safety shall be designed and located so as to continue to perform their safety functions effectively under fire and explosion exposure conditions. Noncombustible and heat-resistant materials shall be used wherever practical throughout the installation, particularly in locations vital to the control of radioactive materials, and to the maintenance of safety control functions. Explosion and fire detection, alarm, and suppression systems shall be designed and provided with sufficient capacity and capability to minimize the adverse effects of fires and explosions on structures, systems, and components important to safety. The design of the facility shall include provisions to

protect against adverse effects which might result from either the operation or the failure of the fire suppression system.

(4) Sharing of Structures, Systems, and Components

Structures, systems, and components important to safety shall not be shared between an ISFSI and other plants unless it is shown that such sharing will not impair the capability of the ISFSI to perform its safety functions, including the capability for return to a safe condition in the event of an accident or incident.

(5) Proximity of Sites

An ISFSI located near other nuclear facilities shall be designed and operated to ensure that the cumulative effects of their combined operations will not result in a significant additional risk to the health and safety of the public.

(6) Testing and Maintenance of Systems and Components

Systems and components that have safety-related functions shall be designed to permit inspection, maintenance, and testing to ensure their continued functioning to meet their design objectives.

(7) Emergency Capability

Structures, systems, and components important to safety shall be designed to assure capability of continuity of operations and handling of the emergency. The design shall ensure capability for use, as necessary, of onsite facilities and available offsite facilities and services such as hospitals, fire and police departments, ambulance service, and other emergency agencies.



(8) Confinement Barriers and Systems

(i) The fuel cladding shall be protected against degradation and gross ruptures.

(ii) For underwater storage of spent fuel in which the pool water serves as a shield and a confinement medium for radioactive materials, systems designed for maintaining water purity and the pool water level shall be designed so that any maloperation or failure in those systems from any cause will not cause the water level to fall below safe limits. Drains, permanently connected systems and other features that by maloperation or failure could cause a significant loss of water shall not be installed or included in the design. Pool water level monitoring equipment shall be provided to alarm both locally and in a continuously manned location if the water level in the fuel storage pools falls below a predetermined level.

(iii) Ventilation systems shall be provided where necessary, e.g., for the cask venting station, to assure the confinement of airborne radioactive particulate materials during normal or off-normal conditions.

(9) Instrumentation and Control Systems

Instrumentation and control systems shall be provided to monitor safety-related systems over anticipated ranges for normal operation and off-normal operation. Those instruments and control systems which must remain operational under accident conditions must be identified and designed to remain operable.



(10) Control Room or Control Areas

A control room or control areas shall be designed to permit occupancy and actions to be taken to operate and monitor the ISFSI safely under normal conditions and to maintain the ISFSI in a safe condition under off-normal or accident conditions.

(11) Utility Services

(i) The design of each utility service system required for emergency conditions shall provide for the meeting of safety demands under normal and off-normal conditions. The design of safety-related utility services and distribution shall include redundant systems to the extent necessary to maintain, with adequate capacity, the ability to perform safety functions assuming a single failure.

(ii) Emergency utility services shall be designed to permit testing of the functional operability and capacity, including the full operational sequence, of each system for transfer between normal and emergency supply sources, and the operation of associated safety systems.

(iii) Provisions shall be made so that, in the event of a loss of the primary electric power source or circuit, reliable and timely emergency power will be provided to instruments, utility service systems, and operating systems including the security central alarm station, in amounts sufficient to allow safe storage conditions to be maintained with all safety devices essential to safe storage functioning.

NUCLEAR CRITICALITY SAFETY

## (12) Design for Criticality Safety

All handling, transfer and storage systems shall be designed to be maintained subcritical and to ensure that no nuclear criticality accident can occur unless at least two unlikely (i.e., very low probability), independent, and concurrent or sequential changes have occurred in the conditions essential to nuclear criticality safety. The design of handling, transfer and storage systems shall include margins of safety for the nuclear criticality parameters that are commensurate with the uncertainties in the handling, transfer and storage conditions, in the data and methods used in calculations, and in the nature of the immediate environment under accident conditions.

## (13) Acceptable Methods of Control

(i) Favorable geometry (spacing) is the standard method of nuclear criticality control. Subcriticality is assured by limiting the reactivity through the control of spacing of the individual storage unit (one or more fuel assemblies), and for underwater storage, by the neutron absorption by the water between storage units. Storage racks must be structurally compatible with seismic design criteria.

(ii) The use of permanently fixed neutron-absorbing materials (poisons) is an alternative method of criticality control. Where solid neutron-absorbing materials are used for the prevention of



nuclear criticality, the design shall provide for positive means to verify their continued efficacy.

#### RADIOLOGICAL PROTECTION

##### (14) Exposure Control

Appropriate radiation protection systems and programs shall be provided for all areas and operations where plant personnel may be exposed to levels of radiation or airborne radioactive materials significantly above background levels to ensure that exposures are within the limits of Part 20 and are as low as is reasonably achievable. Structures, systems, and components for which operation, maintenance, and required inspections may involve such exposure shall be designed, fabricated, located, shielded, controlled and tested so as to control external and internal radiation exposures to personnel. This shall include means to:

- (i) prevent the accumulation of or provide for decreasing the content of radioactive material in those systems to which access by personnel is required;
- (ii) provide for control of access to areas of potential contamination or high radiation within the ISFSI;
- (iii) assure that contamination can be monitored and controlled;
- (iv) minimize the time required to perform work in the vicinity of radioactive components, such as by providing sufficient space for ease of operation and designing equipment for ease of repair and replacement; and



(v) provide shielding to assure that exposures to personnel in accessible areas are within the limits of Part 20 and are as low as is reasonably achievable.

(15) Radiation Alarm Systems

Radiation alarm systems shall be provided to warn operating personnel of significant increases in radiation levels in accessible work areas and of excessive concentrations of radioactive material in effluents. Such systems shall be designed with capability to permit testing of their operability.

(16) Effluent Monitoring

Effluent systems shall be designed to include means for measuring the amount of radionuclides in any effluent. In order that the data thus measured and recorded can be used, a means of measuring the flow of environmental diluting media, either air or water, shall be provided.

(17) Effluent Control

The design of the ISFSI shall include means to minimize the release in effluents of radioactive materials in any form, during normal operations and under accident conditions. Systems provided to guard against the release of radioactive materials shall be designed to be monitored and tested, and shall be provided with alarms. Capability shall be provided for prompt cessation of the flow of contaminated effluents or for retention of such effluents as is necessary to ensure that the concentrations and total quantities

of radioactive materials in effluents are maintained within the limits of Part 20 and are as low as is reasonably achievable.

#### SPENT FUEL AND RADIOACTIVE WASTE STORAGE AND HANDLING

##### (18) Spent Fuel and Radioactive Waste Storage and Handling Systems

Spent fuel storage, radioactive waste storage, and other systems that might contain or handle radioactive materials shall be designed to assure adequate safety under normal and accident conditions. These systems shall be designed (i) with a capability to test and monitor components important to safety, (ii) with suitable shielding for radiation protection under normal and accident conditions, (iii) with confinement systems, (iv) with a heat removal capability having testability and reliability consistent with the importance to safety, and (v) to minimize the quantity of radioactive wastes generated.

##### (19) Waste Treatment

Radioactive waste treatment facilities shall be provided. These facilities shall be designed to concentrate all site generated wastes and convert them into a form suitable for interim storage and ultimate final disposal.

#### DECOMMISSIONING

##### (20) Decommissioning

An ISFSI shall be designed to facilitate decontamination of structures and equipment and to minimize the quantity and facilitate



the removal of radioactive wastes and contaminated equipment at the time the installation is permanently decommissioned.

Subpart G - Quality Assurance

§ 72.75 Quality Assurance Program; Records.

(a) A quality assurance program based on the criteria in Appendix B of Part 50 of this chapter shall be established and implemented to provide assurance that the safety-related structures, systems and components of an ISFSI will perform their safety functions. The application of the quality assurance program should be commensurate with the importance of individual structures, systems and components to safety. The quality assurance program should cover the activities of designing, purchasing, fabricating, handling, shipping, storing, cleaning, erecting, installing, inspecting, testing, operating, maintaining, repairing, and modifying.

(b) As used in this section, "quality assurance" means all those planned and systematic actions necessary to provide confidence that a structure, system, or component will perform satisfactorily in service. Quality assurance includes quality control, which comprises those quality assurance actions related to the physical characteristics of a material, structure, component, or system which provide a means to control the quality of the material, structure, component, or system to predetermined requirements.

(c) Appropriate records of the design, fabrication, erection, and testing of structures, systems, and components important to



safety shall be maintained by or under the control of the licensee throughout the life of the installation.

Subpart H - Plant Protection

§ 72.81 Physical Security Plan.

(a) The plan for detailed security measures for physical protection shall consist of two parts. Part I shall demonstrate how the applicant plans to comply with the applicable requirements of Part 73 of this chapter at the proposed installation. Part II shall list tests, inspections, audits, and other means to be used to demonstrate compliance with such requirements. Ten copies are required.

(b) A description of the design for physical protection shall show the site layout and ISFSI design features which will make the installation less vulnerable to sabotage, and shall include:

(i) The principal design criteria for the physical protection of the proposed installation.

(ii) The design bases and the relation of the design bases to the principal design criteria submitted pursuant to paragraph (a) of this section; and

(iii) Information relative to materials of construction, equipment, general arrangement, and proposed quality assurance program sufficient to provide reasonable assurance that the final installation will conform to the design bases for the principal design criteria submitted pursuant to paragraph (a) of this section.

(c) The licensee safeguards contingency plan for dealing with threats and industrial sabotage are defined in Part 73 relating to nuclear facilities licensed under Part 50 of this chapter. This plan shall include the first four categories of information contained in the applicant's safeguards contingency plan. (The first four categories of information, as set forth in Appendix C to Part 73 of this chapter are Background, Generic Planning Base, Licensee Planning Base, and Responsibility Matrix. The fifth category of information, Procedures, does not have to be submitted for approval.)

(d) The licensee shall prepare and maintain safeguards contingency plan Procedures in accordance with Appendix C of 10 CFR Part 73 for effecting the actions and decisions contained in the Responsibility Matrix of his safeguards contingency plan. The licensee shall make no change that would decrease the safeguards effectiveness of the first four categories of information (Background, Generic Planning Base, Licensee Planning Base, and Responsibility Matrix) contained in any licensee safeguards contingency plan prepared pursuant to §§ 72.81(c) and 70.22(g), 70.22(j), 73.30(g), or 73.40 of this chapter without the prior approval of the Commission. A licensee desiring to make such a change shall submit an application for an amendment to his license pursuant to § 72.39 of this chapter. The licensee may make changes to the licensee safeguards contingency plan without prior Commission approval if the changes do not decrease the safeguards effectiveness of the plan. The licensee shall maintain records of changes to any such plan made without prior approval for



a period of 2 years from the date of the change and shall furnish to the Director of Nuclear Material Safety and Safeguards, U.S. Nuclear Regulatory Commission, Washington, D.C. 20555, with a copy to the appropriate NRC Regional Office specified in Appendix A of Part 73 of this chapter, a report containing a description of each change within 2 months after the change is made.

#### Subpart I - Training and Certification of ISFSI Personnel

##### § 72.91 Scope of Training Program.

Manipulation of equipment and controls which have been identified as safety-related in the safety analysis report shall be limited to trained personnel, or in an emergency situation, under the direct supervision of an individual with adequate training in such operation. Supervisory personnel who direct the manipulation of safety-related equipment and controls must have a level of training in such operations comparable to that of trained operating personnel.

##### § 72.92 Responsibility for Training Program.

The training and proficiency certification of operating personnel is the responsibility of the licensee under this part.

##### § 72.93 Physical Requirements.

(a) The physical condition and the general health of personnel certified for the manipulation of safety-related equipment and controls must not be such as might cause operational error endangering other in-plant personnel or the public health and safety. Any



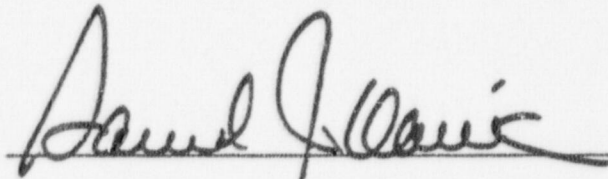
physical or mental condition which might cause impaired judgment or motor coordination must be considered in the selection of personnel for safety-related activities. Such conditions need not categorically disqualify a person provided appropriate provisions are made to accommodate such defect.

§ 72.94 Submission for Approval.

The applicant for a license under this part must submit his program for training, proficiency testing and certification of ISFSI personnel to the Commission for approval at least 6 months prior to the scheduled receipt of the first materials for storage.

Dated at Washington, D. C. this 29th day of  
September 1978

For the Nuclear Regulatory Commission

  
Secretary of the Commission