

U.S. Department of
Homeland Security
**United States
Coast Guard**



**Regulatory Analysis
&
Initial Regulatory Flexibility Analysis**

Vessel Requirements for Notices of Arrival and Departure and Automatic Identification System

Notice of Proposed Rulemaking

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Project Executive Summary

We have prepared this analysis presenting the magnitude of costs that the maritime transportation industry could potentially incur for implementing and complying with this proposed rule under Congressional authority provided in the Ports and Waterways Safety Act (PWSA) and the Maritime Transportation Security Act (MTSA) of 2002. We have also prepared a quantitative benefit analysis based on marine casualty cases and a breakeven analysis that we present later in this report.

The proposed rule significantly expands the requirement for a notice of arrival and departure (NOAD) for all foreign commercial vessels down to zero gross tons, U.S. commercial vessels greater than 300 gross tons (GT) including fishing vessels, and U.S. commercial vessels coming from a foreign port that are less than or equal to 300 GT. This proposed rule also expands the requirements for Automatic Identification System (AIS) for both foreign and domestic self-propelled commercial vessels essentially equal to or greater than 65 feet in length outside of Vessel Traffic Service (VTS) areas, passenger vessels that carry at least 50 passengers, towing vessels at least 26 feet in length and 600 horsepower, certain high-speed craft, certain dredges or floating plants, and vessels carrying certain dangerous cargoes operating in navigable waters of the United States under the International Convention for the Safety of Life at Sea (SOLAS). These expanded requirements would allow the Coast Guard to better correlate vessel AIS data with NOAD data, enhance our ability to identify anomalies, and expand our overall maritime domain awareness (MDA).

The proposed rule would affect the following vessels:

NOAD Applicability:

- All foreign commercial vessels down to zero gross tons, including fishing vessels (foreign recreational vessels less than or equal to 300 GT are exempt, currently-all foreign vessels including recreational vessels, less than or equal to 300 GT, entering the Seventh Coast Guard District are required to submit notice of arrival information); currently, vessels greater than 300 GT could submit notice of arrivals (NOAs) by a variety of means, these vessels would be required to submit notice of departures (NODs) in addition to NOAs electronically. In addition, commercial vessels less than or equal to 300 GT not entering the Seventh Coast Guard District would be required to submit NOADs electronically under this proposed rule, all vessels are required to submit NOADs electronically;
- All U.S. commercial vessels greater than 300 GT [this population essentially includes U.S. non-SOLAS vessels since the U.S. Customs and Border Patrol (CBP) captured U.S. SOLAS vessels in their Sea Advance Passenger Information System (APIS) rulemaking] including fishing vessels, but excluding recreational vessels, now would be required to submit NOADs electronically; currently, as with foreign-flag vessels, U.S.-flag vessels greater than 300 GT could submit notice of arrivals NOAs by a variety of means, these vessels would be required to submit NODs in addition to NOAs electronically, and;
- All U.S. commercial vessels less than or equal to 300 gross tons coming from a foreign port, including fishing vessels, but excluding recreational vessels

AIS Applicability:

- All self-propelled vessels (U.S. and foreign-flag) of 65 feet or more in length engaged in commercial service, including fishing vessels;

- All towing vessels of 26 feet or more in length and more than 600 horsepower engaged in commercial service;
- All self-propelled U.S. and foreign-flag vessels carrying 50 or more passengers engaged in commercial service;
- All dredge or floating plants engaged in or near a commercial channel or shipping fairway in operations likely to restrict or affect navigation of other vessels except for an unmanned or intermittently manned floating plant under the control of a dredge;
- All self-propelled vessels carrying or engaged in the movement of certain dangerous cargoes as defined in § 160.202 of this subchapter, and;
- All vessels carrying more than 12 passengers for hire and capable of speeds in excess of 30 knots [high-speed craft (HSC)]

This regulatory analysis (RA) presents the scope and magnitude of costs incurred by industry (vessel owners and operators) and benefits derived from marine casualty cases, and we include a breakeven analysis for both segments of this proposed rule. We also present the overarching assumptions that provided the foundation for both our cost and benefit analyses, and make this information available to the public for comment.

Currently, vessels greater than 300 gross tons and all foreign vessels less than or equal to 300 gross tons entering the Seventh District are required to submit notice of arrival information by electronic means (fax, telephone, e-mail, etc.). The Coast Guard is now mandating the submission of NOADs electronically (eNOAD) through a specific software package or template that allows users to submit information via the Internet directly to the National Vessel Movement Center (NVMC), the Internet, and the Internet-based eXtensible Markup Language (XML). The eNOAD system would allow the Coast Guard to meet its notification of arrival requirements and provide synergy with the CBPs APIS requirements that should eliminate duplicative reporting. We anticipate that submitting NOADs by this format should reduce the burden hours imposed on industry.

AIS is a system providing ships, on a real-time basis, with the latest information about the identity, voyage data, and maneuvers of other ships which are also equipped with the system. It allows ships to easily track, identify, and exchange pertinent navigation information with one another or ashore for collision avoidance, security, and VTS reporting. We expect the system to enhance situational awareness, permit more effective passing arrangements, and provide VTSs with comprehensive traffic images.

We could not, with a great degree of certainty, estimate how many vessels transit outside of VTS coverage areas. With this in mind, we estimated the numbers of vessels affected for this proposed rule by subtracting out the population figures presented in the AIS final rule (included in the MTSA suite of rulemakings) under docket number, USCG-2003-14757 [the Coast Guard published the final rule for AIS in the Federal Register (FR) on October 22, 2003] (68 FR 60559).

We estimate that the total population of vessels, foreign and domestic, affected by this proposed rule is about 42,607 vessels. Of this amount, we estimate that the total number of U.S. and foreign-flag vessels (SOLAS and non-SOLAS) affected is about 17,323 and 25,284, respectively. We estimate that the NOAD portion of this proposed rule would affect approximately 30,850 vessels (U.S. and foreign-flag vessels), with U.S. vessels representing about 5,566 of this amount and foreign-flag vessels representing the balance of 25,284. Of the 5,566 U.S. vessels, approximately 4,566 would install AIS as well as submit NOADs and approximately 1,000 would submit NOADs only. We estimate that the AIS portion

of this proposed rule would affect approximately 17,442 U.S. and foreign-flag vessels (SOLAS and non-SOLAS), with U.S. vessels representing 16,323 of this amount and foreign-flag vessels representing the balance of 1,119. See Table ES 1 below.

Table ES 1. Summary of U.S. and Foreign Vessel Populations

	NOAD	AIS	Total Vessels Affected*		
			U.S.	Foreign	Total
U.S. Vessels	5,566**	16,323			
Foreign Vessels	25,284	1,119***	17,323	25,284	42,607
Total Vessels by Portion of Rule	30,850	17,442			

* Totals do not add up to sum of portions of the proposed rule since most vessels required to install AIS would also be required to submit NOADs. Consequently, adding both would double count most of the “AIS affected” vessels.

** Of the approximately 5,566 U.S. vessels required to submit NOADs, about 1,000 would submit NOADs only; the remainder of about 4,566 would be required to both install AIS and submit NOADs.

*** All of the approximately 1,119 foreign-flag vessels required to install AIS would also be required to submit NOADs.

This RA analyzes the costs and benefits of the proposed rule over the 10-year period 2008-2017. We present costs in 2006 dollars. We discount costs to their present value (PV) at three and seven percent discount rates over the period of analysis. Cost estimates include capital costs such as the purchase of a computer; and transmission, annual maintenance, and replacement costs for the NOAD portion of this proposed rule. Cost estimates for the AIS portion of this proposed rule include the AIS unit itself; and installation, training, annual maintenance, and replacement costs. Quantified, monetized benefit estimates for the AIS portion of this proposed rule include avoided injuries, fatalities, and pollution as a result of the proposed rule. Non-quantified benefits for AIS include enhanced MDA, improved information sharing with NOAD, and improved overall communications. We expect that non-quantified benefits exist for the NOAD portion of this proposed rule such as an efficient and timesaving method of notification thereby reducing the hour burden on industry and Coast Guard resources.

We estimate the total present discounted value or cost of the proposed rule to U.S. vessel owners and operators is between \$132.2 and \$163.7 million (seven and three percent discount rates, respectively, 2006 dollars) over the 10-year period of analysis, 2008-2017. We estimate the 10-year discounted cost for the NOAD portion of the proposed rule using both a high mean and a low median number of trips. The 10-year discounted total cost to U.S. vessel owners and operators for the NOAD portion of this proposed rule is between \$10.4 and \$20.1 million at seven and three percent discount rates, respectively. We estimate that the total initial cost for the NOAD portion of this proposed rule, to U.S. vessel owners and operators, is approximately between \$3.4 and \$4.3 million (non-discounted). We also estimated the constant annual costs as annualized payments over the 10-year period of analysis, 2008-2017 at both seven and three percent discount rates for the NOAD portion of the proposed rule. We estimate the annualized costs to U.S. vessel owners for the NOAD portion of the proposed rule to be between \$1.5 and \$2.4 million at seven and three percent discount rates, respectively, using both the median and mean number of trips, respectively.

The 10-year discounted total cost to U.S. vessels owners and operators for the AIS portion of this proposed rule is between \$121.8 and \$143.5 million at seven and three percent discount rates, respectively. AIS implementation begins in 2008 with initial year (year 1) cost being approximately \$69.0 million (non-discounted).

The AIS portion of this proposed rule is the most costly element representing about 88 percent of the 10-year total discounted cost at both seven and three percent discount rates (7 percent discount rate: \$121.8 million/\$138.6 million; 3 percent discount rate: \$143.5/\$163.7, see Table ES 2) using the mean number of trips. Using the median number of trips, the AIS portion of this proposed rule increases to about 92 percent of the 10-year total discounted cost at both seven and three percent discount rates (7 percent

discount rate: \$121.8 million/\$132.2 million; 3 percent discount rate: \$143.5 million/\$155.8 million, see Table ES 2). At about \$69.0 million, the initial cost (non-discounted) to U.S. vessel owners for the AIS portion of this proposed rule represents about 94 percent of the total initial cost of this proposed rule or approximately \$73.4 million (non-discounted) using the mean number of trips. Using the median number of trips, the AIS portion of this proposed rule represents about 95 percent of the total initial cost of this proposed rule or approximately \$72.5 million (non-discounted). We estimate the annualized costs to U.S. vessel owners for the AIS portion of the proposed rule to be between \$17.3 and \$16.8 million at seven and three percent discount rates, respectively. These high-annualized costs are attributable to the high initial-year costs, which are significantly larger than the annual costs in the remaining years of the analysis period. With both portions of the proposed rule combined, we estimate the annualized costs to U.S.-flag vessel owners to be between \$18.8 and \$19.2 million at seven and three percent discount rates, respectively, using both the median and mean number of trips, respectively.

We estimate the 10-year total discounted cost for foreign-flag vessels to comply with the NOAD portion of this proposed rule is between \$40.9 and \$62.4 million at seven and three percent discount rates, respectively. We estimate the total discounted cost for foreign-flag vessels to comply with the AIS portion of this proposed rule is between \$8.3 and \$9.8 million at seven and three percent discount rates, respectively. We estimate the NOAD-annualized costs for foreign-flag vessel owners to be between \$5.8 and \$7.3 million at seven and three percent discount rates, respectively, using both the median and mean number of trips, respectively. We estimate the AIS-annualized cost for foreign-flag vessel owners to be approximately \$1.2 million at both discount rates.

We estimate the total discounted cost of this proposed rule for both U.S. and foreign-flag vessel owners and operators is between \$181.4 and \$235.9 million at seven and three percent discount rates, respectively, over the 10-year period of analysis. We estimate the annualized costs to both U.S. and foreign-flag vessels owners for both portions of the proposed rule to be between \$25.8 and \$27.7 million at seven and three percent discount rates, respectively. Again, the high-annualized costs are attributable to the high initial-year capital costs of AIS, which are significantly larger than the annual costs in the remaining years of the analysis period except the replacement year.

In the interest of national security and maritime domain awareness, the Coast Guard believes that this proposed rule, through a combination of NOAD and AIS, would strengthen and enhance not only maritime security but also the national security of this country. We believe that expanding the applicability of the number of vessels that submit notice of arrival and departure information, specifically foreign vessels down to zero gross tons, in conjunction with AIS, would accomplish this goal. The combination of NOAD and AIS would create a synergistic effect between the two requirements. This is the primary benefit of the proposed rule.

Ancillary or secondary benefits exist in the form of avoided injuries, fatalities, and barrels of oil not spilled into the marine environment. We estimate the total discounted benefit (injuries and fatalities) derived from marine casualty cases for the AIS portion of this proposed rule is between \$24.7 and \$30.6 million using \$6.3 million for the value of statistical life (VSL) at seven and three percent discount rates, respectively. Just based on barrels of oil not spilled, we expect the AIS portion of this proposed rule to prevent 22 barrels of oil from being spilled annually or between 136 and 169 barrels at seven and three percent discount rates, respectively, over the 10-year period of analysis. Table ES 2 below summarizes our findings.

Table ES 2. Summary of Total Discounted Cost and Benefit of Proposed Rule for U.S. and Foreign-Flag Vessels (2008-2017, 7 and 3 Percent Discount Rates, 2006 Dollars) (\$Millions)

	NOAD	AIS	10-Year Total Cost of Proposed Rule
7 Percent Discount Rates:			
U.S. Vessels*	\$10.4-\$16.9	\$121.8	\$132.2-\$138.6
Foreign Vessels**	\$40.9-\$52.6	\$8.3	\$49.2-\$61.0
Total Cost	\$51.3-\$69.5	\$130.1	\$181.4-\$199.6
3 Percent Discount Rate:			
U.S. Vessels*	\$12.3-\$20.1	\$143.5	\$155.8-\$163.7
Foreign Vessels**	\$48.1-\$62.4	\$9.8	\$58.0-\$72.2
Total Cost	\$60.4-\$82.5	\$153.4	\$213.8-\$235.9
AIS Benefits			
Injuries and Fatalities Avoided:			
7 Percent Discount Rate (\$6.3M VSL)	-	\$24.7	
3 Percent Discount Rate (\$6.3M VSL)		\$30.6	
Pollution Avoided (bbls):***			
7 Percent Discount Rate	-	136	
3 Percent Discount Rate		169	

Totals may not sum due to independent rounding.

*Using three (and four for vessels \leq 300 GT) and eight (and nine for vessels \leq 300 GT) as the median and mean number of trips, respectively.

**Using two (and three for vessels \leq 300 GT) and four (and five for vessels \leq 300 GT) as the median and mean number of trips, respectively.

***We did not find cases involving oil spills from foreign-flag vessels.

The NOAD portion of this proposed rule would not require a new collection of information, but would require an update of an existing one. The AIS portion of this proposed rule would require a new collection of information under the Paperwork Reduction Act (PRA). This RA includes an Initial Regulatory Flexibility Act Analysis (IRFA) that considers the cost of the proposed rule to small businesses. In our analysis, we found that the proposed rule would not have a significant economic impact on a substantial number of small businesses.

1. Introduction

Expanding the applicability of notice of arrival/departure (NOAD) and Automatic Identification System (AIS) to additional vessel groups would enhance maritime domain awareness and supplement the vessel population currently regulated in previously published NOA and AIS rules.¹ The collection of information of these vessels, as outlined in the notice of proposed rulemaking (NPRM), would provide the maritime community with better knowledge of the operational nature and whereabouts of these vessels thereby reducing the risk, not the vulnerability, from all vessels affected. The expanded applicability would further assist the Coast Guard in its mission and responsibility delegated by the Department of Homeland Security (DHS) to ensure that all vessels (under the NOAD applicability) making port calls in the U.S. are identified and tracked in an effort to minimize the inherent risks to our nation's ports.

Purpose of the Proposed Rule

The purpose of the proposed rule is to expand the applicability of NOAD and AIS in order to meet the intent of MTSA, enhance maritime domain awareness (MDA)², and to correlate AIS vessel data with NOAD data. The combination of these elements of this proposed rule would capture a greater number of vessels thereby enhancing maritime domain awareness and national security.

Statutory Authority

The statutory authority for the Coast Guard to prescribe, change, revise, or amend the affected domestic regulation, 33 CFR parts 160, 161, 164, and 165 is provided under 33 U.S.C. 1223, 1231; 46 U.S.C. 8502 and Chapter 701; as delegated to the Coast Guard in the Department of Homeland Security Delegation No. 0170.1.

Regulatory Analysis

Under Section 6(a)(3)(c) of Executive Order (EO) 12866, "Regulatory Planning and Review," we are required to conduct a benefit/cost analysis for a significant rulemaking (where cost of the rule exceeds \$100 million in any one year) as defined by Section 3(f)(1). We do not expect this proposed rule to be economically significant with the total initial year cost being about \$73.4 million (non-discounted) using the mean number of trips or about \$72.5 million (non-discounted) using the median number of trips. First year benefits (beginning in 2009) in the form of injuries and fatalities avoided range from \$3.5 to \$3.8 million at seven and three percent discount rates, respectively and the pollution avoided (barrels of oil) ranges from 19 to 21 barrels at seven and three percent discount rates, respectively.

¹ The Coast Guard published a final rule for Notice of Arrival in February 2003 (68 FR 9537). The Coast Guard subsequently published a temporary final rule (TFR) entitled "Notification of Arrival in U.S. Ports; Certain Dangerous Cargoes; Electronic Submission" in August 2004 and a subsequent interim rule on December 16, 2005 (70 FR 74663). Readers can view these rules and the associated RAs online under docket numbers USCG-2002-11865, USCG-2003-16688, and USCG-2005-19963 respectively at www.regulations.gov. Under the authority of the Maritime Transportation Security Act of 2002 (MTSA, Public Law 107-295, 116 Stat. 2064), the Coast Guard published a final rule that required the carriage of an AIS on certain domestic vessels in Vessel Traffic Service (VTS) areas and vessels under SOLAS. Readers can also find the rule and the associated RA online under docket number USCG-2003-14757.

² The Coast Guard's definition of maritime domain awareness is "the effective understanding of anything associated with the global maritime environment that could impact the security, safety, economy, or environment of the United States."

This RA presents the analysis of cost and benefit of this proposed rule for the expanded applicability of NOAD and AIS. The period of analysis is 2008-2017. We discount costs and benefits at seven and three percent discount rates, in 2006 dollars.³

Chapter 2 presents the NOAD portion of this proposed rule. Chapter 3 presents the AIS portion of this proposed rule. Chapter 4 summarily presents the costs, benefits, and distributional effects of the combined proposed rule. Chapter 5 presents the Initial Regulatory Flexibility Act (IRFA) analysis. Chapter 6 presents the Paperwork Reduction Act (PRA) analysis.

Chapter Contents

1. Introduction
2. NOAD
3. AIS
4. Cost, Benefits, and Distributional Effects of Combined Notice of Proposed Rulemaking
5. Initial Regulatory Flexibility Act Analysis
6. Paperwork Reduction Act Analysis

³ Per Circular A-4, the Office of Management and Budget (OMB) prefers both 3 and 7 percent discount rates for benefit/cost analyses. Readers can view the Circular online at <http://www.whitehouse.gov/omb/circulars/index.html>.

2. Notice of Arrival and Departure (NOAD)

On February 28, 2003, the Coast Guard published a final rule (68 FR 9537) for the notification of arrival (NOA) in U.S. ports or places. Vessels coming from any port have to submit notices of arrival 96 hours in advance to the National Vessel Movement Center (NVMC) by fax, phone, e-mail, etc. In an ongoing effort to assess security concerns, the Coast Guard published a temporary final rule (TFR) on August 18, 2004 that added two cargoes, ammonium nitrate (except the residue of ammonium nitrate or the residue of ammonium nitrate-based fertilizers) and propylene oxide, to the list for which an NOA is required. In addition, the TFR provided the option for two new means of electronic submittal of NOA reports to barge owners and operators. These two new methods are the Internet and the Internet-based eXtensible Markup Language (XML). A third method of electronic submittal is now available, which is a Microsoft InfoPath template, designed for those to input NOA data when not online for submission later via their Internet connection or as an e-mail attachment to the NVMC.⁴

The TFR for NOA was in effect until March 2006. The costs contained in the TFR were estimated for an 18-month period including all of 2004 and the first six months of 2005 when the TFR was set to expire. The August 2004 TFR also provided the option of electronic submittal of Notice of Arrival (NOA) by three methods to the NVMC. In this proposed rule, we are requiring electronic submission of NOADs. The interim rule published on December 16, 2005 (70 FR 74663) adopted the temporary final rule's definition of "certain dangerous cargo" and is currently in effect.

Baseline

The current baseline conditions for NOA include vessels greater than 300 gross tons (GT),⁵ foreign commercial and recreational vessels less than or equal to 300 GT entering the Seventh Coast Guard District, and all vessels carrying or towing vessels that escort vessels carrying certain dangerous cargoes (CDCs).⁶

Population Affected

The expanded applicability under the proposed rule for NOAD includes all foreign commercial vessels down to zero gross tons (essentially adds foreign commercial vessels less than 300 GT that come to the U.S., but not the Seventh Coast Guard District), all U.S. commercial vessels greater than 300 gross tons, and all U.S. commercial vessels less than or equal to 300 gross tons coming from a foreign port, including commercial fishing vessels.⁷

⁴ Electronic Notice of Arrival and Departure (eNOAD), available at the NVMC website, is the means of entering all required information. Readers can find more detailed information on electronic submittal online at <http://www.nvmc.uscg.gov>.

⁵ By gross tons, we mean gross registered tons (GRT) or gross regulatory tons, which is the tonnage as measured under the U.S. tonnage measurement system found in 46 U.S.C. 14502. For simplicity, we will use GT throughout this report.

⁶ For tractability, in our analysis, we assume towing vessels towing non self-propelled vessels (barges) carrying CDCs are in compliance with the February 2001 temporary final rule (66 FR 50565) and the August 2004 temporary final rule (69 FR 51176) and are submitting NOAs electronically. Commercial towing vessels towing vessels with CDCs on international voyages are required to submit NODs under CBPs APIS rulemaking; we are mandating in this proposed rule that these vessels making coastwise voyages submit NODs. We are unable at this time to accurately estimate the number of voyages that these vessels make and therefore are not included in this analysis. To the extent that this is known, we believe, however, this would add a nominal cost to the NOAD portion of this proposed rule. In addition, in our database, the "cargo authorization" field is not well populated for a majority of the commercial vessels; therefore, we cannot determine the type of cargo a given vessel carries. Moreover, cargo authorization code is not a sound indicator of a vessel's cargo type, but may be used a proxy. Barges notwithstanding, other commercial vessels that may carry CDCs are included in our population as a result, but we cannot accurately quantify this population.

⁷ Exempted vessels include foreign recreational vessels less than or equal to 300 GT, U.S. vessels operating exclusively within a COTP, U.S. towing vessels and U.S. barges operating solely between ports or places in the continental U.S., and U.S.

We used the Coast Guard's Marine Information Safety and Law Enforcement (MISLE) database in order to estimate the number of vessels affected by this proposed rule.⁸ Regarding U.S. commercial vessels less than or equal to 300 gross tons coming from a foreign port, we do not have accurate, reliable last port information in order to estimate this segment of the population affected by the NOAD portion of this proposed rule.⁹ In this case, we did not rely on our database for this information; instead, we contacted and obtained information from representative Captains of the Port (COTPs).¹⁰ Of the data received from these COTPs, the proposed rule would affect approximately 2,467 vessels in this classification. We believe that this population of vessels would mostly come from Caribbean or Canadian ports; many of the vessels in this population potentially could be charter vessels such as fishing vessels or smaller ferries that would not have passenger information until a few minutes before departure. To the extent that many vessels in this population are charter vessels, a 60-minute notice time would greatly benefit these small vessels owners since they would not be idle in port waiting for the charter to reach its capacity. In contrast, if we expand the notice time, for example, to 24 hours for this vessel population, these vessel owners potentially would lose customers and revenues since they rely on walk-up business as they wait in port in order to satisfy a longer notice time. It may be likely that a longer notice time would force some of these small business owners to leave the industry as they realize lower revenues and reduced economic profits as a result.

Our proposed 60-minute notice time provides flexibility for the smaller vessel owner since these businesses would continue to be able to operate efficiently as charter businesses due to the spontaneous nature of their business. This requirement also aligns with the Customs and Border Patrol (CBP) proposed requirement of electronic transmission of arrival and departure information published in their final rule in the Federal Register on July 14, 2006 (71 FR 40040 and 40046) and would alleviate confusion within the industry and provide consistency for the public since both agencies receive this information through eNOAD. The Coast Guard requests comments from the public on how a shorter notice time benefits your business with increased flexibility as opposed to a longer notice time. We would also like comments on how much this provision would save your business annually.

The proposed rule would affect approximately 5,566 U.S. vessels under the NOAD portion of this proposed rule, which includes about 526 commercial fishing vessels.¹¹

commercial vessels less than or equal to 300 gross tons not coming from a foreign port. This proposed rule is counting arrivals and departures (U.S. and foreign vessels making international trips and vessels making domestic trips outside a given COTP zone), not just a distinct trip into a given port; therefore, we included vessels greater than 300 gross in our analysis to account for this difference. Since we are unable to determine what vessels are making international trips in our population of vessels, we could not exclude NODs for these vessels from our analysis. Taking into account CBPs APIS rulemaking, our analysis, likely overestimates the potential number of NOADs mandated by this proposed rule.

⁸ Estimating the number of foreign-flag vessels above or below a certain length and GT threshold is difficult since the length and GT fields in our database are not well populated; however, since this rulemaking includes foreign-flag vessels down to zero GT, we have a good estimate of the total number of foreign-flag vessels affected. What we are not able to determine with a fair degree of accuracy is the number of vessels in specific vessel categories and their associated size (length and GT).

⁹ The Office of Intelligence (CG-2) confirms that we do not have a vehicle in place to capture this population.

¹⁰ We initially contacted 19 COTPs as a representative sample of the ports that would most likely receive U.S. commercial vessels less than 65 feet in length coming from a foreign port and we received responses from 16 of them. We again contacted the same 16 COTPs as a representative sample of the ports that would most likely receive U.S. commercial vessels less than or equal to 300 gross tons coming from a foreign port. Due to staffing shortfalls in the aftermath of Hurricane Katrina, we received replies from only 8 of the 16 COTPs that initially sent a response. The eight respondents accounted for approximately 1,511 vessels less than 300 GT coming from a foreign port and showed an increase of 151 percent from their initial response of 602 vessels less than 65 feet coming from a foreign port during our initial survey $(1,511 - 602)/602 = 1.51$. For our initial survey, all 16 respondents accounted for 983 vessels less than 65 feet coming from a foreign port. Extrapolating this percentage to the remaining 381 vessels from our initial survey $(983 - 602)$ would result in 956 vessels $[381 + (381 \times 1.51)]$. We add this value to 1,511 to arrive at the total number of vessels representing all of the 16 COTPs that we contacted, or 2,467.

¹¹ We obtained an estimate of the number of undocumented and documented fishing vessels in the U.S. from two different Coast Guard offices, the Office of Compliance (G-MOC) and the Office of Boating Safety (G-OPB). From data sent to the Coast

The number of foreign-flag vessels affected by the NOAD portion of this proposed rule is approximately 25,284. The total number of vessels affected by the NOAD portion of this proposed rule is approximately 30,850. These vessels would be required to submit notice of arrival and departure information.

The NOAD portion of this proposed rule exempts U.S. recreational vessels and foreign recreational vessels less than or equal to 300 GT.¹²

NOAD Cost Analysis and Benefits

In this analysis, we develop the national cost and benefit analyses for the NOAD portion of this proposed rule for the affected population. We used the Coast Guard's MISLE database to obtain the population of U.S. and foreign vessels affected. We used the Coast Guard's Ship Arrival Notification System (SANS) 2004 data to estimate the number of port calls in the U.S.¹³ The cost analysis is the 10-year period 2008-2017 (with 2008 being the initial period or year 1), and we discount costs at three and seven percent (per OMB Circular A-4) to their present value (PV) in 2006 dollars.¹⁴ We assume incurred costs begin in 2008 since we do not expect this rule to become effective until some time in 2007.

Unit Costs and Assumptions

From the SANS database, we obtained the number of trips or bounces (voyage) that U.S. and foreign vessels made based on 2004 data.¹⁵ The number of trips made by different classes of vessels and between foreign and U.S. vessels is highly variable. With all vessels combined, we found as a mean that a vessel makes about six trips or bounces. Separated, we found that foreign vessels make fewer trips or bounces per vessel than U.S. vessels. We assume the vessel populations remain constant.

For U.S. vessels greater than 300 GT (approximately 3,099), we found the mean and median number of trips or bounces that a vessel makes is between four and nine, respectively. Since the number of trips or bounces made per U.S. vessel is highly variable, we wanted to provide some sensitivity as to the number of trips or bounces by taking a confidence interval around the mean number of trips or bounces. However, the distribution of the trips or bounces does not represent a normal distribution, so we decided not to use a confidence interval based on the mean number of trips or bounces made per vessel.¹⁶ Instead,

Guard from individual states, we estimate that there are approximately 60,000 undocumented, state numbered and 30,000 documented, non-state numbered fishing vessels in the U.S. This may not represent the total number of fishing vessels since there are about 14 states that do not report this data to the Coast Guard. From our MISLE database, we estimate that there are about 280 documented fishing vessels greater than 300 gross tons. Our database has incomplete information on the number of undocumented fishing vessels and underestimates the total number compared to the information that we have from the two previously mentioned offices. From our database, we found that there are 165 undocumented fishing vessels out of 40,222 (this value represents a subset of the approximately 60,000 undocumented fishing vessels that we believe exist in the U.S.) that are greater than 300 gross tons. If we extrapolate this value to 60,000 vessels, we obtain approximately 246 undocumented fishing vessels that are greater than 300 gross tons ($60,000/40,222 \times 165$). Therefore, we estimate that the total number of U.S. commercial fishing vessels affected by the NOAD portion of this proposed rule is about 526 ($526 = 280 + 246$).

¹² A full list of exemptions for NOAD is contained in 33 CFR part 160.203 and in the associated NPRM. Readers can access the CFR online at <http://www.gpoaccess.gov/cfr/index.html>.

¹³ We used 2004 SANS arrival information as the basis for the number of arrivals and departures that each vessel makes. The data contained in SANS are the vessels that report notice of arrival information to the NVMC. We use trips or bounces interchangeably in this analysis; voyage can be used as well. We identify a trip or a bounce as a vessel that enters one port (port call) and departs to another port as a trip or bounce but is counted as two trips.

¹⁴ The present value (PV) is represented algebraically as follows, $PV = \sum \frac{AnnualCost}{(1+r)^t}$ where r is the interest rate, t is the number of periods, and for the first year of the analysis t is equal to one.

¹⁵ We did not assume an incremental increase in the number of annual port calls made to U.S. ports.

¹⁶ A further analysis of the number of trips or bounces made by both U.S. and foreign vessels shows that the data do not represent a normal distribution. We found the kurtosis for the distribution of U.S. and foreign-flag vessel bounces to be between 7, 28, and

we used both the median and the mean for the number of trips or bounces made per U.S. vessel to reflect the variability in the data. Since these vessels are currently submitting NOAs for a distinct (we characterize a distinct port call as a single trip made by a vessel, not the number of successive bounces or trips that it makes to other ports) port call to the U.S., we subtracted one from the total number of trips or bounces to avoid double counting. For U.S. vessels greater than 300 GT, which is essentially U.S. non-SOLAS vessels (U.S. SOLAS vessels greater than 300 GT were captured by CBPs APIS rulemaking), we therefore subtracted one from the median and the mean number of trips. We found the median and mean number of trips for U.S. vessels to be four and nine, respectively. Subtracting one from both of these values, we arrive at three and eight trips or bounces, respectively. For U.S. vessels less than 300 GT coming from a foreign port, we did not subtract one from the median and mean number of trips since these vessels were not required to submit NOADs previously. Therefore, we used four and nine as the median and mean number of trips, respectively, for the approximately 2,467 vessels in this group.

For foreign-flag vessels, we found the median and mean to be three and five trips or bounces per vessel, respectively. Since foreign-flag vessels greater than 300 gross tons (approximately 16,293) and less than or equal to 300 gross tons entering the Seventh District are currently required to submit NOAs, we again subtract one from these values to obtain two and four, respectively. We do not subtract one from the median and mean number of trips for foreign-flag vessels that are less than 300 GT since these vessels were not required to submit NOADs previously, unless they were making port calls to the Seventh Coast Guard District. Therefore, we used three and five as the median and mean number of trips, respectively, for the approximately 8,991 foreign-flag vessels in this group.

We assume that each vessel would purchase a computer in order to submit a NOAD electronically. We realize that some vessels are currently submitting NOADs electronically (this was an option presented in the August 2004 TFR), but we are unable to accurately identify the number of vessels using this form of submission. We also realize that the cost for a computer is variable depending upon the features available and the model purchased. As a reasonable estimate, we used \$500 as the unit cost of a computer, which is consistent with CBPs APIS rulemaking.¹⁷ We assume that a computer would require \$50 (\$500 x 0.1) per year in annual maintenance. We also assume that each computer has an estimated 5-year life cycle; incurred cost is in the year of installation, or 2007.

We estimate that it would take approximately 60 minutes or 1.0 hour (30 minutes or 0.5 hours per NOA and 30 minutes or 0.5 hours per NOD) to complete and submit an NOA and an NOD report electronically through Microsoft Infopath. Based on a previously OMB-approved collection of information (COI) (OMB 1625-0100), we estimate the labor cost or loaded labor rate associated with submitting these reports is approximately \$31/hour.¹⁸ We also assume a \$2 transmittal cost, which is consistent with the previous NOA rulemaking. We present the burden hours in Chapter 5 of this report.¹⁹

47, respectively. Kurtosis is the degree of peakedness of a distribution around the mean, i.e. the fourth central moment of a distribution about the mean. The kurtosis of a normal distribution is equal to three. From our data, we see that our distributions are leptokurtic which have values greater than three meaning the distributions are extremely peaked with fat tails. This means there is a higher probability of extreme values than a normal distribution. Consequently, a median value may be a better indicator of the number of bounces most vessels would make. This is true for our case, we see that some vessels make few trips and some vessels make as many as 122 trips signifying a high degree of variability in the data set. Readers can find more information on kurtosis online at, <http://mathworld.wolfram.com/Kurtosis.html> and <http://www.riskglossary.com/link/kurtosis.htm>.

¹⁷ We did not assume an installation cost for computers since we believe this cost to be minimal.

¹⁸ A loaded labor rate is what a company pays per hour to employ the person, not what the person makes in hourly wages. The loaded labor rate includes the cost of benefits (health insurance, vacation, etc.).

¹⁹ Our time and labor cost estimates are conservative. Based on Coast Guard information, we do not expect new hires to perform this work; it is a task that will be performed during an employee's down time.

Cost Analysis of NOAD for U.S. Vessels

We estimate that 5,566 U.S. commercial vessels would be required to submit NOADs as a result of this proposed rule. Of the approximately 5,566 U.S. vessels that would be required to submit NOADs, about 3,099 are greater than 300 GT and 2,467 are less than or equal to 300 GT. Using eight (mean minus one) for the number of trips or bounces that U.S. vessels greater than 300 GT make and using nine (mean) for the number of trips that U.S. vessels less than or equal to 300 GT make, the total number of trips or bounces made by U.S. vessels is 46,995 (46,995 trips = 3,099 vessels x 8 trips + 2,467 vessels x 9 trips). The total initial (year 0) capital cost to U.S. vessel owners and operators is approximately \$2,783,000 (\$2,783,000 = 5,566 vessels x \$500/computer). The total initial and annual submission cost to U.S. vessel owners and operators is \$1,550,835 (\$1,550,835 = 46,995 trips x 1.0 hour per NOAD x \$31/hour + 46,995 trips x \$2 transmittal cost). Operation and maintenance (O&M) cost is an annual cost incurred after the initial year and throughout the period of analysis.²⁰ The total annual O&M cost to U.S. vessel owners and operators is \$278,300 (\$278,300 = \$50 x 5,566 vessels). The total initial cost to U.S. vessel owners and operators is \$4,333,835, which is the summation of capital costs and submission costs (\$2,783,000 + \$1,550,835). Total annual cost to U.S. vessel owners and operators is \$1,829,135, which is the summation of annual maintenance costs and submission costs (\$278,300 + \$1,550,835).

The total present discounted value or cost of the NOAD portion of the proposed rule to U.S. vessel owners and operators using eight and nine for the mean number of trips is between \$16.9 million and \$20.1 million over the 10-year period of analysis at seven and three percent discount rates, respectively. Table 1 below summarizes these costs for U.S. vessel owners and operators using eight and nine as the mean number of trips.

Table 1. Summary of Total National NOAD Cost of Proposed Rule for U.S.-Flag Vessels with Eight and Nine Mean Trips (2008-2017, 7 and 3 Percent Discount Rates, 2006 Dollars)

Year	Vessels	Capital Cost	O&M Cost	Submission Cost	Total Cost	PV Cost (7%)	PV Cost (3%)
2008	5,566	\$2,783,000	\$0	\$1,550,835	\$4,333,835	\$4,050,313	\$4,207,607
2009	5,566	-	\$278,300	\$1,550,835	\$1,829,135	\$1,597,637	\$1,724,135
2010	5,566	-	\$278,300	\$1,550,835	\$1,829,135	\$1,493,119	\$1,673,918
2011	5,566	-	\$278,300	\$1,550,835	\$1,829,135	\$1,395,438	\$1,625,163
2012	5,566	-	\$278,300	\$1,550,835	\$1,829,135	\$1,304,148	\$1,577,828
2013	5,566	\$2,783,000	-	\$1,550,835	\$4,333,835	\$2,887,817	\$3,629,519
2014	5,566	-	\$278,300	\$1,550,835	\$1,829,135	\$1,139,093	\$1,487,254
2015	5,566	-	\$278,300	\$1,550,835	\$1,829,135	\$1,064,573	\$1,443,936
2016	5,566	-	\$278,300	\$1,550,835	\$1,829,135	\$994,928	\$1,401,880
2017	5,566	-	\$278,300	\$1,550,835	\$1,829,135	\$929,839	\$1,361,048
Total		\$5,566,000	\$2,226,400	\$15,508,350	\$23,300,750	\$16,856,907	\$20,132,287

Totals may not sum due to independent rounding.

Using the value of three (median minus one) for the number of trips or bounces made per U.S. vessel greater than 300 GT and four (median) per U.S. vessel less than or equal to 300 GT, the total number of trips or bounces decreases to 19,165 (3,099 vessels x 3 trips + 2,467 vessels x 4 trips) and the total initial cost for U.S. vessels decreases to approximately \$3.4 million as opposed to \$4.3 million. The total discounted present value or cost to U.S. vessel owners and operators is then approximately between \$10.4 and \$12.3 million over the 10-year period of analysis at seven and three percent discount rates, respectively, compared to \$16.9 and \$20.1 million using eight and nine as the mean value for the number

²⁰ We assume O&M costs are zero during the initial year when equipment is first installed with an understanding that the likelihood of having to maintain or replace equipment is low during the initial period.

of trips. Table 2 below summarizes these costs to U.S. vessel owners and operators using three and four as the median number of trips.

Table 2. Summary of Total National NOAD Cost of Proposed Rule for U.S.-Flag Vessels with Three and Four Median Trips (2008-2017, 7 and 3 Percent Discount Rates, 2006 Dollars)

Year	Vessels	Capital Cost	O&M Cost	Submission Cost	Total Cost	PV Cost (7%)	PV Cost (3%)
2008	5,566	\$2,783,000	\$0	\$632,445	\$3,415,445	\$3,192,005	\$3,315,966
2009	5,566	-	\$278,300	\$632,445	\$910,745	\$795,480	\$858,465
2010	5,566	-	\$278,300	\$632,445	\$910,745	\$743,439	\$833,461
2010	5,566	-	\$278,300	\$632,445	\$910,745	\$694,803	\$809,185
2012	5,566	-	\$278,300	\$632,445	\$910,745	\$649,349	\$785,617
2013	5,566	\$2,783,000	-	\$632,445	\$3,415,445	\$2,275,855	\$2,860,381
2014	5,566	-	\$278,300	\$632,445	\$910,745	\$567,166	\$740,519
2015	5,566	-	\$278,300	\$632,445	\$910,745	\$530,062	\$718,951
2016	5,566	-	\$278,300	\$632,445	\$910,745	\$495,385	\$698,010
2017	5,566	-	\$278,300	\$632,445	\$910,745	\$462,977	\$677,680
Total		\$5,566,000	\$2,226,400	\$6,324,450	\$14,116,850	\$10,406,520	\$12,298,234

Totals may not sum due to independent rounding.

Using the median and mean number of trips made by U.S.-flag vessels, we estimate the annualized costs to U.S.-flag vessel owners and operators to be between \$1.5 and \$2.4 million, respectively.²¹

Foreign Vessel NOAD Costs

We estimate that 25,284 foreign-flag vessels would be required to submit NOADs electronically as a result of this proposed rule. Of the approximately 25,284 foreign-flag vessels that would be required to submit NOADs, about 16,293 are greater than 300 GT and 8,991 are less than or equal to 300 GT. If we use four (mean minus one) for the number of trips made per foreign-flag vessel greater than 300 GT and five (mean) for the number of trips made per foreign-flag less than or equal to 300 GT, the total number of trips or bounces made is about 110,127 (110,127 trips = 16,293 vessels x 4 trips + 8,991 vessels x 5 trips). The total initial (year 0) capital cost to foreign-flag vessel owners and operators is approximately \$12,642,000 (\$12,642,000 = 25,284 vessels x \$500/computer). The total initial and annual submission cost to foreign-flag vessel owners and operators is \$3,634,191 (\$3,634,191 = 110,127 trips x 1.0 hour per NOAD x \$31/hour + 110,127 trips x \$2 transmittal cost). The total annual maintenance cost to foreign-flag vessel owners and operators is \$1,264,200 (\$1,264,200 = \$50 x 25,284 vessels). The total initial cost to foreign-flag vessel owners and operators is an estimated \$16.3 million, which is the summation of capital costs and submission costs (\$12,642,000 + \$3,634,191). Total annual cost to foreign-flag vessel owners and operators is \$4,898,391, which is the summation of annual maintenance costs and submission costs (\$1,264,200 + \$3,634,191).

The total present discounted value or cost of the NOAD portion of the proposed rule to foreign-flag vessel owners and operators using four and five for the mean number of trips is between \$52.6 and \$62.4 million over the 10-year period of analysis at seven and three percent discount rates, respectively. Table 3 below summarizes these costs to foreign-flag vessels owners and operators using four and five as the mean number of trips.

²¹ For expository purposes, we estimate these constant annual costs as annualized (“annuity”) payments at seven and three percent interest rates over the period of analysis using both the median and mean number of trips, respectively.

Table 3. Summary of Total National NOAD Cost of Proposed Rule for Foreign-Flag Vessels with Four and Five Mean Trips (2008-2017, 7 and 3 Percent Discount Rates, 2006 Dollars)

Year	Vessels	Capital Cost	O&M Cost	Submission Cost	Total Cost	PV Cost (7%)	PV Cost (3%)
2008	25,284	\$12,642,000	\$0	\$3,634,191	\$16,276,191	\$15,211,393	\$15,802,127
2009	25,284	-	\$1,264,200	\$3,634,191	\$4,898,391	\$4,278,444	\$4,617,203
2010	25,284	-	\$1,264,200	\$3,634,191	\$4,898,391	\$3,998,546	\$4,482,722
2011	25,284	-	\$1,264,200	\$3,634,191	\$4,898,391	\$3,736,959	\$4,352,157
2012	25,284	-	\$1,264,200	\$3,634,191	\$4,898,391	\$3,492,485	\$4,225,395
2013	25,284	\$12,642,000	-	\$3,634,191	\$16,276,191	\$10,845,513	\$13,631,054
2014	25,284	-	\$1,264,200	\$3,634,191	\$4,898,391	\$3,050,472	\$3,982,840
2015	25,284	-	\$1,264,200	\$3,634,191	\$4,898,391	\$2,850,908	\$3,866,835
2016	25,284	-	\$1,264,200	\$3,634,191	\$4,898,391	\$2,664,400	\$3,754,209
2017	25,284	-	\$1,264,200	\$3,634,191	\$4,898,391	\$2,490,094	\$3,644,863
Total		\$25,284,000	\$10,113,600	\$36,341,910	\$71,739,510	\$52,619,215	\$62,359,405

Totals may not sum due to independent rounding.

Using the value of two (median minus one) for the number of trips or bounces made per foreign-flag vessel greater than 300 GT and three (median) per foreign-flag vessel less than or equal to 300 GT, the total number of trips or bounces decreases to 59,559 (16,293 vessels x 2 trips + 8,991 vessels x 3 trips) and the total initial cost drops to \$14.6 million. The total discounted present value or cost to foreign-flag vessel owners and operators is then between \$40.9 and \$48.1 million over the 10-year period of analysis at seven and three percent discount rates, respectively. Table 4 below summarizes these costs.

Table 4. Summary of Total National NOAD Cost of Proposed Rule for Foreign-Flag Vessels with Two and Three Median Trips (2008-2017, 7 and 3 Percent Discount Rates, 2006 Dollars)

Year	Vessels	Capital Cost	O&M Cost	Submission Cost	Total Cost	PV Cost (7%)	PV Cost (3%)
2008	25,284	\$12,642,000	\$0	\$1,965,447	\$14,607,447	\$13,651,820	\$14,181,987
2009	25,284	-	\$1,264,200	\$1,965,447	\$3,229,647	\$2,820,899	\$3,044,252
2010	25,284	-	\$1,264,200	\$1,965,447	\$3,229,647	\$2,636,354	\$2,955,585
2011	25,284	-	\$1,264,200	\$1,965,447	\$3,229,647	\$2,463,882	\$2,869,500
2012	25,284	-	\$1,264,200	\$1,965,447	\$3,229,647	\$2,302,694	\$2,785,922
2013	25,284	\$12,642,000	-	\$1,965,447	\$14,607,447	\$9,733,559	\$12,233,507
2014	25,284	-	\$1,264,200	\$1,965,447	\$3,229,647	\$2,011,262	\$2,625,999
2015	25,284	-	\$1,264,200	\$1,965,447	\$3,229,647	\$1,879,684	\$2,549,513
2016	25,284	-	\$1,264,200	\$1,965,447	\$3,229,647	\$1,756,714	\$2,475,256
2017	25,284	-	\$1,264,200	\$1,965,447	\$3,229,647	\$1,641,789	\$2,403,161
Total		\$25,284,000	\$10,113,600	\$19,654,470	\$55,052,070	\$40,898,656	\$48,124,680

Totals may not sum due to independent rounding.

Using the median and mean number of trips made by foreign-flag vessels, we estimate the annualized costs to foreign-flag vessel owners and operators to be approximately \$5.8 and \$7.3 million, respectively.²²

Total Cost of NOAD for Proposed Rule

The total initial NOAD cost of the proposed rule for both U.S. and foreign-flag vessel owners and operators is \$20.6 million using the mean values of eight and nine and four and five, respectively. The

²² See footnote number 21 on page 13 of this report.

total present discounted value or cost to all vessel owners and operators is between \$69.5 (\$16.9 million + \$52.6 million) and \$82.5 million (\$20.1 million + \$62.4 million) over the 10-year period of analysis at seven and three percent discount rates, respectively. Table 5 below summarizes the total costs of the NOAD portion of the proposed rule to both U.S. and foreign-flag vessel owners and operators using the mean number of trips.

Table 5. Summary of Total NOAD Costs of Proposed Rule to U.S. and Foreign-Flag Vessel Owners Using Mean Number of Trips (2008-2017, 7 and 3 Percent Discount Rates, 2006 Dollars) (\$Millions)

Discount Rates	Total NOAD Costs		
	U.S. Vessels	Foreign Vessels	Total Cost
7 Percent Discount Rate	\$16.9	\$52.6	\$69.5
3 Percent Discount Rate	\$20.1	\$62.4	\$82.5

Totals may not sum due to independent rounding.

Using three and four and two and three as the median number of trips made by U.S. and foreign-flag vessels, respectively, the total present discounted value or cost to all vessel owners and operators is approximately between \$51.3 (\$10.4 million + \$40.9 million) and \$60.4 million (\$12.3 million + \$48.1 million) over the 10-year period of analysis at seven and three percent discount rates, respectively. Table 6 below summarizes the total costs of NOAD portion of the proposed rule to both U.S. and foreign-flag vessel owners and operators using the median number of trips.

Table 6. Summary of Total NOAD Costs of Proposed Rule to U.S. and Foreign-Flag Vessel Owners Using Median Number of Trips (2008-2017, 7 and 3 Percent Discount Rates, 2006 Dollars) (\$Millions)

Discount Rates	Total NOAD Costs		
	U.S. Vessels	Foreign Vessels	Total Cost
7 Percent Discount Rate	\$10.4	\$40.9	\$51.3
3 Percent Discount Rate	\$12.3	\$48.1	\$60.4

Totals may not sum due to independent rounding.

Table 7 below summarizes the annualized NOAD costs of the proposed rule to both U.S.-flag and foreign-flag vessel owners and operators.

Table 7. Summary of Annualized Costs of NOAD Portion of Proposed Rule (\$Millions)

	Mean Number of Trips	Median Number of Trips
U.S.-Flag Vessels	\$2.4	\$1.5
Foreign-Flag Vessels	\$7.3	\$5.8

Distributional Effects

We expect that the marine transportation industry would bear the initial cost of this proposed rule, meaning vessel owners and operators. Vessel owners and operators may likely pass the costs of this proposed rule onto U.S. end-users in the form of higher shipping fees. This is one of the reasons why we also include the costs to foreign-flag vessel owners and operators. Firms that supply computer equipment and service would experience increased sales and would be subsequently better off. This is essentially a transfer from consumers and vessel owners and operators to these firms.

NOAD Benefits

We do not expect quantifiable benefits for the NOAD portion of this proposed rule and benefits in this case are non-probabilistic (i.e., not based on historical probabilities). We believe, however, that there are considerable inherent qualitative benefits resulting from the NOAD requirement.

The Coast Guard Intelligence Coordination Center provided an intelligence analysis to other internal Coast Guard offices as well as DHS indicating terrorist organizations have the capability and the intention to conduct attacks on the U.S. using vessels as a delivery method for direct attacks on waterborne primary targets, and as a delivery method for personnel and weapons in support of attacks on secondary targets. Vessels not currently regulated by the Coast Guard under NOAD and/or AIS regulations could pose a security risk to the maritime transportation system that terrorist organizations could exploit. Expanding the applicability of NOAD and AIS could enhance maritime domain awareness by lowering the potential security risks. We believe that having this proposed rule in place could prevent terrorist attacks in the future that might otherwise have occurred without the rule.

We also know that drug boats, which are typically smaller vessels, are still a major concern for the U.S. as well as high-speed craft, which represent crucial regulatory areas that we need to address. These vessels pose a significant threat since terrorists look for smaller vessels to use as weapons much like the vessel used in the U.S.S. Cole incident. We believe that smaller, quicker vessels pose just as much of a threat as larger, slower vessels. This reasoning supports the applicability of this proposed rule to reduce the weight threshold down to zero gross tons for foreign commercial vessels and to maintain the weight threshold of 300 gross tons for U.S. commercial vessels and less than or equal to 300 gross tons for U.S. commercial vessels coming from a foreign port, without being excessively burdensome on industry.

Based on the types of terrorist incidents that may exist (and the corresponding loss of life), we chose to look at generic incidents that resulted in a loss of 100, 250, 500, 750, and 1,000 lives, respectively. We use \$6.3 million as an estimate of a Value of a Statistical Life (VSL) to represent an individual's willingness to pay to avoid a fatality involving maritime transportation and to calculate annualized benefits. Our VSL estimate is based on the 2008 report "Valuing Mortality Risk Reductions in Homeland Security Regulatory Analyses" prepared for the U.S. Customs and Border Protection. This report is available on the docket as detailed under ADDRESSES. Table 8 below presents the loss of life resulting from a terrorist incident and the associated dollar values with each loss of life scenario.

Table 8. Dollar Values for Different Loss of Life Terrorist Incidents

Loss of Lives from One Incident	Loss (\$Millions)
100	630
250	1,575
500	3,150
750	4,725
1,000	6,300

We do not know how likely any of these scenarios are in the absence of this proposed rule. However, based on the information discussed earlier, they could possibly occur. In Table 8, we present the scenarios that show the loss of human capital only. We chose not to analyze scenarios with the loss of physical capital because there is no historical precedent within the maritime industry on which to base our analysis. We realize that an analysis based on the loss of human capital only without regard to physical assets likely underestimates the monetary affects of a terrorist incident; however, the human capital

scenario provides a useful account of the risk reduction probabilities required for the proposed rule to breakeven.

NOAD Breakeven Analysis

In light of discussion above, an alternative way to analyze the benefits is to determine the break-even point where the costs of the rule are equal to the expected reduction in losses in the event of a terrorist attack. Break-even analysis is useful when it is not possible to quantify the benefits of a regulatory action.²³ Threshold or break-even analysis answers the question, “How small could the value of the non-quantified benefits be (or how large would the value of the non-quantified costs need to be) before the rule would yield zero net benefits?”²⁴ Below, we describe a break-even for this proposed rule.

One of the benefits of this regulation is to prevent future terrorist attacks. As such, the effectiveness of the regulation can be measured by the change (reduction) from the current state of risk/loss (L_b) to the new resulting state of risk/loss after the regulation has become effective (L_n). The point where the risk reduction is equal to the cost of the regulation (C_r) is the break-even point, which can be defined as:

$$(1) \quad L_b - L_n = C_r$$

Where L_b is the current state of risk/loss, L_n is the new state of risk/loss resulting from this regulation, and C_r is the cost of the regulation.

Since the percent change in risk reduction is defined as $(L_b - L_n) / L_b$, equation 1 can be rewritten as follows to determine the percentage of risk reduction required for the regulation to be cost effective.

$$(2) \quad \% \text{ Risk Reduction} = \frac{(L_b - L_n)}{L_b} = \frac{C_r}{L_b}$$

For this analysis, the reduction in risk is measured by the expected number of lives saved. Because the types of events that would be prevented by this regulation vary greatly, we calculate potential breakeven results using a range of generic events that result in loss of life or casualties summarized in Table 8. We do expect that most events would also involve asset destruction or other capital loss. Events involving loss of capital in addition to casualties would cause the change in risk reduction to be smaller for costs to equal benefits. In our analysis, we compare annualized costs to direct benefits to estimate the risk reduction required for the rule to break even.

We used annualized costs because we assume that the proposed rulemaking will result in a constant probability reduction in every year following the rule’s implementation. In other words, we assume that the risk reduction resulting from this regulation is constant each year. It is important to note that measuring benefits by focusing on specific scenarios avoided would not account for the possibility that the risk has been transferred but not reduced.

Looking at Table 9, the estimated social loss in the event of a successful hypothetical terrorist attack with 250 lives lost is equivalent to \$1.6 billion, and the total estimated annualized cost of implementing this regulation is \$7.3 million at a seven percent discount rate. As a result, the annual reduction in risk that

²³ In order to monetize the benefits from an anti-terrorism regulation, we would need to know the incremental reduction in risk of a successful terrorist attack that would accrue from the regulatory action being analyzed. However, the data needed to estimate this reduction in risk is not available.

²⁴ U.S. Office of Management and Budget, Circular A-4, September 17, 2003.

would just equate benefits with cost is 0.5%. To state this in another way, if implementing this regulation would lower the likelihood of a successful terrorist attack by more than 0.5% each year, then this would be a socially efficient use of resources.

Table 9. Annual Risk Reduction Required for Cost to Equal Benefits for NOAD

Potential Casualties Avoided Per Incident	Benefit from Casualties Avoided Per Incident (\$Millions)	Annualized Cost (\$Millions)	Risk Reduction Required (%)
7% Discount Rate			
100	\$630	\$7.3	1.2%
250	1,575	7.3	0.5%
500	3,150	7.3	0.2%
750	4,725	7.3	0.2%
1,000	6,300	7.3	0.1%
3% Discount Rate			
100	\$630	\$9.7	1.6%
250	1,575	9.7	0.6%
500	3,150	9.7	0.3%
750	4,725	9.7	0.2%
1,000	6,300	9.7	0.1%

Other NOAD Alternatives

We also considered two alternatives under the NOAD portion of this proposed rule. We considered eliminating the group of vessels that comprise the population of U.S. commercial vessels less than or equal to 300 gross tons coming from a foreign port (2,467 vessels estimated). Our reasoning here is that we believe that the vessels that comprise this population do not make many trips outside of the U.S. or do not transit frequently to foreign ports. Under this alternative and using eight (mean minus one since the remaining 3,099 U.S. vessels are greater than 300 GT) as the number of trips made by U.S. vessels, the total initial cost of the NOAD portion of this rule to U.S. vessel owners and operators decreases to \$2.4 million. The total present discounted value or cost to U.S. vessel owners and operators decreases to \$9.1 and \$10.8 million over the 10-year period of analysis at seven and three percent discount rates, respectively. Table 10 below presents these costs to U.S.-flag vessel owners and operators under this alternative.

Table 10. Summary of Total National NOAD Cost of Proposed Rule for U.S.-Flag Vessels Excluding Vessels Less Than or Equal to 300 GT Coming From a Foreign Port with Eight Mean Trips (2008-2017, 7 and 3 Percent Discount Rates, 2006 Dollars)

Year	Vessels	Capital Cost	O&M Cost	Submission Cost	Total Cost	PV Cost (7%)	PV Cost (3%)
2008	3,099	\$1,549,500	\$0	\$818,136	\$2,367,636	\$2,212,744	\$2,298,676
2009	3,099	-	\$154,950	\$818,136	\$973,086	\$849,931	\$917,227
2010	3,099	-	\$154,950	\$818,136	\$973,086	\$794,328	\$890,512
2011	3,099	-	\$154,950	\$818,136	\$973,086	\$742,363	\$864,574
2012	3,099	-	\$154,950	\$818,136	\$973,086	\$693,797	\$839,393
2013	3,099	\$1,549,500	-	\$818,136	\$2,367,636	\$1,577,656	\$1,982,858
2014	3,099	-	\$154,950	\$818,136	\$973,086	\$605,989	\$791,208
2015	3,099	-	\$154,950	\$818,136	\$973,086	\$566,345	\$768,163
2016	3,099	-	\$154,950	\$818,136	\$973,086	\$529,294	\$745,789
2017	3,099	-	\$154,950	\$818,136	\$973,086	\$494,668	\$724,067
Total		\$3,099,000	\$1,239,600	\$8,181,360	\$12,519,960	\$9,067,114	\$10,822,467

Totals may not sum due to independent rounding.

The total present discounted value or cost to all vessel owners and operators under NOAD excluding the 2,467 U.S. vessels decreases to \$61.7 and \$73.2 million over the 10-year period of analysis at seven and three percent discount rates, respectively using the mean number of trips for both foreign-flag and U.S.-flag vessels.

Using three (median minus one) as the number of trips made by U.S. vessels less than or equal to 300 gross tons coming from a foreign port (2,467 vessels), the total initial cost of the NOAD portion of this rule to U.S. vessel owners and operators decreases to approximately \$1.9 million. The total present discounted value or cost to U.S. vessel owners and operators is approximately between \$5.5 and \$6.5 million over the 10-year period of analysis at seven and three percent discount rates, respectively. Table 11 presents these costs to U.S.-flag vessel owners and operators under this alternative.

Table 11. Summary of Total National NOAD Cost of Proposed Rule for U.S.-Flag Vessels Excluding Vessels Less Than or Equal to 300 GT Coming From a Foreign Port with Three Median Trips (2008-2017, 7 and 3 Percent Discount Rates, 2006 Dollars)

Year	Vessels	Capital Cost	O&M Cost	Submission Cost	Total Cost	PV Cost (7%)	PV Cost (3%)
2008	3,099	\$1,549,500	\$0	\$306,801	\$1,856,301	\$1,734,861	\$1,802,234
2009	3,099	-	\$154,950	\$306,801	\$461,751	\$403,311	\$435,245
2010	3,099	-	\$154,950	\$306,801	\$461,751	\$376,926	\$422,568
2011	3,099	-	\$154,950	\$306,801	\$461,751	\$352,268	\$410,260
2012	3,099	-	\$154,950	\$306,801	\$461,751	\$329,222	\$398,310
2013	3,099	\$1,549,500	-	\$306,801	\$1,856,301	\$1,236,932	\$1,554,623
2014	3,099	-	\$154,950	\$306,801	\$461,751	\$287,555	\$375,446
2015	3,099	-	\$154,950	\$306,801	\$461,751	\$268,743	\$364,511
2016	3,099	-	\$154,950	\$306,801	\$461,751	\$251,162	\$353,894
2017	3,099	-	\$154,950	\$306,801	\$461,751	\$234,731	\$343,586
Total		\$3,099,000	\$1,239,600	\$3,068,010	\$7,406,610	\$5,475,711	\$6,460,675

Totals may not sum due to independent rounding.

The total present discounted value or cost to all vessel owners and operators under NOAD decreases to \$46.4 to \$54.6 million over the 10-year period of analysis at seven and three percent discount rates,

respectively, using the median number of trips for both foreign-flag (two and three trips) and U.S.-flag (three trips) vessels. We eliminated this alternative from consideration because we believe that any vessel coming from a foreign port, even U.S. commercial vessels, poses a unique threat to our national security. The underlying concern behind this rationale is that we do not have background information on the business activities of a given vessel operating outside the U.S. Therefore, these vessels would be required to comply with the NOAD portion of this proposed rule.

As the second alternative, we considered including U.S. commercial vessels equal to or greater than 65 feet in length and less than or equal to 300 GT under the NOAD requirements. This population consists of approximately 12,361 U.S. commercial vessels including commercial fishing vessels. Using the mean number of trips [eight or mean minus one for vessels greater than 300 GT (3,099 vessels) and nine (mean) for vessels less than or equal to 300 GT or 14,828 vessels (12,361 vessels + 2,467 U.S. commercial vessels less than 300 GT coming from a foreign port)], we found the total initial cost (capital cost plus submission cost) to U.S. vessel owners and operators under this alternative to be approximately \$14.2 million [$\$14.2 \text{ million} = 17,927 \text{ vessels} \times \$500/\text{computer} + (3,099 \text{ vessels} \times 8 \text{ trips} + 14,828 \times 9 \text{ trips}) \times (1 \text{ hour per NOAD} \times \$31/\text{hour}) + (158,244 \text{ trips} \times \$2 \text{ transmittal cost})$] as opposed to approximately \$4.3 million without this population (see Table 1). The total discounted present value or cost to U.S. vessel owners and operators to comply with the NOAD portion of this proposed rule would be approximately between \$55.9 and \$66.8 million over the 10-year period of analysis at seven and three percent discount rates, respectively, as opposed to \$16.9 and \$20.1 million without this population (See Table 1).

Using the median number of trips of two (median or three minus one) for vessels U.S. vessels greater than 300 GT (3,099 vessels) and three (median) for vessels less than of equal to 300 GT or 14,828 vessels (12,361 vessels + 2,467 U.S. commercial vessels less than 300 GT coming from a foreign port), we found the total initial cost to U.S. vessel owners and operators to be approximately \$10.6 million [using the same capital and submission costs presented previously with the number of trips being 50,682 (3,099 vessels x 2 trips + 14,828 vessels x 3 trips)] as opposed to approximately \$3.3 million without this population (see Table 2). The total discounted present value or cost to U.S. vessel owners and operators would be approximately between \$31.0 and \$36.5 million over the 10-year period of analysis at seven and three percent discount rates, respectively, as opposed to \$10.4 and \$12.3 million without this population (See Table 2).

We chose not to accept the second alternative; thereby eliminating this population from the NOAD requirements in an effort not impose unnecessary costs and burden on industry since other programs implemented by the Coast Guard currently include these vessels. Additionally, many domestic, commercial vessels are required to be documented with the Coast Guard and are required to be inspected regularly by the Coast Guard for safety and security reasons. Finally, initial costs to U.S. vessel owners and operators and total rulemaking costs over the 10-year period of analysis decrease markedly without this population of vessels.

3. Carriage of Automatic Identification System (AIS)

The Coast Guard published a final rule for the carriage of AIS under the statutory authority of Maritime Transportation Security Act of 2002 (MTSA, Public Law 107-295, 116 Stat. 2064) for certain domestic vessels in Vessel Traffic Service (VTS) areas and vessels under the International Convention for the Safety of Life at Sea (SOLAS). AIS is a system providing ships on a real-time basis with the latest information about the identity, voyage data, and maneuvers of other ships which are also equipped with the system. It allows ships to easily track, identify, and exchange pertinent navigation information with one another or ashore for collision avoidance, security, and VTS reporting. We expect the system to enhance situational awareness, permit more effective arrangements, and provide VTSs with comprehensive traffic images. We believe through a combination of NOAD and AIS that this proposed rule would assist the Coast Guard in its security initiative by enhancing maritime domain awareness as these two elements communicate and share information.

Baseline

Vessels currently required to have AIS onboard include:

- All commercial, self-propelled vessels of 65 feet in length in VTS areas or on a foreign voyage (except fishing and small passenger vessels);
- All passenger vessels certified to carry more than 150 passengers for hire inside VTS areas;
- All commercial towing vessels of 26 feet or more in length and 600 horsepower in VTS areas, and;
- Under SOLAS, all tankers, passenger vessels that carry more than 12 passengers, and any other vessel of 300 GT; while on a foreign voyage

Population Affected

The expanded applicability under the proposed rule for AIS includes:

- Any self-propelled vessel of 65 feet or more in length engaged in commercial service including fishing vessels which essentially includes foreign-flag fishing vessels less than 300 GT and greater than or equal to 65 feet;
- Any towing vessel of 26 feet or more in length and more than 600 horsepower engaged in commercial service;²⁵
- Any self-propelled vessel carrying 50 or more passengers engaged in commercial service (whether for hire or not). Congress has stated that all self-propelled commercial vessels of 65 feet or greater are required to have radiotelephones under the Vessel Bridge-to-Bridge Radiotelephone Act. The Radiotelephone Act also requires every vessel of 100 gross tons and upward carrying one or more passengers for hire to be equipped with a bridge-to-bridge radiotelephone. For passenger vessels, the AIS provision of the MTSA grants the Coast Guard

²⁵ Commercial towing vessels used solely within a limited geographic area, used for assistance towing, or for pollution response do not have to carry AIS. The Coast Guard does not keep data on how many towing vessels meet these criteria.

discretion as to number of passengers for hire a vessel less than 65 feet may carry. After reviewing public comments, we believe that this segment of industry would not be uniquely impacted and would benefit from the carriage of AIS. Therefore, we chose to lower the threshold to vessels carrying 50 or more passengers, at our discretion, whether for hire or not since all passengers pose a safety risk. Together, we believe that the Radiotelephone Act and MTSA would synergistically provide safety benefits that could mitigate collisions and other mishaps;

- Any dredge or floating plant engaged in or near a commercial channel or shipping fairway in operations likely to restrict or affect navigation of other vessels except for an unmanned or intermittently manned floating plant under the control of a dredge;
- Any self-propelled vessel carrying or engaged in the movement of certain dangerous cargoes as defined in § 160.202 of this subchapter, and ;
- Any vessel carrying more than 12 passengers for hire and capable of speeds in excess of 30 knots

We again used the Coast Guard's MISLE database in order to estimate the number of vessels affected by this proposed rule that would need to install AIS. We do not have an accurate measure of the number and types of vessels that transit exclusively outside of VTS. With this mind, we accounted for the vessels affected by AIS under MTSA by subtracting the populations that transit inside VTS areas from our figures as a way to ensure that we were not double counting those vessels already affected.

The total number of vessels affected by the AIS portion of this proposed rule is approximately 17,442. These vessels would be required to install AIS beginning in 2008. Implementing the expanded AIS requirement under proposed rule would affect approximately 16,323 U.S. SOLAS and non-SOLAS vessels with towing vessels, fishing vessels and small passenger vessels comprising about 75 percent of the total population affected by the AIS portion of this proposed rule.²⁶

The number of foreign-flag vessels affected by the AIS portion of this proposed rule is approximately 1,119 with foreign fishing vessels comprising most of this population.

Table 12 presents the number of vessels, by type, affected by the proposed rule. This analysis considers the costs and benefits for U.S-flag SOLAS and non-SOLAS vessels. We also provide cost estimates for foreign-flag vessels as a comparison.

²⁶ See footnote 11 on page 9 of this report for the derivation of the fishing vessel population.

Table 12. Number and Types of U.S.-Flag SOLAS and Non-SOLAS Vessels Affected by Proposed Rule Outside VTS Areas (Estimates Based on MTSA AIS Values and MISLE Data)

Vessel Type	SOLAS and non-SOLAS U.S. Vessels
Fishing Vessels:	
Undocumented (estimated)	949
Documented	4,571
Total fishing vessels	5,520
Freight Ship	298
Industrial vessel	748
MODU*	210
OSV**	553
Passenger	2,167
Research	97
School	19
Tank Ship	122
Towing	4,560
Unclassified	385
Unknown	541
Passenger (≥ 50)	1,062
Dredges or floating plants	35
High-speed craft (HSC)***	6
Total All Vessels	16,323

*Mobile Offshore Drilling Unit

**Offshore Supply Vessel

***Passenger vessels that carry more than 12 passengers and capable of speeds in excess of 30 knots are characterized as high-speed craft; they represent the same population.

AIS Cost Analysis and Benefits

In this section, we develop the national cost and benefits analyses for the AIS portion of this proposed rule for the affected population. Again, we used the Coast Guard's MISLE database to determine the number of vessels that would be required to install AIS. Due to economies of scale (a company achieves economies of scale when increased production lowers average cost per unit produced) in producing an AIS unit, the unit cost has decreased over the past several years. Therefore, we estimate that the cost of an AIS unit today is approximately \$3,000.²⁷ The cost analysis of the proposed rule is the 10-year period 2008-2017 (AIS implementation begins in 2008 or year 1 when initial year costs are incurred), and costs are discounted at seven and three percent (per OMB Circular A-4) to their present value (PV) in 2006 dollars.²⁸ The marine industry would incur costs beginning in 2008 and we expect benefits to accrue beginning in 2009, one year after installation.

²⁷ This price point is based on industry and Coast Guard estimates. We realize that there exists variability in the cost of an AIS unit depending upon the class. With this in mind, we believe this is a representative estimate of the cost of this item.

²⁸ See footnote 13 on page 10 of this report for the present value formula.

Unit Costs and Assumptions

Based on Coast Guard information, the price of an AIS (Coast Guard approved) unit has declined approximately 57 percent over the past several years to approximately \$3,000 per unit.²⁹ We use this value as an estimate per unit, which includes the AIS transponder, graphical display, presentation software, and other equipment.

Other assumptions include:

- We assume a constant vessel population over the period of analysis meaning the number of vessels entering service essentially equals the number of vessels retiring;
- We assume an 8-year life cycle for an AIS unit as previously presented in MTSA;
- Installation cost is approximately \$900 per unit (30 percent of the unit cost) incurred in the year of installation;
- Annual maintenance cost is \$250 per unit to replace parts such as the keyboard or display screen, and;
- Training to use an AIS unit is \$110 per mariner (two hours of training at \$55 per hour); we again estimate that an average of three mariners would need training per vessel, this cost is incurred during the first year of installation

Cost Analysis of AIS for U.S. Vessels

We estimate the AIS portion of this proposed rule would affect about 16,323 U.S.-flag vessels. With a cost of \$3,000 per unit, the initial capital cost to U.S. vessel owners and operators is approximately \$48,969,000 (16,323 vessels x \$3,000/unit). During the initial year, installation cost is approximately \$14,690,700 (16,323 vessels x \$900/unit) and training cost is approximately \$5,386,590 (16,323 vessels x 3 mariners/vessel x \$110/mariner). Operation and maintenance (O&M) cost is an annual cost incurred after the initial year and throughout the period of analysis. We estimate O&M cost is about \$4,080,750 (16,323 vessels x \$250/unit). We estimate that the total initial cost to vessel owners and operators to install and implement AIS is about \$69.0 million.³⁰

The total present discounted value or cost of the AIS portion of the proposed rule to U.S. vessel owners and operators is between \$121.8 and \$143.5 million over the 10-year period of analysis at seven and three percent discount rates, respectively. Table 13 presents a summary of the costs incurred for U.S. vessel owners and operators for the AIS portion of this proposed rule.

²⁹ There exists two classes of AIS units, class A and class B units. We have found that the average cost of a class A unit is approximately \$4,500 and the average cost of a class B unit is approximately \$1,500. Since vessel owners will have the option of purchasing either AIS unit, we use an average cost of \$3,000 per unit.

³⁰ The installation of an AIS unit onboard the required vessels calls for a new collection of information. The collection will involve two response categories, initialization, and a voyage-specific entry. Each vessel will require a one-time initialization response and a voyage specific response based on the mean number of voyages a given vessel makes annually. We estimate that domestic vessels make approximately nine mean voyages per year and foreign-flag vessels make approximately five mean voyages per year. We estimate that it will cost vessel owners and operators approximately \$613,302 annually based on the time it takes to complete this task and the labor rate that is required for this type of work. We assume that an existing employee aboard a vessel will perform this task as part of his duties. Therefore, we did not include the collection costs in the overall AIS cost analysis. See the collection of information for further detail.

Table 13. Summary of Total National AIS Cost of Proposed Rule for U.S.-Flag Vessels (2008-2017, 7 and 3 Percent Discount Rates, 2006 Dollars)

Year	Capital Cost	Installation Cost	Training Cost	O&M Cost	Total Cost	PV Cost (7%)	PV Cost (3%)
2008	\$48,969,000	\$14,690,700	\$5,386,590	-	\$69,046,290	\$ 64,529,243	\$67,035,233
2009	-	-	-	\$4,080,750	\$4,080,750	\$ 3,564,285	\$3,846,498
2010	-	-	-	\$4,080,750	\$4,080,750	\$ 3,331,108	\$3,734,464
2011	-	-	-	\$4,080,750	\$4,080,750	\$ 3,113,185	\$3,625,694
2012	-	-	-	\$4,080,750	\$4,080,750	\$ 2,909,518	\$3,520,091
2013	-	-	-	\$4,080,750	\$4,080,750	\$ 2,719,176	\$3,417,564
2014	-	-	-	\$4,080,750	\$4,080,750	\$ 2,541,286	\$3,318,023
2015	-	-	-	\$4,080,750	\$4,080,750	\$ 2,375,034	\$3,221,382
2016	\$48,969,000	\$14,690,700	-	-	\$63,659,700	\$ 34,626,659	\$48,789,859
2017	-	-	-	\$4,080,750	\$4,080,750	\$ 2,074,446	\$3,036,461
Total	\$97,938,000	\$29,381,400	\$5,386,590	\$32,646,000	\$165,351,990	\$121,783,940	\$143,545,269

Totals may not sum due to independent rounding.

We estimate annualized costs for the AIS portion of this proposed rule to U.S.-flag vessel owners and operators to be between \$16.8 and \$17.3 million.³¹

Of the total present discounted value or cost of \$121.8 million at a seven percent discount rate for AIS implementation, \$49.4 million of this total is a discretionary cost, and the remaining \$72.4 million is a non-discretionary MTSA cost. Of the total present discounted value or cost of \$143.5 million at a three percent discount rate, \$58.2 million of this total is a discretionary cost, and the remaining \$85.3 million is a non-discretionary MTSA cost. Of the \$69.0 million initial cost, \$28.0 million is a discretionary cost, and \$41.0 million is a non-discretionary MTSA cost. Table 14 below summarizes these costs.

Table 14. Summary of AIS Discretionary and Non-Discretionary MTSA Costs of Proposed Rule for U.S.-Flag Vessel Owners (2008-2017, 7 and 3 Percent Discount Rates, 2006 Dollars) (\$Millions)

Discount Rates	Discretionary Costs	Non-Discretionary MTSA Costs	Total Costs
7 Percent Discount Rate	\$49.4	\$72.4	\$121.8
3 Percent Discount Rate	\$58.2	\$85.3	\$143.5

Foreign Vessel AIS Costs

We estimate that the AIS portion of this proposed rule would affect about 1,119 foreign-flag vessels, with fishing vessels comprising a majority of this population. Using the same assumptions that we used for U.S. vessels, we estimate that the implementation of the AIS portion of this proposed rule would cost foreign-flag vessel owners and operators between \$8.3 and \$9.8 million (PV) over the 10-year period of analysis at seven and three percent discount rates, respectively. Initial AIS cost for foreign-flag vessel owners and operators is about \$4.7 million. We estimate annualized costs to be approximately \$1.2 million at both discount rates.³²

³¹ Since AIS installation begins in 2008, we use the value of 10 to represent the number of periods that we annualized costs of the proposed rule over the period from 2008-2017.

³² See the previous footnote.

Total AIS Costs of Proposed Rule

The total initial AIS cost of the proposed rule to both U.S.-flag and foreign-flag vessel owners and operators is about \$73.8 million. The total present discounted value or cost to all vessel owners and operators is between \$130.1 and \$153.4 million over the 10-year period of analysis at seven and three percent discount rates, respectively. We estimate the total annualized cost to both U.S. and foreign-flag vessel owners for the AIS portion of this proposed rule to be between \$18.0 and \$18.5 million at seven and three percent discount rates, respectively. Table 15 presents a summary of the total AIS costs of the proposed rule for both U.S. and foreign-flag vessel owners and operators.

Table 15. Summary of Total AIS Costs of Proposed Rule to U.S. and Foreign-Flag Vessel Owners (2008-2017, 7 and 3 Percent Discount Rates, 2006 Dollars) (\$Millions)

Discount Rates	Total AIS Costs		
	U.S. Vessels	Foreign Vessels	Total Cost
7 Percent Discount Rate	\$121.8	\$8.3	\$130.1
3 Percent Discount Rate	\$143.5	\$9.8	\$153.4

Totals may not sum due to independent rounding.

AIS Quantified Ancillary Benefit Analysis

OMB Circular A-4 suggests that we present quantifiable ancillary benefits whenever possible.³³ The primary benefit of this proposed rule is effectively to include a significant number of smaller vessels that may pose a threat to the U.S. that would be required to submit NOADs and carry AIS onboard that transit outside VTS areas. This would enhance maritime domain awareness and increase the overall level of security of the U.S.

The proposed rule would provide both quantifiable and non-quantifiable benefits. Quantifiable ancillary benefits exist in the form of fatalities, injuries, and pollution avoided as a result of implementing AIS for vessels operating outside of Vessel Traffic Service (VTS) areas. We also identify the enhancements to homeland security provided by expanded AIS carriage. These non-quantifiable benefits include improved information and enhanced communications, which lead to a superior level of maritime domain awareness (MDA). The proposed rule would also support other Coast Guard missions such as marine safety and security and maritime mobility.

We based the identification of quantifiable safety benefits on a review of marine casualty data culled from both the Marine Safety Management System (MSMS) database and its successor, the MISLE database.³⁴ Specifically, we retrieved marine casualty reports from these databases for the 8-year period 1996 to 2003 inclusive, that applied to the population of vessels affected by this proposed rule.³⁵ This population, described above, is distinct from the population evaluated during the previous AIS rulemaking, and includes only those vessels involved in marine casualties outside of a VTS area. We then evaluated the reports to identify those casualties that were most likely to be affected by AIS carriage. Coast Guard

³³ Readers can view the section on ancillary benefits on page 26 of the Circular online at <http://www.whitehouse.gov/omb/circulars/index.html>.

³⁴ For casualty reports through December 2001, we used the Coast Guard's Marine Safety Management System (MSMS) database to retrieve vessel casualty data as well as other vessel information. Data from this database were back-loaded into MISLE after this date and MISLE is now the primary database for vessel information retrieval.

³⁵ We chose to review this period of casualty cases beginning in 1996 since we believe that the Oil Pollution Act of 1990 (OPA 90) had a positive impact on the number of oil spills in the subsequent years. We chose 2003 as the endpoint since it can take as much as one full year for a casualty case to be resolved and entered into the MISLE database. Therefore, a casualty case that occurred in the latter half of 2004 potentially would not be entered into MISLE until the latter half of 2005 when we first began collecting the data, so we decided not to include 2004 in the casualty case period due to insufficient data.

officers with significant experience at sea, deck watch officers, marine casualty investigators, transportation specialists, and economists conducted this identification.

Screening of Marine Casualty Data

We queried MSMS (1996-2001) and MISLE (2002 and 2003) to obtain casualty reports for all collisions, allisions, and groundings involving U.S. commercial vessels, and developed a list containing approximately 10,500 casualty reports for the period 1996 to 2003, inclusive. Collisions, allisions, and groundings are the most likely casualty types to be affected by AIS carriage because they involve navigation and situational awareness, and often occur as a result of insufficient or inaccurate information regarding the behavior and intentions of other vessels. We then filtered this list to remove:

- Duplicate casualty reports;
- Casualties involving vessels where the proposed rule would not apply, and;
- Casualties involving vessels already required to carry AIS under the previous rulemaking, including those casualties occurring in VTS areas

Our filtering process allowed us to focus on approximately 5,500 casualties. We further refined the list by determining whether there was evidence of impaired situational awareness, which we deemed to be a precursor to many casualties. Many marine casualties are a result of inadequate or flawed situational awareness on the part of vessel operators. The primary casualty prevention feature of AIS is its ability to minimize the impacts of such barriers to situational awareness as:

- Limited visibility (visual and/or radar);
- Confusion regarding location or presence of other vessels;
- Confusion regarding intentions (including course and speed) of other vessels;
- Inability to monitor location, course, speed, or intentions of other vessels, and;
- Conflicting or erroneous identification of other vessels

During this initial review, we also evaluated the casualty reports to exclude casualties in which:

1. AIS would have had no effect on the casualty, including factors such as:
 - Unexpected current or wind, or sudden changes;
 - AIS would not provide substantial additional information beyond that already available to the vessel operators, such as a close-in maneuvering situation;
 - Human error or gross negligence, misconduct, or violation of a law or regulation that likely would not have been mitigated by AIS, and;
 - Casualties not related to AIS capabilities (e.g., vessel striking a submerged object)

2. One of the vessels directly involved in the casualty would not be an AIS carrier under the proposed rule due to size (e.g., fishing vessel less than 65 feet in length) or service (e.g., pleasure craft)
3. There was insufficient information in the casualty report to make a definitive determination (e.g., a casualty report stating only, “Two vessels collided during a meeting situation. No pollution or injuries.”)

Once we screened casualties for these elements, the evaluation team drew on the significant experience of its members in navigation strategy development and execution, bridge team management, and casualty investigations. We performed an in-depth analysis of all available MSMS and MISLE casualty documentation in order to confirm that AIS would have significantly enhanced situational awareness to the point that the casualties would likely have been prevented.

Some of the guidelines used were:

- Was there sufficient distance and/or time, prior to becoming *in extremis*, for vessel operator(s) to act on AIS provided information?
- Were radio communications between vessels poor or non-existent?
- Was visibility between vessels restricted by weather, geography, or other factors?, and;
- Was there confusion regarding the presence, identity, location or course/speed of other vessels, or would AIS have provided the vessel operator with additional information that could have made him/her act differently (e.g., visual and radar picture did not indicate presence of other vessel(s), but they would appear on AIS)?

To conduct this final analysis, we made the following assumptions:

- AIS would be properly installed and operational in accordance with applicable requirements;
- AIS meets, but does not exceed, the minimum guidelines of the requirements (e.g., vessels equipped with text-only AIS, not displayed with an electronic chart overlay or other options with more advanced AIS models);
- AIS has superior reception to VHS radio communications (per Coast Guard subject matter experts);
- While radar cannot “see” around waterway bends, AIS can;
- Vessel operators would use the AIS information;
- AIS would alleviate the problem of misidentified vessels on radar or radio communications;
- Specific length of tow would not be included in AIS information as would vessel characteristic (e.g., tow over 200 feet);
- AIS equipped vessels would operate AIS while underway making way, anchored, and, in the case of towing vessels, while pushed up to the bank, and;

- Vessel operators would make timely input of and revision to relevant AIS data fields (e.g., cargo, draft, etc.)

The final casualty selection step was a confirmation that the relevant vessel(s) met the applicability criteria of the proposed rule and that the entire benefit of casualty had not been claimed under previous rulemakings.

From our analysis, we found that AIS most likely would have prevented 68 casualty incidents that caused 18 injuries and five fatalities. We present a list of these cases and the associated injuries, fatalities, and pollution in Appendix A.

We used the identified incidents to develop an average annual historical rate of AIS-preventable marine casualties for the affected vessel population as the basis of our benefit analysis. An explanation of our methodology is as follows:

Fatalities and Injuries: the team evaluated fatalities and injuries onboard the domestic vessels as a result of the AIS-preventable casualties. We again use a VSL of \$6.3 million.³⁶

Pollution: We categorized all pollution incidents resulting from AIS-preventable casualties as oil spills. We used the volume of oil spilled (converting to barrels) contained in the casualty reports.

Calculation of Benefit³⁷

To prevent duplicative counting of regulatory benefits, we reduced benefit amounts by the appropriate percentage for casualties in which we claimed a benefit of less than 100 percent under previous rulemakings. For example, in a prior rulemaking, if we used 60 percent of a casualty case as a benefit, we used the remaining 40 percent for this rulemaking in order not to double count benefits.

For new cases considered, we used a binary form of analysis meaning that we determined whether or not AIS would have prevented a given casualty incident wholly or not at all. We did not use effectiveness factors to measure the proportion of injuries, fatalities, or pollution that could have been avoided if AIS was onboard.

We categorized injuries into three categories: minor, moderate, and serious; we did not find any cases that contained critical or severe injuries. We based our injury valuations on current Department of Transportation guidance and practice that presents injury valuations as a fraction of the WTP value of a fatality averted, in this case, the VSL of \$6.3 million per fatality. It follows that a minor injury is then valued at \$12,600, a moderate injury is valued at \$97,650, and a serious injury is valued at \$316,250 based on this VSL.³⁸ Of the 68 cases that we included in our analysis where AIS would have been beneficial, we found over the 8-year period a total of 18 injuries and five fatalities with a total value of \$32.4 million. We divided by 8 (number of years in the data set) to obtain annualized values for our

³⁶See footnote No. 24.

³⁷ Benefits for AIS would still accrue as presented in this analysis regardless of the infrastructure in place because of the ship-to-ship nature of AIS and with the capacity of Coast Guard resources to receive shipboard information.

³⁸ See additional details see www.dot.gov. As an example, case number 93014220 had one injury that we classified as moderate. Contained in DOT memoranda and guidance, the value of a moderate injury is .0155 of a fatality with 1.00 representing the value of a fatality. To arrive at the value of a moderate injury, we multiply .0155 by \$6.3 million, or \$97,650. We then sum the value of all of the cases to obtain a total value for injuries and fatalities.

benefit values. Using \$6.3 million for the VSL, the average value or benefit per year is about \$4.1 million. See Appendix B for further detail.

We then discounted the annual average over the 10-year period of analysis at seven and three percent discount rates, respectively, to obtain the total discounted benefit of the AIS portion of this proposed rule. Since we assume the installation of AIS would occur in 2008 or year one, benefits would accrue beginning in 2009 or year two and ending in 2017. See Appendices C and D for further detail.

We estimate the total benefit (injuries and fatalities) derived from marine casualty cases for the AIS portion of this proposed rule is between \$24.7 and \$30.6 million (VSL = \$6.3 million/life) at seven and three percent discount rates, respectively. See Appendices C and D for further detail.

Reduced Pollution

We also measure benefit in barrels of oil not spilled. Over the 8-year period, we found that these incidents resulted in oil spills totaling 179 barrels or an annual average of about 22 barrels of oil. Therefore, we can expect that this proposed rule would prevent, in the future, this amount of oil from being spilled into the marine environment annually.

The total discounted or present value benefit measured in barrels of oil not spilled is between 136 and 169 barrels over the 8-year period of analysis at seven and three percent discount rates, respectively. See Appendices C and D for further detail.

We attribute the low benefit values to the low number of casualty cases that would presumably be affected by AIS outside VTS areas.

AIS Non-Quantified Benefit Analysis

Improved Information

Mariners and Coast Guard personnel would enjoy improved real-time information as a result of AIS. While we quantify this benefit above, there are further benefits to having reliable and timely information beyond casualty avoidance. For example, the Coast Guard would also be able to target vessels that operate in a dangerous manner, or identify inspected vessels operating beyond the scope of their certificate, which should improve safety without compromising the efficiency of responsible operators.

Improved Communications

AIS would provide vessel information in an automated mode, thereby reducing misunderstood voice communications that impose a burden to vessel operators. Silent data transmissions, coupled with accurate visual displays would allow vessel operators to operate more efficiently.

Reduced Near Collisions

It is not possible to determine the number of casualties that are narrowly avoided since only those accidents meeting a certain level of severity are reported to the Coast Guard. Near collisions or allisions disrupt shipboard operations, cause undue stress, and slow the flow of traffic in the waterway. AIS should help to alleviate some of this burden because of the nature of its operation; it extends mariners' range of situational awareness and provides a visual indication of targets miles sooner than detected by the human eye, or in areas (e.g., around a bend) not capable of being seen with other equipment such as radar.

Maritime Domain Awareness (MDA)

The acute recognition of the nation's waterside security vulnerabilities requires the Coast Guard to heighten its maritime domain awareness (MDA). The essential elements of MDA include awareness, prevention, response, and consequence management. AIS strengthens maritime security through the first two elements, awareness and prevention.

AIS is a key element in attaining a sufficient level of MDA to enable the Coast Guard to quickly and accurately detect waterborne threats and promptly notify appropriate first responder assets, as well as vessels and facility operators of terrorist threats. Working in conjunction with NOAD, the proposed rule's expansion of AIS (and NOAD) would include a significant number of smaller vessels that pose a threat to the U.S. and would serve to create a synergistic effect with NOAD. If, for some reason, information from one of these requirements is missed, not reported, or incorrectly communicated, it is our hope that the other requirement would capture the requisite information pertaining to identity, thereby creating the synergy between these requirements.

AIS Breakeven Analysis

As noted earlier, the primary benefit of AIS is also security-related. These benefits are in addition to the ones already discussed (pollution prevention, reduced injuries, etc.). We expect that adding AIS to the proposed rule would increase situational awareness over and above just having NOAD and would work synergistically with it. Therefore, it is important to know whether the marginal benefit of adding AIS is worth its marginal cost.

As with NOAD, we do not know the likelihood of any terrorist incidents in the absence of this proposed rule, so we present a breakeven analysis below for the AIS portion of the proposed rule similar to the breakeven analysis that we presented for the NOAD portion of the proposed rule.

Using the analysis previously mentioned in the NOAD section of this report, Table 16 displays the required risk reduction required for AIS to breakeven. We estimated the total annualized cost of implementing the AIS portion of the proposed rule at a seven percent discount rate to be about \$18.5 million (\$18.0 million at three percent). Using the same scenario of 250 hypothetical lives saved as NOAD, the annual risk reduction that would just equate benefits with costs is about 1.2%.

Table 16. Annual Risk Reduction Required for Cost to Equal Benefits for AIS

Potential Casualties Avoided	Benefit from Casualties Avoided (\$Millions)	Annualized Cost (\$Millions)	Risk Reduction Required (%)
7% Discount Rate			
100	\$630	\$18.5	2.9%
250	1,575	18.5	1.2%
500	3,150	18.5	0.6%
750	4,725	18.5	0.4%
1,000	6,300	18.5	0.3%
3% Discount Rate			
100	\$630	\$18.0	2.9%
250	1,575	18.0	1.1%
500	3,150	18.0	0.6%
750	4,725	18.0	0.4%
1,000	6,300	18.0	0.3%

4. Costs, Benefits, and Distributional Effects of Combined Proposed Rule

In this section of our analysis, we summarize the costs, benefits, and distributional effects of the proposed rule. For a more detailed discussion of these elements, refer to the corresponding sections of this analysis.

Total Costs of Proposed Rule

The total initial cost for the NOAD portion of this proposed rule (incurred in 2008) to U.S. vessel owners and operators is between \$3.4 and \$4.3 million; the total initial cost for the AIS portion of this proposed rule is approximately \$69.0 with a combined total of \$73.4 million with initial AIS costs comprising about 94 percent (\$69.0 million/\$73.4 million) of the total initial U.S. cost. Using the mean number of trips (eight for vessels greater than 300 GT and nine for vessels less than or equal to 300 GT), the total present discounted value or cost of this proposed rule to U.S. vessel owners and operators to implement NOAD and install AIS is between \$138.6 and \$163.7 million over the 10-year period of analysis, 2008-2017, at seven and three percent discount rates, respectively. For U.S. vessels, the AIS portion of this proposed rule represents about 87 percent of the total discounted cost at both discount rates.

Using the mean number of trips (or four for vessels greater than 300 GT and five for vessels less than or equal to 300 GT), the total present discounted value or cost of this proposed rule to foreign-flag vessel owners and operators to implement NOAD and install AIS is between \$61.0 and \$72.2 million over the 10-year period of analysis at seven and three percent discount rates, respectively. The total present discounted value or cost of the proposed rule to all vessel owners and operators is between \$199.6 and \$235.9 million over the 10-year period of analysis at seven and three percent discount rates, respectively. Table 17 below summarizes the total costs using mean number of trips.

Table 17. Summary of Total Discounted Costs of Proposed Rule to U.S. and Foreign-Flag Vessel Owners Using Mean Number of Trips (2008-2017, 7 and 3 Percent Discount Rates, 2006 Dollars) (\$Millions)

Discount Rates	Total Costs of Proposed Rule		
	U.S. Vessels	Foreign Vessels	Total Cost
7 Percent Discount Rate	\$138.6	\$61.0	\$199.6
3 Percent Discount Rate	\$163.7	\$72.2	\$235.9

Totals may not sum due to independent rounding.

Using the median number of trips (three or median minus one and four), the total present discounted value or cost of this proposed rule to U.S. vessel owners and operators to implement NOAD and install AIS is between \$132.2 and \$155.8 million over the 10-year period of analysis. For U.S. vessels, the AIS portion of this proposed rule represents about 92 percent of the total discounted cost at both discount rates.

Using the median number of trips (two or median minus one and three), the total present discounted value or cost of this proposed rule to foreign-flag vessel owners and operators to implement NOAD and install AIS is between \$49.2 and \$58.0 million over the 10-year period of analysis. The total present discounted value or cost of the proposed rule to all vessel owners and operators is between \$181.4 and

\$213.8 million over the 10-year period of analysis at seven and three percent discount rates, respectively. Table 18 below summarizes the total costs using median number of trips.

Table 18. Summary of Total Discounted Costs of Proposed Rule to U.S. and Foreign-Flag Vessel Owners Using Median Number of Trips (2008-2017, 7 and 3 Percent Discount Rates, 2006 Dollars) (\$Millions)

Discount Rates	Total Costs of Proposed Rule		
	U.S. Vessels	Foreign Vessels	Total Cost
7 Percent Discount Rate	\$132.2	\$49.2	\$181.4
3 Percent Discount Rate	\$155.8	\$58.0	\$213.8

Totals may not sum due to independent rounding.

Table 19 below summarizes the total annualized costs of the proposed rule for both U.S. and foreign-flag vessel owners and operators.

Table 19. Summary of Total Annualized Costs of Proposed Rule to U.S. and Foreign-Flag Vessel Owners (\$Millions)

	NOAD	AIS	Total Annualized Costs of Proposed Rule*
U.S.-Flag Vessels	\$1.5 - \$2.4	\$16.8 - \$17.3	\$18.8 - \$19.2
Foreign-Flag Vessels	\$5.8 - \$7.3	\$1.2	\$7.0 - \$8.5

*These values include mean and median number of trips made and both seven and three percent discount rates. The values presented in the table are not additive; we calculated the annualized costs for both U.S. and foreign-flag vessel owners separately.

If we combine both portions of the proposed rule together without making the distinction between U.S. and foreign-flag vessel owners, we estimate the total annualized costs to be between \$25.8 and \$27.7 million at seven and three percent discount rates, respectively.

Benefits of Proposed Rule

The benefits of this proposed rule are difficult to quantify since hard data does not exist on the probability of a terrorist attack occurring. The primary benefit of combining both portions of this proposed rule is security-related. In the interest of national security and maritime domain awareness, the Coast Guard believes that through the combination of NOAD and AIS, this proposed rule would strengthen and enhance not only maritime security but also the overall national security of this country. Capturing more vessels that submit notice of arrival and departure information, specifically foreign vessels down to zero gross tons in conjunction with AIS, we believe, would accomplish this goal. The combination of NOAD and AIS would create a synergistic effect between the two requirements and would include a significant number of smaller vessels not currently covered under the current regulations. This is the primary benefit of the proposed rule.

The AIS portion of this proposed rule contains ancillary benefits in the form of injuries avoided, fatalities avoided, and barrels of oil not spilled into the water derived from marine casualty cases. Using the VSL of \$6.3 million, the total discounted benefit (injuries and fatalities) for the AIS portion of this proposed rule over the 10-year period of analysis, 2008-2017, is between \$24.7 and \$30.6 million at seven and three percent discount rates, respectively. Just based on barrels of oil not spilled, we expect the AIS portion of this proposed rule to prevent 22 barrels of oil from being spilled annually or between 136 and

169 barrels at seven and three percent discount rates, respectively, over the 10-year period of analysis. See Appendices C and D for details.

We also provided a breakeven analysis based to determine what risk reductions would have to be for the benefits of this rule to at least equal the costs. Refer to the respective breakeven analysis sections of this report for further detail. Separately, we determined where the costs of the rule are just equal to the expected reduction in casualties from an event for the NOAD and the AIS. For the NOAD portion, depending upon the number of lives saved, the breakeven analysis provides a range in reduction required from 1.6% to 0.1% for this regulation to be beneficial and for the AIS portion, the range is from 2.9% and 0.3%.

Combining the two portions of the regulation would result in the annual reduction in risks that would just equate benefits with cost ranging from 4.1% to 0.4%. This analysis does not assume that the U.S. will necessarily experience an attack, but rather is attempting to provide the best available information to the public on the impacts of the rule.

Lastly, we do not intend this proposed rule to be a panacea, with the combination of AIS and NOAD together; we can identify anomalies that currently exist from NOA and AIS data that do not match one another. Realistically, we are capturing all small vessels (that we have the authority to do so under MTSA) that make port calls to the U.S. in some form. The only vessels that we are not capturing are foreign recreational vessels less than 300 GT, U.S.-flag commercial vessels under 300 GT on domestic voyages, and U.S. recreational vessels. We capture data on these vessels through programs such as merchant mariner licensing and vessel documentation requirements, which provides us the visibility over these vessels. The additional requirements proposed for NOAD would not provide tangible security-related benefits to outweigh the additional costs that would be incurred under NOAD for these vessels. Moreover, those vessels not being captured would have difficulty meeting the requirements because of their lack of size or lack of AC power that would limit the effectiveness or ability to operate AIS. We believe that having these programs in place would serve as a deterrent, not just a reactionary measure.

Distributional Effects of Proposed Rule

We expect distributional effects from both portions of this proposed rule. The manufacturers of computers would benefit from the NOAD portion of this proposed rule with an increase in computer sales and software, and would experience a rise in total revenues. The manufacturers of AIS equipment would benefit from increased sales and would also experience a rise in total revenues. This represents a transfer from consumers and vessel owners and operators to the manufacturers. Vessel owners and operators may choose to increase shipping fees as a result. From our small business analysis, the small businesses that we researched own an average of about five vessels. We found that each company may incur a cost of about \$13,000 initially (or about \$4,800 per vessel) for capital, installation, training costs, etc., depending on how many vessels a company owns. Annually, each small company may incur a cost of about \$900 (or about \$337 per vessel) for maintenance, replacement costs, etc., depending on how many vessels a company owns.

Other distributional effects arise as a result of property damage from casualty cases. Damage claims from casualty cases are changes in transfer payments since insurance companies would pay out claims for damages and may ultimately pass these costs onto consumers in the form of higher insurance premiums. Reductions in insurance premiums that are matched by reductions in insurance claims

payments are changes in transfer payments and not benefits. The 68 casualty cases over the 8-year data period yielded about \$3.2 million in property damage, or about \$400,000 per year.

5. Initial Regulatory Flexibility Act Analysis

In accordance with the Regulatory Flexibility Act (RFA, 5 U.S.C. 601 *et seq.*), the Coast Guard must assess whether a rule would have a significant economic impact on a substantial number of small entities.

A small entity may be-

- A small business that, defined as any independently owned and operated business not dominant in its field that qualifies as a small business per the Small Business Act (15 U.S.C. 632);
- A small independent not-for-profit organization, and;
- A small governmental jurisdiction (locality with fewer than 50,000 people)

Entities affected by the proposed rule would be U.S.-flag vessel owners and operators that must submit NOADs and carry AIS onboard for vessels that transit outside VTS areas. We determined which entities were small, based on the North American Industry Classification System (NAICS) using public and proprietary business databases. The NAICS code, company information such as the number of employees and annual revenues are obtained by utilizing these databases. By using the United States Small Business Administration (SBA) criteria for small businesses and the associated NAICS code for a particular business, we are able to determine whether a business is small or large.³⁹ In some cases, businesses are small based on the number of employees, though many businesses are classified based on their annual revenues.

Due to the large number of vessels and vessel owners and operators potentially affected, we took a random sample of the total number of companies that could be affected by this proposed rule. We found that this proposed rule may affect as many as 14,506 U.S. companies that own the 17,323 domestic vessels. Using 95 percent as our confidence level, we took a random sample of 375 small companies out of the total population of approximately 14,506 U.S. companies. We researched about 3,300 companies in order to achieve our sample size, or about a nine to one ratio.⁴⁰ In other words, for every nine companies that we researched, we found that one was a small business. Additionally, we found that some of the companies that we researched lacked company data such as revenues and employee size, which precluded us from using those companies in our analysis based on SBAs criteria for small companies. We also found that owner and or operator and contact information is not updated periodically in the vessel information database, which in turn, requires the analysis of additional companies.

We address the projected reporting and recordkeeping requirements as well as the type and professional skills necessary for the preparation of reports and records in the cost analysis and Paperwork Reduction Act sections of this report.

This IRFA addresses the following:

³⁹ Readers can access small business information online at <http://www.sba.gov/size/indexableofsize.html>.

⁴⁰ In our estimation, not as a certainty, the value of 375 small businesses out of approximately 3,300 is small because of the applicability of this rulemaking, which is attempting to capture smaller domestic vessels down to 300 GT. Many small businesses that own these smaller vessels may not be included in the databases because either they are not publicly traded companies or they have not registered with a given database itself.

- ◆ The reason the agency is considering this action;
- ◆ The objectives of and legal basis for the proposed rule;
- ◆ The number and types of small entities to which the rule would apply;
- ◆ The classes of small entities that would be subject to the requirements of the proposed rule;
- ◆ Other relevant Federal rules that may duplicate, overlap, or conflict with the proposed rule, and;

Reason for Agency Action

The purpose of the proposed rule is to expand the applicability of NOAD and AIS in order to enhance maritime domain awareness (MDA). The combination of these elements of this proposed rule would capture a greater number of vessels thereby enhancing maritime domain awareness and national security. This would also create a synergistic effect between the requirements of NOAD and AIS. This proposed rule would amend or change sections of 33 CFR parts 160, 161, 164, and 165.

Objective and Legal Basis

This proposed rule would also serve to cover more vessels not currently under existing regulations by capturing a significant number of smaller vessels (including fishing vessels) that may pose a significant threat to U.S. security. The statutory authority for the Coast Guard to prescribe, change, revise, or amend the affected domestic regulation, 33 CFR parts 160, 161, 164, and 165 is provided under 33 U.S.C. 1223, 1231; 46 U.S.C. 8502 and Chapter 701; as delegated to the Coast Guard in the Department of Homeland Security Delegation No. 0170.1.

Number of Types of Small Entities Affected

Of the affected population of approximately 17,323 domestic vessels that would comply with either one or both portions of this proposed rule, we took a random sample of 375 small companies from a total of 14,506 companies that potentially own these vessels. We researched approximately 3,300 companies in order to obtain the 375 small businesses that were required to meet our confidence level while we excluded companies that did not have the requisite data to allow us to make a determination on whether a company was small or not. From the total population of vessels potentially affected by this proposed rule, we assigned each company a random number in order to obtain our sample. In our random sample of small businesses, if revenue information was not available for a given company (since revenue information is required in order to determine the financial impact of the proposed rule on that small business), we researched one additional company as a replacement in our effort to achieve the requisite sample size.

To estimate the impact on small businesses initially, we multiplied the first year costs for implementing NOAD (includes capital, installation, and submission costs) and installing AIS (includes capital, installation, and training costs) by the number of vessels that each small business owns. We divided this cost by the average annual revenues for each small business to obtain a proportion of the initial cost to annual revenues. This allows us to determine the initial cost impact of this proposed rule on small businesses, based on SBAs criteria for small businesses and company information obtained through the

online databases. We also estimated the annual cost impact on small businesses using the same methodology explained above. Again, we multiplied the annual costs that each small business would incur for implementing NOAD (includes operation and maintenance costs and submission costs) and installing AIS (includes operation and maintenance costs) by the number of vessels that each small business owns. We divided this cost by the average annual revenues for each small business to obtain a proportion of the annual costs to annual revenues. Table 20 presents the initial and annual revenue impacts for the sample of 375 small companies that we researched with known average annual revenues.⁴¹

Table 20. Estimated Revenue Impact of the Proposed Rule for Small Businesses That Own U.S.-Flag SOLAS and Non-SOLAS Vessels

Percent impact on annual revenue	Initial		Annual	
	Number of small entities with known revenue data	Percent of small entities with known revenue data	Number of small entities with known revenue data	Percent of small entities with known revenue data
0-3%	357	95%	375	100%
>3-5%	10	3%	0	0%
>5-10%	7	2%	0	0%
>10-20%	1	0%	0	0%
>20%	0	0%	0	0%
Total	375	100%	375	100%

As shown, the proposed rule would have a 3 percent or less impact on 95 percent of the small businesses that own vessels that would have to comply with both the NOAD and AIS portions of this proposed rule during the first year that the rule is in effect.⁴² Annually, the proposed rule would have a 3 percent or less impact on 100 percent of the small businesses that we sampled. The data suggest that this proposed rule would not have a significant impact on a substantial number of small entities and we request comments from the public on whether they believe that this finding is correct.

We are interested in the potential impacts from this proposed rule on small businesses and we request public comment on these potential impacts. If you think that your business, organization, or government jurisdiction qualifies as a small entity and that this proposed rule would have a significant economic impact on it, please submit a comment to the Docket Management Facility at the address under ADDRESSES. In your comment, explain why, how, and to what degree you think this rule would have an economic impact on you.

Types of Entities Affected by the Proposed Rule

We classified small businesses by the NAICS code previously mentioned for those businesses that had known company information and determined whether a business was small or large by using the SBA size standards matched to the NAICS codes.⁴³ Based on the industry classification codes, we found that

⁴¹ When estimating revenue impacts, we do not discount initial and annual costs or annual revenues.

⁴² These data are based on the small businesses that we sampled from the total population and from the data that we obtained using the online public and proprietary business databases.

⁴³ See footnote numbers 41 and 42.

about 12 percent of the small businesses that we analyzed are classified as “navigational services to shipping” companies. “Scenic and sightseeing transportation” companies represent about 11 percent of the small companies that we analyzed. The remaining 77 percent of the small businesses that we analyzed are comprised of 23 different industry classification codes for a total of 23 NAICS codes. All of the 375 small businesses that we analyzed represent 99 different NAICS codes. Table 21 presents the types of small entities that the proposed rule would affect.

Table 21. NAICS Codes, Descriptions, Definitions, and Number and Percent of Small Businesses Affected by the Proposed Rule

NAICS Code	Description	Small Business Definition	Number of Small Entities	Percent of Small Entities
488330	Navigational services to shipping	< \$6.5M annual rev.	45	12.0%
487210	Scenic and sightseeing transportation, Water	< \$6.5M annual rev.	42	11.2%
238910	Site preparation contractors	< \$13.0M annual rev.	27	7.2%
336611	Ship building and repairing	< 1,000 employees	19	5.1%
236115	New single-family housing construction	< \$31.0M annual rev.	15	4.0%
713930	Marinas	< \$6.5M annual rev.	12	3.2%
424460	Fish and seafood merchant wholesalers	< 100 employees	10	2.7%
483211	Inland water freight transportation	< 500 employees	10	2.7%
441222	Boat dealers	< \$6.5M annual rev.	9	2.4%
114111	Finfish fishing	< \$4.0M annual rev.	8	2.1%
237110	Water and sewer line and related structures construction	< \$31.0M annual rev.	8	2.1%
483212	Inland water passenger transportation	< 500 employees	8	2.1%
561510	Travel agencies	< \$3.5M annual rev.	8	2.1%
713990	All other amusement and recreation industries	< \$6.5M annual rev.	8	2.1%
423320	Brick, stone, and related construction material merchant wholesalers	< 100 employees	7	1.9%
213111	Drilling oil and gas wells	< 500 employees	6	1.6%
488410	Motor vehicle towing	< \$6.5M annual rev.	6	1.6%
212111	Bituminous coal and lignite surface mining	< 500 employees	5	1.3%
311712	Fresh and frozen seafood processing	< 500 employees	5	1.3%
237990	Other heavy and civil engineering construction (except dredging and surface cleanup activities)	< \$31.0M annual rev.	4	1.1%
424720	Petroleum and petroleum products merchant wholesalers (except bulk stations and terminals)	< 100 employees	4	1.1%
445220	Fish and seafood markets	< \$6.5M annual rev.	4	1.1%
541990	All other professional, scientific, and technical services	< \$6.5M annual rev.	4	1.1%
Other	Various*		101	26.9%
Total			375	100.0%

* Three or fewer companies in an NAICS category.

Other Federal Rules

The requirements in this proposed rule overlap with the provisions contained in CBPs APIS final rule because we are both requiring all commercial vessels arriving from a foreign port to submit NOAs. Additionally, we are both requiring a NOD when departing to foreign within 60 minutes. However, the overlap does not extend to domestic traffic (U.S. to U.S. arrivals and departures) or recreational vessels.

However, we believe that the proposed rule would not create additional burdens on industry since both agencies worked in unison in order not to collect duplicate information.

Regulatory Alternatives

Our goal with this proposed rule is to enhance MDA and to create synergy between the NOAD and AIS requirements by correlating vessel AIS data with NOAD data. This, in turn should identify and invariably mitigate anomalies between the data collected from both of these requirements.

Additionally, we contemplated using 65 feet for domestic, commercial vessels as the minimum threshold for the NOAD portion of this proposed rule. We found that this would have included approximately 13,000 additional domestic vessels that would have had to submit NOADs, with commercial fishing vessels representing about 40 percent of this population. However, we found that this would have caused undue burden on smaller vessel owners and operators by having them submit NOADs. We therefore decided to use 300 GT as the minimum applicability because these vessels engage in domestic voyages and do not pose a security risk as discussed previously in this analysis (see pages 20 and 34 of this report for our reasoning). By using this threshold, we have eliminated approximately 13,000 smaller vessels and approximately 1,500 companies from having to comply with the NOAD portion of this proposed rule, which we believe would lift the burden on many smaller vessel owners and operators.

6. Paperwork Reduction Act

This proposed rule would call for two collections of information under the Paperwork Reduction Act of 1995 (44 U.S.C. 3501-3520). It would require a revision to an existing collection and a new collection. The following is an analysis for the burden associated with the revision and the new collection.

As defined in 5 CFR 1320.3(c), “collection of information”: comprises reporting, recordkeeping, monitoring, posting, labeling, and other, similar actions. The title and description of the information collection, a description of those who must collect the information, and an estimate of the total annual burden follow. The estimates cover the time for submitting a notice of arrival and notice of departure and entering information into an AIS unit.

Sections 160.201, 160.202, 160.203, 160.206, 160.207, 160.208, 160.210, 160.212, and 160.213 of this proposed rule amend the collection of information requirements for vessel owners and operators. The Coast Guard needs this information to determine whether an entity meets statutory requirements. These provisions would require modifying the burden in the previously approved collection under OMB Control Number 1625-0100. A control number has not yet been established for the new collection of information for AIS.

Title: Advance Notice of Arrival and Electronic Transmission of Vessel Transit Data.

OMB Control Number: 1625-0100 and 1625-new.

Summary of the Collections of Information: The proposed rule would require vessel owners and operators to submit notice of arrivals and departures electronically to the NVMC under §§ 160.206 and 160.207. This requirement would require a change in the previously approved OMB Collection 1625-0100 because it expands the NOAD requirement to include vessels greater than 300 gross tons for U.S. commercial vessels, foreign vessels down to zero gross tons, and U.S. commercial vessels less than or equal to 300 gross tons coming from a foreign port. The proposed rule would require vessel owners and operators to submit electronically information that is entered into an AIS unit. This represents a new collection of information for vessel owners and operators of vessels equal to or greater than 65 feet in length outside of VTS areas, passenger vessels that carry at least 50 passengers outside VTS areas, commercial towing vessels at least 26 feet in length and 600 horsepower outside VTS areas, dredges or floating plants, and high-speed craft.

Need for Information: The Coast Guard needs this information to determine whether an entity meets the statutory requirements.

Proposed Use of Information: The Coast Guard would use this information to determine whether an entity meets the statutory requirements.

Description of Respondents: The respondents are vessel owners and operators who make port calls in the U.S. Each vessel making a port call in the U.S. is required to submit a notice of arrival before entering a U.S. port and a notice of departure when departing a U.S. port. For AIS, the respondents are vessels that carry AIS onboard.

Number of Respondents: The existing OMB-approved number of respondents, as adjusted on March 25, 2005, is 10,478. The rule would increase the number of respondents in this OMB-approved collection to

a total of approximately 30,850 (5,566 U.S.-flag vessels and 25,284 foreign-flag vessels). For AIS, there is currently no OMB-approved number of respondents; the number of respondents is new and would be approximately 17,442 (16,323 U.S.-flag vessels and 1,119 foreign-flag vessels).

Frequency of Response: The existing OMB-approved number of responses, as adjusted on March 25, 2005, is 70,577. The rule would increase the number of responses in this OMB-approved collection to a total of approximately 157,122 (46,995 responses from U.S.-flag vessels owners and operators and 110,127 responses from foreign-flag vessel owners and operators). For AIS, there is currently no OMB-approved number of responses, the number of responses is new and would be approximately 169,994 (163,230 from U.S.-flag vessel owners and operators and 6,714 from foreign-flag vessel owners and operators).

Burden of Response: The burden of this proposed rule would arise from the inclusion of a notice of departure and from the increase in the total number of vessels affected. We assume that it would take 30 minutes per vessel to submit a notice of arrival and departure to the NVMC, for a total of one hour for each trip that a vessel makes (one trip includes arriving and departing). For AIS, the burden would arise from initializing the unit and entering the necessary information electronically. We assume it would take about 20 minutes to initialize the unit and about five minutes per voyage to enter the information.

Estimate of Total Annual Burden: The existing OMB-approved total annual burden, as adjusted on March 25, 2005, is 175,525 hours. The initial year and annual total burden would be approximately 157,122 hours (assuming a constant number of submittals). For AIS, there is currently no OMB-approved annual burden; the new burden would be approximately 18,522 hours (assuming a constant number of submittals).

We will collect comments from the public, and we will consider them for future analysis of the burden.

Appendix A

Detail of Casualties that Would Have Been Affected by AIS (1996-2003), U.S. Vessels

Year	Case No.	Casualty	Location	U.S.	U.S.	Total Value of Life/Injury	Pollution
				Fatalities	Injuries	VSL = \$6.3 Million	(bbls spilled)
1996	MC96001459	ALLISION	NULL	0	0	0	0
1996	MC96001732	COLLISION	NAVIGABLE WATERS NEC	0	0	0	0
1996	MC96002605	COLLISION	GULF OF MEXICO COASTAL	0	1	362,250	0
1996	MC96004410	COLLISION	INTERCOASTAL WTRWY-GULF	0	0	0	0
1996	MC96005444	COLLISION	MONONGAHELA RIVER	0	0	0	0
1996	MC96006703	COLLISION	LOWER MISSISSIPPI RIVER	0	0	0	0
1996	MC96006868	COLLISION	GULF OF MEXICO 12-200 MILES	0	0	0	0
1996	MC96007138	ALLISION	OHIO RIVER	0	1	12,600	0
1996	MC96009188	COLLISION	LOWER MISSISSIPPI RIVER	0	0	0	0
1996	MC96014807	GROUNDING	LOWER MISSISSIPPI RIVER	0	0	0	0
1996	MC96015008	COLLISION	INTERCOASTAL WTRWY-GULF	0	0	0	0
1996	MC96017054	COLLISION	LOWER MISSISSIPPI RIVER	0	0	0	0
1996	MC96017136	COLLISION	GULF OF MEXICO COASTAL	0	0	0	0
1996	MC96017344	COLLISION	GULF OF MEXICO 12-200 MILES	0	0	0	0
1996	MC96018182	COLLISION	NAVIGABLE WATERS NEC	0	1	12,600	0
1996	MC97000223	COLLISION	INTERCOASTAL WTRWY-GULF	0	0	0	0
1997	MC97000577	COLLISION	GULF OF MEXICO	0	0	0	0
1997	MC97001549	COLLISION	LOWER MISSISSIPPI RIVER	0	0	0	0
1997	MC97003807	COLLISION	ATCHAFALAYA RIVER	0	0	0	0
1997	MC97005217	COLLISION	LOWER MISSISSIPPI RIVER	0	0	0	0
1997	MC97012384	COLLISION	CORPUS CHRISTI SHP CHNL	0	0	0	0
1997	MC97013831	COLLISION	INTERCOASTAL WTRWY-GULF	0	0	0	0
1997	MC97014891	COLLISION	VERMILLION BAY	0	0	0	0
1997	MC97017971	COLLISION	GULF OF MEXICO COASTAL	0	0	0	0
1997	MC98000568	COLLISION	LOWER MISSISSIPPI RIVER	0	0	0	0
1998	MC98000078	COLLISION	INTERCOASTAL WTRWY-GULF	0	0	0	0
1998	MC98000416	COLLISION	GULF OF MEXICO 12-200 MILES	0	0	0	0
1998	MC98003938	COLLISION	GULF OF MEXICO COASTAL	0	0	0	0
1998	MC98005142	COLLISION	LOWER MISSISSIPPI RIVER	0	0	0	0
1998	MC98010319	COLLISION	INTERCOASTAL WTRWY-GULF	0	0	0	0
1998	MC98011969	ALLISION	INTERCOASTAL WTRWY-GULF	0	0	0	0
1998	MC98013656	GROUNDING	PORT ALLEN ROUTE	0	0	0	0
1998	MC98015239	COLLISION	INTERCOASTAL WTRWY-GULF	0	0	0	0
1998	MC98015669	COLLISION	GULF OF MEXICO 12-200 MILES	0	0	0	167

1998	MC98016006	COLLISION	DELAWARE RIVER	0	0	0	0
1999	MC99000883	COLLISION	LOWER MISSISSIPPI RIVER	1	7	6,558,300	0
1999	MC99000884	COLLISION	LOWER MISSISSIPPI RIVER	0	0	0	0
1999	MC99001100	COLLISION	GULF OF MEXICO 12-200 MILES	0	0	0	0
1999	MC99003313	ALLISION	OHIO RIVER	0	0	0	0
1999	MC99005567	COLLISION	INTERCOASTAL WTRWY-GULF	0	0	0	0
1999	MC99006680	COLLISION	TOMBIGBEE RIVER	0	0	0	0
1999	MC99011001	COLLISION	INTERCOASTAL WTRWY-GULF	0	0	0	0
1999	MC99011040	COLLISION	NULL	0	0	0	0
1999	MC99013041	COLLISION	CHICAGO SHIP CANAL	0	0	0	0
1999	MC99014005	COLLISION	DELAWARE BAY	0	0	0	0
1999	MC99014426	COLLISION	INTERCOASTAL WTRWY-GULF	0	0	0	0
1999	MC99015865	COLLISION	GULF OF MEXICO COASTAL	0	0	0	0
2000	MC00001422	COLLISION	BERING SEA	0	0	0	0
2000	MC00010465	GROUNDING	OHIO RIVER	0	0	0	0
2000	MC00011882	COLLISION	ILLINOIS RIVER	0	0	0	0
2000	MC00013763	COLLISION	NAVIGABLE WATERS NEC	0	0	0	0
2000	MC00014564	COLLISION	LOWER MISSISSIPPI RIVER	0	0	0	0
2001	MC01011726	ALLISION	HUDSON RIVER (N OF 41 00 N)	0	0	0	0
2001	MC01005151	COLLISION	OHIO RIVER	0	0	0	0
2001	MC01010901	COLLISION	GULF OF MEXICO 12-200 MILES	0	0	0	0
2002	1485154	COLLISION	GULF OF MEXICO	0	0	0	0
2002	1491964	COLLISION	LOWER MISSISSIPPI RIVER	0	0	0	0
2002	1493713	COLLISION	ELK RIVER	4	1	25,297,650	12
2002	1494888	ALLISION	LOWER MISSISSIPPI RIVER	0	0	0	0
2002	1599828	COLLISION	INTERCOASTAL WTRWY-GULF	0	0	0	0
2002	1608214	COLLISION	LOWER MISSISSIPPI RIVER	0	4	135,450	0
2002	1638788	COLLISION	INTERCOASTAL WTRWY-GULF	0	0	0	0
2002	1687544	COLLISION	LOWER MISSISSIPPI RIVER	0	1	12,600	0
2002	1711644	COLLISION	GULF OF MEXICO	0	1	12,600	0
2003	1744365	ALLISION	INTERCOASTAL WTRWY-GULF	0	0	0	0
2003	1809458	ALLISION	LOWER MISSISSIPPI RIVER	0	0	0	0
2003	1897784	COLLISION	GULF OF MEXICO	0	1	12,600	0
2003	1936744	COLLISION	PACIFIC OCEAN	0	0	0	0

5 18 \$32,416,650 179

- Notes:
1. Personnel casualties exclude losses suffered on non-U.S. flagged vessels.
 2. VSL is the value of statistical life for prevention of injury and death, "Valuing Mortality Risk Reductions in Homeland Security Regulatory Analyses", Industrial Economics, Inc., April 2008.
 3. One barrel (bbl) = 42 U.S. gallons

Appendix B

Summary of AIS-Preventable Annual Personnel Casualties and Pollution by Year

Year	Cost of Injury/Death	Pollution (bbls)
	VSL = \$6.3M	
1996	387,450	0
1997	0	0
1998	0	167
1999	6,558,300	0
2000	0	0
2001	0	0
2002	25,458,300	12
2003	12,600	0

TOTAL: **\$32,416,650** **179** barrels

Average: **\$4,052,081** **22** barrels per year
(Total/8 Years)

Appendix C

Summary of Present Value Benefit of AIS (7 Percent Discount Rate)

Average Annual Value of Injuries and Fatalities Avoided: VSL = \$6.3M
\$4,052,081

TOTAL: \$4,052,081

Average Annual Spills avoided (bbls): 22

Discount rate: 7%

<u>Year</u>	<u>Benefit</u>	<u>PV Benefit (Death, Injury)</u>	<u>Oil Spill (bbls)</u>
2007	0 \$0	\$0	-
2008	1 -	-	-
2009	2 4,052,081	3,539,245	19
2010	3 4,052,081	3,307,705	18
2011	4 4,052,081	3,091,313	17
2012	5 4,052,081	2,889,078	16
2013	6 4,052,081	2,700,073	15
2014	7 4,052,081	2,523,433	14
2015	8 4,052,081	2,358,348	13
2016	9 4,052,081	2,204,064	12
2017	10 4,052,081	2,059,873	11
	<u>\$ 36,468,731</u>	<u>\$ 24,673,131</u>	<u>136</u>

Appendix D

Summary of Present Value Benefit of AIS (3 Percent Discount Rate)

Average Annual Value of Injuries and Fatalities Avoided: VSL = \$6.3M
 \$4,052,081

TOTAL: \$4,052,081

Average annual spills avoided (bbls): 22

Discount rate: 3%

<u>Year</u>		<u>Benefit</u>	<u>PV Benefit (Death, Injury)</u>	<u>Oil Spill (bbls)</u>
2007	0	\$0	\$0	-
2008	1	-	-	-
2009	2	4,052,081	3,819,475	21
2010	3	4,052,081	3,708,228	20
2011	4	4,052,081	3,600,222	20
2012	5	4,052,081	3,495,361	19
2013	6	4,052,081	3,393,554	19
2014	7	4,052,081	3,294,713	18
2015	8	4,052,081	3,198,750	18
2016	9	4,052,081	3,105,583	17
2017	10	4,052,081	3,015,129	17
		<u>\$ 36,468,731</u>	<u>\$ 30,631,016</u>	<u>169</u>