November 16, 1982

SECY-82-456

RULEMAKING ISSUE
(Notation Vote)

For: The Commissioners

From: William J. Dircks
Executive Director for Operations

Subject: PHYSICAL PROTECTION REQUIREMENTS FOR NONPOWER REACTOR (NPR) LICENSEES POSSESSING FORMULA QUANTITIES OF SSNM

Purpose: To obtain approval to publish for public comment, proposed amendments to 10 CFR Part 73. These amendments will establish physical protection requirements for nonpower reactor licensees who possess formula quantities of strategic special nuclear material.

Category: Major policy issue.

Discussion: Background

On July 24, 1979, the Commission approved a recommendation that nonpower reactor (NPR) licensees possesssing formula quantities of strategic special nuclear material (SSNM) be deferred from implementing the requirements of the Safeguards Upgrade Rule (10 CFR 73.20, 73.45, and 73.46). At that time the Commission asked the staff to develop new physical protection requirements for NPR licensees that would provide comparable protection against the theft of SSNM. These new requirements were to take into account the unique safeguards considerations of facility design features and fuel type and form at NPRs. In the interim, the

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XA Copy Has Been Sent to PDR

Commission stated that licensees possessing a formula quantity of nonexempt material would be subject to recently enacted Category II requirements (10 CFR 73.67(d)) as well as previously existing requirements (10 CFR 73.60) for Category I material.

On August 12, 1981 in response to SECY-81-376, the Commission approved the publication of proposed physical protection requirements regarding Category I NPRs (those possessing formula quantities of SSNM). These requirements were published in the Federal Register on September 18, 1981 (46 FR 46333) along with a minority opinion of Commissioners Gilinsky and Bradford and the separate views of Commissioner Bradford. These requirements took into account the NPR facility and fuel design, eliminated some Safeguards Upgrade Rule requirements, and maintained the 100 rem/hr exemption from physical protection requirements.

RESPONSE TO THE PUBLIC COMMENT

Twelve public comments were received which discussed specific provisions of the proposed rule. Eleven were from NPR operators who questioned one or more aspects of the proposed rule as being too restrictive or unnecessary. One commenter called for stricter requirements than those being proposed and supported the minority Commission position.

The most frequent comments were: (1) the requirements as stated were too prescriptive and did not allow for consideration of site specific features, (2) the 100 rem/hour exemption level may be difficult for some licensees to maintain and could encourage unncessary reactor operations just to meet that level, (3) a phase in period should be allowed before full Category I requirements are necessary (i.e., when a formula quantity of SSNM becomes nonexempt), (4) licensees irradiating enough SSNM to over 100 rem/hour should only have to implement Category III physical protection measures and should be exempt from both Category I and Category II requirements, and (5) the cost estimates for implementing the proposed rule were too low.

In response to these comments, staff has extensively revised the September 18, 1981 proposed rule as follows. The Category I physical protection requirements were rewritten as performance capabilities. Also, prescriptive security measures are no longer specified, thereby allowing the licensee greater flexibility in preparing its plan. To aid the public commenters in understanding the rule's intent, scope of application, and rationale, the additional information in Enclosure B will be made available with the proposed amendments. This information is expected to serve as the regulatory position in a Regulatory Guide to be published for comment at a later date. A final version of the Guide will be published with the final rule.

Second, given the inability of all but a very few insiders to know the expected dose rate from any irradiated fuel element, the licensee will be allowed to average its irradiated fuel to meet the 100 rem/hour exemption as long as no single fuel unit drops below 50 rem/hour at 3 feet. This approach will reduce the need for a licensee to conduct reactor operations just to satisfy the exemption criterion.

Third, the revised rule allows an interim period of 90 days after a licensee no longer meets the 100 rem/hour exemption level before it has to implement full Category I requirements. However, during the interim period, some compensatory physical protection measures are required which could be less costly than the full Category I measures. This interim period can be permitted because, in most cases, as irradiated fuel decays below the 100 rem/hour average value, it does so fairly slowly.

Fourth, if a licensee can show that, for a theft of a formula quantity, it is reasonable to expect that a thief would receive an absorbed dose of at least 2000 rem, then the licensee will only have to satisfy Category III physical protection requirements. The 2000 rem dose would be incapacitating within a short period and would mean certain death. However, since the International Atomic Energy Agency (IAEA) standard is that the irradiated fuel exemption should be used to drop a facility only one material protection category and since uranium enriched above 20% could be more directly useable in a nuclear explosive device, the rule requires NPR licensees possessing a formula quantity of SSNM to satisfy at least Category II physical protection requirements when the 2000 rem exemption cannot be met.

Fifth, given the extensive restructuring of the revised proposed rule, the cost/benefit analysis was also extensively revised. This analysis is included in Enclosure C and reflects updated figures.

Differences from the Safeguards Upgrade Rule

As a result of the uniqueness of the facility design features and the type and form of fuel at NPRs, it is not necessary to require as extensive a set of physical protection measures as is included in the Safeguards Upgrade Rule. It is sufficient to require that the licensee detect an attempted theft and arrange for a response force to prevent the theft of a formula quantity of SSNM. This is acceptable in view of the fact that NPR fuel cannot be used in a clandestine fission explosive device without undergoing reprocessing to recover the uranium and this requires a large commitment of resources. Also, because the SSNM is contained in fuel elements which typically have 100-200 grams of U-235 each, the theft of a formula quantity would have to include a number of repetitive acts that require a long time to complete. Thus, there will be considerable opportunity for a response action to prevent the removal of a formula quantity from the site.

As a result of these factors, a number of prescriptive Safeguards Upgrade Rule requirements can be reduced or eliminated for protecting formula quantities at NPRs. These include the reduction or the elimination of requirements for redundant and hardened alarm stations, entrance searches for weapons and explosives, a second SNM exit search, Part 73 Appendix B Guard Training requirements and Appendix C Contingency Plans, armed guards on site, and vault hardening.

However, the proposed rule requires protection against theft by both insiders and external adversaries at security capability levels comparable to the Safeguards Upgrade Rule.

Cost/Benefit

Several benefits will be derived from implementing the proposed amendments rather than keeping the status quo. First, protection against insider theft of nuclear material will be included. This is not currently required. Second, licensees are given more flexibility in selecting a set of physical protection measures which can take maximum benefit of any site specific design features that aid security functions. Finally, except under special conditions, licensees who possess a formula quantity, regardless of its irradiation exemption status, must at least satisfy the physical protection requirements for Category II material, thereby reducing the possibility of theft of such material.

The cost comparison estimates the cost increase between implementing the proposed amendments and the measures necessary to satisfy Category II requirements. The Regulatory Analysis (Enclosure C) shows an estimated one time capital cost of $1,100 to $5,100 and an operating cost during one year of $300 to $7,900 per facility if the proposed requirements are adopted. It should be noted that, within the range of cost estimates, a low operating cost will normally match up with a high capital cost and vice versa.

While there are 15 current NPR licensees who possess formula quantities, no more than three licensees are expected to have to implement the full Category I proposed requirements and this number could very well go to zero since dose rate averaging is allowed. In addition, if any licensee is unable to keep its amount of nonexempt fuel smaller than a formula quantity, this would most likely occur only for short periods of time which are less than the 90-day interim phase-in period. For those cases, it may not be necessary to expend the full capital costs estimated above. In fact, if labor intensive procedures are used for these short periods in place of hardware, the capital cost could be avoided altogether.

Conclusion: The revised proposed amendments are the most cost-effective approach for providing assurance against the theft of a formula quantity of SSNM, while taking into account the unique features of the facility design, and fuel type and form at nonpower reactors.

Recommendation: That the Commission:

1. Approve the revised proposed amendments and authorize publication of Enclosure A in the Federal Register for public comment.

2. Certify, in order to satisfy the requirements of the Regulatory Flexibility Act, 5 U.S.C. 605(b), that this rule, if promulgated, will not have a significant economic impact on a substantial number of small entities. This Certification is included in the enclosed Federal Register notice.

3. Note:

   a. That the appropriate Congressional Committees will be notified of this Commission action.

   b. That, in accordance with 10 CFR 51.5(d)(3), neither an environmental impact statement nor a negative declaration need be prepared since the proposed amendments are not significant from the standpoint of environmental impact.

   c. That the Chief Counsel for Advocacy of the Small Business Administration will be informed of the certification and the reasons for it as required by the Regulatory Flexibility Act.

   d. That a public announcement will be issued when the amendments are filed with the Office of the Federal Register.

   e. That copies of this notice will be distributed to affected licensees and other interested persons by the Office of Administration.

   f. That DOE is developing lower enriched fuels which, it is our understanding, could be substituted for higher enriched fuels in existing nonpower reactors with minimal

modifications. Approval of the recommended regulatory action should not be construed as foreclosing further future encouragement of NPR licensees to reduce their holdings of high enriched uranium once the lower enriched fuels become available.

William J. Dircks
Executive Director for Operations

Enclosure:
A - Federal Register Notice
B - Draft Intent and Scope Guide
C - Regulatory Analysis

Commissioners' comments or consent should be provided directly to the Office of the Secretary by c.o.b. Friday, December 3, 1982.

Commission Staff Office comments, if any, should be submitted to the Commissioners NLT Wednesday, November 24, 1982, with an information copy to the Office of the Secretary. If the paper is of such a nature that it requires additional time for analytical review and comment, the Commissioners and the Secretariat should be apprised of when comments may be expected.

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ENCLOSURE A

[7590-01]

NUCLEAR REGULATORY COMMISSION

10 CFR Part 73

Safeguards Requirements for Nonpower Reactor Licensees Possessing Formula Quantities of Strategic Special Nuclear Material

AGENCY: Nuclear Regulatory Commission.

ACTION: Proposed Rule.

SUMMARY: The Nuclear Regulatory Commission is proposing to amend its physical protection regulations for nonpower reactor licensees possessing formula quantities of strategic special nuclear material. The proposed amendments have been prepared in response to a Commission request for the development of these new physical protection requirements. These amendments would replace the interim requirements which are currently in force at these facilities. The result of these amendments will be the most cost-effective appproach for providing assurance against the theft of a formula quantity of SSNM, while taking into account the unique features of the facility design, and fuel type and form at NPRs.

DATES: Comments must be received on or before *_____. Comments received after this date will be considered if it is practical to do so, but assurance of consideration cannot be given except as to comments received on or before this date.

ADDRESSES: Comments or suggestions regarding the proposed amendments should be sent to the Secretary of the Commission, U. S. Nuclear Regulatory Commission, Washington, DC 20555, Attention: Docketing and Service Branch. Comments received will be available for examination and copying at the NRC Public Document Room at 1717 H Street, NW., Washington, DC 20555.

*Insert date 120 days after publication in the Federal Register.

Enclosure A

as part of the design basis threat. However, as provided in 10 CFR Section 73.1(a)(2), insiders are part of the physical protection design basis threat for facilities possessing formula quantities of SSNM.

On August 12, the Commission approved the publication of proposed physical protection requirements regarding Category I NPRs (those possessing formula quantities of SSNM). These requirements were published in the Federal Register on September 18, 1981 (46 FR 46333) along with a minority opinion of Commissioners Gilinsky and Bradford and the separate views of Commissioner Bradford. These requirements took into account the NPR facility and fuel design and eliminated some Safeguards Upgrade Rule requirements.

Those proposed amendments (46 FR 46333) also included a statement of the staff's resolution of a number of issues which had been raised earlier. In particular, the Commission presented its finding that the existing protection exemption level of 100 rem per hour at 3 feet from any accessible surface without any intervening shielding was appropriate.

Several nonsubstantive clarifying and conforming amendments to the currently effective Parts 50 and 70 were also proposed in the September 18, 1981 notice. There was no public comment on these amendments and they do not modify current practices or applications of the regulations, but only clarify the text of several sections. There is no further change in those previously proposed amendments and thus they are not repeated in this notice.

RESPONSE TO THE PUBLIC COMMENTS

Twelve public comments were received which discussed specific provisions of the proposed rule. Eleven of these questioned one or more aspects of the

Second, given the inability of all but a very few insiders to know the expected dose rate from any irradiated fuel element, the licensee will be allowed to average its irradiated fuel to meet the 100 rem per hour exemption as long as no single fuel unit drops below 50 rem per hour at 3 feet. This approach will reduce the need for a licensee to conduct reactor operations just to satisfy the exemption criterion.

Third, the revised rule allows an interim period of 90 days after a licensee no longer meets the 100 rem per hour exemption level before it has to implement full Category I requirements. However, during the interim period some compensatory physical protection measures are required which could be less costly than the full Category I measures. This interim period can be permitted because, in most cases, as irradiated fuel decays below the 100 rem per hour average value, it does so fairly slowly.

Fourth, if a licensee can show that for a theft of a formula quantity it is reasonable to expect that a thief would receive an absorbed dose of at least 2000 rem, then the licensee will only have to satisfy Category III physical protection requirements. The 2000 rem dose would be incapacitating within a short period and would mean certain death. However, since the International Atomic Energy Agency (IAEA) standard is that the irradiated fuel exemption should be used to drop a facility only one material protection category and since uranium enriched above 20% could be more directly useable in a nuclear explosive device, the rule requires NPR licensees possessing a formula quantity of SSNM to satisfy at least Category II physical protection requirements when the 2000 rem exemption cannot be met.

However, the proposed rule requires protection against theft by both insiders and external adversaries at security capability levels comparable to the Safeguards Upgrade Rule.

Cost/Benefit

Several benefits will be derived from implementing the proposed amendments rather than keeping the status quo. First, protection against insider theft of nuclear material will be included. This is not currently required. Second, licensees are given more flexibility in selecting a set of physical protection measures which can take maximum benefit of any site specific design features that aid security functions. Finally, except under special conditions, licensees who possess a formula quantity, regardless of its irradiation exemption status, must at least satisfy the physical protection requirements for Category II material, thereby reducing the possibility of theft of such material.

The cost comparison estimates the increase between implementing the proposed amendments and the measures necessary to satisfy Category II requirements. The Regulatory Analysis shows an estimated one time capital cost of $1,100 to $5,100 and an operating cost during one year of $300 to $7,900 per facility, if the proposed requirements are adopted. It should be noted that, within the range of cost estimates, a low operating cost will normally match up with a high capital cost and vice versa.

While there are 15 current NPR licensees who possess formula quantities, no more than three licensees are expected to have to implement the full Category I proposed requirements and this number could very well go to zero since dose rate

include certain additional security precautions that would be implemented when a sufficient amount of the licensee's irradiated fuel drops below the 100 rem per hour at 3 feet external radiation dose rate exemption level resulting in the licensee possessing a formula quantity of fuel that is not self-protecting.

At this time the proposed amendments would require only 15 licensees to submit revised security plans, and no more than three nonpower reactor licensees are expected to implement the additional security measures. The amendments probably would not affect any future licensees since they would not likely build a non-power reactor requiring a formula quantity of SSNM.

The 15 licensees include three large companies (Union Carbide Corporation, General Atomic Corporation - a subsidiary of Gulf Corporation, and General Electric Corporation), ten major universities (Georgia Institute of Technology, University of Wisconsin, Massachusetts Institute of Technology, University of Michigan, University of Virginia, Oregon State University, Virginia Polytechnic Institute, Texas A&M, University of Missouri at Columbia, and Washington State University), the National Bureau of Standards (NBS), and the Rhode Island Atomic Energy Commission. The three corporations each employ in excess of 500 employees and have annual sales in excess of $1 million for services they provide. NBS and the Rhode Island Atomic Energy Commission are a Federal and state agency, respectively. None of these affected licensees fall within the scope of the definition of "small entities" set forth in the Regulatory Flexibility Act or the Small Business Size Standards in regulations issued by the Small Business Administration at 13 CFR Part 121.

2. In §73.2, paragraph (x) is revised to read as follows:

§73.2 Definitions.

* * * * *

(x) "Special nuclear material of moderate strategic significance" means:

(1) Less than a formula quantity of strategic special nuclear material but more than 1000 grams of uranium-235 (contained in uranium enriched to 20 percent or more in the U-235 isotope) or more than 500 grams of uranium-233 or plutonium or in a combined quantity of more than 1000 grams when computed by the equation, grams = (grams contained U-235) + 2 (grams U-233 + grams plutonium), ~~[or]~~*

(2) 10,000 grams or more of uranium-235 (contained in uranium enriched to 10 percent or more but less than 20 percent in the U-235 isotope) ~~[.]~~, or

(3) Formula quantities of strategic special nuclear material possessed at nonpower reactors.

* * * * *

3. In §73.6, paragraph (e) is revised to read as follows:

§73.6 Exemptions of certain quantities and kinds of special nuclear material.

* * * * *

(e) Special nuclear material at nonpower reactors. Any licensee~~[s]~~ subject to §~~[73.60]~~ 73.67(h) is ~~[are]~~ not exempted from §§73.70 and 73.72, and any licensee~~[s]~~ subject to §73.67(e) is ~~[are]~~ not exempted from §73.72 of this part.

*Comparative text shows changes between proposed rule and current regulations. Underlined text shows additions and dashed through text in brackets shows deletions.

6. Section 73.67 is revised as follows:

a. Paragraphs (b) and (c) are revised;

b. In paragraph (d), (10) and (11) are revised and a new (12) is added; and

c. A new paragraph (h) is added to read as follows.

§73.67 Licensee fixed site and in-transit requirements for the physical protection of special nuclear material of moderate and low strategic significance and of formula quantities at nonpower reactors.

* * * * *

(b) Exemptions. (1) A licensee's possession, use, or transportation of the following materials is exempt from the requirements of this section [~~to the extent that he possesses, uses or transports~~]: (i) Special nuclear material in a quantity not exceeding 350 grams of uranium-235, uranium-233, plutonium, or a combination thereof, possessed in any analytical, research, quality control, metallurgical, or electronic laboratory, [~~which is not readily separable from other radioactive material and which has a total external radiation dose rate in excess of 3 feet from any accessible surface without intervening shielding,~~] or (ii) Sealed plutonium-beryllium neutron sources totalling 500 grams or less contained plutonium at any one site or contiguous sites, or (iii) Plutonium with an isotopic concentration exceeding 80 percent in plutonium-238.

(2) A licensee, other than a nonpower reactor licensee who possesses a formula quantity or more of strategic special nuclear material, is exempt from the requirements of this section to the extent that it possesses, uses, or transports special nuclear material which is not readily separable from other radioactive material and which has a total external radiation dose rate in excess of 100 rems per hour at a distance of 3 feet from any accessible surface without intervening shielding.

(c) Each licensee who possesses, uses, transports, or [~~who~~] delivers to a carrier for transport, special nuclear material of moderate strategic significance or 10 kg or more of special nuclear material of low strategic significance, and each licensee who possesses a formula quantity of strategic special nuclear material for use in the operation of a nonpower reactor, shall:

(1) * * *

(2) Within [~~300 days after the effective date of these amendments (March 25, 1980) or~~] 30 days after the plan(s) submitted pursuant to paragraph (c)(1) of this section is approved, [~~whichever is later,~~] implement the approved security plan; or[~~,~~]

(3) For a nonpower reactor licensee who possesses a formula quantity of strategic special nuclear material, (i) submit by * a physical security plan or an amended physical security plan describing how the licensee will comply with the requirements of paragraph (h) of this section, any compensatory measures to be used during a 90-day interim period, schedules of implementation, and methods used for determining external radiation dose rates of irradiated reactor fuel; and (ii) implement the applicable parts of the approved physical security plan submitted pursuant to paragraph (c)(3)(i) of this section by ** , or within 30 days after this plan is approved, whichever is later.

*(Insert date 150 days after effective date of these amendments.)
**(Insert date 240 days after effective date of these amendments.)

(ii) Detect unauthorized activities and conditions within the protected area and the controlled access areas:

(iii) Detect unauthorized removal of strategic special nuclear material from the controlled access areas; and

(iv) Provide for a response capability sufficient to prevent the unauthorized removal of a formula quantity of strategic special nuclear material from the protected area; and

(3) Test physical protection devices used pursuant to the requirements of this section to assure their functional performance during periods when they are required to be in use.

7. In §73.70 the introductory text and paragraph (c) are revised to read as follows:

§ 73.70 Records

Each licensee subject to provisions of §§ 73.20, 73.25, 73.26, 73.27, 73.45, 73.46, 73.55, or ~~[§ 73.60]~~ 73.67(h) shall keep the following records:

* * * * *

(c) A register of visitors, vendors, and other individuals not employed by the licensee pursuant to §§73.46(d)(10), 73.55(d)(6), or ~~[§ 73.60]~~ by a licensee required to satisfy § 73.67(h).

* * * * *

Dated at Washington, DC this _____ day of _____ 1982.

For the Nuclear Regulatory Commission.

_____

Samuel J. Chilk,
Secretary of the Commission.

Enclosure A

ENCLOSURE B

Physical Protection Requirements for
Nonpower Reactor Licensees Possessing Formula Quantities of SSNM

73.67(b)(2)

1. Q: Besides the 2000 rem exemption, why are nonpower reactor licensees possessing formula quantities of strategic special nuclear material (Category I) not able to have physical protection requirements reduced more than one material category by using the 100 rem/hr criterion?

   A: Uranium enriched above 20% is more directly useable in a nuclear explosive device (i.e., does not necessarily need further enrichment) than uranium not so enriched. Because of the high strategic significance of this type of material, we have maintained a close compatibility with the recommendation of the International Atomic Energy Agency (IAEA) in INFCIRC 225 except when the fuel is extremely self-protecting. The IAEA says that the irradiated fuel exemption should be used to drop a facility no more than one material protection category.

2. Q: Does each fuel element have to have at least a dose rate of 100 rem/hr at 3 feet to qualify for the exemption?

   A. No. A licensee is allowed to apply an average value to the irradiated fuel it wishes to have qualified for the dose rate exemption. Material is exempted as long as (1) the weighted average (weighted by U-235 isotope weight) of all exempted material per CAA is at least 100 rem/hr at three feet and (2) no single fuel unit has a dose rate of less than 50 rem/hr at 3 feet.

3. Q: Must direct radiation measurement be used to show that fuel meets the 100 rem/hr exemption criterion?

quantity is nonexempt. After this, the licensee will have 90 days to assess the extent of the emergency and set up any additional equipment which has been committed to on a permanent basis.

73.67(h)(1)

5. Q: Can you describe the design basis insider threat?

A: Yes. The design basis insider threat is an individual, including an employee (in any position), and a conspiracy between individuals in any position who may have: (a) access to and detailed knowledge of the facility or (b) items that could facilitate theft of special nuclear material (e.g. small tools, substitute material, false documents, etc.) or both.

6. Q: What is the meaning of "early detection" in 73.67(a)(2) as referenced by this paragraph?

A: As required under 73.67(h)(2)(iv), a licensee must arrange for a response capability to prevent the unauthorized removal of a formula quantity from the protected area. In order to meet this requirement, a detection must be "early" enough to permit a response which can satisfy the prevention requirement. The length of time available for detection will depend on the speed of the arranged response and the expected length of time it would take to steal a formual quantity.

73.67(h)(2)

7. Q: Is the heavy impact of implementing a full set of additional security measures justified where fuel should happen to slip just below the 100 rem/hr level to say 99 or 95 rem/hr, particularly when unscheduled equipment failure may have caused this?

6. Eliminate requirements for armed guards.

7. Reduce Contingency Plan requirements.

8. Eliminate hardening for vaults.

9. Q: Why does the rule require three capabilities: (1) detecting unauthorized access into CAAs, (2) detecting unauthorized activities and conditions in CAAs and PAs and (3) detecting unauthorized removal of SSNM?

A: The objective is to detect attempts to remove SSNM as early as possible. In order to help achieve this with high assurance, a safeguards system which provides defense in depth is essential. In addition, the resulting redundancy and diversity of capabilities helps assure that the system is not vulnerable to common mode failures or any single adversary act, such as commercial power failures or the severing of non-tampersafed alarm lines.

10. Q: What are examples of unauthorized activities and conditions?

A: Some examples of unauthorized activities are (a) failure to follow significant operating procedures, (b) someone being in a restricted area without proper authorization, or (c) moving fuel without prior approval. Some examples of unauthorized conditions are (a) a door left unlocked when it should be secured, (b) monitoring equipment that is not energized when it should be, or (c) fuel handling equipment not being secured when required.

11. Q: Does the protected area (PA) required in 73.67(h)(2) have to be inclosed by barriers of the construction defined in 73.2(f)(1) and (2)?

A: No. As stated in 73.2(f)(3) "any other physical obstruction constructed in a manner and of material suitable for the purpose for which the obstruction is intended," is acceptable. Thus, while alternatives to the

It should be noted that many of the measures listed here can also satisfy some of the other capability requirements.

73.67(h)(2)(ii)

14. Q: What measures could be used to detect unauthorized activities?

A: Again some measures may be able to satisfy several capabilties. Some means of detecting unauthorized activities are:

1. Motion detectors which cover the interior space of the area,

2. Periodic patrols,

3. Appropriate use of CCTV's or observation windows which can survey the important parts of the area, or

4. Use of the two man rule inside the area.

73.67(h)(2)(iii)

15. Q: What measures could be used to detect unauthorized removal of material?

A: Some measures for detecting attempts at unauthorized removal are:

1. Motion detectors which view (a) the fuel, (b) fuel removal points such as a core plug, or (c) specialized tools, such as remote manipulators or cranes, which are necessary for fuel removal,

2. A radiation detector which is difficult to shield and has sufficient sensitivity to detect the removal of any irradiated fuel it is protecting,

3. Alarming of the special fuel removal tools mentioned above, or

A: When the equipment is needed for use, it should be tested. A test should be made prior to a licensee reaching the point where a formula quantity of nonexempt material is possessed. After that, periodic tests should be made at least every 7 days to assure that the equipment is still functioning at the necessary level.

ENCLOSURE C

Regulatory Analysis
Physical Protection of Nonpower Reactors
Possessing Formula Quantities of SSNM (10 CFR Part 73)[1]

Statement of Problem

Under currently applicable regulations, nonpower reactor (NPR) licensees possessing formula quantities of nonexempt strategic special nuclear material (SSNM) are subject to requirements relating to the physical protection of special nuclear material of moderate strategic significance (10 CFR 73.67(d)) as well as interim additional requirements (10 CFR 73.60) in place of implementing the more stringent requirements of the Safeguards Upgrade Rule (10 CFR 73.45 and 46). These interim requirements are in effect while the NRC staff determines the measures necessary to afford this material with a level of physical protection comparable to the protection provided for formula quantities of SSNM at fuel cycle facilities, while at the same time giving credit for specific facility and fuel design features that together offer intrinsic protection against theft. The new level of protection is to be commensurate with the threat posed to the public safety and health by theft of a formula quantity of this material, while providing protection actually needed at each specific site.

Potentially, there could be 15 licensees affected by the proposed amendments although no more than one to three are likely to be affected. These 15 licensees are made up of large companies, large universities, and Federal and state agencies. Consequently, under the provisions of the Regulatory Flexibility Act (5 U.S.C. 605(b)), this rule would not have a significant economic impact on a substantial number of small entities.

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[1]Copies of the Regulatory Analysis are being placed in the NRC Public Document room, 1717 H Street NW., Washington DC, where they will be available for public inspection and copying for a fee.

All licensees, with the possible exception of one, currently have plans on file addressing the Category II requirements which mandate that licensees have a system which will provide early detection of theft of material of moderate strategic significance. Adapting and expanding plans already on file to include measures for preventing the theft of a formula quantity of SSNM by an external adversary or insider(s) could be done to meet the requirements of the proposed rule. For most licensees, this can be accomplished by expanding procedures, with little emphasis on new capital equipment. Others may choose to install new equipment because they anticipate a more frequent need to satisfy Category I requirements (although it is unlikely that a licensee, baring unforseen emergencies, would choose to possess a formula quantity of unirradiated fuel). By operating with fuel at an exempt level (>100 rem/hour at 3 feet or 2000 rem dose to an adversary), NPR licensees can avoid having to implement the proposed rule.

Objectives

The general goal of physical protection requirements at NPRs is to assure that the public health and safety will not be threatened due to the theft of a formula quantity of SSNM. The objectives are to detect an attempted theft of material and protect against theft through appropriate response. Concurrently, the aim is to not burden licensees with overly restrictive measures which might unnecessarily inhibit their operation (e.g., research, instructional, etc.). In meeting the objectives, the new rule continues to give some safeguards credit for fuel irradiated above 100 rem/hour since it provides a certain deterence against theft.

Alternatives

Regulatory options considered for placing physical protection requirements on NPRs licensees possessing formula quantities of nonexempt strategic special

nuclear material ranged from allowing the opportunity for no requirements based on fuel exemption, up to requiring implementation of all of the Safeguards Upgrade Rule measures.

After this consideration, staff developed recommended amendments which (1) protect against insider theft of nuclear material, (2) give the licensees much greater flexibility in selecting a set of physical protection measures, and (3) take maximum benefit of any NPR and fuel design features that provide intrinsic safeguards, which help achieve protection levels comparable to the Safeguards Upgrade Rule. These amendments are provided as an alternative to maintaining the status quo. Thus, the two alternatives can be stated as follows:

1) Status quo.

2) Implement the revised proposed amendments to protect against theft by the insider, conspiracy between insiders, and the external adversary.

The current regulations are given in 10 CFR 73.60 and 73.67(d). The recommended reform amendments can be summarized as containing the following requirements:

- Detect access of unauthorized personnel to strategic special nuclear material within the protected area and the controlled access areas;
- Detect unauthorized activities and conditions within the protected area and the controlled access areas;
- Detect unauthorized removal of strategic special nuclear material from the controlled access areas; and
- Provide for a response capability sufficient to prevent the unauthorized removal of a formula quantity of strategic special nuclear material.

In addition, because of the design features and fuel type and form at Category I NPRs, changes from the Safeguards Upgrade Rule requirements (i.e., 10 CFR 73.45 and 73.46) were possible. These include elimination of redundant and hardened alarm stations, entrance searches for weapons and explosives, a second SSNM exit search, Part 73 Appendix B Guard Training requirements, armed guards on site, and vault hardening.

Cost/Benefit

To give the estimated costs a proper perspective, they must be weighed against the benefits which will result from adopting the revised proposed amendments instead of keeping the status quo. These benefits are listed first and are as follows: 1) protection against theft by insiders and a collusion of insiders will be added to the protection already given against theft by external adversaries, 2) by replacing the prescriptive requirements of 73.60 with performance capability requirements, the licensee is given much greater flexibility in selecting cost-effective physical protection measures which make optimum use of any inherent site specific features, 3) the combination of physical protection requirements and unique features of NPR fuel and facility design provides a level of protection comparable to that of the Safeguards Upgrade Rule, and 4) except for cases when the fuel is extremely self-protecting, all NPR licensees possessing a formula quantity must protect it at least to the level required for Category II material (moderate strategic significance), thereby reducing the likelihood of a theft of a formula quantity of SSNM.

There are currently 15 NPR licensees who possess formula quantities of SSNM and thus could potentially be subject to the proposed Category I requirements, if they are unable to keep their amount of nonexempt fuel below a formula quantity. With current levels of operations, it is conservatively estimated that no more than one to three of these 15 would ever have a formula quantity of nonexempt

fuel and then only for short periods of time. This number could very well go to zero when licensees are allowed to average the dose rate of all fuel qualifying for the self-protecting exemption.

In developing the cost figures, a typical set of physical protection measures was established which were representative of an average current NPR licensee covered by this rulemaking action. Because the great majority of current licensees maintain an exemption from Category I requirements and have NRC approved or have submitted plans at the Category II level, the typical set of physical protection measures will only satisfy Category II requirements. Two sets of physical protection measures were drawn up which could satisfy the Category I requirements contained in the revised proposed amendments. The sets included measures for both irradiated and unirradiated fuel. One set was capital equipment intensive and one set was personnel intensive.

The estimated additional cost per facility for implementing the revised proposed amendments above the requirements of Category II are given in Table 1.

Table 1

Estimated Additonal Cost Per Facility
to Implement the Revised Proposed Amendments

Type of Measures Employed	One Time Capital Equipment Expenditure	Operating Cost During One Year
Personnel Intensive	$1,100 - $1,400	$5,300 - $7,900
Capital Equipment Intensive	$2,500 - $5,100	$300 - $1,000

It is not necessary, and highly unlikely, that a licensee would choose to use equipment and operating procedures which both fall at the high cost end of their respective ranges.

It should be remembered that no more than three licensees are expected to have to implement the full Category I proposed requirements and that this number could very well go to zero. In addition, if any licensee is unable to keep its amount of nonexempt fuel smaller than a formula quantity, this would most likely occur only for short periods of time which would be less than the 90 day interim period. For those cases, it would not be necessary to expend the full capital costs estimated above. In fact, if labor intensive procedures are used for these short periods instead of hardware, the capital cost might be avoided altogether.