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# **Analysis of Assurance Provided by Current and Proposed Financial Assurance Mechanisms**

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This report was prepared to assist the Staff in evaluating a Petition for Proposed Rulemaking requesting amendments to the financial assurance requirements for decommissioning. The Petition asserts that self-guarantors who satisfy a financial test proposed in the Petition will provide a degree of assurance superior to that provided by financial assurance mechanisms currently authorized by NRC. In this report a measure of "assurance risk" is provided for each financial assurance mechanism currently authorized for use by licensees, as well as for the proposed self-guarantee and several other self-guarantee alternatives. The assurance risks are compared. In addition, estimates are provided of the number of licensees under 10 CFR Parts 30, 40, 70, and 72 who might be capable of self-guaranteeing under several alternative financial test provisions. Based on the estimates of availability and assurance risk, as well as assumptions concerning decommissioning costs and the costs of financial assurance mechanisms, estimates are provided of the potential public and private costs of alternative financial assurance mechanisms. Finally, methods for implementing self-guarantee options are evaluated.

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### EXECUTIVE SUMMARY

This report presents the results of an analysis of issues raised by a Petition for Proposed Rulemaking whose receipt was noticed in the Federal Register on September 25, 1991 (56 Fed. Reg. 48445). The Petition requests amendments to the financial assurance requirements for decommissioning for materials licensees. The Petition asserts that self-guarantors who satisfy a financial test proposed in the Petition will provide a degree of assurance equal or superior to that provided by the financial assurance mechanisms currently authorized by NRC.

The Petition argues, specifically, that self-guarantees provided by NRC materials licensees under 10 CFR Parts 30, 40, 70, and 72 who can pass the financial test proposed in the Petition will provide a degree of assurance equal or superior to that achieved by the parent corporation guarantee currently authorized by NRC and to the degree of assurance achieved by financial assurance mechanisms provided by certain banks, savings and loan institutions, sureties, and insurance companies that are currently allowed to provide third-party assurances for NRC licensees.

The key elements of the financial test proposed in the Petition are the following:

- The licensee seeking to provide a self-guarantee must show it has tangible net worth of at least \$1 billion. The licensee also must show that it is not owned by another firm. In contrast, NRC's current financial tests for corporate parents of licensees require the firm providing the guarantee to show that it has tangible net worth of at least \$10 million. The parent corporation providing the guarantee also must show that it is the owner of the licensee.
- The licensee seeking to provide a self-guarantee must show it has tangible net worth at least 10 times the current decommissioning cost estimate. In contrast, NRC's current financial tests for the corporate parents of licensees require the firm providing the guarantee to show it has tangible net worth at least 6 times the current decommissioning cost estimate.
- The licensee seeking to provide a self-guarantee must show that its most recent bond issuance has a current rating of AAA, AA, or A from Standard and Poor's or Aaa, Aa, or A from Moody's. In contrast, NRC's current financial test requires a current rating for the parent corporation's most recent bond issuance of AAA, AA, A, or BBB from Standard and Poor's or Aaa, Aa, A, or Baa from



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Moody's. (NRC also allows a second financial test option that substitutes financial ratios for bond ratings. The Petition did not recommend that an equivalent financial test be authorized for self-guarantees.)

ICF evaluated three aspects of the proposed amendments to the financial assurance requirements. First, data on the failure rates of firms of different sizes and on the failure rates of banks, savings and loans, and other suppliers of financial assurance were used to estimate the assurance risk presented by alternative financial assurance mechanisms. Second, a database containing information about NRC materials licensees was used to estimate the number of licensees that might be able to use the proposed self-guarantee. Finally, information about the costs of financial assurance and the estimated size of decommissioning costs was used to prepare cost-implications estimates of the proposed regulatory amendment.

The analyses indicate that the assurance risks of the financial assurance mechanisms currently authorized by NRC are substantially lower than firm failure rates for firms without financial assurance. The baseline failure rates range from about 1.53% for small firms to about 0.14% for firms over \$1 billion in net worth. The estimated assurance risk for financial assurance mechanisms provided by third parties are substantially lower than the baseline failure rate, ranging from about 0.055% (for letters of credit provided by savings and loans to firms with net worth below \$10 million) to 0.001% (for letters of credit and insurance provided to firms with net worth greater than \$1 billion). The assurance risks of sureties and insurance supported by insurance guarantee funds are at least one order of magnitude smaller still; in contrast, the assurance risk of letters of credit supplied by savings and loans is substantially higher than for other third-party financial assurance mechanisms, especially for smaller firms, because of the recent problems in that industry. The assurance risk for the current NRC financial test and parent company guarantee, weighted to reflect the assumption that parent companies are unlikely to be drawn into the financial problems of their subsidiaries, is approximately equal to the assurance risk of a letter of credit provided by a savings and loan. The estimate of assurance risk for the parent guarantee, however, is sensitive to the assumption concerning the degree of "independence" of the parent company from financial problems of its subsidiary. The assurance risk for the proposed financial test and self-guarantee, which pertains only to firms with more than \$1 billion in net worth, is estimated to be about 0.13%.

### Estimates of Assurance Risk

Baseline risk of licensee failure. ICF first prepared a baseline for the estimates of assurance risk by calculating estimated annual failure rates for different sizes of firms for the period 1984 through 1990. These estimated failure rates were based on statistics collected by the Bureau of the Census for manufacturing firms. Although all materials licensees are not manufacturers, as indicated by the Standard Industrial Classification codes for their primary business activities, a high proportion of materials licensees who might seek to self-guarantee were considered to be manufacturing firms, and thus accurately described by the Census data. These estimates of firm failure rates were generally consistent with other estimates, when compared to data on business failure rates collected by Dun and Bradstreet; to data on failure rates by firms with different levels of bond ratings collected by Moody's; to data on failure rates for Fortune 500 firms; and to calculations performed for the U.S. EPA.

The failure rates decline as firms increase in size, as measured by their net worth. The baseline annual failure rate estimates range from 1.53% for firms with net worth below \$10 million to 0.55% for firms between \$400 million and \$1 billion in net worth. Calculation of an estimated annual failure rate for firms over \$1 billion in net worth is difficult because of the small number of such firms that have entered bankruptcy. Such calculations are also sensitive to the period from which data are obtained. For the period from 1984 through 1990, the failure rate for firms over \$1 billion in net worth was estimated as 0.14%. The full range of estimated annual failure rates is provided in Table ES-1.

**Table ES.1    Estimated baseline annual failure rate**

<b>Net Worth (\$MM)</b>	<b>Failure Rate</b>
0 - 10	1.53%
10 - 20	1.24%
20 - 100	1.02%
100 - 400	0.81%
400 - 1 billion	0.55%
> 1 billion	0.14%

ICF evaluated the assurance risk presented by alternative financial assurance mechanisms by estimating the combined likelihood that the licensee would fail (as measured by the baseline failure rate) and that the financial assurance mechanism would not provide funds when needed, due to the incapacity of the assurance provider.

Assurance risk of prepayment mechanisms. Prepayment mechanisms (trust funds, escrow accounts, government funds, certificates of deposit, and deposits of government securities) were evaluated in terms of the investment risk they pose. Investment risk was defined as the likelihood that a licensee would fail, and therefore be unable to add new funds to the financial assurance mechanism, at a time when decommissioning was required but the value of the financial assurance had declined because of a drop in the market for the type of securities in which the prepayment had been invested. Two types of securities were considered: low risk securities such as treasury bills and higher risk securities such as common stocks.

The investment risk of treasury bills was estimated to be zero. Therefore the assurance risk of the prepayment mechanisms with low risk investments was also estimated to be zero.

The investment risk of common stock investments was calculated by identifying situations between 1926 and 1986 in which, on an annual basis, a fully diversified portfolio of common stocks had declined in value and the percentage of decline that occurred in each instance. (The analysis assumed that licensees would remove funds in years when the portfolio increased in value beyond the amount required to provide financial assurance.) The mean decline was estimated to be about 3.79%. That is, the analysis assumed that approximately 3.79% of the value of prepayment mechanisms might have to be added by licensees after the mechanism is set up to account for declines in the value of investments of the mechanism's funds if decommissioning is required at a time of such decline. Because failed firms will be unable to provide such additional funds, that estimated decline in value was multiplied by the baseline failure rate for each net worth category to calculate the percentage of prepayment financial assurance obligations that would be underfunded if decommissioning was required in a year in which the market declined. The estimated assurance risk of prepayment mechanisms involving higher risk securities was calculated to range from 0.058% for firms under \$10 million in net worth to 0.021% for firms from \$400 million to \$1 billion in net worth. The risk for firms over \$1 billion in net worth was estimated at 0.005%. The full range of estimated assurance risk for

prepayment mechanisms is provided in Table ES-2. This risk represents the threat that the amount set aside will be insufficient to carry out decommissioning fully.

**Table ES.2**      **Estimated assurance risk of prepayment mechanisms**

Net Worth (\$MM)	Assurance Risk	
	Low Risk Investment Policy	Higher Risk Investment Policy
0 - 10	0.0%	0.058%
10 - 20	0.0%	0.047%
20 - 100	0.0%	0.039%
100 - 400	0.0%	0.031%
400 - 1 billion	0.0%	0.021%
> 1 billion	0.0%	0.005%

Assurance risk of surety, insurance, and guarantee mechanisms.

Financial assurance mechanisms provided by third parties (surety bonds, insurance, letters of credit, and parent corporation guarantees) were evaluated in terms of the combined risk that the licensee would fail and that the third party providing the financial assurance would also fail, and therefore could not serve as an independent source of funds. The baseline failure rates for firms at different levels of net worth were used to represent the likelihood of failure of licensees. ICF obtained data from various government and private sources, including the Surety Bond Branch of the U.S. Treasury, the Federal Deposit Insurance Corporation, the Office of Thrift Supervision, the Resolution Trust Corporation, and the Insurance Information Institute, from which estimates were calculated of the failure rates for banks, savings and loans, sureties, and insurance companies from 1984 through 1990. That period was considered to represent a "worst case" situation for such financial institutions. In addition, although federal and/or state guarantee funds provide insurance for depositors or insureds of such financial institutions, calculations of assurance risk that did not take such



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insurance into account also were considered to represent "worst case" situations.

The worst case estimates of assurance risk for financial assurance mechanisms provided by banks, savings and loans, sureties, and insurance companies differ from the assurance risk estimates for prepayment mechanisms in one important respect: the risk for prepayment mechanisms is that the amount set aside will be insufficient to carry out decommissioning fully; the risk for the surety, insurance, and guaranty mechanisms is that no funds will be provided for decommissioning. The likelihood of such an event occurring in no case exceeded 0.055%, although, as Table ES-3 indicates, it varies depending on the type of financial institution providing the assurance:

**Table ES.3 Estimated assurance risk of third-party financial assurance mechanisms**

Net Worth (\$MM)	Surety Bond	Insurance	Letter of Credit (Banks)	Letter of Credit (S&Ls)
0 - 10	0.015%	0.013%	0.017%	0.055%
10 - 20	0.013%	0.011%	0.013%	0.050%
20 - 100	0.011%	0.009%	0.011%	0.041%
100 - 400	0.008%	0.007%	0.008%	0.036%
400 - 1 billion	0.006%	0.004%	0.007%	0.024%
> 1 billion	0.002%	0.001%	0.001%	0.002%

ICF also estimated the assurance risk of the parent guarantee and financial test currently authorized by NRC for decommissioning financial assurance. That assurance risk is composed of the likelihood that the licensee will fail financially and the likelihood that the licensee's parent corporation will also fail. Because, in some cases, events affecting the subsidiary will also affect the solvency of the subsidiary's parent corporation, or vice versa, two estimates were prepared. The first assumed that the two firms' financial fates would be independent of each other; the second assumed that the financial



fate of one would affect the other. The assurance risk reported in Table ES-4 is a weighted average of the two estimates, based on a qualitative evaluation of the available doctrines in corporation law, bankruptcy, and contracts that could lead to disregard of the separate incorporation of the parent and its subsidiary. The assurance risk was calculated on the assumption that in up to 3% of the cases the two firms would not be treated as independent.

Table ES.4 Estimated assurance risk of NRC parent guarantee

Net Worth (\$MM)	Parent Guarantee (Independent)	Parent Guarantee (Non-Independent)	Parent Guarantee Weighted*
10 - 20	0.007%	0.459%	0.021%
20 - 100	0.004%	0.377%	0.015%
100 - 400	0.003%	0.300%	0.012%
400 - 1 billion	0.003%	0.204%	0.009%
> 1 billion	0.001%	0.14%	0.005%

\* Based on 97% independent and 3% non-independent.

Finally, ICF evaluated the assurance risk of the proposed self-guarantee. The financial test underlying the self-guarantee contains two main components: the licensee must possess tangible net worth of more than \$1 billion and the licensee must have a rating on its most recent bond issuance of AAA, AA, or A from Standard and Poor's or Aaa, Aa, or A from Moody's. As described above, the baseline failure rate for firms of greater than \$1 billion in net worth was calculated as about 0.14%. Moody's firm failure rates data by bond rating indicate that firms with bonds rated A or better have failed at a rate of approximately 0.13%. In addition, although net worth is one of the key factors considered in the development of bond ratings, it is not the sole factor taken into account. ICF therefore concluded that the assurance risk for the proposed self-guarantee equalled approximately 0.13%.

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### Estimated Availability of Proposed Self- Guarantee

A database containing financial information and bond ratings of many of the NRC licensees required to provide financial assurance for decommissioning was prepared and used to evaluate the availability to NRC licensees of the proposed self-guarantee, as well as variations of that test recommended by public commenters. Data on almost 250 licensees under 10 CFR Parts 30, 40, 70, and 72 were included in the database, along with data on almost 50 licensees under 10 CFR Part 50. However, 116 universities and about 25 local government licensees were excluded from the analysis because they are unlikely to be able to use a self-guarantee. Several additional firms also were not included because financial information concerning them was not available, but they too would be unlikely to be able to use a self-guarantee. The database therefore includes most of the NRC licensees that might qualify to use a self-guarantee. Depending on the size of their decommissioning cost estimates, ICF estimated that at most between 16 and 22 materials licensees under 10 CFR Parts 30, 40, 70, and 72 might be able to qualify to use the proposed self-guarantee.

### Estimated Costs

Estimates were prepared of the public and private costs associated with the current and proposed financial assurance requirements for materials licensees included in the database. The number of licenses held by firms in the database was determined, and each license under 10 CFR Parts 30, 40, 70, or 72 was assumed to require decommissioning financial assurance in the amount of \$750,000. The private costs of the current financial assurance mechanisms were defined as the annual fees to obtain the mechanisms. Firms were estimated to pay 1.5% of the amount assured annually to obtain a financial assurance mechanism. All financial assurance mechanisms, including prepayment, were assumed to cost the same amount. (A separate analysis was conducted for the parent company guarantee, which was assumed to have a nominal cost.) The annual private costs to obtain financial assurance mechanisms for the approximately 250 firms in the database were estimated to be about \$3.7 million (representing the costs if all licensees obtained financial assurance at an annual cost of 1.5% of the amount of assurance each provided).

The public costs associated with prepayment, surety, insurance, and guarantee mechanisms (except the parent company guarantee) were estimated to be the amount of decommissioning financial assurance that would not be paid in any year because of the failure of the financial assurance mechanism. Public costs first were estimated based on the assumption that all firms obtain a letter of credit. The estimate of public costs was derived by multiplying the cost of

\$750,000 per license times the estimated assurance risk for the different forms of financial assurance. Public costs were estimated on the assumption that all firms use a letter of credit provided by banks. (Because licenses have not submitted letters of credit provided by savings and loans, the higher public cost estimate for that mechanism was considered to overestimate the likely upper limit for public costs.)

The private costs associated with the current parent guarantee and the proposed self-guarantee were evaluated by calculating the costs for firms to use a financial test that could do so and estimating the private costs of using financial tests and self-guarantees as zero.

Finally, estimates were prepared of the public costs associated with the current parent company guarantee and the proposed self-guarantee. These estimates pertain only to those firms that the analysis indicated might be capable of passing one of the current or proposed financial tests. Public costs were calculated on the basis of \$750,000 per license multiplied by the assurance risk associated with the current parent guarantee or with the proposed self-guarantee. The annual public costs of the current NRC parent guarantee for all firms in the database capable of passing the current NRC financial test are estimated to be approximately \$1,800. The annual public costs of the proposed self-guarantee for all those firms in the database capable of passing that test are estimated to be about \$52,100.

ABA	American Bar Association
D&B	Dun and Bradstreet
FDIC	Federal Deposit Insurance Corporation
FSLIC	Federal Savings and Loan Insurance Corporation
NAIC	National Association of Insurance Commissioners
NCIGF	National Conference on Insurance Guaranty Funds
OTS	Office of Thrift Supervision
S&P	Standard and Poors
SAIF	Savings Association Insurance Fund
SEC	Securities and Exchange Commission
UCC	Uniform Commercial Code



## 1 INTRODUCTION

### 1.1 Background

The U.S. Nuclear Regulatory Commission (NRC) is considering whether to amend the current regulations establishing general requirements for decommissioning licensee facilities to allow certain NRC non-electric utility reactor licensees to self-guarantee decommissioning funding costs. In a notice of receipt of petition for rulemaking published in the Federal Register on September 25, 1991 (56 Fed. Reg. 48445) NRC requested comments on the contents of a petition for rulemaking received from the General Electric Corporation (GE) and the Westinghouse Electric Corporation (Westinghouse) requesting such an amendment. This report was prepared by ICF Incorporated to support NRC's analysis of the proposed rulemaking.

NRC currently administers over 7,000 licenses for the possession and use of nuclear materials under 10 CFR Parts 30, 40, 70, and 72. Approximately 700 of the licensees who hold these licenses are required to provide financial assurances for decommissioning under rules promulgated in 1988 (53 Fed. Reg. 24018, June 27, 1988).

The rules on financial assurance for decommissioning provide that licensees under 10 CFR Parts 30, 40, 70, and 72 must provide financial assurance to ensure that decommissioning of licensed facilities will be accomplished in a safe and timely manner and that adequate funds will be available for this purpose. According to the decommissioning rule,<sup>1</sup> financial assurance must be provided by one or more of the following methods:

- \*(1) Prepayment. Prepayment is the deposit prior to the start of operation into an account segregated from licensee assets and outside the licensee's administrative control of cash or liquid assets such that the amount of funds would be sufficient to pay decommissioning costs. Prepayment may be in the form of a trust, escrow account, government fund, certificate of deposit, or deposit of government securities.
- (2) A surety method, insurance, or other guarantee method. These methods guarantee that decommissioning costs will be paid should the licensee default. A surety method may be in the form of a surety bond, letter of credit, or line of credit. A parent company guarantee of funds for decommissioning costs based on a financial test may be used if the guarantee and test are as

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<sup>1</sup> The same four alternative methods of providing financial assurance are authorized for licensees under Parts 30, 40, 50, 70, and 72 in the following sections: 10 CFR §§ 30.35(f), 40.36(e), 50.75(e), 70.25(f), and 72.30(c).



specified in Appendix A of 10 CFR Part 30. A parent company guarantee may not be used in combination with any other financial methods to satisfy the [decommissioning financial assurance] requirements. . . .

- (3) An external sinking fund in which deposits are made at least annually, coupled with a surety method or insurance, the value of which may decrease by the amount being accumulated in the sinking fund. An external sinking fund is a fund established and maintained by setting aside funds periodically in an account segregated from licensee assets and outside the licensee's administrative control in which the total amount of funds would be sufficient to pay decommissioning costs at any time termination of operation is expected. An external sinking fund may be in the form of a trust, escrow account, government fund, certificate of deposit, or deposit of government securities. . . .
- (4) In the case of Federal, State, or local government licensees, a statement of intent . . . indicating that funds for decommissioning will be obtained when necessary.<sup>2</sup>

With the exception of the financial test component of the parent company guarantee, the terms and conditions of the various financial mechanisms that may be used as proof of financial assurance for decommissioning are provided in guidance.<sup>3</sup> The financial test requirements are provided in the regulations, at 10 CFR Part 30 Appendix A, and are referenced in other pertinent Parts.<sup>4</sup>

The parent company guarantee provided for under the decommissioning financial assurance rules contains two elements: a guarantee and an underlying financial test submission. Under this mechanism, a corporate parent of the licensee may submit a guarantee to NRC affirming that the corporate parent will pay the decommissioning costs if the licensee does not pay. For such a guarantee to be acceptable, the corporate parent must demonstrate that it has adequate financial resources to cover the costs of

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<sup>2</sup> 53 Fed. Reg. 24018, June 27, 1988.

<sup>3</sup> U.S. Nuclear Regulatory Commission, Regulatory Guide 3.66, Standard Format and Content of Financial Assurance Mechanisms Required For Decommissioning Under 10 CFR Parts 30, 40, 70, and 72 (June 1990).

<sup>4</sup> The decommissioning rules do not define "parent company." NRC has provided in Regulatory Guide 3.66 that in order to qualify as a parent company a firm must demonstrate that it has "majority control of the licensee's voting stock." Regulatory Guide 3.66, pp. 3-21 and 3-23.

decommissioning activities. The corporate parent makes such a demonstration when it provides specified documentation to NRC that it passes a financial test that measures the financial strength of the firm.

The financial test currently requires a parent corporation to demonstrate that it possesses tangible net worth of at least \$10 million, as well as tangible net worth and net working capital at least six times the decommissioning cost estimate. Tangible net worth is defined as net worth minus goodwill, patents, trademarks, and copyrights. It must show that it possesses assets in the United States amounting to at least 90 percent of its total assets or at least six times the sum of the current decommissioning cost estimates being covered by the test. The parent corporation also must show that certain specified financial ratios meet or exceed certain criteria. In the alternative, the parent corporation must show that it possesses tangible net worth of at least \$10 million, as well as tangible net worth at least six times decommissioning costs. It also must show that it possesses assets in the United States amounting to at least 90 percent of its total assets or at least six times the sum of the current decommissioning cost estimates being covered by the test. Finally, it must show that it has a current investment grade rating for its most recent bond issuance from one of two major bond rating organizations. The test must be passed annually.

In March 1990, the General Electric Corporation and the Westinghouse Electric Corporation each requested an exemption from the requirements of the decommissioning regulations to permit them to satisfy the financial assurance requirements through a self-guarantee. The Commission denied the requests for exemptions. GE and Westinghouse then submitted a request for reconsideration in August 1990. The request for reconsideration was also denied by the Commission. GE and Westinghouse then submitted a Joint Petition for Rulemaking, which was docketed on July 11, 1991 (Docket No. PRM-30-59).<sup>5</sup> The Commission has directed the NRC staff to evaluate potential self-guarantee criteria. This report provides the results of analysis conducted to assist the staff in that evaluation.

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<sup>5</sup> Petition for Rulemaking Under 10 C.F.R. 2.802, docketed July 11, 1991.

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## 1.2 Proposed Test for Self- Guarantee

GE and Westinghouse propose criteria for a self-guarantee, to be available for any licensee, other than an electric utility licensed to operate a reactor under 10 CFR Part 50. The criteria, some of which parallel current requirements, are:<sup>6</sup>

- 1) The self-guarantee may not be used "in any situation where the applicant or licensee has a parent company holding majority control of the voting stock of the company."
- 2) The applicant or licensee must furnish its own guarantee that funds will be available for decommissioning costs. The terms of this self-guarantee must provide that:
  - (a) The self-guarantee will remain in force unless written notice of cancellation is sent to NRC. The self-guarantee, however, must remain in force for 120 days after NRC receives notice of cancellation. [parallels current requirements]
  - (b) Alternative financial assurance will be provided within 90 days after NRC receives notice of cancellation of the self-guarantee. [parallels current requirements]
  - (c) The self-guarantee and supporting financial test will remain in force until the Commission has terminated the license or until another acceptable financial assurance method has been put into effect by the licensee. [parallels current requirements]
  - (d) The licensee will provide the Commission with copies of all reports filed with the Securities and Exchange Commission under Section 13 of the Securities Exchange Act of 1934.
  - (e) The licensee will provide notice to the Commission within 20 days after the rating of its most recent bond issuance ceases to be A or above by either Standard and Poor's or Moody's.
- 3) The applicant or licensee demonstrates that it passes a financial test. All of the following terms of the test must be satisfied:
  - (a) The company must have a current rating for its most recent bond issuance of AAA, AA, or A, as issued by Standard and Poor's or Aaa, Aa, or A, as issued by Moody's.

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<sup>6</sup> 56 Fed. Reg. 48446.

- (b) The company must have tangible net worth at least 10 times the current decommissioning cost estimate, or the current amount required if certification is used.
  - (c) The company must have tangible net worth of at least \$1 billion.
  - (d) The company must have assets located in the United States amounting to at least 90 percent of total assets or at least 10 times the current decommissioning cost estimates, or the current amount required if certification is used.
- 4) The applicant or licensee must continue to satisfy certain procedural requirements:
- a) The company's independent certified public accountant must compare the data used by the company in the financial test with the amounts in the company's independently audited year end financial statements. [parallels current requirements]
  - b) The company must notify NRC within 90 days of any matters coming to the attention of the auditor that cause the auditor to believe that the data specified in the financial test should be adjusted and that the company no longer passes the test. [parallels current requirements]
  - c) The company must have at least one class of equity securities registered under the Securities Exchange Act of 1934.
  - d) After the initial financial test, the company must repeat the passage of the test within 90 days after the close of each succeeding fiscal year. [parallels current requirements]
  - e) If the company no longer passes the financial test, it must send notice of intent to establish alternate financial assurance. Such notice must be sent within 90 days after the end of the fiscal year for which the year end data show that the company no longer meets the financial test requirements. The licensee must provide alternate financial assurance within 120 days after the end of such fiscal year. [parallels current requirements]

Table 1.1 Comparison of current financial test criteria for parent guarantors of NRC licensees with proposed self-guaranteed financial test criteria

Current NRC Parent Guarantee Financial Test Criteria Alternative 1:

- (A) Two of the following three ratios:
  - (1) a ratio of total liabilities to net worth less than 2.0;
  - (2) a ratio of the sum of net income plus depreciation, depletion, and amortization to total liabilities greater than 0.1; and,
  - (3) a ratio of current assets to current liabilities greater than 1.5; and
- (B) Net working capital and tangible net worth each at least six times the sum of current decommissioning cost estimates being covered by the test; and
- (C) Tangible net worth of at least \$10 million; and
- (D) Assets in the United States amounting to at least 90 percent of total assets or at least six times the sum of the current decommissioning cost estimates being covered by the test.

Current NRC Parent Guarantee Financial Test Criteria Alternative 2:

- (A) A current rating for the most recent bond issuance of AAA, AA, A, or BBB as issued by Standard and Poor's or Aaa, Aa, A, or Baa as issued by Moody's; and
- (B) Tangible net worth at least six times the sum of current decommissioning cost estimates being covered by the test; and
- (C) Tangible net worth of at least \$10 million; and
- (D) Assets in the United States amounting to at least 90 percent of total assets or at least six times the sum of the current decommissioning cost estimates being covered by the test.

Proposed Self-Guarantee Financial Test Criteria:

- (A) A current rating for the most recent bond issuance of AAA, AA, A as issued by Standard and Poor's or Aaa, Aa, A as issued by Moody's; and
- (B) Tangible net worth at least ten times the sum of current decommissioning cost estimates being covered by the test; and
- (C) Tangible net worth of at least \$1 billion; and
- (D) Assets in the United States amounting to at least 90 percent of total assets or at least 10 times the sum of the current decommissioning cost estimates being covered by the test.



### 1.3 Issues Raised By Petition

The issues raised by the petition for rulemaking also are presented by the NRC in its Notice of Receipt of Petition for Rulemaking.<sup>7</sup>

- 1) Under the current rule, parent corporations that are themselves NRC licensees are unable to provide self-guarantees of decommissioning funding costs. However, \*less financially strong institutions, such as insurance companies, banks, and savings and loan institutions are permitted to guarantee the decommissioning funding costs of NRC licensees without providing any evidence of financial strength.\*<sup>8</sup>
- 2) Under the current rule, an NRC licensee that is a parent company may provide a guarantee to its subsidiaries who are also NRC licensees. However, the parent company guarantee may be provided \*solely because these parent companies are legal entities distinct from the subsidiary licenses [sic] whose decommissioning funding they guarantee.\*<sup>9</sup>
- 3) \*The existing rule compels GE and Westinghouse either to restructure their licensed activities into less financially secure licensee-subsidiaries (for which the petitioners could then provide parent guarantees) or to obtain external assurances at a cost (in future years, literally hundreds of thousands of dollars annually in non-recoverable changes) that will be quite significant over the lives of their licensed activities.\*<sup>10</sup>

GE and Westinghouse are requesting that NRC amend the decommissioning financial assurance regulations to allow licensees to provide self-guarantees of decommissioning funding. They base the request on several arguments, summarized in the Notice of Receipt of Petition for Rulemaking as follows:

- 1) \*[W]hatever incremental assurance of funding availability may be achieved by a separate parent guarantee may also be achieved by a licensee's self-guarantee when the licensee can show that it is

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<sup>7</sup> 56 Fed. Reg. 48445, September 25, 1991. The Federal Register Notice summarizes arguments presented in the petition at pp. 4-8.

<sup>8</sup> 56 Fed. Reg. 48445.

<sup>9</sup> 56 Fed. Reg. 48445. Petition for Rulemaking Under 10 C.F.R. 2.802, p. 4.

<sup>10</sup> Petition for Rulemaking Under 10 C.F.R. 2.802, p. 7.

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substantially less likely to face bankruptcy than a parent guarantor qualifying under Appendix A to 10 CFR part 30.<sup>11</sup>

- 2) \*The stricter financial test criteria [for self-guarantees proposed by the petitioners] . . . more than offset the benefits derived from segregating a parent company's assets in the event of a bankruptcy by the subsidiary licensee.<sup>12</sup>
- 3) Bond ratings provide an effective early warning system concerning changes in a licensee's financial condition.

#### 1.4 Issues Raised by Commenters on Petition for Rulemaking

Public comments were received from September 25 to November 15, 1991, on the Notice of Receipt of Petition for Rulemaking. The comments received in response to the Notice raised several additional issues.

##### Self-guarantees should not be allowed.

- The possibility of a takeover and breakup of a self-guaranteeing licensee by another company makes self-guarantees an ineffective financial assurance mechanism. [M.I. Lewis]
- Parent guarantees, while more expensive than self-guarantees, have been shown by experience to provide a higher degree of assurance. [M.I. Lewis]

##### Self-guarantees should be allowed.

- Although self-guarantees should be allowed, the financial test proposed in the petition should not be adopted. Because a number of NRC licensees that would otherwise be able to qualify under the proposed self-guarantee test will be unable to do so because they have tangible net worth less than \$1 billion, that requirement should be revised. A net worth requirement of 10 times the estimated decommissioning costs for a licensee with a single facility, or a net worth requirement of \$500 million to \$1 billion for licensees with multiple facilities, depending on the number of facilities, should be considered instead. [Allied Signal Incorporated]

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<sup>11</sup> 56 Fed. Reg. 48448.

<sup>12</sup> 56 Fed. Reg. 48448.

- If the financial test proposed in the petition is adopted, it should be revised to make it more fair. An investment grade bond rating not lower than BBB from Standard and Poor's or Baa from Moody's should be substituted. Second, the minimum tangible net worth standard should be reduced from \$1 billion to at most \$100 million. [Harris Corporation]
- The arguments presented by the petition in support of allowing self-guarantees are well reasoned and persuasive. However, the financial test proposed in the petition is too restrictive and will benefit very few companies. [Cabot Corporation]
- The existing criteria for parent company guarantee adequately ensure that sufficient resources will be available to properly decommission licensed sources and should be allowed for self-guarantees as well as parent guarantees. [Harris Corporation]
- The adequacy of financial assurance provided by either a parent guarantee or a self-guarantee is based on the value of the assets securing the decommissioning obligation. If the assets are held in two separate pools, each technically owned by a different but related company, the level of financial security provided does not increase in any significant measure. The financial and other elements of a parent and subsidiary company are likely to be substantially the same and their financial success or weakness will be interdependent. [Harris Corporation]
- The same financial test now applicable to parent guarantors should be extended to self-guarantors. The current requirements are sufficiently stringent. These requirements were adopted from EPA's hazardous waste program, and EPA has a body of experience with financial assurance matters. [Cabot Corporation]
- Because NRC-licensed facilities may be subject to EPA's RCRA program as mixed waste facilities, the two agencies should maintain consistent requirements for financial assurance. [Cabot Corporation]
- Because NRC-licensed facilities may be regulated by EPA or EPA-authorized states because of hazardous chemicals, EPA's experience with financial assurance should be considered. [Dundulis]

- If NRC adopts a new financial test for self-guarantors, a net worth requirement of \$1 billion is too high; a minimum of \$25 million or at most \$50 million should be adopted. There is no justification for not allowing bond ratings of BBB and Baa, which are considered investment grade by the market. The increase of minimum net worth from 6 to 10 times estimated decommissioning costs lacks justification. [Cabot Corporation]
- If a self-guarantee is allowed, reviews of whether a licensee passes the financial test should take place more frequently than only at license renewal, and firms should be required to notify NRC of sudden increases in company debt. [Godwin]
- If a self-guarantee is allowed, NRC should consider how long firms that passed the financial test but subsequently cease to pass the test should be given in which to obtain alternative financial assurance. [Godwin]
- If a self-guarantee is allowed, NRC should consider if the bankruptcy rule needs to be amended in any way to address self-guarantees. [Dundulis]
- If a self-guarantee is allowed, NRC should consider whether parent companies retain liability for debts of wholly-owned subsidiaries. [Quillin]

### 1.5 Issues Evaluated

This report evaluates some of the issues raised by the petitioners and the commenters. **Chapters 2 and 3** examine the estimated assurance risk of the financial assurance mechanisms currently authorized by the decommissioning financial assurance requirements and the degree of assurance provided by the proposed financial test. Chapter 2.0 describes the methodology used to develop the estimates of the assurance risk of the financial mechanisms. Chapter 3.0 provides the results of the analysis. Estimates of the assurance risk are provided for financial assurance mechanisms currently authorized for decommissioning. Estimates are also provided for self-guarantee and parent guarantee alternatives, including alternatives proposed by commenters on the Notice of Petition for Rulemaking. **Chapter 4** provides estimates of the numbers of materials licensees that potentially could make use of the proposed financial test and the financial test currently authorized for parent guarantors, if allowed to self-guarantee. It also provides estimates of the numbers of NRC licensees that might be able to use various self-guarantee options for a range of decommissioning cost alternatives. **Chapter 5** presents



estimates of the costs to NRC and to licensees of the alternate current and proposed financial assurance mechanisms. **Chapter 6** examines the proposed components of the financial test and associated methods of implementation.

## 2 METHODOLOGY FOR COMPARING RELATIVE ASSURANCE PROVIDED BY FINANCIAL ASSURANCE ALTERNATIVES

This chapter describes the methods ICF used for quantifying the financial assurance risk provided by the financial mechanisms currently allowed under NRC regulations and the assurance risk associated with the self-guarantee proposed by General Electric and Westinghouse in their petition for rulemaking. The methodology provides a means for estimating and comparing the assurance provided by the proposed self-guarantee relative to each of the financial mechanisms currently allowed by NRC. In addition, in order to most fully evaluate the self-guarantee proposed by General Electric and Westinghouse, ICF also evaluated the assurance provided by a self-guarantee accompanied by the same financial test used in NRC's parent company guarantee, a mechanism not currently allowed by NRC.

\*Assurance\* is a concept closely related to security; something given, deposited, or pledged to make certain the performance of an obligation or the payment of a debt. In the case of financial assurance for decommissioning, licensees are required either to deposit funds in advance or to obtain the pledge of another firm that funds will be available when needed. The licensee always retains primary responsibility for performance of the decommissioning regardless of the method of assurance used. The issue examined through the following methodology is the degree of assurance that each of the financial mechanisms under investigation is likely to attain. Because of the intrinsic differences between deposits and pledges, a separate but similar methodology is necessary for each. In both cases, the degree of assurance is measured as a probability that the desired event -- payment of decommissioning costs -- will occur in the event the licensee fails to perform decommissioning.

In both cases, certain risks are excluded from the analysis. They include the following:

- **The possibility that the financial mechanism suffers from intrinsic drafting flaws that will render it ineffective.** In general, the text of the financial mechanisms recommended for use by NRC has been carefully reviewed by a number of Federal and State agencies and private parties. The analysis assumes that the mechanisms will not be rendered ineffective by heretofore undetected errors or omissions in their terms and conditions.
- **The possibility that the financial mechanism has been improperly executed.** Financial mechanisms, otherwise

properly drafted, may be rendered ineffective as a result of improper execution (e.g., missing signatures). The analysis assumes that careful review by NRC Regions and Headquarters will detect any such errors or omissions.

- **The possibility that the financial mechanism has been issued by an unauthorized provider.** In general, providers of financial mechanisms are subject to supervision and regulation by a number of different Federal and State agencies. NRC stipulates in guidance that providers must be regulated. The analysis assumes that the mechanisms will not be rendered ineffective as a result of issuance by a provider who is evading regulatory requirements.
- **The possibility of collusion or fraud.** The effectiveness of well drafted and executed financial mechanisms could be subverted by illegal diversions of funds (e.g., embezzlement by a trustee). The analysis does not attempt to quantify the risk posed by this possibility.
- **The possibility of economic conditions substantially reducing the effectiveness of financial assurance.** The effect of inflation on the degree of assurance provided by financial mechanisms is not included in the analysis. The NRC decommissioning cost estimating procedures, as well as periodic adjustments to the certification amounts, are designed to ensure that the amount of assurance provided is sufficient to carry out decommissioning. This analysis concentrates on whether the assurance will in fact be provided.

In summary, the analysis seeks to quantify and compare the degree of assurance provided by properly designed and executed financial mechanisms by evaluating the types of systemic failure to which they may be subjected and the likelihood of those failures. For each category of financial mechanism, the analysis assumes an initial probability of 1.0 that the mechanism will function fully effectively to supply the necessary amount of financial assurance when needed. The analysis then develops a final estimated assurance risk that the mechanism will not function with full effectiveness.

## 2.1 Methodology for Evaluation of Assurance Provided by Prepayment Mechanisms

Prepayment mechanisms include trust funds, escrow accounts, government funds, certificates of deposit, and deposits of government securities. Each is described in detail in Chapter 3. Each, by definition, involves the deposit in advance of cash or liquid assets sufficient to pay decommissioning costs into the hands of a third party. These mechanisms vary, however, with respect to the identity of the third party, the degree to which the funds are kept separate from other funds in the control of the third party, and the degree to which the funds are invested. Funds in a prepayment mechanism are therefore exposed to three categories of risks:

- (1) Risk that funds placed in the hands of the depository are accessible to creditors of the licensee;
- (2) Risk that investment of the prepaid funds will lead to a decline in their value; and
- (3) Risk that if the funds in the prepayment mechanism decline in value, the licensee will not deposit sufficient additional funds to bring their value back up to the required level.

For the first category of risk, NRC has previously assessed each of the prepayment mechanisms and concluded that there is a very low risk that funds placed in the hands of the depository institution are potentially accessible by a creditor of the licensee for purposes other than financial assurance for decommissioning. That assessment is reported in the description of the mechanisms. The risk is determined to be sufficiently small so that it is not quantified in the calculation of assurance risk.

For the second category of risk, a two-step process was followed. First, each mechanism was reviewed to determine if its funds could be invested by the depository institution. Second, historical materials were reviewed to develop an estimate of the "investment risk" associated with the categories of investment allowed. Investment risk is distinguished from inflation by its relation to the fluctuations of the price of investments.

For the third category of risk, ICF developed a baseline failure rate for firms, calculated by firm size as measured by net worth.

Finally, ICF estimated the assurance risk by combining an estimate of the likelihood that licensees would be unable to fulfill their obligations



(i.e., due to bankruptcy) with an estimate of the probability that the invested funds would decline in value.

## 2.2 Methodology for Evaluation of Assurance Provided by Surety, Insurance, and Other Guarantee Methods

Surety, insurance, or other guarantee methods include surety bonds, letters of credit, lines of credit, and parent company guarantees backed by a financial test. Each is described in detail in Chapter 3. Each involves a promise by a third party that the third party will pay decommissioning costs if certain pre-specified conditions occur. Such funds, when paid, go directly into a standby trust fund. These mechanisms vary primarily with respect to the identity of the third party. Funds in a surety mechanism are exposed to three categories of risks:

- (1) Risk that the funds provided by the third party will be accessible to other creditors of the licensee;
- (2) Risk that the third party will not be capable of satisfying the obligation at the time it falls due; and
- (3) Because the surety, insurance, and other guarantee mechanisms serve as backups to the licensee's own resources, the assurance risk to NRC posed by these mechanisms also is affected by the risk of failure by the licensee.

The first category of risk has previously been assessed by NRC and is considered to be sufficiently small so that it is not quantified in the calculation of assurance risk, except for the corporate parent guarantee.

Assurance risk was estimated as the combined likelihood that the provider of the assurance mechanism would not satisfy the obligation and that the licensee would be insolvent. For parent guarantees ICF also analyzed the special case of the assurance risk posed by a corporate parent whose financial viability is dependent on the financial health of its subsidiary, although the intent of the current NRC parent guarantee is to allow only parent guarantors financially independent of their licensee subsidiaries to provide assurance for the costs of decommissioning.

2.3 Methodology for  
Evaluation of  
Assurance  
Provided by  
Self-guarantees

Self-guarantees represent situations in which a firm demonstrates that it possesses sufficient resources to cover its own obligations without resort to a prepayment or to a surety, insurance, or guarantee by a third party. The demonstration is usually provided by satisfaction of the terms of a financial test. Assurance provided by a self-guarantee is exposed to the risk that a decline in the financial condition of the self-guarantor will not be identified in time so that a prepayment or third party financial assurance mechanism can be obtained to replace the self-guarantee.

ICF analyzed the self-guarantee by evaluating the "misprediction" rates of components of financial tests proposed for use to screen potential self-guarantors and by evaluating the baseline failure rates for firms, calculated by firm size as measured by net worth. In addition, ICF evaluated the likelihood that a parent corporation, capable of providing a self-guarantee for its own obligations, would be threatened by the insolvency of its subsidiaries.

2.4 Methodology for  
Calculation of  
Confidence  
Bounds of  
Assurance Risk

Confidence bounds are presented for the estimates of assurance risk. The confidence bounds were calculated according to a process that varied slightly depending on the type of financial assurance mechanism.

(A) The confidence bounds for the assurance risk of surety bonds, insurance, standby letters of credit, and lines of credit were calculated in the following way:

Step 1: Data on the number of failures of the relevant institution (i.e., surety firms, insurance firms, banks, or savings and loan institutions) were obtained for the period 1984 through 1990. From this information, failure rates were calculated for each of those years ( $X = x_1, \dots, x_7$ )

Step 2: The above failure rates were combined with manufacturing firm failure rates for the period 1984 through 1990 ( $Y = y_1, \dots, y_7$ ) to create a new distribution ( $XY = x_1y_1, \dots, x_7y_7$ ). Distribution XY is the assurance risk of the relevant mechanism. In the case of surety bonds with insurance guarantee funds and insurance with insurance guarantee funds, distribution XY was further multiplied through by the failure rates of insurance companies before moving on to Step 3.

Step 3: The mean and standard deviation of distribution XY were calculated, and 95 percent confidence bounds were obtained using the following formula:

$$\text{Mean}(XY) \pm t_{0.25} * s / (n)^{0.5}$$

where  $t_{0.25}$  is the upper 0.25 (= 0.5/2) point of the t distribution with degrees of freedom = n-1; n is the number of observations (in this case 7); and s is the standard deviation of distribution XY.

(B) The confidence bounds for the NRC parent guarantee and the self-guarantee alternatives were calculated in the same way as above, except that Step 1 was not required and Step 2 varied in the following ways:

- In the case of the proposed EPA financial test and the self-guarantee using the NRC financial test, the firm failure rates for the period 1984 through 1990 were multiplied by the misprediction rate of each test. The misprediction rate of a test reflects the percentage of bankrupt firms able to pass the financial test in any of the three years prior to the year of bankruptcy. This rate is 0.27 in the case of the proposed EPA financial test and 0.37 in the case of a self-guarantee using the NRC financial test.<sup>13</sup> In the case of the proposed EPA financial test with a non-independent subsidiary and a self-guarantee using the NRC financial test with a non-independent subsidiary, the resulting distributions were multiplied by two.
- In the case of the NRC parent guarantee, the firm failure rates for the period 1984 through 1990 were multiplied by themselves and then by the misprediction rate (0.37).

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<sup>13</sup> The misprediction rate of the current NRC financial test was estimated on the basis of its similarity to the financial test adopted by the Environmental Protection Agency in 1982, whose misprediction rate was calculated as 0.37. EPA has recently proposed changes designed, in part, to achieve a lower misprediction rate. For a discussion of the derivation of these misprediction rates, see 47 Fed. Reg. 16544, April 16, 1982, and 56 Fed. Reg. 30201, July 1, 1991.

### 3 EVALUATION OF FINANCIAL ASSURANCE MECHANISMS

This chapter provides an evaluation of the estimated assurance risk for the following financial assurance alternatives:

- No financial assurance mechanism. Section 3.1 provides a baseline estimate, for comparison with other mechanisms, of the failure rate for firms, calculated by firm size as measured by net worth.
- Prepayment financial assurance mechanisms currently authorized by NRC. NRC currently allows licensees to deposit funds or government securities in trusts, escrow accounts, government funds, or certificates of deposit. Section 3.2.1 provides a description of the key characteristics of these mechanisms; Section 3.2.2 provides an evaluation of their assurance risk.
- Surety, insurance, and guarantee mechanisms currently authorized by NRC. NRC currently allows licensees to provide pledges from third parties that the third party will supply funds for decommissioning if the licensee does not do so. The financial assurance mechanisms authorized for this purpose are surety bonds, insurance, letters of credit, lines of credit, and parent company guarantees. Section 3.3.1 provides a description of the key characteristics of these mechanisms; Section 3.3.2 provides an evaluation of their assurance risk.
- Self-guarantee mechanism proposed by the Petition for Rulemaking. NRC currently does not allow licensees to provide self-guarantees supported by a financial test. Section 3.4 provides a description of the key characteristics of the self-guarantee proposed in the Petition for Rulemaking and an evaluation of the assurance risk of that mechanism.
- Self-guarantee mechanisms proposed by public comments on the Petition for Rulemaking. Public comments on the Notice of Petition for Rulemaking suggested several alternative self-guarantee provisions, supported by alternative formulations of the financial test. Section 3.5 provides a description of these self-guarantee alternatives and an evaluation of their assurance risks.

This chapter concludes with a comparison of the assurance risks presented by all of the financial mechanisms examined in the analysis.



### 3.1 No Financial Assurance Mechanism

This section presents an estimate of the relationship between firm size (as measured by net worth) and firm failure rates (defined as the percentage of firms likely to go bankrupt in any given year). This baseline failure rate serves as the point of comparison for evaluating the relative assurance risk of alternative financial assurance mechanisms.

#### 3.1.1 Industrial Categories of NRC Materials Licensees

To calculate estimated failure rates, ICF first sought to specify the types of industries that contain firms that have materials licensees under 10 CFR Part 30 (by-product materials licensees), Part 40 (source materials licensees), Part 70 (special nuclear materials licensees), and Part 72 (independent spent fuel storage installations). Industries were identified by matching NRC program codes (as described in the NRC reference guide "Program Codes Used in Materials Licensing and Inspection Programs") with SIC code descriptions<sup>14</sup>. This was supplemented by limited information obtained from other sources.<sup>15</sup>

Table 3.1 lists the industries (and their SIC codes) expected to have materials licensees under Parts 30, 40, 70, or 72. The industries included in Table 3.2 account for the majority of licensees under Parts 40, 70, and 72. Part 30 licensees are more numerous and diverse than licensees under Parts 40, 70, and 72.

In addition to manufacturing firms, firms in several other industrial categories also are licensees:

- Mining facilities (SIC code 10 covers all metal mining activities; SIC code 1094 covers mining and milling of uranium/radium/vanadium ores;
- Colleges and universities (SIC codes 8221 and 8222);
- Hospitals (SIC code 806) and outpatient care facilities (SIC code 8081);

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<sup>14</sup> Office of Management and Budget Standard Industrial Classification Manual. Although a 1987 edition of this manual is available, the 1972 edition was used to provide compatibility with other data sources used in related analyses.

<sup>15</sup> NUREG/CR-4958 Impact of Proposed Financial Assurance Requirements on Nuclear Materials Licensees, Pacific Northwest Laboratory, September, 1987, Table C-7.

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Table 3.1 Industries containing NRC licensees under Parts 30, 40, 70, and 72 (by SIC code)

Part 30

<u>SIC CODE</u>	<u>INDUSTRY</u>
074	Veterinary Services
1311	Crude Petroleum and Natural Gas
1381	Drilling Oil and Gas Wells
1382	Oil and Gas Field Exploration Services
333	Primary Smelting and Refining of Nonferrous Metals
3443	Fabricated Plate Work (Boiler Shops)
367	Electronic Components and Accessories
369	Miscellaneous Electrical Machinery, Equipment and Supplies
3811	Engineering, Laboratory, Scientific, and Research Instruments and Associated Equipment
495	Sanitary Services
7391	Research and Development Laboratories
7397	Commercial Testing Laboratories
8011	Offices and Clinics of Doctors of Medicine
8031	Offices of Osteopathic Physicians
8044	Offices of Other Health Practitioners
806	Hospitals
8071	Medical Laboratories
8081	Outpatient Care Facilities
8221	Colleges, Universities, and Professional Schools
8222	Junior Colleges and Technical Institutes
8922	Noncommercial Educational, Scientific, and Research Organizations

Part 40

<u>SIC CODE</u>	<u>INDUSTRY</u>
10	Metal Mining
281	Industrial Organic Chemicals
333	Primary Smelting and Refining of Nonferrous Metals
3443	Fabricated Plate Work (Boiler Shops)

Table 3.1 Industries containing NRC licensees under Parts 30, 40, 70, and 72 (by SIC code)  
(continued)Part 70

<u>SIC CODE</u>	<u>INDUSTRY</u>
10	Metal Mining
1094	Mining and Milling of Uranium/Radium/Vanadium Ores
1381	Drilling Oil and Gas Wells
1382	Oil and Gas Field Exploration Services
281	Industrial Organic Chemicals
3811	Engineering, Laboratory, Scientific, and Research Instruments and Associated Equipment
4911	Electric Services
7391	Research and Development Laboratories
7397	Commercial Testing laboratories
806	Hospitals
8071	Medical Laboratories
8081	Outpatient Care Facilities
8221	Colleges, Universities, and Professional Schools
8222	Junior Colleges and Technical Institutes
8922	Noncommercial Educational, Scientific, and Research Organizations

Part 72

<u>SIC CODE</u>	<u>INDUSTRY</u>
4911	Electric Services

- Noncommercial educational, scientific, and research organizations (SIC code 8922); and
- Electric utilities (SIC code 4911).

ICF also obtained and reviewed SIC codes directly for all firms that passed any of the financial test alternatives that were analyzed. This information indicated that numerous firms fell into SIC manufacturing categories, especially SIC codes 281 to 291 and SIC codes 361 to 385.

These results indicate that although a substantial proportion of NRC materials licensees are not included in manufacturing SIC categories, those firms that are most likely to seek to provide self-guarantees do fall into the manufacturing categories.

### 3.1.2 Baseline Failure Rate for Firms Without Financial Assurance Mechanism

In order to provide a baseline estimate of the likelihood that licensees without financial assurance would be unable to pay decommissioning costs, a baseline business failure rate was calculated for firms of different sizes.

In theory, business failure rates might be calculated easily for various net worth categories by dividing the average annual number of business failures by the total number of firms in each net worth category. However, two problems make that approach infeasible:

- (1) Complete data on failures and number of firms are not available by net worth category; and
- (2) Net worth typically falls sharply in the years just prior to bankruptcy (insolvent firms, by definition, have negative net worth), so net worth at the time of failure is not a useful basis for analyzing the percentage of firms of a certain size that fail in a particular year.

To overcome these two problems, available financial profiles of firms by annual sales, total assets, and total liabilities were used to derive failure rates by net worth category. The analysis was based on three sources:

- (1) 1982 and 1987 Census data on the total number of manufacturing firms segmented by annual sales categories;<sup>16</sup>

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<sup>16</sup> 1982 Enterprise Statistics, U.S. Department of Commerce, Bureau of the Census.



- (2) 1987 Census data segmented by total assets;<sup>17</sup> and
- (3) Dun and Bradstreet (D&B) data on manufacturing firm failures segmented by total liabilities at the time of bankruptcy.<sup>18</sup>

Rather than associating bankruptcies with the net worth of the bankrupt firm at the time of bankruptcy, total liabilities at the time of failure were used to estimate the net worth of bankrupt firms two or three years prior to bankruptcy. Total liabilities is a useful starting point for such a calculation because total liabilities can be expected to remain relatively stable; a failing firm cannot reduce liabilities substantially and creditors will not allow the firm to increase liabilities. To verify this assumption, ICF reviewed a database that it had previously compiled containing financial information about bankrupt firms. The bankrupt firm sample contains financial data on the three years prior to bankruptcy for each of thirty-four firms with net worth prior to bankruptcy of at least \$10 million. Analysis of this sample confirmed that total liabilities for most of these firms did not change substantially over the three years prior to bankruptcy.

To determine the specific net worth categories that best correspond to the data segmented by sales and total liabilities, ICF also analyzed the Firm/Financial/Facility Database (F3DB), a data base containing financial data on over 2000 manufacturing firms managed by ICF for EPA. The data showed that more than 90 percent of firms with less than \$10 million in net worth also had less than \$50 million in annual sales and less than \$15 million in total liabilities. Consequently, the failure rate for firms with less than \$10 million in net worth was derived from the average number of failures for firms with less than \$15 million in total liabilities (D&B data) divided by the total number of firms with less than \$50 million in sales (1982 and 1987 Census data). To develop failure rates for net worth categories above \$100 million, ICF obtained recent failures data from D&B and determined the net worth categories that best correspond to the 1987 Census data segmented by total assets. ICF also reviewed available research on debt ratios, and employed the accounting identity that total assets must equal total liabilities (debt) plus net worth. A wide variety of manufacturing firms maintain average debt ratios of 60 percent (i.e., 60 percent of their

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<sup>17</sup> 1987 Enterprise Statistics, U.S. Department of Commerce, Bureau of the Census, ES87-1 Large Companies, issued August 1990 and ES87-3 Company Summaries, issued June 1991.

<sup>18</sup> Dun & Bradstreet's annual Business Failure Record was used for the years 1984 through 1987. ICF also obtained additional data directly from D&B's business failure database.

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assets are financed with debt, and 40 percent are financed by net worth).<sup>19</sup> ICF therefore derived the failure rate for firms with \$20 to \$100 million in net worth from the average number of failures for firms with \$30 to \$150 million in total liabilities (D&B data) divided by the total number of firms with \$50 to \$250 million in total assets (1987 Census data). This methodology, based on 1987 Census data and D&B failures data for 1988 through 1990, was used to calculate revised failure rates for several net worth categories.

Estimates of failure rates for firms with more than \$100 million in net worth should be used with extreme caution, because there is an insufficient number of bankruptcies of this size to develop reliable statistics. D&B does report one failure for firms with more than \$1 billion in net worth in 1986 and no failures for firms with liabilities greater than \$1.5 billion in 1988 through 1990. ICF's bankrupt firm sample contains several firms that have failed over the past two decades after reporting more than \$1 billion in net worth in one of the three years prior to bankruptcy.

Estimates of the assurance risk (i.e., failure rate) from 1984 through 1990 are presented in Table 3.2. The average annual number of failures in each net worth category was calculated from D&B failures data for 1984 through 1990, and the total number of firms reflect both 1982 and 1987 Census data.<sup>20</sup>

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<sup>19</sup> Based on research reported in "Draft Regulatory Impact Analysis for Proposed Rulemaking on Corrective Action," U.S. EPA Office of Solid Waste, September 13, 1988, p. C-23.

<sup>20</sup> The 1982 Census data segmented by sales indicates that there were 515 manufacturing firms with net worth greater than \$100 million, and 1165 firms with net worth greater than \$20 million but less than \$100 million. The 1987 Census data segmented by assets indicates that there were 788 firms with net worth greater than \$100 million, and 1281 firms with net worth greater than \$20 million but less than \$100 million. The business failure rates in Table 3.3 are based on 1982 Census data on the number of firms with less than \$20 million in net worth, and on an average of 1982 and 1987 Census data on the number of firms with more than \$20 million in net worth (i.e., 651 firms with net worth greater than \$100 million, and 1223 firms with net worth greater than \$20 million but less than \$100 million).

Table 3.2 Estimated assurance risk of no financial assurance mechanism (1984 through 1990)

Net Worth (\$MM)	Assurance Risk	Confidence Bounds of Assurance Risk	
		Lower Bound	Upper Bound
0 - 10	1.53%	1.35%	1.71%
10 - 20	1.24%	0.74%	1.74%
20 - 100	1.02%	0.74%	1.30%
100 - 400	0.81%	0.32%	1.30%
400 - 1 billion	0.55%	0.00%	1.19%
> 1 billion	0.14%	0.00%	0.48%

The analysis of firm failure rates indicates that the assurance risk of no financial assurance mechanism ranges from 0.14 percent to 1.53 percent, depending on firm size.<sup>21</sup>

### 3.2 Prepayment Mechanisms

Section 3.2.1 describes the key characteristics of prepayment mechanisms. Section 3.2.2 presents the analysis and results of the evaluation of assurance risk associated with those mechanisms.

#### 3.2.1 Description of Key Characteristics of Prepayment Mechanisms

Prepayment mechanisms currently allowed under NRC regulations include trust funds, escrow accounts, government funds, certificates of deposit, and deposits of government securities. The feature common to these mechanisms is that sufficient monies are set aside in advance to cover the obligations being assured.

<sup>21</sup> This analysis is based on data for manufacturing firms only, and may not be applicable to other industries. In particular, the very low bankruptcy rates recorded for large manufacturing firms may not be a good basis for drawing conclusions with respect to electric utilities. Research has identified only six failures over the past decade involving firms with net worth of more than \$1 billion. Two utilities, Washington Public Power Supply System and Public Service Company of New Hampshire, accounted for two of these six failures. Among the remaining four firms, Texaco could be considered a strategic bankruptcy involving no real losses to creditors. Thus, public utilities accounted for 40 percent of all of the very large failures (the other three non-utility failures were Penn Central, LTV, and Manville). In order to assess the sensitivity of the results for firms over \$1 billion in net worth, ICF also reviewed the Fortune 500 reports for industrial firms with stockholders equity in excess of \$1 billion for the seven year period 1984 through 1990. One firm (out of an annual average of 146 firms above \$1 billion on the Fortune list) was removed as a result of liquidation in bankruptcy.

This section provides a short description of each of the prepayment mechanisms, identifying the features that are key elements of the evaluation of their assurance risk.

A **trust fund** is an arrangement in which the grantor of the trust (e.g., a licensee) transfers legal title of property to a trustee (e.g., a bank), who manages the property for the beneficiary (e.g., the NRC) according to the terms of the written trust agreement and applicable state law. The grantor may modify or amend the terms of the trust only with the approval of the NRC. The trustee is generally required to invest the monies in the trust fund in a prudent manner. The income goes to the trust and the trustee earns an annual fee for its services.

Trust services are widely available from major banks and are likely to remain available throughout the life of the regulations. Smaller banks, however, may not have trust departments and may not offer trust services.

Average or typical annual trust fees range from 0.1 to 1 percent of the trust fund balance. Trust fees can vary depending on the size of the trust fund, the level of investment activity, the grantor's relationship with the financial institution serving as trustee, and local banking practices.

Trust funds that are fully paid in advance provide an effective source of assurance. Monies in a trust fund are well protected from the bankruptcy of a licensee or grantor. When a trust fund is established, the grantor transfers legal title to the property deposited in the trust fund to the trustee. The basic concept of a trust is incompatible with the licensee retaining title to the funds. Thus, a properly drafted trust fund should not be vulnerable to creditors of a bankrupt operator. On the other hand, a trust fund may be vulnerable to bankruptcy of the financial institution serving as trustee. If, however, acceptable trustees are limited to trustees such as banks, whose operations are regulated, bankruptcy of the trustee is unlikely.

An **escrow account** is an account containing funds deposited by the licensee and held by a bank or other financial institution. The licensee provides funds that are held by the escrow until the happening of a contingency or the performance of a condition, and then are released to the grantee. The licensee deposits cash or other liquid assets in an amount at least equal to the certified or estimated cost of decommissioning in an escrow account. The bank or other institution where the funds are deposited is the escrow agent. The escrow itself is the written agreement between the licensee and the escrow agent

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that specifies that the funds are to be held by the escrow agent until they are required for decommissioning activities or there is a determination by the Commission of failure by the licensee to satisfactorily perform decommissioning activities. The escrow becomes irrevocable when the licensee delivers the deposit to the escrow agent accompanied by the escrow agreement. The escrow remains irrevocable for the length of time stated in the escrow agreement. The terms may be amended, however, by mutual consent of the licensee and the Commission. If the licensee defaults or is otherwise unable to carry out decommissioning, the Commission will order the escrow agent to release the funds to pay decommissioning costs.

A **government fund** may be created if a State regulatory agency has the authority to establish special segregated government funds or accounts to receive and hold cash for specified purposes. To use this mechanism, the licensee and the State agency would agree that decommissioning funds in an amount at least equal to the decommissioning cost would be held in a special State account with the State agency acting as trustee or escrow agent for the funds. The licensee would deposit the required amount of cash or liquid assets in the special account. The State agency should provide written verification of its agreement to use funds solely to carry out decommissioning. The trust or escrow account should satisfy the criteria for those financial assurance mechanisms. If the licensee defaults, the State regulatory agency would arrange for the necessary decommissioning work to be completed by (1) ordering the licensee to decommission the site, (2) ordering the trustee to select a decommissioning contractor, or (3) choosing a contractor. In the latter two situations, the costs of decommissioning would be paid from the fund.

A **certificate of deposit (CD)** is a bank's written acknowledgement of the receipt and deposit of a sum of money by the licensee and the bank's promise of repayment. The wording of the CD may vary, provided it acknowledges the receipt of the licensee's deposit and contains a promise to pay the funds to the holder or named payee upon surrender of the certificate properly endorsed. The licensee or applicant must establish a standby trust or escrow account to receive funds drawn from the CD in the event of default.

Banks issuing CDs generally have a set-off right to the funds that are deposited. A set-off right refers to the general rule that a bank may look to deposits it holds for the repayment of any indebtedness to it on the part of the depositor and may apply the debtor's deposit on his



debts to the bank as they become due. The set-off right does not apply, however, to special deposits. When money is deposited for a special purpose, a bank is ordinarily precluded from exercising the right of set-off. In addition, in order to warrant a set-off, it ordinarily is necessary that the money deposited belong to the depositor. Thus, the set-off rule does not apply where a bank has knowledge that the funds are deposited by the depositor for the use of another, or where the bank has knowledge of facts sufficient to put it on notice as to the ownership by someone other than the depositor.

To avoid a bank's right of set-off, licensees using non-negotiable CDs as financial assurance instruments should (1) name the trustee of a standby trust or the escrow agent of an escrow account as payee, and (2) inform the issuing bank that the certificate is being used to demonstrate financial assurance in compliance with a regulatory requirement.

A **deposit of government securities** represents a particular type of asset that may be set aside in a trust fund, escrow account, government fund, or certificate of deposit.

### 3.2.2 Evaluation of Assurance Risk of Prepayment Mechanisms

ICF's evaluation of the degree of assurance provided by prepayment mechanisms assumes that a sufficient amount of funds is set aside at the time the mechanism is initially set up. The financial assurance provided by a prepayment mechanism then depends on preservation of those funds, and preservation depends primarily on the manner in which the mechanism's funds are invested.<sup>22</sup>

All types of investments are associated with a degree of risk. This "investment risk" can cause a fully-funded mechanism to become underfunded as a result of changes in the market value of securities held. Investment risk can vary significantly on a case-by-case basis, even under a single type of prepayment mechanism (e.g., a trust). Some investment options (e.g., U.S. Treasury Bills) are virtually certain to return all invested funds, or "principal." However, other investment options, such as futures and stock or commodity options, may carry considerable risk to principal. To compensate investors for accepting higher levels of risk, riskier investments must pay higher levels of return.

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<sup>22</sup> Escrows and certificates of deposits may face some additional risk due to the possibility that creditors could seek to recover these assets during a bankruptcy proceeding. As discussed in Section 2, ICF has not attempted to quantify this risk.

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To quantify the assurance provided by NRC licensees' use of prepayment mechanisms, the applicable investment risk was calculated under several alternative investment scenarios. For purposes of this analysis, the investment risk of trust funds and escrows was considered to be representative of the other prepayment mechanisms, i.e., of government funds, deposits of government securities, and certificates of deposit. This assumption is supported by the following facts:

- Government funds must be governed by written trust or escrow agreements. In addition, the investment policies of government funds are generally established by law, and are ordinarily equivalent to the "low-risk" policy described below.
- Because deposits of government securities must be placed into a trust fund or escrow account, they actually represent a particular type of trust or escrow arrangement.
- The investment risk for certificates of deposit is low because those instruments receive a stated rate of interest that usually is fixed at their creation. Although the interest could be lost as a result of insolvency of the issuing bank, the principal is likely to be protected because the certificate of deposit (when properly implemented) is insured by the Federal Deposit Insurance Corporation (FDIC).<sup>23</sup> When certificates of deposit are drawn upon the funds will be placed in an accompanying standby trust. The investment risk associated with standby trusts is likely to be low, because the funds will be put to immediate use in decommissioning and are unlikely to be available for investment.
- Based on NRC's experience with non-standard submissions, trust funds and escrows are used much more commonly by licensees than are the other prepayment mechanisms. For example, no government funds have been submitted by NRC licensees, and only a few certificates of deposit and deposits of government securities have been submitted.

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<sup>23</sup> To date, properly insured accounts of liquidated banks or savings and loans have been covered by the deposit insurance system. In some cases, the rate of interest paid on certificates of deposit may be reduced by receivers or new owners of banks or savings and loans that pass through transfers of ownership, or, less frequently, funds in certificates of deposit may be returned to the depositor without interest. ICF has not attempted to quantify the risk that Congress will cease to provide funds to support the deposit insurance system in the future.

The manner in which funds are invested and hence the investment risk of the prepayment mechanism, depends on the investment guidelines followed by the investment manager -- i.e., by the trustee or escrow agent. The trust fund and escrow allowed by NRC specify the same investment guidelines. These guidelines permit the licensee to direct the investment manager in how to invest the funds, subject to the restrictions of the wording of the mechanism and to applicable standards of investment prudence as defined in the applicable statutes or case law. Two "extreme" alternative investment policies that are consistent with these conditions were used in the analysis:

- (1) The trustee or escrow agent invests funds to best ensure that sufficient funds will be available whenever necessary (i.e., in the short-term) to pay for assured activities. This "low risk" investment policy provides the greatest protection to NRC.
- (2) The trustee or escrow agent invests funds to maximize the licensee's return consistent with the potentially long-term nature of the assured obligation. Because most licensees do not expect decommissioning activities to occur until the relatively distant future (if at all), the trustee or escrow agent may consider it prudent to invest funds in a manner that may entail greater short-term risk, but a reasonable level of long-term risk (e.g., zero coupon bonds). This "high return" investment policy is less protective of NRC's interests. An open question is whether this approach conflicts with the provision in the trust fund and escrow account that the trustee or escrow agent will discharge its duties with respect to the trust fund or escrow solely in the interest of the beneficiary (NRC).

#### 3.2.2.1 Investment Risk with Low-Risk Portfolio

Under the first, "low-risk" investment policy, the trustee or escrow agent will focus on very safe, short-term investments, such as Treasury Bills. These securities are extremely unlikely to lose their value, and are even considered to be essentially risk-free in financial theory and analysis.<sup>24</sup> The zero-risk assessment may also be appropriate if assets are invested in certificates of deposit of less than \$100,000 because these amounts are covered by federal deposit insurance.<sup>25</sup> Consequently, under the first, "low risk," investment policy, ICF believes that an appropriate estimate of investment risk is zero, i.e., that 100

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<sup>24</sup> See, for example, R. Brealey and S. Myers, *Principles of Corporate Finance, Second Edition*, McGraw-Hill, 1984, p. 128.

<sup>25</sup> In the event that the issuing financial institution defaults and the federal deposit insurance must be used to pay the claim, however, NRC or the licensee could face some delay before receiving payments. Such delay could prevent decommissioning activities from being conducted in a timely manner.

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percent of all funds assured by the prepayment mechanism will be available whenever needed.

3.2.2.2 Investment Risk with  
Moderate- or High-Risk  
Portfolio

Under the second, "high return" investment policy, a number of specific investment strategies could be considered prudent. For example, investment of assets in a fully-diversified portfolio of common stocks would likely be deemed prudent to finance obligations that will arise only in the distant future (i.e., 25 years or more).<sup>26</sup> Two other example strategies that might also be considered prudent under a high return investment policy include a "balanced fund" strategy (investing in a diversified portfolio of stocks, bonds, and other liquid assets) and a "growth" strategy (investing in a diversified portfolio of stocks believed to have superior prospects for market value increases). The risk, estimated below, associated with a diversified portfolio of common stocks was used as an appropriate estimate of the risk of the high return investment policy for two reasons. First, this common stock investment strategy is of relatively moderate risk; that is, it carries less risk than some high return strategies (e.g., the growth strategy) but more risk than other high return strategies (e.g., the balanced strategy). Second, because the historical performance of common stock as an investment is well documented, its investment risk can be clearly estimated.

To estimate the investment risk associated with a fully-diversified portfolio of common stocks, the historical performance of common stocks was used to calculate the "expected value" of a trust or escrow that uses this investment strategy. Specifically, the expected value of the trust or escrow was calculated for the time of decommissioning, assuming that the trust or escrow had been fully funded the previous year.

Although the value of stocks will rise or fall each year, the analysis assumed that the fund will not increase or decrease in value prior to the year in which decommissioning occurs. The analysis assumes that, in years when the values of stocks increase, licensees will withdraw any increase that raises a fund's value beyond the required amount of assurance. In years when the values of stocks decline, licensees are required to refinance the fund so that the required amount of assurance is maintained. If a licensee is unable or unwilling to re-fund

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<sup>26</sup> Although the market value of stocks fluctuates considerably from month to month and year to year, stocks have in the long term consistently outperformed other investment securities. Basic data on the performance of securities were obtained from Stocks, Bonds, Bills, and Inflation, 1987 Yearbook: Market Results for 1926-1986, Ibbotson Associates, 1987, a widely recognized source for comprehensive historical statistics on market results.

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the trust or escrow following a decline in the value of stocks, NRC could potentially declare the licensee in default and draw upon the fund to pay for decommissioning.

Data on past market results, based on values reported by Ibbotson Associates, indicates that a fully-diversified portfolio of common stocks will, in any given year, increase in value with a probability of approximately 69 percent, and decline in value with a probability of about 31 percent. In the 69 percent chance that stocks increase in value, the fund will not lose any of its value.<sup>27</sup> However, in the 31 percent chance that stocks decline in value, the value of the fund will decrease. While the amount of the decrease in a given year cannot be predicted with certainty, it is possible to estimate the expected value of the fund based on our stated assumptions and on the past total returns on common stocks. Based on data from 1926 through 1986, ICF estimates the fund's expected value at 96.2 percent of the required amount, assuming it had been fully funded in the previous year. Table 3.3 details the expected value calculation.

As suggested by the term "expected value," this estimate considers the magnitude of declines relative to the probabilities associated with declines of those magnitudes. Because the prices of stocks fluctuate widely in the short term, invested funds could decrease to less than 96 percent of the assured obligations. For example, in the stock market "crash" of October, 1987, stock values fell by approximately 20 percent on October 19, and by a total of approximately 33 percent overall from their peak in August of 1987.<sup>28</sup> By July of 1989, stocks had regained all value lost since their August 1987 peak. As shown in Table 3.1, since 1926, stocks have suffered single-year declines of 10 percent or more eight times, declines of 20 percent or more four times, and by more than 30 percent only twice.

### 3.2.3 Assurance Risk of Prepayment Mechanism

The assurance risk of a prepayment mechanism can be calculated using the statistical rule that the joint probability of independent events is equal to the product of the probabilities of each separate event. For example, as Section 3.1 described, the "probability" of firm failure, or the "expected" percentage of firms likely to fail in any given year, is 1.53% for firms with less than \$10 million in net worth. The "expected"

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<sup>27</sup> ICF assumed that the fund will never increase in value because licensees will withdraw any monies (e.g., earnings) in excess of the required amount of assurance. Consequently, the value of the fund will not exceed the required amount of assurance regardless of increases in the market value of the stock.

<sup>28</sup> Based on the Standard & Poor's 500 Index, as reported by The Wall Street Journal.

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Table 3.3 Expected value at the time of decommissioning of trust/escrow with common stock investments<sup>1</sup>

Column 1	Column 2	Column 3	Column 4	Column 5
Annual Return (percent)	Number of Occurrences Since 1926	Probability of Occurrence (percent)	Value of Fund (100% + Column 1)	Probability x Value (Column 3 x Column 4)
0.00 <sup>2</sup>	45	69.23	100.00	69.23
-43.34	1	1.54	56.66	0.87
-35.03	1	1.54	64.97	1.00
-26.47	1	1.54	73.53	1.13
-24.90	1	1.54	75.10	1.16
-14.66	1	1.54	85.34	1.31
-11.59	1	1.54	88.41	1.36
-10.78	1	1.54	89.22	1.37
-10.06	1	1.54	89.94	1.38
-9.78	1	1.54	90.22	1.39
-8.73	1	1.54	91.27	1.40
-8.50	1	1.54	91.50	1.41
-8.42	1	1.54	91.58	1.41
-8.19	1	1.54	91.81	1.41
-8.07	1	1.54	91.93	1.41
-7.18	1	1.54	92.82	1.43
-4.91	1	1.54	95.09	1.46
-3.17	1	1.54	96.83	1.49
-1.44	1	1.54	98.56	1.52
-0.99	1	1.54	99.01	1.52
-0.41	1	1.54	99.59	1.53
Mean = -3.79	65	100.00%		
ESTIMATED VALUE (equals total of column 5)				96.21%

<sup>1</sup> Source: ICF calculations based on *Stocks, Bonds, Bills, and Inflation: 1991 Yearbook Market Results for 1926-1990*, Ibbotson Associates, 1991. Assumes investment in a fully-diversified portfolio of common stocks.

<sup>2</sup> The 0.00% total return includes positive returns, which are assumed to be withdrawn by the licensee.

or "probable" value of the prepayment mechanism is a percentage of the investment that will be returned at the particular investment risk, estimated for common stock investments at 96.21% (100% minus 3.79%), with a confidence range from 94.15% to 98.27%. The assurance risk of a prepayment mechanism therefore equals those instances when the licensee fails to honor its obligations (i.e. goes bankrupt) and the prepayment mechanism is underfunded. Table 3.4 summarizes the assurance risk for different size categories of firms with low and high risk investment policies.

**Table 3.4** Estimated assurance risk of prepayment mechanisms

Net Worth (\$MM)	Assurance Risk	
	Low Risk Investment Policy	Higher Risk Investment Policy
0 - 10	0.0%	0.058%
10 - 20	0.0%	0.047%
20 - 100	0.0%	0.039%
100 - 400	0.0%	0.031%
400 - 1 billion	0.0%	0.021%
> 1 billion	0.0%	0.005%

### 3.3 Surety, Insurance, and Guarantee Mechanisms

Section 3.3.1 describes the key characteristics of the surety, insurance, and guarantee mechanisms. Section 3.3.2 presents the analysis and results of the evaluation of assurance risk associated with those mechanisms.

#### 3.3.1 Description of Key Aspects of Surety, Insurance, and Guarantee Mechanisms

Surety, insurance, and guarantee mechanisms currently allowed under NRC regulations include surety bonds, insurance, standby letters of credit, lines of credit, and guarantees. The feature common to these mechanisms is that a third party is relied upon to provide funds to cover the obligations being assured if the licensee does not do so.

This section provides a short description of each of the surety, insurance, and guarantee mechanisms, identifying the features that are key elements of the evaluation of their assurance risk.

A **surety bond** represents an agreement between three parties: the "principal" (e.g., a licensee); the "obligee," the party to whom the principal promises to fulfill an obligation (i.e., the NRC); and the "surety" or surety company, the party that assures the obligee that the principal will fulfill his promise and, that, if the principal fails, the surety will fulfill the principal's obligation to the obligee.

The monetary liability of the surety company is called the "penal sum." Most payment bonds contain a provision that expressly discharges the surety's liability under the bond once the surety has paid a sum equal to the penal sum. Under a performance bond, the surety's obligation is limited to the penal sum if it chooses to pay under the bond. However, if the surety chooses to perform to satisfy its obligation under the bond, the surety is not released from its obligation until the performance is complete.

The availability of surety bonds is likely to be limited, especially to small licensees. Surety bonds have typically been available only to large companies and then only as a service to "preferred" customers.

A number of factors affect the availability of surety bonds:

- The financial risk posed by the licensee. Bonds are more readily available to financially strong licensees who are likely to be able to meet their obligations (and therefore less likely to fail to perform the action for which the bond has been issued) or who can post sufficient collateral to reduce the surety company's risk in issuing the bond.
- The cancellation provisions. The willingness of a surety to issue a bond depends on the risk the surety assumes by issuing the bond. Regulations that make bonds noncancelable increase the surety's risk by eliminating its ability to cancel the bond in the event that the operator becomes financially unsound. Such a provision will limit the availability of surety bonds, particularly where the operator's financial strength is difficult to predict or where the assured activity is scheduled to occur in the distant future.

Surety companies generally charge an annual fee for issuing a surety bond. The fee is typically between 0.35 percent and 5 percent of the penal sum. The annual fee will be lower if the licensee can post substantial collateral to back the bond or if the obligation being guaranteed is to occur in the very near future. Both of these factors reduce the risk assumed by the surety. In many cases, posting of

collateral will be a condition for obtaining a surety bond, as well as a factor affecting the cost of the surety bond. As much as 100 percent collateral may be required as a condition of obtaining a surety bond.

The effectiveness of surety bonds depends on the continued financial health of the surety company. Existing state regulations seek to require that surety companies have the financial strength to meet their obligations. In addition, NRC accepts only surety bonds issued by companies listed on Treasury Circular 570, "Surety Companies Acceptable on Federal Bonds." To be on this list, sureties must comply with standards established by the Treasury Department (as specified in Sections 9304 and 9308 of Title 31 of the United States Code).

Surety bonds provide reasonable assurance of funds in the event of bankruptcy of a licensee. Because the surety bond is an obligation of a third party, the surety company, and not an obligation of the licensee, funds assured by the bond are not subject to the claims of the operator's creditors in bankruptcy proceedings. If the surety company must make a payment or perform an act on behalf of a bankrupt company, the surety company must attempt to recover the funds through the bankruptcy proceedings.

**Insurance** is generally considered a method of transferring risk of financial loss from a relative few suffering such loss to the larger number of purchasers of coverage for losses of that type. The losses covered are contingent (i.e., are not certain to occur). The type of insurance authorized for decommissioning financial assurance, in contrast, covers a non-contingent event, since decommissioning is certain to occur. Furthermore, all members of the pool purchasing such insurance can be expected to seek payment, and little or no "spreading" of the loss is likely to occur. Policies therefore resemble prepayment mechanisms or modified prepayment mechanisms with pay-in periods in which premiums gradually come to equal the amount of the eventual payout. Like other forms of insurance, however, assurance risk can occur if the insurer becomes insolvent before paying the assured costs.

A **letter of credit** is a financial instrument under which a bank (the "issuer") undertakes to meet a monetary obligation of its customer (the "account party") if the latter fails to do so. Payment is made to a predesignated third party (the "beneficiary") who initiates the process by making a claim (a "drawing") directly on the bank. The bank becomes the primary obligor and has recourse to the account party for reimbursement.



The type of letter of credit used to provide financial assurance is a standby letter of credit, which is a form of guarantee. It is differentiated from standard commercial letters of credit by the absence of an underlying trade transaction. Bank policies and pricing of stand-by letters of credit are distinct from standard commercial letters of credit.

The availability of letters of credit for decommissioning is also affected by the need for provisions that ensure that gaps in coverage are avoided. In order to ensure continuous coverage, the letter of credit should provide for automatic renewals after an initial coverage period. In addition, the issuer of credit must be required to provide advance notice of an intent to cancel or not renew a letter of credit so that NRC can draw on the mechanism before it expires if the licensee is unable to find alternative financial assurance. Many banks are unwilling to issue letters of credit with such provisions, which they consider as de facto noncancellation provisions.

In addition, banks prefer to issue letters of credit for a short term (i.e., one year or less). They are much less willing to issue credit for longer periods. The short-term component will increase the importance of administrative procedures that ensure that a letter of credit is renewed in a timely manner, that a replacement financial mechanism is obtained by the operator if the letter of credit cannot be renewed, and that the letter of credit is drawn upon before cancellation if neither renewal nor replacement is feasible.

Average or typical fees range from 1 to 1.5 percent of the face value of the letter of credit per year. Letter of credit fees can vary depending on the financial risk of the account party, the term of the letter of credit, and the general availability of this instrument within the issuing bank. Additional fees may be charged to cover minor administrative expenses, but banks often waive these fees for their best customers. Additional fees also may be incurred to establish a stand-by trust fund.

A licensee will also incur opportunity costs if the issuer requires collateral or compensating balances, which is a common requirement, or if the letter of credit diminishes an existing line of credit at the bank. These opportunity costs are likely to vary significantly depending on the licensee's financial risk and relationship with the issuer. If banks issue letters of credit only to their best and strongest customers, these opportunity costs are not likely to be significant.

A letter of credit is generally not vulnerable to bankruptcy of an account party (e.g., a licensee) because the mechanism and its



proceeds are not part of the bankruptcy estate. The letter of credit is viewed as an obligation of the issuing bank and is separate from the underlying agreement with the account party. Payments from the bank go directly to the beneficiary, and thus cannot be reached by the powers of the trustee in bankruptcy. (However, a recent court decision suggests that the proceeds from a letter of credit may be vulnerable to bankruptcy proceedings in certain limited circumstances if the letter was issued within 90 days of the bankruptcy filing.)

A letter of credit is vulnerable to bankruptcy of the issuing financial institution. If the issuing bank is liquidated, the letter of credit obligation can be abrogated. If the issuing bank is acquired, the acquiring bank can accept or reject the obligation, based on the secured or unsecured status of the letter of credit and the financial condition of the account party.

A **parent guarantee** is a commitment by a firm (the "parent") with a controlling interest in another firm (the "subsidiary") to pay a particular debt or other obligation of the subsidiary if the subsidiary does not do so. Generally, in order to provide a clear test of the parent-subsidiary relationship, the firm providing the guarantee is required to own more than 50 percent of the outstanding stock of the subsidiary. The parent corporation also usually is required to demonstrate through a financial test or other means that it possess sufficient financial strength to provide the guarantee.

### 3.3.2 Estimate of Assurance Risk of Surety, Insurance, and Guarantee Mechanisms

The following analysis compares the relative assurance provided by each of five alternative financial assurance mechanisms:

- Surety bond;
- Insurance;
- Standby letter of credit;
- Line of credit; and
- Parent guarantee with NRC financial test.

The measure of "assurance risk" used to compare each of these mechanisms is the probability that the licensee will be unable to perform decommissioning and the percentage of situations in which guarantors will fail to honor financial assurance obligations, on average, in any given year. Because financial assurance obligations are legal obligations that must be honored by solvent licensees, the analysis assumes that the risk of financial assurance failure is the risk that both a licensee and a guarantor will fail to honor financial assurance obligations. The assurance risk thus is equivalent to the risk that both

the licensee and the guarantor will become bankrupt. The case of a self-guarantee without any financial test or third-party financial mechanism is used to establish a baseline assurance risk, which is equivalent to the percentage of firms likely to fail in any given year.

This analysis does not reflect the likelihood that some financial assurance obligations will be recovered from insolvent firms through bankruptcy proceedings. Therefore, the estimates of assurance risk should be used only for comparing the relative assurance of alternative mechanisms, and should not be used as the basis for drawing conclusions about the absolute assurance risk of any particular mechanism.

#### 3.3.2.1 Surety Bond

A surety bond mechanism provides a source of financial assurance that is completely independent from the licensee, and assurance risk is limited to those instances when a licensee fails to honor its obligations and its surety firm becomes insolvent. Furthermore, obligations of failed surety firms may be covered by insurance guarantee funds (state funds that guarantee insurance claims in much the same way that federal deposit insurance guarantees bank deposits), providing another independent source of financial assurance in any instance where a licensee and its surety firm become insolvent.

NRC regulations require that surety bonds for financial assurance must be issued by surety firms listed on Treasury Circular 570. Data compiled by the Surety Bond Branch of the Treasury Department indicates that over the period 1984 through 1990 Circular 570 listed 316 surety firms on average, each year. Over this period, 125 firms were terminated (removed from Circular 570). Of these terminated firms, 21 were subsequently liquidated between 1984 and 1990 (all of them within three years of termination). Therefore, the average annual number of failures for Circular 570 surety firms was 3.0 (21 divided by 7). The average annual failure rate for Circular 570 firms was 0.95 percent (3 divided by 316 equals 0.0095). The assurance risk of the surety bond mechanism is therefore 0.95 percent of the assurance risk of self-insurance without a financial test (.0095 times the estimated failure rate for each net worth category). Table 3.5 shows that this assurance risk is extremely low for firms in any net worth category.

Table 3.5 Estimated assurance risk of surety bonds without insurance guarantee funds (1984 through 1990)

Net Worth (\$MM)	Assurance Risk	Confidence Bounds of Assurance Risk	
		Lower Bound	Upper Bound
0 - 10	0.015%	0.0%	0.031%
10 - 20	0.013%	0.0%	0.032%
20 - 100	0.011%	0.0%	0.025%
100 - 400	0.008%	0.0%	0.018%
400 - 1 billion	0.006%	0.0%	0.016%
> 1 billion	0.002%	0.0%	0.008%

The existence of surety insurance guarantee funds makes the actual assurance risk of surety bonds even more remote than indicated in Table 3.5. Although these funds are intended to eliminate the risk of failed insurance coverage, there is some small risk that such funds will not always be able to honor all of the claims of insolvent surety firms, and there may be delay even if claims are honored. One reason for this limitation is that most of these funds are not pre-funded (i.e., there is not actually a pool of invested funds set aside to pay claims against insolvent insurers). Insurance guarantee funds are generally post-funded by solvent insurers, who pay the claims against insolvent insurers as they fall due, and there are limitations on the amount that any solvent insurer must pay in any given year.

Although these qualifications indicate that guarantee funds entail some risk, the analysis assumes that the risk of these diversified insurance pools (spreading claims among solvent insurers) failing to honor financial assurance obligations is at least as low as the failure risk for any single property casualty insurer (i.e., 0.85 percent, as estimated below). Thus, the assurance risk of the insurance mechanism with guarantee funds is actually less than 0.85 percent of the assurance risks shown in Table 3.5, because insurance guarantee funds would cover at least 99.15 percent of surety mechanism financial assurance obligations not covered in any given year by licensees or their surety

guarantors. Table 3.6 shows that this assurance risk is extremely remote for firms in any net worth category.

Table 3.6 Estimated assurance risk of surety bonds with insurance guarantee funds (1984 through 1990)

Net Worth (\$MM)	Assurance Risk	Confidence Bounds of Assurance Risk	
		Lower Bound	Upper Bound
0 - 10	0.00015%	0.0%	0.00035%
10 - 20	0.00014%	0.0%	0.00039%
20 - 100	0.00012%	0.0%	0.00030%
100 - 400	0.00008%	0.0%	0.00020%
400 - 1 billion	0.00004%	0.0%	0.00011%
> 1 billion	0.00001%	0.0%	0.00005%

### 3.3.2.2 Insurance

Insurance provides a source of financial assurance that is completely independent from the licensee. Assurance risk is limited to those instances when a licensee fails to honor its obligations and the insurance company providing the coverage for the licensee's obligations becomes insolvent. Furthermore, obligations of failed insurance companies may be covered by insurance guarantee funds, providing an additional independent source of financial assurance in a situation where both a licensee and its insurance company become insolvent. The assurance risk for insurance can be calculated in the same manner as the assurance risk for surety bonds. Data reported by the Insurance Information Institute<sup>29</sup> identify 225 property/casualty insurers insolvent over the seven year period from 1984 through 1990. Therefore, the average annual number of insolvencies was 32.14 (225 divided by 7). The total number of property/casualty insurers over this period, according to information provided by the insurance departments of the various states, averaged 3,800. Thus the average

<sup>29</sup> Data Base Reports: Current Reports from the Institute's Data Base, Insurance Information Institute, December 1991, p. 6. Property/casualty insolvency totals are reported by the National Association of Insurance Commissioners (NAIC), the National Conference on Insurance Guaranty Funds (NCIGF), and the A.M. Best Company. The A.M. Best Company data were used in this analysis because they include all property/casualty insurance companies placed in conservation, receivership, or liquidation or under state supervision (including companies that operate in only one state, which are not included in NAIC totals, and companies that are not covered by guarantee funds, which are not included in NCIGF totals).



annual failure rate for property casualty insurers was 0.85 percent (32.14 divided by 3,800 equals .0085). Thus, even in the absence of insurance guarantee funds, the assurance risk of the insurance mechanism would be only 0.85 percent of the assurance risk of self-insurance without a financial test. Table 3.7 shows that this assurance risk is extremely low for firms in any net worth category.

Table 3.7 Estimated assurance risk of insurance without insurance guarantee funds (1984 through 1990)

Net Worth (\$MM)	Assurance Risk	Confidence Bounds of Assurance Risk	
		Lower Bound	Upper Bound
0 - 10	0.013%	0.009%	0.017%
10 - 20	0.011%	0.004%	0.018%
20 - 100	0.009%	0.004%	0.014%
100 - 400	0.007%	0.002%	0.011%
400 - 1 billion	0.004%	0.0%	0.009%
> 1 billion	0.001%	0.0%	0.003%

The existence of insurance guarantee funds makes the actual assurance risk of insurance even more remote than indicated in Table 3.5.<sup>30</sup> Our analysis assumes that the risk of these insurance funds failing to honor financial assurance obligations is at least as low as the failure risk for any single property casualty insurer (i.e., 0.85 percent). Thus, the assurance risk of the insurance mechanism is actually less than 0.85 percent of the assurance risks shown in Table 3.7, because insurance guarantee funds would cover at least 99.15 percent of an insurance mechanism's financial assurance obligations not covered in any given year by licensees or their insurers. Table 3.8 shows that this assurance risk is extremely remote for firms in any net worth category.

<sup>30</sup> Data Base Reports: Current Reports from the Institute's Data Base. Insurance Information Institute, December 1991. provides a review of the current status of state guarantee funds and pending legislative proposals to improve insurance company solvency regulation. According to NCIGF data, in general, state guarantee funds in 1990 had significant unspent capacity to pay claims, although in two states all available funds were used.



Table 3.8 Estimated assurance risk of insurance with insurance guarantee funds (1984 through 1990)

Net Worth (\$MM)	Assurance Risk	Confidence Bounds of Assurance Risk	
		Lower Bound	Upper Bound
0 - 10	0.00012%	0.00005%	0.00019%
10 - 20	0.00011%	0.00001%	0.00021%
20 - 100	0.00009%	0.00001%	0.00016%
100 - 400	0.00006%	0.00001%	0.00011%
400 - 1 billion	0.00004%	0.00003%	0.00007%
> 1 billion	0.00001%	0.00000%	0.00002%

#### 3.3.2.3 Standby Letter of Credit

Standby letters of credit provided by banks or savings and loans (S&Ls) provide a completely independent source of financial assurance. The assurance risk of this mechanism is limited to those instances when a licensee fails to honor its obligations and the bank or S&L issuing the standby letter of credit also becomes insolvent. Unlike surety bonds and insurance, however, no insurance guarantee fund exists for letters of credit. Although bank and S&L deposits are covered by federal deposit insurance, the courts have explicitly ruled that this coverage does not extend to standby letters of credit. Furthermore, the letter of credit obligation can be repudiated during a receivership or transfer of ownership of the bank or S&L. Both the federal agencies that take over operations of insolvent banks or savings and loans, such as the RTC, and any new owner of a bank or savings and loan acquiring the business have the power to repudiate contracts, such as letters of credit obligations, entered into by the bank or savings and loan prior to the receivership or acquisition.

Data provided by the Federal Deposit Insurance Corporation (FDIC)<sup>31</sup> indicate that FDIC-regulated banks numbered 13,574, on average, during the seven years from 1984 through 1990. Over this period, there were 1,082 FDIC bank failures. Therefore, the average annual number of FDIC bank failures was 155 (1,082 divided by 7), and the average annual failure rate for FDIC-insured banks was 1.14 percent (155 divided by 13,574 equals 0.0114). Thus, the assurance risk of a standby letter of credit from an FDIC-insured bank is only 1.14 percent of the assurance risk of self-insurance without a financial test. Table 3.9 shows that this assurance risk is extremely low for firms in any net worth category.

**Table 3.9** Estimated assurance risk of standby letters of credit issued by FDIC insured banks (1984 through 1990)

Net Worth (\$MM)	Assurance Risk	Confidence Bounds of Assurance Risk	
		Lower Bound	Upper Bound
0 - 10	0.017%	0.013%	0.021%
10 - 20	0.013%	0.008%	0.019%
20 - 100	0.011%	0.008%	0.015%
100 - 400	0.008%	0.003%	0.014%
400 - 1 billion	0.007%	0.001%	0.013%
> 1 billion	0.001%	0.000%	0.005%

It should be noted that the assurance risks shown in Table 3.9 are based on a seven-year period of exceptional turmoil in the banking industry. Throughout the 1950s, 60s, and 70s, the FDIC insured approximately the same number of banks as in the 1980s, but the

<sup>31</sup> "Structure Data, Insured Commercial Banks, 1934-1990," provided by the Office of Corporate Communications, Federal Deposit Insurance Corporation, lists the number of FDIC-insured banks, by year, from 1934 through 1990, and the number of bank failures, by year, for the same period. Table 122 of the *FDIC Annual Report, 1989*. Federal Deposit Insurance Corporation December 1990, provides data on the number of banks closed because of financial difficulties from 1934 through 1989, but does not provide data for 1990. The calculations reported in this section therefore were based on the "Structure Data" source. Table 122 indicates two additional failures in 1985, one additional failure in 1987, and one additional failure in 1989. Table 122 also indicates that all banks closed from 1984 through 1990 were insured, and all closings involved disbursements by the FDIC.

average annual number of bank failures in previous decades was less than one-tenth of that recorded in the 1980s.<sup>32</sup>

Data provided by the Office of Thrift Supervision and the Resolution Trust Corporation<sup>33</sup> indicate that thrifts insured by the Savings Association Insurance Fund (SAIF) and its predecessor, the Federal Savings and Loan Insurance Corporation (FSLIC), numbered 3,014, on average, during the seven years from 1984 through 1990. Over this period, there were 721 SAIF/FSLIC thrift failures. Therefore, the average annual number of SAIF/FSLIC thrift failures was 103.0 (721 divided by 7), and the average annual failure rate for SAIF/FSLIC thrifts was 3.42 percent (103.0 divided by 3014 equals 0.0342). Thus, the assurance risk of a standby letter of credit from an SAIF/FSLIC thrift (over this eight-year period) was 3.42 percent of the assurance risk of self-insurance without a financial test. Table 3.10 shows that this assurance risk is very low, in spite of the extraordinary recent turmoil in the thrift industry.

**Table 3.10 Estimated assurance risk of standby letters of credit issued by SAIF/FSLIC insured thrifts (1984 through 1990)**

Net Worth (\$MM)	Assurance Risk	Confidence Bounds of Assurance Risk	
		Lower Bound	Upper Bound
0 - 10	0.055%	0.0%	0.116%
10 - 20	0.050%	0.0%	0.125%
20 - 100	0.041%	0.0%	0.093%
100 - 400	0.036%	0.0%	0.098%
400 - 1 billion	0.024%	0.0%	0.050%
> 1 billion	0.002%	0.0%	0.006%

<sup>32</sup> Table 122 of the FDIC Annual Report, 1989, Federal Deposit Insurance Corporation, December 1990.

<sup>33</sup> Data provided from Office of Thrift Supervision and Resolution Trust Corporation included annual summaries of FSLIC liquidations through 1989 and RTC liquidations for 1989. Monthly totals for RTC resolved conservatorships were provided for August 1989 through August 1991.

The assurance risks shown in Table 3.10 reflect the unprecedented number of thrift stabilizations in 1988, 1989, and 1990.<sup>34</sup>

The analysis reported in this section assumes that letters of credit are not affected by assurance risk caused by refusals to pay letters of credit issued by solvent banks. A review of the report on the Uniform Commercial Code Article 5 (Letters of Credit) presented to the Letter of Credit Subcommittee of the Uniform Commercial Code Committee of the American Bar Association's Business Law Section and the U.S. Council on International Banking by the A.B.A. Task Force on the study of U.C.C. Article 5<sup>35</sup> and of annual summaries of letter of credit law<sup>36</sup> did not identify issues clearly affecting letters of credit as they are used in decommissioning financial assurance.

#### 3.3.2.4 Line of Credit

In addition to the standby letter of credit mechanism, NRC also allows a line of credit mechanism for financial assurance. However, NRC's regulatory definition of "line of credit" is very different from the common usage of the term in banking. This regulatory definition effectively requires the line of credit to incorporate provisions that make this mechanism very similar to a standby letter of credit.

The general purpose of a standby letter of credit is to assure the credit-worthiness of a bank customer. A critical factor in this assurance is that the standby letter of credit is generally "irrevocable" over some specified period of time. Thus, a third-party beneficiary of the standby letter of credit is assured that the bank will honor certain obligations in the event that the bank's customer becomes insolvent or otherwise fails to honor such obligations.

The general purpose of a line of credit is to assure the liquidity of a bank customer. For example, large corporations with excellent, recognized credit-worthiness generally must obtain bank lines of credit or letters of credit to back their commercial paper issues, to assure third-party purchasers of commercial paper that the corporations will have ready access to substantial amounts of cash to repay these very

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<sup>34</sup> OTC/RTC data indicate 165, 117, and 315 actions in those 3 years. These actions included liquidations, asset-backed transfers, management consignments, and FDIC passthroughs, all of which were considered to raise the possibility that obligations such as letters of credit contracts could be abrogated by new owners or lost in liquidations.

<sup>35</sup> 45 The Business Lawyer, June 1990, pp. 1521-1543.

<sup>36</sup> Givray, A.J., C.J. Chapman, J.C. Doub, H.D. Gabriel, G.A. Hisert, R.T. Cuttrell, and B. Wannicke, "Letters of Credit," 46 The Business Lawyer, August 1991, pp. 1579-1696. Previous annual surveys for 1988, 1989, and 1990, cited at p. 1582, were also reviewed.

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short-term debt obligations. The bank's compensation for providing lines of credit is substantially lower than the fees that would be charged for a standby letter of credit, because the solvency risk of these large corporations is very low and because the bank has the right to revoke the line of credit if the credit-worthiness of the corporation deteriorates. Thus, a typical line of credit would provide little or no assurance beyond that provided by a self-guarantee without any financial test, because the bank would revoke the line of credit any time that firm failure appeared imminent.

The NRC definition of "line of credit" effectively requires the line of credit to incorporate provisions that make this mechanism very similar to a standby letter of credit (e.g., severe limits on the bank's ability to revoke the mechanism). For this reason, our analysis assumes that this mechanism entails essentially the same risk as a standby letter of credit.

#### 3.3.2.5 Parent Guarantee

##### Parent Guarantee with NRC Financial Test

The assurance risk of a corporate parent guarantee is limited to those instances when both a subsidiary fails to honor its obligations and its parent company guarantor fails to honor its obligations. NRC has allowed a parent guarantee mechanism, but not a self-guarantee, because a parent guarantee was thought to provide the assurance of an entity in addition to the licensee itself. The Preamble to the decommissioning rule states that "use of the parent company guarantee and financial test provides assurance in that the company will provide an independent commitment beyond that of the licensee to expend funds."<sup>37</sup>

In estimating the assurance risk of a parent guarantee, the critical question is whether a corporate parent is really an independent entity in its role as a financial assurance provider for its subsidiary. A parent guarantee that provides a completely independent source of financial assurance must satisfy several conditions:

- (1) The parent corporation must be capable of providing a guarantee in support of its subsidiary that is no more vulnerable to attack from the standpoint of corporation law and of contract law than if the parent was providing a guarantee for a completely unaffiliated corporation;

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<sup>37</sup> 53 Fed. Reg. 24036 (emphasis added).

- (2) The assets of the parent corporation must be protected from creditors of the subsidiary if the subsidiary becomes insolvent;
- (3) The financial condition of the parent must not be materially dependent on the financial condition of the subsidiary; and
- (4) In order to ensure fully independent risks, the financial condition of the subsidiary must not be materially dependent on the financial health of the parent.

Whenever any of these four conditions is compromised, the independence of the parent guarantee is called into question.

The issue of the validity of guarantees issued by one member of a corporate group in favor of another member, and particularly of guarantees issued by parent corporations in support of their subsidiaries, has been described by the most extensive analysis of the issue as "surprisingly complex" but generally clear.<sup>38</sup> The power of corporations under general corporation statutes to guarantee obligations is now expressly authorized by at least 46 states, and so-called "downstream" guarantees by parents of subsidiaries' obligations are "uniformly upheld."<sup>39</sup>

The issue of when the parent corporation of a corporate group will be involved in bankruptcy actions or other types of claims arising with respect to a subsidiary within the group is related to, but not identical with, the issue of corporate control. Control, defined as "the power to elect a majority of the board of directors . . . and thus the power to direct the management of [a subsidiary's] business and affairs," is frequently considered to rest with ownership of a majority of the voting stock. Under modern business practices, however, control is sometimes practically secured with less than 50 percent of the voting stock.<sup>40</sup>

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<sup>38</sup> Phillip I. Blumberg, The Law of Corporate Groups: Problems in the Bankruptcy or Reorganization of Parent and Subsidiary Corporations, Including the Law of Corporate Guaranties, Little, Brown, and Company, 1985, pp. 245-283 and Phillip Blumberg, Kent Strasser, and Evelyn Bogen, 1991 Supplement - The Law of Corporate Groups: Bankruptcy Law, pp. 47-52.

<sup>39</sup> *Id.* pp. 249 and 259-60.

<sup>40</sup> Phillip Blumberg, The Law of Corporate Groups: Procedural Problems in the Law of Parent and Subsidiary Corporations, Little, Brown and Company, 1983, pp. 425-426, cites authorities who point to 5 percent as effective control in some instances, and cites statutes, such as the Investment Company Act of 1940 and the Bank Holding Company Act of 1956, that use 25 percent as a rebuttable or conclusive presumption of control.

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Conclusions about when members of a corporate group, particularly the parent corporation and its subsidiaries, are or are not liable for obligations of other members of the group rarely turn on issues of voting control. They are more likely to be decided by reference to a broad range of other factors. Blumberg identifies 40 specific factors, involving the formalities of the subsidiary's operations, physical separation between parent and subsidiary, integration of business activities, integration of internal operations, integration of external operations, extent of participation by the parent in the decisionmaking of the group, and others. This is because, in addition to being linked to subsidiaries through control, parent corporations are also linked through different degrees of organizational and economic integration, ranging from situations in which the parent is completely removed from participation in business operations of the subsidiaries to situations in which parent and subsidiaries are closely integrated in their business operations.<sup>41</sup>

The general rule is that separate incorporation is a shield between a parent corporation and liability for debts of its subsidiaries. The parent is liable only if the shield of incorporation can be pierced.

The factors that determine whether a parent corporation is treated independently or the corporate group is treated as one entity vary from case to case and are too numerous and disparate to list. A useful summary is the following:

"[T]he extent to which the group exhibits a combination of the fundamental elements of (1) economic integration, (2) participation by the parent in the decisionmaking of the constituents, and (3) holding out the group to the public as a single integrated enterprise."<sup>42</sup>

Such questions arise in a number of procedural and substantive contexts. ICF reviewed the available bankruptcy doctrines that might support determinations that a solvent parent corporation is liable for

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<sup>41</sup> Blumberg, *Procedural Problems*, pp. 432-437 distinguishes investment companies, conglomerates, strongly integrated groups, and weakly integrated groups, based on the degree of economic integration they exhibit. As an example of a weakly integrated group, he suggests a subsidiary that conducts a business in a strictly regulated industry. In such cases, he points out, "the parent tends to keep its operations carefully segregated, as a matter of business as well as form, from the activities of the constituent companies. The separation of the parent's economic activity from the regulated subsidiary's reflects the parent's concern to insulate the economic activities of the group outside the regulated industry from the regulatory process." pp. 436-437

<sup>42</sup> Blumberg, *Procedural Problems*, p. 455.



obligations of an insolvent subsidiary.<sup>43</sup> ICF also reviewed substantive legal doctrines in contract that could lead to involuntary responsibility by a parent corporation for obligations of its subsidiary, and situations when such obligations might be avoided.<sup>44</sup> In general, although there is a strong likelihood that liability will not be imposed on a parent corporation for obligations of a subsidiary, whether or not the subsidiary is solvent, legal doctrines do exist that in the appropriate factual circumstances will lead to such parent corporation liability. Therefore, the assurance risk of parent guarantees was evaluated for the situation in which a parent corporation was not affected by obligations of its subsidiary ("independent" parent guarantees), and for situations in which it will be affected ("non-independent" parent guarantees). Weighted averages of those two estimates were then prepared to represent the "worst case" and the "most likely" balance of the two situations.

The first section below reviews those scenarios when the parent guarantee provides a reasonably independent source of financial assurance, resulting in very low assurance risk. If, however, the assets of the parent corporation can be obtained by creditors of the subsidiary (in the absence of an explicit commitment, such as a guarantee, to pay certain specified debts) then the parent will not be an independent source of assurance. The second section considers scenarios where the assurance risk of the parent guarantee is not fully independent. The third section discusses the assurance risk implications of the incentive effects of this mechanism and presents the weighted averages.

#### Independent Parent Guarantees

If the parent guarantee is a completely independent source of financial assurance, then the risk of a parent and its subsidiary both failing to honor financial assurance obligations can be calculated using the statistical rule that the joint probability of independent events is equal to the product of the probabilities of each separate event: If the firm failure rate is one percent, for both the subsidiary and the corporate parent, then the assurance risk of an independent parent guarantee

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<sup>43</sup> Phillip I. Blumberg, The Law of Corporate Groups: Problems in the Bankruptcy or Reorganization of Parent and Subsidiary Corporations, Including the Law of Corporate Guaranties, Little, Brown and Company, 1985 and 1991 Supplement, Stephen B. Presser, Piercing the Corporate Veil, Clark Boardman Callaghan, 1991.

<sup>44</sup> Phillip I. Blumberg, The Law of Corporate Groups: Tort, Contract, and Other Common Law Problems in the Substantive Law of Parent and Subsidiary Corporations, Little, Brown and Company, 1987 and 1991 Supplement.

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without a financial test would be equal to one percent of one percent, or 0.01 percent.

If a financial test is used to screen potential parent guarantors, the assurance risk should be still lower, because the financial test is designed to screen out guarantors that are likely to go bankrupt. The NRC financial test for parent guarantors is the same as the financial test used by EPA for financial assurance of obligations for permittees under RCRA Subtitle C. Recent analysis of the EPA test found that it has a "misprediction" rate of 37 percent (i.e., 37 percent of firms in a bankrupt firm sample could have passed the test in one of the three years prior to the year in which they went bankrupt).<sup>45</sup> Therefore, continuing the example above, the assurance risk of an independent parent guarantee with this financial test would be equal to 37 percent of 0.01 percent, or 0.0037 percent.

Table 3.11 shows the assurance risk of an independent parent guarantee, with the NRC financial test, assuming that both the parent guarantor and its subsidiary fall within the same net worth category.<sup>46</sup> The ability of the financial test to screen out firms that will go bankrupt is reflected in Table 3.11 for all firms with net worth categories of less than \$1 billion. For firms with net worth greater than \$1 billion the assurance risk shown assumes that the financial test does not screen out any of the very few failures in this category, because the bankrupt firm sample used by EPA to calculate the misprediction rate of the financial test included only three firms with net worth greater than \$1 billion, and all three firms would have passed the test in one of the three years prior to bankruptcy. The existence of the bond rating alternative in the financial test may explain the test's inability to screen out any of the very few failures for firms with net worth greater than \$1 billion. This alternative is generally unavailable to smaller firms (most do not have rated bonds). Therefore, the misprediction rate of the financial test is largely determined by the misprediction rate of Alternative 1 (i.e., the ratio requirements). However, more than 90 percent of NRC licensees with net worth greater than \$1 billion also have investment grade bonds (i.e., BBB or better).

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<sup>45</sup> Background Document to Proposed Revisions to the Subtitle C Financial Tests, U.S. EPA, Office of Solid Waste and 56 Fed. Reg. 30201, July 1, 1991.

<sup>46</sup> The results are not sensitive to this simplifying assumption, although subsidiaries are likely in many cases to be smaller than their parents.

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Table 3.11 Estimated assurance risk of independent parent guarantee with NRC financial test

Net Worth (\$MM)	Assurance Risk	Confidence Bounds of Assurance Risk	
		Lower Bound	Upper Bound
10 - 20	0.007%	0.002%	0.012%
20 - 100	0.004%	0.002%	0.007%
100 - 400	0.003%	0.001%	0.006%
400 - 1 billion	0.003%	0.000%	0.007%
> 1 billion	0.001%	0.000%	0.005%*

\* On the assumption that all firms > \$1 billion pass test.

#### Non-Independent Parent Guarantees

If a subsidiary accounts for a very large part of a corporate group's business (i.e., the corporate parent is largely a holding company) or the corporate parent is not insulated from claims against its insolvent subsidiary, then the failure of the subsidiary may also trigger a very high failure risk for the corporate parent. If this "conditional probability" of corporate parent failure is 100 percent (i.e., if the corporate parent is certain to fail in the event that its subsidiary fails), the obligation would be honored if the subsidiary remained solvent but would not be honored if the subsidiary went bankrupt. The assurance risk of the non-independent corporate parent guarantee is exactly the same as the assurance risk of a subsidiary self-guarantee; that is, the assurance risk would equal the misprediction rate for the financial test times the failure rate for the

subsidiary. Table 3.12 shows the assurance risk of such a non-independent parent guarantee with the NRC financial test.<sup>47</sup>

Table 3.12 Estimated assurance risk of non-independent parent guarantee with NRC financial test

Net Worth (\$MM)	Assurance Risk	Confidence Bounds of Assurance Risk	
		Lower Bound	Upper Bound
10 - 20	0.459%	0.274%	0.644%
20 - 100	0.377%	0.274%	0.481%
100 - 400	0.300%	0.118%	0.481%
400 - 1 billion	0.204%	0.000%	0.444%
> 1 billion	0.140%*	0.000%*	0.480%*

\* On assumption that all firms > \$1 billion pass test.

#### Weighted Assurance Risk of Parent Guarantees

Corporate parents can and do insulate their assets from the obligations of their subsidiaries. Subsidiaries, however, may be less able to isolate their assets, since the subsidiary itself is an asset of the corporate parent. The opportunity to reduce the cost of financial assurance creates an incentive for licensees to create artificial corporate structures to satisfy the regulatory requirements of the parent guarantee mechanism. In the extreme case, licensees could create a

<sup>47</sup> The assumption of a 100 percent likelihood that a parent corporation will be drawn into the bankruptcy of its subsidiary represents a highly unlikely scenario. Despite a strong personal preference for treating members of a corporate group as a single enterprise, Blumberg concedes that the principle of limited liability "continues to possess strength in numerous areas." *Law of Corporate Groups: Bankruptcy*, p. 700. He concludes that "liability of a parent for obligations of an insolvent subsidiary strikes directly at limited liability. Entity law, as may be expected, remains the rule. Although a number of cases show signs of change, entity law continues to be strong. This is the last area in which enterprise law will prevail, even if accepted elsewhere." p. 703. A recent case, *Electrical Workers v. Midwest Fasteners*, 779 F. Supp. 788 (D.N.J. 1992) reviews many of the factors generally considered in reviewing whether a parent corporation is responsible for obligations of a subsidiary. Although the case illustrates how specific statutory policies (in the Worker Adjustment and Retraining Notification Act, for example) can provide special criteria leading to liability for the parent corporation when it would otherwise not be found to exist, the court also emphasizes the unusual circumstances that must exist before separate incorporation will be disregarded.



parent holding company with essentially no assets or net worth other than the assets and net worth of its subsidiaries. NRC staff have expressed concern about the creation of such "shell" corporate parents without independent financial strength supplementing the resources of the licensee subsidiary. Language in the preamble to the decommissioning financial assurance rule expresses NRC's intent that the parent guarantor be able to provide an "independent" source of assurance "beyond that of the licensee."<sup>48</sup> In addition, undercapitalization of a subsidiary is one important criterion for making a parent corporation responsible for the obligations of its subsidiary.

Because the instances in which limited liability can be overcome are so intimately tied to particular factual situations, precise quantification of the likelihood that a parent corporation's limited liability will be ignored is not possible. Similarly, the likelihood that a subsidiary will be drawn into insolvency of its parent also cannot be quantified. If subsidiaries cannot be insulated from claims against their corporate parents, then the conditional probability of such a subsidiary failing to honor its obligations could be close to 100 percent when its corporate parent fails (because the subsidiary would be caught up in bankruptcy proceedings with its parent). In this "non-independent" subsidiary case, the assurance risk for the subsidiary of a parent guarantee would be equivalent to the assurance risk of a self-guarantee by the parent. In either instance, the obligation would be honored if the corporate parent remained solvent, and would not be honored if the corporate parent went bankrupt. In order to estimate the assurance risk of a parent guarantee, taking into account the possibility that a parent corporation may in some cases be held responsible for the obligations of its subsidiary, ICF calculated estimates of assurance risks for the parent guarantee based on a weighted average of the independent and non-independent parent guarantee estimates. Two weighted averages were prepared. A weighted average based on an assumption that 10 percent of parent guarantees are non-independent and 90 percent are independent represents a "worst case" scenario. A weighted average based on an assumption that 3 percent of parent guarantees are non-independent and 97 percent are independent represents a much more likely scenario.

It should be emphasized that these numbers are speculative, since few hard data exist to precisely quantify independence estimates. Consequently, assurance risks associated with parent guarantees also

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<sup>48</sup> 53 Fed. Reg. 24036, June 27, 1988.



are speculative since assurance risks are sensitive to the independence estimates. If parent companies are substantially less independent than estimated, for example, then the assurance risks of the parent guarantee would be higher than estimated.

**Table 3.13** Weighted assurance risk of NRC parent guarantee (worst case)

Net Worth (\$MM)	Parent Guarantee (Independent)	Parent Guarantee (Non-Independent)	Parent Guarantee Weighted*
10 - 20	0.007%	0.459%	0.052%
20 - 100	0.004%	0.377%	0.041%
100 - 400	0.003%	0.300%	0.033%
400 - 1 billion	0.003%	0.204%	0.023%
> 1 billion	0.001%	0.14%	0.015%

\* Based on 90% independent and 10% non-independent.

**Table 3.14** Weighted assurance risk of NRC parent guarantee (most likely case)

Net Worth (\$MM)	Parent Guarantee (Independent)	Parent Guarantee (Non-Independent)	Parent Guarantee Weighted*
10 - 20	0.007%	0.459%	0.021%
20 - 100	0.004%	0.377%	0.015%
100 - 400	0.003%	0.300%	0.012%
400 - 1 billion	0.003%	0.204%	0.009%
> 1 billion	0.001%	0.14%	0.005%

\* Based on 97% independent and 3% non-independent.

### 3.4 Self-Guarantee with General Electric/Westinghouse Financial Test

The Petition for Rulemaking proposes that a parent firm that is an NRC materials licensee be allowed to self-guarantee if it satisfies a specified financial test.<sup>49</sup> The financial test supporting the self-guarantee proposed by GE and Westinghouse relies on two factors -- tangible net worth greater than \$1 billion and a bond rating of 'A' or better -- that are both individually and in combination difficult to evaluate because a very small number of firms with either have become insolvent.<sup>50</sup> Furthermore, the misprediction rate calculated for financial tests is most pertinent to Alternative one of the current NRC financial tests, and the GE/Westinghouse proposal most resembles Alternative two of the current NRC test. Most firms with \$1 billion in net worth and/or a 'A' or better bond rating are likely to use Alternative two.

The best available quantitative measure of the assurance risk of the financial test proposed by General Electric and Westinghouse is based on the data provided by Moody's for the failure rate of firms with bond ratings of 'A or better.' Although the proposal incorporates other requirements in addition to a bond rating of 'A or better,' these requirements are also considered in bond rating evaluations. In particular, ICF has confirmed with Moody's Investors Service that corporate net worth is a 'very important' consideration in bond ratings.<sup>51</sup> Moreover, ICF has identified only 50 NRC licensees with bonds rated A or better and found 39 of these firms (78 percent) also have net worth greater than \$1 billion. Another 3 of the other 11 firms have net worth greater than \$800 million.

The misprediction rates calculated for the EPA and NRC financial tests reflect the percentage of bankrupt firms able to pass the financial test in any of the three years prior to the year of bankruptcy. The assurance risk estimates for these financial tests are based on the average annual failure rate for firms able to pass the financial test. Table 3.15 presents comparable data for the average annual default

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<sup>49</sup> This provision makes the self-guarantee unavailable to firms that have a corporate parent holding majority control of the firm. This restriction would require such firms (i.e., subsidiaries) to provide an NRC corporate parent guarantee. Thus, the non-independent subsidiary scenario would not be an issue for the proposed General Electric/Westinghouse test.

<sup>50</sup> ICF's analysis, reported below, of the third proposed component of the financial test calling for tangible net worth at least 10 times the decommissioning costs indicated that this component is not a key factor.

<sup>51</sup> Source: Andrew Kimball, co-author of the Moody's special report on default rates for rated bonds, which was cited extensively in the GE/Westinghouse proposal. Mr. Kimball actually noted that both Moody's and Standard & Poors have been criticized, on occasion, for paying too much attention to net worth when assigning bond ratings, but both agencies have indicated that net worth deserves the attention it receives, and will continue to be a major factor reflected in bond ratings.

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Table 3.15 Default rates of bond issuers

Bond Rating	Assurance Risk
Aaa	0.03%
Aa	0.13%
A	0.17%
A or better	0.13%

rates of bond issuers rated A or better in one of the three years prior to the year of default.<sup>52</sup>

Comparing the 0.13 percent assurance risk for bonds rated A or better with the analysis of firm failure rates presented earlier suggests that a \$1 billion net worth requirement may provide little additional assurance beyond that implied by the bond rating. The baseline failure rates reported in Table 3.3 show a 0.14 percent failure rate for firms with net worth greater than \$1 billion. The slightly lower assurance risk for firms rated A or better, and the high percentage of A rated firms with net worth greater than \$1 billion, suggest that the assurance provided by very substantial net worth is already reflected in the calculated assurance risk for firms with high bond ratings. Therefore, 0.13% is a reasonable failure rate estimate for firms with an A or better rating and net worth greater than \$1 billion.

Moody's analysis of default rates included as an attachment to the Joint Petition for Rulemaking was based on a company's actual or implied rating on senior unsecured debt. According to the analysis, "in most cases, this will yield an assessment of risk that is relatively unaffected by special considerations of collateral or of a subordinated position within the capital structure."<sup>53</sup> ICF has confirmed with Moody's that this senior debt rating reflects a company's own

<sup>52</sup> Corporate Bond Defaults and Default Rates, 1970-1990, Moody's Special Report, January 1991. Data on cumulative default rates for specific bond ratings was taken from Table 4, p. 32. Default rates comparable to the assurance risk estimates for the financial test (which reflect the percentage of firms passing the test in any of the three years prior to the year of firm failure) are the four-year cumulative default rates reported by Moody's, because Moody's defines "year 1" as the year in which the default occurs. The author of the Moody's report, Jerome Fons, provided ICF with an estimate of 0.4 percent for the average cumulative four-year default rate for issuers with bonds rated A or better.

<sup>53</sup> Corporate Bond Defaults and Default Rates, 1970-1990, Moody's Special Report, January 1991, p. 7.

fundamental credit-worthiness, excluding third-party guarantees as well as collateral considerations that might enhance the rating of other specific bond issues.<sup>54</sup>

Many bond ratings, however, are based on the specific bond in question, and do not imply a rating for other obligations or for the firm as a whole. Different bonds are secured by different types and amounts of collateral, and some bond ratings are based on the financial strength of third party guarantees (e.g., from a bank or insurance company). Over the past decade, bond markets have witnessed a substantial increase in the number and variety of these "structured credits" with ratings that do not in any way reflect the underlying financial strength of the issuing firm.<sup>55</sup> This rapid growth in structured credits suggests that a financial test based on the historical linkage between bond ratings and firm failure should explicitly state that this mechanism can only be based on senior unsecured bond ratings.<sup>56</sup>

### 3.5 Self-guarantee with Alternative Financial Tests

Although NRC does not currently allow self-guarantees, the assurance risk of several self-guarantee alternatives was examined to provide comparisons with the self-guarantee proposed in the Petition for Rulemaking. This analysis closely parallels the analysis for parent guarantees. If firms must pass a financial test in order to use a self-guarantee mechanism, then the assurance risk of the mechanism can be calculated by multiplying the firm failure rate times the percentage of bankrupt firms that are expected to pass the financial test in the years just prior to failure and be unable to finance an alternative financial assurance mechanism.

The assurance risk of two alternative self-guarantee financial tests was estimated:

- (1) Self-guarantee using the current NRC financial test for parent guarantors (which corresponds to the current EPA financial test). This analysis examines two distinct applications for a self-

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<sup>54</sup> Source: Moody's Investors Service.

<sup>55</sup> As much as 50 percent of all corporate bonds issued in 1990 were secured by collateral or insured by a third party, according to anecdotal evidence obtained by ICF from a national bond investment service.

<sup>56</sup> In the case of utilities, staff of Moody's has advised ICF that a "first mortgage" bond rating is equivalent to a senior unsecured bond rating.



guarantee: (1) a self-guarantee by a firm that has no corporate parent; and (2) a self-guarantee by a corporate subsidiary.

- (2) Self-guarantee using the financial test recently proposed by EPA as a replacement for its current test.<sup>57</sup> This analysis examines two distinct applications for a self-guarantee: (1) a self-guarantee by a firm that has no corporate parent; and (2) a self-guarantee by a corporate subsidiary.

In an analysis of the current EPA financial test, which is also the NRC financial test for parent guarantees, ICF found that the 'misprediction' rate of the test was 37 percent for firms with more than \$10 million in net worth (i.e., 37 percent of bankrupt firms with more than \$10 million in net worth in one of the three years prior to bankruptcy could have passed the financial test during any of those three years). Thus, the assurance risk of a self-guarantee with the NRC financial test is only 37 percent of the assurance risk without a financial assurance mechanism.

Table 3.16 shows this assurance risk for different net worth categories (no estimate is shown for firms with less than \$10 million in net worth,

**Table 3.16 Estimated assurance risk of independent self-guarantee with NRC financial test**

Net Worth (\$MM)	Assurance Risk	Confidence Bounds of Assurance Risk	
		Lower Bound	Upper Bound
10 - 20	0.459%	0.274%	0.644%
20 - 100	0.377%	0.274%	0.481%
100 - 400	0.300%	0.118%	0.481%
400 - 1 billion	0.204%	0.000%	0.444%
> 1 billion	0.140%*	0.000%*	0.480%*

\* On the assumption that all firms > \$1 billion pass test.

<sup>57</sup> 56 Fed. Reg. 30201, July 1, 1991.

because the financial test includes a \$10 million minimum net worth requirement).

The assurance risk estimates in Table 3.16 apply to self-guarantees by firms that do not have corporate parents (i.e., firms that are not themselves subsidiaries of another firm). Currently, NRC does not allow self-guarantees by either parents or subsidiaries, and the self-guarantee proposed by GE and Westinghouse is limited to parents.

In order to examine the implications of allowing firms that are subsidiaries to provide self-guarantees, ICF also calculated the assurance risk of this situation. If the subsidiary cannot be drawn into the insolvency of its parent, the assurance risk would be shown by Table 3.16. However, the risk of a self-guarantee by a corporate subsidiary could be greater than the estimates in Table 3.16 if the subsidiary's corporate parent is insulated from claims against the subsidiary but the subsidiary is not insulated from claims against the corporate parent. In that case, the assurance risk could equal the risk of the corporate parent going bankrupt (and involving the subsidiary in bankruptcy proceedings) plus the risk of the subsidiary going bankrupt.

Such situations will turn upon the facts of particular transactions and corporate relationships.<sup>56</sup>

Allowing creditors of parent corporations to make claims against subsidiaries, when subsidiary creditors cannot make claims against a corporate parent, is sometimes justified on the basis of accounting rules for consolidated financial reporting. The unconsolidated balance sheet (assets, liabilities, and net worth) and income statement (revenues and expenses) for a corporate subsidiary would not reflect the activities of other corporate affiliates. Therefore, creditors lending directly to a subsidiary on the basis of such financial statements might not have any claim against the assets of other affiliates or the corporate parent because they had not looked to the assets of the group or been misled about the basis for the transaction. However, accounting rules generally require that corporate parents prepare financial statements consolidating the assets, liabilities, net worth, and income of all the

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<sup>56</sup> For example, Blumberg and Strasser cite cases in which banks made loans to parent corporations and required a compensating deposit or purchase of a certificate of deposit by subsidiaries as conditions of the loans. The banks have been permitted to set off the unpaid balance on the loan to the parent against the banks' liabilities on the deposit or certificate of deposit of the subsidiary. Law of Corporate Groups: Procedure, 1990 Supplement, p. 206.

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subsidiaries owned and controlled by the corporation.<sup>59</sup> In some situations, creditors lending to a corporation on the basis of consolidated financial statements might have a legitimate claim against the assets of any subsidiary included in such statements.<sup>60</sup>

Anecdotal evidence suggests that corporate parents can and do insulate themselves from the obligations of their subsidiaries, but subsidiaries may not always be able to escape responsibility for the obligations of their corporate parent. For example, creditors of LTV Aerospace have been caught up in bankruptcy proceedings for the parent LTV Corporation in spite of the fact that LTV Aerospace was a financially sound, independent subsidiary. In other circumstances, subsidiaries have escaped the obligations of bankrupt corporate parents.<sup>61</sup>

Table 3.17 shows that a subsidiary self-guarantee in which the subsidiary is not insulated from the parent could entail up to twice the assurance risk of a self-guarantee by firms that do not have corporate parents (the estimates in Table 3.17 assume that both the parent and its subsidiary fall within the same net worth category). These assurance risk estimates would apply in instances where the corporate parent is insulated from claims against the subsidiary and the subsidiary is not insulated from claims against the corporate parent. In this case, the failure of either entity could result in a failure to honor financial assurance obligations.

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<sup>59</sup> Consolidated financial statements generally must include the activities of all subsidiaries in which the corporation has an ownership position of 50 percent or greater, and may include the activities of subsidiaries in which the corporation has an ownership stake of more than 20 percent. The notable exception to this rule is when a subsidiary is engaged in a distinctly different type of business activity, relative to other corporate affiliates, as in the case of the financial services subsidiaries of motor vehicle manufacturers.

<sup>60</sup> Liability of a subsidiary for the contracts of its parent "does not arise frequently," according to Blumberg, and generally turns on whether the parent and subsidiary are in fact under common control. Law of Corporate Groups: Tort, Contract, and Other Common Law Problems in the Substantive Law of Parent and Subsidiary Corporations, pp. 543-545.

<sup>61</sup> The American Municipal Bond Assurance Corporation (AMBAC), a regulated financial institution, was actually engaged in the business of "selling" AAA bond ratings, by guaranteeing the payment of municipal bond principal and interest, at a time when AMBAC was a subsidiary of Baldwin United and Baldwin United was in Chapter 11 bankruptcy. In this instance, the regulatory separation of AMBAC permitted the eventual sale of the firm (to Citicorp), and the claims of Baldwin United creditors against AMBAC were limited to the proceeds from the subsidiary's sale.

Table 3.17 Estimated assurance risk of non-independent subsidiary self-guarantee with NRC financial test

Net Worth (\$MM)	Average Risk	Confidence Bounds of Assurance Risk	
		Lower Bound	Upper Bound
10 - 20	0.921%	0.357%	1.294%
20 - 100	0.754%	0.544%	0.965%
100 - 400	0.601%	0.240%	0.962%
400 - 1 billion	0.406%	0.000%	0.878%
> 1 billion	0.277%*	0.000%*	0.955%

\* On the assumption that all firms > \$1 billion pass test.

In addition to evaluating the assurance risk of self-guarantees using the current NRC financial test, ICF also evaluated the effect of using a revised financial test recently proposed by EPA that was designed to reduce the misprediction rate of the financial test and to increase the availability of the test to solvent firms. ICF's analysis indicates that the misprediction rate of the proposed test is only 27 percent (that is, 27 percent of bankrupt firms could have passed the financial test during any of the three years prior to the year of bankruptcy).<sup>62</sup> Thus, the assurance risk of a self-guarantee with the proposed financial test is only 27 percent of the assurance risk of no financial mechanism. Table 3.18 shows this assurance risk for different net worth categories (no estimate is shown for firms with less than \$10 million in net worth, because the proposed financial test also includes a \$10 million minimum net worth requirement).

<sup>62</sup> 56 Fed. Reg. 30201, 30207, July 1, 1991.



Table 3.18 Estimated assurance risk of self-guarantee with proposed EPA financial test

Net Worth (\$MM)	Assurance Risk	Confidence Bounds of Assurance Risk	
		Lower Bound	Upper Bound
10 - 20	0.335%	0.200%	0.470%
20 - 100	0.275%	0.200%	0.351%
100 - 400	0.219%	0.086%	0.324%
400 - 1 billion	0.149%	0.000%	0.324%
> 1 billion	0.140 <sup>*</sup>	0.000% <sup>*</sup>	0.480% <sup>*</sup>

<sup>\*</sup> On the assumption that all firms > \$1 billion pass test.

The proposed EPA financial test for self-guarantees would be available to corporate subsidiaries as well as corporate parents. For the reasons discussed above, the assurance risk estimates in Table 3.18 might only apply to self-guarantees by firms that do not have corporate parents. Table 3.19 shows that a 'non-independent subsidiary self-guarantee' with EPA's proposed financial test could entail twice the assurance risk of a self-guarantee by firms that do not have corporate parents, if the corporate parent were insulated from claims against the subsidiary but the subsidiary were not insulated from claims against the corporate parent. In this case, the failure of either entity could result in a failure to honor financial assurance obligations.

Table 3.19 Estimated assurance risk of non-independent subsidiary self-guarantee with proposed EPA financial test

Net Worth (\$MM)	Average Risk	Confidence Bounds of Assurance Risk	
		Lower Bound	Upper Bound
10 - 20	0.672%	0.407%	0.937%
20 - 100	0.550%	0.397%	0.704%
100 - 400	0.439%	0.175%	0.702%
400 - 1 billion	0.296%	0.000%	0.641%
> 1 billion	0.277%	0.000%	0.955%

### 3.6 Comparative Assurance of Financial Assurance Mechanisms

Tables 3.20 to 3.24 summarize the estimates presented in Sections 3.1 to 3.5. They show the comparative failure risk for alternative providers of financial assurance.

Although the risks of the assurance mechanisms presented here vary significantly relative to one another, they are all small on an absolute scale. For example, a self-guarantee mechanism carries an assurance risk calculated to be 0.13 percent, while a bank letter of credit carries an assurance risk of 0.001 percent for licensees with a net worth greater than \$1 billion. However, on an absolute scale even the larger of the two numbers, 0.13 percent, is small -- just over one chance in a thousand that the self-guarantee will fail.

Table 3.20 Estimated assurance risk of no financial assurance mechanism (baseline failure rate for manufacturing firms, 1984 through 1990)

Net Worth (\$MM)	Assurance Risk	Confidence Bounds of Assurance Risk	
		Lower Bound	Upper Bound
0 - 10	1.53%	1.35%	1.70%
10 - 20	1.24%	0.74%	1.74%
20 - 100	1.02%	0.74%	1.30%
100 - 400	0.81%	0.32%	1.30%
400 - 1 billion	0.55%	0.00%	1.19%
> 1 billion	0.14%	0.00%	0.48%

Table 3.21 Estimated assurance risk of NRC-approved prepayment mechanisms (product of investment risk for low or higher risk investments and baseline failure rates for firms)

Net Worth (\$MM)	Assurance Risk	
	Low Risk Investment Policy	Higher Risk Investment Policy
0 - 10	0.0%	0.058%
10 - 20	0.0%	0.047%
20 - 100	0.0%	0.039%
100 - 400	0.0%	0.031%
400 - 1 billion	0.0%	0.021%
> 1 billion	0.0%	0.005%

Table 3.22 Estimated assurance risk for NRC-approved surety, insurance, and guarantee mechanisms (product of failure rates for third-party providers without insurance guarantee funds and baseline failure rates for firms, 1984 through 1990)

Net Worth (\$MM)	Surety Bonds	Insurance	Bank	Savings and Loan	Parent Guarantee* (with NRC test)
0 - 10	0.015%	0.013%	0.017%	0.055%	NA
10 - 20	0.013%	0.011%	0.013%	0.050%	0.007%
20 - 100	0.011%	0.009%	0.011%	0.041%	0.004%
100 - 400	0.008%	0.007%	0.008%	0.036%	0.003%
400 - 1 billion	0.006%	0.004%	0.007%	0.024%	0.003%
> 1 billion	0.002%	0.001%	0.001%	0.002%	0.001%

\* Assuming 100% independent.

Table 3.23 Estimated assurance risk for NRC-approved surety, insurance, and guarantee mechanisms (product of failure rates for third-party providers with insurance guarantee funds and baseline failure rates for firms, 1984 through 1990)

Net Worth (\$MM)	Surety (with fund)	Insurance (with fund)
0 - 10	0.00015%	0.00012%
10 - 20	0.00014%	0.00011%
20 - 100	0.00012%	0.00009%
100 - 400	0.00008%	0.00006%
400 - 1 billion	0.00004%	0.00004%
> 1 billion	0.00001%	0.00001%



Table 3.24 Estimated assurance risk of self-guarantee with GE/Westinghouse financial test and weighted parent guarantee (assuming 3% non-independent)

Net Worth (\$MM)	GE/Westinghouse Self-Guarantee	NRC Parent Guarantee
0 - 10	NA	NA
10 - 20	NA	0.021%
20 - 100	NA	0.015%
100 - 400	NA	0.012%
400 - 1 billion	NA	0.009%
> 1 billion	0.13% <sup>*</sup>	0.005%

<sup>\*</sup> On the assumption that all firms > \$1 billion pass test.

#### 4 ESTIMATED AVAILABILITY OF PROPOSED FINANCIAL TEST AND SELF-GUARANTEE TO NRC LICENSEES

This chapter presents estimates of the number of current NRC licensees that could satisfy the basic requirements of the financial test proposed by GE and Westinghouse as the criteria for self-guarantees. It also presents estimates of the number of licensees who as self-guarantors could satisfy the basic requirements of the NRC financial test currently used as the criteria for qualification as a parent guarantor. Finally, it presents estimates for variations to the criteria proposed in the petition for rulemaking suggested by commenters on the petition.

The estimates are based on a database containing financial and other information for all NRC licensees subject to decommissioning financial assurance for which such information is available. The contents of the database are described in Section 4.1. Results obtained from operations using the database are described in Section 4.2.

The numbers presented in this report are based on data available in early 1992, and should therefore be viewed as approximate rather than exact figures. Changes in financial conditions can and will change the availability of financial test options to NRC licensees. A licensee using a financial test must pass the test each year to continue using it; if the licensee does not pass, it must obtain another method of financial assurance.

##### 4.1 Development of Financial Data Base

The database that has been developed attempts to capture the entire population of NRC licensees that might be eligible to use a self-guarantee mechanism. The procedure used to develop the database is explained in this section.

Step 1: Obtain the names of all NRC licensees that are required to demonstrate financial assurance for decommissioning.

ICF obtained from NRC a list of licensees under Parts 30, 40, 70, and 72 required to provide financial assurance for decommissioning. This list contains 735 license numbers. Firms that had been listed several times depending on the number of licenses they possessed were consolidated into one entry.<sup>63</sup>

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<sup>63</sup> A record was maintained of the number of licenses held by each licensee.

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Step 2: Eliminate licensees that are unlikely to use a self-guarantee.

Of the licensees identified in Step 1, about 25 government entities and 116 universities (both public and private) were deleted.<sup>64</sup> These licensees generally prepare financial data that is not suited for use in self-guarantee mechanisms. In addition, Federal, State, and local government licensees are eligible to use a statement of intent to assure for decommissioning costs, and would probably opt for the statement of intent over the self-guarantee.

Step 3: Add missing licensees that submitted non-standard financial assurance submissions for decommissioning.

Any licensees not in the database that had submitted non-standard decommissioning funding plans or certifications of financial assurance for decommissioning were added to the database. (The non-standard submissions were submitted by NRC Regions to NRC Headquarters for review, and included numerous parent company guarantees and a number of attempted self-guarantees, as well as other financial assurance mechanisms.) The firms identified in this step all consist of licensees under 10 CFR Parts 30, 40, and 70, and all are required to meet financial assurance requirements. Twenty-two such licensees were added. These 22 licensees may have been included on the licensee list that ICF received from NRC but under a different name.

Step 4: Add firm names and financial data for NRC licensees under 10 CFR Part 50.

In order to include a sample of firms licensed under 10 CFR Part 50, ICF reviewed NUREG-0327, Rev. 5, Owners of Nuclear Power Plants, and included in the database license applicants listed as greater than 50 percent owners of plants. The greater than 50 percent ownership criterion was adopted to ensure that the firms included were likely to be primarily responsible for the plant. Data for these firms can be analyzed separately in the database to allow comparisons with licensees under Parts 30, 40, 70, and 72. This process added 46 firms to the database.

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<sup>64</sup> University hospitals, which operate as financial entities separate from universities, were not deleted.

Step 5: Obtain financial data on the licensees.

The resulting list of licensees, consisting of 497 firm names, was sent to Dun and Bradstreet in order to obtain financial information. There were approximately 30 firms on which Dun and Bradstreet had no information, and 80 firm names that were determined to be duplicates. Dun and Bradstreet provided data on the remaining 385 licensees, although gaps in data remained. Information on domestic assets and depreciation, depletion and amortization was unavailable. The data provided by Dun and Bradstreet related to 1989 and 1990. Table 4.1 presents the financial data currently in the database and their relevance for each of the three financial tests evaluated (i.e., Alternative 1 of the NRC financial test, Alternative 2 of the NRC financial test, and the General Electric/Westinghouse proposed financial test).

Table 4.1 Primary categories of financial data and relation to financial tests examined

Financial Data	Information Received (Yes/No)	Items Required in NRC Test (Alt. 1)	Items Required in NRC Test (Alt. 2)	Items Required in Proposed GE/Westinghouse Test
Net worth	Yes	X		
Tangible net worth	Yes	X	X	X
Current assets	Yes	X		
Current liabilities	Yes	X		
Total liabilities	Yes	X		
Net income	Yes	X		
Depreciation depletion and amortization	No	X		
Net working capital	Yes	X		
U.S. assets	No	X	X	X
Bond rating	Yes		X	X

Step 6: Obtain information on bond ratings of firms.

Bond ratings were collected from Standard & Poor's November 1991, Bond Guide for the 385 firms in the database for which financial information was available. Ratings on commercial paper were not



considered acceptable. The rating on the most recent bond issue was used. If a company had several bonds with different ratings, ICF contacted Standard & Poor's to verify which bond had been most recently issued.

Step 7: Eliminate licensees on which the available data is incomplete or of questionable quality.

In this step, a total of 40 licensees were removed from the database owing to discrepancies in data. These discrepancies included:

- Firms on which key elements of the data were missing.
- Licensees whose names were different from those on which Dun and Bradstreet had provided data. Some of these firms were identified as the parents of the licensees and the others could not be reconciled with NRC's records of licensee names. The former category had to be deleted because the financial data pertained to the parent company and not the licensee. At the end of this step 289 licensees remained in the database.

Step 8: Enter data on decommissioning costs.

Six levels of decommissioning costs -- \$75,000, \$750,000, \$5,000,000, \$20,000,000, \$50,000,000, and \$200,000,000 -- were incorporated in the database for analytic purposes. The first two decommissioning cost levels represent the lowest and the highest amounts currently established for which a licensee may submit certification of financial assurance if a Decommissioning Funding Plan containing a site-specific cost estimate is not submitted. Five million dollars was considered to be a relatively high amount, corresponding to a substantial decommissioning cost estimate for licensees under Parts 30, 40, 70, and 72. A decommissioning cost of twenty million dollars was included because it is the highest cost estimate in any submission reviewed to date. The last two possibilities, \$50,000,000 and \$200,000,000, were used to account for 10 CFR Part 50 licensees, who may face higher obligations than licensees under Parts 30, 40, 70, and 72.

The database that resulted from the above eight steps contains a total of 289 firms. The missing firms are those on which the data were either unavailable or of questionable quality.

Database Limitations

ICF has identified the following limitations to the database:

- The financial information provided by Dun and Bradstreet presents the financial condition of different firms in different years, i.e., in 1989 and 1990. It is unlikely that this situation is material to the results of the analysis, however, because in all cases the data cover a full calendar or fiscal year.
- Data on depreciation, depletion, and amortization, needed in Alternative 1 of NRC's financial test, could not be obtained from Dun and Bradstreet. The results for Alternative 1 therefore are likely to overstate the number of firms that can pass the test, since none have been screened for this criterion.
- Data on domestic assets also could not be obtained from Dun and Bradstreet. The U.S. asset requirement appears in all three financial tests. This limitation, however, will not affect estimates of the availability or assurance of the proposed test relative to the financial test included in NRC's parent guarantee mechanism.
- Finally, no information is available on auditors' opinions. The database therefore cannot be used to incorporate financial test provisions (found in all the tests reviewed) requiring that the licensees have their financial statements audited by independent certified accountants, that their accounting practices are in conformity with generally accepted accounting practices, and that their auditor's opinions are "clean." The absence of this information also could lead to an overestimate of the number of firms able to pass all financial tests.

#### 4.2 Estimated Availability of Self- Guarantees

This section reports the results of ICF's evaluation of the ability of firms included in the database described in Section 4.1 to pass alternative financial tests. The tests were close analogues of the self-guarantee criteria proposed by GE and Westinghouse and the two alternatives of the current NRC financial test for parent guarantees. In addition, to address public comments that NRC should seek consistency with EPA's requirements for financial assurance, the tests also included EPA's recently-proposed revisions to its financial test. The criteria included are listed in Table 4.2. Elements of the current NRC financial tests were excluded from the analysis if publicly available data could not be obtained for a particular element, or if the element involved procedural aspects such as independent auditor certifications.

Table 4.2 Financial test components included in analysis

## Proposed Self-guarantee

- Tangible Net Worth  $\geq$  \$1 billion;
- Tangible Net Worth  $\geq$  10 times decommissioning costs; and
- Bond rating of AAA, AA, or A from Standard and Poor's.

## NRC Current Alternative 1

- Tangible Net Worth  $\geq$  \$10 million;
- Net Working Capital  $\geq$  6 times decommissioning costs; and
- Tangible Net Worth  $\geq$  6 times decommissioning costs; and
- Two of the following three ratios:
  - Total liabilities to net worth less than 2.0;
  - The sum of net income plus depreciation, depletion, and amortization to total liabilities greater than 0.1; and
  - Current assets to current liabilities greater than 1.5.

## NRC Current Alternative 2

- Tangible Net Worth  $\geq$  \$10 million;
- Tangible Net Worth  $\geq$  6 times decommissioning costs; and
- Bond rating of AAA, AA, A, or BBB from Standard and Poor's.

## EPA Proposed Alternative 1

- Net Worth  $\geq$  \$10 million;
- Either of the following two ratios:
  - Cash flow -  $(0.66 \times FR)/\text{Total Liabilities} > 0.05$ ; or
  - Total Liabilities/Net Worth  $< 2.5$ ; and
- Net Worth at least 1X decommissioning costs.

## EPA Proposed Alternative 2

- Net Worth  $\geq$  \$10 million plus net worth in the amount of decommissioning costs; and
- Either of the following two ratios:
  - Cash flow - \$10M/total liabilities  $> 0.10$ ; or
  - Total Liabilities/Net Worth  $< 1.5$ .

The most important omissions are the absence of consideration of depreciation, depletion, and amortization in the NRC Alternative 1 test.

The estimates generated for six levels of decommissioning costs are reported in Tables 4.3 through 4.14. A pair of exhibits is presented for each cost category. The first exhibit in the pair presents estimates for the numbers of licensees in the database, by category, that pass each alternative test. In addition, the licensees passing each test are identified as parent or subsidiary firms. The exhibit indicates specifically whether GE and/or Westinghouse can pass the test. The second exhibit in each pair shows the number of licensees in the database in each size category capable of passing. The numbers presented in the second exhibit are nested. Therefore, these tables show the number of licensees cumulatively for each size category that can pass the test and the number that fall into that size category. As Tables 4.3 to 4.14 demonstrate, approximately 22 licensees under Parts 30, 40, 70, and 72 are capable of passing the GE and Westinghouse proposed self-guarantee at all levels of decommissioning cost estimates tested, up to \$200 million. At \$200 million only 16 licensees can pass. A few more licensees can use the NRC Alternative 2 test, which is less sensitive to the amount of decommissioning costs than is the Alternative 1 test. NRC's current Alternative 1 financial test for parent guarantees substantially reduces the number of licensees that can pass with high decommissioning cost estimates (greater than \$20 million). NRC Alternative 1 test also consistently fails GE and Westinghouse, due to the ratios criteria in the test. Because data on depletion, depreciation, and amortization are not included in the database used to test the effects of alternate financial tests, however, this result cannot be considered definitive for GE and Westinghouse.

The results presented in this section suggest that, as noted by public comments on the Notice of Petition for Proposed Rulemaking, fewer firms pass the financial test for the self-guarantee in the petition for rulemaking than pass the current NRC financial test. At the lowest decommissioning cost estimates tested (\$75,000 to \$5 million), a larger number of Parts 30, 40, 70, and 72 licensees are estimated to pass the NRC Alternative 2 test than are estimated to pass the test included in the Petition (30 for NRC Alternative 2; 22 for the proposed test). The ratio declines slightly at higher estimated decommissioning costs. As noted by public comments, the tangible net worth requirement in the proposed test accounts for the smaller number of licensees capable of passing the proposed test; ICF's analysis also indicated that these results remain the same whether the test requires tangible net worth 6 times or 10 times decommissioning costs.



Table 4.3 Licensees\* passing alternative tests, by category (current decommissioning cost estimate of \$75,000)

	Total Number of Licensees	Proposed Self- Guarantee	NRC Alt 1	NRC Alt 2	EPA Proposed Test	
					Alt 1	Alt 2
All Licensees	291	38	63	70	49	70
Part 30,40,70,72 Licensees	254	22/0	38/21	30/7	28/17	30/7
Part 50 Licensees**	37	9/7	0/0	17/15	0/0	17/15
General Electric	--	PASS	FAIL	PASS	FAIL	PASS
Westinghouse	--	PASS	FAIL	PASS	FAIL	PASS

\* When two numbers are separated by a slash, licensees that are parent corporations are listed first, subsidiaries are listed second.

\*\* If a licensee has both a Part 50 license and a Part 30, 40, 70, or 72 license, the licensee is listed under the Part 30, 40, 70, 72 category.

Table 4.4 Licensees passing alternative tests, by size\* (current decommissioning cost estimate of \$75,000)

	Total Number of Licensees	Proposed Self- Guarantee	NRC Alt 1	NRC Alt 2	EPA Proposed Test	
					Alt 1	Alt 2
> 1 billion TNW	63	38	8	52	10	52
> 500 million TNW	81	38/0	13/5	62/10	14/4	62/10
> 50 million TNW	138	38/0	37/24	70/8	34/20	70/8
> 25 million TNW	159	38/0	52/15	70/0	43/9	70/0
> 10 million TNW	184	38/0	63/11	70/0	49/6	70/0
< 10 million TNW	107	0	0	0	0	0

\* In cells with two numbers separated by a slash: The first figure is the total number of passing firms at or above the specified TNW size level; and the second figure is the incremental number of firms passing at the specified size level (e.g., in the second row, the first figure is the number of passing firms with more than \$500 million in tangible net worth, and the second figure is the number of passing firms with tangible net worth between \$500 million and \$1 billion).

Table 4.5 Licensees\* passing alternative tests, by category (current decommissioning cost estimate of \$750,000)

	Total Number of Licensees	Proposed Self- Guarantee	NRC Alt 1	NRC Alt 2	EPA Proposed Test	
					Alt 1	Alt 2
All Licensees	291	38	59	70	49	70
Part 30,40,70,72 Licensees	254	22/0	34/21	30/7	28/17	0/0
Part 50 Licensees**	37	9/7	0/0	17/15	30/7	17/15
General Electric	--	PASS	FAIL	PASS	FAIL	PASS
Westinghouse	--	PASS	FAIL	PASS	FAIL	PASS

\* When two numbers are separated by a slash, licensees that are parent corporations are listed first; subsidiaries are listed second.

\*\* If a licensee has both a Part 50 license and a Part 30, 40, 70, or 72 license, the licensee is listed under the Part 30, 40, 70, 72 category.

Table 4.6 Licensees passing alternative tests, by size\* (current decommissioning cost estimate of \$750,000)

	Total Number of Licensees	Proposed Self- Guarantee	NRC Alt 1	NRC Alt 2	EPA Proposed Test	
					Alt 1	Alt 2
> 1 billion TNW	63	38	8	52	10	52
> 500 million TNW	81	38/0	13/5	62/10	14/4	62/10
> 50 million TNW	138	38/0	36/23	70/8	34/20	70/8
> 25 million TNW	159	38/0	50/14	70/0	43/9	70/0
> 10 million TNW	184	38/0	59/9	70/0	49/6	70/0
< 10 million TNW	107	0	0	0	0	0

\* In cells with two numbers separated by a slash: The first figure is the total number of passing firms at or above the specified TNW size level; and the second figure is the incremental number of firms passing at the specified size level (e.g., in the second row, the first figure is the number of passing firms with more than \$500 million in tangible net worth, and the second figure is the number of passing firms with tangible net worth between \$500 million and \$1 billion).

Table 4.7 Licensees\* passing alternative tests, by category (current decommissioning cost estimate of \$5,000,000)

	Total Number of Licensees	Proposed Self- Guarantee	NRC Alt 1	NRC Alt 2	EPA Proposed Test	
					Alt 1	Alt 2
All Licensees	291	38	29	70	47	70
Part 30,40,70,72 Licensees	254	22/0	16/10	30/7	27/16	30/7
Part 50 Licensees**	37	9/7	0/0	17/15	0/0	17/15
General Electric	--	PASS	FAIL	PASS	FAIL	PASS
Westinghouse	--	PASS	FAIL	PASS	FAIL	PASS

\* When two numbers are separated by a slash, licensees that are parent corporations are listed first; subsidiaries are listed second.

\*\* If a licensee has both a Part 50 license and a Part 30, 40, 70, or 72 license, the licensee is listed under the Part 30, 40, 70, 72 category.

Table 4.8 Licensees passing alternative tests, by size\* (current decommissioning cost estimate of \$5,000,000)

	Total Number of Licensees	Proposed Self- Guarantee	NRC Alt 1	NRC Alt 2	EPA Proposed Test	
					Alt 1	Alt 2
> 1 billion TNW	63	38	8	52	10	52
> 500 million TNW	81	38/0	13/5	62/10	14/4	62/10
> 50 million TNW	138	38/0	27/14	70/8	34/20	70/8
> 25 million TNW	159	38/0	29/2	70/0	43/9	70/0
> 10 million TNW	184	38/0	29/0	70/0	47/4	70/0
< 10 million TNW	107	0	0	0	0	0

\* In cells with two numbers separated by a slash, the first figure is the total number of passing firms at or above the specified TNW size level; and the second figure is the incremental number of firms passing at the specified size level (e.g., in the second row, the first figure is the number of passing firms with more than \$500 million in tangible net worth, and the second figure is the number of passing firms with tangible net worth between \$500 million and \$1 billion).

Table 4.9 Licensees\* passing alternative tests, by category (current decommissioning cost estimate of \$20,000,000)

	Total Number of Licensees	Proposed Self- Guarantee	NRC Alt 1	NRC Alt 2	EPA Proposed Test	
					Alt 1	Alt 2
All Licensees	291	38	15	67	38	70
Part 30,40,70,72 Licensees	254	22/0	11/3	27/7	20/14	30/7
Part 50 Licensees**	37	9/7	0/0	17/15	0/0	17/15
General Electric	--	PASS	FAIL	PASS	FAIL	PASS
Westinghouse	--	PASS	FAIL	PASS	FAIL	PASS

\* When two numbers are separated by a slash, licensees that are parent corporations are listed first; subsidiaries are listed second.

\*\* If a licensee has both a Part 50 license and a Part 30, 40, 70, or 72 license, the licensee is listed under the Part 30, 40, 70, 72 category.

Table 4.10 Licensees passing alternative tests, by size\* (current decommissioning cost estimate of \$20,000,000)

	Total Number of Licensees	Proposed Self- Guarantee	NRC Alt 1	NRC Alt 2	EPA Proposed Test	
					Alt 1	Alt 2
> 1 billion TNW	63	38	8	52	10	52
> 500 million TNW	81	38/0	13/5	62/10	14/4	62/10
> 50 million TNW	138	38/0	15/2	67/8	34/20	70/8
> 25 million TNW	159	38/0	15/0	67/0	38/4	70/0
> 10 million TNW	184	38/0	15/0	67/0	38/0	70/0
< 10 million TNW	107	0	0	0	0	0

\* In cells with two numbers separated by a slash: The first figure is the total number of passing firms at or above the specified TNW size level; and the second figure is the incremental number of firms passing at the specified size level (e.g., in the second row, the first figure is the number of passing firms with more than \$500 million in tangible net worth, and the second figure is the number of passing firms with tangible net worth between \$500 million and \$1 billion).



Table 4.11 Licensees\* passing alternative tests, by category (current decommissioning cost estimate of \$50,000,000)

	Total Number of Licensees	Proposed Self- Guarantee	NRC Alt 1	NRC Alt 2	EPA Proposed Test	
					Alt 1	Alt 2
All Licensees	291	38	9	64	32	69
Part 30,40,70,72 Licensees	254	22/0	8/1	27/5	15/14	29/7
Part 50 Licensees**	37	9/7	0/0	17/14	0/0	17/15
General Electric	--	PASS	FAIL	PASS	FAIL	PASS
Westinghouse	--	PASS	FAIL	PASS	FAIL	PASS

\* When two numbers are separated by a slash, licensees that are parent corporations are listed first; subsidiaries are listed second.

\*\* If a licensee has both a Part 50 license and a Part 30, 40, 70, or 72 license, the licensee is listed under the Part 30, 40, 70, 72 category.

Table 4.12 Licensees passing alternative tests, by size\* (current decommissioning cost estimate of \$50,000,000)

	Total Number of Licensees	Proposed Self- Guarantee	NRC Alt 1	NRC Alt 2	EPA Proposed Test	
					Alt 1	Alt 2
> 1 billion TNW	63	38	7	52	10	51
> 500 million TNW	81	38/0	9/2	62/10	14/4	61/10
> 50 million TNW	138	38/0	9/0	64/2	32/18	69/8
> 25 million TNW	159	38/0	9/0	64/0	32/0	69/0
> 10 million TNW	184	38/0	9/0	64/0	32/0	69/0
< 10 million TNW	107	0	0	0	0	0

\* In cells with two numbers separated by a slash: The first figure is the total number of passing firms at or above the specified TNW size level; and the second figure is the incremental number of firms passing at the specified size level (e.g., in the second row, the first figure is the number of passing firms with more than \$500 million in tangible net worth, and the second figure is the number of passing firms with tangible net worth between \$500 million and \$1 billion).

Table 4.13 Licensees\* passing alternative tests, by category (current decommissioning cost estimate of \$200,000,000)

	Total Number of Licensees	Proposed Self- Guarantee	NRC Alt 1	NRC Alt 2	EPA Proposed Test	
					Alt 1	Alt 2
All Licensees	291	29	4	47	20	67
Part 30,40,70,72 Licensees	254	16/0	4/0	21/2	12/7	27/7
Part 50 Licensees**	37	19/4	0/0	15/9	0/0	17/15
General Electric	--	PASS	FAIL	PASS	FAIL	PASS
Westinghouse	--	PASS	FAIL	PASS	FAIL	PASS

\* When two numbers are separated by a slash, licensees that are parent corporations are listed first; subsidiaries are listed second.

\*\* If a licensee has both a Part 50 license and a Part 30, 40, 70, or 72 license, the licensee is listed under the Part 30, 40, 70, 72 category.

Table 4.14 Licensees passing alternative tests, by size\* (current decommissioning cost estimate of \$200,000,000)

	Total Number of Licensees	Proposed Self- Guarantee	NRC Alt 1	NRC Alt 2	EPA Proposed Test	
					Alt 1	Alt 2
> 1 billion TNW	63	29	4	47	10	52
> 500 million TNW	81	29/0	4/0	47/0	14/4	62/10
> 50 million TNW	138	29/0	4/0	47/8	20/6	67/5
> 25 million TNW	159	29/0	4/0	47/0	20/0	67/0
> 10 million TNW	184	29/0	4/0	47/0	20/0	67/0
< 10 million TNW	107	0	0	0	0	0

\* in cells with two numbers separated by a slash: The first figure is the total number of passing firms at or above the specified TNW size level; and the second figure is the incremental number of firms passing at the specified size level (e.g., in the second row, the first figure is the number of passing firms with more than \$500 million in tangible net worth, and the second figure is the number of passing firms with tangible net worth between \$500 million and \$1 billion).

4.3 Estimated  
Availability  
of Proposed  
Self-Guarantee  
with Revised  
Criteria  
Proposed by  
Public Comments

This section reports the results of ICF's analysis of the effect on the availability of self-guarantees of the use of criteria proposed by commenters on the financial test proposed by GE and Westinghouse. Instead of a tangible net worth requirement of \$1 billion, tangible net worth criteria of \$50 million, \$100 million, and \$500 million were substituted. In addition, an alternative test including a tangible net worth requirement of \$100 million and an investment grade bond rating (BBB or better) was examined. The results are presented in Tables 4.15 to 4.20. Finally, a requirement of a multiple of 6 times estimated decommissioning costs, rather than 10 times estimated costs, was also examined. That revision to the proposed test did not affect the availability of the proposed self-guarantee and those results are not reported in detail.

The results reported in Tables 4.15 to 4.20 indicate that the reductions in tangible net worth requirements suggested by commenters do increase the availability of the proposed financial test for self-guarantees. Halving the tangible net worth requirement from \$1 billion to \$500 million, for example, increases by 6 licensees the estimated number of licensees able to pass the test. Reducing the requirement 10 times, to \$100 million, adds an estimated total of 10 licensees under Parts 30, 40, 70, and 72 who may be able to pass the test. However, Alternative 2 of the current NRC test remains more available to licensees than any of these alternatives analyzed.

An increase in the tangible net worth requirement in the current NRC Alternative 2 test, from \$10 million and a BBB or better rating to \$100 million and a BBB or better rating, does not significantly change the number of licensees that pass. Comparison of the results for NRC Alternative 2 (i.e., tangible net worth of \$10 million and BBB or above rating) reported in Tables 4.3 to 4.14 with the results for the proposed self-guarantee using a tangible net worth of \$100 million and BBB or above rating indicate that only 3 additional Part 30, 40, 70, and 72 licensees pass the less stringent test.

Table 4.15 Licensees passing proposed self-guarantee test with revisions suggested by commenters (current decommissioning cost estimate of \$75,000)

	Proposed Self-Guarantee Using a Tangible Net Worth of 1 Billion and a Bond Rating of A	Proposed Self-Guarantee Using a Tangible Net Worth of 500 Million and a Bond Rating of A	Proposed Self-Guarantee Using a Tangible Net Worth of 100 Million and a Bond Rating of A	Proposed Self-Guarantee Using a Tangible Net Worth of 50 Million and a Bond Rating of A	Proposed Self-Guarantee Using a Tangible Net Worth of 100 Million and a Bond Rating of BBB
All Licensees	38	44	48	50	67
Part 30,40,70,72 Licensees	22	25	28	30	34
Part 50 Licensees	16	19	20	20	33

Table 4.16 Licensees passing proposed self-guarantee test with revisions suggested by commenters (current decommissioning cost estimate of \$750,000)

	Proposed Self-Guarantee Using a Tangible Net Worth of 1 Billion and a Bond Rating of A	Proposed Self-Guarantee Using a Tangible Net Worth of 500 Million and a Bond Rating of A	Proposed Self-Guarantee Using a Tangible Net Worth of 100 Million and a Bond Rating of A	Proposed Self-Guarantee Using a Tangible Net Worth of 50 Million and a Bond Rating of A	Proposed Self-Guarantee Using a Tangible Net Worth of 100 Million and a Bond Rating of BBB
All Licensees	38	44	48	50	68
Part 30,40,70,72 Licensees	22	25	28	30	34
Part 50 Licensees	16	19	20	20	33



Table 4.17 Licensees passing proposed self-guarantee test with revisions suggested by commenters (current decommissioning cost estimate of \$5,000,000)

	Proposed Self-Guarantee Using a Tangible Net Worth of 1 Billion and a Bond Rating of A	Proposed Self-Guarantee Using a Tangible Net Worth of 500 Million and a Bond Rating of A	Proposed Self-Guarantee Using a Tangible Net Worth of 100 Million and a Bond Rating of A	Proposed Self-Guarantee Using a Tangible Net Worth of 50 Million and a Bond Rating of A	Proposed Self-Guarantee Using a Tangible Net Worth of 100 Million and a Bond Rating of BBB
All Licensees	38	44	48	50	68
Part 30,40,70,72 Licensees	22	25	28	30	34
Part 50 Licensees	16	19	20	20	33

Table 4.18 Licensees passing proposed self-guarantee test with revisions suggested by commenters (current decommissioning cost estimate of \$20,000,000)

	Proposed Self-Guarantee Using a Tangible Net Worth of 1 Billion and a Bond Rating of A	Proposed Self-Guarantee Using a Tangible Net Worth of 500 Million and a Bond Rating of A	Proposed Self-Guarantee Using a Tangible Net Worth of 100 Million and a Bond Rating of A	Proposed Self-Guarantee Using a Tangible Net Worth of 50 Million and a Bond Rating of A	Proposed Self-Guarantee Using a Tangible Net Worth of 100 Million and a Bond Rating of BBB
All Licensees	38	44	48	48	67
Part 30,40,70,72 Licensees	22	25	28	28	34
Part 50 Licensees	16	19	20	20	33

Table 4.19 Licensees passing proposed self-guarantee test with revisions suggested by commenters (current decommissioning cost estimate of \$50,000,000)

	Proposed Self-Guarantee Using a Tangible Net Worth of 1 Billion and a Bond Rating of A	Proposed Self-Guarantee Using a Tangible Net Worth of 500 Million and a Bond Rating of A	Proposed Self-Guarantee Using a Tangible Net Worth of 100 Million and a Bond Rating of A	Proposed Self-Guarantee Using a Tangible Net Worth of 50 Million and a Bond Rating of A	Proposed Self-Guarantee Using a Tangible Net Worth of 100 Million and a Bond Rating of BBB
All Licensees	38	44	44	44	62
Part 30,40,70,72 Licensees	22	25	25	25	30
Part 50 Licensees	16	19	19	19	32

Table 4.20 Licensees passing proposed self-guarantee test with revisions suggested by commenters (current decommissioning cost estimate of \$200,000,000)

	Proposed Self-Guarantee Using a Tangible Net Worth of 1 Billion and a Bond Rating of A	Proposed Self-Guarantee Using a Tangible Net Worth of 500 Million and a Bond Rating of A	Proposed Self-Guarantee Using a Tangible Net Worth of 100 Million and a Bond Rating of A	Proposed Self-Guarantee Using a Tangible Net Worth of 50 Million and a Bond Rating of A	Proposed Self-Guarantee Using a Tangible Net Worth of 100 Million and a Bond Rating of BBB
All Licensees	29	29	29	29	37
Part 30,40,70,72 Licensees	16	16	16	16	18
Part 50 Licensees	13	13	13	13	19

## 5 ANALYSIS OF PUBLIC AND PRIVATE COSTS OF FINANCIAL ASSURANCE ALTERNATIVES

This section presents a comparison of the estimated public and private costs associated with alternative financial assurance mechanisms, based on the licensees included in the database prepared by ICF. Although the database does not include all NRC materials licensees, the cost estimates presented in this section provide a robust analytical tool, for the reasons discussed below, for evaluating the alternative financial assurance options.

In this analysis, public costs are defined as the amount of decommissioning costs that would be required to be paid by the public sector due to the financial failure of licensees and/or their guarantors without the substitution of another source of financial assurance. Private costs are defined as the cost of financial assurance mechanisms that must be obtained by licensees in order to comply with regulatory requirements.

The analysis reported in this section is not a full benefit-cost analysis for NRC's current financial assurance requirements or for the proposed amendment to those requirements. NRC has previously evaluated the impact of financial assurance requirements on nuclear materials licensees.<sup>65</sup> NRC also has concluded that properly conducted decommissioning ensures that adverse health, safety and environmental impacts do not occur, while financial assurance requirements ensure that licensees adequately carry out the funding and completion of decommissioning in a manner which protects public health and safety.<sup>66</sup> Financial assurance requirements, however, are difficult to address in a full benefit-cost framework, because NRC does not possess the authority to use options, such as taxes, that could lead to full cost internalization, and attainment of protection of public health and safety precludes full cost minimization.

Public and private costs are presented below in separate tables for financial assurance mechanisms that do not rely upon financial tests (i.e., prepayment, surety bond, standby letter of credit, and insurance) and mechanisms that incorporate financial tests (i.e., parent guarantees, such as that currently authorized by NRC, and self-guarantees, such as that proposed in the Petition for Rulemaking).

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<sup>65</sup> Impact of Proposed Financial Assurance Requirements on Nuclear Materials Licensees, NUREG/CR-4958, PNL-6233, September 1987.

<sup>66</sup> 53 Fed. Reg. 24019, June 27, 1988.

This section first describes the procedures used to calculate costs and then provides the costs.

## 5.1 Procedures

The cost calculations required the development of three measures: (1) the estimated amount of decommissioning costs being covered by financial assurance; (2) the private costs of the financial assurance mechanisms used; and (3) the public costs attributable to failure of financial assurance to cover certain decommissioning costs.<sup>67</sup>

### **Estimated total amount of decommissioning costs**

ICF calculated the estimated total amount of decommissioning costs for licensees included in the analytical database by determining the number of licenses held by those licensees and multiplying by an estimated decommissioning cost per license. The number of licenses held by each licensee in the database was determined by a count of the licenses associated with each firm in NRC's license information system. Licensees were sorted into the six net worth categories used in the analysis presented in Section 3. The total amount of decommissioning costs for each net worth category then was calculated based on average decommissioning cost estimate of \$750,000 per license. (Thus, for example, if the licensees in a particular net worth category held a total of 200 Part 30 licenses, the total amount of Part 30 decommissioning costs for that net worth category was estimated to be 200 licenses x \$750,000 per license = \$150 million.)<sup>68</sup>

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<sup>67</sup> The general method used closely resembles the procedures described in the Preamble to the rule proposed by EPA amending its financial test under Subtitle C of RCRA. 56 Fed. Reg. 30201, July 1, 1991.

<sup>68</sup> ICF reviewed the records of all attempts to date to make use of the NRC parent guarantee for providing decommissioning financial assurance. Approximately 56 licensees sought to use the mechanism, and about half had more than one license under Parts 30, 40, 70, or 72. Substantially more than half the submissions covered cost certifications of \$750,000 per license, which represents the highest level of financial assurance for holders of an NRC license under Part 30, 40, or 70 issued before July 27, 1990, that can be submitted with a certification rather than a cost estimate and Decommissioning Funding Plan. For this reason, \$750,000 was used in this analysis as the average decommissioning cost for all licenses.



### Calculation of Private Costs

Private costs per dollar assured for non-test financial assurance mechanisms are based on estimates of the costs of obtaining prepayment or surety and insurance mechanisms provided by third parties.<sup>69</sup>

For comparison purposes, the private costs shown for each non-test mechanism reflect the total private costs estimated to be incurred if all licensees in the database use that mechanism. Private costs were calculated by multiplying total decommissioning costs in each category times a cost for each of the financial assurance mechanisms (i.e., the cost per dollar assured) of 1.5 percent.

### Calculation of public costs

Public costs were calculated by multiplying the assurance risk for each net worth category for each financial assurance mechanism times the total amount of decommissioning costs in each category.

## 5.2 Public and Private Costs of Financial Assurance Mechanisms That Do Not Rely on Financial Tests

The public and private costs of non-test mechanisms can be used as a baseline for comparison with financial test mechanisms. The public costs associated with all non-test mechanisms are all extremely low, reflecting the low assurance risk of these alternatives. Estimated total private costs for non-test mechanisms are all identical, reflecting the assumption that all of these mechanisms will be priced at 1.5 percent of the amount of the mechanism.

Table 5.1 compares the public and private costs of non-test mechanisms for Part 30, 40, 70, and 72 licensees. At a cost of 1.5 percent per dollar assured, the total private cost for these licensees would be about \$3.68 million annually. These private cost estimates are based on an average decommissioning cost of \$750,000 per

<sup>69</sup> Data on the costs of financial assurance mechanisms were collected as part of EPA's analysis of the public and private costs of the RCRA Subtitle C financial test. The annual cost of a prepayment mechanism reflects the difference between the interest rate that a firm could earn on prepaid funds and the interest rate that a firm pays for borrowed funds. The annual cost of the other mechanisms reflects the charges by the third-party provider of the mechanism, plus any costs of collateral required to be supplied. This analysis indicated that the annual cost to a licensee of these mechanisms can range from about 1.5 to 3 percent of the amount assured. The EPA analysis concluded that the 1.5 percent cost estimate was the most appropriate estimate, particularly for large and medium-sized firms, although firms smaller than \$100 million, could pay a higher amount for financial assurance. Background Document, Proposed Revisions to the Subtitle C Financial Tests, U.S. EPA, Office of Solid Waste.

Table 5.1 Public and private costs of prepayment and surety financial mechanisms: Parts 30, 40, 70, and 72 licensees (\$000)

Mechanism	Private Costs	Public Costs
Prepayment	\$3,679	\$ 0.0
Surety Bond (no guarantee)	3,679	22.4
Surety Bond (guaranteed)	3,679	0.2
Insurance (no guarantee)	3,679	18.5
Insurance (guaranteed)	3,679	0.2
Letter of Credit (bank)	3,679	23.9
Letter of Credit (S&L)	3,679	82.6

license for Part 30, 40, 70, and 72 licensees. Increases or decreases in the estimated decommissioning cost per license would also change the estimated total private cost of financial assurance proportionately.

The estimated annual public cost of non-test mechanisms shown in Table 5.1 ranges from zero for prepayment mechanisms (funded with Treasury bills or other low-risk, short-term securities) to \$82,600 for letters of credit provided by savings and loans. At a decommissioning cost of \$750,000 per license, the public cost of the S&L letter of credit mechanism can be interpreted to mean that if all Part 30, 40, 70, and 72 licenses were covered by this mechanism, the public sector would expect to pay for one decommissioning every 9 years (\$82.6 thousand per year times 9 years equals \$750,000).

### 5.3 Public and Private Costs of Financial Test Mechanisms

Financial test mechanisms reduce private costs by allowing licensees to demonstrate financial assurance without incurring the expense of non-test mechanisms. The private costs associated with each financial test mechanism were assumed to be de minimus (the costs of preparation of necessary submissions, and the cost of preparation of letters from an independent auditor). The number of firms and licenses likely to use the current NRC parent guarantee was calculated from actual financial assurance submissions obtained by NRC. All submissions to date involving parent guarantees have been reviewed by NRC Headquarters as well as by Regions. The file for each such submission was used to determine the number of licenses and amount of financial assurance covered by the application as well as the identity

of the potential guarantor. This information was then cross-checked against the information contained in the analytic database. The private costs of firms deemed incapable of using the NRC financial test and parent guarantee were considered to be the costs of obtaining a letter of credit from a bank, which was the mechanism most commonly used by licensees who were unable to provide a parent guarantee.

The public costs of the NRC parent guarantee and self-guarantee mechanisms are calculated by multiplying the assurance risk for each net worth category times the amount of decommissioning costs covered by the mechanism in each category. The public costs of self-guarantee mechanisms are significantly higher than the public costs of other mechanisms, reflecting the higher estimated assurance risk of self-guarantee mechanisms.

Table 5.2 provides the estimated private costs and public costs of the NRC parent guarantee and the proposed self-guarantee for Parts 30, 40, 70, and 72 licensees. Private cost estimates were derived from an analysis of the number of licensees able to pass either the NRC parent guarantee tests or the proposed self-guarantee test,<sup>70</sup> and the number of licenses held by such licensees. Public cost estimates reflect the assurance risk of each self-guarantee by net worth category, and the number of licenses covered by firms in each net worth category. The private and public costs also reflect the assumption that all licensees that could not make use of either the current NRC parent guarantee or the proposed self-guarantee would obtain a letter of credit from a bank.

As Table 5.2 demonstrates, the private costs to licensees decline when licensees use the NRC parent guarantee and/or the proposed self-guarantee. Public costs, however, increase only slightly as a result of licensees' use of the NRC parent guarantee. When the proposed self-guarantee is included, public costs are estimated at more than three times as much as the public costs when only the NRC parent guarantee and bank letter of credit are included.

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<sup>70</sup> Because the NRC parent guarantee is available only to licensees that are subsidiaries, and the proposed self-guarantee is available only to licensees that are parents, the two tests cover separate groups of licensees. In some cases, however, a parent firm may be a licensee and it may have subsidiaries that are also licensees.

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Table 5.2 Public and private costs of NRC parent guarantee and proposed self-guarantee: Parts 30, 40, 70, and 72 licensees (\$000)

Mechanism	Private Costs	Public Costs
All licensees use Bank Letter of Credit only	\$3,678	\$23.8
All licensees use Bank Letter of Credit or NRC Parent Guarantee	\$3,060	\$25.6
All licensees use Bank Letter of Credit, NRC Parent Guarantee, or Proposed Self-Guarantee	\$2,453	\$77.7

The method used to calculate these costs is described in more detail in Tables 5.3, 5.4, and 5.5 below:

Table 5.3 below provides additional detail on the derivation of the estimated public and private costs incurred when all licensees use a bank letter of credit. Private costs are the costs of obtaining the financial assurance mechanism, assumed to be 1.5 percent of its value. For example, private costs for licensees in the \$0 - 10 million net worth category are 84 licenses times \$750,000 decommissioning cost per license times 1.5 percent, which equals approximately \$945,000. Public costs, or the costs incurred by a failure of the mechanism, are calculated similarly, substituting the average assurance risk of the mechanism for the cost of obtaining the mechanism. Thus, the public costs incurred for licensees in the \$0 - 10 million net worth are 84 licenses x \$750,000 decommissioning cost per license x 0.017 percent, which is about \$10,700. Total private and public costs are the sum of the costs of each net worth category.



Table 5.3 Costs Associated With All Licensees Using Bank Letter of Credit

Licensee Net Worth (\$ million)	No. Licenses	Private Costs	Average Assurance Risk (percent)	Public Cost
0 - 10	84	\$945,000	0.017	\$10,710
10 - 20	30	\$337,500	0.013	\$ 2,925
20 - 100	63	\$708,750	0.011	\$ 5,387
100 - 400	41	\$461,250	0.008	\$ 2,583
400 - 1,000	30	\$337,500	0.007	\$ 1,508
1,000 +	79	\$888,750	0.001	\$ 770
<b>TOTAL</b>	<b>327</b>	<b>\$3,678,000</b>		<b>\$23,800</b>
<b>Private Cost</b>	(Cost of Bank Letter of Credit) x (No. Licenses) x (Decommissioning Cost)			\$3,678,000
<b>Public Cost</b>	(Average Assurance Risk) x (No. Licenses) x (Decommissioning Cost)			\$ 23,800

(Figures are not exact due to rounding)

Table 5.4 below explains the derivation of the estimated costs of use of a letter of credit and the NRC parent guarantee. The private costs of using the NRC parent guarantee are estimated to be zero. The private savings, then, are the savings to the licensee of not obtaining a letter of credit. Increased assurance risk is the difference between the estimated risk of a parent guarantee and the risk of a letter of credit. For licensees in the \$10 - 20 million net worth category, the increased assurance risk is the average assurance risk of a parent guarantee (0.020 percent) minus the risk of a bank letter of credit (0.013 percent), resulting in an increased assurance risk of 0.007 percent. The increased public cost is thus one license times decommissioning costs of \$750,000 times 0.007 percent, which is approximately \$54 (accounting for rounding errors).

It is important to note that the assurance risks for a parent guarantee are calculated using the parent's (or guarantor's) net worth status, not the licensee's net worth, since the parent is, in effect, the assurance



mechanism. The table reflects *parent* rather than licensee net worth. Thus, the 54 licenses covered by a parent guarantee in the one billion plus net worth category may actually reflect licenses owned by smaller licensees.

**Table 5.4 Private Cost Savings and Added Public Costs:  
Associated With NRC Parent Guarantee**

Guarantor Net Worth (\$ millions)	No. Licenses Covered by NRC Parent Guarantee	Private Savings	Increased Assurance Risk (percentage points)	Increase in Public Cost
0 - 10	0	0	-	\$ 0
10 - 20	1	\$1,250	0.007	\$ 54
20 - 100	0	0	0.004	\$ 0
100 - 400	5	\$56,250	0.004	\$ 143
400 - 1,000	0	0	0.002	\$ 0
1,000 +	49	\$551,250	0.003	\$1,543
<b>TOTAL</b>	<b>55</b>	<b>\$618,750</b>		<b>\$1,740</b>
<b>Total Private Cost</b>	(Costs of All Licensees Using Letter of Credit) - (Savings of Licensees Using Parent Guarantee)			\$3,060,000
<b>Total Public Cost</b>	(Public Cost of All Licensees Using Letter of Credit) + (Increased Cost of Licensees Using Parent Guarantee)			\$25,600

(Figures are not exact due to rounding)

Table 5.5 below explains the derivation of the estimated costs associated with the proposed self-guarantee, as well as the NRC parent guarantee and bank letter of credit. The private savings and added public costs are calculated in the same manner as described above for the parent guarantee. Because only firms with net worth greater than \$1 billion may use the test, the calculation pertains only to them.

Table 5.5 Private Cost Savings and Increased Public Costs Associated With the Proposed Self-Guarantee

Licensee Net Worth (\$ millions)	No. Licenses Covered by Self Guarantee	Private Savings	Increased Assurance Risk (Percentage Points)	Increased Public Cost
0 - 10	0	0	-	0
10 - 20	0	0	-	0
20 - 100	0	0	-	0
100 - 400	0	0	-	0
400 - 1,000	0	0	-	0
1,000 +	54	\$607,500	0.129	\$52,124
TOTAL		\$607,500		\$52,124

Total Private Cost	(Costs of All Licensees Using Letter of Credit) - (Savings of Licensees Using Parent Guarantee) - (Savings of Licensees Using Self Guarantee)	\$2,453,000
Total Public Cost	(Public Cost of All Licensees Using Letter of Credit) + (Increased Cost of Licensees Using Parent Guarantee) + (Increased Cost of Licensees Using Self Guarantee)	\$77,700

(Figures are not exact due to rounding)

#### 5.4 Pertinence of Cost Results to All NRC Licensees

The cost results presented in this section pertain directly only to the licensees included in the analytical database. In addition to those firms, approximately 116 universities and about 25 governmental agencies, which were not included in the database, hold materials licenses. In addition, financial data could not be obtained for approximately 60 firms that are licensees.

None of the licensees not included in the data base are likely to be able to use a parent guarantee or self-guarantee. The firms for which data could not be obtained are likely to be too small to satisfy tangible

net worth components of financial tests; government entities and universities generally do not qualify to use financial tests because of the absence of a parent corporation or because of their unique accounting procedures.

The licensees not included in the database therefore can be expected to use financial mechanisms such as letters of credit or statements of intent.

Because both the private costs of statements of intent and the public costs of their use are likely to be very low (based on the very low rate of insolvencies by government agencies and universities) absence of these licensees does not significantly affect the cost estimates.

Additional use of letters of credit could be expected to increase the private costs of licensees, particularly since the licensees not included in the database would be likely to pay relatively high fees for the letters of credit. Without additional information on the size, and failure rates, of these firms, the estimated public costs cannot be calculated. They would not, however, affect the cost analysis for parent or self-guarantees.

6 REVIEW OF  
PROPOSED  
FINANCIAL  
TEST TERMS  
AND IMPE-  
LEMENTATION  
PROCEDURES

This chapter evaluates selected components of the financial test criteria proposed by GE and Westinghouse in their joint petition for rulemaking. Section 6.1 evaluates the proposed component that includes a U.S. asset requirement. Section 6.2 evaluates the proposed implementation procedures. In addition to reviewing the effectiveness of those procedures, Section 6.2 also reviews the sources of information that would be available to NRC to provide advance notice that a licensee who has passed the proposed test is at risk subsequently of failing the test.

6.1 Evaluation  
of U.S. Assets  
Requirement

The financial test for self-guarantee proposed by the petitioners includes the following U.S. asset requirement:

\*Assets located in the United States amounting to at least 90 percent of total assets or at least 10 times the current decommissioning cost estimate (or prescribed amount if a certification is used)\*. (Petition for Rulemaking Under 10 CFR 2.802).

This requirement is similar to requirements in existing financial tests which require licensees to have assets located in the United States amounting to least 90 percent of total assets or at least ~~six~~ times the current decommissioning cost estimates. Three aspects of the proposed requirements were reviewed: (1) Whether the initial rationale for a U.S. asset requirement continues to exist; (2) If so, whether licensees should continue to be given an option to show either 90 percent or a multiple of decommissioning costs; and (3) if a multiple of decommissioning costs continues to be a useful requirement, whether the proposed increase from six times to ten times decommissioning costs is warranted.

6.1.1 Rationale for U.S.  
Assets Requirement

The parent company financial test currently authorized by NRC in 10 CFR Part 30 Appendix A contains a requirement that the licensee demonstrate that it has assets located in the United States amounting to at least 90 percent of total assets or at least six times the current decommissioning cost estimate. That requirement parallels similar requirements in EPA financial assurance regulations that served as the model for the NRC financial test. In order to understand the rationale for the requirement, ICF reviewed EPA's explanation contained in the preamble to the financial test rulemaking of April 7, 1982, when the requirement first appeared in the RCRA financial test, and other rulemaking documents.



The first regulatory proposal allowing a financial test as a means of assuring availability of funds for closure and post-closure care was introduced in EPA's proposed regulations on hazardous waste facilities of May 19, 1980. (45 Fed. Reg. 33268). That proposal contained no requirement concerning assets in the U.S. Instead, owners/operators were required to have "net working capital in the United States of at least twice the adjusted closure cost estimate." (45 Fed. Reg. 33268). Although an extensive analysis was subsequently conducted to develop a financial test that met EPA's objectives, the impact of the U.S. assets requirement was not incorporated into the analysis. This requirement was nonetheless included in the revised interim final rule, which stated that "... the owner or operator must have assets in the United States amounting to at least 90 percent of total assets or at least six times the sum of the closure and post-closure cost estimates." (47 Fed. Reg. 15036, April 7, 1982). The justification stated in the preamble to that rule for the U.S. asset requirement was that, in the event of bankruptcy or other default, a substantial amount of assets in the United States would ensure access to funds.

A review of laws governing international bankruptcy<sup>71</sup> indicates that the EPA was justified in its concerns. Different countries have different laws governing bankruptcy and the claims of a foreign creditor are not always protected in bankruptcy proceedings. Under the U.S. Bankruptcy Code, the district court in which the case has been filed has exclusive jurisdiction over all the property of the U.S. Debtor, irrespective of geographic location, upon commencement of a case. This is to ensure an orderly liquidation procedure and equal treatment of all creditors. When a U.S. Debtor has assets located in foreign jurisdictions, such assets may be threatened by the actions of local creditors in each jurisdiction. To guard against such a possibility, section 508(a) of the U.S. Bankruptcy Code states the following:

"If a creditor receives, in a foreign proceeding, payment of, or a transfer of property on account of, a claim that is allowed under this title, such creditor may not receive any payment under this title on account of such claim until each of the other holders of claims on account of which such holders are entitled to share equally with such creditor under this title has received payment under this title

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<sup>71</sup> Sources included the bankruptcy sections of the 1991 general index of the United States Code Annotated for issues such as: foreign countries, location of assets, recovery of assets, and cases ancillary to foreign proceedings. The Index to Legal Periodicals, dating back to 1981, was searched similarly for any articles on international commercial law, international assets, bankruptcy assets in the international arena, and recovery of assets. Additional indexes, including economic and business journals, were also reviewed. Finally, sources included books on international businesses, bankruptcy law guides, international law guides, and Collier on Bankruptcy.

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equal in value to the consideration received by such creditor in such foreign proceeding.\* (Section 508(a) of the U.S. Bankruptcy Code.)

Accordingly, if a creditor has received partial payment as a result of a foreign proceeding, he will receive nothing more until comparable U.S. creditors have received an equivalent payment.

Although the above law appears to protect a U.S. debtor's assets from the claims of local creditors in an international bankruptcy, and ensure fair treatment of all creditors, it has no force outside the United States. The cooperation of courts within the jurisdiction of which foreign assets are located is crucial. Laws governing international bankruptcies are not at all definitive, and bilateral or multilateral treaties based on reciprocity have yet to come into existence. The International Bar Association has been very active in this area and has even developed a model law that can be adopted in several countries, but no dramatic change is likely to be observed in the near future.

The above discussion suggests that concerns about the accessibility of assets in the event of bankruptcy or default are justified. Therefore, the U.S. asset requirement remains an important element of the financial test.

#### 6.1.2 Rationale for 90 Percent Alternative

The 90 percent requirement was stated to be an alternative option that firms could use to meet this requirement, in lieu of having U.S. assets worth six times the amount of the cost estimates. This was allowed for the convenience of firms that might not be required by SEC to report their U.S. assets separately, and is explained in the preamble to the interim final rule as follows:

"The [EPA] believes that allowing firms to meet this requirement by having 90 percent of their assets in the United States rather than requiring all firms using the test to have six times the cost estimates in U.S.-located assets will save some firms added reporting costs while providing equivalent assurance. The standards of the American Institute of Certified Public Accountants provide that information about identifiable assets for a firm's foreign operations should be included in its financial statements if those assets are 10 percent or more of total assets. The Securities and Exchange Commission requires that firms filing Form 10K reports indicate those assets located outside the United States if 10 percent or more of their assets are located outside this country. A firm with less than 10 percent of its assets outside the country

and filing a Form 10K will therefore not have to take the additional step of identifying the exact amount of assets in the United States in order to meet this requirement of the financial test\*. (Revised interim final rule, 47 Fed. Reg. 15036, April 7, 1982). (Emphasis added).

Because a firm also needs to have tangible net worth at least six times the cost estimates in order to pass the financial test, the EPA was correct in its assessment that the 90 percent requirement would ensure at least as much assurance as the alternative U.S. asset requirement. This is because tangible net worth is only a part of a firm's total assets. For a firm with 90 percent of its assets in the United States, the tangible net worth multiple requirement will necessarily ensure U.S.-located assets of at least six times cost estimates.

The most recent Financial Accounting Standards Board (FASB) standards (June 1990) were reviewed to determine if the American Institute of Certified Public Accountants and the Securities and Exchange Commission have changed their reporting thresholds for firms with assets abroad after 1982. FASB standards concerning information to be provided about a firm's foreign operations and export sales state the following:

\*The information ... shall be presented for (1) an enterprise's foreign operations ... if either of the following conditions is met:

- a. Revenue generated by the enterprise's foreign operations from sales to unaffiliated customers is 10 percent or more of consolidated revenue as reported in the enterprise's income statement.
- b. Identifiable assets of the enterprise's foreign operations are 10 percent or more of consolidated total assets as reported in the enterprise's balance sheet\*. [FAS14, ¶132]

Furthermore,

\*The following information shall be presented for an enterprise's foreign operations ...:

- a. Revenue ...
- b. Operating profit or loss ...

- c. Identifiable assets as defined in paragraph .405\*. [FAS14, ¶135]

The regulations giving general instructions to businesses for filing forms to the SEC clarify the issue further. Financial information to be reported on foreign and domestic operations and export sales includes the following:

\*State for each of the registrant's last three fiscal years, or for each fiscal year the registrant has been in business, whichever period is shorter, ... identifiable assets attributable to each of the registrant's geographic areas .... To the extent that financial information included pursuant to this paragraph (d) complies with Generally Accepted Accounting Principles, the registrant may include in its financial statements a cross reference to this data in lieu of presenting duplicative data in its financial statements; conversely a registrant may cross reference to the financial statements\*. (17 CFR 229.101(d), 1991).

Thus, FASB reporting thresholds have apparently remained the same as in 1982.

Little reporting burden will be imposed on firms with less than 10 percent of their assets abroad if the 90 percent alternative is not provided. A firm that has between 0 and 10 percent of its assets located abroad, and that does not have to report any detailed information on such assets, need not in fact know the exact dollar value of those assets in order to satisfy the GE/Westinghouse requirement that it have U.S.-located assets worth ten times the cost estimates. The maximum percent of total assets that such a firm could possibly have abroad is 10 percent, implying that it has at least 90 percent of its assets in the United States. Since the balance sheet provides information on a firm's total assets, it is a simple matter to calculate the dollar value of 90 percent of total assets. A firm that has passed the net worth multiple requirement and that has U.S.-located assets amounting to at least 90 percent of its total assets, can also generally be expected to meet the multiple requirement for U.S. assets.

**6.1.3 Rationale for  
10 Times  
Decommissioning  
Requirement**

The GE/Westinghouse proposal requires licensees to have tangible net worth of at least 10 times the current decommissioning cost estimate. The U.S. asset component requires U.S.-located assets amounting to at least 90 percent of total assets, or at least 10 times cost estimates. This is more stringent than the six times multiple in NRC's present financial test. The analysis performed by ICF indicated that a 10 times



multiple did not decrease the number of licensees that could pass the proposed test, when compared to a 6 times multiple. ICF did not analyze whether the higher multiple requirement improves (i.e., lowers) the misprediction rate of the test.

## 6.2 Implementation and Monitoring Issues

This section examines the implementation issues that arise if the self-guarantee criteria of the GE/Westinghouse proposal are adopted and the options that may be available to the Commission to monitor firms that use self-guarantees as a means of providing assurance for decommissioning. Such procedures will help determine whether NRC will be alerted on a timely basis about a firm that no longer meets the conditions for self-guarantee, as well as identify the time frame within which the Commission can require alternative financial assurance criteria.

Issues concerning the implementation of the GE/Westinghouse proposal are not very complicated because a financial test in conjunction with a parent guarantee is already an acceptable means of financial assurance for decommissioning purposes. The submissions required to satisfy the criteria for parent guarantees under current rules are:

- Letter from the Chief Executive Officer of the applicant or licensee, certifying that the applicant or licensee is a going concern with positive tangible net worth.
- Letter from the Chief Financial Officer of the corporate parent, with decommissioning cost estimates and data from audited financial statements indicating that one of the alternatives of the financial test has been met.
- Special Report from an independent certified public accountant verifying the figures in the CFO's letter and confirming that the amounts have been derived from the company's independently audited year-end financial statements for the most recent fiscal year.
- Parent company guarantee.
- Financial statements of the guarantor.

In addition to the above documents, the Petitioners have further proposed that licensees using the self-guarantee should be required to submit all reports filed with the Securities and Exchange Commission

(SEC) to both the NRC and the licensee's independent auditor. Although this is the only additional implementation issue that arises, it has administrative implications for NRC.

In order to qualify for the proposed financial test, a company must have at least one class of equity securities registered under the Securities Exchange Act of 1934. The Securities Exchange Act of 1934 is a federal statute that requires all publicly held companies to comply with certain periodic reporting requirements.<sup>72</sup> The major forms that companies with registered securities under the 1934 Act must file with the SEC are listed below:<sup>73</sup>

- Form 10-K: The principal annual report form is Form 10-K. It must be filed 90 days after the close of the fiscal year, and it contains audited financial statements for the latest fiscal years.
- Form 10-Q: Form 10-Q is required to be filed for each of the first three quarters of the fiscal year, within 45 days after the end of each quarter. It contains unaudited financial statements, and provides an outlook on a company's financial position during the year.
- Form 8-K: To report any unscheduled material events or significant corporate changes, a Form 8-K must be filed. Significant events include changes in control of the registrant, acquisition or disposition of assets, bankruptcy or receivership, change in fiscal year, changes in registrant's certifying accountants, resignation of registrant's directors, and other events. The due date for filing of Form 8-K to report such events ranges from 5 business days to 15 calendar days after the occurrence of the event. Reporting on "other events" is optional, and there is no mandatory time for filing.
- Form 11-K: Employee stock purchase, savings, and similar plans are reported annually on Form 11-K.

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<sup>72</sup> The principal objective of the 1934 Act is to protect the public, not the issuer of securities. This is done by ensuring the dissemination of significant financial and other information relating to publicly traded securities through a regulated system of reporting.

<sup>73</sup> All information relating to reporting requirements under the 1934 act has been taken from Cooper & Lybrand's "SEC Manual" for 1990.

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- Form 8: All amendments to registration statements or reports are filed on Form 8.
- Form 12b-25: Registrants who are unable to file all or any portion of a periodic report due on Form 10-K, 11-K, 10-Q, or 20-F must file Form 12b-25 to request for an extension no later than one day after the due date of the filing form to which it relates.

Additional forms that need to be filed under the 1934 Act contain information regarding registration of securities, foreign issuers of securities, tender offers, going private transactions, and changes in beneficial ownership, among other topics.

The Petition proposes that licensees using a self-guarantee should be required to submit all forms filed with the SEC to NRC and the licensee's independent auditor. This implies that NRC would have to train its administrative staff and familiarize them with the full range of SEC's reporting requirements and forms.

#### 6.2.1 Alternatives for Monitoring and Advance Notice

Monitoring of firms that use the self-guarantee method of financial assurance is the more important issue given the Commission's goal of ensuring adequate funds. In the event that a firm no longer meets the proposed criteria an alternative mechanism is necessary. The GE/Westinghouse proposal states that within 90 days of the close of each fiscal year, a firm must either successfully pass the test or send notice by certified mail to the Commission of intent to establish alternate financial assurance, if it no longer meets the requirements of the financial test. In the latter case, alternate financial assurance must be provided within 120 days after the end of the fiscal year. The Petitioners, however, do not offer any suggestions on how soon the Commission should require alternative assurance in the event that a licensee no longer satisfies the financial test at any point during the year.

If the Petition is adopted, two requirements in the proposal would facilitate monitoring of financial test users between annual submissions. These are as follows:

1. \*Licensees using a self-guarantee would be required to forward promptly to both the NRC and the licensee's independent auditor all reports filed with the Securities and Exchange Commission\* (emphasis added), and

2. "In the event that the licensee's most recent bond issuance at any time ceased to be rated 'A' or above by either Moody's or S&P, the licensee would be required to provide the NRC with notice of that fact within 20 days after the change was published by the relevant rating service".

With regard to the first point, the Petition mentions only Form 10-K, Form 10-Q, and Form 8-K in any detail. However, as noted above in the discussion on reporting requirements under the Securities and Exchange Act of 1934, there are several forms that companies must file with the SEC. If firms are required to forward all these forms to the Commission, it would significantly increase the reporting burden of licensees as well as the administrative costs of NRC, without commensurate benefits. Even if only Form 10-K, Form 10-Q, and Form 8-K are required to be submitted, it is likely to impose an undesirable administrative burden with respect to monitoring, although the information contained in these forms is useful.

The second avenue suggested by the Petitioners whereby NRC can monitor self-guarantors is bond ratings. By requiring licensees to notify NRC within 20 days after their most recent bond issuance ceased to qualify for the financial test, the proposed test allows NRC to ensure that an adequate replacement is put in place.

In addition to the above means of monitoring self-guarantors, the Petitioners also state that an adequate "early warning system" can be established. Investor information services could be used by NRC as information sources to facilitate the monitoring process. Services offered by Standard and Poors and Moody's are probably the most relevant since their ratings are the only ones that are acceptable for the financial test, but a number of such services exist.

1. Standard & Poor's Ratings Group, for example, offers a variety of information services including computerized On-Line service, daily fax service of rating changes, and a customized research service. The customized research service provides, among other things, information on the outlook of a company, its profitability, and whether or not it is facing a possible downgrading of its bond rating. A subscriber can specify the number of companies on which information is sought as well as the frequency of reporting (e.g., every week or every month). Prices vary but an estimate of



\$360 was quoted for one hundred companies per reporting period.<sup>74</sup> Moody's provides similar services.

2. Disclosure provides information on a company's SEC filings through microfiche and paper subscription as well as compact disc and online computerized services.
3. Value Line publishes a periodic journal called the "Investment Survey" which discusses the current, and expected future, performance of different companies and industries. The focus, however, is primarily on equity and the risks of investing in the stock of a particular company.

For the Commission's purposes, the services providing information on a company's latest bond rating and the rationale behind it, whether it is facing a possible downgrading of its bond rating, and what the outlook on its future is would probably be the most useful. In this way, NRC might be alerted in advance of the deteriorating financial condition of a licensee before it reaches the point where it is unable to meet its decommissioning obligations.

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<sup>74</sup> Based on a telephone conversation with a Standard and Poor's representative.

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