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**Regulatory Analysis for Final Rule: 10 CFR 73.37,  
Physical Protection of Irradiated Reactor Fuel in Transit**

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**U.S. Nuclear Regulatory Commission  
February 2012**



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## EXECUTIVE SUMMARY

The U.S. Nuclear Regulatory Commission (NRC or the Commission) is amending its security regulations for the transport of irradiated reactor fuel.<sup>1</sup> This rulemaking establishes generically applicable security requirements similar to the requirements currently imposed by NRC Order EA-02-109, “Issuance of Order for Interim Safeguards and Security Compensatory Measures for the Transportation of Spent Nuclear Fuel Greater than 100 Grams,” (67 FR 63167; October 10, 2002). This Order was issued to NRC power reactor licensees, non-power reactor licensees, independent spent fuel storage installation (ISFSI) licensees, and special nuclear material licensees, who shipped, received, or planned to ship or receive spent nuclear fuel (SNF) under the provisions of Title 10 of the *Code of Federal Regulations* (10 CFR) Part 71. Subsequently, the Commission issued similar orders to licensees shipping SNF during the period October 2003 through December 8, 2010. These orders are collectively referred to as the “Orders for SNF in Transit” or “the Orders.” This rulemaking also establishes performance standards and objectives for the protection of SNF shipments from theft, diversion, or radiological sabotage. Additionally, this rulemaking also addresses, in part, a 1999 petition for rulemaking from the State of Nevada (PRM-73-10) that requests NRC to strengthen the regulations governing the security of SNF shipments against malevolent acts. This rule will apply to NRC licensees who transport, or deliver to a carrier for transport SNF.

The purpose of this regulatory analysis is to measure the incremental costs of the rule. The baseline for the analysis is the No-Action Alternative, or how things would be without the rule. In the absence of the rule, the Commission’s Orders would remain in place. The assumption in the regulatory analysis is that in the absence of the rule, the Commission will continue to issue Orders for SNF in Transit to licensees who were not covered under previously issued Orders. The costs evaluated in the regulatory analysis are only those costs that would be incurred under the rule, not under the Commission Orders for SNF in Transit or the existing § 73.37 regulations. In addition, another analysis called the “pre-order analysis” is included in this regulatory analysis for informational purposes only. Under these assumptions, the analysis presented in this document examines the benefits and costs of the new security requirements. The analysis found:

- *Total Cost to Industry.* The total annual cost of implementing the rule for each NRC licensee who transports, or delivers to a carrier for transport, SNF (industry) is \$71,000, and total one-time costs are \$5,000. The total present value of the costs to industry is \$0.5 million (using a 7 percent discount rate) and \$0.6 million (using a 3 percent discount rate) over a 10-year analysis period. These costs reflect additional security requirements that were developed as a result of lessons learned from implementation of the Orders. These costs are discussed in Section 3.
- *Value of Benefits Not Reflected Above.* With the exception of some of the direct monetary savings to industry, the cost figures shown above do not reflect the value of the benefits of the final rule. These benefits are evaluated qualitatively in Section 4.1. Based on the qualitative analysis, the NRC determined that the costs of the rule are justified in view of the qualitative benefits.

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<sup>1</sup> For purposes of this rulemaking, the terms “irradiated reactor fuel” and “spent nuclear fuel” (SNF) are used interchangeably.

- *Costs to NRC.* There are no annual costs for the NRC associated with the implementation of the rule. The NRC has a one-time cost associated with updating the associated guidance, NUREG-0561, Physical Protection of Irradiated Reactor Fuel in Transit, to be consistent with the final rule, which is \$5,000.
- *Decision Rationale.* The analysis did not quantify the benefits of this rulemaking. Rather, it, qualitatively examines the benefits of the rule. It was concluded that the rule would provide security-related benefits. These security-related benefits are associated with safeguards and security considerations stemming from the decreased risk of a security-related event, such as an act of sabotage. Thus, decreasing the risk of a security-related event protects the common defense and security, protects the health of the public and occupational workers, and decreases the risk of damage to offsite properties.

The sum total of the requirements in the final rule will provide additional assurance of NRC licensees' ability to protect SNF security requirements in transit from theft, diversion, or radiological sabotage. The final rule provides a substantial increase in the protection of the common defense and security and the public health and safety from SNF in Transit. Specifically, the final rule will require armed escorts throughout the rail and road route, minimum of 2 weapons for private armed escorts, private armed escorts' deadly force training, and additional NRC notifications. The rule will also include implementation of certain technological advances in the areas of communications and global positional tracking, which are necessary during a safeguards contingency event. In addition, the rule's requirements for training and procedures for the transportation security program and background investigations for all personnel associated with the shipment will increase the effectiveness of NRC licensees' security programs. Finally, public confidence in the NRC and its licensees would increase because the rule will establish performance standards and objectives for the physical protection of SNF in Transit from theft, diversion, or radiological sabotage that are generally applicable to all NRC licensees authorized to transport, or delivers to a carrier for transport SNF.

In conclusion, the NRC staff believes that these qualitative benefits represent a substantial increase in public health safety and the protection of the common defense and security. As such, the costs of the final rulemaking are justified based upon the qualitative benefits.

## ACRONYMS AND ABBREVIATIONS

CFR	<i>Code of Federal Regulations</i>
FR	Federal Register
LLEA	Local Law Enforcement Agency
NRC	Nuclear Regulatory Commission
NUREG	Nuclear Regulatory Commission technical report designation
NUREG/BR	NUREG brochure
OMB	Office of Management and Budget
SECY	A paper addressing policy, rulemaking, or adjudicatory matters submitted to the Commission for consideration in a document style and format established specifically for the purpose.
SIG	Safeguards Information
SNF	Spent Nuclear Fuel

## 1. INTRODUCTION

This document presents a regulatory analysis of the security requirements for the physical protection of irradiated reactor fuel.<sup>2</sup> The U.S. Nuclear Regulatory Commission (NRC or the Commission) is revising Title 10 to the Code of Federal Regulations (10 CFR) Part 73 to establish generically applicable security requirements similar to those issued after the events of September 11, 2001. This rulemaking will also establish performance standards and objectives for the protection of spent nuclear fuel (SNF) shipments from theft, diversion, or radiological sabotage. Additionally, this rulemaking also addresses, in part, a 1999 petition for rulemaking from the State of Nevada (PRM-73-10) that requests NRC to strengthen the regulations governing the security of SNF shipments against malevolent acts. This rule will apply to NRC licensees who transport, or deliver to a carrier to transport SNF.

The purpose of this regulatory analysis is to measure the incremental costs of the rule. Section 1.1 of this document states the problem and the reasons for the rulemaking. Section 1.2 provides background information. Section 1.3 discusses the regulatory objectives of the rule.

### 1.1 Statement of the Problem and Objective of the Rulemaking

After the attacks of September 11, 2001, the NRC reevaluated its security requirements for SNF in Transit. From this effort, additional security measures were identified. In the area of security for SNF in transit, the Commission imposed additional security requirements through NRC Order EA-02-109, "Issuance of Order for Interim Safeguards and Security Compensatory Measures for the Transportation of Spent Nuclear Fuel Greater than 100 Grams," (67 FR 63167; October 10, 2002). This Order was issued to NRC power reactor licensees, non-power reactor licensees, independent spent fuel storage installation (ISFSI) licensees, and special nuclear material licensees, who shipped, received, or planned to ship or receive SNF under the provisions of 10 CFR Part 71. Subsequently, the Commission issued similar orders to licensees shipping SNF during the period October 2003 through December 8, 2010. These orders are collectively referred to as the "Orders for SNF in Transit" or "the Orders." The current rulemaking incorporates the security requirements in the Orders as well as lessons learned from implementation of the Orders. It also addresses, in part, the 1999 petition for rulemaking submitted by the State of Nevada (PRM-73-10).

Orders, unlike rules, do not apply prospectively to applicants for new licenses. The NRC would have to periodically issue new orders to cover new and amended licenses. In order to make the security requirements generally applicable to present and future licensees who transport, or deliver to a carrier for transport SNF, the security-related requirements need to be incorporated into NRC regulations. In addition, notice and comment rulemaking allows for public participation and is an open and transparent process.

The NRC objectives for this rulemaking are to: 1) establish generically applicable security requirements similar to those previously imposed by Commission Orders issued after September 11, 2001; 2) establish the performance standards and objectives for the protection of

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<sup>2</sup> For purposes of this rulemaking, the terms "irradiated reactor fuel" and "spent nuclear fuel" (SNF) are used interchangeably.

SNF shipments from theft, diversion, or radiological sabotage; 3) ensure that the performance standards and objectives for SNF shipments apply to all licensees authorized to transport, or deliver to a carrier for transport SNF; and 4) address, in part, the requests for NRC rulemaking raised in PRM-73-10.

## 1.2 Background

The SNF comes from commercial nuclear power reactors and non-power reactors. After the fresh fuel has been used in a reactor, highly radioactive SNF assemblies remain. The assemblies must be removed from the reactor for storage to make room for new assemblies and to allow the fuel to cool. Currently, most SNF assemblies are stored in pools of water, aboveground vaults, or concrete casks. The SNF may be shipped to temporary storage sites when space at reactor sites is limited. It is also shipped for research studies. The NRC regulates SNF shipments to protect both public health and safety and common defense and security.

On June 15, 1979, the NRC published in the *Federal Register* (44 FR 34466) an interim final rule that established requirements for the physical protection of irradiated reactor fuel in transit. The interim final rule added a new Section 73.37 to 10 CFR Part 73 entitled, "Physical Protection of Irradiated Reactor Fuel in Transit." The interim rule and related guidance, NUREG-0561, "Physical Protection of Shipments of Irradiated Reactor Fuel," were issued in effective form without the benefit of public comment. At the time of publication, public comments were solicited on the interim regulation and the guidance document. After considering public comments, amendments to the interim final rule and the guidance document were issued on June 3, 1980 (45 FR 37399). This rulemaking also requires that the physical protection system: 1) provide for the early detection and assessment of attempts to gain unauthorized access to or control over SNF shipments; 2) provide notification to the appropriate response forces of any sabotage events; and 3) impede attempts at radiological sabotage of SNF shipments in heavily populated areas or attempts to illicitly move such shipments into heavily populated areas.

## 1.3 Commission Orders

In response to the September 11, 2001, terrorist attacks, the NRC determined that additional security measures were needed to enhance the protection of SNF shipments from theft, diversion, or radiological sabotage. The Commission imposed these additional security requirements through Orders for SNF in Transit. The Orders were issued to NRC power reactor licensees, non-power reactor licensees, ISFSI licensees, and special nuclear material licensees, who shipped, received, or planned to ship or receive SNF under the provisions of 10 CFR Part 71.

The specifics of the Orders for SNF in Transit are protected as safeguards information (SGI); as such, their details cannot be discussed in this document. In general, the security requirements in the Orders resulted in enhancements in the following areas: 1) preplanning and coordination with local law enforcement agency (LLEA) and State law enforcement agencies; 2) communications among movement control personnel; 3) development of normal operating and contingency procedures; 4) a minimum number of weapons for escorts; and 5) background investigations for individuals associated with SNF shipments.

## **2. IDENTIFICATION OF ALTERNATIVE APPROACHES**

The NRC considered two alternatives to meet the regulatory goals identified in the previous section. The alternatives are described below.

### **2.1 Alternative 1: No-Action**

Alternative 1 is the No-Action Alternative. The No-Action Alternative is how the regulatory environment for SNF in transit would look absent the rule. Under the No-Action Alternative, the NRC would not move forward with the rule. The existing regulations in § 73.37, the Orders for SNF in Transit would remain in place, and the Commission would continue to issue Orders for SNF in Transit to licensees who were not covered under previously issued Orders. The No-Action alternative serves as the baseline against which the Rule Alternative (described below) is measured.

This alternative does not reflect the additional security requirements developed as a result of lessons learned from implementation of the Orders, and from the implementation of the Orders. Thus, this alternative would not incorporate the additional requirements needed to establish performance standards and objectives for the protection of SNF shipments from theft, diversion, or radiological sabotage.

In addition, this alternative would place an administrative burden on the NRC. Unlike the requirements of a rule which apply to all applicable licensees, the Orders for SNF in Transit apply only to the licensees that are specifically subject to the Orders. It would not apply to new licensees, unless the Orders are sent to them as well. The NRC would be required to issue Orders to each new licensee seeking to transport SNF, which makes this alternative less efficient and effective than developing regulations.

### **2.2 Alternative 2: Rulemaking to Enhance the Physical Protection of SNF in Transit**

Under Alternative 2, the NRC would enhance the requirements for the physical protection of SNF in Transit through rulemaking. The rulemaking would include revisions to §§ 73.37 and 73.72 and the creation of a new § 73.38, as described in the rule.

Alternative 2 is more efficient and effective than the continued issuance of Orders for SNF in Transit. The NRC has estimated the qualitative benefits and costs of this alternative, as described in Sections 3 and 4 of this regulatory analysis. The preferred approach is Alternative 2 (Rulemaking) for the reasons discussed in Section 5.

## **3. Evaluation of Benefits and Costs**

This section examines the benefits and costs expected from this rulemaking, and are presented in four subsections. Section 3.1 identifies the attributes that are expected to be affected by the rulemaking. Section 3.2 describes how the benefits and costs have been analyzed for the main analysis. Section 3.3 describes how the benefits and costs have been analyzed for costs of the rule compared to the costs associated with the No-Action Alternative.



Throughout this analysis, various labor rates are used. These rates are used consistently for all of the analyses and their derivations are described below.

Licensee labor rates were obtained from National Wage Data available on the Bureau of Labor Statistics web site ([www.bls.gov](http://www.bls.gov)). Depending on the industry and the occupation (e.g., manufacturing, health and safety, etc.), the NRC selected an appropriate mean hourly labor rate. The rate is then increased using a multiplier of 1.5 to account for benefits (insurance premiums, pension, and legally required benefits). Because exact hourly rates would be difficult to obtain and may not be recent, the NRC used nationwide mean hourly rates. For all licensee labor rates, \$73.20/hour is used, which is from Bureau of Labor Statistics Employer Costs for Employee Compensation data set, "Nuclear Engineers,"<sup>3</sup> however, some of the actions evaluated may be conducted by lower paid employees, such as clerical staff.

The NRC's labor rates are determined using the calculation methodology described in Abstract 5.2, "NRC Labor Rates in the Generic Cost Catalog," of NUREG/CR-4627, "Generic Cost Estimates." This methodology considers only variable costs that are directly related to the implementation, operation, and maintenance of the requirement. Currently, this hourly labor rate for the NRC is \$119.

The estimation of costs for rulemaking is based on professional staff full-time equivalent (FTE). Based on actual data from the NRC's time and labor system, the number of hours in 1 year that directly relate to implementation of assigned duties is 1,451; this excludes hours on such things as leave, training, and completing administrative tasks. Therefore, an NRC professional staff FTE hour rate is based on 1,451 hours. As described in the Office of Management and Budget (OMB) Circular A-76, "Performance of Commercial Activities," the number of productive hours in one year is 1,776. As this actual value is likely to vary from State to State and no specific data are available, the FTE costs for the States are based on the number of hours estimated in OMB Circular A-76.

### **3.1 Identification of Affected Attributes**

This section identifies the factors within the public and private sectors that the NRC expects the final rule to affect, using the list of potential attributes in Chapter 5 of NUREG/BR-0184, "Regulatory Analysis Technical Evaluation Handbook," issued January 1997, and in Chapter 4 of NUREG/BR-0058, "Regulatory Analysis Guidelines of the U.S. Nuclear Regulatory Commission," Revision 4, issued September 2004. The basis for selecting those attributes is presented below.

Affected attributes include the following:

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<sup>3</sup> U.S. Department of Labor, Bureau of Labor Statistics. Occupational Employment Statistics, Occupational Employment and Wages, May 2010 17-2161 Nuclear Engineers. Mean hourly wage is  $\$48.80 \times 1.5 = \$73.20/\text{hour}$ .

- *Environmental Considerations* – The rule will result in a decrease in the potential risk of environmental contamination that could result from theft, diversion, or radiological sabotage of SNF shipments.
- *Improvements in Knowledge* – The rule will result in an increase in the information available to the NRC on SNF shipments.
- *Industry Implementation* – The rule will require licensees to revise their Transportation Physical Security Plans, Safeguards Contingency Plans, and Training and Qualification Plans, and conduct background investigations of personnel associated with SNF shipments.
- *Industry Operation* – The rule will require licensees to modify their operations due to additional security activities beyond those currently required.
- *NRC Implementation* – The rule will require the NRC to update existing guidance, NUREG-0561, “Physical Protection of Shipments of Irradiated Reactor Fuel.”
- *NRC Operation* – The rule will require the NRC Operations Center to receive additional notifications.
- *Occupational Health (Accident)* – The rule will reduce the risk that occupational health would be affected by radiological releases resulting from radiological sabotage.
- *Offsite Property* – The rule will reduce the risk that offsite properties would be affected by radiological releases resulting from radiological sabotage.
- *Other Government* – The rule will require additional State and LLEA interaction with licensees and the NRC.
- *Public Health (Accident)* – The rule will reduce the risk that public health would be affected by radiological releases resulting from radiological sabotage.
- *Regulatory Efficiency* – The rule will enhance regulatory efficiency by incorporating security requirements similar to those previously imposed by Commission Orders for SNF in Transit and additional security requirements in regulations resulting from the lessons learned from implementing the Orders.
- *Safeguards and Security Considerations* – The rule will establish the performance standards and objectives for the physical protection of SNF in Transit that will provide high assurance that the transport of SNF is not inimical to the common defense and security and does not constitute an unreasonable risk to the public health and safety.

The rule is not expected to affect the following attributes: antitrust considerations, general public, occupational health (routine), public health (routine), improvements in knowledge, and on-site property.

## **3.2 Analytic Methodology**

This section describes the process used to evaluate the incremental values (benefits) and impacts (costs) associated with the rule relative to the No-Action Alternative. The benefits include desirable changes in affected attributes, *e.g.*, monetary savings and improved safety and security. The analysis relies upon a qualitative evaluation of the benefits associated with improved safety and security of spent nuclear fuel transport.

The costs include undesirable changes in affected attributes, *e.g.*, increased monetary costs and radiation exposure levels. The NRC evaluated industry implementation and operating costs and the NRC implementation and operating costs quantitatively. Quantitative analysis requires a baseline characterization. This analysis includes: 1) the average number of shipments affected; 2) the nature of current activities; 3) the types of new or modified systems and procedures that would be implemented, or would no longer be implemented; and 4) the number of hours and costs entailed in conforming to written procedures.

Licensees may, however, respond differently to the orders. Their responses are dependent on site-specific characteristics, such as: 1) site physical attributes; 2) current contingency, security, training, and qualification plan contents; and 3) organizational and management structure. Costs are also dependent upon the number of anticipated shipments and the number of States each shipment would pass through; these considerations would require additional efforts in terms of planning and coordination. Because individual licensee physical protection system information in large part is considered SGI under § 73.21, this analysis only examines licensees in the aggregate by making general assumptions.

The NRC collected input assumptions using data and information from NRC workgroups and staff experience and NRC databases. In accordance with OMB guidance and NUREG/BR-0058, Rev. 4, the results of the analysis are calculated using both 3 percent and 7 percent real discount rates.

## **3.3 Main Analysis (Post Orders)**

The Main Analysis identifies the incremental impacts of Alternative 2 relative to the No-Action Alternative.

### **3.3.1 Baseline for the Main Analysis**

The baseline for the Main Analysis is the No-Action Alternative. The No-Action Alternative is how the regulatory environment for SNF in transit would be absent the rulemaking. The baseline assumes full compliance with existing NRC requirements, including current regulations and orders. This baseline is consistent with NUREG/BR-0058, "Regulatory Analysis Guidelines of the U.S. Nuclear Regulatory Commission," Rev. 4, which states that, "in evaluating a new requirement..., the staff should assume that all existing NRC requirements have been implemented." An additional assumption of the baseline for this analysis is that the Commission would continue to issue Orders for SNF in Transit to those licensees not covered under previous orders. The incremental costs represented in the Main Analysis are costs that are in addition to costs already incurred by licensees in their efforts to comply with the Orders for SNF in Transit.

### **3.3.2 Main Analysis Assumptions**

NRC used licensee and State labor rates from National Wage Data available on the Bureau of Labor Statistics web site ([www.bls.gov](http://www.bls.gov)). The NRC assumes an industry labor cost of \$73.20 per hour, and State labor cost of \$50 per hour, and an NRC labor cost of \$119 per hour. Costs are expressed in 2011 dollars and are modeled either on an annual recurring cost basis or on a one-time implementation basis. The analysis calculates costs over a 10-year period, with the annual costs in each year beyond 2011 discounted back at a 7 percent and 3 percent discount rate, in accordance with NUREG/BR-0058, "Regulatory Analysis Guidelines of the U.S. Nuclear Regulatory Commission," Rev. 4.

The licensee activities in the Main Analysis, which are in addition to compliance with security orders, are activities that would be required by the rule that are the additional requirements developed as a result of the lessons learned from implementation of the security Orders. These include licensee activities to document and preplan coordinating activities, to perform more thorough background investigations compared to what is required under the orders, to provide cancellation notices, and to maintain records. The assumptions used to represent these activities are listed in Appendix 1.

An assumption is made in the Main Analysis that the NRC would update existing guidance documents, at a one-time cost of \$5,000.

### **3.4 Pre-order Analysis (Orders and Lessons Learned)**

To date the Orders have been issued to only a small number of licensees. The pre-order analysis measures the incremental impacts of the rule assuming that the orders were never issued. The analysis assumes full licensee compliance with existing NRC regulations, but not the orders that have been issued. This reflects anticipated behavior in the event that the regulation is not imposed and the Orders were not in effect. In addition, this analysis considers the cost of implementing the security requirements as well as the costs of regulatory changes based on lessons learned.

The Pre-Order Analysis is presented to give the reader an idea of the costs and savings that have already been incurred or would be incurred absent the rulemaking as a result of the Orders for SNF in Transit. This analysis is for informational purposes only and should not be used to determine whether or not to proceed with the rulemaking.

#### **3.4.1 Pre-order Analysis Assumptions**

To represent the cost of implementing the Orders for SNF in Transit, the NRC assumes 20 SNF shipments per year which is based on historical data. This data was obtained from NUREG-0725, "Public Information Circular for Shipments of Irradiated Reactor Fuel," Rev. 15, dated January 2010, which summarizes data for highway and rail shipments of SNF from 1979-2007. The 20 shipments would consist of 10 shipments via highway and 10 via railway. No shipments occur via water. An analysis of existing approved shipping routes showed that the shipments pass through or cross, on average, five States per shipment. Annually, five of the shipments would originate in U.S. ports as part of international shipments of SNF (i.e., imports of US-origin SNF). These shipments would then be shipped from port via highway or railway. The NRC assumes that five shipments would incur difficulties annually, each of which would require

revisions to the shipping schedule, and that one shipment would be canceled over a 3-year period. The 20 shipments would impact 18 licensees per year on average, as 2 licensees are assumed to ship twice each year. Also, the NRC estimates that one shipment in a 3-year period would incur an “event” which would require reporting and investigation. The NRC assumes an industry labor cost of \$73.20 per hour, State labor cost of \$50 per hour, and an NRC labor cost of \$119 per hour.

Licensees would bear the largest share of this rule’s costs in the Pre-order Analysis. These costs include establishing a communication program (which includes maintaining two distinct means of communication), an armed escort training and qualification program, and a telemetric monitoring system to track various modes of SNF in transit.

NRC assumes that industry uses contractors to ship SNF and that only two security support companies are used industry-wide to provide private armed escorts for SNF shipments. The two security support companies would incur a one-time implementation cost to cover background investigations for armed escorts, for a total of 10 personnel. NRC also assumes that industry will incur annual background investigation costs as a result of each licensee losing and gaining one employee per year due to attrition. New armed escorts must undergo background investigations and the associated costs are considered in this cost analysis.

To implement 10 CFR 73.38, the NRC assumes that eight research and test reactor licensees as well as two other licensees would have to develop and implement written background investigation procedures. The NRC estimates that it will take 70 hours per licensee to develop and implement these procedures, which is a cumulative total of 700 hours for the 10 anticipated licensees.

The NRC incurs annual costs in the Pre-order Analysis, estimated to be \$5,000 per year, due to handling advance notifications and potential theft investigations.

States also incur annual costs, estimated to be \$10,000 per year, for advance notifications and preplanning and coordinating activities.

The benefits in the Pre-order Analysis are expressed in qualitative terms (i.e., existing regulations). The security-related benefits are associated with safeguards and security considerations stemming from the decreased risk of a security-related event, such as an act of sabotage. Thus, decreasing the risk of a security-related event protects the common defense and security, protects the health of the public and occupational workers, and decreases the risk of damage to offsite properties.

#### **4. RESULTS**

This section presents results of benefits and costs that the NRC expects will be derived from the rule. To the extent that the affected attributes could be analyzed quantitatively, the costs have been calculated and are presented below. The benefits are expressed only on a qualitative basis because there are no quantifiable limits associated with the benefits of protection of public health and safety, and security.

#### 4.1 Benefits and Costs for Main Analysis

The benefits of this rule are associated with safeguards and security considerations and the decreased risk of a security-related event, such as theft, diversion, or radiological sabotage of SNF and subsequent use for malevolent purposes. By enhancing the physical protection of SNF in Transit, the risk of security-related events decreases, and the common defense and security of the nation increases. Other qualitative values that are positively affected by the decreased risk of a security-related event include public and occupational health due to an accident or event and the risk of damage to onsite and offsite property. In addition, regulatory efficiency is enhanced by the rule because orders, unlike rules, do not apply prospectively to applicants for new licenses. The NRC would have to periodically issue new orders to cover new and amended licenses, and perhaps reissue orders periodically to existing licensees if requirements or administrative practices change. In order to make the requirements generically applicable to all present and future licensees, the security-related requirements need to be placed in the regulations.

The results of the cost for the Main Analysis are summarized in Table 4-1. The Rulemaking Alternative costs between \$0.5 million and \$0.6 million (7 percent and 3 percent discount rate, respectively). The Rulemaking Alternative would result in an estimated \$71,000 of additional annual costs when compared to the No-Action Alternative. These costs are from implementing rule provisions derived from insights gained while implementing the orders.

**Table 4-1: Net Impact of Alternatives 1 and 2**

<b>Regulatory Alternative</b>	<b>10-year total 3% discount rate (\$)</b>	<b>10-year total 7% discount rate (\$)</b>
1. No-Action	0	0
2. Rulemaking	\$617,352	\$510,089

Alternative 1: There are no costs associated with the No-Action Alternative. No changes would be made to the regulations and orders would continue to be issued on a case-by-case basis. The NRC licensees who are subject to existing Orders for SNF in Transit would continue to comply with these requirements. Costs have already been incurred by licensees carrying out the Orders.

Alternative 2: The Rulemaking Alternative would impose a new annual cost to the industry of an estimated \$71,000. The itemized assumptions for this cost are listed in Appendix 1, Table 1 Post Orders. This cost is derived from the additional requirements resulting from lessons learned from implementing the Orders for SNF in Transit. The benefits of this Alternative are associated with safeguards and security considerations and the decreased risk of a security-related event, such as theft, diversion, or radiological sabotage of SNF and subsequent use for malevolent purposes. By enhancing the physical protection of SNF in transit, the risk of security-related events decreases, and the common defense and security of the nation increases. Other qualitative values that are positively affected by the decreased risk of a security-related event include public and occupational health due to an accident or event and the risk of damage to onsite and offsite property. In addition, regulatory efficiency is enhanced by the rule because orders, unlike rules, do not apply prospectively to applicants for new licenses. The NRC would have to periodically issue new orders to cover new and amended

licenses, and perhaps reissue orders periodically to existing licensees if requirements or administrative practices change. In order to make the requirements generically applicable to all present and future licensees, the security-related requirements need to be incorporated into NRC regulations.

Table 4-2 summarizes the Main Analysis costs by entity. Over a 10-year analysis period, these costs range between \$0.5 and \$0.6 million (7 percent and 3 percent discount rate, respectively). Almost all of the costs are incurred by industry. The NRC incurs a small one-time cost. The States incur no additional costs. The itemized assumptions for the Main Analysis are listed in Summary Table 1 in Appendix 1.

**Table 4-2: Summary of Costs for Main Analysis by Entity**

	One-time Start up Costs	Annual Cost	Total Cost with 3% discount rate	Total Cost with 7% discount rate
Industry	\$5,050	\$71,194	\$612,352	\$505,089
NRC	\$5,000	\$0	\$5,000	\$5,000
States	\$0	\$0	\$0	\$0
Total	\$10,050	\$71,194	\$617,352	\$510,089

Table 4-3 summarizes the Pre-order Analysis by entity, using a baseline of costs incurred prior to the issuance of Orders for SNF in Transit. Over a 10-year analysis period, these costs range between \$6.2 and \$7.5 million (7 percent and 3 percent discount rate, respectively). Almost all of the costs are incurred by industry. The NRC and States incur annual costs of \$4,760 and \$10,000 per year, respectively. The itemized assumptions for the Pre-order Analysis are listed in Summary Table 2 in Appendix 1. Security during shipping accounts for the majority of industry costs, at \$580,000 annually. Other costs include non-LLEA armed response, preplanning and coordination activities, documentation, advance notification and cancellations, recordkeeping, background checks, and investigations.

**Table 4-3: Summary of Costs for Pre-order Analysis by Entity**

	One-time Start up Costs	Annual Cost	Total Cost with 3% discount rate	Total Cost with 7% discount rate
Industry	\$76,050	\$860,229	\$7,413,975	\$6,117,936
NRC	\$5,000	\$4,760	\$45,604	\$38,432
States	\$0	\$10,000	\$85,302	\$70,236
Total	\$81,050	\$874,989	\$7,544,881	\$6,226,604

## **4.2 Backfit Analysis**

The NRC has determined that the Backfit Rule does not apply to this rule, because this amendment does not add or modify any regulations to impose backfits as defined in 10 CFR 50.109 or 10 CFR 72.62. Part 50.109(a)(1) defines backfitting as the modification of or addition to systems, structures, components, or design of a facility; or the design approval or manufacturing license for a facility; or the procedures or organization required to design, construct or operate a facility. The definition in 10 CFR 72.62 is similar in relevant part to the definition in Part 50. This rulemaking will impose new requirements to enhance the security of SNF in transit. It will not make any modification or addition to any systems, structures or components or the design of a facility, affect the design approval or manufacturing license of a facility, or affect the procedures or organization required to design, construct or operate a facility. Therefore, it is the NRC's determination that a backfit analysis is not required.

## **5. DECISION RATIONALE AND IMPLEMENTATION**

Two alternatives were evaluated in this Regulatory Analysis. Alternative 1 (No-Action Alternative) would maintain the regulations as currently written, continue to require licensees to comply with the Orders for SNF in Transit and require the NRC to issue new Orders as needed.

Alternative 2 (Rulemaking Alternative) would amend NRC regulations to: 1) establish generically applicable security requirements similar to those previously imposed by Commission orders issued after September 11, 2001; 2) establish the performance standards and objectives for the protection of SNF shipments from theft, diversion, or radiological sabotage; 3) ensure that the performance standards and objectives for SNF shipments apply to all licensees authorized to transport, or delivers to a carrier for transport SNF; and 4) address, in part, the State of Nevada petition for rulemaking (PRM-73-10).

Specifically, the new rule would require the following: 1) armed escorts throughout the rail and road routes; 2) procedures for normal and contingency responses; 3) the training of personnel; 4) continuous and active monitoring of the SNF shipment by a movement control center; 5) shipment preplanning and coordination with States; 6) constant visual surveillance by armed escorts; 7) two-way redundant communication capabilities; 8) a minimum of two weapons for armed escorts; 9) additional NRC notifications; 10) private armed escort instructions on the use of deadly force; and 11) background investigations for individuals granted unescorted access to SNF shipments.

Alternative 2 would have significant qualitative benefits. The benefits of this Alternative are associated with safeguards and security considerations and the decreased risk of a security-related event, such as theft, diversion, or radiological sabotage of SNF and subsequent use for malevolent purposes. By enhancing the physical protection of SNF in transit, the risk of security-related events decreases, and the common defense and security of the nation increases. Other qualitative values that are positively affected by the decreased risk of a security-related event include public and occupational health due to an accident or event and the risk of damage to onsite and offsite property. In addition, regulatory efficiency is enhanced by the rule because orders, unlike rules, do not apply prospectively to applicants for new licenses. The NRC would have to periodically issue new orders to cover new and amended licenses, and perhaps reissue orders periodically to existing licensees if requirements or



administrative practices change. In order to make the requirements generically applicable to all present and future licensees, the security-related requirements need to be placed in the regulations.

Further, there are relatively low costs associated with the rule because of the baseline assumption of full compliance with previously issued Orders. The large majority of costs have already been incurred under the baseline condition. Alternative 2 qualitative benefits represent a substantial increase in public health safety and the protection of the common defense and security. As such, the costs of the final rulemaking are justified based upon the qualitative benefits. Therefore, the Rulemaking Alternative is the preferred approach. The rule is planned for publication in the *Federal Register* in spring of 2012.

## **6. REFERENCES**

NUREG/BR-0058, "Regulatory Analysis Guidelines of the U.S. Nuclear Regulatory Commission," Rev. 4.

NUREG-0725, "Public Information Circular for Shipments of Irradiated Reactor Fuel," Rev. 14.

NUREG-0561, "Physical Protection of Shipments of Irradiated Reactor Fuel," Rev. 1.

NUREG/BR-0184, "Regulatory Analysis Technical Evaluation Handbook, Final Report," Office of Nuclear Regulatory Research, January 1997.

## Appendix

### **§ 73.37(b)(1)(vii) - Document the Preplanning and Coordination Activities**

The current regulations do not require the coordination of law enforcement escorts, the sharing of movement control information, or the coordination of safe haven locations. The revisions would require licensees to preplan and coordinate spent fuel shipment information with the States through which transport will occur and to document these activities.

Hours of staff time to preplan and coordinate, per shipment	40
Cost of staff time per hour	73.20
	\$2928
Number of annual shipments	x 20
<b>Total annual cost for preplanning and coordination activities</b>	<b>(\$58,560)</b>

### **§ 73.37(b)(2)(v) - Cancellation Notice**

Although the current regulations require the NRC and the State to receive advanced notifications of shipments, there is no provision requiring the notification of a cancellation of a previously approved advance notification. This is a rare occurrence. It is assumed that one shipment will be canceled over a 3-year period.

Hours of staff time per call	1
Cost of manager's time per hour	73.20
Number of cancellations per year	x 0.33
<b>Total annual cost of cancellation notice</b>	<b>(\$24.16)</b>

### **§ 73.37(b)(2)(i-iii) - Written Advance Notices**

The current regulations do not require the coordination of law enforcement escorts, the sharing of movement control information, or the coordination of safe haven locations. The revisions would require licensees to preplan and coordinate spent fuel shipment information with the States through which transport will occur and to document these activities.

The licensee must coordinate with all States that shipments pass through. For the purposes of the Regulatory Analysis, we are assuming an average of five states would require advance notification. Thus, 20 annual shipments would require 100 written advance notices to States and each of the 20 shipments would require an advance notice to the NRC.

Hours of staff time	0.50
Cost of staff time per hour	\$73.20
Number of notifications	120
<b>Total annual cost of advance notifications</b>	<b>(\$4,392)</b>

**§ 73.37(b)(3)(v) - Security Procedures**

The licensee shall develop, maintain, revise, and implement written transportation physical protection procedures. These procedures are needed to protect SNF during transport and to provide an adequate response to various emergencies that may occur during shipment.

Preparation of the security plan and procedures necessary to implement the security program.

Hours of staff time to prepare and update procedures (per license per year)	150
Cost of staff time per hour	\$73.20
Impacted Licensees	18
<b>Total annual cost of staff time for procedures</b>	<b>(\$197,640)</b>

**§§ 73.37(b)(1)(vii), (2)(vi), (3)(iv-vi), (4)(iii) and § 73.38(l) - Records**

Although there are record requirements in 10 CFR § 73.70, the SNF regulations in § 73.37 do not have any recordkeeping requirements. As such, the rulemaking would require new recordkeeping requirements. These records would include a copy of the preplanning and coordination activities, advance notification, and any revision or cancellation notice. These records are to be maintained for 3 years in accordance with § 73.70. Records in § 73.38(i) are to be kept for 5 years.

Number of Shipments	20
Cost of staff (clerical) time per hour	\$73.20
Hours of staff time to maintain records per shipment	3.275
<b>Total Annual Cost for Recordkeeping</b>	<b>(\$4,795)</b>
Implementation cost of additional file cabinets, etc, for all licensees	\$1,000
<b>Total Implementation Cost for Recordkeeping (one-time cost)</b>	<b>(\$1,000)</b>

**§ 73.37(c)(d) - Shipping Costs**

Industry has averaged 20 shipments of SNF via road and rail (collectively) per year over the last 5 years. For purposes of the regulatory analysis, an assumption of 20 shipments per year is used. The NRC regulations define the modes of transport to be by “road,” “rail,” and “sea.” Road and sea modes would incur equal costs; shipping by rail would be lower. Nevertheless, for this regulatory analysis, zero shipments by sea are assumed.

Industry has indicated that it is more cost effective to hire contractors to conduct SNF shipments. The below mentioned costs take into consideration all the internal costs that contractors incur to be compliant with NRC orders and the regulation.

**Ship by Road**

Number of shipments	10
Average trip transit costs, including rental	\$3,000
Average trip communication costs	\$2,000
Contractor cost	\$25,000
<b>Total annual cost by road</b>	<b>(\$300,000)</b>

**Ship by Rail**

Number of shipments	10
Average trip transit costs, including rental	\$1,000
Average trip communication costs	\$2,000
Contractor cost	\$25,000
<b>Total annual cost by rail</b>	<b>(\$280,000)</b>

**Total annual cost for shipping (\$580,000)**

**§ 73.37(f)- Event Investigations**

Although licensees are required by 10 CFR 73.71 to notify the NRC of any safeguards events and to submit a report concerning the event, there is no specific requirement for an investigation. This requirement is being added to address this issue. It is assumed that any safeguards events would be rare. It is assumed that one would occur every 3 years.

Hours of staff time per investigation	40
Hours of staff to write report	40
Cost of staff time per hour	\$73.20
Number of investigations per year (1/3)	x 0.33
<b>Total annual cost of event investigation</b>	<b>(\$1932)</b>

**§ 73.38(d) - Background Investigation**

Section 73.38(d) is being added to Part 73 to implement an access authorization program that requires background investigations of individuals involved with the transportation of SNF.

Number of hours to conduct a background check (this includes labor associated with criminal history records; verification of true identity; employment history evaluation; verification of education and military history; credit history evaluation; local criminal history review; and character and reputation determination).	6
Cost of manager time per hour	\$73.20
	<hr/>
	\$439

Cost of credit history	\$20
Cost of taking fingerprints	\$10
Cost for fingerprint submission	\$36
Cost of background check	\$505
Number of individuals needing background checks (per year)	x 18
<b>Total annual cost of background checks</b>	<b>(\$9,090)</b>

The implementation cost for two companies providing support assumes 10 background investigations up front, as a one-time cost.

**Total Implementation Cost for Background Investigations (\$5,050)**

**§ 73.38(j) Procedures for Background Investigations**

Licensees shall develop, implement, and maintain written procedures for conducting background investigations for persons who are applying for unescorted access authorization for spent nuclear fuel in transit. Licensees shall develop, implement, and maintain written procedures for updating background investigations for persons who are applying for reinstatement of unescorted access authorization. Licensees shall develop, implement, and maintain written procedures to ensure that persons who have been denied unescorted access authorization are not allowed access to spent nuclear fuel in transit or information relative to spent nuclear material in transit. Licensees shall develop, implement, and maintain written procedures for the notification of individuals who are denied unescorted access. The procedures must include provisions for the review of a denial or termination of unescorted access authorization, if the affected individual requests such a review. The procedure must contain a provision to ensure that the individual is informed of the grounds for the denial or termination of unescorted access authorization and allow the individual an opportunity to provide additional relevant information. The implementation cost is estimated to be a 70-hour effort at \$73.20 per hour labor cost for each of the eight research and test reactors and two other licensees who would need to prepare these procedures, assuming all other licensees would have existing procedures.

**Total Implementation Cost for Background Investigations Procedures (\$70,000)**

**§ 73.72 - Advance Notification**

The current regulations in § 73.72(a)(4) require NRC notification, by phone, 2 days before the shipment commences. The rule would require two additional notifications of the NRC, one to be made 2 hours before the shipment commences, and the other to be made when the shipment reaches its final destination. These additional notifications would allow the NRC to monitor SNF shipments and to maximize its readiness in case of a safeguards event. The NRC estimates each phone call to take 18 minutes for a total of 36 minutes of notifications per shipment.

Staff time to phone in advance notification per shipment (hours)	0.6
Cost of staff time per hour	\$73.2
Number of shipments per year	20
<b>Total annual cost of advance notifications</b>	<b>(\$878)</b>

**Summary Table 1 Post Orders**

**Licensee**

<b>Description</b>	<b>Section</b>	<b>One time Cost</b>	<b>Total Annual Cost</b>	<b>Present Value 10 year at 3%</b>	<b>Present Value 10 year at 7%</b>
<b>Document the Preplanning and Coordination Activities</b>	<b>73.37(b)(1)(vii)</b>	\$0	\$58,560	\$499,529	\$411,301
<b>Cancellation Notice</b>	<b>73.37(b)(2)(v)</b>		\$24	\$206	\$170
<b>Records</b>		\$ -	\$622	\$5,307	\$4,370
<b>Background Investigations</b>	<b>73.38(d)</b>	\$ 5,050	\$11,988	\$107,310	\$89,249
Totals		\$5,050	\$71,194	\$612,352	\$505,089

**NRC**

<b>Description</b>	<b>Section</b>	<b>One time Cost</b>	<b>Total NRC Annual Cost</b>	<b>Present Value 10 year at 3%</b>	<b>Present Value 10 year at 7%</b>
<b>Update Guidance</b>		\$ 5,000		\$5,000	\$5,000
Totals		\$ 5,000	\$0	\$5,000	\$5,000

**States**

<b>Description</b>	<b>Section</b>	<b>One time Cost</b>	<b>Total State Annual Cost</b>	<b>Present Value 10 year at 3%</b>	<b>Present Value 10 year at 7%</b>
Totals		\$ -	\$0	\$0	\$0

## Summary Table # 2 Pre Orders

### Licensee

Description	Section	One time Cost (\$)	Total Annual Cost (\$)	Present Value 10 year at 3% (\$)	Present Value 10 year at 7% (\$)
Document the Preplanning and Coordination Activities	73.37(b)(1)	0	58,560	499,529	411,301
Written advance notices to NRC/States	73.37(b)(2)(i-ii)		4,392	37,465	30,848
Cancellation Notice	73.37(b)(2)(v)		24	206	170
Security Procedures	73.37(b)(3)(v)		197,640	1,685,909	1,388,141
Records	73.37(b)(2)(vi), 73.38(i), 73.38(g)	1,000	4,795	41,899	34,675
Ship by Highway/Road	73.37 (c)	0	300,000	2,559,061	2,107,074
Ship by Rail	73.37(d)	0	280,000	2,388,457	1,966,603
Background Investigations	73.38(d)	5,050	11,988	107,310	89,249
Develop Procedures	73.38(j))	70,000	0	70,000	70,000
Advance Notification Requirements	73.72	0	878	7,493	6,170
Event Investigations	73.37(f)	0	1,952	16,647	13,707
Totals		76,050	860,229	7,413,975	6,117,936

### NRC

Description	Section	One time Cost (\$)	Total NRC Annual Cost (\$)	Present Value 10 year at 3% (\$)	Present Value 10 year at 7% (\$)
Written advance notices to NRC	73.37(b)(2)(i-iii)	0	1,190	10,151	8,358
Update Guidance		5,000		5,000	5,000
Event Investigations	73.37(f)	0	3,570	30,453	25,074
Written advance notices to States	73.37(b)(2)(i-ii)	0	2,500	21,326	17,559

**States**

<b>Description</b>	<b>Section</b>	<b>One time Cost (\$)</b>	<b>Total State Annual Cost (\$)</b>	<b>Present Value 10 year at 3% (\$)</b>	<b>Present Value 10 year at 7% (\$)</b>
Document the Preplanning and Coordination Activities	73.37(b)(1)(vii)	0	7,500	63,977	52,677
Written advance notices to States	73.37(b)(2)(i-ii)	0	2,500	21,326	17,559