

RULEMAKING ISSUE

Notation Vote

June 27, 2002

SECY-02-0116

FOR: The Commissioners

FROM: William D. Travers
Executive Director for Operations /RA/

SUBJECT: PROPOSED RULE: 10 CFR PARTS 30, 40, AND 70: FINANCIAL
ASSURANCE AMENDMENTS FOR MATERIALS LICENSEES

PURPOSE:

To request Commission approval to publish a proposed rule, in the Federal Register, that would amend financial assurance requirements for certain materials licensees in 10 CFR Parts 30, 40, and 70. The proposed amendments would bring financial assurance requirements more in line with actual decommissioning costs for these materials licensees.

BACKGROUND:

The staff notified the Commission of its intent to develop a rulemaking to amend financial assurance requirements for materials licensees in SECY-01-0084, "Rulemaking Plan: Financial Assurance Amendments for Materials Licensees," May, 9, 2001. The Commission advised the staff that it did not object to the rulemaking plan, in a Staff Requirements Memorandum dated June 6, 2001 (Attachment 1).

DISCUSSION:

A. Current Financial Assurance Requirements for Materials Licensees

Under current decommissioning regulations, materials licensees using quantities of nuclear materials above a threshold level must provide financial assurance for

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decommissioning. Most materials licensees are not required to provide financial assurance; of approximately 4900 materials licensees, only approximately 10 percent require financial assurance. All but the largest licensees, such as fuel cycle licensees, may base the amount of financial assurance required on either a site-specific decommissioning cost estimate approved by NRC, or one of the certification amounts in NRC regulations. The certification amounts are based on possession limits, and range from \$75,000 for sealed source licensees, to \$750,000 for licensees possessing large quantities of unsealed material.

The financial assurance requirements were promulgated in 1988 as part of the decommissioning rulemaking (53 FR 24018, June 27, 1988). Revision to some of the financial assurance requirements for materials licensees are needed because there have been changes in decommissioning costs since that time, and U.S. Nuclear Regulatory Commission experience has revealed that, for certain types of licensees, such as waste brokers, special considerations exist that require different treatment.

B. Proposed Changes

The changes being proposed are in four areas: (1) large sealed source licensees--large irradiators--would no longer be able to use the \$75,000 certification amount as a basis for financial assurance, and would have to base their financial assurance on a site-specific decommissioning cost estimate; (2) all waste broker licensees would have to provide financial assurance and would not be permitted to use the certification amounts. They would have to base their financial assurance on a site-specific decommissioning cost estimate; (3) the certification amounts for all licensees would be increased by 50 percent; and (4) licensees using a decommissioning cost estimate would have to update it at least every 3 years.

Large Sealed Source Licensees

Studies conducted for NRC conclude that, for large irradiators, decommissioning costs are substantially above the \$75,000 certification amount they currently may use as a basis for financial assurance (as discussed later, the staff proposes to modify the current certification amounts). The proposed amendments place an upper limit on the amount of licensed radioactive material that a sealed source licensee may possess and continue to use the \$75,000 certification amount. For Cobalt-60 sources, the types of sources generally used by large irradiators, the ceiling amount would be 1 million curies. Approximately 10 NRC licensees would be affected; these licensees would have to submit a site-specific decommissioning cost estimate.

Waste Broker Licensees

NRC has approximately 15 waste broker licensees, approximately half now require financial assurance. The term "waste broker" is not defined in NRC regulations. The proposed rule would define "waste broker" as any licensee that collects or accepts radioactive material from other entities for the purpose of processing, compacting, packaging, or otherwise preparing such material for disposal, or for storage. Under current regulations, waste brokers are treated like any other materials licensees for the purpose of financial assurance. However, their decommissioning costs are likely to be much higher than typical licensees because of the large amounts of waste that must

be disposed of. The proposed amendments would require all waste brokers to provide financial assurance, based on a site-specific decommissioning cost estimate.

Certification Amounts

The current certification amounts are \$75,000 for sealed source licensees, and \$150,000 or \$750,000 for other licensees, depending on the possession limits. These amounts have not been changed since the 1988 decommissioning rulemaking. Studies of changes in decommissioning costs since the certification amounts were established show substantial increases in decommissioning costs. The proposed amendments would raise all certification amounts by 50 percent. Proposed certification amounts for sealed source licensees would be \$113,000, and for other licensees, \$225,000 and \$1,125,000. Approximately 300 NRC licensees would be affected.

Requirement for Updating Decommissioning Cost Estimates

The existing financial assurance regulations do not contain a specific requirement for updating cost estimates in decommissioning funding plans after a certain number of years. Existing regulatory language only refers to "...adjusting cost estimates and associated funding levels periodically over the life of the facility." The staff believes that a more specific requirement is warranted, and is proposing to require updated decommissioning cost estimates at least every 3 years.

STRATEGIC PLAN GOALS:

The proposed rule would maintain safety by providing additional assurance of adequate/timely decommissioning. The effect of inadequate/untimely funding of decommissioning may have adverse impacts on public health and safety. If a site is not decommissioned because of insufficient funds, there is an increased likelihood of contamination and/or exposure of members of the public. The proposed rule would increase public confidence in NRC by reducing the likelihood that a State or local government would be forced to pay for decommissioning of a facility. It would make NRC financial assurance regulations more realistic and effective. Although the cost burden on licensees required to provide financial assurance would increase, the increase would be no more than necessary to maintain parity with increased decommissioning costs.

AGREEMENT STATE ISSUES:

The proposed amendments would affect Agreement States. The draft proposed rule was sent to Agreement States for review and comment on March 7, 2002. Ohio, Texas, and California provided comments. The comments generally supported NRC's proposed changes to financial assurance requirements.

Ohio supports all the proposed changes except reducing the maximum period for updating decommissioning cost estimates to 3 years. Ohio believes that 5 years is an adequate time frame, and that it is more convenient for the licensee and State to update decommissioning cost estimates at the time of license renewal, which is every 5 years. The staff recognizes that licensee preparation of a new decommissioning cost estimate, as well as regulator review, is a resource burden. However, decommissioning costs, especially waste disposal costs, can change significantly over a relatively short time period. For example, the decommissioning cost estimate for a large materials licensee increased from approximately \$40 million in 2001 to over \$67 million in 2002. Even

requiring updates at least every 3 years would not completely address this problem. However, by requiring an update of decommissioning cost estimates at least every 3 years, the staff is attempting to prevent a large gap between actual decommissioning costs and licensee decommissioning cost estimates from developing.

Texas supports all the proposed changes. It suggested that a definition of “waste broker” be added to the proposed rule. Texas also suggested that the discussion of the proposed rule note the relationship between security of radioactive material and appropriate decommissioning of a site, with timely disposal of radioactive materials. The staff agrees with these comments, and has made these changes.

California’s comments were in the form of several questions about the proposed rule. California wanted to know if a licensee’s certification amount would be evaluated every 3 years. The staff recognizes that the certification amounts will need to be evaluated periodically, but is not proposing a schedule. California had questions about the implementation of the proposed rule. The staff plans to implement the rule, if finalized, in a way that minimizes the burden on licensees and regulators. Licensees would have a certain time period to conform to new requirements. The staff also plans to implement any new requirements so that all affected licensees would not be required to submit new financial assurance at one time. A section on implementation has been added to the Federal Register notice “Statement of Considerations” asking for comments on how best to implement the rule. California asked if a cost adjustment factor, such as is used for financial assurance requirements in 10 CFR Part 50, would be proposed for materials licensees. The adjustment factor in 10 CFR 50.75 was specifically developed for reactor licensees. It would be much more difficult to develop a similar adjustment factor for materials licensees because of the great diversity in types and sizes of materials licensees.

The Conference of Radiation Control Program Directors (CRCPD) is in the process of developing amendments to the Suggested State Regulations for financial assurance. The staff has coordinated with CRCPD in preparing NRC’s draft proposed rule.

RESOURCES:

The staff estimates that 2.4 FTE’s will be required to complete this rulemaking. Implementation, consisting of guidance revision and review of additional decommissioning cost estimates, will require 0.5 FTE. In addition, more frequent review of decommissioning cost estimate updates will require 0.1 FTE per year. Contractor support for the rulemaking is estimated at approximately \$160K.

COORDINATION:

The Office of the General Counsel has no legal objection to the proposed rulemaking. The Office of the Chief Financial Officer has reviewed this Commission Paper for resource implications and has no objections. The rule proposes changes in information collection requirements that must be submitted to the Office of Management and Budget (OMB) no later than the date the proposed rule is forwarded to the Federal Register for publication.

RECOMMENDATIONS:

That the Commission:

1. Approve for publication, in the Federal Register, the proposed amendments to Parts 30, 40, and 70 (Attachment 2).
2. Note:
 - a. That the proposed amendments will be published in the Federal Register, allowing 75 days for public comment;
 - b. That the Chief Counsel for Advocacy of the Small Business Administration will be informed of the certification regarding economic impact on small entities and the reasons for it, as required by the Regulatory Flexibility Act, 5 U.S.C. 605(b);
 - c. That a draft Regulatory Analysis has been prepared for this rulemaking (Attachment 3);
 - d. That a draft Environmental Assessment is included in the Federal Register notice under "Environmental Assessment and Finding of No Significant Environmental Impact: Availability;"
 - e. That appropriate Congressional committees will be informed of this action;
 - f. That OMB review is required and a clearance package will be forwarded to OMB no later than the date the proposed rule is submitted to the Office of the Federal Register, for publication; and
 - g. That resources to complete and implement this rulemaking are included in the current budget.

/RA/

William D. Travers
Executive Director
for Operations

Attachments:

1. SRM
2. Federal Register Notice
3. Regulatory Analysis

June 6, 2001

MEMORANDUM TO: William D. Travers
Executive Director for Operations

FROM: Annette L. Vietti-Cook, Secretary **/RA/**

SUBJECT: STAFF REQUIREMENTS - SECY-01-0084 - RULEMAKING PLAN:
FINANCIAL ASSURANCE AMENDMENTS FOR MATERIALS
LICENSEES

This is to advise you that the Commission has not objected to the Rulemaking Plan for amending financial assurance requirements for materials licensees.

cc: Chairman Meserve
Commissioner Dicus
Commissioner Diaz
Commissioner McGaffigan
Commissioner Merrifield
OGC
CFO
OCA
OIG
OPA
Office Directors, Regions, ACRS, ACNW, ASLBP (via E-Mail)
PDR

NUCLEAR REGULATORY COMMISSION

10 CFR Parts 30, 40, and 70

RIN 3150-AG85

Financial Assurance Amendments for Materials Licensees

AGENCY: Nuclear Regulatory Commission.

ACTION: Proposed rule.

SUMMARY: The Nuclear Regulatory Commission (NRC) is proposing to amend its regulations for financial assurance for certain materials licensees to bring the amount of financial assurance required more in line with current decommissioning costs. The objective of this proposed action is to maintain adequate assurance so that timely decommissioning can be carried out following shutdown of a licensed facility.

DATES: The comment period expires (insert 75 days from date of publication). Comments received after this date will be considered if it is practical to do so, but the NRC is able to assure consideration only for comments received on or before this date.

ADDRESSES: Submit comments to: Secretary, U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, Attn: Rulemakings and Adjudications Staff.

Deliver comments to 11555 Rockville Pike, Rockville, MD, between 7:30 a.m. and 4:15 p.m. on Federal workdays.

You may also provide comments via the NRC's interactive rulemaking website (<http://ruleforum.llnl.gov>). This site provides the capability to upload comments as files (any format) if your web browser supports that function. For information about the interactive rulemaking website, contact Ms. Carol Gallagher (301) 415-5905; e-mail CAG@nrc.gov.

Certain documents related to this rulemaking, including comments received, may be examined at the NRC Public Document Room, Room O-1F23, 11555 Rockville Pike, Rockville, MD. These same documents may also be viewed and downloaded electronically via the rulemaking website.

The NRC maintains an Agencywide Document Access and Management System (ADAMS), which provides text and image files of NRC's public documents. These documents may be accessed through the NRC's Public Electronic Reading Room on the Internet at <http://www.nrc.gov/reading-rm/adams.html>. If you do not have access to ADAMS or if there are problems in accessing the documents located in ADAMS, contact the NRC Public Document Room (PDR) Reference staff at 1-800-397-4209, 301-415-4737, or by e-mail to pdr@nrc.gov.

FOR FURTHER INFORMATION CONTACT: Clark Prichard, Office of Nuclear Material Safety and Safeguards, U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, telephone (301) 415-6203 e-mail, cwp@nrc.gov.

SUPPLEMENTARY INFORMATION:

Background

The NRC regulations requiring financial assurance for decommissioning are designed to ensure that adequate funding will be available for timely decommissioning by licensees following shutdown of normal operations. The financial assurance regulations are part of the overall NRC strategy to maintain safety and protection of the environment during decommissioning and decontamination of nuclear facilities.

Financial assurance is composed of several parts: (1) licensees for which financial assurance should be required must be identified; (2) the amount of financial assurance required for each licensee must be adequate to fund current decommissioning costs; and (3) appropriate financial assurance mechanisms (surety bonds, escrow accounts, parent or self-guarantee, etc.) must be required. The objective of this rulemaking is to maintain adequate financial assurance by addressing gaps in the current regulatory framework regarding (1) and (2) above.

Under current decommissioning regulations, materials licensees using substantial quantities of nuclear materials must provide financial assurance for decommissioning (most materials licensees do not need to provide financial assurance because their possession limits are below the threshold for requiring financial assurance). NRC has approximately 4900 materials licensees of which approximately 10 percent require financial assurance. The financial assurance requirements were established in 1988 as part of the decommissioning rulemaking (53 FR 24018; June 27, 1988). Revision to some of the financial assurance requirements for materials licensees are needed because there have been changes in decommissioning costs since that time. Also, experience has revealed that for certain types of

licensees, such as waste brokers, special considerations exist that require more appropriate treatment.

Discussion

This proposed rule would maintain assurance of adequate funding for timely decommissioning. The current financial assurance regulations do not provide adequate coverage of potential decommissioning costs for certain types of materials licensees, mainly due to large increases in decommissioning costs since the financial assurance regulations were put in place. Allowing these financial assurance coverage shortfalls to remain could increase the likelihood of inadequate funding for timely decommissioning.

Inadequate/untimely funding of decommissioning could have adverse impacts on public health and safety, and protection of the environment. If a site is not decommissioned due to insufficient funds, there is an increased likelihood of contamination and/or exposure of members of the public. The changes to the regulations proposed here are focused on areas where the likelihood of inadequate funding relative to decommissioning costs is high. The proposed changes address situations where currently required amounts of financial assurance appear to be substantially less than decommissioning costs. The proposed changes would provide approximately \$80 million in additional financial assurance¹.

These proposed amendments were developed prior to recent heightened concerns about security of nuclear material. Because the objective of the amendments is timely decommissioning of nuclear facilities with appropriate disposal of radioactive materials, these amendments should

¹ Staff estimate based on numbers of licensees using each of the 3 certification amounts.

also enhance security of nuclear materials.

Failure to provide adequate financial assurance for decommissioning also has equity considerations. The potential costs to the public when it is required to cover the expense of cleanup of contaminated facilities where financial assurance is inadequate, must be considered. Equity considerations call for adequate financial assurance so that a licensee's decommissioning costs are borne by that licensee, not the Federal, State, or local government.

The NRC has completed studies of financial assurance requirements for materials licensees. The studies were carried out by ICF, Inc., a contractor with extensive experience in financial assurance. The studies, "Assessment of the Financial Assurance Requirements for Waste Broker Material Licensees," ICF, Inc., July 1999, and "Analysis of Decommissioning Certification Amounts for Materials Licensees - Parts 30, 40, and 70," ICF Consulting, December 2000, provide information that has been used to develop this proposed rulemaking. In addition, Pacific Northwest National Laboratory (PNNL), which has extensive experience in analyzing decommissioning costs, has completed several reports on current decommissioning costs for various types of nuclear facilities. The PNNL reports, Revised Analysis of Decommissioning Reference Non-Fuel Cycle Facilities, draft NUREG/CR-6477, PNNL, 1996, and Technology, Safety, and Costs of Decommissioning a Reference Large Irradiator and Reference Sealed Sources, NUREG/CR-6280, PNNL, January 1996, also form a basis for this proposed rule².

Proposed Changes

² For availability of these documents see the ADDRESSES section.

The changes being proposed are in four areas:

- (1) Large sealed source licensees--large irradiators--would no longer be able to use the \$75,000 certification amount as a basis for financial assurance, and would have to base their financial assurance on a site-specific decommissioning cost estimate;
- (2) All waste broker licensees would have to provide financial assurance, would not be permitted to use the certification amounts, and would have to base their financial assurance on a site-specific decommissioning cost estimate;
- (3) The certification amounts for licensees would be increased by 50 percent; and
- (4) Decommissioning cost estimates would have to be updated at least every 3 years.

Large Irradiators

Large irradiator licensees engage in the industrial irradiation of material primarily for purposes of sterilization (e.g., food products and medical equipment). These large irradiators operate facilities that have a large number of sealed sources, with possession limits of several million curies. The NRC has approximately 10 irradiator licensees authorized for possession of 1 million curies or more. Under present financial assurance requirements, these licensees may use the \$75,000 certification amount as a basis for financial assurance. Although this licensed radioactive material is all in the form of sealed sources, estimated current decommissioning costs for this type of facility, such as for source removal, shipping, and supplier handling charges, greatly exceed the \$75,000 certification amount that they may use.

PNNL's study of large irradiator decommissioning costs, Technology, Safety, and Costs of Decommissioning a Reference Large Irradiator and Reference Sealed Sources, NUREG/CR-6280, PNNL, January 1996, provides estimates of decommissioning costs under a number of

scenarios. Estimated decommissioning costs for an irradiator facility with 1 million curies of source activity are at least \$128,000; for a facility with 2 million curies, estimated costs are at least \$231,000. These cost estimates are for the least costly decommissioning scenarios, with all sources being returned to the supplier and no leakage of contamination.

The NRC is proposing to put an upper limit on the size of a sealed source licensee able to continue to use the \$75,000 certification amount. This proposed change would require a sealed source licensee with possession limits of over 1 million curies of Co-60, the radioactive material generally used by large irradiators, to base financial assurance on a decommissioning cost estimate. This facility-specific cost estimate is likely to be higher than \$75,000, and the licensee would incur higher financial assurance costs. However, the facility-specific cost estimate should provide a more accurate estimate of decommissioning costs.

Waste Brokers

Waste broker licensees handle radioactive waste associated with or generated by other licensees and non-licensed entities. There is no definition of “waste broker” in existing NRC regulations and the term is commonly used to describe several different activities. These amendments would add a definition of “waste broker” to cover licensees that accept radioactive material for the purpose of processing, compaction, repackaging, or otherwise preparing it for disposal, or for storage. The NRC has approximately 15 waste broker licensees, of which about one half require financial assurance under current regulations. Many waste broker licensees also conduct other types of licensed activities as part of their overall business. The NRC financial assurance regulations treat waste brokers in the same way as other materials licensees; there are no special financial assurance requirements applicable only to waste brokers.

The NRC has conducted an analysis of the adequacy of financial assurance requirements for waste brokers. The ICF report, "Assessment of the Financial Assurance Requirements for Waste Broker Material Licensees," ICF, Inc., July 1999, concludes that waste brokers engage in fundamentally different types of activities than other materials licensees, and require treatment appropriate to these activities.

From the viewpoint of financial assurance, waste broker activities are unique in that: (1) waste brokers are likely to have radioactive wastes generated by other licensees, and the inventory of waste a broker will have onsite at any time may fluctuate considerably and be difficult to predict; and (2) waste brokers have a financial interest in maximizing the amount of radioactive waste that they handle -- waste broker revenues are directly correlated to the amount of waste accepted.

The disposal costs of waste inventories are very high--much greater than when the decommissioning regulations were promulgated. The current financial assurance regulations do not consider the costs of disposing of significant volumes of waste generated outside the decommissioning process, such as inventories of brokered waste. Waste brokers may currently maintain a level of financial assurance that is inadequate for disposal of waste inventories. Charges for disposal of waste at low-level waste disposal facilities are based on the volume of waste disposed and also on the level of activity (e.g., quantity of curies) of the waste. The possession limits that determine what level of financial assurance a waste broker licensee must have are based on the quantity of curies of material possessed, not volume of material possessed. A waste broker that must dispose of large volumes of relatively low activity waste would be subject to substantial waste disposal charges. That same waste broker might have an inadequate amount of financial assurance to pay these charges because the financial assurance

requirements are based only on curie level.

The 1988 financial assurance regulations made no special provision for waste brokers. However, it is now clear that the activities of a waste broker licensee have very different implications for decommissioning costs than is the case for other types of materials licensees. For example, a laboratory using radioactive materials in making products will have a licensed possession limit based on the amount of radioactive materials in use at the facility. Most of the inventory of radioactive material will pass out of the licensee's possession as products are sold and shipped to users. Even in the case of bankruptcy and abrupt shutdown of operations, the product of the laboratory can most likely be sold or transferred. Decommissioning activities will consist of decontamination of the facility and some limited waste disposal. On the other hand, a waste broker having similar possession limits has limited options to reduce its inventory of radioactive material (waste) usually by disposal at a radioactive waste disposal facility. Thus, decommissioning costs are substantially higher for a waste broker than for another type of licensee with similar possession limits.

The NRC is proposing that all waste broker licensees be required to have financial assurance, and to base financial assurance on a facility-specific decommissioning cost estimate that takes into account other factors such as actual volume of material in addition to possession limits in curies.

Certification Amounts

The amount of financial assurance that must be provided can be based on either: (1) a facility-specific decommissioning cost estimate provided by the licensee in a decommissioning

funding plan³; or (2), one of several dollar amounts (certification amounts) specified in the regulations. The certification amounts are based on possession limits, and range from \$75,000 for sealed source licensees to \$750,000 for licensees possessing large quantities of unsealed material. At present, about 60 percent of materials licensees required to have financial assurance use the certification amounts. Which certification amount is required of a licensee depends on the possession limits for radioactive materials applicable to that license.

The present certification amounts are based on decommissioning cost estimates that are now approximately 15 years old. When the decommissioning rule was established, it was expected that periodic adjustments to the certification amounts would be needed as decommissioning costs changed over time. NRC has reviewed current decommissioning cost information and is proposing adjustments to the certification amounts. General inflation since 1988, as measured by the Gross Domestic Product price deflator (price index), has resulted in current prices that are approximately 40 percent higher than they were when the final decommissioning rule was published⁴. Specific information on decommissioning costs also shows a substantial increase. NRC regulations for decommissioning of nuclear power reactor licensees at 10 CFR 50.75 contain a cost adjustment factor for licensees to update the minimum amount of financial assurance required. This adjustment factor, which takes into account labor, energy, and waste disposal costs, shows a minimum increase of approximately 65 percent in reactor

³For some types of licensees using very large amounts of unsealed radioactive material, a facility-specific cost estimate must be used.

⁴ National Income and Product Accounts Tables, Bureau of Economic Analysis, U.S. Department of Commerce.

decommissioning costs from 1986 to 2000⁵. A major factor underlying the increase is waste disposal charges, which have gone up by at least 120 percent during this period. The increase is much greater in certain geographic areas -- disposal costs vary considerably according to disposal site⁶.

A study by PNNL for NRC on costs of decommissioning for six different types of reference non-fuel cycle nuclear materials licensees concludes that decommissioning costs increased by 34-66 percent between 1986 and 1996⁷. An ICF study found that estimates of decommissioning costs for a majority of a sample of Part 30 licensees using certification amounts exceed the applicable certification amount by a substantial margin.⁸

The NRC is proposing to raise all certification amounts by 50 percent. The proposed certification amounts would be \$113K for sealed source licensees, and \$225K and \$1,125K for licensees using unsealed sources. The revisions to the certification amounts proposed in this notice are aimed at keeping the certification amounts reasonably in accordance with current decommissioning costs for a typical licensee that has possession limits that allow it to use that particular certification amount.

⁵ Report on Waste Burial Charges, NUREG-1307, Revision 9, U.S. Nuclear Regulatory Commission, 2000, p.6. Copies of NUREG-1307, Revision 9 are available for inspection or copying for a fee from the NRC Public Document Room at O-1F23, 11555 Rockville Pike, Rockville, MD. Copies may be purchased at current rates from the U.S. Government Printing Office, P.O. Box 370892, Washington, DC 20402-9328 (telephone (202)512-2249); or from the National Technical Information Service by writing NTIS at 5285 Port Royal Road, Springfield, VA 22161.

⁶NUREG-1307, Revision 9, p. 6.

⁷ Revised Analysis of Decommissioning Reference Non-Fuel Cycle Facilities, draft NUREG/CR-6477, Pacific Northwest National Laboratories, 1996, p.iv.

⁸ "Analysis of Decommissioning Certification Amounts for Materials Licensees (Parts 30, 40, and 70)," ICF Consulting, 2000, p. 36.

The certification amounts were never intended to be an exact measure of decommissioning costs for all licensees. The universe of materials licensees required to have financial assurance is composed of very diverse types of operations. Actual decommissioning costs vary considerably, depending on extent and type of activities, and quantities and types of radionuclides in use. The NRC recognizes that the applicable certification amounts for any one particular licensee may be greater than the amount required to decommission that licensee's facility. In these cases, the NRC encourages a licensee to submit a facility specific decommissioning cost estimate as a basis for financial assurance.

The certification amounts are designed to provide qualifying licensees a method for establishing a basis for the amount of financial assurance needed without devoting the resources needed to develop detailed decommissioning cost estimates. The NRC believes that the certification amounts serve a useful purpose by allowing certain licensees using relatively small quantities of radioactive materials to establish financial assurance in a simple, cost-effective way. At issue is the assurance of timely funding of decommissioning and the cost burden on licensees of providing this assurance. In comparing the relative merits of using a decommissioning cost estimate or a certification amount, the tradeoff involved is the benefit of having the amount of financial assurance required more closely track actual decommissioning costs against the additional expense of developing a decommissioning cost estimate. The NRC would also require more resources for review of a financial assurance submission based on a decommissioning cost estimate than for review of a submission based on a certification amount.

Requirement for Updating Decommissioning Cost Estimates

The existing financial assurance regulations do not contain a specific requirement for updating cost estimates in decommissioning funding plans after a certain number of years. Existing regulatory language only refers to “adjusting cost estimates and associated funding levels periodically over the life of the facility.” The NRC believes that a more specific requirement is warranted and is proposing to require updated decommissioning cost estimates at least every 3 years. Decommissioning costs, especially waste disposal costs, can change significantly over a relatively short time period. For example, the decommissioning cost estimate for a large materials licensee increased from approximately \$40 million in 2001 to over \$67 million in 2002. Even requiring updates at least every 3 years would not completely address this problem. However, by requiring an update of decommissioning cost estimates at least every 3 years, the NRC is attempting to prevent a large gap between actual decommissioning costs and licensee decommissioning cost estimates from developing. This proposed change is intended to assure adequate financial coverage of actual decommissioning costs.

Cost Impacts on Licensees

The proposed requirements would have significant cost impacts for large irradiators, waste brokers, and licensees that use the certification amounts. The NRC has only a small number of large irradiators and waste brokers, but approximately 300 NRC materials licensees use the certification amounts. The NRC estimates that additional annual costs of providing financial assurance for all affected licensees would be approximately \$1.2 million. Most of this would be attributable to the increase in the certification amounts. In addition, one-time costs of approximately \$60K-\$250K would result from additional licensees having to prepare

decommissioning cost estimates. Also, licensees that base financial assurance on a decommissioning cost estimate would incur the additional costs of having to prepare more frequent decommissioning cost updates to comply with the proposed requirement for updated cost estimates every 3 years. More detailed information on cost impacts is contained in the Regulatory Analysis cited in this notice.

As stated previously, the benefit of the proposed rulemaking is the assurance of adequate funding for timely decommissioning. Updates are needed in the current financial assurance regulations that would decrease the likelihood of inadequate funding for timely decommissioning. The effect of inadequate/untimely funding of decommissioning may have adverse impacts on public health and safety. If a site is not decommissioned due to insufficient funds, there is an increased likelihood of contamination and/or exposure of members of the public. In addition, adequate financial assurance would prevent situations where Federal, State, or local governments bear the cost of decommissioning, rather than site operators. This proposed action would require licensees to provide an additional approximately \$80 million in financial assurance coverage.

Implementation

The NRC plans to implement these requirements, if finalized, in a way that minimizes the burden on licensees and regulators. Licensees would be given a reasonable period of time to submit new decommissioning cost estimates and to obtain any additional financial assurance that may be required. The NRC is considering having different effective dates for revised financial assurance requirements, depending on the type of licensee, so that new financial assurance submittals would not all occur at one time, causing problems for regulators. The NRC encourages

public comments on implementation issues and concerns.

Discussion of Proposed Amendments by Section

Section 30.4 Definitions.

A definition of the term “waste broker” is added.

Section 30.35 Financial assurance and recordkeeping for decommissioning.

Paragraph (a) is amended to require licensees possessing very large quantities of sealed sources to base financial assurance on a decommissioning funding plan. Amended § 30.35(c)(2) revises the certification amount. A new § 30.35(c)(5) would require waste broker licensees to base financial assurance on a site-specific decommissioning cost estimate. Amended §30.35(d) would increase the certification amounts by 50 percent and put an upper limit on use of the size of sealed source licensees allowed to use the certification amount. Amended §30.35(e) would require that decommissioning funding plans be updated at least every 3 years.

10 CFR 40.36 Financial assurance and recordkeeping.

Amended §40.36(b)(2) would increase the applicable certification amount by 50 percent. Amended §40.36(c)(2) revises the certification amount. Amended §40.36(d) would require that decommissioning funding plans be updated at least every 3 years.

10 CFR 70.25 Financial assurance and recordkeeping for decommissioning.

Amended §70.25(c)(2) revises the certification amount. Amended §70.25(d) would increase the applicable certification amount by 50 percent. Revised §70.25(e) would require that decommissioning funding plans be updated at least every 3 years.

Agreement State Compatibility

Under the “Policy Statement on Adequacy and Compatibility of Agreement State Programs” that became effective on September 3, 1997 (62 FR 46517), NRC program elements (including regulations) are placed into four compatibility categories. In addition, NRC program elements also can be identified as having particular health and safety significance or as being reserved solely to the NRC. The compatibility categories of the financial assurance regulations are not being changed in the proposed rulemaking.

The sections of 10 CFR Parts 30, 40, and 70 dealing with financial assurance that are being changed and their respective compatibility categories are as follows:

§30.35 Financial assurance and recordkeeping for decommissioning.

Compatibility category D, except D/ Health and Safety - paragraphs (a), (b), (d), and (g).

States are given flexibility to allow different dollar amounts based upon jurisdiction and local conditions. The Health and Safety designation for paragraph (g) is warranted because of the requirement for transfer of certain records (e. g., spills or spread of contamination) important for

decommissioning to a subsequent licensee at the same facility.

§40.36 Financial assurance and recordkeeping for decommissioning

Compatibility category D - paragraphs (c) and (e). Category D/Health and Safety - paragraphs (a), (b), (d), and (f).

States have the flexibility to specify different dollar amounts based on jurisdiction and local conditions. The Health and Safety designation for paragraph (f) is warranted because of the requirement for transfer of certain records (e. g., spills or spread of contamination) important for decommissioning to a subsequent licensee at the same facility.

§70.25 Financial assurance and recordkeeping for decommissioning

Compatibility category D except (a) is NRC, and D/Health and Safety - paragraphs (b), (d), and (g).

States have the flexibility to specify different dollar amounts based on jurisdiction and local conditions. Paragraph (a) addresses areas reserved to the NRC because it concerns uranium enrichment facilities and special nuclear materials in quantities sufficient to form a critical mass.

Plain Language

The Presidential Memorandum dated June 1, 1998, entitled "Plain Language in Government

Writing” directed that the Government’s writing be in plain language. The NRC requests comments on this proposed rule specifically with respect to the clarity and effectiveness of the language used. Comments should be sent to the address listed under the heading “ADDRESSES” above.

Voluntary Consensus Standards

The National Technology Transfer Act of 1995 (Pub. L. 104-113) requires that Federal agencies use technical standards that are developed or adopted by voluntary consensus standards bodies unless the use of such a standard is inconsistent with applicable law or otherwise impractical. In this proposed rule, the NRC would make revisions to certain financial assurance requirements for materials licensees. Financial assurance requirements are not standards that have been established by any voluntary consensus organizations.

Environmental Assessment and Finding of No Significant Environmental Impact: Availability

The Commission has determined under the National Environmental Policy Act of 1969, as amended, and the Commission's regulations in Subpart A of 10 CFR Part 51, not to prepare an environmental impact statement for this proposed rule because the Commission has concluded on the basis of an environmental assessment that this proposed rule, if adopted, would not be a major Federal action significantly affecting the quality of the human environment. These proposed amendments would revise financial assurance requirements for certain materials licensees. The amendments would not lead to any increase in the effect on the environment of the decommissioning activities considered in the final rule published on June 27, 1988 (53 FR 24018),

as analyzed in the Final Generic Environmental Impact Statement on Decommissioning of Nuclear Facilities (NUREG-0586, August 1988).⁹ Actions conducted under this rule would not introduce any impacts on the environment not previously considered by the NRC.

The determination of this environmental assessment is that there will be no significant adverse impact to the quality of the human environment from this action. This action should provide a positive impact by providing additional assurance of timely decommissioning. However, the general public should note that the NRC welcomes public participation. Comments on any aspect of the Environmental Assessment may be submitted to the NRC as indicated under the ADDRESSES heading.

The NRC has sent a copy of this notice of proposed rulemaking, which includes the environmental assessment, to every State Liaison Officer and requested their comments. It may be examined at the NRC Public Document Room, O-1F23, 11555 Rockville Pike, Rockville, MD. Single copies are available from Clark Prichard, telephone (301) 415- 6203, e-mail, cwp@nrc.gov, of the Office of Nuclear Material Safety and Safeguards.

Paperwork Reduction Act Statement

This proposed rule amends information collection requirements contained in 10 CFR Parts 30, 40, and 70 that are subject to the Paperwork Reduction Act of 1995 (44 U.S.C. 3501 et seq). These information collection requirements have been submitted to the Office of Management and Budget for review and approval. Existing requirements were approved by the Office of

⁹ Copies of NUREG-0586 are available for inspection or copying for a fee from the NRC Public Document Room at O-1F23, 11555 Rockville Pike, Rockville, MD. Copies may be purchased at current rates from the U.S. Government Printing Office, P.O. Box 370892, Washington, DC 20402-9328 (telephone (202) 512-2249); or from the National Technical Information Service by writing NTIS at 5285 Port Royal Road, Springfield, VA 22161.

Management and Budget, approval number(s) 3150-_____.

The burden to the public for the information collections in 10 CFR Parts 30, 40, and 70 is estimated to average 80-160 hours per response. This includes the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the information collection. The U.S. Nuclear Regulatory Commission is seeking public comment on the potential impact of the information collections contained in the proposed rule and on the following issues:

1. Is the proposed information collection necessary for the proper performance of the functions of the NRC, including whether the information will have practical utility?
2. Is the estimate of burden accurate?
3. Is there a way to enhance the quality, utility, and clarity of the information to be collected?
4. How can the burden of the information collection be minimized, including the use of automated collection techniques?

Send comments on any aspect of these proposed information collections, including suggestions for reducing the burden, to the Records Management Branch (T-6 E6), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by Internet electronic mail at BJS1@NRC.GOV; and to the Desk Officer, Office of Information and Regulatory Affairs, NEOB-10202, (3150-[OMB approval number(s) with revised information collection requirements]), Office

of Management and Budget, Washington, DC 20503.

Comments to OMB on the information collections or on the above issues should be submitted by (insert date 30 days after publication in the Federal Register). Comments received after this date will be considered if it is practical to do so, but assurance of consideration cannot be given to comments received after this date.

Public Protection Notification

If a means used to impose an information collection does not display a currently valid OMB control number, the NRC may not conduct or sponsor, and a person is not required to respond to, the information collection.

Regulatory Analysis

The Commission has prepared a draft regulatory analysis on this proposed regulation. The analysis examines the costs and benefits of the alternatives considered by the Commission.

The Commission requests public comment on the draft regulatory analysis. Comments on the draft analysis may be submitted to the NRC as indicated under the ADDRESSES heading.

The analysis is available for inspection in the NRC Public Document Room, 11555 Rockville Pike, Rockville, MD. Single copies of the regulatory analysis are available from Clark Prichard, telephone (301) 415-6203, e-mail, cwp@nrc.gov of the Office of Nuclear Material Safety and Safeguards.

Regulatory Flexibility Certification

In accordance with the Regulatory Flexibility Act of 1980 (5 U.S.C. 605(b)), the Commission certifies that this rule would not, if promulgated, have a significant economic impact on a substantial number of small entities. Some licensees affected by this proposed action may fall within the definition of "small entities" set forth in the Regulatory Flexibility Act or the Small Business Size Standards set out in regulations issued by the Small Business Administration at 13 CFR Part 121. However, while the proposed rule would change the financial assurance requirements for these licensees, a licensee may base its financial assurance on a facility-specific decommissioning cost estimate. No licensee would be required to provide financial assurance in excess of what is needed to cover decommissioning costs. Increases in financial assurance amounts required are only the amounts necessary to maintain adequate financial assurance to cover increased decommissioning costs. The regulatory analysis cited for this proposed action contains estimates of cost impacts on different types of licensees.

The NRC is seeking public comment on the potential impact of the proposed rule on small entities. The NRC particularly desires comment from small entities (i.e., small businesses, small organizations, and small jurisdictions under the Regulatory Flexibility Act) as to how the proposed regulations will affect them and how the regulations may be tiered or otherwise modified to impose less stringent requirements on small entities while still adequately protecting the public health and safety. Those small entities that offer comments on how the regulations could be modified should specifically discuss--

(a) The size of their business and how the proposed regulations would result in a significant economic burden upon them as compared to large organizations in the same business community.

(b) How the proposed regulations could be modified to take into account their differing

needs or capabilities.

(c) The benefits that would accrue, or the detriments that would be avoided, if the proposed regulations were modified as suggested by the commenter.

(d) How the proposed regulations, as modified, would more closely equalize the impact of NRC regulations or create more equal access to the benefits of Federal programs as opposed to providing special advantages to any individuals or groups; and

(e) How the proposed regulations, as modified, would still adequately protect the public health and safety.

The comments should be sent to the Secretary of the Commission, U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, Attn: Rulemakings and Adjudications Staff.

Backfit Analysis

There are no backfit requirements in 10 CFR Parts 30 and 40, and, in accordance with the effective date note regarding implementation of §70.76, the provisions of 10 CFR 70.76 on backfitting have not yet gone into effect. Therefore, a backfit analysis is not required. However, the burdens and the benefits associated with this proposed rule are addressed in this notice and in the Regulatory Analysis.

List of Subjects

10 CFR Part 30

Byproduct material, Criminal penalties, Government contracts, Intergovernmental

relations, Isotopes, Nuclear materials, Radiation protection, Reporting and recordkeeping requirements.

10 CFR Part 40

Criminal penalties, Government contracts, Hazardous materials transportation, Nuclear materials, Reporting and recordkeeping requirements, Source material, Uranium.

10 CFR Part 70

Criminal penalties, Hazardous materials transportation, Material control and accounting, Nuclear materials, Packaging and containers, Radiation protection, Reporting and recordkeeping requirements, Scientific equipment, Security measures, Special nuclear material.

For the reasons set out in the preamble and under the authority of the Atomic Energy Act of 1954, as amended; the Energy Reorganization Act of 1974, as amended; and 5 U.S.C. 553; the NRC is proposing to adopt the following amendments to 10 CFR Parts 30, 40, and 70.

PART 30-RULES OF GENERAL APPLICABILITY TO DOMESTIC LICENSING OF BYPRODUCT MATERIAL

1. The authority citation for Part 30 continues to read as follows:

AUTHORITY: Secs. 81, 82, 161, 182, 183, 186, 68 Stat. 935, 948, 953, 954, 955, as amended, sec. 234, 83 Stat. 444, as amended (42 U.S.C. 2111, 2112, 2201, 2232, 2233, 2236, 2282); secs. 201, as amended, 202, 206, 88 Stat. 1242, as amended, 1244, 1246 (42 U.S.C.5841, 5842, 5846).

Section 30.7 also issued under Pub. L. 95-601, sec. 10, 92 Stat. 2951 as amended by Pub. L. 102-486, sec. 2902, 106 Stat. 3123, (42 U.S.C. 5851). Section 30.34(b) also issued under sec.184, 68 Stat. 954, as amended (42 U.S.C. 2234). Section 30.61 also issued under sec. 187, 68 Stat. 955 (42 U.S.C. 2237).

2. In § 30.4, a definition is added to read as follows:

§ 30.4 Definitions.

* * * * *

Waste broker means any licensee that collects or accepts radioactive material from other entities for the purpose of processing, compaction, repackaging, or otherwise preparing it for disposal, or for storage.

* * * * *

3. In § 30.35, paragraph (a) is revised to read as follows:

§ 30.35 Financial assurance and recordkeeping for decommissioning.

(a)(1) Each applicant for a specific license authorizing possession and use of unsealed byproduct material of half-life greater than 120 days and in quantities exceeding 10^5 times the

applicable quantities set forth in appendix B to part 30 shall submit a decommissioning funding plan as described in paragraph (e) of this section. The decommissioning funding plan must also be submitted when a combination of isotopes is involved if R divided by 10^5 is greater than 1 (unity rule), where R is defined here as the sum of the ratios of the quantity of each isotope to the applicable value in appendix B to part 30.

(2) Each holder of, or applicant for, any specific license authorizing possession and use of sealed sources or plated foils of half-life greater than 120 days and in quantities exceeding 10^{12} times the applicable quantities set forth in appendix B to part 30 (or when a combination of isotopes is involved if R , as defined in § 30.35(a)(1), divided by 10^{12} is greater than 1), shall submit a decommissioning funding plan as described in paragraph (e) of this section.

* * * * *

4. In § 30.35, paragraph (c)(2) is revised to read as follows:

§ 30.35 Financial assurance and recordkeeping.

* * * * *

(c) * * *

(2) Each holder of a specific license issued before July 27, 1990, and of a type described in paragraph (a) of this section shall submit, on or before July 27, 1990, a decommissioning funding plan as described in paragraph (e) of this section or a certification of financial assurance for decommissioning in an amount at least equal to \$1,125,000 in accordance with the criteria set forth in this section. If the licensee submits the certification of financial assurance rather than a decommissioning funding plan, the licensee shall include a decommissioning funding plan in any application for license renewal.

* * * * *

5. In § 30.35, new paragraph (c)(5) is added, and paragraphs (d) and (e) are revised to read as follows:

§ 30.35 Financial assurance and recordkeeping.

* * * * *

(c) * * *

(5) Waste brokers, i.e., each applicant or holder of a specific license that collects or accepts radioactive material from other entities for the purpose of processing, compaction, repackaging, or otherwise preparing it for disposal, or for storage, must provide financial assurance in an amount based on a decommissioning funding plan as described in paragraph (e) of this section. The decommissioning funding plan must include the cost of disposal of the maximum amount (curies) of radioactive material permitted by license, and the cost of disposal of the maximum quantity, by volume, of radioactive material present at the licensee's facility at any time, in addition to the cost to remediate the licensee's site to meet the license termination criteria of 10 CFR Part 20.

(d) Table of required amounts of financial assurance for decommissioning by quantity of material. Licensees having possession limits exceeding the upper bounds of this table must base financial assurance on a decommissioning funding plan.

greater than 10^4 but less than or equal to 10^5 times the applicable quantities of appendix B to part 30 in unsealed form. (For a combination of isotopes, if R, as defined in §30.35(a)(1), divided by 10^4 is greater than 1 but R divided by 10^5 is less than or equal to 1).\$1,125,000

greater than 10^3 but less than or equal to 10^4 times the applicable quantities of appendix B to part

30 in unsealed form. (For a combination of isotopes, if R, as defined in §30.35(a)(1), divided by 10^3 is greater than 1 but R divided by 10^4 is less than or equal to 1).\$225,000

greater than 10^{10} but less than or equal to 10^{12} times the applicable quantities of appendix B to part 30 in sealed sources or plated foils. (For a combination of isotopes, if R, as defined in §30.35(a)(1), divided by 10^{10} is greater than 1, but R divided by 10^{12} is less than or equal to 1).\$113,000

(e) Each decommissioning funding plan must contain a cost estimate for decommissioning and a description of the method of assuring funds for decommissioning from paragraph (f) of this section, including means for adjusting cost estimates and associated funding levels periodically over the life of the facility. Cost estimates must be adjusted at intervals not to exceed three years. The decommissioning funding plan must also contain a certification by the licensee that financial assurance for decommissioning has been provided in the amount of the cost estimate for decommissioning and a signed original of the financial instrument obtained to satisfy the requirements of paragraph (f) of this section.

* * * * *

PART 40 - DOMESTIC LICENSING OF SOURCE MATERIAL

6. The authority citation for Part 40 continues to read as follows:

AUTHORITY: Secs. 62, 63, 64, 65, 81, 161, 182, 183, 186, 68 Stat. 932, 933, 935, 948, 953, 954, 955, as amended, secs. 11e(2), 83, 84, Pub. L. 95-604, 92Stat. 3033, as amended, 3039, sec. 234, 83 Stat. 444, as amended (42 U.S.C. 2014(e)(2), 2092, 2093, 2094, 2095, 2111, 2113, 2114, 2201, 2232, 2233, 2236, 2282); sec. 274, Pub. L. 86-373, 73 Stat. 688 (42 U.S.C. 2021); secs. 201, as amended, 202, 206, 88 Stat. 1242, as amended, 1244, 1246 (42 U.S.C.

5841, 5842, 5846); sec. 275, 92 Stat. 3021, as amended by Pub. L. 97-415, 96 Stat. 2067 (42 U.S.C. 2022); sec. 193, 104 Stat. 2835, as amended by Pub. L. 104-134, 110 Stat. 1321, 1321-349 (42 U.S.C. 2243).

Section 40.7 also issued under Pub. L. 95-601, sec. 10, 92 Stat. 2951 (42 U.S.C. 5851). Section 40.31(g) also issued under sec. 122, 68 Stat. 939 (42 U.S.C. 2152). Section 40.46 also issued under sec. 184, 68 Stat. 954, as amended (42 U.S.C. 2234). Section 40.71 also issued under sec. 187, 68 Stat. 955 (42 U.S.C. 2237).

7. In § 40.36, paragraphs (b)(2), (c)(2), and (d) are revised to read as follows:

§ 40.36 Financial assurance and recordkeeping for decommissioning.

* * * * *

(b) * * *

(2) Submit a certification that financial assurance for decommissioning has been provided in the amount of \$225,000 using one of the methods described in paragraph (e) of this section. For an applicant, this certification may state that the appropriate assurance will be obtained after the application has been approved and the license issued but before the receipt of licensed material. If the applicant defers execution of the financial instrument until after the license has been issued, a signed original of the financial instrument obtained to satisfy the requirements of paragraph (e) of this section must be submitted to NRC prior to receipt of licensed material. If the applicant does not defer execution of the financial instrument , the applicant shall submit to NRC, as part of the certification, a signed original of the financial instrument obtained to satisfy the requirements of paragraph (e) of this section.

* * * * *

(c) * * *

(2) Each holder of a specific license issued before July 27, 1990, and of a type described in paragraph (a) of this section shall submit, on or before July 27, 1990, a decommissioning funding plan as described in paragraph (d) of this section or a certification of financial assurance for decommissioning in an amount at least equal to \$1,125,000 in accordance with the criteria set forth in this section. If the licensee submits the certification of financial assurance rather than a decommissioning funding plan, the licensee shall include a decommissioning funding plan in any application for license renewal.

* * * * *

(d) Each decommissioning funding plan must contain a cost estimate for decommissioning and a description of the method of assuring funds for decommissioning from paragraph (e) of this section, including means for adjusting cost estimates and associated funding levels periodically over the life of the facility. Cost estimates must be adjusted at intervals not to exceed three years. The decommissioning funding plan must also contain a certification by the licensee that financial assurance for decommissioning has been provided in the amount of the cost estimate for decommissioning and a signed original of the financial instrument obtained to satisfy the requirements of paragraph (e) of this section.

* * * * *

PART 70 - DOMESTIC LICENSING OF SPECIAL NUCLEAR MATERIAL

8. The authority citation for Part 70 continues to read as follows:

AUTHORITY: Secs. 51, 53, 161, 182, 183, 68 Stat. 929, 930, 948, 953, 954, as amended, sec. 234, 83 Stat. 444, as amended, (42 U.S.C. 2071, 2073, 2201, 2232, 2233, 2282, 2297f); secs. 201, as amended, 202, 204, 206, 88 Stat. 1242, as amended, 1244, 1245, 1246 (42 U.S.C. 5841, 5842, 5845, 5846). Sec. 193, 104 Stat. 2835 as amended by Pub.L. 104-134, 110 Stat. 1321, 1321-349 (42 U.S.C. 2243).

Sections 70.1(c) and 70.20a(b) also issued under secs. 135, 141, Pub. L. 97-425, 96 Stat. 2232, 2241 (42 U.S.C. 10155, 10161). Section 70.7 also issued under Pub. L. 95-601, sec. 10, 92 Stat. 2951 (42 U.S.C. 5851). Section 70.21(g) also issued under sec. 122, 68 Stat. 939 (42 U.S.C. 2152). Section 70.31 also issued under sec. 57d, Pub. L. 93-377, 88 Stat. 475 (42 U.S.C. 2077). Sections 70.36 and 70.44 also issued under sec. 184, 68 Stat. 954, as amended (42 U.S.C. 2234). Section 70.81 also issued under secs. 186, 187, 68 Stat. 955 (42 U.S.C. 2236, 2237). Section 70.82 also issued under sec. 108, 68 Stat. 939, as amended (42 U.S.C. 2138).

9. In § 70.25, paragraphs (c)(2), (d), and (e) are revised to read as follows:

§ 70.25 Financial assurance and recordkeeping for decommissioning.

* * * * *

(c) * * *

(2) Each holder of a specific license issued before July 27, 1990, and of a type described in paragraph (a) of this section shall submit, on or before July 27, 1990, a decommissioning funding

plan as described in paragraph (e) of this section or a certification of financial assurance for decommissioning in an amount at least equal to \$1,125,000 in accordance with the criteria set forth in this section. If the licensee submits the certification of financial assurance rather than a decommissioning funding plan, the licensee shall include a decommissioning funding plan in any application for license renewal.

* * * * *

(d) Table of required amounts of financial assurance for decommissioning by quantity of material. Licensees having possession limits exceeding the upper bounds of this table must base financial assurance on a decommissioning funding plan.

greater than 10^4 but less than or equal to 10^5 times the applicable quantities of appendix B to part 30. (For a combination of isotopes, if R, as defined in §70.25(a), divided by 10^4 is greater than 1 but R divided by 10^5 is less than or equal to 1.)\$1,125,000

greater than 10^3 but less than or equal to 10^4 times the applicable quantities of appendix B to part 30. (For a combination of isotopes, if R, as defined in §70.25(a), divided by 10^3 is greater than 1 but R divided by 10^4 is less than or equal to 1.)\$225,000

(e) Each decommissioning funding plan must contain a cost estimate for decommissioning and a description of the method of assuring funds for decommissioning from paragraph (f) of this section, including means for adjusting cost estimates and associated funding levels periodically over the life of the facility. Cost estimates must be adjusted at intervals not to exceed three years. The decommissioning funding plan must also contain a certification by the licensee that financial assurance for decommissioning has been provided in the amount of the cost estimate for

decommissioning and a signed original of the financial instrument obtained to satisfy the requirements of paragraph (f) of this section.

* * * * *

Dated at Rockville, Maryland, this _____ day of _____, 2002.

For the Nuclear Regulatory Commission.

Annette Vietti-Cook,
Secretary of the Commission.

REGULATORY ANALYSIS

PROPOSED RULE

FINANCIAL ASSURANCE AMENDMENTS FOR MATERIALS LICENSEES

I. Regulatory Problems to be Addressed by This Proposed Rule

The NRC regulations requiring financial assurance for decommissioning are designed to assure that adequate funding will be available for timely decommissioning by licensees. The financial assurance regulations are part of the overall NRC strategy to maintain safety and protection of the environment during decommissioning and decontamination of nuclear facilities.

Financial assurance is composed of several parts: (1) appropriate identification of licensees for which financial assurance should be required; (2) the amount of financial assurance required for each licensee must be adequate to fund current decommissioning costs; and (3) appropriate financial assurance mechanisms (surety bonds, escrow accounts, parent or self-guarantee, etc.) must be required.

The NRC is proposing to amend its financial assurance requirements for certain materials licensees to bring required financial assurance amounts more in line with actual current decommissioning costs. The objective of this rulemaking is to maintain adequate financial assurance by addressing gaps in the current regulatory framework regarding (1) and (2) above.

Under current regulations, materials licensees using substantial quantities of nuclear materials must provide financial assurance for decommissioning (most materials licensees do not need to provide financial assurance because their possession limits are below the threshold for requiring financial assurance). Approximately 490, or about 10 percent, of the NRC's materials licensees require financial assurance. The financial assurance requirements were promulgated in

1988 as part of the decommissioning rulemaking (53 FR 24018, June 27, 1988). Revision to some of the financial assurance requirements for materials licensees are needed because there have been changes in decommissioning costs since that time, and experience has revealed that for certain types of licensees, such as waste brokers, special considerations exist which require different treatment.

II. Current Rule Requirements

A. 10 CFR Part 30

10 CFR Part 30 requires a licensee authorized to possess very large quantities of unsealed byproduct material to submit a decommissioning funding plan which includes a site-specific decommissioning cost estimate.

Part 30 licensees authorized to possess lesser amounts of unsealed byproduct material, but above the threshold for financial assurance, may either submit a decommissioning funding plan, or submit a certification that financial assurance for decommissioning has been provided. Certification amounts of \$750,000, or \$150,000, depending on the quantity of material the licensee is authorized to possess, are applicable to Part 30 licensees.

Part 30 licensees authorized to possess certain quantities of byproduct material in sealed sources or plated foils may either submit a decommissioning funding plan or submit a certification that financial assurance has been provided in the amount of \$75,000.

B. 10 CFR Part 40

Section 40.36 requires a licensee authorized to possess large quantities of material to submit a decommissioning funding plan which includes a site-specific decommissioning cost estimate. Section 40.36 licensees authorized to possess lesser amounts of material, but above the threshold for financial assurance, may either submit a decommissioning funding plan, or submit a

certification that financial assurance for decommissioning has been provided in the amount of \$150,000.

C. 10 CFR Part 70

10 CFR Part 70 requires a uranium enrichment facility licensee, or a licensee authorized to possess large quantities (based on applicable quantities in Appendix B to Part 30) of unsealed special nuclear material having a half-life greater than 120 days to submit a decommissioning funding plan, which includes a site-specific decommissioning cost estimate.

Part 70 licensees, other than uranium enrichment facility licensees, authorized to possess lesser amounts of such special nuclear material, but above the threshold for financial assurance, may either submit a decommissioning funding plan, or submit a certification that financial assurance for decommissioning has been provided. Certification amounts of \$750,000 or \$150,000, depending on the quantity of material the licensee is authorized to possess, are applicable to Part 70 licensees.

III. Proposed Changes

The changes being proposed are in four areas: (1) Large sealed source licensees--large irradiators-- would no longer be able to use the \$75,000 certification amount as a basis for financial assurance, and would have to base their financial assurance on a site-specific decommissioning cost estimate; (2) Waste broker licensees would be required to provide financial assurance and would not be permitted to use the certification amounts. They would have to base their financial assurance on a site-specific decommissioning cost estimate; (3) the certification amounts for all licensees would be increased by 50 percent; and (4) Licensees using a decommissioning cost estimate would have to update it at least every 3 years.

IV. Alternatives

The two alternatives considered here are (A) no action, and (B) carrying out the rulemaking described in this regulatory analysis.

(A) No Action

Under this alternative, no rulemaking would be done. The amount of financial assurance required would not be adequate to fully fund decommissioning activities for a large number of licensees. This gap in funding would increase the likelihood that decommissioning of some facilities would not be carried out in a timely manner. This could result in adverse health and safety effects, and could also have adverse environmental effects. It would also increase the likelihood that State or local governments and/or the general public would have to bear the costs of decommissioning.

No costs to licensees or NRC would be involved for this alternative. Licensees would not be subject to any cost increases, and NRC would not incur costs associated with developing and implementing the rulemaking.

(B) Rulemaking to Revise the Financial Assurance Requirements for Materials Licensees

Under this alternative, large irradiator and waste broker licensees would have to base financial assurance on a site-specific decommissioning cost estimate. All waste brokers would have to provide financial assurance. The certification amounts would be raised by 50%, providing approximately \$80 million in additional financial assurance¹. Decommissioning cost estimates would have to be updated at least every 3 years. A rulemaking to revise the financial assurance requirements for materials licensees would increase the assurance of adequate funding for decommissioning activities. This increased assurance would make timely decommissioning more likely, contributing to maintaining public health and safety and protection of the environment. This action would also decrease the likelihood that State and local governments and/or the general public would have to bear the costs of decommissioning.

¹ Staff estimate based on current numbers of licensees using each certification amount.

The benefit of the planned rulemaking is the continuation of assurance of adequate funding for timely decommissioning. As stated above, there are gaps in the current financial assurance regulations, mainly due to large increases in decommissioning costs since the financial assurance regulations were put in place. Allowing these gaps to remain could increase the likelihood of inadequate funding for timely decommissioning.

The effect of inadequate/untimely funding of decommissioning may have adverse impacts on public health and safety. If a site is not decommissioned due to insufficient funds there is an increased likelihood of contamination and/or exposure of members of the public. The changes to the regulations proposed are concentrated in areas where the likelihood of inadequate funding relative to decommissioning costs appear to be relatively high. First, the financial assurance requirements are imposed only on those licensees having the highest possession limits, and thus the potential for highest doses. Only about 10 percent of materials licensees must provide financial assurance. Second, the changes proposed in this plan address situations where risk of inadequate funding of decommissioning obligations is greatest -- where required amounts of financial assurance appear to be substantially less than decommissioning costs.

Failure to provide adequate financial assurance for decommissioning also has equity considerations. The potential public costs involved in cleanup of contaminated facilities where financial assurance is inadequate must be considered. Equity considerations call for adequate financial assurance so that a licensee's decommissioning costs are borne by the licensee.

Large Irradiators

Large irradiator licensees are licensees that are engaged in the irradiation of food products and medical equipment. These large irradiators operate facilities that have a large number of sealed sources, with possession limits ranging up to several million curies. The NRC has approximately 10 large irradiator licensees (licensees authorized for 1 million curies or more). Estimated decommissioning costs for an irradiator facility with 1 million curies of source activity are at least \$128K; for a facility with 2 million curies, estimated costs are at least \$231K. These cost

estimates are for the least costly decommissioning scenarios, with all sources being returned to the supplier and no leakage contamination².

Revision of the possession limits under which a sealed source licensee may use the \$75K certification amount would make large irradiator licensees base financial assurance on the alternative of a site-specific decommissioning cost estimate. This facility-specific cost estimate is likely to be higher than \$75K, and the licensee would incur higher financial assurance costs. The NRC believes that the increased financial burden on licensees is necessary to provide an adequate amount of financial assurance. The facility-specific cost estimate should provide a more accurate estimate of decommissioning costs, but would involve more effort on the part of licensees to prepare such an estimate.

Cost impacts on licensees would consist of: (1) the cost of preparing a decommissioning cost estimate; and (2) the cost of additional financial assurance required if the decommissioning cost estimate were above the applicable certification amount that could formerly be used.

The cost of preparing a site-specific decommissioning cost estimate could vary considerably depending on type of operations conducted by the licensee. It should be noted that a decommissioning cost estimate is only a part of an overall decommissioning plan. An actual database on costs is lacking. For the purposes of this regulatory analysis, a potential range of costs is given, based on a lower assumption of 2 professional staff weeks of effort to prepare a decommissioning cost estimate, and a higher assumption of 4 professional staff weeks of effort. Labor rate assumed is \$77 per staff hour.

Large Irradiators
Estimated Cost of Preparing Decommissioning Cost Estimate
10 licensees

Cost per Licensee

Total Costs All Licensees

²Technology, Safety, and Costs of Decommissioning a Reference Large Irradiator and Reference Sealed Sources, NUREG/CR-6820, Pacific Northwest National Laboratory, 1996.

Lower	\$6,200	\$62,000
Higher	\$12,400	\$124,000

The higher cost estimate per licensee would represent approximately 5% of a total decommissioning cost of \$250K, which seems a reasonable percentage. However, NRC welcomes comments on these estimates.

Cost impacts from the additional amount of financial assurance required if based on a decommissioning cost estimate are estimated using the \$75K certification amount currently used by these licensees as a baseline. The estimated cost of basing financial assurance on a decommissioning cost estimate is taken from the decommissioning cost estimates for large irradiators in NUREG/CR-6280. For a large irradiator, NUREG/CR-6280 gives estimated decommissioning costs of \$231K for the most likely decommissioning option. The additional financial assurance required by the change would be \$231K less \$75K, or \$156K per licensee. Financial assurance instruments, such as letters of credit and surety bonds, typically cost approximately 1.5% of the amount of financial assurance covered per year. Added costs per licensee would thus be \$2.3K per year. Total added costs for all 10 licensees would be \$23K per year.

3) Waste Broker Licensees

Waste broker licensees are those licensees that handle radioactive waste associated with or generated under other licenses. There is no definition of “waste broker” in existing NRC regulations and the term is commonly used to describe several different activities. However, NRC practice has been that waste broker refers to any licensee that engages in the following activities: waste collection and consolidation; waste storage; waste processing, repackaging, or other treatment (e.g., decay in storage, compaction); or transfer to another waste broker or to a licensed low-level radioactive waste land disposal facility. The NRC has approximately 15 waste broker

licensees, of which 8 require financial assurance³. Many waste broker licensees also conduct other types of licensed activities as part of their overall business. The NRC financial assurance regulations treat waste brokers in the same way as other materials licensees; there are no special financial assurance requirements applicable only to waste brokers.

From the viewpoint of financial assurance, waste broker activities are unique in that: (1) waste brokers are likely to have radioactive wastes generated by other licensees, and the inventory of waste a broker will have on site at any time may fluctuate considerably and be difficult to predict, decommissioning options are mainly limited to waste disposal; and (2) waste brokers have a financial interest in maximizing the amount of radioactive waste that they handle -- waste broker revenues are directly correlated to the amount of waste accepted.

The disposal costs of waste inventories are very high - much greater than when the decommissioning regulations were promulgated. The cost of disposal of 100 drums of waste is estimated to be approximately \$300K to \$400K⁴. The current financial assurance regulations do not consider the costs of disposing of significant volumes of waste generated outside the decommissioning process, such as inventories of brokered waste. Waste brokers currently may maintain a level of financial assurance which is inadequate for disposal of waste inventories. Charges for disposal of waste at low-level waste disposal facilities are based on the volume of waste disposed, and also on level of activity and characteristics of the waste. The possession limits that determine what level of financial assurance a waste broker licensee must have are based on the quantity of curies of material possessed, not volume of material possessed. A waste broker that must dispose of large volumes of relatively low activity waste would be subject to substantial waste disposal charges. However, that same waste broker might be required to have

³ "Assessment of the Financial Assurance Requirements for Waste Broker Material Licensees", ICF Consulting, 1999, p. 6.

⁴ "Assessment of the Financial Assurance Requirements for Waste Broker Material Licensees", ICF Consulting, 1999, p. 3.

an inadequate amount of financial assurance to pay these charges because the financial assurance requirements are based only on curie level.

Cost impacts on licensees would consist of: (1) the cost of preparing a decommissioning cost estimate; (2) the cost of providing financial assurance for licensees not now required to do so; and (3) the cost of additional financial assurance required if the decommissioning cost estimate were above the applicable certification amount that could formerly be used.

The cost of preparing a site-specific decommissioning cost estimate could vary considerably depending on type of operations conducted by the licensee. An actual database on costs is lacking. For the purposes of this regulatory analysis, a potential range of costs is given, based on a lower assumption of 2 professional staff weeks of effort to prepare a decommissioning cost estimate, and a higher assumption of 4 professional staff weeks of effort. NRC has 3 waste broker licensees that use the certification amount and 7 that do not now require financial assurance so that a total of 10 additional licensees would have to prepare a decommissioning cost estimate.

Waste Brokers
 Estimated Cost of Preparing Decommissioning Cost Estimate
 10 waste broker licensees

	Cost per Licensee	Total Costs All Licensees
Lower	\$6,200	\$62,000
Higher	\$12,400	\$124,000

Most waste brokers are organizations primarily engaged in other activities. What part of the organization's decommissioning costs, and its current financial assurance requirements, are attributable to its waste broker activities is not known. This makes estimates of decommissioning

costs for a “typical” waste broker difficult. These licensees would face larger financial assurance requirements if this proposed rule became final, but an estimate of added costs cannot be made.

Certification Amounts

The amount of financial assurance which must be provided can be based on either: (1) a facility-specific decommissioning cost estimate provided by the licensee in a decommissioning funding plan⁵; or (2) one of several dollar amounts (certification amounts) specified in the regulations at 10 CFR 30.35. The certification amounts are based on possession limits, and range from \$75,000 for sealed source licensees to \$750,000 for licensees possessing large quantities of unsealed material. At present, about 60% of materials licensees required to have financial assurance use the certification amounts. Which certification amount is required of a licensee depends on the possession limits for radioactive materials applicable to that license.

The present certification amounts are based on decommissioning cost estimates that are now approximately 15 years old. When the decommissioning rule was established, it was expected that periodic adjustments to the certification amounts would be needed as decommissioning costs changed over time. General inflation since 1988, as measured by the Gross Domestic Product price deflator, has resulted in current prices that are approximately 40 percent higher than they were when the final decommissioning rule was published. Specific information on decommissioning costs also show a substantial increase⁶. NRC has reviewed the current decommissioning cost information⁷, and is proposing adjustments to the certification amounts. The revisions to the certification amounts proposed in this notice are aimed at keeping the certification

⁵For some types of licensees using very large amounts of unsealed radioactive material, a facility specific cost estimate must be used.

⁶Revised Analysis of Decommissioning Reference Non-Fuel Cycle Facilities, draft NUREG/CR-6477, Pacific Northwest National Laboratories, 1998.

⁷2. “ Analysis of Decommissioning Certification Amounts for Materials Licensees (Parts 30, 40, and 70)”, ICF Consulting, 2000.

amounts reasonably in accordance with current decommissioning costs for a typical licensee that has possession limits that allow it to use that particular certification amount.

Approximately 300 NRC materials licensees required to have financial assurance use the certification amounts rather than a facility-specific decommissioning funding plan. These licensees would face increased costs of obtaining financial assurance if an increase in certification amounts resulted from this proposed rulemaking. All licensees using the certification amounts would continue to have the option of submitting a facility-specific decommissioning funding plan. If a licensee believed that the certification amounts were excessive for its decommissioning obligations, it could use the alternative of a facility-specific decommissioning funding plan.

An estimate of costs to licensees of increasing the certification amounts by 50% can be made assuming the number of licensees using certification amounts does not change, and annual costs of financial assurance are 1.5% of the amount of financial assurance provided. Per licensee annual costs of providing the additional financial assurance would range from a low of \$0.6K per year for licensees using the \$75K amount to a high of \$5.6K per year for licensees using the \$750K amount. Total estimated additional annual financial assurance costs for all of the 300 licensees are \$1,175K.

The estimated cost impacts presented here can be regarded as upper limits. Actual total cost impacts on licensees using the certification amounts can be expected to be less than these estimates, for several reasons: (1) a licensee facing an increased certification amount may decide to stop using the certification amounts as a basis for financial assurance, and instead, base financial assurance on a decommissioning funding plan. This would be expected if a licensee's actual decommissioning cost estimates were lower than the applicable certification amount; and (2) approximately 30% of licensees using the certification amounts can use virtually costless financial assurance mechanisms, such as statements of intent, and parent guarantees or self guarantees. A government licensee, such as a Federal military facility or certain State universities, can use a statement of intent -- a commitment by a government agency that it will seek appropriations for decommissioning. Some qualifying private licensees can use a self guarantee or a parent company guarantee, which also do not involve any direct expense for the licensee.

Requirement for Updating Decommissioning Cost Estimates

The proposed rule contains a requirement that decommissioning cost estimates be updated at least every three years. Current requirements call for updating periodically, but do not specify a time limit. NRC guidance calls for updating every 5 years. Approximately 210 licensees would be affected. Based on a staff estimate of 15 hours needed for each update at \$77 per hour, cost per licensee for each update is \$1,155. If updating were done every 5 years, on an annual basis cost per licensee would be \$231 -- every 3 years it would be \$385. The additional annual cost to each licensee of increasing the frequency of updating from every 5 to every 3 years would be approximately \$150. Total additional costs for all 210 licensees of imposing a 3 year updating requirement would be approximately \$32K per year.

Summary of Cost Impacts on Licensees

Cost impacts are of 2 types, one-time costs, such as preparing an initial decommissioning cost estimate, or recurring costs, such as for financial assurance, or updating a decommissioning cost estimate. Total estimated additional costs for all of the affected licensees are: (1) one-time costs of \$124K-\$248K for preparing initial decommissioning cost estimates; (2) recurring annual costs of providing additional financial assurance -- \$1,198K; and (3) recurring costs of updating the decommissioning cost estimate -- \$32K on an annual basis. The major cost impact is the approximately \$1.2 million annual cost of providing the additional approximately \$80 million in financial assurance required by raising the certification amounts.

D. Resource Cost to NRC of Planned Rulemaking

NRC costs are the immediate costs of developing a rulemaking, and any subsequent implementation costs. NRC estimates that this proposed rulemaking, if finalized, would require 2.4 full time equivalent person-years. At present labor rates of \$137K per year, this amounts to \$329K. In addition, direct contractor support for the rulemaking is estimated at \$159K. The total direct cost of the rule is thus \$488K. Some portion of the studies of decommissioning costs carried out by

PNNL can also be considered an indirect cost (these reports are used for other purposes in addition to supporting a basis for this rulemaking).

Implementation costs would be the cost of revising guidance documents, principally the “NMSS Decommissioning Standard Review Plan”, NUREG-1727, and additional costs involved in reviewing a larger number of decommissioning funding plans. NRC would also need to review decommissioning cost updates on a more frequent basis. At \$77 per hour, the estimated cost of these activities would be approximately \$35K (460 staff hours) in one-time costs and \$11K (140 staff hours) in annualized recurring costs.

Decision Rationale

As stated previously, the benefit of the planned rulemaking is the continuation of assurance of adequate funding for timely decommissioning. There are gaps in the current financial assurance regulations that could increase the likelihood of inadequate funding for timely decommissioning. The effect of inadequate/untimely funding of decommissioning may have adverse impacts on public health and safety. If a site is not decommissioned due to insufficient funds there is an increased likelihood of contamination and/or exposure of members of the public. In addition, adequate financial assurance would prevent situations where Federal, State, or local governments would bear the cost of decommissioning, rather than site operators. This proposed action would provide an additional approximately \$80 million in financial assurance coverage.

The total costs of this proposed action are one-time costs to licensees and NRC of approximately \$650-\$770K, and recurring annual costs of approximately \$1,240K. These costs appear reasonable to achieve the objectives stated above.

Impacts on Agreement States and Agreement State Licensees

The sections of 10 CFR Parts 30, 40, and 70 dealing with financial assurance and their respective compatibility categories are as follows:

§30.35 Financial assurance and recordkeeping for decommissioning

Compatibility category D, except D/ Health and Safety - paragraphs (a), (b), (d), and (g).

States are given flexibility to allow different dollar amounts based upon jurisdiction and local conditions. The Health and Safety designation for paragraph (g) is warranted because of the requirement for transfer of certain records (e. g., spills or spread of contamination) important for decommissioning to a subsequent licensee at the same facility.

§40.36 Financial assurance and recordkeeping for decommissioning

Compatibility category D - paragraphs (c) and (e). Category D/Health and Safety - paragraphs (a), (b), (d), and (f).

States have the flexibility to specify different dollar amounts based on jurisdiction and local conditions. The Health and Safety designation for paragraph (f) is warranted because of the requirement for transfer of certain records (e. g., spills or spread of contamination) important for decommissioning to a subsequent licensee at the same facility.

§70.25 Financial assurance and recordkeeping for decommissioning

Compatibility category D except (a) is NRC, and D/Health and Safety - paragraphs (b), (d), and (g).

States have the flexibility to specify different dollar amounts based on jurisdiction and local conditions. Paragraph (a) addresses areas reserved to the NRC because it concerns uranium enrichment facilities and special nuclear materials in quantities sufficient to form a critical mass.

The compatibility categories of the financial assurance regulations are not being changed in the proposed rulemaking.

Certain materials licensees in Agreement States would have increased costs of providing financial assurance if this proposed rule becomes final. An estimate of the cost impacts on Agreement State licensees cannot be made here due to the limitations of data and this analysis. However, some idea of the extent of potential impacts on Agreement State licensees could be inferred from the relative numbers of NRC and Agreement State licensees. The NRC has approximately 4900 materials licensees, while Agreement States have approximately 16,000.

Implementation

NRC's schedule for completion of this rulemaking calls for a final rule to be published in 2003.

Applicable guidance material, the "NMSS Decommissioning Standard Review Plan", NUREG-1727, would be revised as part of the next general revision of this document.

Implications for Other Federal Agencies

Promulgation of this rule would have no adverse effects on other Federal agencies. If financial assurance enhancements prevented future situations where inadequate decommissioning funding resulted in sites being added to the Environmental Protection Agency's Superfund list, EPA's obligations would be reduced.

References

1. Technology, Safety, and Costs of Decommissioning a Reference Large Irradiator and Reference Sealed Sources, NUREG/CR-6820, Pacific Northwest National Laboratory, 1996.
2. "Analysis of Decommissioning Certification Amounts for Materials Licensees (Parts 30, 40, and 70)", ICF Consulting, 2000.
3. "Assessment of the Financial Assurance Requirements for Waste Broker Material Licensees", ICF Consulting, 1999.

4. Revised Analysis of Decommissioning Reference Non-Fuel Cycle Facilities, draft NUREG/CR-6477, Pacific Northwest National Laboratories, 1998.