

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



Transportation Worker Identification Credential (TWIC) - Reader Requirements

Final Rule

Regulatory Analysis and Final Regulatory Flexibility Analysis

**USCG-2007-28915
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Acronyms

AIS	Abbreviated Injury Scale
ANRPM.....	Advanced Notice of Proposed Rulemaking
ASP	Alternative Security Program
BLS	Bureau of Labor Statistics
CCL	Canceled Card List
CDC.....	Certain Dangerous Cargoes
CFR.....	Code of Federal Regulations
CSO.....	Company Security Officer
DHS	Department of Homeland Security
DOT	Department of Transportation
FASC-N.....	Federal Agency Smart Credential Number
FRFA	Final Regulatory Flexibility Analysis
FSO.....	Facility Security Officer
FSP.....	Facility Security Plan
GAO	Government Accountability Office
GSA.....	General Services Administration
HSI	Homeland Security Institute
IRFA.....	Initial Regulatory Flexibility Analysis
IMO.....	International Maritime Organization
MARSEC Level.....	Maritime Security Level
MISLE.....	Marine Information Safety and Law Enforcement System
MSRAM.....	Maritime Security Risk Analysis Model
MTSA.....	Maritime Transportation Security Act of 2002
NAICS.....	North American Industry Classification System
NIPP.....	National Infrastructure Protection Plan
NIST	National Institute of Standards and Technology
NPRM.....	Notice of Proposed Rulemaking
OCS.....	Outer Continental Shelf
OMB.....	Office of Management and Budget
OSLTF.....	Oil Spill Liability Trust Fund
PACS.....	Physical Access Control System
RA.....	Regulatory Analysis
RBDM.....	Risk-Based Decision Making
RFA.....	Regulatory Flexibility Act
RUA.....	Recurring Unescorted Access
SAFE Port Act.....	Security and Accountability For Every Port Act of 2006
SBA	Small Business Administration
ST&E.....	Systems Test and Evaluation
TSA.....	Transportation Security Administration
TSL.....	Transportation Security Incident
TWIC.....	Transportation Worker Identification Credential
USCG.....	United States Coast Guard
VSL.....	Value of a Statistical Life

VSO.....
VSP.....

Vessel Security Officer
Vessel Security Plan

Executive Summary

Under Executive Order 12866, as supplemented by Executive Order 13563, the Coast Guard is required to assess the costs and benefits of its rulemakings. This final rule is significant under section 3(f) of that order. This Regulatory Analysis (RA) provides an assessment of potential costs and benefits from the Transportation Worker Identification Credential (TWIC) – Reader Requirements final rule [USCG-2007-28915].

This report does not attempt to exactly replicate the regulatory language of the final rule or any other supporting documentation; the regulatory text, not the text of this report, is legally binding. We urge the reader to review the final rule before reviewing this report.

The Coast Guard proposes amending its regulations on certain Maritime Transportation Security Act of 2002 (MTSA)-regulated facilities and vessels to include requirements for electronic TWIC inspection to be used for access control for unescorted access to secure areas of facilities and vessels.

The following table summarizes the undiscounted costs and benefits of this rule.

Table ES-1 Summary of Costs and Benefits¹

Category	Final Rule
Applicability	High-risk, MTSA-regulated facilities and high-risk, MTSA-regulated vessels with greater than 20 crew.
Affected Population	1 vessel
	525 facilities
Costs (\$ millions, 7% discount rate)	\$21.9 (annualized)
	\$153.8 (10-year)
Costs (Qualitative)	Time to retrieve or replace lost PINs for use with TWIC cards
Benefits (Qualitative)	Standardization of access control and credential verification among high-risk facilities and vessels ²
	Enhanced access control and security at U.S. maritime facilities and onboard U.S.-flagged vessels
	Reduction of human error when checking identification and manning access points

In this final rule, the Coast Guard will require owners and operators of certain vessels and facilities regulated by the Coast Guard under 33 CFR Chapter I, subchapter H, to use electronic readers designed to work with TWIC as an access control measure. This final

¹ For a breakdown of costs by provision, see Appendix G.

² There may be a reduction in standardization across facilities and vessels with different levels of risk, because of increased requirements for access control at high-risk facilities.

rule will also implement additional requirements associated with Electronic TWIC readers or the Physical Access Control System (PACS) equivalent, including recordkeeping requirements for those owners/operators required to use an electronic TWIC reader, and amendments to security plans previously approved by the Coast Guard to incorporate TWIC requirements.

This final rule will enhance the security of vessels, ports, and other facilities by ensuring that only individuals who hold valid TWICs are granted unescorted access to secure areas at those locations.³ It will also implement the MTSA transportation security card requirement, as well as the Security and Accountability For Every Port Act of 2006 (SAFE Port Act) electronic TWIC inspection requirements.

The Coast Guard estimates that this final rule will specifically affect owners and operators of certain MTSA-regulated U.S.-flagged vessels and domestic facilities. We obtained population data from the Coast Guard's Marine Information Safety and Law Enforcement (MISLE) database. Based on these data, we estimate the following population of MTSA-regulated entities: 3,647 unique owners/operators of 13,825 vessels, 2,046 unique owners/operators of 3,270 facilities, and 19 unique owners/operators of 56 Outer Continental Shelf (OCS) facilities. Of these entities, 525 facilities and 1 vessel will have to comply with new electronic TWIC inspection requirements. The Coast Guard used a risk-based tiering approach to apply these regulatory requirements – the net result is less than 5% of the MTSA-regulated population are impacted which represented approximately 80% of the potential consequences⁴. This risk-based hierarchy is described in Chapter 2.

We estimate the annualized cost of this rule to industry to be approximately \$21.9 million at a 7% discount rate. The main cost drivers of this rule are the acquisition and installation of TWIC readers and the maintenance of the affected entity's electronic TWIC inspection system. The cost estimates in this regulatory analysis are likely to overstate costs, as we do not have actual costs for what facilities will spend out of their own funds for infrastructure and installation, and we cannot quantitatively account for several methods of relief that will be afforded industry in this final rule. In addition, the increased flexibility provided by this final rule allows for the use of an existing PACS with minor modifications and increases the pool of available reader technology will decrease the burden on industry. However, our cost estimates do not reflect any cost savings that may result from this flexibility and assume that all entities would comply by installing new TWIC readers. Costs, which we distribute over a 2-year implementation phase in our calculations, consist predominantly of the costs to purchase, install, and

³ TWIC readers will not help identify valid cards that were obtained via fraudulent means, however, TWIC readers will provide a means to verify and validate TWICs that the current visual ID check cannot.

⁴ Consequences drawn from MSRAM consequence assessments. The subset of the population required to install TWIC readers represents about 5% of the entire population. That 5% accounts for approximately 80% of the total consequence for all MTSA-regulated facilities and vessels, as determined by analyzing the MSRAM consequence data for those facilities and vessels in the highest risk category as compared to the consequence scores for the entire MTSA-regulated population. This is discussed in greater detail in Chapter 5 of this RA.

integrate approved TWIC readers to their current physical access control system. Recurring annual costs will be driven by costs associated with canceled card list updates, training, opportunity cost associated with delays and replacement of TWICs that cannot be read, and maintenance of the affected entity's electronic TWIC inspection system.

The benefits of the rulemaking include the enhancement of the security of vessels, ports, and other facilities by ensuring that only individuals who hold valid TWICs are granted unescorted access to secure areas at those locations. TWIC readers will allow for enhanced verification of personal identity, card authentication and validation of TWICs, all of which will improve access control at high-risk, MTSA-regulated facilities and vessels. They will also reduce potential vulnerability by establishing earlier the temper and intent of perpetrators who attempt to bypass or thwart the readers, triggering more capable security assets. TWIC readers will contribute as potential deterrent given enhanced security and attacker desire to maximize success. Another benefit of TWIC readers is in reducing the consequence given increased likelihood of stopping the attack at the checkpoint, farther from the main target and immediately identifying intent and a greater chance of implementing protective measures (e.g., shutdown of sensitive systems). They also contribute to the removal of the current patchwork of credentials and reader technologies used throughout the maritime industry, and will serve to standardize the use of readers at high-risk facilities and vessels. It will also implement the 2002 MTSA transportation security card requirement, as well as the 2006 SAFE Port Act electronic TWIC inspection requirements, thereby ensuring compliance with those statutes. Since the primary function of the TWIC card and of electronic TWIC inspection is to enhance access control and identity verification and validation, we evaluated three specific attack scenarios (Truck Bomb, Terrorist Assault Team and Passenger/Passerby Explosives/Improvised Explosive Device, or IED) that are most likely to be mitigated by the implementation of electronic TWIC inspection program. However, the electronic TWIC inspection requirements will not address potential attacks from outside a target, attacks at lower risk facilities or the verification and validation of a duly issued TWIC obtained using fraudulent documents. We present qualitative benefits and a break-even analysis in Chapter 5 of this final RA.

We considered several alternatives in the formulation of this final rule. These alternatives were based on several different combinations of facility and vessel populations facing electronic TWIC inspection requirements. The selected alternative allowed the Coast Guard to target the highest risk entities while minimizing the overall burden. For a complete discussion of the alternatives, see Chapter 6 of this RA.

Under the Regulatory Flexibility Act (RFA, 5 U.S.C. 601-612), we have considered whether this final rule will have a significant economic impact on a substantial number of small entities. The term "small entities" comprises small businesses, not-for-profit organizations that are independently owned and operated and are not dominant in their fields, and governmental jurisdictions with populations of fewer than 50,000 people.

For this final rule, we reviewed recent company size and ownership data from the Coast Guard MISLE database, and public business revenue and size data for our affected

population. Of these 525 facilities that will be affected by the electronic TWIC inspection requirements, we found 306 unique owners. Among these 306 entities, there were 31 government-owned entities, 0 not-for-profits, and 275 businesses. Of the 275 businesses, 114 companies exceed Small Business Administration (SBA) small business size standards, 88 companies are considered small by the SBA, and 73 companies have no available information. For the purposes of this analysis, we consider all entities for which information was not available to be small. The businesses considered small for this analysis comprise 58% of the total population of unique owners.

We were able to find revenue information for 64 of the 88 businesses deemed small by SBA standards.⁵ We then determined the impacts of the final regulation on these companies by dividing the total costs of the regulation by the number of regulated entities to determine a cost per entity for the regulation. We estimate these costs to be on average \$195,715 per entity per year during the implementation period, and \$12,312 per entity in annual cost. By comparing average costs to revenue, we determined what percent impact on revenue the final regulation will have based on implementation costs and annual costs. Table ES-2 presents the impacts on small businesses that own and operate facilities during implementation and annually.

Table ES-2 Revenue Impacts on Affected Small Business – Facilities

Revenue Impact Range	Impacts from Implementation Costs		Impacts from Annual Costs	
	Number of Entities	Percent of Entities	Number of Entities	Percent of Entities
0% < Impact ≤ 1%	33	52%	57	89%
1% < Impact ≤ 3%	4	6%	6	9%
3% < Impact ≤ 5%	5	8%	1	2%
5% < Impact ≤ 10%	8	13%	0	0%
Above 10%	14	22%	0	0%
Total	64	100%	64	100%

Note: Values may not total due to rounding.

The greatest impact will occur during the implementation phase when 48 percent of small businesses that we were able to find revenue data on will experience an impact of greater than 1 percent, and 22 percent of small businesses with available revenue data will experience an impact greater than 10 percent. After implementation, the impacts decrease and 89 percent of affected small businesses will see an impact less than 1 percent. We expect the revenue impacts for years with equipment replacement to be between those for implementation and annual impacts. During those years with equipment replacement, we estimate that approximately 42 percent of businesses will see

⁵ SBA small business standards are based on either company revenue or number of employees. Many companies in our sample have employee numbers determining them small, but we were unable to find annual revenue data to pair with the employee data.

an impact of greater than 1 percent. Of the 31 government jurisdictions, 7 are less than the RFA's 50,000 population threshold to be considered small, and all have revenue levels such that there will not be an impact greater than 1% of revenue.⁶ For vessels, we found that the 1 vessel that will be affected by this final rule is not a small business.

Under the provisions of the final rule, the affected facilities and vessel will be required to update their security plans, and to create and maintain a system of recordkeeping within 2 years of the final rule's promulgation. This requirement will be added to an existing collection with Office of Management and Budget control number 1625-0077 entitled Security Plans for Ports, Vessels, Facilities, Outer Continental Shelf (OCS) Facilities and Other Security-Related Requirements. The total additional burden from the final rule is estimated at 17,128 respondents (65 for vessels + 17,063 for facilities) in Year 1, 18,644 respondents (6 for vessels + 18,638 for facilities) in Year 2, and 3,156 respondents (6 for vessels + 3,150 for facilities) in Year 3. The current annual burden listed in this collection of information is 1,108,043. The new burden, as a result of this final rule, in Year 1 is 1,125,171 (1,108,043 + 17,128). In Year 2 the new burden is 1,126,687 (1,108,043 + 18,644) and in Year 3 it is 1,111,199 (1,108,043 + 3,156). The average annual additional burden across the 3 years is 12,976.

⁶ Government revenues used for this analysis include tax revenues, and in some cases, operating revenues for government-owned waterfront facilities.

A-4 Accounting Statement

Agency/Program Office: U.S. Coast Guard

Rule Title: Transportation Worker Identification Credential (TWIC) – Reader Requirements

RIN#: 1625-AB21

Date: November 2015

<u>Category</u>	<u>Primary Estimate</u>		<u>Minimum Estimate</u>		<u>High Estimate</u>		<u>Source</u>
Benefits							
Annualized monetized benefits (\$ Millions)	--	7%	--	7%	--	7%	
	--	3%	--	3%	--	3%	
Annualized quantified, but unmonetized, benefits	--						
Unquantifiable Benefits	Reduced regulatory uncertainty by clarifying SAFE Port Act and MTSA requirements						RA
	Standardization of reader technology throughout industry						
	Access control strengthened by enhanced identity verification, card authentication and card validation; reduced consequence given increased likelihood of stopping the attack at the checkpoint, farther from the main target; reduced consequence by immediate identification of intent and a greater chance of implementing measures; and, a potential deterrent given enhanced security and attacker desire to maximize success						
	Reduction of human error when checking identification and manning access points						
Costs (in Millions)							
Annualized monetized costs (\$ Millions)	\$21.9	7%	N/A	7%	N/A	7%	RA
	\$20.4	3%	N/A	3%	N/A	3%	RA
Annualized quantified, but unmonetized, costs	--						
Qualitative (un-quantified) costs	Costs associated with notification of access control system failures						
Transfers							
Annualized monetized	n/a		n/a		n/a		
From whom to whom?							
Annualized monetized transfers: "off-budget"	n/a		n/a		n/a		
From whom to whom?	n/a		n/a		n/a		
Miscellaneous Analyses/Category							
Effects on State, local, and/or tribal governments	No						RA/FRFA
Effects on small businesses	We expect this rule to have an impact on small businesses						RA/FRFA
Effects on wages	No determination		No determination		No determination		
Effects on growth	No determination		No determination		No determination		

Notes:

- (1) Discount rate appears to the right of the estimates.
- (2) Annualized monetized costs include both industry and government costs.

1) Introduction

This RA provides an assessment of potential impacts to industry and the economy from the Transportation Worker Identification Credential (TWIC) – Reader Requirements final rule [USCG-2007-28915]. This report does not attempt to exactly replicate the regulatory language of the final rule or the language of any other supporting documentation; the regulatory text, not the text of this RA, is legally binding. We urge the reader to review the final rule before reviewing this RA.

This RA provides supporting documentation for certain regulatory requirements addressed in the final rule, specifically, the economic impact analysis related to Executive Order 12866 as amended by Executive Order 13563 and the assessment of small entity (business) impacts related to the RFA (5 U.S.C. 601-612). It does not provide supporting documentation for other regulatory requirements, environmental impacts, risk assessments, or technology and operational performance issues involved with this rulemaking.

1.1 Summary of Requirements Resulting in Costs

This final rule will require owners and operators of certain vessels and facilities regulated by the Coast Guard to use electronic TWIC inspection through approved TWIC reader systems (“TWIC readers”), or the PACS equivalent, as an access control measure. This rulemaking separates the affected population of vessels, facilities, and OCS facilities into risk groups with tiered requirements for access control based on risk hierarchy; see the “Discussion of Comments and Changes to the Final Rule” section of the preamble for more details of the development of this rulemaking and the risk-based approach and methodology. The risk hierarchy methodology determines if owners and operators will or will not be required to install and use card reader systems, focusing on those with the greatest potential consequences.

The final rule will require all facilities and one vessel in Risk Group A to comply with additional electronic worker identity authentication and additional TWIC authentication and validation provisions over and above the current requirements to use the TWIC as a flash pass. These provisions necessitate that owners and operators acquire, install and operate approved card reader technology, perform regular Canceled Card List (CCL) downloads, and comply with access control recordkeeping requirements. The final rule will also require all owners and operators to amend their security plans based on how they will comply with the new requirements.

The following sections of the final rule result in additional impacts to industry:

- 101.520 Electronic TWIC inspection.
- 101.535 Electronic TWIC inspection requirements for Risk Group A.
- 104.235(b)(9) Vessel recordkeeping requirements.
- 104.405 Format of the Vessel Security Plan (VSP).
- 105.225(b)(9) Facility recordkeeping requirements.
- 105.405(a)(10) Format and content of the Facility Security Plan (FSP).

In general, these provisions will require certain changes, and therefore bring additional costs and impacts, for certain owners and operators in all risk groups affected by this rulemaking. The costs associated with these provisions are explained in detail in Chapter 4 of this RA. Appendix A summarizes the cost impacts of the regulatory requirements.

The requirements set forth in this final rule differ from those discussed in the 2009 TWIC Advanced Notice of Proposed Rulemaking (ANPRM) and the 2013 TWIC Reader Requirements Notice of Proposed Rulemaking (NPRM). Specifically, based on feedback received on the ANPRM and subsequent further analysis, in the NPRM, we narrowed the affected population in the NPRM to just Risk Group A. Similarly, based on feedback to the NPRM, we further refined requirements exempting some facilities and most of the vessels. The differences among the ANPRM, the NPRM, and the final rule are shown in Table 1.1.

Table 1.1 Change in Requirements, ANPRM, NPRM, and Final Rule

	ANPRM	NPRM	Final Rule
Classification of Facilities and Vessels into Risk Groups	Three Risk Groups based on MSRAM and other data	Same requirements as ANPRM.	The final rule removes barge fleeting facilities from Risk Group A and raises the threshold for vessels being exempted from TWIC reader requirements from 14 to 20 or fewer TWIC-holding crewmembers.
TWIC Inspection Requirements for Risk Group A	Use an electronic TWIC reader to utilize the card's most protective measures for identity verification, card authentication, and card validation. This would require matching the cardholder's biometric information with that on the card.	Same requirements as ANPRM. This would increase the burden on industry compared to the current use of TWIC for visual inspection only.	The final rule provides additional flexibility and choice with regard to electronic readers.
TWIC Inspection Requirements for Risk Group B	Requirements would differ by MARSEC Level. At MARSEC Level 1, Risk Group B facilities would be required to use TWIC as a visual identity badge with random monthly verification checks using TWIC readers. These facilities and vessels would not be required to perform a biometric match.	Non Risk-group A vessels and facilities are required to use TWIC as a visual identity badge only (at all MARSEC Levels). As discussed in Chapter 6 of this RA, this change would result in a decreased cost to industry over that which was proposed in the ANPRM, as only those facilities with the highest risk (top 80% of consequences) would be required to have readers.	No change in burden for Risk Group B (that is now redefined as non-Risk Group A).
TWIC Inspection Requirements for Risk Group C	Required to use TWIC as a visual identity badge only.	Same requirements as the ANPRM. There would be no increased burden for Risk Group C.	No change in burden for Risk Group C (that is now redefined as non-Risk Group A).
Recurring Unescorted Access (RUA)	RUA would allow the owner/operator of a vessel or facility to grant up to 14 TWIC-holders the privilege of entering secure areas on a repetitive basis without having their TWICs scanned each time.	No RUA. No longer necessary, as vessels with fewer than 14 TWIC-holding crew will not require TWIC readers.	Designated Recurring Access Area (DRAA) replaces RUA in the final rule and potentially reduces burden for affected entities.
TWIC Reader approval, calibration and compliance	The ANPRM proposed that owners/operators follow the standards/specifications that will be developed from the TWIC pilot. TWIC readers would be required to be inspected, tested, calibrated, and maintained in accordance with the manufacturers' recommendations, and that records of those actions be maintained as well.	Same requirements as the ANPRM.	No longer necessary as the increased flexibility by the final rule will allow the use of existing systems with minor modifications and increase the pool of available reader technology.
Security Plan Amendment	Requires all affected owners/operators to amend their security plans to include TWIC requirements within 6 months of promulgation of a final TWIC reader rule.	Same requirements as the ANPRM. There would be a burden associated with security plan amendments for Risk Group A.	Same requirements as the NPRM.

	ANPRM	NPRM	Final Rule
Recordkeeping	<p>The following must be recorded: For each individual granted unescorted access to a secure area, the: FASC-N; date and time that unescorted access was granted; and, if captured, the individual's name. Additionally, documentation to demonstrate that the owner or operator has updated the CCL with the frequency required in § 101.520 of this subchapter.</p>	<p>Same requirements as the ANPRM. There would be a burden associated with the recordkeeping requirement for Risk Group A.</p>	<p>Same requirements as the NPRM</p>

The changes made from the ANPRM to the NPRM and the final rule represent a significant reduction in potential cost to industry, as is detailed in Chapter 6 of this RA.

1.2 Objective of the Rulemaking

We anticipate that this rulemaking will enhance the security of ports and vessels by providing an effective means to ensure that only persons who hold valid TWICs are granted unescorted access to secure areas on high-risk vessels and port facilities. It will provide enhancements over the current level of security and access control currently required at certain types of facilities regulated under the MTSA. It will also complete the implementation of the MTSA transportation security card requirement, as well as the requirements of the SAFE Port Act for regulations on electronic readers for use with TWICs.

The finalized electronic TWIC inspection requirements will enhance security procedures and protocols currently in place as a result of the 2006 MTSA regulations and the 2007 TWIC regulations found in 33 CFR Subchapter H. Sections 104.265, 105.255 and 106.260, respectively, discuss security measures for access control at MTSA-regulated vessels, facilities, and OCS facilities. These sections detail the requirements to deter the unauthorized introduction of dangerous substances and devices, secure dangerous substances and devices that are authorized, and control access, which includes preventing unescorted individuals from entering certain areas without a duly issued TWIC. The introduction of electronic TWIC inspections will be an enhancement over the current security baseline.

1.3 Statement of Need

There exist potential port security risks related to not having sufficiently robust identity verification, card authentication and card validation⁷ as part of access control at the highest risk MTSA-regulated vessels and facilities. To this end, the MTSA transportation security card requirement, as well as the SAFE Port Act electronic TWIC inspection

⁷ See U.S. Coast Guard Assessment of TWIC and TWIC Readers, Fiscal Year 2014 Report to Congress (TWIC Report to Congress), p.7 for definitions of the identity verification, card authentication and card validation.

requirements call for the installation and use of electronic readers to verify and validate the information presented on a TWIC upon requesting unescorted access to a secure area of a vessel or facility. Owners and operators of these facilities and vessels have not implemented electronic readers despite congressional mandates for biometrically enabled cards that need such systems to be fully functional. Facility and vessel owners want to protect their facilities, but may not fully incorporate into their decisionmaking the consequences of attacks (with more offsite consequences for the facilities impacted) and thus not see sufficient value to drive installation of readers.

The electronic TWIC inspection requirements will enhance access control and thus security by strengthening identity verification, card authorization and card validation.

1.4 Changes in Regulatory Analysis from NPRM to Final Rule

In this section, we summarize the changes in the RA as we moved from the NPRM to this final rule. These changes to the RA came from either policy changes on the electronic TWIC inspection requirements, public comments received after the publication of the NPRM in March 2013, or simply from updating the data and information that informed our regulatory analysis. Table 1.2 breaks down these changes by corresponding element in our regulatory analysis with the reason why our analysis needed to change as well as an explanation on each change.

Table 1.2 Changes in Regulatory Analysis from NPRM to Final Rule

Element of Regulatory Analysis	Reason Changed	Explanation of Change
Affected Population	Policy change	a. Barge fleeting facilities were removed reducing the previous facility population of 532 to 525, and b. Crew size changed to 20 (instead of 14) and thus reducing the number of vessels to 1.
Cost of TWIC Readers	Update to reflect current prices for TWIC readers	The most recent prices of electronic TWIC readers as published in GSA schedule and TSA's QTL were significantly reduced.
	Comments received	Some public comments suggested that TWIC reader costs have declined since the NPRM RA data was collected.
Wages for transportation workers	More current BLS data	Revised labor cost by using May 2012 BLS data.
Maintenance Cost of TWIC Readers	Comment received	Revised this cost assumption from 5% of the total cost of a TWIC Reader to 10%.
Number of TWIC Readers	Comment received	Per one large ferry passenger facility's input, incorporated this facility's higher number of readers in cost estimates.

1.5 Treatment of Costs

The requirements in the final rule do not specifically require the purchase and use of TWIC readers for the affected population of facilities and vessels, if a PACS or other system can accomplish the same process of electronic TWIC inspection. This added compliance method provides flexibility to the affected population and allows them to leverage existing systems and infrastructure. As the existing infrastructure and systems would be specific to each facility or vessel, and we are uncertain as to what portion of the affected population would chose to comply through this alternative approach, the remainder of the cost analysis in this RA estimates the cost of complying with electronic TWIC inspection requirements as the cost to purchase, install and use of electronic TWIC readers. As facility and vessel owners will only use the alternatives to TWIC readers if these approaches are more cost-effective or more efficient for existing business practices; the cost estimates in this RA may overstate actual compliance costs.

2) Regulated Industry and Affected Population

This final rule will affect owners and operators of certain vessels and facilities regulated by the Coast Guard under 33 CFR chapter 1, subchapter H, commonly known as “MTSA-regulated” vessels and facilities. This final rule segregates MTSA-regulated vessels, facilities, and OCS facilities into different risk groups. Each risk group will have its own associated electronic TWIC inspection requirements.

The Coast Guard estimates that this final rule will affect specific owners and operators of MTSA-regulated, U.S.-flagged vessels and domestic facilities. We obtained population data from the U.S. Coast Guard’s MISLE database. Based on this data, we estimate the following population of MTSA-regulated entities: 3,647 unique owners/operators of 13,825 vessels, 2,046 unique owners/operators of 3,270 facilities, and 19 unique owners/operators of 56 OCS facilities. This proposal will only impact a subset of the MTSA-regulated population, based on the risk-based hierarchy described below.

2.1 Risk-Based Affected Vessel and Facility Populations

The rulemaking separates MTSA-regulated vessels, facilities, and OCS facilities into different risk groups, as discussed in the ANPRM and the NPRM. In this final rule, each risk group will have its own associated electronic TWIC inspection requirements. Figures 2.1 and 2.2 summarize the criteria for the risk groups for vessels and vessel services subject to 33 CFR part 104, and facilities and facility services subject to 33 CFR part 105. Risk Group A for vessels and facilities will consist of those vessels and facilities with highest consequence for a TSI. Risk Group B will be comprised of facilities and vessels that make up the second tier of risk. All OCS facilities will also be included in Risk Group B. Risk Group C will be comprised of the lowest tier of risk. For the purposes of the final rule, Risk Groups B and C have been combined and are referred to as “Non-Risk Group A”. This risk-based hierarchy was validated by the Homeland Security Institute (HSI), and is discussed further in Section 3.1 of this RA.

Figure 2.1 Risk Groups for MTSA-Regulated Vessels

Risk Group A

- (1) Vessels that carry Certain Dangerous Cargoes (CDC) in bulk;
- (2) Vessels certificated to carry more than 1,000 passengers; and
- (3) Towing vessels engaged in towing barges subject to paragraphs (1) or (2).

Non-Risk Group A

- (1) Vessels that carry hazardous materials other than CDC in bulk;
- (2) Vessels subject to 46 CFR chapter I, subchapter D, that carry any flammable or combustible liquid cargoes or residues.
- (3) Vessels certificated to carry 500 to 1,000 passengers; and
- (4) Towing vessels engaged in towing a barge or barges subject to paragraphs (1), (2), or (3).
- (5) Vessels carrying non-hazardous cargoes that are required to have a vessel security plan;
- (6) Vessels certificated to carry fewer than 500 passengers;
- (7) Towing vessels engaged in towing barges subject to paragraphs (5) or (6);
- (8) Mobile Offshore Drilling Units; and
- (9) Offshore Supply Vessels (OSVs) subject to 46 CFR chapter I, subchapters L or I.

Figure 2.2 Risk Groups for MTSA-Regulated Facilities*

Risk Group A⁸

- (1) Facilities that handle CDC in bulk or receive vessels carrying CDC in bulk; and
- (2) Facilities that receive vessels certificated to carry more than 1,000 passengers.

Non-Risk Group A

- (1) Facilities that receive vessels that carry hazardous materials other than CDC in bulk;
- (2) Facilities that receive vessels subject to 46 CFR chapter I, subchapter D, that carry any flammable or combustible liquid cargoes or residues;
- (3) Facilities that receive vessels certificated to carry 500 to 1,000 passengers; and
- (4) Facilities that receive towing vessels engaged in towing a barge or barges carrying hazardous materials other than CDC in bulk, crude oil, or certificated to carry 500 to 1,000 passengers.
- (5) MTSA-regulated facilities that receive vessels carrying non-hazardous cargoes that are required to have a vessel security plan;
- (6) Facilities that receive towing vessels engaged in towing a barge or barges carrying non-hazardous cargoes; and
- (7) Facilities that receive vessels certificated to carry fewer than 500 passengers.

* OCS facilities subject to 33 CFR part 106 fall into Non-Risk Group A.

The populations of MTSA-regulated vessels, facilities, and OCS facilities are broken down by risk group in the tables below. These estimates are based on the MSRAM Analysis detailed in the “Discussion of Proposal” section of the NPRM and additional review by the Coast Guard Office of Port and Facility Activities and the Marine Safety Center. This population is filtered here, with many vessel and facility types exempted. As such, and as described below, the population in this proposed rule is a subset of the MTSA-regulated population.

The vessel population is separated into self-propelled vessels and barges. We do not anticipate that barges will be impacted by this final rule given limited numbers of personnel on board. For the purpose of our analysis, we assume that barges are manned with no more than 20 persons, and as such, will not be required to comply with electronic TWIC inspection requirements. Removing barges from the Risk Group A population reduces our affected population from 3,313 vessels to 138 vessels. Of these 138 vessels, 137 also have crew sizes less than 21 and are thus exempt from electronic TWIC inspection requirements. This will further reduce the affected population from 138 vessels requiring TWIC readers to 1 vessel.

⁸ While this rulemaking does not include container facilities or vessels in its definition of Risk Group A, there may be cases where the cargo being handled by a container facility or vessel (e.g., CDC) would necessitate a Risk Group A classification.

Table 2.1 Affected Vessels by Risk Group

Risk Group	Owners/Operators ⁹		Vessels	
	Self-Propelled	Barges	Self-Propelled	Barges
A	1	-	1	-
Non-A	1,864	433	5,221	5,291

The facility population was adjusted to remove public access facilities and other facilities not required to have an Alternate Security Program (ASP) or Facility Security Plan (FSP), as well as facilities that are part of another FSP, and other facilities that have been granted waivers from certain MTSA provisions. This removes 653 facilities and 489 owners from the overall MTSA-regulated population as shown in Table 2.2. These facilities will not be required to use TWIC readers because it will be technologically or operationally unfeasible to implement readers at this time as the total net benefit is less than it is for just Risk Group A facilities. Table 2.2 decomposes the remaining facilities by risk group and accounts for the barge fleeting facilities that are not required to comply with this final rule, as discussed in the previous chapter. While this rulemaking does not include container facilities in its definition of Risk Group A, there may be cases where the cargo being handled by a container facility or vessel (e.g., CDC) would necessitate a Risk Group A classification. The affected population used for this rulemaking includes three such facilities.

Table 2.2 Affected Facilities by Risk Group

Risk Group	Owners/Operators ¹⁰	Facilities
A	340	525
Non-A	1,334	2,092
Total	1,674	2,617

Based on the risk hierarchy, OCS facilities that are shown in Table 2.3 are not considered high-risk for this final rule, and as such, we do not analyze the impact of the electronic TWIC inspection rulemaking on this population given that they do not have requirements for readers.

⁹ Some owners/operators have multiple vessels in different risk groups. The sum of the owners/operators by risk group, therefore, may not equal the total number of owners/operators in the affected population.

¹⁰ Some owners/operators have multiple facilities in different risk groups. The sum of the owners/operators by risk group, therefore, may not equal the total number of owners/operators in the affected population.

Table 2.3 OCS Facilities Population

Owners/Operators	Facilities
19	56

*All OCS facilities subject to 33 CFR part 106 fall into non-Risk Group A.

In the analysis supporting the 2006 ANPRM that estimated previously proposed card reader requirements, the mandatory card reader requirement costs were estimated for 5,257 vessels, 3,492 facilities, and 42 OCS facilities. For this final rule, we estimated mandatory card reader requirement costs for 1 vessel and 525 facilities due to the new requirements, which are focused on high-risk facilities as shown in Table 2.4 below.

Table 2.4 Affected Number of Facilities and Vessels

Facilities	Vessels
525	1

2.2 Movement Between Risk Groups

This final rule allows for movement between risk groups, when specified in an approved security plan. This provision will allow for a facility or vessel to operate at a different risk group depending on the cargo being carried or handled. The purpose of this provision is to offer relief for facilities or vessels that handle Risk Group A type cargo infrequently, such as a facility that handles bulk CDC or receives vessels carrying bulk CDC only one or two times a year. Because these facilities will be required to comply with all electronic TWIC inspection requirements for Risk Group A when handling CDC cargo or otherwise operating in a manner that will put them in Risk Group A, we expect any facilities to deploy appropriate electronic TWIC inspection infrastructure that will enable them to operate as a Risk Group A facility. Because facilities taking advantage of this provision will have to purchase and install TWIC readers to comply with the requirements at the highest risk group they may operate under, we do not anticipate a reduction in implementation period costs for these facilities. However, because we assign facilities or vessels into the risk groups based on their highest risk group determination,¹¹ there may be some facilities or vessels in Risk Group A that incur fewer day to day operational costs than are estimated in this analysis, since they will not have to use a TWIC reader during the periods that they are not operating as a Risk Group A facility. These potential cost savings, however, are not estimated in this RA.

2.3 Estimated TWIC-Holder Population

The TWIC Pilot Report lists estimates of the number of TWIC-holders by facility type for the pilot participants. These numbers represent the estimated potential population of

¹¹ Even though a facility or vessel may only handle CDC a few times per year it is still classified as a Risk Group A facility or vessel for the purposes of this analysis.

TWIC-holders who might access participating facilities by various means, including truck, vehicle, or pedestrian gate.¹² Table 2.5 shows these estimates.

Table 2.5 Estimated Population of TWIC-Holders at Pilot Participants, by Facility Type

Facility Type	Truck	Vehicle	Pedestrian	Total	Percent of Total
Container Terminals	19,200	100	4,700	24,000	72.4%
Large Passenger Vessels/Terminals	20	200	1,700	1,920	5.8%
Break Bulk Terminals	700	210	700	1,610	4.9%
Petroleum Facilities	225	110	4,765	5,100	15.4%
Small Passenger/Vessel/Towboats/Other	-	100	400	500	1.5%
Total	20,145	720	12,265	33,130	100.0%

We assume that the nationwide distribution of TWIC-holders by facility type is similar to that among TWIC-holders at pilot sites, and we apply Table 2.5's shares of TWIC-holders by facility type from the TWIC Pilot Program data to the current 2,200,000¹³ total number of active TWIC-holders to estimate the total number of all TWIC-holders by facility type. Table 2.6 shows the estimated breakdown of the TWIC-holding population based on the percentage of TWIC-holders reported in the TWIC Pilot Report.

¹² According to Section 4.5.1 of the TWIC Pilot Report, the truck column represents tractor-trailer drivers who transport containerized cargos, oil/petroleum products, and/or break bulk payloads. The vehicle TWIC-holder population consisted of vendors, delivery truck drivers, employees and security personnel who access facilities using vehicles. The pedestrian population included labor, facility employees, and others who access facilities through pedestrian gates.

¹³ TSA provided us the following figures for May 2016 from TWIC Dashboard: 3,887,906 TWIC enrollments since TWIC's inception in 2007 and 2,164,866 current number of active cards. TSA's TWIC PMO Office of Intelligence and Analysis recommended that we use the 2.2 million active TWIC cards figure instead of 3.9 million of TWIC enrollments for the purposes of our regulatory impact analysis. For the last five years the population of TWIC-holders actively using their cards was stable at slightly over 2 million active users.

Table 2.6 Active TWIC-Holders by Facility Type

Participant Group	Percent of Total	Total Population
Container Terminals	72.4%	1,592,800
Large Passenger Vessels/Terminals	5.8%	127,600
Break Bulk Terminals	4.9%	107,800
Petroleum Facilities	15.4%	338,800
Small Passenger/Vessel/Towboats/Other	1.5%	33,000
Total	100.0%	2,200,000

We then divided the estimated number of TWIC-holders in each type by the total number of facilities in each type to obtain an estimate of TWIC-holders per facility, by facility type, as shown in Table 2.7.

Table 2.7 Estimated National TWIC-Holder Population, by Facility Type

Facility Type	Total TWIC-Holders	Total Facilities	TWIC-Holders per Facility
Container Terminals	1,592,800	122	13,056
Large Passenger Vessels/Terminals	127,600	555	230
Break Bulk Terminals	107,800	510	211
Petroleum Facilities (Bulk Liquid)	338,800	1,097	309
Small Passenger/Vessel/Towboats/Other	33,000	333	99
Total	2,200,000	2,617	841

Using the figures from Table 2.8 for the number of TWIC-holder per facility by facility type, we then estimate the total number of TWIC-holder for each risk group. Tables 2.7 through 2.9 show how these values were estimated.

Table 2.8 TWIC-Holders in Risk Group A

	Number of Facilities	TWIC-Holders per Facility	Total TWIC-Holders
Container Terminals	3	13,056	39,168
Large Passenger Vessels/Terminals	92	230	21,160
Break Bulk Terminals	16	211	3,376
Petroleum Facilities (Bulk Liquid)	290	309	89,610
Small Passenger/Vessel/Towboats/Other	124	99	12,276
Total	525		165,590

We then use the estimates for TWIC-holders by risk group to calculate the percent of all TWIC-holders by risk group. Table 2.9 shows the breakdown for estimated TWIC-holder population by risk group.

Table 2.9 TWIC-Holder Population by Risk Group

	TWIC-Holder Population	Percent of Total
A	165,590	7.5%
Non-A	2,034,410	92.5%
Total	2,200,000	100.0%

Our methodology for estimating the number of TWIC-holders by risk group inherently assumes that the number of TWIC-holders per facility is constant across different risk groups. This assumption may not hold if, for example, high-risk facilities have more employees than lower risk ones.

2.4 Facility Access Points

As a means to estimate the number of readers that will be required, we first determined the average number of access points at MTSA-regulated facilities by reviewing FSPs. As outlined in 33 CFR 105.405(a), FSPs include the security administration and organization of the facility and security measures for access control, including designated public areas, among many other items. Through the FSPs we sampled, we were able to estimate the number of access points by facility type. Our analysis of affected facilities includes a review of facility security plans to estimate the average number of access points by aggregated facility grouping. The facility grouping was compiled by facility type. Table 2.10 shows the results of this analysis. Although container facility is not a type specified in the risk group decision making, it is used as a facility type in the TWIC Pilot Program. As such, we include this type to better assess impacts as a separate facility type.

From our review of FSPs, we found minimum, maximum, and average numbers of access points for the aggregated facility groupings. We use the following data to estimate the costs to facilities. Since facilities vary greatly in size, geography, and operation, we use the average number of access points as the basis of this analysis. This average was developed and applied by facility type so as to better account for the differences between facility types.

Table 2.10 Facility Access Points
(Data collected from Facility Security Plans)

Aggregated Facility Groupings*	Min	Max	Average	FSPs with Data (FSP Sampled)
Bulk Liquids	1	18	3	220 (304)
Break Bulk & Solids	1	28	4	101 (176)
Container	1	37	8	155 (204)
Passenger (Cruise)	1	11	4	210 (237)
Passenger (Ferry)*	--	--	2	--
Mixed Use	1	53	6	38 (50)

* Most ferry terminals have a variety of public and worker access points.

An access point to a secure area may require more than one TWIC reader, depending on the type of access point and how it is defined in the FSP. As such, we have estimated the number of readers required per access point for the facility groupings found in Table 2.8, based on data from the TSA's TWIC pilot. Table 2.11 shows the average number of TWIC access points and TWIC readers per facility grouping, based on TWIC pilot data, along with the reader-to-access-point ratio. Although the TSA TWIC pilot is not a statistically representative sample of Group A facilities, it is used here as it is the largest scale study of electronic TWIC inspection impacts, providing the best approximation of the average number of readers likely to be needed at each facility required to use TWIC readers.¹⁴

¹⁴ The number of readers required for each facility will be correlated to the number of access points and the size of the facility. Greater throughput may lead to the need for more access points. Only 2 of 17 pilot participants were Risk Group A facilities and, to the extent that Risk Group A facilities differ from those in the pilot study in terms of size of facility or throughput, our estimate numbers of access points may be either too large or too small.

Table 2.11 Readers Per Access Point
(Data collected from TWIC Pilot)

Facility Type	Average Number of TWIC Access Points¹	Average Number of TWIC Readers¹	Readers per Access Point²
Bulk Liquid	5.0	10.3	2.1
Break Bulk and Solids	6.0	8.3	1.4
Container	10.4	18.0	1.7
Passenger (Cruise)	9.0	16.0	1.8
Passenger (Ferry)	1.0	2.0	2.0
Mixed Use ¹⁵	5.0	4.0	0.7

1 Values in these columns represent the average number of access points and readers by facility type for the TSA pilot. The number of readers includes any readers needed for backup in the case of some system failures.

2 This number represents the average of the individual ratios for each facility, by facility type. They may not equal the ratio of the aggregate readers to access points.

We use the population figures in conjunction with the estimates for access points and the calculation of readers per access point to extrapolate the TWIC Pilot cost estimates to the national population.

¹⁵ For mixed-use facilities the estimated number of readers is less than the estimated number of access points. Although not in the final TWIC Pilot Report, individual pilot reports reported the number of access points they used in the pilot and the number of readers deployed. In the case of the mixed use facilities (which were separated out from the small passenger/towboat/other facility category), each facility used one fewer reader than they had entrances. This may be due to these facilities exclusively using portable readers, allowing for one reader to be used at multiple access points.

3) Data Sources and Independent Research

With the completion of the TSA's TWIC Pilot Program, as well as published independent reports, the Coast Guard has been able to better focus the requirements in this final rule. This chapter briefly discusses some of these data sources and how they affected the final rule.

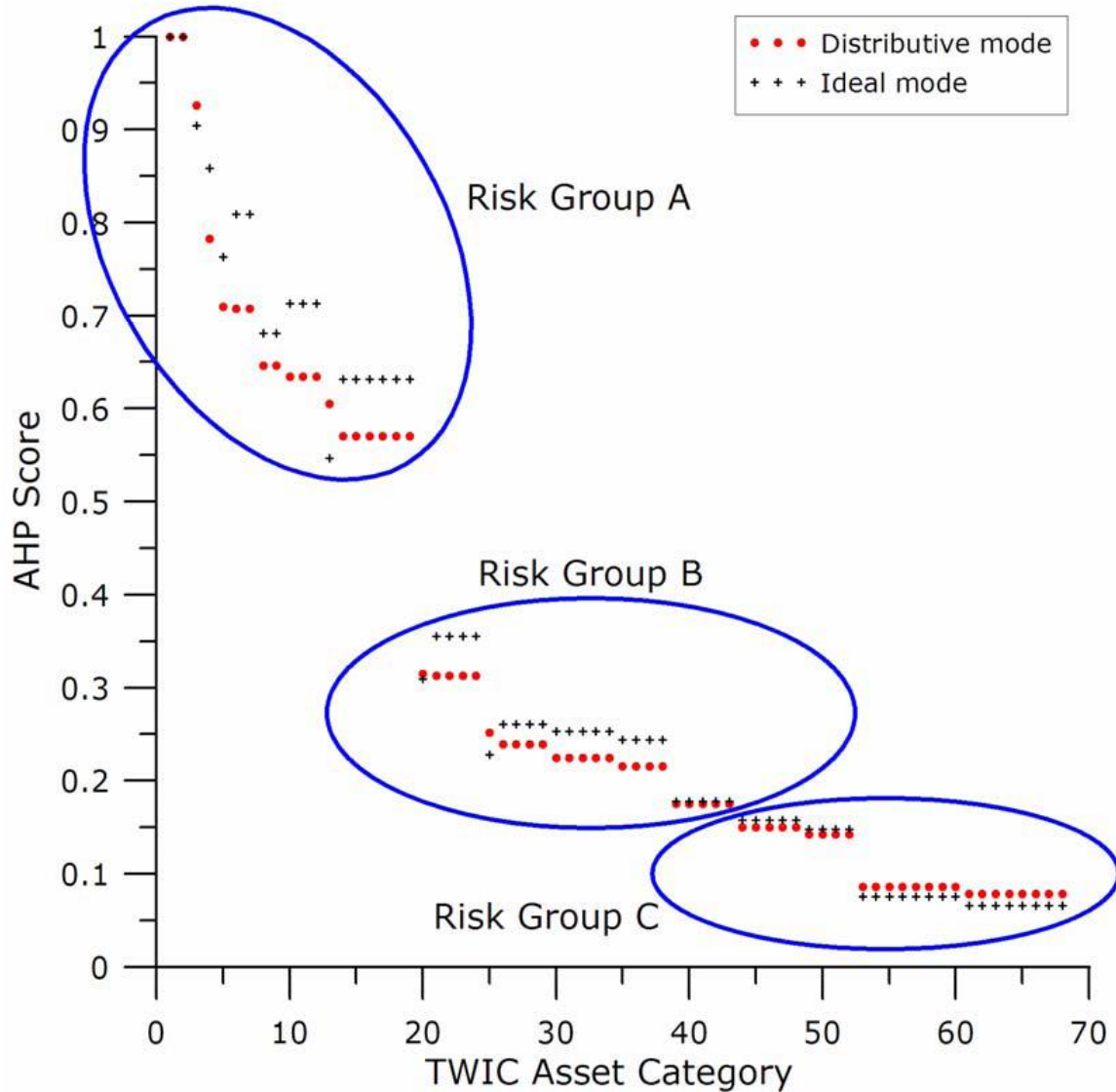
3.1 Homeland Security Institute Study

At the direction of the Office of Management and Budget (OMB), the Coast Guard tasked the HSI to conduct an independent peer review of its TWIC implementation analysis.¹⁶ This involved an independent verification and validation of the reader requirements development process including a verification and validation of the MSRAM-based risk hierarchy presented in the ANPRM. Based in part on the findings and recommendations of this study, the Coast Guard adjusted the applicability of the reader requirements from the ANPRM in the NPRM. As the HSI report shows, the distinction between Risk Groups A and B, based on the Analytic Hierarchy Process (AHP),¹⁷ is well defined, with Risk Group A scores greater or equal to a specified threshold. The distinction between Risk Groups B and C, based on the HSI report, is not as clear as that between A and B with Risk Group B and Risk Group C having AHP scores lower than the threshold. As such, for this final rule, we have removed the electronic TWIC inspection requirements for Risk Group B and will focus only on the requirements for Risk Group A. In addition, for the final rule, we have removed the distinction between Risk Groups B and C, and now refer to the combined group as “Non-Risk Group A.” Figure 3.1 below shows the rank-ordered AHP scores for all 68 TWIC asset categories. Current risk groupings considered in the TWIC report and the NPRM are also displayed. As discussed below, we considered the costs and benefits when deciding which facilities should be required to install readers. We concluded that the level of risk, discussed as consequence, associated with targets in Risk Groups B and C does not warrant the investment in readers at this time given current costs and benefits. In contrast, facilities in Risk Group A have significantly higher risk and can be more cost-effectively protected through this rule.

¹⁶ Independent Verification and Validation of Development of Transportation Worker Identification Credential (TWIC) Reader Requirements, Final, *Homeland Security Institute*, October 21, 2008.

¹⁷ The AHP is a methodology for (1) structuring a complicated problem in a hierarchy, (2) measuring preference on a ratio scale through pair-wise comparisons, (3) establishing global priority, and (4) synthesizing all information for decision making. Three criteria were used in determining the risk rankings, including MSRAM maximum consequence, critical infrastructure and key resource criticality, and TWIC utility. This process was fully explained in the TWIC Reader Requirements ANPRM, Docket No. USCG–2007–28915.

Figure 3.1 Rank-Ordered AHP Scores, with Current TWIC Risk Groupings¹⁸



3.2 TSA Pilot Program

3.2.1 Background

The TWIC Pilot Program was established under Section 104 of the SAFE Port Act. The purpose of the TWIC pilot was to evaluate TWIC and electronic TWIC inspection

¹⁸ Independent Verification and Validation of Development of Transportation Worker Identification Credential (TWIC) Reader Requirements, Final, *Homeland Security Institute*, October 21, 2008. This report was required to validate the MSRAM risk hierarchy completed for the ANPRM.

interoperability and assess the impacts of implementing a transportation security card reader system.

The SAFE Port Act directed the Department of Homeland Security (DHS) to conduct the TWIC pilot to inform the use of TWICs with biometric readers. The purpose of this report was to test the business processes, technology, and operational impacts required to deploy transportation security card readers at secure areas of the maritime transportation system.

3.2.2 Pilot Participants

Five main participant groups were established for the TWIC pilot in an attempt to capture a broad cross-section of the maritime industry. These five groups were container terminals, large passenger vessel terminals, break-bulk terminals, petroleum facilities, and a fifth group that included small passenger vessel terminals, towboat and other facility types. The pilot participants varied in size and traffic, both dimensions of which generally spanned the range of potentially regulated facilities. For a list of the pilot participants, see Appendix B.

The TWIC pilot study conducted between August 2008 and May 2011, and subsequent report released February 27, 2012 provided a sample of costs associated with the implementation of a card reader system that we leveraged to estimate what a reader system would cost on a national scale. These data included estimates for the costs associated with TWIC reader hardware and software, installation costs, infrastructure costs, and costs associated with upgrading or modifying current physical access control systems. The table below shows the final cost data collected from the pilot participants. These data provide a snapshot of what electronic TWIC inspection implementation could potentially cost across a wide spectrum of facility types. While not all of the TWIC pilot participants were in Risk Group A (2 out of 17 participants), using the costs associated with electronic TWIC inspection at facilities not in Risk Group A does not adversely affect our overall estimates. Potential electronic TWIC inspection implementation costs should not differ greatly across risk groups, as the size and geography of a facility is independent of its risk grouping. The affected population is based on common characteristics of facilities. The key difference between the risk groups is the potential consequences of a TSI¹⁹ at a particular facility, not the costs associated with potential electronic TWIC inspection deployment. Again, although the data from the TWIC pilot is not from a statistically representative sample of the affected population of MTSA-regulated facilities and vessels affected by this final rule, the pilot presents the most complete information available regarding the costs associated with large-scale reader implementation and integration for access control. Table 3.1 presents summary data from the pilot that we used in this RA.

¹⁹ 46 U.S.C. 70101(6) defines the term “Transportation Security Incident” in part as a security incident resulting in a significant loss of life, environmental damage, transportation system disruption, or economic disruption in a particular area.

Table 3.1 Summary of TWIC Pilot Study Data²⁰

Participant	Category	TWIC Access Points	TWIC Readers	Reader Costs	PACS Costs	Infrastructure Costs	Installation/Integration Costs	Total
1	Petroleum	10	15	\$64,155	\$272,836	\$162,440	\$80,133	\$579,564
2		4	15	\$152,000	\$103,500	\$301,000	\$142,500	\$699,000
3		1	1	\$4,240	\$0	\$2,000	\$4,000	\$10,240
4	Break-Bulk	11	15	\$75,000	\$150,000	\$711,583	\$50,000	\$986,583
5		1	4	\$109,203	\$138,625	\$8,000	\$12,000	\$267,828
6		6	6	\$68,340	\$120,983	\$196,376	\$81,661	\$467,360
7	Container	7	21	\$239,914	\$184,342	\$216,494	\$467,099	\$1,107,849
8		5	6	\$263,083	\$138,625	\$15,463	\$50,000	\$467,171
9		5	11	\$172,967	\$138,625	\$90,000	\$50,000	\$451,592
10		11	13	\$266,400	\$713,190	\$400,000	\$645,500	\$2,025,090
11		24	39	\$245,463	\$646,707	\$592,893	\$724,925	\$2,209,988
12	Large Passenger Vessel	5	5	\$53,903	\$0	\$0	\$9,933	\$63,836
13		13	27	\$243,462	\$80,283	\$391,396	\$106,836	\$821,977
14*	Small Passenger Vessel/	1	2	\$15,845	\$0	\$0	\$0	\$15,845
15		2	1	\$16,200	\$0	\$0	\$0	\$16,200
16*	Towboat/ Other	1	2	\$15,282	\$0	\$0	\$0	\$15,282
17		8	7	\$83,405	\$69,000	\$350,000	\$455,060	\$957,465

* Note that in subsequent tables, these two pilot participants are separated out from this broad category and are discussed as small passenger facilities. The other two in this category will be discussed as Mixed Use in the subsequent analysis.

²⁰ Transportation Worker Identification Credential Reader Pilot Program, February 27, 2012. A table of the TWIC implementation costs can be found on page 22, Table 4-1. A copy of this report can be found on the docket for this rulemaking. Data on TWIC access points and TWIC readers are taken from intermediate reports from the Pilot study, but are not found in the final report released February 27, 2012

3.3 Pilot Results

The TSA TWIC pilot provided significant insights to advance the electronic TWIC inspection requirements. The TWIC pilot brought to light some of the operational and technical difficulties at many pilot locations, but also demonstrated that many options are available to facility and vessel operators for validating the authenticity of a TWIC card and verifying the identity of the TWIC-holder. The TWIC pilot affirmed the need for a performance-based standard to allow flexibility in the deployment of electronic TWIC inspection to provide a best-fit solution due to the uniqueness of each regulated facility and vessel operation.

3.4 Use of Pilot Data

The Coast Guard used the TWIC pilot findings in a number of ways. The TWIC pilot findings were the source for data on the deployment costs of electronic TWIC inspection, as well as the number of readers per access point, throughput times, population of TWIC-holders by facility type, and failure rates of readers. Pilot data was supplemented with other available data sources to provide preliminary estimates of costs and benefits. Other data sources included MISLE for population figures, Facility Security Plans for the number of access points per facility, MSRAM for risk hierarchy and consequence data, the GSA schedule for reader hardware and software costs, U.S. Environmental Protection Agency data for estimates for truck throughput, and other literature for basic background on electronic TWIC inspection.

4) Costs of Electronic TWIC Inspection Requirements

This chapter discusses the estimated cost associated with the implementation of the electronic TWIC inspection requirements. The costs associated with the electronic TWIC inspection requirements will be borne by MTSA-regulated entities based on a tiered system. The following analysis is broken down into three sections. Section 4.1 estimates the costs to waterfront facilities as a result of the electronic TWIC inspection requirements. Section 4.2 estimates the associated costs to vessel owners. Section 4.3 presents estimates of additional costs. Section 4.4 summarizes total costs to industry. Section 4.5 discusses cost mitigation, and Section 4.6 estimates government and total costs.

For this final rule, we present costs by risk group for affected owners and operators of certain vessels, facilities, and OCS facilities. The conclusion of this chapter aggregates these estimates into national (direct industry) cost estimates.

Although the final rule refers to more stringent requirements under elevated Maritime Security (MARSEC) Levels²¹, we assess the costs of this rule assuming operation under MARSEC Level 1. The MARSEC Level has risen above MARSEC Level 1 few times, and not within the last five years. As such, the requirements for elevated MARSEC Levels would infrequently occur. Furthermore, overall costs associated with an increase in MARSEC Level would be targeted to a location and time, and in response to specific threat information. Such changes would trigger a number of existing requirements, of which reader costs would be a small subset. Additionally, the enhanced security afforded by the readers may cause Captains of the Ports (COTPs) to be less likely to initiate other potentially more expensive security changes in response to an elevated MARSEC level, thereby providing potential cost savings. Neither these potential savings nor potential costs are assessed here, given the lack of data from these infrequent and targeted increases in MARSEC Levels.

We also present and discuss for each primary cost driver or key assumption in the below cost analysis section whether a public comment was received and if we modified or kept unchanged those assumptions and ensuing cost analyses or estimates based on such comment and continuous review of the current industry data.

4.1 Costs to Facilities

The reader requirements will only apply to those 525 facilities in Risk Group A, as those facilities pose the greatest risk of, and highest consequence from, a TSI. The remaining facilities will not incur costs under this final rule. After the publication of the NPRM, we received several comments questioning whether barge fleeting facilities should have been

²¹ Section 101.525 requires different CCL download frequencies at each MARSEC Level. At MARSEC Level 1, CCL information should not be more than 7 days old while at MARSEC Level 2 and 3, the card validity check must be conducted using CCL information that is no more than 1 day old. Also, the CCL information used to conduct the card validity check must be updated within 12 hours of any increase in MARSEC level, no matter when the information was last updated.

required to implement an electronic TWIC inspection program. Based on these comments and upon further consideration, this final rule excludes those barge fleeting facilities, and therefore, reducing the NPRM's affected population of 532 facilities to the current population of 525 facilities.

There are ten primary cost drivers for this proposed rule:

1. TWIC reader, which includes hardware and software.
2. Installation of the TWIC readers at the facility.
3. Infrastructure updates required for the TWIC readers to operate or be installed in appropriate locations, including costs to integrate TWIC readers with existing PACS.
4. Maintenance.
5. Amending the FSP.
6. Recordkeeping systems.
7. Updating the CCL.
8. Training personnel to perform electronic TWIC inspections.
9. Delay costs due to reader failures.
10. Additional delay, travel and TWIC replacement costs due to TWIC failures.

4.1.1 TWIC Reader Costs

To estimate the costs of the electronic TWIC inspection requirements, the Coast Guard had to estimate the number of readers needed nationwide. To do this, we obtained data from the Coast Guard MISLE database, research conducted by subject matter experts in the Coast Guard's Office of Port and Facility Compliance, as well as data provided in the TWIC Reader Pilot Program conducted by the TSA.

Several steps were needed to estimate the number of TWIC readers required on a national scale. The first step was to determine the number of access points per facility based on facility type. To determine this, Coast Guard subject matter experts reviewed FSPs to compile a sample of facilities. From this sample, the corresponding minimum, maximum, and average numbers of access points were generated. Table 4.1 below shows the results of the survey of FSPs.

Table 4.1 Facility Access Points
(Data from collected Facility Security Plans)

Aggregated Facility Groupings	Min	Max	Average	FSPs with Data Assessed (FSPs Sampled)²²
Bulk Liquids	1	18	3	220 (304)
Break Bulk & Solids	1	28	4	101 (176)
Container	1	37	8	155 (204)
Passenger (Cruise)	1	11	4	210 (237)
Passenger (Ferry)*	--	--	2	--
Mixed Use	1	53	6	38 (50)

* Most ferry terminals have a variety of public and worker access points. Based on limited security plan data, we maintain that there would be an average of two access points for these facilities.

Next, we created an estimate of the number of TWIC readers needed per access point. This ratio was based on the data from the TWIC pilot, and was calculated by dividing the number of readers for each pilot site by the number of access points for that pilot site. Here we used the same grouping of facilities as was used for the access point calculation, we then took the average of the reader-to-access-point ratio by facility grouping to obtain our reader-to-access-point ratio by facility type. The results can be seen in Table 4.2 below.

²² Some FSPs did not contain enough data to include in this analysis, however, we believe that we were able to get a reliable sample based on the high percentage of FSPs that did contain data.

Table 4.2 Readers per Access Point, by Facility Type

(Data from TWIC Pilot)

Participant	Category	TWIC Access Points	TWIC Readers	Readers per Access Point
1	Bulk Liquid	10	15	1.5
2		4	15	3.8
3		1	1	1.0
Average		5.0	10.3	2.1
1	Break-Bulk	1	4	4.0
2		6	6	1.0
3		11	15	1.4
Average		6.0	8.3	2.1
1	Container	7	21	3.0
2		5	6	1.2
3		5	11	2.2
4		11	13	1.2
5		24	39	1.6
Average		10.4	18.0	1.8
1	Large Passenger Vessel	5	5	1.0
2		13	27	2.1
Average		9.0	16.0	1.5
1*	Small Passenger Vessel/ Towboat/ Other	1	2	2.0
3		2	1	0.5
2*		1	2	2.0
4		8	7	0.9
Average	Small Passenger	1.0	2.0	2.0
Average	Mixed Use	5.0	4.0	0.7

* Note that these two pilot participants are separated out from this broad category and are discussed as small passenger facilities. The other two in this category will be discussed as Mixed Use in the subsequent analysis. This breakdown is used to calculate the average values for Small Passenger and Mixed Use categories.

The next step was to combine the average number of access points by facility type with the corresponding reader-to-access-point ratio to estimate the number of readers required by facility type. These results are shown in Table 4.3.

Table 4.3 Estimate of Average Number of Readers per Facility Type*

Facility Type	Average Number of Access Points¹ (A)	Reader to Access Point Ratio² (B)	Average Number of Readers Required (A * B)
Bulk Liquid	3	2.1	6.3
Break Bulk and Solids	4	2.1	8.5
Container	8	1.8	14.7
Large Passenger	4	1.5	6.2
Small passenger	2	2.0	4.0
Mixed Use	6	0.7	4.1

* Values are rounded from actual calculations and may not average to the exact numbers presented in the table.

¹ Based on data collected from FSPs.

² Based on data collected during the TWIC pilot. It should be noted that because the pilot was voluntary, when readers broke down, participants generally reverted to current visual TWIC inspection requirements. This final rule allows for a facility to revert to visual TWIC inspection for persons known to possess a TWIC and who have been previously granted unescorted access for up to 30 days if readers malfunction.

We then broke down the Risk Group A population of 525 facilities by facility type and multiplied the population numbers with the corresponding average number of readers required. The last step in determining the number of readers required on a national scale was to apply a percentage of fixed and portable readers to the number of total readers required. To obtain the numbers for fixed versus portable readers, we again turned to the TWIC pilot. We reviewed the number of fixed and portable readers used by the pilot participants to estimate the percentages of fixed and portable readers needed by facility type and used these percentages to estimate the total number of fixed and portable readers required (see TWIC Pilot Study Report, Table 4.2).²³ These numbers are detailed below in Table 4.4.

We received public comments on the number of readers stating that we underestimated the average number of readers in our cost analysis. The one commenter that provided a specific estimate was a large ferry facility with an estimate for the number of readers needed at 62. The average of 4 readers per facility used in the NPRM analysis represents the average number per facility derived from facility plans and TWIC pilot data. To acknowledge that large passenger facilities at the high end of the distribution would have a larger number of readers, we use the 62 readers as the proxy for the top 5th percentile of passenger facilities. Thus, for 3 facilities (5 percent of 63 facilities), we assume 62 readers per facilities, and maintain the average number of readers per facility for the remaining 60 passenger facilities.

²³ The pilot data included the number of readers per pilot site by reader type, i.e. fixed or portable. We calculated a percent for each type of reader by facility type and extrapolated across the entire affected population.

Table 4.4 Estimate of Total Readers*

Facility Type	Facility Count	Average Number of Readers Required	Total Readers	Average Percent Fixed	Average Percent Portable	Fixed	Portable
Bulk Liquid	290	6.3	1,827	84%	16%	1,535	292
Break Bulk and Solids	16	8.5	136	67%	33%	91	45
Containerized	3	14.7	44	82%	18%	36	8
Passenger Cruise	92	6.2	566	7%	93%	42	524
Passenger Ferry	63	6.8	426	0%	100%	0	426
Average	60	4.0	240	0%	100%	0	240
Large Passenger Ferry	3	62.0	186	0%	100%	0	186
Mixed Use	61	4.1	252	71%	29%	180	72
Total	525		3,251			1,884	1,367

* Values are rounded from actual calculations and may not average or total to the exact numbers presented in the table.

To complete the cost calculation for the readers, we next researched the equipment costs for all TWIC readers that have passed the TSA’s test to conform with its TWIC reader requirements, and thus, placed on the QTL.²⁴ The NPRM RA’s reader cost estimates relied on the ICE Test and utilized those equipment costs listed on the GSA price schedule as no readers were yet on the QTL.²⁵ The QTL includes all five readers that are currently approved by TSA for use in reading TWICs. Instead of using GSA schedule listed prices for TWIC readers,²⁶ as was the case for the NPRM RA, this time we utilized QTL’s reader information to obtain an average cost for portable readers and used GSA schedule for fixed readers.²⁷ Table 4.5 below shows the results of this research.

²⁴ While we note that TSA does not directly publish the QTL on its website, it is available to manufacturers. We have provided a link to a version of the current QTL available on the Department of Homeland Security website for informational purposes:

<https://universalenroll.dhs.gov/permalinks/static/twic-reader-qt>

²⁵ <https://www.gsaadvantage.gov>

²⁶ See Appendix C for both TSA’s QTL and ICE lists of approved models and prices.

²⁷ Please note that under this final rule the Electronic TWIC Inspection requirements can be met by fingerprint readers connected to the facility’s access control system as long as the three aspects of electronic TWIC inspection are satisfied. As discussed in the final rule preamble, the final rule does not mandate specific design requirements for TWIC readers and allows the use of biometric input equipment such as a fingerprint reader, vascular scanner, or other means connected to the facility’s access control systems. For purposes of comparison, we provide a sample of such equipment costs that are not listed on TSA’s ICE list.

Table 4.5 Average Reader Costs

	Fixed*	Portable*
Total Average Cost (includes hardware and software)	\$5,373	\$7,035

* For portable readers we used the average of all four products listed on the QTL (Figure C4). For fixed readers, we took the average of fixed reader prices from GSA Schedule (Figure C3).

The average reader costs were then multiplied by the estimated number of readers required to estimate the national cost to purchase readers. Table 4.6 below shows the estimated national costs for readers at Risk Group A facilities. These figures represent the estimated combined hardware and software costs for TWIC readers across all Risk Group A facilities. We divide the initial costs of readers equally among the first 2 years of implementation. Because we could not find reliable data on maintenance and lifespan of TWIC readers, we estimate that every fifth year after implementation, there will be a full replacement of readers equal to that of the implementation year cost. We believe that 5 years is the expected life of readers, based in part on the experience that the Coast Guard has had with readers in the field.

Table 4.6 Estimated National Reader Costs

	Number of Readers*	Average Cost per Reader*	Estimated National Cost
Fixed	1,884	\$5,373	\$10,122,732
Portable	1,367	\$7,035	\$9,616,845
Total	3,251		\$19,739,577

* Both Number of Readers and Average Cost per Reader are rounded. Average Cost per Reader includes hardware and software.

The TWIC Pilot captured several additional costs associated with the deployment of electronic TWIC inspections. These costs include installation and integration, infrastructure costs, and costs associated with modifying PACS to be interoperable with TWIC readers.²⁸ The final regulation uses a performance-based approach, with owners/operators being given significant flexibilities to comply with the reader requirement. At its most basic, owners/operators could merely deploy portable readers, which will require no new infrastructure (owners/operators must have access to control lists, computers and other required capabilities in order to comply with MTSA and other requirements) and little in the form of annual maintenance. We expect this to be the approach used for vessels, and Appendix D shows that installation can come at no cost. Other owners/operators may decide to use fixed readers, in order to increase throughput or for other business reasons. Such installations will involve slightly more infrastructure,

²⁸ These costs could include additional software or infrastructure specifically related to the existing PACS and not the TWIC readers themselves, such as new communications links to connect the old equipment to the new equipment.

including a mounting mechanism for the reader, power to the reader and a communications link to the access control system.²⁹ As such, we expect these marginal costs to be small and require minimal annual maintenance. Still other owners/operators may choose a more complicated installation, including more complex monitoring and decision support systems in their PACS and/or adding gates or extra lanes to further increase throughput.

The Coast Guard is using data on FY06 and FY07 grants, as captured in the TWIC pilot Study, to determine the costs of these reader installations.³⁰ It should be noted that these funds were not funds that facilities decided to spend out of their own resources. These grant funds were used for installing TWIC readers and infrastructure to support the TWIC pilot and were not used to comply with specific regulatory requirements since none currently exist — specific national regulatory requirements for electronic TWIC inspections to meet standards for access control and credential verification is the subject of this rulemaking. Therefore, expenditures used to support the TWIC pilot may not be needed to meet the narrow applicability and minimum performance standards of the regulatory requirements in this final rule. As such, the data captured in the TWIC Pilot Report may overestimate the PACS, infrastructure, and installation costs as noted in our responses to public comments in Section 1.1 of this RA. Absent other data sources, however, the Coast Guard used the data in the TWIC Pilot Report to inform this rulemaking.

To assess these costs for the affected population, we extrapolated the costs reported in the TWIC pilot by first determining a per reader cost for these components for each facility type grouping. This per reader cost was then multiplied by the estimated total number of readers required as shown in Table 4.4. Details are shown in Appendix D. The results of this methodology are shown in Tables 4.7, 4.8, and 4.9.

Additional costs will be required to install and integrate TWIC readers into each facility's access control system. These integration costs may vary greatly by facility based on facility type and whether fixed or portable readers are predominantly employed. To provide an estimate of the installation costs of the electronic TWIC inspection program, we used the TWIC Pilot Program data in Table 3.1 to estimate an average installation cost per reader by facility type.³¹ We did not change our installation costs assumptions based on public comments received on the NPRM, which provided only general characterization and not specific estimated information. This average was then multiplied by the number of total readers per facility type estimated in Table 4.4. Table

²⁹ Pilot participants' installation costs included the costs of encapsulating readers to protect them from weather. Many participants employed some type of device to protect the reader from the elements when mounting them for use at pedestrian or vehicle gates. Due to the nature of the pilot reporting, however, we are unable to separate those costs, or most other costs, from the overall costs provided for installation and infrastructure.

³⁰ See Section 1.6, "Port security Grant Process," p. 9 of the Pilot Report for more information.

³¹ To see the steps used to calculate the cost per reader for installation, infrastructure and PACS costs, see Appendix D.

4.7 shows this calculation. We estimate a total installation cost of \$23.2 million to install and integrate electronic TWIC inspection programs at Risk Group A facilities.

Table 4.7 Installation Costs for TWIC Readers

Facility Type	Number of Readers	Installation Cost Per Reader	Cost By Facility Type
Bulk Liquid	1,827	\$6,281	\$11,475,387
Break Bulk and Solids	136	\$6,648	\$904,128
Container	44	\$20,673	\$909,612
Large Passenger	566	\$2,972	\$1,682,152
Small passenger	426	\$0	\$0
Mixed Use	252	\$32,504	\$8,191,008
Total	3,251		\$23,162,287

Based on the TWIC Pilot Program, we also estimate that there will be infrastructure costs associated with implementing the electronic TWIC inspection requirements. These costs include required supporting investments, such as running power and fiber optics to fixed readers at facilities. It should be noted that participants in the Pilot Program also made several discretionary investments, including installing guard stations, lift gates, fencing, and others that are not directly related to the electronic TWIC inspection requirements. We included these costs in our estimate of installation costs, however the inclusion of these costs may lead to an overestimate of this cost component to the extent that these are unnecessary for security or to facilitate an electronic TWIC inspection program. We calculated the estimates for infrastructure costs the same way we estimated the installation and integration costs. To provide an estimate of the infrastructure costs of the electronic TWIC inspection program, we used the TWIC Pilot Program data in Table 3.1 to estimate an average infrastructure cost per reader by facility type.³² As in the case of installation costs that we discussed in the previous section, we did not change our infrastructure costs assumptions based on public comments received. Table 4.8 shows these infrastructure costs, by facility type. We estimate a \$34.8 million infrastructure cost during the period of implementation.

³² To see the steps used to calculate the cost per reader for installation, infrastructure and PACS costs, see Appendix D.

Table 4.8 Infrastructure Costs for TWIC Readers

Facility Type	Number of Readers	Infrastructure Cost Per Reader	Cost By Facility Type
Bulk Liquid	1,827	\$10,965	\$20,033,055
Break Bulk and Solids	136	\$27,389	\$3,724,904
Container	44	\$13,408	\$589,952
Large Passenger	566	\$7,248	\$4,102,368
Small passenger	426	\$0	\$0
Mixed Use	252	\$25,000	\$6,300,000
Total	3,251		\$34,750,279

Infrastructure costs also include those costs related to integrating the TWIC readers into existing PACS. Based on the Pilot Study, integration of TWIC into current PACS may be more cost effective and efficient than implementing TWIC independent of any current systems, due to fewer operational and technical integration issues. For this reason, we include these costs. The cost reduction for existing PACS was captured through the use of pilot data. Pilot participants who saw a savings due to their current infrastructure would have reported lower costs associated with the pilot, which were then used to calculate the overall average cost per reader. These cost savings would effectively be represented in the average costs per reader.

Based on TSA Pilot Program data, we estimated the average PACS cost per reader installed by facility type, and applied that estimate to the total number of readers by facility type in Risk Group A. To provide an estimate of the PACS costs of the electronic TWIC inspection program, we used the TWIC Pilot Program data in Table 3.1 to estimate an average PACS cost per reader by facility type.³³ As discussed in the derivation of our installation and infrastructure cost estimates earlier, we left our PACS cost estimates unchanged. There were no specific public comments addressing these costs providing any information or data.

Table 4.9 shows these PACS related costs, by facility type. We estimate a \$21.3 million implementation cost to integrate TWIC with current PACS.

³³ To see the steps used to calculate the cost per reader for installation, infrastructure and PACS costs, see Appendix D.

Table 4.9 PACS Costs for TWIC Readers

Facility Type	Number of Readers	PACS Cost Per Reader	Cost By Facility Type
Bulk Liquid	1,827	\$8,363	\$15,279,201
Break Bulk and Solids	136	\$21,607	\$2,938,552
Container	44	\$23,186	\$1,020,184
Large Passenger	566	\$1,487	\$841,642
Small passenger	426	\$0	\$0
Mixed Use	252	\$4,929	\$1,242,108
Total	3,251		\$21,321,687

Based on these costs, we estimate that the electronic TWIC inspection requirements will cost facilities approximately \$99.0 million in capital costs³⁴ for full implementation as shown in Table 4.10. This includes \$19.7 million in TWIC reader costs, and \$79.2 million in costs associated installation, infrastructure, and PACS. We assume that facilities will face similar TWIC reader costs 5 years after implementation, due to equipment replacement.

Table 4.10 Total Facility Capital Costs, 2-Year Implementation Period (Years 1 and 2)

Facility Type	Number of Facilities	Total Readers		Total Reader Costs		Total Costs			Total Capital Cost
		Fixed	Portable	Fixed	Portable	Installation	Infrastructure	PACS	
Bulk Liquid	290	1,535	292	\$8,247,555	\$2,054,220	\$11,475,387	\$20,033,055	\$15,279,201	\$57,089,418
Break Bulk and Solids	16	91	45	\$488,943	\$316,575	\$904,128	\$3,724,904	\$2,938,552	\$8,373,102
Container	3	36	8	\$193,428	\$56,280	\$909,612	\$589,952	\$1,020,184	\$2,769,456
Large Passenger	92	42	524	\$225,666	\$3,686,340	\$1,682,152	\$4,102,368	\$841,642	\$10,538,168
Small Passenger	63	0	426	\$0	\$2,996,910	\$0	\$0	\$0	\$2,996,910
Mixed Use	61	180	72	\$967,140	\$506,520	\$8,191,008	\$6,300,000	\$1,242,108	\$17,206,776
Total	525	1,884	1,367	\$10,122,732	\$9,616,845	\$23,162,287	\$34,750,279	\$21,321,687	\$98,973,830

4.1.2 Maintenance Costs

We assume an annual maintenance cost equivalent to 10% of the cost of the TWIC readers (hardware and software combined) in addition to a cost for replacing readers

³⁴ Capital costs include equipment costs and costs associated with the installation of readers. As per the TSA pilot, these installation costs may include trenching, laying fiber cables, new lift gates, and new guard booths, fencing, or gates.

every five years.³⁵ Because TWIC readers will be used in the harsh maritime environment, we assume that there will be an annual maintenance component to the cost of TWIC readers. Table 4.11 shows the calculation for the TWIC reader maintenance costs. Based on these calculations, we estimate an annual cost of \$2.0 million for reader maintenance.

Table 4.11 Annual Maintenance Costs for TWIC Readers

	Fixed	Portable
Number of Readers	1,884	1,367
Cost Per Reader	\$5,373	\$7,035
Maintenance Cost (Percent of Reader Cost)	10%	10%
Total Maintenance Cost	\$1,012,273	\$961,685

We do not include maintenance costs for infrastructure and PACS that may accompany the TWIC reader installation in this RA and the Final Regulatory Flexibility Analysis (FRFA). Based on our observations during the TWIC pilot implementation, the infrastructure and PACS modifications for TWIC reader installations involve existing infrastructure, such as extended power or communications cables to existing access points, and will not result in additional maintenance costs.

While we expect there to be no additional maintenance costs for infrastructure and PACS, we provide a sensitivity analysis to reveal whether, and to what extent, the results of the cost analysis are sensitive to this assumption.³⁶ We provide an estimate of maintenance costs by using the 10% annual maintenance cost assumption and methodology above for TWIC readers and applying it to the infrastructure and PACS implementation costs in Table 4.10, Total Facility Capital Costs. This will present an estimate of infrastructure and PACS maintenance costs if we found all of the TWIC pilot expenditures resulted in direct compliance costs for this final rule.

As previously discussed, we expect the infrastructure and PACS-related costs collected from the TWIC pilot to be an overestimate and not include additions that require substantive annual maintenance. As a result, we use half of the total infrastructure and PACS implementation costs for the purposes of a sensitivity analysis. Using this information, the undiscounted annual recurring maintenance cost for infrastructure and PACS will be \$2,803,598 per year for Risk Group A facilities after the 2-year

³⁵ In the NPRM RA, we used a 5% maintenance cost assumption made based on USCG experience with similar readers due to lack of historical data on replacement and maintenance costs, as readers have not been widely deployed. However, one commenter provided an estimate of approximately \$300 for card inserts. Incorporating this cost estimate, we revised our maintenance cost estimate to 10% of the total reader cost.

³⁶ OMB Circular A-4, page 3: “It is usually necessary to provide a sensitivity analysis to reveal whether, and to what extent, the results of the analysis are sensitive to plausible changes in the main assumptions and numeric inputs.”

implementation period.³⁷ If we add this to the undiscounted costs of the final rule, then it will increase the annual recurring industry costs from about \$8.1 million to about \$10.9 million (increase by about 34%) and the total 10-year industry costs from about \$198.4 million to about \$201.2 million (increase by 14%).³⁸ Total industry costs of the final rule are presented in Section 4.4 for comparison. This cost differential applies across the alternative shown in Table 6.3, and thus the Final Rule Alternative remains the most cost effective, requiring the least amount of averted attacks to break even.

4.1.3 Operational Costs for Facilities

The final rule will require facilities regulated by 33 CFR part 105 to update their security plans to reflect the incorporation of TWIC readers, maintain records on individuals accessing their properties, and modify their access control procedures to integrate TWIC readers. These requirements will impose costs on owners and operators of Risk Group A facilities regulated by part 105 that install TWIC readers.

The final rule will require facilities to submit an amendment to their security plans that will detail how TWIC readers will be incorporated into their security measures. This represents a financial impact to regulated entities as an employee will need to draft an addendum and submit it to the Coast Guard. The Coast Guard estimates that it will take 25 hours for each facility to create an addendum, and that the average loaded wage³⁹ of someone performing this work will equal \$71.12 per hour, which is the estimated wage for a Facility Security Officer (FSO).⁴⁰ One commenter said it should not take 25 hours to update a facility security plan for TWIC. We believe that for some facilities it may take fewer hours, but for others it will take more than 25 hours, especially if changes to security plans are reviewed by multiple people, and therefore, we kept it unchanged as it represents a reasonable average. See Table 4.12 for the cost for amendments. As only Risk Group A facilities will be required to implement an electronic TWIC inspection

³⁷ $\$2,803,598 = \$28,035,983 \times .10$ “annual maintenance cost assumption”, where $\$28,035,983 = \$56,071,966$ “total infrastructure and PACS costs for all Risk Group A Facilities” $\div 2$, and $\$56,071,966$ “total infrastructure and PACS costs for all Risk Group A Facilities” = $\$34,750,279$ “total infrastructure costs” + $\$21,321,687$ “total PACS costs”. Infrastructure and PACS implementation costs are provided in Table 4.10, Total Facility Capital Costs.

³⁸ The total 10-year cost estimates assume no maintenance cost in Year 1 and partial maintenance cost in Year 2 for those installations that occurred in Year 1. Annual recurring industry costs discussed here do not include TWIC capital replacement. To simplify the discussion, this comparison uses undiscounted costs to industry.

³⁹ The load factor for wages is calculated by dividing total compensation by wages and salaries. For this report, we used the Transportation and Materials Moving Occupations, Private Industry report (Series IDs CMU2010000520000D and CMU2020000520000D). Using 2011 Q3 data, we divide $\$23.25/\15.58 to get the load factor of 1.49. See Appendix E for screenshot of BLS data used to calculate load factor.

⁴⁰ Wage information obtained from BLS (http://data.bls.gov/cgi-bin/print.pl/oes/2012/may/naics3_483000.htm) as of 1/3/2014. The wage used for an FSO equals that of Managers, All (11-9199, “Mean Hourly Wage” reported at \$47.73) with a load factor of 1.49 to account for benefits in addition to wages. For complete listing of NAICS Industry 483000 occupations and wages, see Appendix E.

program, we anticipate 525 MTSA-regulated facilities in Risk Group A to amend their FSPs to include information related to electronic TWIC inspections.

Table 4.12 Costs for TWIC Amendments

Year	Facilities	Hours	Unit Cost	Total =
	A	B	C	A x B x C
1	263	25	\$71.12	\$467,614
2	262	25	\$71.12	\$465,836
3	0	25	\$71.12	\$0
4	0	25	\$71.12	\$0
5	0	25	\$71.12	\$0
6	0	25	\$71.12	\$0
7	0	25	\$71.12	\$0
8	0	25	\$71.12	\$0
9	0	25	\$71.12	\$0
10	0	25	\$71.12	\$0
Total				\$933,450

The final rule requires a new recordkeeping requirement for facilities that perform electronic TWIC inspections, mandating that they maintain records of all individuals who access the facility for 2 years. Current MTSA requirements account for the protection of sensitive security information (SSI). Furthermore, an electronic TWIC inspection will typically capture three pieces of information when an individual’s TWIC is scanned: (1) Federal Agency Smart Credential Number (FASC–N), (2) date, and (3) time. Electronic TWIC inspection does not capture the name of the TWIC-holder unless the TWIC is being read by a contact reader and the Personal Identification Number (PIN) has been entered. We assume this will require additional labor. We employ the same wage rate used to estimate the cost to amend the FSP and determined that it will take 40 hours to create an adequate recordkeeping system to fulfill the requirements of the final rule. We anticipate the recordkeeping system to be predominantly automated, requiring little maintenance and upkeep. It will consist of reviewing and backing up files on a monthly basis. As such, we estimate that there will also be a burden of approximately 30 minutes per month to conduct maintenance of the recordkeeping system.⁴¹ This will add an additional 6 hours of burden per facility per year. Based on information from USCG subject matter experts and facility observations, it is assumed that the majority of PACS currently in place already possess this capability, and a number of approved TWIC readers also can independently perform this function. We did not receive any public comments on these cost assumptions and therefore, they are unchanged from the NPRM RA. See Table 4.13 for recordkeeping costs. For this requirement, only those facilities performing electronic TWIC inspections will need to comply.

⁴¹ The 30 minutes is based on an estimate by subject matter experts. Because we anticipate these computer systems to be sophisticated enough to be automated for the relatively straightforward usage here, maintenance should entail backing up files and little else.

Table 4.13 Costs to Create and Maintain Recordkeeping Systems

Year	Facilities	Hours	Unit Cost	Total =
	A	B	C	A x B x C
1	263	40	\$71.12	\$748,182
2	262	46	\$71.12	\$857,138
3	525	6	\$71.12	\$224,028
4	525	6	\$71.12	\$224,028
5	525	6	\$71.12	\$224,028
6	525	6	\$71.12	\$224,028
7	525	6	\$71.12	\$224,028
8	525	6	\$71.12	\$224,028
9	525	6	\$71.12	\$224,028
10	525	6	\$71.12	\$224,028
Total				\$3,397,544

We estimate the CCL download to take approximately 30 minutes based on information from the TSA HAZMAT Threat Assessment Program.⁴² During the public comment period after the publication of the NPRM in March 2013, some commenters stated that the Coast Guard overestimated the amount of time needed for a CCL update, and that updates to the CCL should be an automated function taking about five seconds. Therefore, the CCL update should not be included as an ongoing item with assigned labor expense in the RA. While we recognize that some larger facilities may be able to automate this process, we do not believe that all facilities will have such an automated solution. Therefore, we did not change our estimate that this will constitute, on average, 30 minutes per week per facility for 26 annual hours of labor. We also changed wages to reflect loaded wage rates for FSOs. See Table 4.14 for cost associated with CCL downloads.

Table 4.14 Costs for Frequent CCL Downloads

Year	Facilities	Hours	Unit Cost	Total = A x B x C
	A	B	C	
1	263	26	\$71.12	\$486,319
2	262	26	\$71.12	\$484,469
3	525	26	\$71.12	\$970,788
4	525	26	\$71.12	\$970,788
5	525	26	\$71.12	\$970,788
6	525	26	\$71.12	\$970,788

⁴²A system needs internet connectivity to download the CCL. Laying of fiber optics was included in many pilot site infrastructure costs. Updating the CCL is a quick process and there are no data costs. It essentially requires visiting a website to download the latest CCL and is not labor intensive. More information can be found at http://www.tsa.gov/what_we_do/layers/hazmat/index.shtm.

7	525	26	\$71.12	\$970,788
8	525	26	\$71.12	\$970,788
9	525	26	\$71.12	\$970,788
10	525	26	\$71.12	\$970,788
Total				\$8,737,092

The Coast Guard also assumes that there will be a training component necessary for the full implementation of the electronic TWIC inspection requirements, so that facility personnel can properly use the readers. We estimate that this training will be done on the job, as it will be facility-specific based on the hardware, software, and physical layout of the facility. We estimate that training will require 4 hours and that all FSOs and facility personnel with security duties will need to undergo electronic TWIC inspection training. Because familiarization with TWIC and identity verification was required in the first TWIC rulemaking,⁴³ the training discussed here will focus solely on the electronic TWIC inspections. Using Coast Guard data, including a review of FSPs as well as work-shift hour information, we determined the average number of FSOs and personnel with security duties for all Risk Group A facilities: 1 FSO per facility and 6.46 personnel with security duties. We assume that electronic TWIC inspection training will take an estimated 4 hours to complete. The cost of this training is the opportunity cost of time spent in training, which is equal to the wage of the employee multiplied by the number of hours spent training. We did not receive any public comments on these training hours assumptions, and therefore, we kept them unchanged for this final rule's RA. The loaded wage for an FSO is the same as used above (\$71.12) and the loaded wage for personnel with security duties is \$30.84.⁴⁴

Hours of training (first year) x loaded wage for FSO x Number of FSOs = Cost of Training

$$4 \times \$71.12 \times 525 = \$149,352$$

Hours of training (first year) x loaded wage for Personnel with Security Duties x Number of Personnel with Security Duties = Cost of Training

$$4 \times \$30.84 \times 3,392 = \$418,437$$

We divide these costs evenly over the 2-year implementation period, based on the assumption that approximately 50% of the regulated entities will comply each year of the implementation period. We also include an estimated one hour of training each subsequent year for both FSOs and personnel with security duties to account for

⁴³ The Regulatory Impact Assessment completed in December 2006 (TSA-2006-24191-0745) already accounts for 40 hours annually for all appropriate personnel to become familiarized with TWIC.

⁴⁴ Wage information obtained from Bureau of Labor Statistics (http://data.bls.gov/cgi-bin/print.pl/oes/2012/may/naics3_483000.htm) as 1/3/2014. The wage used for Personnel with Security Duties equals that of Protective Service Operations ("Mean Hourly Wage" reported at \$20.70), with a load factor of 1.49 to account for benefits in addition to wages.

additional electronic TWIC inspection-related training that will be included in the existing annual required facility-specific MTSA training.⁴⁵

Table 4.15 below shows the costs of training for facility personnel.

Table 4.15 Training Costs for Facilities

Year	FSO	Personnel With Security Duties	Cost of Training
1	\$74,676	\$209,219	\$283,895
2	\$93,345	\$261,523	\$354,868
3	\$37,338	\$104,609	\$141,947
4	\$37,338	\$104,609	\$141,947
5	\$37,338	\$104,609	\$141,947
6	\$37,338	\$104,609	\$141,947
7	\$37,338	\$104,609	\$141,947
8	\$37,338	\$104,609	\$141,947
9	\$37,338	\$104,609	\$141,947
10	\$37,338	\$104,609	\$141,947
Total			\$1,774,341

Based on these costs, we estimate that the electronic TWIC inspection requirements will cost facilities approximately \$2.0 million in the first two years in operational costs, with recurring costs of approximately \$1.3 million combining results shown in Table 4.12 through 4.15. Table 4.16 shows the 10-year undiscounted operational costs for this rulemaking.

⁴⁵ 33 CFR 105.210 and 105.215 require that all personnel have knowledge through training or on the job experience of relevant provisions of the FSP and the TWIC program.

Table 4.16 Operational Costs for Facilities

				Training		
	Amendments	Recordkeeping	Canceled Card List	Personnel	FSO	Total
1	\$467,614	\$748,182	\$486,319	\$209,219	\$74,676	\$1,986,009
2	\$465,836	\$857,138	\$484,469	\$261,523	\$93,345	\$2,162,312
3	\$0	\$224,028	\$970,788	\$104,609	\$37,338	\$1,336,763
4	\$0	\$224,028	\$970,788	\$104,609	\$37,338	\$1,336,763
5	\$0	\$224,028	\$970,788	\$104,609	\$37,338	\$1,336,763
6	\$0	\$224,028	\$970,788	\$104,609	\$37,338	\$1,336,763
7	\$0	\$224,028	\$970,788	\$104,609	\$37,338	\$1,336,763
8	\$0	\$224,028	\$970,788	\$104,609	\$37,338	\$1,336,763
9	\$0	\$224,028	\$970,788	\$104,609	\$37,338	\$1,336,763
10	\$0	\$224,028	\$970,788	\$104,609	\$37,338	\$1,336,763
Total	\$933,450	\$3,397,544	\$8,737,092	\$1,307,616	\$466,725	\$14,842,427

4.1.4 Total Facility Costs

When we combine the capital and operational costs, we get the total estimated costs for facilities. The 10-year total cost to facilities will be approximately \$124.1 million at a 7 percent discount rate and \$137.8 million at a 3 percent discount rate. The annualized cost will be \$17.7 million and \$15.1 million discounted at 7 percent and 3 percent, respectively. The total cost figures can be seen in table 4.17 below.

Table 4.17 Total Facility Costs (\$ Millions)

	Capital Costs	Maintenance Costs	Operational Costs	Undiscounted Total	7%	3%
1	\$49.5	\$0.0	\$2.0	\$51.5	\$48.1	\$50.0
2	\$49.5	\$1.0	\$2.2	\$52.6	\$46.0	\$49.6
3	\$0.0	\$2.0	\$1.3	\$3.3	\$2.7	\$3.0
4	\$0.0	\$2.0	\$1.3	\$3.3	\$2.5	\$2.9
5	\$0.0	\$2.0	\$1.3	\$3.3	\$2.4	\$2.9
6	\$9.9	\$2.0	\$1.3	\$13.2	\$8.8	\$11.0
7	\$9.9	\$2.0	\$1.3	\$13.2	\$8.2	\$10.7
8	\$0.0	\$2.0	\$1.3	\$3.3	\$1.9	\$2.6
9	\$0.0	\$2.0	\$1.3	\$3.3	\$1.8	\$2.5
10	\$0.0	\$2.0	\$1.3	\$3.3	\$1.7	\$2.5
Total	\$118.7	\$16.8	\$14.8	\$150.3	\$124.1	\$137.8
Annualized					\$17.7	\$16.2

4.2 Vessel Costs

4.2.1 Reader Costs for Vessels

The proposal will require certain vessels in Risk Group A to implement electronic TWIC inspections to control access to all restricted areas. As discussed in the Affected Population chapter of this RA, this final rule affects vessels in Risk Group A with greater than 20 TWIC-holding crewmembers, which brings the total current number of affected vessels to 1. The TWIC pilot did not include vessels, so we relied on expert elicitations to estimate vessel costs. As discussed in the facility costs section above, we received several public comments on our cost assumptions. However, none of them provided any specific information and data. Therefore, our assumptions in estimating vessel costs remained unchanged.

Coast Guard subject matter experts from the Domestic Ports Division estimate that this vessel will require 2 portable readers, for a total reader cost of approximately \$14,070. This is based on the same average cost for reader hardware and software used to estimate the reader costs for facilities. We also assume that first-year costs will be repeated in Year 6 due to replacement of equipment, as we saw with facilities. Because the affected population is small, we assume that the vessel will comply within the first year of implementation. See Table 4.18 below for reader costs for vessels.

Table 4.18 Vessel Reader Costs, First Year

	Price	Vessel Count	Readers Per Vessel	Cost
Portable Reader	\$7,035	1	2	\$14,070

Based on estimates from the Coast Guard Office of Port and Facility Activities, we assume a technician or labor equivalent will need to install the software and set up the readers for each vessel. The Coast Guard assumes it will take one technician, earning an hourly rate of \$58.81⁴⁶ per hour, 4 hours to set up a handheld system. See Table 4.19 for installation costs.

Table 4.19 Costs to Install Readers and Software

Year	Vessels	Hours	Unit Cost	Cost
1	1	4	\$58.81	\$235
2	0	4	\$58.81	\$0
3	0	4	\$58.81	\$0
4	0	4	\$58.81	\$0
5	0	4	\$58.81	\$0
6	1	4	\$58.81	\$235
7	0	4	\$58.81	\$0
8	0	4	\$58.81	\$0
9	0	4	\$58.81	\$0
10	0	4	\$58.81	\$0
Total				\$470

4.2.2 Maintenance Costs

We estimate an annual maintenance cost equivalent to 10% of the cost of the TWIC readers (hardware and software combined) in addition to a cost for replacing readers every five years. Because TWIC readers will be used in the harsh maritime environment, we assume that there will be an annual maintenance component to the cost of electronic TWIC inspections. Because we assume that vessels will deploy portable readers, we assign the maintenance costs based only for that type of reader. Table 4.20 shows this calculation. We estimate an annual cost of \$1,407 for vessel reader maintenance.

⁴⁶ Wage information provided by BLS (http://www.bls.gov/oes/2012/may/naics3_483000.htm) as of 1/3/2014. The wage used for a Technician equals that of First-Line Supervisors of Mechanics, Installers, and Repairers (49-1011, "Mean Hourly Wage" reported at \$39.47), with a load factor of 1.49 to account for benefits in addition to wages.

Table 4.20 Maintenance Costs for Vessel TWIC Readers

Number of Vessels	1
Readers Per Vessel	2
Cost Per Reader	\$7,035
Maintenance Cost (Percent of Reader Cost)	10%
Total Maintenance Cost	\$1,407

4.2.3 Operational Costs for Vessels

The final rule will require owners and operators of the one affected vessel to create and submit amendments to their security plans that detail how they will comply with the final regulations. This vessel represents all self-propelled vessels in Risk Group A, as defined in Chapter 2 of this RA, that have a total crew size greater than 20 TWIC-holding crewmembers. The Coast Guard estimates that it will take 25 hours to create an addendum for each Vessel Security Plan (VSP), and that the average loaded wage of someone performing this work will equal \$53.54 per hour, which is the estimated wage for a Vessel Security Officer (VSO).⁴⁷ See Table 4.21 for the cost for amendments.

Table 4.21 Costs for TWIC Amendments

Year	Vessels	Hours	Unit Cost	Total =
	A	B	C	A x B x C
1	1	25	\$53.54	\$1,339
2	0	25	\$53.54	\$0
3	0	25	\$53.54	\$0
4	0	25	\$53.54	\$0
5	0	25	\$53.54	\$0
6	0	25	\$53.54	\$0
7	0	25	\$53.54	\$0
8	0	25	\$53.54	\$0
9	0	25	\$53.54	\$0
10	0	25	\$53.54	\$0
Total				\$1,339

The final rule will require owners and operators of vessels that are implementing an electronic TWIC inspection program to maintain detailed records of access to the vessel. Based on information from the 2006 ANPRM analysis,⁴⁸ at least some owners and

⁴⁷ Wage information provided by BLS (http://www.bls.gov/oes/2012/may/naics3_483000.htm) as of 1/3/2014. The wage used for a VSO equals that of Mean Hourly Wage for Captains, Mates, and Pilots of Water Vessels (“Mean Hourly Wage” reported at \$35.93), with a load factor of 1.49 to account for benefits in addition to wages.

⁴⁸ 74 FR 13360, March 27, 2009 (Transportation Worker Identification Credential (TWIC) - Reader Requirements).

operators of regulated vessels currently practice similar recordkeeping as part of normal business practice, as individuals are sometimes required to log in and log out. Furthermore, some of the card readers that are compatible with TWIC have the ability to record access information by reader area, worker ID, date, and time. However, based on the findings of the 2006 ANPRM analysis, we assume that owners and operators of all vessels will need to only set up a system for keeping track of who is on and off the vessel and at what time.

Based on Coast Guard subject matter experts from the Domestic Vessel Division, we assumed that it will take approximately 40 hours in the first year for a mid-level employee to complete this task. For this RA, we assume that a VSO will likely perform all vessel-specific security tasks. We increased the loaded hourly wage to \$53.54 to reflect VSO-level wages.⁴⁹ We also estimate that there will be a burden of approximately 30 minutes per month to conduct maintenance of the recordkeeping system. This will add an additional 6 hours of burden per facility per year. See Table 4.22 for revised record keeping costs.

⁴⁹ Wage information provided by BLS (http://www.bls.gov/oes/2012/may/naics3_483000.htm) as of 1/3/2014. The wage used for a VSO equals that of Mean Hourly Wage for Captains, Mates, and Pilots of Water Vessels (“Mean Hourly Wage” reported at \$35.93), with a load factor of 1.49 to account for benefits in addition to wages.

Table 4.22 Costs to Create Recordkeeping Systems

Year	Vessels	Hours	Unit Cost	Total =
	A	B	C	A x B x C
1	1	40	\$53.54	\$2,142
2	1	6	\$53.54	\$321
3	1	6	\$53.54	\$321
4	1	6	\$53.54	\$321
5	1	6	\$53.54	\$321
6	1	6	\$53.54	\$321
7	1	6	\$53.54	\$321
8	1	6	\$53.54	\$321
9	1	6	\$53.54	\$321
10	1	6	\$53.54	\$321
Total				\$5,031

We estimate the CCL download to take approximately 30 minutes based on information from the TSA HAZMAT Threat Assessment Program. We anticipate that this will constitute, on average, 30 minutes per week per vessel for 26 annual hours of labor. We base this cost on the loaded wage rates for VSOs. See Table 4.23, Costs to Download CCLs.

Table 4.23 Costs to Download CCLs (Non-discounted)

Year	Vessels	Hours	Unit Cost	Total =
	A	B	C	A x B x C
1	1	26	\$53.54	\$1,392
2	1	26	\$53.54	\$1,392
3	1	26	\$53.54	\$1,392
4	1	26	\$53.54	\$1,392
5	1	26	\$53.54	\$1,392
6	1	26	\$53.54	\$1,392
7	1	26	\$53.54	\$1,392
8	1	26	\$53.54	\$1,392
9	1	26	\$53.54	\$1,392
10	1	26	\$53.54	\$1,392
Total				\$13,920

In order to properly implement the electronic TWIC inspection requirements, we also assume that vessel personnel will need to be trained how to use the readers properly. Using Coast Guard published rule on Implementation of Vessel Security Officer Training and Certification Requirements: International Convention on Standards of Training, Certification and Watchkeeping for Seafarers, 1978 as amended (73 FR 98 29060-29017), we determined the average number of VSOs and personnel with security duties by vessel type. We then multiplied the personnel numbers by the vessel count by type in

Risk Group A: 2 VSOs and 14.2 personnel with security duties.⁵⁰ We assume that electronic TWIC inspection training will take an estimated 4 hours to complete. The cost of this training is the opportunity cost of time spent in training, which is equal to the wage of the employee multiplied by the number of hours spent training. The loaded wage for a VSO is the same as used above (\$53.54), and the loaded wage for personnel with security duties is \$28.15.⁵¹ Table 4.24 shows the total cost of training vessel personnel.

Hours of training x loaded wage for Personnel with Security Duties x Number of Personnel with Security Duties = Cost of Training

$$4 \times \$28.15 \times 14.2 = \$1,600$$

Hours of training x loaded wage for VSO x Number of VSOs = Cost of Training

$$4 \times \$53.54 \times 2 = \$428$$

We also include an estimated 1 hour of training each subsequent year for both VSOs and personnel with security duties to account for additional electronic TWIC inspection-related training that will be included in the existing annual required facility-specific MTSA training.⁵²

Table 4.24 Cost of Training for Vessel Personnel

Year	Personnel with Security Duties	VSO	Total Training Cost
1	\$1,600	\$428	\$2,028
2	\$400	\$107	\$507
3	\$400	\$107	\$507
4	\$400	\$107	\$507
5	\$400	\$107	\$507
6	\$400	\$107	\$507
7	\$400	\$107	\$507
8	\$400	\$107	\$507
9	\$400	\$107	\$507
10	\$400	\$107	\$507
Total	\$5,200	\$1,392	\$6,592

⁵⁰ Personnel can include any person with security duties. For example, screeners are personnel with security duties, but are not security guards. This is a standard employee class descriptor in existing MTSA regulations.

⁵¹ Wage information provided by BLS (http://www.bls.gov/oes/2012/may/naics3_483000.htm) as of 1/3/2014. The wage used for personnel with security duties equals that of Mean Hourly Wage for Sailors and Marine Oilers (\$18.89), with a load factor of 1.49 to account for benefits in addition to wages.

⁵² 33 CFR 104.210, 104.215, and 104.220 require that all personnel have knowledge through training or on the job experience of relevant provisions of the VSP and the TWIC program.

Based on these costs, we estimate that the electronic TWIC inspection requirements will cost vessels approximately \$6,900 in the first year in operational costs, with recurring costs of approximately \$2,200. Table 4.25 shows the 10-year undiscounted operational costs for this rulemaking.

Table 4.25 Vessel Operational Costs

Year	Amendments	Recordkeeping	Canceled Card List	Training		Total
				Personnel	VSO	
1	\$1,339	\$2,142	\$1,392	\$1,600	\$428	\$6,901
2	\$0	\$321	\$1,392	\$400	\$107	\$2,220
3	\$0	\$321	\$1,392	\$400	\$107	\$2,220
4	\$0	\$321	\$1,392	\$400	\$107	\$2,220
5	\$0	\$321	\$1,392	\$400	\$107	\$2,220
6	\$0	\$321	\$1,392	\$400	\$107	\$2,220
7	\$0	\$321	\$1,392	\$400	\$107	\$2,220
8	\$0	\$321	\$1,392	\$400	\$107	\$2,220
9	\$0	\$321	\$1,392	\$400	\$107	\$2,220
10	\$0	\$321	\$1,392	\$400	\$107	\$2,220
Total	\$1,339	\$5,031	\$13,920	\$5,200	\$1,392	\$26,881

Based on the above costs, we estimate that the electronic TWIC inspection requirements will cost an estimated \$21,000 in the first year and approximately \$3,600 annually thereafter, except Year 6, which will experience higher costs due to equipment replacement. We estimate a 10-year cost of \$7,300 at a 7-percent discount rate and \$7,000 at 3 percent. Table 4.26 presents the total non-discounted and discounted costs to vessels.

Table 4.26 Total Costs to Vessels

Year	Capital Costs	Maintenance Costs	Operational Costs	Undiscounted	7%	3%
1	\$14,070	\$0	\$6,901	\$20,971	\$19,599	\$20,360
2	\$0	\$1,407	\$2,220	\$3,627	\$3,168	\$3,419
3	\$0	\$1,407	\$2,220	\$3,627	\$2,961	\$3,319
4	\$0	\$1,407	\$2,220	\$3,627	\$2,767	\$3,222
5	\$0	\$1,407	\$2,220	\$3,627	\$2,586	\$3,129
6	\$14,070	\$1,407	\$2,220	\$17,697	\$11,792	\$14,821
7	\$0	\$1,407	\$2,220	\$3,627	\$2,259	\$2,949
8	\$0	\$1,407	\$2,220	\$3,627	\$2,111	\$2,863
9	\$0	\$1,407	\$2,220	\$3,627	\$1,973	\$2,780
10	\$0	\$1,407	\$2,220	\$3,627	\$1,844	\$2,699
Total	\$28,140	\$12,663	\$26,879	\$67,682	\$51,058	\$59,560
Annualized					\$7,270	\$6,982

4.3 Additional Delay, Travel and TWIC Replacement Costs due to TWIC Failures

Part 101 requires persons requiring unescorted access to secure areas to have a valid TWIC before accessing such locations, and that such TWICs must be provided for machine reads and the accompanying biometric/PIN upon request. As part of efforts to ensure that TWICs being used are valid and functional, the Coast Guard and TSA have deployed hundreds of readers to the field to conduct the enhanced inspections envisioned under this rule. As such, the requirement for a valid, machine-readable TWIC has been in place and has been the subject of an increased inspection rate, which this final rule will further increase.

The increased likelihood of detecting invalid/broken TWICs will result in additional delay, and potentially travel and TWIC replacement costs. We estimate there will be additional costs since the use of TWIC readers will increase the likelihood of faulty TWICs (TWICs that are not machine readable) being identified and the need for secondary screening procedures so affected workers and operators can address these issues.

If a worker's TWIC cannot be read by a TWIC reader, then there may be delay costs while the worker and the facility or vessel operator implement secondary screening procedures.⁵³ If a worker's card is faulty and cannot be read, the worker will need to travel to a TWIC enrollment center to get a replacement TWIC, which results in additional travel and replacement costs. This section also evaluates costs associated with card failures and the use of secondary processing options, such as PINs and escorts.

⁵³ A complete discussion on TWIC inspection and processing under special circumstances is available in the NPRM; see 78 FR 17814, "TWIC Inspection Requirements in Special Circumstances."

4.3.1 Delay Costs Due to an Invalid Electronic TWIC Inspection

To account for potential opportunity costs associated with the delays as a result of the electronic TWIC inspection requirements,⁵⁴ we estimate a cost of delay associated with failed reads. A description of the different types of TWIC reader failures can be found in Table 4.34. We provide a range of delay costs based on different delays in seconds and also based on the number of times a TWIC-holder may have their card read on a weekly basis. The TWIC pilot estimates the number of TWIC-holders who might access participating facilities by participant group. As discussed in Chapter 2 of this RA, we used these estimates to extrapolate across the affected population to obtain a national estimate of TWIC-holders by facility type. Table 4.27 shows the TWIC-holder populations as estimated in the TWIC pilot.

Table 4.27 TWIC-Holder Population, from TWIC Pilot

Facility Type	Truck	Vehicle	Pedestrian	Total	Percent of Total
Container Terminals	19,200	100	4,700	24,000	72.4%
Large Passenger Vessels/Terminals	20	200	1,700	1,920	5.8%
Break Bulk Terminals	700	210	700	1,610	4.9%
Petroleum Facilities	225	110	4,765	5,100	15.4%
Small Passenger/Vessel/Towboats/Other	-	100	400	500	1.5%
Total	20,145	720	12,265	33,130	100.0%

As shown above, container terminals account for 72.4% of the total TWIC-holder population in the TWIC pilot, and 95% of the truck population. As most container facilities are not required to implement an electronic TWIC inspection program, the vast majority of potential congestion delays are avoided in the preferred alternative.

To assess the delays due to failed card reads, we extended the TWIC pilot cardholder data to the full affected population. First, we determined the total number of TWIC-holders by facility type by applying the percentages from the TWIC pilot to the estimated TWIC-holder population of 2,200,000. Table 4.28 shows the breakdown of total TWIC-holder population by facility type.

⁵⁴ Delays may result from operational, human, or weather-related factors.

Table 4.28 TWIC-Holder Population by Facility Type

Facility Type	Percent of Total	Total Population
Container Terminals	72.4%	1,592,800
Large Passenger Vessels/Terminals	5.8%	127,600
Break Bulk Terminals	4.9%	107,800
Petroleum Facilities	15.4%	338,800
Small Passenger/Vessel/Towboats/Other	1.5%	33,000
Total	100.0%	2,200,000

We then divide the total number of TWIC-holders for each facility type by the total number of facilities to obtain the number of TWIC-holders per facility, as shown in Table 4.29. Using the number of TWIC-holders per facility, by facility type, we are able to then extrapolate the number of TWIC-holders for each risk group, by facility type, as shown in Table 4.30.

Table 4.29 TWIC-Holders per Facility, by Facility Type

Facility Type	Total TWIC-Holders	Total Facilities	TWIC-Holders per Facility
Container Terminals	1,592,800	122	13,056
Large Passenger Vessels/Terminals	127,600	555	230
Break Bulk Terminals	107,800	510	211
Petroleum Facilities (Bulk Liquid)	338,800	1,097	309
Small Passenger/Vessel/Towboats/Other	33,000	333	99
Total	2,200,000	2,617	13,905

Table 4.30 TWIC-Holder Population, by Facility Type and Risk Group

Facility Type	A	B	C	Total
Container Terminals	39,168	261,121	1,292,511	1,592,800
Large Passenger Vessels/Terminals	21,160	69,230	37,210	127,600
Break Bulk Terminals	3,376	101,301	3,123	107,800
Petroleum Facilities (Bulk Liquid)	89,610	248,572	618	338,800
Small Passenger/Vessel/Towboats/Other	12,276	4,617	16,107	33,000
Total	165,590	684,841	1,349,569	2,200,000

The next step in calculating the delay was to determine the number of electronic TWIC inspection interfaces per year. As we do not have data on the number of TWIC reads per

year, we performed a sensitivity analysis where we considered the impacts of each TWIC-holder encountering a TWIC reader one to five times a week.⁵⁵ We then multiplied this number by 50 weeks per year⁵⁶ to get an annual estimate of electronic TWIC inspection interfaces for each risk group. Table 4.31 shows the number of electronic TWIC inspection interfaces for the risk groups.

Table 4.31 Annual Number of Electronic TWIC Inspections

Risk Group	1 Read per Week	2 Reads per Week	3 Reads per Week	4 Reads per Week	5 Reads per Week
A	8,279,500	16,559,000	24,838,500	33,118,000	41,397,500
B	34,242,050	68,484,100	102,726,150	136,968,200	171,210,250
C	67,478,450	134,956,900	202,435,350	269,913,800	337,392,250

The reader success rates from the TWIC Pilot Systems Test & Evaluation (ST&E) reports show that across all pilot participants, there was an approximately 82.9% validation rate for electronic TWIC inspections. The invalid transactions include the full range of possibilities for an invalid transaction, such as any type of biometric failure, user error, and invalid, expired or canceled card, and card issuer certificates. The number of annual electronic TWIC inspections was then multiplied by a failure rate of 17.1%, which was the combined rate for invalid electronic TWIC inspections, as reported in the TWIC Pilot Final ST&E reports. Table 4.32 shows the results of this calculation. Because this invalid transaction rate includes all types of invalid transactions, there exists a range of options regarding secondary processing to grant the TWIC-holder access, such as use of visual TWIC inspection mode, or use of escorted access.

Table 4.32 Annual Invalid TWIC Transactions

Risk Group	1 Read per Week	2 Reads per Week	3 Reads per Week	4 Reads per Week	5 Reads per Week
A	1,415,795	2,831,589	4,247,384	5,663,178	7,078,973
B	5,855,391	11,710,781	17,566,172	23,421,562	29,276,953
C	11,538,815	23,077,630	34,616,445	46,155,260	57,694,075

The number of invalid transactions was then used to calculate a cost of delay associated with failed TWIC authentication. For this step, we provide a range of costs based on three different delay times. The TWIC Pilot Study contains estimates of the duration for TWIC activities: 6 seconds duration to conduct a visual TWIC inspection and 8 seconds for electronic TWIC inspection.⁵⁷ We calculate a delay cost for a failed TWIC reader

⁵⁵ This range represents a person visiting a facility anywhere from 1 to 5 days a week, allowing for full-time workers, part-time workers and occasional visitors.

⁵⁶ We assume a 50-week work year to account for holidays and vacation.

⁵⁷ The estimated difference in time for electronic TWIC inspection instead of visual TWIC inspection is equal to 2 seconds. This is the incremental time for required reader use on all reads at Risk Group A facilities. However, we do not account for the cost of this time difference in the RA. We believe that this small time difference can be accommodated for through altered or improved business practices such that it will not lead to delays or congestion at the affected facilities.

transaction followed by an immediate visual inspection to be 6 seconds. We also calculate the delay cost for a second attempt at an automated TWIC authentication followed by a visual authentication of 14 seconds and a 30-second delay to account for additional actions to be taken as necessary.⁵⁸ We also include 60-second and 120-second delays in our calculation to account for situations in which a longer delay may arise.⁵⁹ Once the delay times were calculated, we multiply the delay time by \$39.98,⁶⁰ which is the mean wage for an employee in the labor category Deep Sea, Coastal and Great lakes Water Transportation. Table 4.33 shows the results of these calculations for Risk Group A facilities. By using a range of delay costs, we are able to account for multiple scenarios where an invalid electronic TWIC inspection will lead to the use of a secondary processing operation, such as a visual TWIC inspection, additional identification validation, or other provisions as set forth in the FSP.

In response to our request in the NPRM RA on the accuracy of delay and cost estimates used in that analysis, we received numerous comments from the public and addressed them in the Responses to Economic Comments section where we specifically discussed them under the Transaction Times subsection. One commenter suggested 3.5-second average transaction time using TWIC reader for card validation and fingerprint verification based on their own facility operations. Another commenter estimated 20-30 seconds for each TWIC reader transaction without any further explanation or justification. We had used in the NPRM and Final Rule RAs' 8-second estimation for each TWIC reader transaction. Many others did not provide any specific information regarding their transaction times they have been experiencing and simply made overall statements regarding the performance of TWIC validation and associated biometric functions as time consuming. We believe our assumption of 8-second per transaction estimate is reasonable based on pilot data collected over two years in various participant facilities. After careful review and consideration of these comments, we kept our NPRM RA cost assumptions and therefore our related estimates unchanged.

⁵⁸ Because the current regulatory requirements call for visual TWIC inspections, we assume that under these new requirements, there will still be a security person nearby to assist persons or address problems with the TWIC readers. We did not estimate any reductions in security personnel or costs afforded by the potential automation of identity verification. As such we assume that security personnel will be present, or reasonably nearby.

⁵⁹ These times provide an estimate for the time required for security to travel to the access point, perform a visual verification and/or take other steps in accordance with that facility's FSP to either grant or deny access. Including these times provided the ability to ascertain the impacts of such delays and better discriminate between regulatory alternatives (e.g., with higher transaction volumes at facilities such as container facilities not in the preferred alternative, costs were seen to rise much more quickly than in the preferred alternative).

⁶⁰ The Coast Guard took the average of four mariner wage categories from BLS's May 2010 NAICS 48300 Water Transportation series (http://www.bls.gov/oes/2012/may/naics3_483000.htm) Sailors and Marine Oilers (53-5011), Captains, Mates, and Pilots of Water Vessels (53-5021), Motorboat Operators (53-5022) and Ship Engineers (53-5031), and used a load factor of 1.49 to the average wage rate of \$26.83 of these four categories to obtain \$39.98/hour.

**Table 4.33 Cost of Delays Due to Invalid Transaction Per Year,
for Risk Group A Facilities**

	1 Read per Week	2 Reads per Week	3 Reads per Week	4 Reads per Week	5 Reads per Week	Average
6 Seconds	\$94,339	\$188,678	\$283,017	\$377,356	\$471,696	\$283,017
14 Second	\$220,125	\$440,249	\$660,374	\$880,498	\$1,100,623	\$660,374
30 Seconds	\$471,696	\$943,391	\$1,415,087	\$1,886,782	\$2,358,478	\$1,415,087
60 Seconds	\$943,391	\$1,886,782	\$2,830,173	\$3,773,564	\$4,716,955	\$2,830,173
120 Seconds	\$1,886,782	\$3,773,564	\$5,660,346	\$7,547,129	\$9,433,911	\$5,660,346
Average	\$723,266	\$1,446,533	\$2,169,799	\$2,893,066	\$3,616,332	\$2,169,799

For the purposes of this analysis, we used the cost of delay estimate of \$2,169,799, which represents the average delay across all iterations of delay times and reader interface.

4.3.2 Costs to Replace Faulty TWICs

As reader use is not currently universal, we anticipate that some of the cards that were issued properly will still not be readable in TWIC readers. To account for this, we estimate a cost for a percentage of TWIC-holders to obtain replacement cards. Based on the ST&E reports provided by the individual pilot participants,⁶¹ we estimate a 17.1% rate for invalid electronic TWIC inspections. Invalid electronic TWIC inspections can be categorized as shown in Table 4.34.⁶²

Table 4.34 Invalid TWIC Reader Transactions

Failure Mode	Description
1. Card on Canceled Card List (CCL)	Card listed on TSA’s CCL. This is not technically a failure, as the card cannot be legally used.
2. Card Invalid	Card not a legitimate TWIC. This is not technically a failure, as the card cannot be legally used.
3. Biometric Failure	Card not able to be matched to biometrics.
4. Card Failure	Card unable to be read in contactless mode.
5. Otherwise Unreadable Card	Card otherwise not able to be read.
6. User Error	TWIC-holder misuses reader.
7. Reader Failure	TWIC reader not able to process TWICs.

As noted, the first two “failures” are actually successes; in these two conditions, the card should be rejected, so the TWIC readers are performing as expected. However these

⁶¹ The ST&E reports were submitted by the pilot participants as the third phase of the TWIC Pilot Program and are used to inform the TWIC Pilot Program Final Report that was issued February 27, 2012.

⁶² The table of different failure types was created based on information of failures reported in the ST&E reports.

successful transactions, along with the next five failures, are captured in the 17% failure rate identified in the TWIC pilot. Since the TWIC pilot did not decompose these failures further in the data provided, we assume a uniform distribution of these failures across the 7 failure modes (2.43% for each). Of the seven types of invalid electronic TWIC inspections, we focus on the two that will identify previously undetected unreadable TWICs. These two card failure modes are identified in Table 4.34 above as “4. Card Failure” and “5. Otherwise Unreadable Card.” We estimate these two failure modes account for approximately 5% of invalid transactions. We use this rate to estimate the number of TWIC cards that will need replacing due to the new requirements. Table 4.35 shows the total TWIC-holder population, based on data from the TWIC Pilot Report.

Table 4.35 TWIC-Holder Population, by Facility Type

	A	B	C	Total
Container Terminals	39,168	261,121	1,292,511	1,592,800
Large Passenger Vessels/Terminals	21,160	69,230	37,210	127,600
Break Bulk Terminals	3,376	101,301	3,123	107,800
Petroleum Facilities (Bulk Liquid)	89,610	248,572	618	338,800
Small Passenger/Vessel/Towboats/Other	12,276	4,617	16,107	33,000
Total	165,590	684,841	1,349,569	2,200,000

We estimate 165,590 TWIC-holders work at, or access, Risk Group A facilities. Using the 5% rate for invalid electronic TWIC inspections as calculated based on the TWIC pilot data, we estimate that 8,280 TWIC-holders attempting to access Risk Group A facilities will not successfully pass electronic TWIC inspection. According to the TSA, approximately 26,000 previously issued TWICs were improperly encoded and may not work with TWIC readers, which will be replaced for free by TSA.⁶³ To factor in these no-cost replacements, we distributed the 26,000 known faulty cards across the risk groups by the percent of total TWIC-holders per risk group, resulting in an approximate 2,000 TWIC-holders in Risk Group A that will receive a free replacement TWIC.

We assume that mariners will drive 100 miles (round-trip) to travel to a TWIC enrollment center.⁶⁴ This round-trip commute will take about 3.125 hours at an average 32 mph commuting speed.⁶⁵ An average enrollment and wait time of 30 minutes at TWIC enrollment centers is added to the commuting time for a total sum of commuting, enrollment, and wait time of 3.625 hours. The Coast Guard used an average loaded wage rate of \$39.98 to value the opportunity cost of the mariners’ time.⁶⁶ In addition to these

⁶³ For more information, see http://www.tsa.gov/assets/pdf/truncated_fasc_n_notification_11182011.pdf

⁶⁴ This estimate is based on the travel costs used in the Implementation of the 1995 Amendments to the International Convention on Standards of Training, Certification, and Watchkeeping for Seafarers, 1978, and Changes to National Endorsements, SNPRM. Docket Number USCG-2004-17914.

⁶⁵ We obtained 32 mph from the Federal Highway Administration’s Summary of Travel Trends, 2001. (www.fhwa.dot.gov)

⁶⁶ The Coast Guard took the average of four mariner wage categories from BLS's May 2010 NAICS 48300 Water Transportation series (http://www.bls.gov/oes/2012/may/naics3_483000.htm): Sailors and Marine Oilers (53-5011), Captains, Mates, and Pilots of Water Vessels (53-5021), Motorboat Operators (53-5022)

opportunity cost estimates, the Coast Guard added \$56 to the total estimate in order to account for commuting motor vehicle costs at \$.56 per mile,⁶⁷ and used \$204.93 for each trip to TWIC enrollment center.

$$(3.625 \text{ hours} \times \$39.98/\text{hour}) + (100 \text{ miles} \times \$0.56/\text{mile}) = \$144.93 + \$56 = \$200.93$$

In addition to the costs associated with traveling to an enrollment center, we also include the cost to replace a TWIC at the time of reporting it lost, stolen or damaged, which is \$60.⁶⁸ If 6,280 (8,280 TWIC holders minus 2,000 receiving free replacements) TWIC-holders will need to obtain a replacement, we estimate that this will cost mariners approximately \$2.04 million per year.

$$(\$200.93 * 8,280) + (\$60 * 6,280) = \$2,040,500.4⁶⁹$$

We assess this as an annual cost, though we anticipate that the percent of invalid TWIC transactions will decrease as TWIC-holders become more familiar with the requirements and using TWIC readers. At this time, we do not have sufficient data to estimate the rate at which future invalid electronic TWIC inspections will occur. However, since all initial TWIC cards have been already re-issued to all TWIC-holders, the initially faulty TWICs should have already been replaced. This will further help decrease the percent of invalid TWIC transactions.

4.3.3 Increased Use of Personal Identification Number (PIN)

This final rule accounts for TWIC inspection requirements in special circumstances. One of these contingencies is the use of a PIN. When an individual has poor quality fingerprints, a TWIC reader may not be able to consistently perform the biometric identity verification function. Also, a small number of TWIC cards will be issued that contain either poor quality fingerprint templates, mostly due to badly damaged fingers, or no fingerprint minutiae in the case of amputations. Owners and operators will describe the exception handling process to be used in such cases in their security plans. The exception handling process may include granting unescorted access after the individual has successfully provided a PIN. In Section 4.3.2 of this RA, we discuss the costs associated with TWIC-holders replacing their TWICs due to invalid electronic TWIC inspections. In that section, we discuss a subset of failures for biometric failure. We expect that a subset of this group will need to travel to a TWIC enrollment center to retrieve their PIN (as the cardholder may have forgotten their PIN) so that it may be used

and Ship Engineers (53-5031), and used a load factor of 1.49 to the average wage rate of \$26.83 of these four categories to obtain \$39.98/hour.

⁶⁷ Obtained from the General Services Administration (GSA) domestic Privately Owned Vehicle Mileage Reimbursement Rates in April 2012 and rounded \$0.555 to \$0.56 (www.gsa.gov)

⁶⁸ We did not calculate an estimate for lost productivity or lost leisure time associated with TWIC replacement. We assume that there will be minimum lost productivity, as the rule allows flexibilities for people to continue working while waiting to replace their TWIC. Furthermore, TSA recommends allowing for 5 days to obtain a replacement card, but it is usually available earlier. Also, there are several relief provisions in the final rule. See Section 4.5 of this RA, Cost Mitigation.

⁶⁹ Numbers may not total due to rounding.

as an alternative means of access in cases where the TWIC-holder’s biometrics cannot be read by a reader. At this time, we have no information regarding the number of TWIC-holders that may need to use a PIN in lieu of biometrics, nor do we have information regarding the use of PIN as an alternate means of identification, or an estimate of the percentage of card holders that may have forgotten their PIN. No data were provided in response to the NPRM to enable this estimate.

4.3.4 Use of Escorts

Another option for access when a valid electronic TWIC inspection does not occur is the use of an escort. For the costs associated with this contingency, we have some preliminary data for another project (Seafarer’s Access, required by the Coast Guard Authorization Act of 2010) indicating that 90% of facilities have provisions for escorts through secure areas and that at least some do so with existing, non-dedicated personnel on an ad hoc basis. As discussed in Section 4.5 of this RA, there are other means of gaining access in instances of an invalid electronic TWIC inspection. Therefore, we do not foresee the use of escorts increasing substantially due to this rulemaking.⁷⁰ Additionally, no data were provided in response to the NPRM to cause us to modify this assessment.

4.3.5 Summary of Additional Costs

Based on these costs, we estimate that the electronic TWIC inspection requirements will cost an additional \$4.2 million each year due to delays and TWIC replacements. Table 4.36 shows the 10-year undiscounted additional costs for this rulemaking.

Table 4.36 Additional Costs

Year	Delay Due to Failure	Replacement of Unreadable TWIC	Total Undiscounted
1	\$2,169,799	\$2,040,500	\$4,210,300
2	\$2,169,799	\$2,040,500	\$4,210,300
3	\$2,169,799	\$2,040,500	\$4,210,300
4	\$2,169,799	\$2,040,500	\$4,210,300
5	\$2,169,799	\$2,040,500	\$4,210,300
6	\$2,169,799	\$2,040,500	\$4,210,300
7	\$2,169,799	\$2,040,500	\$4,210,300
8	\$2,169,799	\$2,040,500	\$4,210,300
9	\$2,169,799	\$2,040,500	\$4,210,300
10	\$2,169,799	\$2,040,500	\$4,210,300

⁷⁰ The pilot did not address the use of escorts. As it was voluntary, if a card could not be read, pilot sites reverted to the current requirements of visual TWIC inspection. As noted in Section 4.5, there are several mechanisms available to deal with an invalid TWIC reader transaction, including the shift to a visual inspection.

Total	\$21,697,995	\$20,405,004	\$42,102,999
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4.4 Total Industry Costs

Because the costs for this rulemaking will vary greatly depending on the type and size of facility, we present the estimated 10-year total costs to industry by facility group in Table 4.37. This includes all capital, maintenance, operational, and additional costs related to delays and TWIC replacement for facilities, as shown in Tables 4.10, 4.11, 4.16, and 4.36.

The reader should note that our total industry costs do not capture two cost elements: (1) cost savings due to the optional DRAA flexibility, and (2) potential costs due to the new COTP notification requirement if and when an access control system fails to operate. By designating a limited RUA area, facility and vessel operations are expected to become less repeated and redundant for certain workers who use that area frequently throughout their work hours. For example, a TWIC card holder needs to enter a vessel only once during their work hours to meet the requirements of electronic TWIC inspection because the final rule allows the vessel owner and operator to define the entire vessel as a DRAA instead of different areas of the vessel to which the worker needs to enter and exit dozens of times during work hours. However, these potential cost savings are not estimated directly as we don't know how many facility and vessel operator will choose to implement the DRAA. Similarly, we don't have any past or current data to estimate the frequency and the resulting potential costs of requiring the owner or operator to notify the COTP of access control system failure that might suspend operations or permit the operations to continue.

Table 4.37 Ten-year Total Costs, by Facility Type* (\$ Millions)

Year	Bulk Liquid	Break Bulk and Solids	Container	Large Passenger	Small Passenger	Mixed Use	Total
1	\$31.3	\$2.3	\$0.8	\$9.7	\$7.3	\$4.3	\$55.7
2	\$31.9	\$2.4	\$0.8	\$9.9	\$7.4	\$4.4	\$56.8
3	\$4.2	\$0.3	\$0.1	\$1.3	\$1.0	\$0.6	\$7.5
4	\$4.2	\$0.3	\$0.1	\$1.3	\$1.0	\$0.6	\$7.5
5	\$4.2	\$0.3	\$0.1	\$1.3	\$1.0	\$0.6	\$7.5
6	\$9.8	\$0.7	\$0.2	\$3.0	\$2.3	\$1.3	\$17.4
7	\$9.8	\$0.7	\$0.2	\$3.0	\$2.3	\$1.3	\$17.4
8	\$4.2	\$0.3	\$0.1	\$1.3	\$1.0	\$0.6	\$7.5
9	\$4.2	\$0.3	\$0.1	\$1.3	\$1.0	\$0.6	\$7.5
10	\$4.2	\$0.3	\$0.1	\$1.3	\$1.0	\$0.6	\$7.5
Total Undiscounted	\$108.1	\$8.1	\$2.6	\$33.5	\$25.2	\$14.9	\$192.4
<i>Total Discounted at 7%</i>	<i>\$86.3</i>	<i>\$6.4</i>	<i>\$2.1</i>	<i>\$26.7</i>	<i>\$20.1</i>	<i>\$11.9</i>	<i>\$153.6</i>
<i>Total Discounted at 3%</i>	<i>\$97.6</i>	<i>\$7.3</i>	<i>\$2.4</i>	<i>\$30.2</i>	<i>\$22.8</i>	<i>\$13.5</i>	<i>\$173.7</i>

* This table includes the costs to facilities as well as additional costs such as delay, travel and TWIC replacement costs due to TWIC failures. Figures may not total due to rounding

We estimate the present value average costs of this rulemaking on industry for a 10-year period as summarized in Table 4.38 (which combines the estimates from Tables 4.17, 4.26, and 4.37). This includes all costs to facilities, vessels, and TWIC-holders. The costs are discounted at 3 and 7 percent as set forth by guidance in OMB Circular A-4.

Table 4.38 Total Industry Cost, Facilities and Vessels (\$ Millions)

Year	Facility	Vessel	Additional Costs*	Undiscounted Total	7%	3%
1	\$51.5	\$0.0	\$4.2	\$55.7	\$52.1	\$54.1
2	\$52.6	\$0.0	\$4.2	\$56.9	\$49.7	\$53.6
3	\$3.3	\$0.0	\$4.2	\$7.5	\$6.1	\$6.9
4	\$3.3	\$0.0	\$4.2	\$7.5	\$5.7	\$6.7
5	\$3.3	\$0.0	\$4.2	\$7.5	\$5.4	\$6.5
6	\$13.2	\$0.0	\$4.2	\$17.4	\$11.6	\$14.6
7	\$13.2	\$0.0	\$4.2	\$17.4	\$10.8	\$14.1
8	\$3.3	\$0.0	\$4.2	\$7.5	\$4.4	\$5.9
9	\$3.3	\$0.0	\$4.2	\$7.5	\$4.1	\$5.8
10	\$3.3	\$0.0	\$4.2	\$7.5	\$3.8	\$5.6
Total	\$150.3	\$0.1	\$42.1	\$192.5	\$153.7	\$173.8
Annualized					\$21.9	\$20.4

* This includes additional delay, travel and TWIC replacement costs due to TWIC failures. Figures may not total due to rounding

Based on this final rule and recent data, we estimated the average first-year cost of this rulemaking to be approximately \$52.1 million at 7% or \$54.1 million at 3% discount rate, respectively. The undiscounted annual recurring cost for this proposal is approximately \$7.5 million in every year except years 6 and 7, due to equipment replacement 5 years after implementation. The annualized cost of this proposal is \$21.9 million at 7 percent and \$20.4 million at 3 percent. The 10-year cost of this rulemaking to industry is approximately \$153.7 million at a 7% discount rate, and \$173.8 million at a 3% discount rate, respectively. Appendix F discusses the cumulative impacts of the TWIC program.

4.5 Cost Mitigation

The cost estimates in this RA are likely to overstate costs, as we do not have actual costs for what facilities will spend out of their own funds for infrastructure and installation (versus the TWIC pilot, where grant funds were used), and we cannot quantitatively account for several methods of relief that will be afforded industry in this final rule. The increased flexibility provided by this final rule allows for the use of an existing PACS with minor modifications and increases the pool of available reader technology, which will decrease the burden on industry. However, our cost estimates do not reflect any cost savings that may result from this flexibility and assume that all affected entities would comply by installing new TWIC readers. The flexibility in this rule includes the ability to

redefine secure areas, provisions to allow for a facility to have areas designated as different risk groups, and movement between risk groups. While we expect these provisions to provide a certain amount of relief to industry, we do not have any estimate of how much relief or how widespread the use of these relief mechanisms will be. Additionally, in Section 2.2 of this RA, we discuss one of these relief mechanisms in some detail, movement between risk groups. As stated, we expect there to be some operational reduction of burden, but do not know the extent to which this provision will be used.

Furthermore, in the original 2007 Transportation Worker Identification Credential (TWIC) Implementation in the Maritime Sector; Hazardous Materials Endorsement for a Commercial Driver's License (TWIC 1) final rule, we provided greater flexibility to facility owners and operators by allowing them the option, in revised 33 CFR 105.115, to redefine their secure area as only that portion of their access control area that is directly related to maritime transportation. Although this provision already exists, we anticipate that an increased number of facilities may take advantage of this when deploying electronic TWIC inspection programs in an attempt to reduce the number of facility access points requiring TWIC readers. For the purposes of this rulemaking, we assess the cost of readers based on the average number of access points by facility type. We also considered allowing multiple risk group designations within one facility, to account for situations where one portion of a facility handles dangerous cargoes and another portion does not.

We also discuss relief in the form of alternative compliance through the use of PINs as a secondary verification option, the use of escorts, which is already in place under current regulations, and flexibilities to allow for temporary use of TWIC as a visual identification under certain circumstances. These flexibilities are in place to ensure that electronic TWIC inspection does not adversely impact business operations.

Finally, as indicated in footnote 24 above and displayed in Figure C3 of Appendix C, actual costs for TWIC readers are likely to be less than the average reader costs as reported in Table 4.5 if facility and vessel owners and operators choose to implement different design requirements (and, therefore, other biometric readers) in complying with the three aspects of TWIC inspection as discussed in the final rule.

4.6 Government Cost

As this rule will require amendments to security plans, we estimate a cost to the government to review these amendments during the implementation period. There may be additional costs for COTP's to review notifications of reader system failures. However, we do not have data on the frequency of these events and have not quantified that potential cost to government.

To review an amended FSP will take an estimated 4 labor hours. Assuming a 2-year, phased-in implementation, approximately 262.5 FSPs will be amended in each of the first

2 years, for a total of 1,050 hours in each of the first 2 years. Amendments to FSPs are reviewed by Coast Guard personnel at an hourly wage of \$49.⁷¹ As such, the government cost for FSP amendment review will be approximately \$51,450 ($\$49 * 1,050$) in each year of implementation. For VSPs, we estimate an average of 3 labor hours per amendment for a total of 3 hours in the first year of implementation, assuming the only affected vessel to amend its plan in first year of implementation. According to the Coast Guard Vessel Security Division, the persons responsible for VSP review earn, on average \$55.25 an hour. As such, the government cost for VSP amendment review will be approximately \$166 ($\$55.25 * 3$). For the total implementation period, the total government cost will be \$103,066 ($(\$51,450 * 2) + \166). Table 4.39 shows the 10-year government costs.

Table 4.39 Government Costs

Year	FSP	VSP	Total Undiscounted	7%	3%
1	\$51,450	\$166	\$51,616	\$48,239	\$50,112
2	\$51,450	\$0	\$51,450	\$44,938	\$48,497
3	\$0	\$0	\$0	\$0	\$0
4	\$0	\$0	\$0	\$0	\$0
5	\$0	\$0	\$0	\$0	\$0
6	\$0	\$0	\$0	\$0	\$0
7	\$0	\$0	\$0	\$0	\$0
8	\$0	\$0	\$0	\$0	\$0
9	\$0	\$0	\$0	\$0	\$0
10	\$0	\$0	\$0	\$0	\$0
Total	\$102,900	\$166	\$103,066	\$93,177	\$98,609
Annualized				\$13,266	\$11,560

Except for reviewing security plan amendments, we do not expect the preferred alternative in this final rule to require additional government resources to implement. The Coast Guard and TSA will use existing resources related to the TWIC program and port security to implement the electronic TWIC inspection requirements for the preferred alternative.⁷² Other alternatives could have resource implications for USCG and TSA.

⁷¹ This is the wage for an E-5, per Commandant Instruction 7310.1N, available at http://www.uscg.mil/directives/ci/7000-7999/CI_7310_1N.pdf

⁷² Inspections are already required under MTSa. A TWIC reader requirement does not change the current inspection requirements, and as such there is no additional cost to the government. This final rule does not specify the creation or use of the QTL, and therefore any costs to TSA regarding the QTL would not be due to this rule. Also, according to TSA, there are no fees or cost to the government related to the QTL.

As discussed in Section 4.4 (Total Industry Costs) above, we didn't estimate any potential costs of requiring the owner or operator when the access control system fails. Likewise, our government costs do not include any such potential impact on government costs, as there is no past or current data to estimate the frequency of such eventuality.

Table 4.40 shows the combined industry and government costs of this final rule. We estimate the average first-year cost of this final rule (combined industry and government) to be about \$52.1 million or \$54.1 million at a 7% discount rate or a 3% discount rate, respectively. The undiscounted annual recurring cost for this proposal is approximately \$7.5 million in every year except Years 6 and 7, due to equipment replacement 5 years after implementation. The annualized cost of this final rule is \$21.9 million at 7% discount rate and \$20.4 million at 3% discount rate. The 10-year cost to industry and government of this proposed rule is approximately \$153.8 million at a 7% discount rate, and \$173.9 million at a 3% discount rate, respectively.

Table 4.40 Combined Industry and Government Costs* (\$ Millions)

Year	Industry	Government	Undiscounted	7%	3%
1	\$55.7	\$0.1	\$55.8	\$52.1	\$54.1
2	\$56.9	\$0.1	\$56.9	\$49.7	\$53.6
3	\$7.5	\$0.0	\$7.5	\$6.1	\$6.9
4	\$7.5	\$0.0	\$7.5	\$5.7	\$6.7
5	\$7.5	\$0.0	\$7.5	\$5.4	\$6.5
6	\$17.4	\$0.0	\$17.4	\$11.6	\$14.6
7	\$17.4	\$0.0	\$17.4	\$10.8	\$14.1
8	\$7.5	\$0.0	\$7.5	\$4.4	\$5.9
9	\$7.5	\$0.0	\$7.5	\$4.1	\$5.8
10	\$7.5	\$0.0	\$7.5	\$3.8	\$5.6
Total	\$192.5	\$0.1	\$192.6	\$153.8	\$173.9
Annualized				\$21.9	\$20.4

* Figures may not total due to rounding.

5) Benefits

We expect that this rulemaking will enhance the security of ports and vessels by increasing the likelihood that only persons who possess a duly issued TWIC are granted unescorted access to secure areas on vessels and facilities.

There exist potential port security risks related to not having consistent access control, identification, and security background checks for transportation workers accessing and/or interfacing with high-risk U.S. port facilities and vessels (e.g., higher consequence targets of terrorist acts). To this end, the MTSA transportation security card requirement and the SAFE Port Act electronic TWIC inspection requirements call for the installation and use of electronic readers to verify and validate the information presented on a TWIC upon requesting unescorted access to a secure area of a vessel or facility. Absent a legal requirement, owners and operators of these facilities and vessels are not likely to develop, acquire, and/or install a universal technology to provide an access control systems on a national scale that will perform and update background checks and provide worker identification for access to all high-risk facilities and vessels due to the costs associated with acquiring and installing readers. Facility and vessel owners want to protect their facilities, but may focus on systems that do not provide the nationwide interoperability needed to avoid multiple proprietary cards/interfaces for card holders and increased compliance challenges. The electronic TWIC inspection requirements will create a more standardized access control process that will potentially reduce confusion for workers accessing multiple facilities.

In this chapter, we provide examples of the consequences of a TSI and discuss the benefits that may accrue from this final rule. We cannot derive any specific values for the benefits of the final rule due to the fact that we cannot assign probabilities to the TSI events analyzed, or calculate risk mitigation for these events.

The Benefits chapter is organized in the following manner:

- Beneficial Impacts of the Final Rule
- Benefits Based on USCG Enforcement Actions
- Risk Framework and the Maritime Security Risk Analysis Model (MSRAM)
- Potential Consequences of a TSI
- Monetization of TSI Consequences
- Break-even Analysis

5.1 Beneficial Impacts of the Final Rule

This rule seeks to prevent terrorist attacks by enhancing access control – a foundational element of security. The objective of the TWIC reader is to provide an additional layer of security and access control at high-risk facilities and vessels. Implementation and use of TWIC readers will make identification, validation, and verification of individuals attempting to gain unescorted access to a secure area more reliable, and also will help to alleviate potential sources of human error when checking credentials at access points.

Identity verification ensures that the individual presenting the TWIC is the same person to whom the TWIC was issued. Card authentication ensures that the TWIC is not counterfeit and card validation ensures that the TWIC has not expired or been revoked by TSA, or reported as lost, stolen, or damaged.

5.2 Benefits Based on Coast Guard Enforcement Data

To assess the potential vulnerabilities at U.S. high-risk maritime facilities, the Coast Guard reviewed USCG enforcement data from 2007 through 2010. Based on the enforcement data, there were a total of 443 enforcement actions taken due to violations of 33 CFR part 105 relating to access control.⁷³ Among these, more than one-third (152) of violations could potentially be corrected or avoided through the electronic TWIC inspection requirement. These violations were predominantly due to failures to perform appropriate access control, specifically guards not checking identification, and a general lack of awareness of access control protocol. The implementation of an electronic TWIC inspection program will potentially address these failings by providing an additional layer of access control. Also, the inclusion of TWIC readers to an access control system will be accompanied by updated security protocols and increased training, which could improve the awareness and effectiveness of access control protocols.

The implementation of the electronic TWIC inspection requirements has the potential to reduce the human error in access control by requiring a more effective validation and verification of a person's credentials when attempting to access a secure area of a facility than reliance on a visual inspection of a credential.

The Coast Guard believes that the final rule may help to reduce criminal activity, in addition to its effects on terrorist activity. However, we do not discuss this potential benefit in this RA because we do not have any data specifically showing that an electronic TWIC inspection program will prevent criminal activity.

5.3 Evaluating the Beneficial Impacts with the Risk Framework and MSRAM

The Coast Guard assesses vessels and facilities based on the vulnerabilities to potential security threats and the consequences of potential incidents. We use a systematic process known as Risk-Based Decision Making (RBDM) to meet those needs. Specifically, MSRAM is an analysis tool designed to assess risk for potential terrorist targets in the U.S. maritime domain. The Coast Guard has used MSRAM extensively for the past 8 years, and considers it to be the best available tool for determining which maritime facilities and vessels should be considered a high risk. We calculate risk in MSRAM by analyzing specific vessels and facilities and pairing each to various terrorist attack modes.

The use of RBDM ensures a comprehensive evaluation by considering the relative risks of various targets and attack mode combinations or scenarios. It provides a more realistic

⁷³ For more information regarding enforcement of Coast Guard security standards, see "Compliance with Security Standards Established Pursuant to Maritime Transportation Security Plans in 2012," Fiscal Year 2011 Annual Report to Congress.

estimation of risk (and more efficient risk management activities) than a simple “worst case scenario” assessment, where only the worst possible consequences are considered. In addition, the RBDM approach was based on the recommendations from the Government Accountability Office (GAO), and is consistent with DHS directives, including the National Infrastructure Protection Plan (NIPP). Managing risk is one of the best tools to complete a security assessment and to determine appropriate security measures, as has been recommended by GAO in several studies (see, e.g., GAO-01-822, GAO-01-1158T, and GAO/NSIAD-98-74).

Risk management principles acknowledge that, while risk cannot be eliminated entirely, it can be reduced. Risk reduction is done by adjusting operations to reduce consequence, threat, or vulnerability of a security threat. The term “consequence” is the estimation of adverse effect from the target/attack scenario and is an important consideration in risk evaluation and security planning. The term “threat” is a measure of the likelihood of an attack. It represents the estimated probability of an attack based on collective intelligence through maritime domain awareness. The term “vulnerability” measures the conditional probability of success given that a threat scenario occurs. It evaluates the adequacy and effectiveness of safeguards (both existing and proposed). We assess risk according to the risk equation:

$$\text{Risk} = \text{Threat} * \text{Consequence} * \text{Vulnerability}$$

Generally, it is easier to reduce vulnerabilities by adding security measures than it is to reduce consequences or threats (although reductions in all three are possible). Risk assessments provide visibility into those elements of the risk equation that exert the greatest influence on risk, and those elements become priorities in the risk management approach. The goal for maritime security is to ensure that, if the level of threat increases, either the consequences or vulnerabilities (or both) decrease enough to offset that increase.

Initial MSRAM risk assessment is performed at the port level with input from members of the Area Maritime Security committees, ensuring industry and local government representatives are involved in the risk analysis process, and providing access to what are often the best data sources. This initial assessment provides the maximum potential consequence⁷⁴ for the total loss of a target using factors such as injury and loss of life, economic and environmental impact.⁷⁵ If a target’s maximum potential consequence score surpasses a predetermined threshold, then the risk analysis continues with the evaluation of risk scenarios in terms of threat, vulnerability, and consequence to produce

⁷⁴ The maximum potential consequence represents the highest possible consequence of a scenario. This initial scoring accounts for all attack modes analyzed by MSRAM to provide the worst case scenario for each target across all relevant attack modes. This technique is used to determine the risk hierarchy. For our analysis, we focus only on specific attack scenarios that would be mitigated by TWIC readers, which focuses the maximum potential consequences to only those scenarios selected.

⁷⁵ While the approach used in MSRAM predates the NIPP, it is consistent with the approaches recommended there, covering health, environmental, mission (including national security), and psychological dimensions.

unique risk estimates for each scenario. Data provided by the Coast Guard's Office of Port and Facility Activities, Cargo and Facilities Division cover 362 facilities, 17 vessels and 4 other targets regulated under MTSA that have been analyzed by MSRAM. We were able to match 383 targets from our affected population to targets in MSRAM. This discrepancy is due to differences in facility names in MISLE, which provided our initial MTSA-regulated population and the naming of facilities in MSRAM. As such, we were unable to match our entire population to MSRAM consequence data.

Because the primary function of the TWIC card and of electronic TWIC inspection is to enhance access control and identity verification and validation, the attack scenarios evaluated within MSRAM to provide the consequence data for this analysis were limited to the following:

- Truck Bomb
 - Armed terrorists use a truck loaded with explosives to attack the target focal point. The terrorists will attempt to overcome guards and barriers if they encounter them.
- Terrorist Assault Team
 - A team of terrorists using weapons and explosives attack the target focal point. Assume the terrorists have done prior planning and surveillance, but have no insider support of assault.
- Passenger/Passerby Explosives/IED
 - Terrorists exploit inadequate access control and detonate carried explosives at the target focal point. Assume the terrorists approach the target under cover of legitimate presence and are not armed. Note: for this attack mode, terrorist is not an insider.

The focus on these three attack scenarios allows us to look at specific attack scenarios that are most likely to be mitigated by the use of TWIC readers. We base our analysis on the highest consequence scenario of these three for each target.⁷⁶ These scenarios were chosen because they represent the scenarios most likely to benefit from the enhanced access control afforded by electronic TWIC inspections, as they require would-be attackers gaining access to the target in question. For these three attack types, the aggressor will first need to gain access to the facility to inflict maximum damage. Because the function of the electronic TWIC inspection is to enhance access control, the deployment of electronic TWIC inspection programs will increase the likelihood of identifying and denying access to an individual attempting terrorist acts. The consequence of an attack scenario is dependent on both the target and the attack mode. The attack modes selected for this analysis, as described above, serve to limit the potential maximum consequence compared to other potential attack modes, which often have more damage potential. Typically, one or more threat, vulnerability, or consequence drivers will contribute significantly more to a target's risk scores than

⁷⁶ When determining the risk groups, we looked at the overall consequence level of all facilities across all attack types. To discuss the consequences potentially mitigated or avoided from this rule, we looked only at the attack scenarios that would be affected by TWIC readers.

others; these are known as major risk drivers. The local COTPs document major risk drivers such as inherent limitations on access control or the potential death and injury during the analysis process.

Specifically, the use of electronic TWIC inspection primarily addresses the vulnerability component of risk, although electronic TWIC inspection may also impact the other components as well. For the Truck Bomb scenario, use of electronic TWIC inspection would preclude terrorists from driving a truck into the facility without an operative TWIC card, reducing vulnerability. If the terrorists cannot reach their primary target, they may still detonate a truck at the perimeter of the facility (i.e., they may change the location of the threat). For the scenario of detonating the truck at the perimeter of the facility, the deterrence from electronic TWIC inspections displaces the attack away from the primary target, providing a greater distance from the blast radius, and thereby reducing the potential consequences. Thus, the use of electronic TWIC inspection addressed at least two risk components by reducing the vulnerability of the facility through denying access, and by reducing consequences by moving the detonation away from the primary target, and possibly addresses a third component, depending on the level of deterrent impact an electronic TWIC inspection has on would-be attackers.

Similarly, for the scenario of attempting to break through the gates or protective barriers at a facility, the nature of the threat is changed from a surreptitious act to an overt and immediately recognizable threat. The very act of trying to bypass electronic TWIC inspection immediately signals harmful intent, increasing the likelihood of intercepting and stopping the attack before the target is reached (reducing both vulnerability and consequence).

For the Terrorist Assault Team scenario, the use of electronic TWIC inspection would preclude persons not holding a duly issued TWIC from obtaining unescorted access to the secure areas of a facility or vessel, thus reducing the potential for a terrorist action to take place there (reducing vulnerability). As with the Truck Bomb scenario, electronic TWIC inspection could cause the nature of the threat to change by forcing the incident to be perpetrated outside the perimeter of a facility (reducing consequences), or by forcing the terrorist assault team to break through the gates or barriers by force (providing clear signs of an attack and triggering the use of more capable security response measures).

Lastly, for the Passenger/passerby IED scenario, by ensuring that only those persons possessing a duly issued TWIC can access secure areas, electronic TWIC inspection would mitigate the possibility of a person bringing an explosive device into a secure area. Electronic TWIC inspection would have the same impacts on the attacks on the perimeter and breaking through the gates as they have on the Truck Bomb and Terrorist Assault Team scenarios.

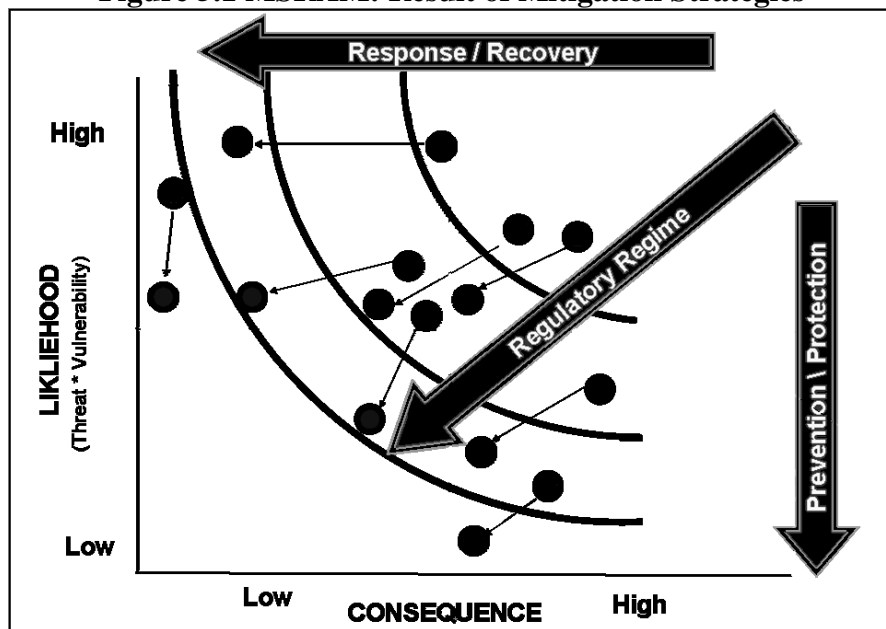
Overall effects of electronic TWIC inspection on risk are shown in Table 5.1.

Table 5.1 Overall Impact of Electronic TWIC Inspection on Risk

Risk Component Addressed	How Risk is Addressed
Threat	Potential deterrent given enhanced security and attacker desire to maximize success
Vulnerability	Access control strengthened by enhanced identity verification (TWIC card and reader), card authentication (TWIC reader) and card validation (TWIC reader). Potential vulnerability reduction by establishing temper and intent earlier, triggering more capable security assets.
Consequence	Reduced consequence given increased likelihood of stopping the attack at the checkpoint, farther from the main target. Reduced consequence by immediate identification of intent and a greater chance of implementing protective measures (e.g., shutdown of sensitive systems).

The implementation of an electronic TWIC inspection program enables better detection of attempted TSIs, which in turn increases the effectiveness of active measures to defend the target and/or defeat the attack. By enhancing a facility's or vessel's ability to detect a potential threat, electronic TWIC inspection programs increase the likelihood of avoiding a TSI. The final rule seeks to reduce the likelihood of a TSI as well as the consequences thereof (e.g., earlier detections that do not result in an explosive being detonated at the intended target, but for which detonation is triggered earlier and in a less vulnerable location). Figure 5.1 illustrates the multidimensional impact of the electronic TWIC inspection.

Figure 5.1 MSRAM: Result of Mitigation Strategies



5.4 Potential Consequences of a TSI

MSRAM contains information on the potential consequences at risk for each target in six categories, as detailed in Table 5.2. For the purposes of this rulemaking, we analyze the consequence of the relevant attack scenarios only for death and injury.

Table 5.2 Description of Consequence Factors in MSRAM*

Consequence Factors	Definitions
Death/serious injury	Represents the expected number of deaths/serious injuries from a successful attack. This includes both deaths at the time of attack, and deaths that occur later but are still clearly a direct result of the attack (e.g., burn victims, or victims who become sick and die from exposure to chemical or biological agents).
Economic - primary	Represents the expected property damage and immediate business interruption from a successful attack. This includes the actual costs of replacing or repairing maritime infrastructure, as well as business losses resulting from the attack.
Environmental	Represents the expected environmental impacts of a successful attack. This impact predominately captures impacts from oil and oil-like substances.
National security	Represents the expected impact of a successful attack on a target involved in providing national security.
Symbolic	Represents the symbolic impact of a successful attack based on the iconic value of the target in terms of its local, regional, national, and international importance.
Economic - secondary	Represents the expected follow-on economic effects of a successful attack. For example, an attack on a fuel refinery could interrupt energy production and distribution, which is considered a secondary economic effect. This assessment should take into account redundancy and resiliency of the target.

* Note: Even though the MSRAM includes the above consequence factors, the break-even analysis used in this rule only considers and quantifies the “Death/serious injury” factor.

For its consequence estimates, MSRAM only considers serious, severe and critical injuries. This is done to focus scarce analytic resources on the highest consequence scenarios of national significance quickly, without having to assess all scenarios. As such, MSRAM does not account for the consequences of minor and moderate injuries, and these are not included in this RA. To calculate the value of injuries as well as fatalities, MSRAM assigns an equivalency of 10 injuries to 1 fatality (1 injury is equal to 10% of a fatality). For comparison purposes, according to the Department of

Transportation (DOT) Abbreviated Injury Scale (AIS)⁷⁷, a serious injury is equivalent to 10.5% of an unsurvivable accident (a fatality); this 10.5% value is greater than the value MSRAM places on all serious, severe and critical injuries and suggests MSRAM may be underestimating the value of injuries.

Table 5.3 Relative Disutility Factors by Injury Severity Level (AIS)⁷⁸

AIS Level	Severity	Fraction of VSL
AIS 1	Minor	0.003
AIS 2	Moderate	0.047
AIS 3	Serious	0.105
AIS 4	Severe	0.266
AIS 5	Critical	0.593
AIS 6	Unsurvivable	1

Since MSRAM counts serious, severe and critical injuries equally, as 10% of a "value of a statistical life" (VSL), when determining consequence scores, it can be argued that the value of a MSRAM injury may be undervalued, based on the AIS scale, which counts severe injuries as 26.6% of a VSL and Critical Injuries as 59.3% of a VSL. For example, if there was an explosion that left 1 person critically injured and another person severely injured, the MSRAM will equate the cost to be \$1.82 million (\$9.1 million VSL * 10% * 2 people) however, using the AIS scale, the cost will be \$7.82 million (\$9.1 million VSL * 0.266 for the severely injured person + \$9.1 million * 0.593 for the critically injured person).

For the purposes of this RA, we focus on equivalent fatalities⁷⁹ for our valuation of consequences (for example 50 injuries are considered to be 5 “equivalent fatalities”). We do not consider primary economic loss or environmental loss in our estimate of consequences for the break-even analysis, since MSRAM includes potential individual business losses in its estimates of primary economic loss, which may not represent the overall net loss to the economy.⁸⁰ The valuation of environmental loss is quantified in barrels, and not monetized or distinguished for damages associated with petroleum spills or releases of other substances, such as CDC, which is only considered in Risk Group A. MSRAM consequence data are initially collected at the local level with input from Coast

⁷⁷ Revised Departmental Guidance: Treatment of the Value of Preventing Fatalities and Injuries in Preparing Economic Analyses – 2011 Revision, DOT Memorandum July 29, 2011.

<http://www.dot.gov/sites/dot.dev/files/docs/VSL%20Guidance%202013.pdf>

⁷⁸ <http://www.dot.gov/regulations/economic-values-used-in-analysis>

⁷⁹ Equivalent fatalities include fatalities and injuries. MSRAM assumes that the cost of an injury is approximately 10% that of a fatality. Recall that MSRAM does not include minor or moderate injuries.

⁸⁰ Individual business losses are typically not considered primary economic impacts and are not real costs associated with resource loss (i.e., real resource impacts are associated capital and infrastructure losses). For example, if a facility were to be shut down due to an attack and that attack resulted in lost income, another facility may gain those additional customers and have an increase in income, resulting in little to no national-level business impact. For more details, see OMB Circular A-4, Regulatory Analysis, “The Difference between Costs (or Benefits) and Transfer Payments,” p. 38

http://www.whitehouse.gov/sites/default/files/omb/assets/regulatory_matters_pdf/a-4.pdf.

Guard resources and stakeholders such as owners/operators, first responders, and local, State and other law enforcement. Coast Guard staff at the District, Area, and Headquarters level then review the data to ensure consistency between ports and across Districts to allow for a national aggregation of data. The Coast Guard updates the data periodically to reflect changes over time.

Data on equivalent fatalities provided by the Office of Port and Facility Activities, Cargo and Facilities Division cover 362 facilities, 17 vessels, and 4 other targets⁸¹ (for a total of 383 targets) that might come under attack in such a way that TWIC readers could prove to be effective in interdiction have been analyzed by MSRAM.⁸² We then look at these targets by attack type to provide an overview of the different threats associated with each target as well as the potential consequences of the three attack scenarios presented. MSRAM assesses attack scenarios for specific targets, and as such, not all scenarios are estimated for each target, as specific targets may not be vulnerable to a particular attack type. Table 5.4 shows the number of targets analyzed and the average maximum consequence by attack type.

Table 5.4 Average Maximum Consequence by Attack Type

Attack Scenarios	Count of Target Scenarios	Average Maximum Consequence (\$ Millions)
Attack by Terrorist Assault Team	139	\$5,082.5
Passenger/Passerby Explosives/IED	360	\$1,403.5
Truck Bomb	366	\$2,275.8

To develop scenarios for further use, we extract consequences from the list of 383 targets. To obtain the maximum average consequence across the three attack types analyzed, we use the maximum consequence scenario for each of the 383 targets.⁸³ We then calculated the average of the maximum consequence scenarios to estimate the average maximum consequence of the three attack modes across the full affected population. We present the average maximum consequence for several target classes and combinations. Table 5.5 presents the average potential equivalent fatalities for three target combinations.

⁸¹ Other targets can include stadiums, tourist attractions, or other venues that would have substantial consequences due to a terrorist attack.

⁸² We were able to match 383 targets from our affected population to targets in MSRAM. This discrepancy is due to differences in facility names in MISLE, which provided our initial MTSA-regulated population and the naming of facilities in MSRAM. As such, we were unable to match our entire population to MSRAM consequence data.

⁸³ We were able to match 383 targets from our affected population to targets in MSRAM. This discrepancy is due to differences in facility names in MISLE, which provided our initial MTSA-regulated population and the naming of facilities in MSRAM. As such, we were unable to match our entire population to MSRAM consequence data.

Table 5.5 Equivalent Fatalities At Risk, by Target Group

	Number of Targets ⁸⁴	Average Maximum Number of Equivalent Fatalities
Risk Group A	383	551
Risk Group B	1,162	88
Containers	90	58
Risk Group A and Containers	474	457
Risk Group A plus Petroleum Refineries, Non-CDC Bulk Hazardous Materials Facilities, and Petroleum Storage Facilities	1,025	243
Risk Groups A and B	1,546	181

5.5 Monetization of TSI Consequences Derived from MSRAM

Valuation of Lives Lost

To monetize the value of fatalities and fatalities prevented, we use the concept of the “value of a statistical life” (VSL), which is commonly used in safety and security analyses. The VSL does not represent the dollar value of a person’s life, but the amount society would be willing to pay to reduce the probability of death. We currently use a value of \$9.1 million as an estimate of the VSL.⁸⁵

Table 5.6 presents the monetized value of the consequences faced across several target groups based on the data from the MSRAM consequence data in Table 5.5. These target groupings are used in Chapter 6 of this RA as part of our alternatives analysis.

⁸⁴ Targets include 362 facilities, 17 vessels, and 4 other targets. This is not the same as the count of facilities and vessels discussed in Chapter 2 where we define Risk Groups A and B.

⁸⁵ See the Department of Transportation’s “*Guidance on the Treatment of the Economic Value of a Statistical Life in U.S. Department of Transportation Analyses*” <http://www.dot.gov/sites/dot.dev/files/docs/VSL%20Guidance%202013.pdf>

Table 5.6 Monetary Value of Consequences at Risk, by Target Group (\$ Millions)

Target Group	Number of Targets	Average Number of Equivalent Fatalities	Average Max Consequence (\$ millions) ⁸⁶
Risk Group A	383	551	\$5,014.1
Risk Group B	1,162	88	\$800.8
Containers	90	58	\$527.8
Risk Group A and Containers	474	457	\$4,158.7
Risk Group A plus Petroleum Refineries, Non-CDC Bulk Hazardous Materials Facilities, and Petroleum Storage Facilities	1,025	243	\$2,211.3
Risk Groups A and B	1,546	181	\$1,647.1

The facilities and vessel represented in Risk Group A include fuel storage facilities (which have high potential infrastructure consequences), facilities and vessels that handle CDCs⁸⁷ (which have high potential environmental consequences), and passenger ships and terminals (which have high potential fatalities). Facilities that handle CDCs present a high risk based on the cargo that they handle and the potential impacts of an incident occurring on that facility. These CDCs include items such as ammonium nitrate or liquefied chlorine gas, and other items that could be weaponized or used to cause severe casualties in the case of a TSI. Large passenger facilities present a high risk because of the number of persons that would be vulnerable to a TSI. In 2011, the average number of passengers on cruises embarking at U.S. ports was 2,301 passengers per cruise.⁸⁸ This volume of persons vulnerable to an attack makes cruise terminals attractive and high-risk. The targets represented in Risk Groups A and B includes all the high-risk targets in Risk Group A, along with the medium risk population. Each group's monetized consequence is the average of all scenarios for that group. The average for all scenarios is the consequence shown for the overall group. These consequences are taken as representing potential benefit, as there have been no TSIs at MTSA-regulated entities to evaluate and we do not have publicly releasable information on expected TSIs in the future. We use this average maximum consequence data to evaluate the target groups and scenarios with actual, verified consequence data in a break-even analysis.

⁸⁶ This table shows the average maximum consequence, which is the average of the highest consequence attack scenario for each target in the referenced target group. The average maximum consequence compares the results from the three analyzed attack modes for each target and averages the maximum consequence for all targets.

⁸⁷ A listing of CDCs can be found in 33 CFR 106.204. <http://www.gpo.gov/fdsys/pkg/CFR-2006-title33-vol2/xml/CFR-2006-title33-vol2-sec160-204.xml>

⁸⁸ U.S. Department of Transportation Maritime Administration, North American Cruise Statistical Snapshot, 2011, p. 3. <http://www.marad.dot.gov/resources/data-statistics/>

5.6 Break-even or Threshold Analysis

The primary impetus of this rule is the security benefit afforded by the implementation of electronic TWIC inspection requirements. The quantification and monetization of the beneficial security effects of this regulation will involve two steps. Estimating the initial probability and reduction in the probability of a successful terrorist attack resulting from implementation of the regulation and the consequences of the avoided event (the risk associated with a potential terrorist attack). We do not have data available to estimate the initial and reduction in probability of a successful terrorist attack and can therefore not directly quantify benefits, thus we use break-even analysis.

Break-even analysis is useful when it is not possible to quantify the benefits of a regulatory action.⁸⁹ OMB Circular A-4 recommends a “threshold” or “break-even” analysis when non-quantified benefits are important to evaluating the benefits of a regulation. 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?”⁹⁰ For this rulemaking, we calculate a potential range of break-even results using attack scenarios representing casualties and terrorist events that result in loss of life.

One of the benefits of this regulation is to avoid the likelihood of 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:

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

Since the percent change in risk reduction is defined as $(L_b - L_n) / L_b$, the first equation 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 equivalent fatalities saved and uses an estimate of \$9.1 million as the VSL. By only using the number of equivalent fatalities saved and not including any savings from avoided property damage, temporary shortages in trade goods, and/or environmental damage, we may be overstating the probability reductions required for benefits to equal the costs.

⁸⁹ 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 are not available.

⁹⁰ OMB Circular A-4, September 17, 2003.

In addition, annualized costs were used because we assume that the final rule 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 will not account for the possibility that the risk has been transferred but not reduced. For this analysis, we use costs annualized at 7 percent over 10 years, since annualized costs do not differ greatly between 7 and 3 percent.

Table 5.7 presents the results of this methodology. From the results, an avoided terrorist attack at an average target is equivalent to \$5,014.1 million in avoided consequences. Using the estimated annualized cost of this regulation, the annual reduction in the probability of attack to a Risk Group A facility that would just equate avoided consequences with cost is less than 1 percent. To state this another way, if implementing this regulation would lower the likelihood of a successful terrorist attack by 1 percent or more each year, then this would be a socially efficient use of resources. In other words, this final rule is estimated to cost approximately \$22.5 million annualized at 7%, and it will be cost effective if it prevented one terrorist attack with consequence equal to the average every 228.8 years ($\$5,014.1/\22.5). These small changes in risk reduction suggest the potential benefits of the final rule justify the costs. We include the calculations for the potential regulatory alternatives in Table 5.7 to demonstrate the differences in cost, consequence, risk reduction, and frequency of attacks averted for each alternative. The affected populations for the regulatory alternatives are derived from the multiple target groups as shown in Tables 5.4 and 5.5. The regulatory alternatives below include the estimated costs for facilities and vessels and the effected populations are different from those in Tables 5.5 and 5.6, which show the consequences only, which are based on MSRAM assets or targets, and which include a combination of facilities, vessels, and other targets. These alternatives are discussed fully in Section 6.1 of this RA.

**Table 5.7 Annual Risk Reduction Required for Costs to Equal Benefits,
by Regulatory Alternative**

TWIC Reader Requirement	Annualize Cost, 7% Discount Rate	Average Consequence	Required Reduction in Risk	Required Frequency of Attacks Averted
Final Rule Alternative	\$21.9	\$5,014.1	0.4%	One every 229.0 years
NPRM Alternative	\$21.9	\$5,014.1	0.4%	One every 229.0 years
Risk Group A facilities and all Risk Group A vessels	\$22.5	\$5,014.1	0.4%	One every 222.8 years
Risk Group A and container facilities and Risk Group A vessels with more than 14 Crewmembers	\$26.0	\$4,158.7	0.6%	One every 160.0 years
All Risk Group A facilities, plus additional high- consequence facilities including petroleum refineries, non-CDC bulk hazardous materials facilities, and petroleum storage facilities, and Risk Group A vessels with more than 14 crewmembers	\$44.1	\$2,211.30	2.0%	One every 50.1 years
ANPRM Alternative: Risk Groups A and B facilities and Risk Group A vessels with more than 14 Crewmembers	\$78.1	\$1,647.1	4.7%	One every 21.1 years

6) Alternatives

When creating this final rule, the Coast Guard considered several alternatives. These included several iterations of different populations for facilities and vessels that could require an electronic TWIC inspection program. In the following sections, we examine these alternatives by looking at how the cost of the proposal would change based on different population assumptions.

The Final Rule Alternative evaluated all Risk Group A facilities with the exception of barge fleeting facilities as listed in Figure 2.2 . As for vessels, the evaluation included all Risk Group A vessels with a crew size greater than 20 TWIC-holding crewmembers.

For the NPRM alternative, we assess that all Risk Group A facilities will be required to install and use TWIC readers. On the vessel side, we assess that all Risk Group A vessels with a crew size greater than 14 TWIC-holding crewmembers will be required to carry 2 portable readers. For this alternatives analysis, we look at three other alternatives.

In calculating the alternatives for electronic TWIC inspection requirements for container facilities, we also included an estimated annual cost for delays due to congestion caused by the longer processing time required for a biometric read of a TWIC, as compared to a visual TWIC inspection. The time difference for a biometric read as opposed to a visual TWIC inspection is estimated from the TWIC pilot to be about 2 seconds a transaction. In the Draft Programmatic Environmental Assessment for this rulemaking, we estimate the delay, in hours, for electronic TWIC inspections versus visual TWIC inspections. Using the average of these delay calculations and the mean wage for an employee in the labor category Deep Sea, Costal and Great lakes Water Transportation (\$39.98),⁹¹ we are able to estimate the cost of delays for all 122 container facilities. Table 6.1 shows this result.

Table 6.1 Annual Cost of Delay for Container Facilities

Number of Container Facilities	122
Average Delay, in Hours	1,531
Wage	\$39.98
Annual Cost of Delays	\$7,467,544

We anticipate that container facilities would present the greatest threat of congestion delays leading to opportunity costs. Because we are not requiring electronic TWIC inspections at the majority of the container facilities, we assume that this final rule will

⁹¹ The Coast Guard took the average of four mariner wage categories from BLS's May 2010 NAICS 48300 Water Transportation series (http://www.bls.gov/oes/2012/may/naics3_483000.htm): Sailors and Marine Oilers (53-5011), Captains, Mates, and Pilots of Water Vessels (53-5021), Motorboat Operators (53-5022) and Ship Engineers (53-5031), and used a load factor of 1.49 to the average wage rate of \$26.83 of these categories to obtain \$39.98/hour.

not lead to increased costs due to congestion delays. We only account for congestion delays at container facilities, as containers account for the majority of TWIC-holder vehicle traffic. We anticipate that because vehicle traffic will not be unexpected, other facilities will be able to adjust their business practices so that the additional 2 seconds will not result in additional processing time or congestion delays. Therefore, we do not account for congestion costs other than at container facilities. Table 6.2 summarizes the alternatives considered. The costs displayed in Table 6.2 are for both ten-year total and annualized at a 7% discount rate.

Table 6.2 Regulatory Alternatives

	Description	Facility Population	Vessel Population	Total Cost (\$ millions, at 7% Discount Rate)	Annualized Cost (\$ millions, at 7% Discount Rate)
Final Rule Alternative	All Risk Group A facilities and Risk Group A vessels with more than 20 crewmembers	525	1	\$153.8	\$21.9
NPRM Alternative	All Risk Group A facilities and Risk Group A vessels with more than 14 crewmembers	532	38	\$153.5	\$21.9
Alternative 2	All Risk Group A facilities and Risk Group A vessels (except barges)	532	138	\$158.2	\$22.5
Alternative 3	Risk Group A and all Container Facilities and Risk Group A vessels with more than 14 crewmembers	651	38	\$182.6	\$26.0
Alternative 4	All Risk Group A facilities, plus additional high consequence facilities including petroleum refineries, non-CDC bulk hazardous materials facilities, and petroleum storage facilities, and Risk Group A vessels with more than 14 crewmembers	1,174	38	\$309.5	\$44.1
Alternative 5 (ANPRM Alternative)	Risk Group A and B facilities and Risk Group A vessels with more than 14 crewmembers	2,173	38	\$548.9	\$78.1

When comparing alternatives, we also looked at the results of the break-even analysis for several different facility combinations. Because the vessel population and cost are small compared to the population and cost for facilities, we focus our comparisons on the break-even results for the different facility type combinations. We show the break-even comparison for the overall range of scenarios. There exists a strong positive correlation between risk and consequence. As such, the targets that would lead to the greatest consequence of a TSI should be considered in our analysis, as they are the most desirable targets. In Table 6.3, we compare the costs, required risk reduction, and averted attack

frequencies for the four regulatory alternatives. This table shows that by focusing on the highest risk population, we have effectively reduced costs and maximized our required probability reduction and frequency of attacks averted.

6.1 Alternatives

Final Rule Alternative – Risk Group A Facilities Except Barge Fleeting Facilities and Vessels with More than 20 TWIC-holding Crewmembers

The analysis for this alternative is discussed in detail previously in the final rule RA, as it is the preferred alternative for this final rule.

NPRM Alternative – Risk Group A Facilities and Vessels with More than 14 TWIC-holding Crewmembers

The analysis for this alternative is discussed in detail in the NPRM RA, as it was the alternative proposed in the NPRM. The difference in assessed costs and benefits are in the affected population with the NPRM alternative affecting 38 vessels (versus 1) and 532 facilities (versus 525).

Alternative 2 – Risk Group A Facilities and all Risk Group A Vessels, Except Barges

This alternative would require readers to be used at all Risk Group A facilities and for all Risk Group A vessels, except barges. This alternative would increase the burden on industry by increasing the affected population from 1 vessel to 138 vessels. The number of facilities will be the same (532) as in the NPRM Alternative. Under this alternative, annualized cost of this rulemaking would stay at \$22.5 million, at a 7% discount rate. The discounted 10-year costs will go from \$153.8 million to \$158.2 million. While this alternative would not lead to a significant increase in costs, we rejected it because requiring electronic TWIC inspections on vessels with 20 or fewer TWIC-holding crewmembers is unnecessary, as crews with that few members are known to all on the vessel and identity verification at the vessel would not add significant benefit.

Alternative 3 – Risk Group A and all Container Facilities and Risk Group A Vessels with More than 14 TWIC-holding Crewmembers

For this alternative, we assumed that only those facilities in Risk Group A, as previously defined, and all container facilities will be required to perform electronic TWIC inspections. This alternative will increase the burden on industry by increasing the affected population from 525 facilities to 651 facilities, and from 1 vessel to 38 vessels. Under this scenario, the annualized cost of this rulemaking will increase from \$21.9 million to \$26.0 million, at a 7% discount rate. The discounted 10-year costs will go from \$153.8 million to \$182.6 million. The inclusion of container facilities will also potentially have adverse environmental impacts, due to increased air emissions from longer queuing times and congestion at facilities.

We considered this alternative because container facilities are perceived to pose a unique threat to the maritime environment due to the large number of people accessing container terminals from the shore side, and as such, they may benefit from the enhanced access control provided by electronic TWIC inspection. As discussed in the preamble of the NPRM, many of the high-risk threat scenarios at container facilities would not be mitigated by electronic TWIC inspection. The costs for TWIC readers at container facilities would not be justified by the amount of potential risk reduction at these facilities. While container facilities pose an increased transfer risk – that is, there is a greater risk of a threat coming through a container facility and inflicting harm or damage elsewhere than with any other facility type – such threats are not mitigated by the use of TWIC readers. Furthermore, the use of TWIC readers, or other access control features, would not mitigate the threat associated with the contents of a container. Electronic TWIC inspection serves as an additional access control measure, but would not improve screening of cargoes for dangerous substances or devices.

Alternative 4 – Adding Certain High-consequence Facilities to Risk Group A, including Petroleum Refineries, Non-CDC Bulk Hazardous Materials Facilities, and Petroleum Storage Facilities

For this alternative, we moved three facility categories – petroleum refineries, non-CDC bulk hazardous materials facilities, and petroleum storage facilities – into Risk Group A from Risk Group B, based on the average maximum consequence for these facility types. This alternative would increase the burden on industry by increasing the affected population from 525 facilities to 1,174 facilities and from 1 vessel to 38 vessels. Under this scenario, the annualized cost of this rulemaking would increase from \$21.9 million to \$44.1 million, at a 7% discount rate. The discounted 10-year costs would rise from \$153.8 million to \$309.5 million.

We considered this alternative based on the high MSRAM consequence scores associated with these three facility types, as well as due to the perception that petroleum facilities pose a greater security risk than other facility types. Despite the high MSRAM consequence scores for these facility types, the overall risk score as determined in the AHP were not as high as those in the current Risk Group A, and therefore, we rejected this alternative and maintained the AHP-based risk groupings.

Alternative 5 – Risk Group A and Risk Group B Facilities and Risk Group A Vessels with More than 14 TWIC-holding Crewmembers

Alternative 5 represents the facility requirements that were presented in the Advanced Notice of Proposed Rulemaking. This alternative would require readers to be used at all Risk Group A and Risk Group B facilities. This alternative would increase the burden on industry by increasing the affected population from 525 facilities to 2,173 facilities and from 1 vessel to 38 vessels. This increase in facilities would extend the affected population to facilities that fall under the second risk tier. Under this alternative, annualized cost of this rulemaking would increase from \$21.9 million to \$78.1 million, at a 7% discount rate. The discounted 10-year costs would rise from \$153.8 million to

\$548.9 million. Based on a recent study by the HSI, as discussed in the preamble of the NPRM, the difference in risk between Risk Group A and B facilities is great, indicating that the two risk groups do not require the same level of scrutiny for TWIC cards. Further, as discussed in the Benefits section of this analysis, the break-even point for this alternative is much higher than that of the preferred alternative. Moreover, many of the comments opposing electronic TWIC inspection requirements represented the interests of owners and operators of vessels or facilities assigned to Risk Group B. For these reasons, we rejected this alternative. For an example of what an impact of an incident at a Risk Group B petroleum facility could be, see Appendix F.

**Table 6. 3 Summary of Required Risk Reduction by Regulatory Alternative Overall
(\$ Millions)**

TWIC Reader Requirement	Annualize Cost, 7% Discount Rate	Average Consequence	Required Reduction in Risk	Required Frequency of Attacks Averted
Final Rule Alternative	\$21.9	\$5,014.1	0.45%	One every 229.0 years
NPRM Alternative	\$21.9	\$5,014.1	0.44%	One every 229.0 years
Risk Group A facilities and all Risk Group A vessels	\$22.5	\$5,014.1	0.45%	One every 222.8 years
Risk Group A and container facilities and Risk Group A vessels with more than 14 crewmembers	\$26.0	\$4,158.7	0.63%	One every 160.0 years
All Risk Group A facilities, plus additional high-consequence facilities including petroleum refineries, non-CDC bulk hazardous materials facilities, and petroleum storage facilities, and Risk Group A vessels with more than 14 crewmembers	\$44.1	\$2,211.3	1.99%	One every 50.1 years
ANPRM Alternative: Risk Groups A and B facilities and Risk Group A vessels with more than 14 crewmembers	\$78.1	\$1,647.1	4.74%	One every 21.1 years

7) Final Regulatory Flexibility Analysis

7.1 Overview of the Final Regulatory Flexibility Act Analysis

The RFA (Public Law 96-354) establishes “as a principle of regulatory issuance that agencies shall endeavor, consistent with the objectives of the rule and of applicable statutes, to fit regulatory and informational requirements to the scale of the businesses, organizations, and governmental jurisdictions subject to regulation. To achieve this principle, agencies are required to solicit and consider flexible regulatory proposals and to explain the rationale for their actions to assure that such proposals are given serious consideration.”

When an agency promulgates a final rule under section 553 of the RFA, after being required by that section or any other law to publish a general notice of proposed rulemaking, or promulgates a final interpretative rule involving the internal revenue laws of the United States as described in section 603(a), the agency must prepare a FRFA or have the head of the agency certify pursuant to RFA section 605(b) that the rule will not, if promulgated, have a significant economic impact on a substantial number of small entities. The RFA prescribes the content of the FRFA in section 604(a), which we discuss below.

In accordance with the RFA (5 U.S.C. 601-612), the Coast Guard prepared this FRFA that examines the impacts of the final rule on small entities (5 U.S.C. 601, *et seq.*). A small entity may be:

- A small independent business, defined as any independently owned and operated business not dominant in its field that qualifies as a small business per the Small Business Act (5 U.S.C. 632);
- A small not-for-profit organization; and;
- A small governmental jurisdiction (locality with fewer than 50,000 people).

This FRFA addresses the following:

- (1) a statement of the need for, and objectives of, the rule;
- (2) a statement of the significant issues raised by the public comments in response to the initial regulatory flexibility analysis, a statement of the assessment of the agency of such issues, and a statement of any changes made in the proposed rule as a result of such comments;
- (3) the response of the agency to any comments filed by the Chief Counsel for Advocacy of the SBA in response to the proposed rule, and a detailed statement of any change made to the proposed rule in the final rule as a result of the comments;
- (4) a description of and an estimate of the number of small entities to which the rule will apply or an explanation of why no such estimate is available;
- (5) a description of the projected reporting, recordkeeping and other compliance requirements of the rule, including an estimate of the classes of small entities which will

be subject to the requirement and the type of professional skills necessary for preparation of the report or record;

(6) a description of the steps the agency has taken to minimize the significant economic impact on small entities consistent with the stated objectives of applicable statutes, including a statement of the factual, policy, and legal reasons for selecting the alternative adopted in the final rule and why each one of the other significant alternatives to the rule considered by the agency which affect the impact on small entities was rejected.

Below is a discussion of FRFA analysis by each of these six elements:

7.1.1 A statement of the need for, and objectives of, the rule

The need for Federal regulatory action is due to port security risks related to not having consistent access control, identification, and security background checks for transportation workers accessing or interfacing with high-risk U.S. port facilities and vessels (e.g., higher consequence targets of terrorist acts). To this end, the MTSA transportation security card requirement, as well as the SAFE Port Act electronic TWIC reader requirements, call for the installation and use of electronic readers to verify and validate the information presented on a TWIC upon requesting unescorted access to a secure area of a vessel or facility.

Owners and operators of these facilities and vessels are not likely to develop, acquire, and install a universal technology to provide an access control systems on a national scale that will perform and update background checks and provide worker identification for access to all high-risk facilities and vessels due to the costs associated with acquiring and installing readers. Facility and vessel owners want to protect their facilities, but may focus on systems that do not provide the nationwide interoperability needed to avoid multiple proprietary cards/interfaces for cardholders and increased compliance challenges. Therefore, the implementation of electronic TWIC inspection requirements will create a more standardized access control system that will potentially reduce confusion for workers accessing multiple facilities.

The objective of this regulatory action is to enhance the security of ports, facilities, and vessels by providing an effective means to ensure that only persons who hold valid TWICs are granted unescorted access to secure areas on high consequence vessels and port facilities. This rule will provide enhancements over the current level of security and access control currently required at certain types of MTSA-regulated facilities. It will also complete the implementation of the MTSA transportation security card requirement, as well as the requirements of the SAFE Port Act for regulations on electronic readers for use with TWICs.

7.1.2 A statement of the significant issues raised by the public comments in response to the initial regulatory flexibility analysis, a statement of the assessment of the agency of such issues, and a statement of any changes made in the proposed rule as a result of such comments

On March 22, 2013, the Coast Guard published an NPRM (78 FR 17782) and received approximately 88 individual submissions. We summarized these comments in the Discussion of Comments and Changes to the Final Rule section of the final rule. The commenters raised issues related to the economic impact of the NPRM, such as the revenue impacts to small entities, the costs of electronic TWIC inspections, and the cumulative impact of security regulations on small businesses. The significant issues raised by the public comments on the Initial Regulatory Flexibility Analysis were the following:

Revenue Impacts – One commenter expressed concern that its small profit margin will be negatively affected by new expenses on security due to changes to technology and additional regulations. Cognizant of regulatory impacts on small businesses, the Coast Guard sought to minimize these impacts by allowing businesses to integrate electronic TWIC inspection requirements into their existing PACS, to choose from a variety of biometric scanners that may be less expensive than those approved by the TSA and listed on the TSA’s QTL and to have the option of designate a DRAA, a limited form of RUA, that could minimize the burden on business operations due to cumbersome and redundant electronic TWIC inspections.

Costs of TWIC readers – Several commenters believe that the Coast Guard did not appropriately address the overall costs of TWIC readers, specifically the relatively high costs to set up a TWIC Reader system for small vessels and facilities. Some commenters felt that they will be incurring significant expenses to outfit their vessels and facilities with them. Some others stated that the NPRM RA overestimated the cost of TWIC readers. We note that, in the final rule, small vessels were excluded from the electronic TWIC inspection requirement, so many of these concerns are mooted. The Coast Guard believes that the increased flexibility of this final rule is the most cost-effective way to meet the goals of the TWIC program and serve the needs of small businesses. Also, the Coast Guard updated cost estimates for the readers to reflect the current market costs of the readers, which are significantly less than those reported in the NPRM RA.

Cumulative Impact of Regulations on Small Businesses – Some commenters warned of the cumulative economic impacts of this rulemaking with several other finalized rules across the Federal agencies.⁹² However, these comments did not provide specific data or information on these cumulative economic impacts. Also, several of the comments were beyond the scope of this rulemaking when discussing the TWIC program generally and the costs of acquiring, using and maintaining TWIC cards.

We made two changes to the Final Rule requirements as a result of public comments that will reduce the impact on small entities:

⁹² For example, “Small passenger vessel operators are bearing the brunt of numerous, simultaneous government-imposed economic impacts caused by vessel and facility security plan requirements, TWIC, AIS, higher passenger weight calculations, permits for incidental discharges of wastewater, engine air emission limitations, vessel accessibility requirements, etc.”

1. We are allowing additional flexibility with regard to electronic readers; instead of requiring the use of a TWIC reader on the TSA's QTL, small businesses can choose to fully integrate electronic TWIC inspection and biometric matching into their existing PACS, and
2. We are increasing the exemption from electronic TWIC inspection requirements to vessels with 20 or fewer TWIC-holding crewmembers that will effectively remove all small entities that own and operate MTSA-regulated vessels.

As explained in the final rule, we used a risk-based approach to apply these regulatory requirements to less than 5 percent of the MTSA-regulated population, which represents approximately 80 percent of the potential consequences of a TSI. The provisions in this final rule target the highest risk entities while minimizing the overall burden of the rule. We conducted a robust alternatives analysis that considered the "break-even" point of several different alternatives and we chose the alternative that shows the final rule will be cost effective if it prevents 1 TSI with every 222.8 years.

Therefore, the Coast Guard already sought to minimize the cumulative impacts on industry by applying the final rule to as small of a population of MTSA-regulated entities as reasonably possible, and by increasing the flexibility of integrating other readers to their existing access control systems.

Please see Appendix F (Cumulative TWIC Programmatic Costs) of this RA for the final rule for a discussion of the cumulative impacts of two TWIC rulemakings (which are both Congressional mandates): TWIC Final Rule issued in 2007 and TWIC Reader Final Rule. We estimate the cumulative annualized costs of TWIC regulations to be about \$319.03 million in 2016. This includes \$296.53 million from the 2007 TWIC Final Rule⁹³ and \$22.5 million from the TWIC Reader final rule (estimates discounted at 7 percent). As previously discussed, these estimates may overestimate costs due to unquantified cost savings from flexibility to affected entities that the final rule allows.

7.1.3 The response of the agency to any comments filed by the Chief Counsel for Advocacy of the Small Business Administration in response to the proposed rule, and a detailed statement of any change made to the proposed rule in the final rule as a results of the comments⁹⁴

The Coast Guard did not receive any comments from the SBA's Office of Advocacy regarding the impact that the proposed rule would have on small entities.

7.1.4 A description of and an estimate of the number of small entities to which the rule will apply or an explanation of why no such estimate is available

⁹³ We converted the 2007 TWIC RA's primary estimate of \$250 million (annualized at 7% discount rate) reported in 2006 dollars to 2012 dollars using the GDP deflator from U.S. Bureau of Economic Analysis (BEA) and estimated \$296.53 million for 2016. For 2015 GDP deflator, we averaged the actual GDP deflators reported by BEA.

⁹⁴ This section of 604(a) in the RFA was added by the Small Business Jobs Act of 2010.

The final rule will affect the owners and operators of certain MTSA-regulated facilities and vessels. Based on the Coast Guard's MISLE database, we identified 525 facilities and 1 vessel affected by this rule that are owned by 307 unique owners and operators.

We used available operator name and address information to research public and proprietary databases for entity type (subsidiary or parent company), primary line of business, employee size, revenue, and other information. We matched this information to the SBA's "Table of Small Business Size Standards" (January 2013 version) to determine if an entity is small in its primary line of business as classified in the North American Industry Classification System (NAICS).

For each of the 60 NAICS-coded industries in the final rule's affected population, we show below the 10 industries that appeared most frequently in the affected population of facilities.

Table 7.1 Ten Most Frequent Industries Affected by the Proposed Rule - Facilities

NAICS Code	Description	Count of Facility Companies
486110	Pipeline Transportation of Crude Oil	9
493190	Other Warehousing and Storage	9
324110	Petroleum Refineries ⁴	7
561510	Travel Agencies ¹⁰	6
325110	Petrochemical Manufacturing	5
325199	All Other Basic Organic Chemical Manufacturing	5
325998	All Other Miscellaneous Chemical Product and Preparation Manufacturing	5
483212	Inland Water Passenger Transportation	5
336611	Ship Building and Repairing	4
488320	Marine Cargo Handling	4

Of the 1 vessel that will require an electronic TWIC inspection program, we identified 1 unique owner. Based on current data provided by the Coast Guard’s MISLE database, we estimate that there are potentially 3,647 distinct owners and operators of 13,825 active U.S.-flagged, MTSA-regulated vessels; 2,046 distinct owners and operators of 3,270 MTSA-regulated facilities; and 19 unique owners and operators of 56 OCS facilities that could be affected by this final rule. For this final rule, we estimated mandatory card reader requirement costs for 1 vessel and 525 facilities based on the risk assessment hierarchy. OCS facilities are not considered high-risk for this final rule, and as such they are out of scope of this analysis, and therefore, we did not analyze the impact of the electronic TWIC inspection requirements on this population. Of these 525 facilities that will be affected by the electronic TWIC inspection requirements, we found 306 unique owners. Among these 306 entities, there were 31 government-owned entities, 275 businesses, and 0 not-for-profit entities. Of the 275 businesses, there were 114 companies that exceeded SBA small business size standards, 88 companies considered small by the SBA, and 73 companies for which no information was available. For the purposes of this analysis, we consider all entities for which information was not available to be small. We also assume that each entity owns 2 facilities on average.

We were able to find revenue information for 64 of the 88 businesses deemed small by SBA standards.⁹⁵ We then determined the impacts of the final rule on these companies by dividing the total costs of the regulation by the number of regulated entities to determine a cost per entity for the regulation. We estimate these costs to be on average \$195,715 per entity per year during the implementation period and \$12,612 per entity in annual cost. We base our impact analysis on average cost to regulated entities due to the increased flexibility afforded by this final rule to owners and operators of individual

⁹⁵ SBA small business standards are based on either company revenue or number of employees. Many companies in our sample have employee numbers determining them small, but we were unable to find annual revenue data to pair with the employee data.

facilities so they can determine how best to implement electronic TWIC inspection requirements.⁹⁶ We then found what percent impact on revenue the proposed regulation will have based on implementation costs and annual costs. Table 7.2 presents the impacts on small businesses that own and operate facilities during implementation and annually.

Table 7.2 Revenue Impacts on Affected Small Businesses - Facilities

Revenue Impact Range	Impacts from Implementation Costs		Impacts from Annual Costs	
	Number of Entities	Percent of Entities	Number of Entities	Percent of Entities
0% < Impact ≤ 1%	33	52%	57	89%
1% < Impact ≤ 3%	4	6%	6	9%
3% < Impact ≤ 5%	5	8%	0	0%
5% < Impact ≤ 10%	8	13%	1	2%
Above 10%	14	22%	0	0%
Total	64	100%	64	100%

Note: Values may not total due to rounding.

The greatest impact will occur during the implementation phase when 48 percent of small businesses that we were able to find revenue data on will experience an impact of greater than 1 percent, and 22 percent of small businesses that we were able to find revenue data on will experience an impact greater than 10 percent. After implementation, the impacts decrease and 89 percent of affected small businesses will see an impact of less than 1 percent. We expect the revenue impacts for years with equipment replacement to be between those for implementation and annual impacts. During those years with equipment replacement, we estimate that approximately 42% of businesses will encounter an impact greater than 1 percent, and 11% will see an impact greater than 10 percent.⁹⁷

Of the 31 government jurisdictions that will be impacted by this final rule, 24 exceed the 50,000 population threshold to be considered small, and the other 7 have revenue levels such that there will not be an impact greater than 1% of revenue.

We found that for the 1 vessel that will be affected by this rule, the owner is not a small business. Therefore, we do not provide a revenue impact analysis for affected small businesses-owned vessels as we provided above for affected facilities.

7.1.5 A description of the projected reporting, recordkeeping and other compliance requirements of the rule, including an estimate of the classes of small entities which will be subject to the requirement and the type of professional skills necessary for preparation of the report or record

⁹⁶ We do not know how a specific facility will comply with this rulemaking in regards to type and number of readers installed, number of personnel requiring training at a given facility, etc.

⁹⁷ We estimate an average cost per facility in years with equipment replacement to be \$62,463.

Under the provisions of the final rule, 525 affected facilities and 1 vessel will be required to update their FSPs and VSPs, and to create and maintain a system of recordkeeping within 2 years of the final rule's promulgation. This requirement will be added to an existing collection of information with the OMB control number 1625-0077. Please see Paperwork Reduction Act (Chapter 8) of this RA for a detailed description and discussion of reporting and recordkeeping requirements of the rule.

7.1.6 A description of the steps the agency has taken to minimize the significant economic impact on small entities consistent with the stated objectives of applicable statutes, including a statement of the factual, policy, and legal reasons for selecting the alternative adopted in the final rule and why each one of the other significant alternatives to the rule considered by the agency which affect the impact on small entities was rejected

The Coast Guard has made two changes from the rule proposed by the NPRM after consideration of public comments. A full discussion of comments and Coast Guard responses is found in the Discussion of Comments and Changes to the Final Rule section of the final rule. The Coast Guard took the following steps to minimize the economic impact on small entities: 1. allowing additional flexibility with regard to electronic readers; instead of requiring the use of a TWIC reader on the TSA's QTL, small businesses can choose to fully integrate electronic TWIC inspection and biometric matching into their existing PACS, and 2. increasing the exemption from electronic TWIC inspection requirements to vessels with 20 or fewer TWIC-holding crewmembers that will effectively remove all small entities that own and operate MTSA-regulated vessels.

We used managing owner and operator contact information from Coast Guard data to research public and proprietary business databases for entity ownership status (subsidiary, parent company, government entity, etc.), employee size, and revenue, among other information. By using the SBA's size standards and the NAICS code classifications, we are able to determine whether a business is small or not. The SBA provides business size standards for all sectors of the NAICS.

The Coast Guard will not retaliate against small entities that question or complain about this rule or any policy or action of the Coast Guard.

Small businesses may send comments on the actions of Federal employees who enforce, or otherwise determine compliance with, Federal regulations to the Small Business and Agriculture Regulatory Enforcement Ombudsman and the Regional Small Business Regulatory Fairness Boards. The Ombudsman evaluates these actions annually and rates each agency's responsiveness to small business. If you wish to comment on actions by employees of the Coast Guard, call 1-888-REG-FAIR (1-888-734-3247).

8) Collection of Information

This proposed rule calls for a collection of information under the Paperwork Reduction Act of 1995 (44 U.S.C. 3501-3520). As defined in 5 CFR 1320.3(c), a "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 estimate covers the time for reviewing instructions, searching existing sources of data, gathering and maintaining the data needed, and completing and reviewing the collection.

Under the provisions of the final rule, the affected facilities and vessels will be required to update their Facility and Vessel Security Plans (FSPs and VSPs), and to create and maintain a system of recordkeeping within 2 years of promulgation. This requirement will be added to an existing collection with OMB control number 1625-0077.

TITLE: Security Plans for Ports, Vessels, Facilities, Outer Continental Shelf (OCS) Facilities and Other Security-Related Requirements

OMB Control Number: 1625-0077

SUMMARY OF THE COLLECTION OF INFORMATION: This information collection is associated with the maritime security requirements mandated by the MTSA. Security assessments, security plans and other security-related requirements are found in 33 CFR Chapter I, subchapter H. The final rule requires certain vessels and facilities to use electronic readers designed to work with the TWIC as an access control measure. Affected owners and operators will also face requirements associated with electronic TWIC inspection programs, including recordkeeping requirements for those owners and operators required to implement an electronic TWIC inspection program, and security plan amendments to incorporate TWIC requirements.

PROPOSED USE OF INFORMATION: The Coast Guard will use this information to ensure that facilities and vessels are properly implementing and utilizing TWIC readers.

DESCRIPTION OF THE RESPONDENTS: The respondents are owners and operators of certain vessels and facilities regulated by the Coast Guard under 33 CFR Chapter I, subchapter H.

NUMBER OF RESPONDENTS: The number of respondents as a result of this final rule is 525 facilities that are considered high risk will be required to modify their existing FSPs, and 1 vessel will be required to modify their VSPs to account for the electronic TWIC inspection requirements. These same populations will be required to create and maintain recordkeeping systems as well.

FREQUENCY OF RESPONSE: The FSP and VSP will need to be amended once within 2 years of promulgation to include electronic TWIC inspection-related procedures. Recordkeeping requirements will need to be met along a similar timeline.

BURDEN OF RESPONSE: The estimated burden for facilities will be 17,063 in the first year, 18,638 hours in the second year, and 3,150 hours in the third year and all subsequent years. The burden for vessels will be 65 burden hours in year 1, and 6 burden hours for all subsequent years. This includes an estimated 25-hour burden to amend the FSP or VSP, along with an implementation period burden of 40 hours and an annual burden of 6 hours for recordkeeping for each facility or vessel, which includes recordkeeping costs associated with the TSA's CCL.

ESTIMATE OF TOTAL ANNUAL BURDEN:

Facilities: The estimated burden over the 2-year implementation period for facilities is 25 hours per FSP amendment. Since there are currently 525 facilities that will need to amend their FSPs, the total burden on facilities will be 13,125 hours (525 FSPs x 25 hours per amendment) during the 2-year implementation period, or 6,563 hours each year of the first 2 years. Facilities will also face a recordkeeping burden of 21,000 hours during the 2-year implementation period (525 facilities x 40 hours per recordkeeping system), or 10,500 hours each year over the first 2 years. There will also be an annual recordkeeping burden of 3,150 hours (525 facilities x 6 hours per year), starting in the third year. In the second year, the 262 facilities that implemented in the first year will incur the 6 hours of annual recordkeeping, at a burden of 1,572 (262 facilities x 6 hours). The total burden for facilities is estimated at 17,063 (6,563 + 10,500) in Year 1, 18,638 in Year 2 (6,563 + 10,500 + 1,575), and 3,150 in Year 3.

Vessels: For the 1 vessel, the burden in the first year will be 25 hours (1 VSP x 25 hour per amendment). The vessel will also face a recordkeeping burden of 40 hours during the 1-year implementation period (1 vessel x 40 hours per recordkeeping system). There will also be an annual recordkeeping burden of 6 hours starting in year 2 (1 vessel x 6 hours per year). The total burden for vessels is estimated at 65 (25 + 40) in Year 1 and 6 hours in Years 2 and 3.

Total: The total additional burden from the final rule is estimated at 17,128 (65 for vessels + 17,063 for facilities) in Year 1, 18,644 (6 for vessels + 18,638 for facilities) in Year 2, and 3,156 (6 for vessels + 3,150 for facilities) in Year 3. The current annual burden listed in this collection of information is 1,108,043. The new burden, as a result of this final rule, in Year 1 is 1,125,171 (1,108,043 + 17,128). In Year 2 the new burden is 1,126,687 (1,108,043 + 18,644) and in Year 3 it is 1,111,199 (1,108,043 + 3,156). The average annual additional burden across the 3 years is 12,976.

As required by the Paperwork Reduction Act of 1995 (44 U.S.C. 3507(d)), we have submitted a copy of this proposed rule to the OMB for its review of the collection of information.

You need not respond to a collection of information unless it displays a currently valid control number from OMB. Before the requirements for this collection of information becomes effective, we will publish a notice in the Federal Register of OMB's decision to approve, modify, or disapprove the proposed collection.

Appendix A: Baseline Matrix

Section	Topic	Regulatory Language	Impact
101.105	Definitions	Add Definitions	No cost. Administrative: new definitions.
101.112(a)	Federalism	(a) The regulations in 33 CFR parts 101, 103, 104, and 106 have preemptive effect over State or local regulation within the same field.	No cost. Administrative: clarification.
101.112(b)	Federalism	(b) The regulations in 33 CFR part 105 have preemptive effect over State or local regulations insofar as a State or local law or regulation applicable to the facilities covered by part 105 would conflict with the regulations in part 105, either by actually conflicting or frustrating an overriding Federal need for uniformity.	No cost. Administrative: clarification.
101.514	Requirement	Remove § 101.514(e)	No cost. Administrative: editorial realignment.
101.515(d)(2)	TWIC/Personal Identification	Each person who has been issued or who possesses a TWIC must pass an electronic TWIC inspection and must submit his or her reference biometric, such as a fingerprint, and any other required information, such as a Personal Identification Number (PIN), upon a request from TSA, the Coast Guard, any other authorized DHS representative, or a Federal, State, or local law enforcement officer.	Text Modified, but no cost impact.
101.520	Electronic TWIC inspection	To conduct an electronic TWIC inspection, the owner or operator of a vessel or facility must ensure the following actions are performed. (a) Card Authentication: The TWIC must be authenticated by performing a change/response protocol using the Card Authentication Certificate (CAC) and the associated card authentication private key stored in the TWIC. (b) Card Validity Check: the TWIC must be checked against TSA's Canceled Card List (CCL), and no match on the CCL may be found; (c) Identity Verification: (1) one of the fingerprint templates stored in the TWIC must be matched to the TWIC-holder's live sample biometric; or (2) the TWIC-holder must enter the Personal Identification Number with the TWIC, and pass a visual TWIC inspection.	Costs associated with the acquisition and installation and integration of TWIC readers to current access control systems for facilities and vessels detailed in RA.
101.525(a)	Canceled Card List (CCL) MARSEC Level 1	At Maritime Security (MARSEC) Level 1, the card validity check must be conducted using CCL information that is no more than 7 days old.	Costs associated with obtaining, installing, and operating TWIC Readers, as well as recordkeeping, training, and amendments to security plans, as detailed in RA.
101.525(b) and (c)	Canceled Card List (CCL) MARSEC Level 2 and 3	At these MARSEC Levels, the same procedures outlined in paragraph (a) of this section must be used, except that the card validity check must use CCL information that is no more than 1 day old.	No estimated cost impact due to infrequency of changes in MARSEC level.
101.525(d)		The CCL information used to conduct the card validity check must be updated within 12 hours of any increase in MARSEC level, no matter when the information was last updated.	No estimated cost impact due to infrequency and localized nature of changes in MARSEC level.
101.525(e)		Only the most recently obtained CCL information must be used to conduct card validity checks.	Costs associated with updating the CCL, as detailed in the RA..

Section	Topic	Regulatory Language	Impact
101.530	PACS Requirements for Risk Group A	This section lays out the requirements for PACS that may be used to meet the electronic TWIC inspection requirements of § 101.520.	Since this section will supersede the guidance in PAC 08-09, there will be no new costs.
101.535	Electronic TWIC inspection requirements for Risk Group A	Owners or operators of any vessel or facility subject to part 104 or 105 of this subchapter, that are assigned to Risk Group A in §§ 104.263 or 105.253 of this subchapter, must ensure that a Transportation Worker Identification Credential (TWIC) program is implemented as follows:	
101.535(a)	Requirements for Risk Group A Vessels	Prior to each boarding of the vessel, all persons who require access to a secure area of the vessel must pass an electronic TWIC inspection before being granted unescorted access to the vessel.	No new cost since electronic TWIC inspection costs are already covered in 101.525 above for vessels.
101.535(b)	Requirements for Risk Group A Facilities	Prior to each entry into a secure area of the facility, all persons must pass an electronic TWIC inspection before being granted unescorted access to secure areas of the facility.	No new cost since electronic TWIC inspection costs are already covered in 101.525 above for facilities.
101.535(c)		(c) A Physical Access Control System that meets the requirements of § 101.530 of this subpart may be used to meet the requirements of this section.	Potential cost savings if vessels or facilities could comply with electronic TWIC inspection requirements by using their existing PACS.
101.535(d)		(d) The requirements of this section do not apply under certain situations described in §§ 101.550 or 101.555 of this subpart.	No cost. Administrative: clarifications.
101.535(e)		(e) Emergency access to secure areas, including access by law enforcement and emergency responders, does not require electronic TWIC inspection.	Current requirement.
101.540	Electronic TWIC inspection requirements for vessels, facilities, and OCS facilities not in Risk Group A	A vessel or facility not in Risk Group A may use the electronic TWIC inspection requirements of § 101.535 of this subpart in lieu of visual TWIC inspection. If electronic TWIC inspection is used, the recordkeeping requirements of §§ 104.235(b)(9) and (c) of this subchapter, or 105.225(b)(9) and (c) of this subchapter, as appropriate, apply.	No cost as no non-Risk Group A vessel or facility is expected to choose this alternative.

Section	Topic	Regulatory Language	Impact
101.550	TWIC inspection requirements in special circumstances	Owners or operators of any vessel, facility, or Outer Continental Shelf (OCS) facility subject to part 104, 105 or 106 of this subchapter must ensure a Transportation Worker Identification Credential (TWIC) program is implemented as follows:	
101.550 (a)		(a) Lost, Damaged or Stolen TWIC. If an individual cannot present a TWIC because it has been lost, damaged or stolen, and the individual previously has been granted unescorted access to secure areas and is known to have had a TWIC, the individual may be granted unescorted access to secure areas for a period of no longer than 30 consecutive calendar days if (1) The individual has reported the TWIC as lost, damaged, or stolen to the Transportation Security Administration (TSA) as required in 49 CFR 1572.19(f); (2) The individual can present another identification credential that meets the requirements of § 101.515 of this subpart; and (3) There are no other suspicious circumstances associated with the individual's claim that the TWIC was lost, damaged, or stolen.	Current practice.
101.550 (b)		(b) TWIC on the Canceled Card List. In the event an individual reports his or her TWIC as lost, damaged or stolen, and that TWIC is then placed on the CCL, the individual may be granted unescorted access by a Physical Access Control System (PACS) that meets the requirements of § 101.530 of this subpart for a period of no longer than 30 days. The individual must be known to have had a TWIC, and known to have reported the TWIC as lost, damaged, or stolen to TSA	No cost. Administrative: Clarification.
101.550 (c)		(c) Special Requirements for Risk Group A Vessels and Facilities. If a TWIC reader or PACS cannot read an individual's fingerprints due to poor fingerprint quality or no fingerprint minutiae, the owner or operator may grant the individual unescorted access to secure areas based on secondary authentication procedures: (1) The owner or operator must conduct a visual TWIC inspection and require the individual to provide his or her Personal Identification Number. (2) The owner or operator may require the person to present an alternative biometric that has been incorporated into the PACS.	No cost. Administrative: Clarification.
101.550 (d)		(d) If an individual cannot present a TWIC for any reason other than those outlined in paragraphs (a) or (b) of this section, the vessel or facility operator may not grant unescorted access to secure areas. The individual must be under escort at all times within the secure area.	No cost. Administrative: Clarification.
101.550 (e)		(e) With the exception of individuals granted access according to paragraph (a) or (b) of this section, all individuals granted unescorted access to secure areas of a vessel, facility, or OCS facility must be able to produce their TWICs upon request from the TSA, the Coast Guard or another authorized DHS representative, or a Federal, State or local law enforcement officer.	No cost. Administrative: Clarification.
101.550 (f)		(f) There must be disciplinary measures in place to prevent fraud and abuse.	No cost. Administrative: Clarification.
101.550 (g)		(g) Owners or operators must establish the frequency of the application of any security measures for access control in their approved security plans, particularly if these security measures are applied on a random or occasional basis.	No cost. Administrative: Clarification.
101.550 (h)		(h) The vessel, facility or OCS facility operator should coordinate the TWIC Program, when practical, with identification and TWIC access control measures of other entities that interface with vessel, facility or OCS facility.	No cost. Administrative: Clarification.
101.555	Recurring Unescorted Access for Risk Group A vessels and facilities	This section describes how designated TWIC-holders may access certain secure areas on Risk Group A vessels and facilities on a continual and repeated basis without undergoing repeated electronic TWIC inspections.	

Section	Topic	Regulatory Language	Impact
101.555 (a)		Definition of a Designated Recurring Access Area (DRAA) according to approved security plan, whether there are security personnel at the access points, whether those requesting Recurring Unescorted Access possess TWICs, and whether the personnel have passed an electronic TWIC inspection in the presence of the on-scene security personnel.	No cost. Administrative: Editorial change.
101.555 (b)		(b) The following requirements apply to DRAA: (1) It must consist of an unsecured area where personnel will be moving into an adjacent secure area repeatedly. (2) The entire DRAA must be visible to security personnel. (3) During operation as a DRAA, there must be security personnel present at all times.	No cost. Administrative: Clarification.
101.555 (c)		(c) An area may operate as a DRAA during certain times, and during other times, access to secure areas may be obtained through the procedures in § 101.535 of this subpart.	No cost. Administrative: Clarification.
101.555 (d)		(d) Personnel may enter the secure areas adjacent to a DRAA at any time using the procedures in § 101.535 of this subpart.	No cost. Administrative: Clarification.
103.505 (f)	Elements of the Area Maritime Security (AMS) Plan	Remove extraneous parenthetical reference to TWIC.	No cost. Editorial change.
104.105	Applicability		No cost. Administrative: Clarification.
104.110	Exemptions	(c) Vessels with a minimum manning requirement of 20 or fewer TWIC-holding crewmembers are exempt from the requirements in 33 CFR 101.535(a)(1).	No new cost since electronic TWIC inspection costs are already covered in 101.525 above for vessels.
104.115	Compliance		
104.115 (c)		(c) By (2 YEARS AFTER DATE OF PUBLICATION OF FINAL RULE), owners and operators of vessels subject to this part must amend their vessel security plans to indicate how they will implement the TWIC requirements in this subchapter. By (2 YEARS AFTER DATE OF PUBLICATION OF FINAL RULE), owners and operators of vessels subject to this part must operate in accordance with the TWIC provisions found within this subchapter.	Costs analyzed in RA are based on 2 year implementation.
104.115 (d)		Remove text describing a deadline which passed April 16, 2009.	No cost. Editorial change.
104.120	Amended text	Definitional	No cost. Editorial change.
104.125	Amended text	Definitional	No cost. Editorial change.
104.235	Vessel recordkeeping requirements		

Section	Topic	Regulatory Language	Impact
104.235(b)(9)	Electronic Reader/PACS	For each individual granted unescorted access to a secure area, the: FASC-N; date and time that unescorted access was granted; and, if captured, the individual's name. Additionally, documentation to demonstrate that the owner or operator has updated the CCL with the frequency required in § 101.525 of this subchapter.	Costs associated with recordkeeping assessed in the RA.
104.263	Risk Group classifications for vessels		
104.263 (a)		(a) For purposes of the TWIC requirements of this subchapter, the following vessels subject to this part are in Risk Group A: (1) Vessels that carry Certain Dangerous Cargoes (CDC) in bulk. (2) Vessels certificated to carry more than 1,000 passengers. (3) Any vessel engaged in towing a vessel subject to paragraph (a)(1) or paragraph (a)(2) of this section.	No cost associated with classification.
104.263 (b)		(b) Vessels may move from one Risk Group classification to another, based on the cargo they are carrying or handling at any given time. An owner or operator expecting a vessel to move between Risk Groups must explain, in the Vessel Security Plan, the timing of such movements, as well as how the vessel will move between the requirements of the higher and lower Risk Groups, with particular attention to the security measures to be taken moving from a lower risk group to a higher Risk Group.	No cost associated with classification. Optional action.
104.267	Security measures for newly hired employees	Remove final sentence of paragraph (a), which promises Coast Guard guidance on the issue.	No cost. Editorial change.
104.405 (b)	Format of the vessel security plan (VSP)	Removes a deadline that passed March 27, 2007.	No cost. Editorial change.
104.410	Amended	Removes deadlines that passed January 1, 2004.	No cost. Editorial change.
105.110(b)	Exemptions	A public access area designated under §105.106 of this subpart is exempt from the requirements for screening of persons, baggage, and personal effects and identification of persons in subpart E of part 101 of this subchapter, as applicable, in § 105.255 of this part, and in § 105.285(a)(1) of this part.	No cost. Administrative: Clarification.
105.110(e)	Exemptions	Barge fleeting facilities without shore side access are exempt from the requirements in 33 CFR 101.535(b)(1).	No cost affiliated with classification.
105.115	Compliance		
105.115 (d)		By (2 YEARS AFTER DATE OF PUBLICATION OF FINAL RULE), owners and operators of facilities subject to this part must amend their facility security plans to indicate how they will implement the TWIC requirements in this subchapter. By (2 YEARS AFTER DATE OF PUBLICATION OF FINAL RULE), owners and operators of facilities subject to this part must be operating in accordance with the TWIC provisions found within this subchapter.	Costs analyzed based on 2 year implementation

Section	Topic	Regulatory Language	Impact
105.120	Amended	Removes a deadline that passed July 2, 2004.	No cost. Editorial change.
105.225	Facility recordkeeping requirements		
105.225 (b)(9)		Electronic Reader/PACS. For each individual granted unescorted access to a secure area, the: FASC-N; date and time that unescorted access was granted; and, if captured, the individual's name. Additionally, documentation to demonstrate that the owner or operator has updated the CCL with the frequency required in § 101.520 of this subchapter.	Costs associated with recordkeeping assessed in the RA.
105.253	Risk Group classifications for facilities		
105.253 (a)		For purposes of the TWIC requirements of this subchapter, the following facilities subject to this part are in Risk Group A: (1) Facilities, that handle Certain Dangerous Cargoes (CDC) in bulk or receive vessels carrying CDC in bulk. (2) Facilities that receive vessels certificated to carry more than 1,000 passengers.	No cost associated with classification.
105.253 (b)		Facilities may move from one Risk Group classification to another, based on the material they handle or the types of vessels they receive at any given time. An owner or operator of a facility expected to move between Risk Groups must explain, in the Facility Security Plan, the timing of such movements, as well as how the facility will move between the requirements of the higher and lower Risk Groups, with particular attention to the security measures to be taken when moving from a lower Risk Group to a higher Risk Group.	No cost associated with classification. Optional practice.
105.257	Amended	Definitional	No cost. Editorial change.
105.290	Amended	Definitional	No cost. Editorial change.
105.296 (a)(4)	Amended	Definitional	No cost. Editorial change.
105.405	Format and content of the Facility Security Plan (FSP)		
105.405 (a)(10)		Security measures for access control, including the facility's TWIC program and designated public access areas;	Cost associated with the update of FSP.
106	Maritime Security - Outer Continental Shelf (OCS) Facilities		No cost. No reader requirements for OCS.

Section	Topic	Regulatory Language	Impact
106.110 (c)	Compliance dates	By (2 YEARS AFTER DATE OF PUBLICATION OF FINAL RULE), owners and operators of OCS facilities subject to this part must amend their facility security plans to indicate how they will implement the TWIC requirements in this subchapter. By (2 YEARS AFTER DATE OF PUBLICATION OF FINAL RULE), owners and operators of OCS facilities subject to this part must be operating in accordance with the TWIC provisions in this subchapter.	No cost. No electronic TWIC inspection requirements for OCS facilities.
106.200	Owner or operator	Introduction to 106.200 sections	No cost. Editorial changes.
106.258	Risk Group classifications for OCS facilities	For purposes of this subchapter, no OCS facilities are considered Risk Group A.	No cost. No reader requirements for OCS facilities.
106.262	Security measures for newly-hired employees	Removes statement that the Coast Guard will issue guidance on the subject.	No cost. Editorial change.
106.405 (a)(10)	Format of the Facility Security Plan	Security measures for access control, including the OCS facility's TWIC program;	No cost. No electronic TWIC inspection requirements for OCS facilities.

Appendix B: TWIC Pilot Participants

Location	Participant Name	Industry Group
Port Authority of New York/New Jersey	Staten Island Ferry	Small Passenger Vessel/ Towboat/Other
Port Authority of New York/New Jersey	APM Terminal	Container Terminal
Port Authority of New York/New Jersey	Maher Terminal	Container Terminal
Port Authority of New York/New Jersey	Brooklyn Marine Terminal	Container Terminal
Annapolis, MD	Watermark Cruises	Small Passenger Vessel/ Towboat/Other
Vicksburg, MS	Magnolia Marine Transport	Small Passenger Vessel/ Towboat/Other
Norco, LA	Shell Chemical LP	Petroleum Facilities
Brownsville, TX	Port of Brownsville	Container Terminal
Port of Long Beach	BP	Petroleum Facilities
Port of Long Beach	Metropolitan Stevedore Company	Break-Bulk
Port of Long Beach	Total Terminals International	Container Terminal
Port of Long Beach	Sea Launch	Small Passenger Vessel/ Towboat/Other
Port of Long Beach	SSAMarine	Container Terminal
Port of Los Angeles	NuStar Energy	Petroleum Facilities
Port of Los Angeles	World Cruise Center	Large Passenger
Port of Los Angeles	APL	Container Terminal
Seattle, WA	Clipper Navigation	Small Passenger Vessel/ Towboat/Other

Appendix C: Reader Cost Information

To estimate the average cost of TWIC reader hardware and software, we used the GSA schedule to find the current market prices for TWIC reader hardware and software for models listed on the QTL List. Although price information was not available for all models on the QTL List, we were able to obtain a sample of reader hardware and software prices to use in our analysis.

The current QTL List is available at <https://universalenroll.dhs.gov/permalinks/static/twic-reader-ctl>.

Prices for items on the GSA schedule can be found at: <https://www.gsaadvantage.gov> (with a search term of “TWIC” for TWIC readers or “Transparent Reader with Biometric” for other readers). These prices were researched January 2, 2014, however, these prices may have changed since our research.

For purposes of comparison, we provide a sample of equipment costs that were provided on TSA’s ICE List in 2013 when we estimated reader costs for the NPRM RA. However, TSA discontinued the publication of ICE List.

Figure C1: ICE List Approved TWIC Readers – Hardware Price

Company	Reader Model	Fixed/ Portable	Contact/ Contactless	Hardware Price
Innometriks	RHINO-XSI-TWIC-OUTDOOR	Fixed	Contactless	\$3,086
Morpho Trak	MA120w	Fixed	Contactless	\$1,186
	MA521	Fixed	Contactless	\$1,729
	OMA521 Outdoor	Fixed	Contactless	\$2,265
Datastrip	DSV2+turbo-Hybrid,TWICcheck + Mobile/Audit	Portable	Both	\$10,049
	DSV2+turbo-Hybrid,TWICcheck + Mobile/Audit	Portable	Both	\$6,402
	DSV II SC	Portable	Both	\$1,969
	DSV II SC	Portable	Both	\$3,467
Mobilisa	IM2700	Portable		\$7,999
PSION Teklogix	Workabout Pro	Portable	Contactless	\$2,837
CrossMatch	Be.U Mobile	Portable		\$2,134

Figure C2: ICE List Approved TWIC Readers – Software Price

Company	Price Point	Codebench CoreStreet		
		OMNICheck	PIVCheck	TWICCheck
Portable	Low	\$2,438	\$5,600	\$3,244
	Middle		\$6,746	\$5,869
	High	\$3,314	\$7,830	\$8,055
Fixed	Low		\$4,450	
	High		\$7,830	

Figure C3: Sample of Other Biometric Readers from GSA Schedule

Company	Reader Model	Fixed/ Portable	Hardware & Software Price
XTec	Basic Enrollment Station (X040000-BES)	Fixed	\$7,501
Quintron Systems	2 Reader HSPD12 PACS	Fixed	\$5,283
Telos	Biometrics Indoor Hand Geometry Reader	Fixed	\$4,450
TAPCO	Turnstile, Waist Catrax Master Model	Fixed	\$4,259
Telos	Biometric Outdoor Hand Geometry Reader	Portable	\$6,250
MDI	Biometric Hand Geometry Reader	Portable	\$3,840
Amag Technology	4 Reader Biometric M2000	Portable	\$2,453

Figure C4: Qualified Technology List (QTL) TSA Approved TWIC Readers

Company	Reader Model	Fixed/ Portable	Hardware Price	Software Price
Intellicheck Mobilisa	Fugitive Finder IM2610	Portable	\$5,200*	-
Intellicheck Mobilisa	Fugitive Finder IM2610	Portable	\$5,470*	-
Morpho Trak	Morpho Check 200	Portable	\$4,353	\$3,805
	Morpho Check 250	Portable	\$5,507	\$3,805
Schneider Electric	PC3-TBR	Fixed	\$6,600*	-

* Includes software price.

Appendix D: Capital Costs Per Reader

This appendix shows the inputs and calculations used to determine the cost per reader for installation, infrastructure and PACS costs, as specified in the TWIC Pilot Program Final Report. For our analysis, participant category ‘Small Passenger Vessel/Towboat/Other’ has been broken down into two categories; Small Passenger and Mixed Use. Participants 1 and 3 comprise the Small Passenger group and participants 2 and 4 comprise the Mixed Use group.

Figure D1: Installation Costs per Reader⁹⁸

Participant	Category	TWIC Readers (A)	Installation/ Integration Costs (B)	Cost Per Reader = (B)/(A)
1	Petroleum	15	\$80,133	\$5,342
2		15	\$142,500	\$9,500
3		1	\$4,000	\$4,000
Average Bulk Liquid		10	\$75,544	\$6,281
1	Break-Bulk	15	\$50,000	\$3,333
2		4	\$12,000	\$3,000
3		6	\$81,661	\$13,610
Average Break-Bulk		8	\$47,887	\$6,648
1	Container	21	\$467,099	\$22,243
2		6	\$50,000	\$8,333
3		11	\$50,000	\$4,545
4		13	\$645,500	\$49,654
5		39	\$724,925	\$18,588
Average Container		18	\$387,505	\$20,673
1	Large Passenger Vessel	5	\$9,933	\$1,987
2		27	\$106,836	\$3,957
Average Large Passenger		16	\$58,385	\$2,972
1*	Small Passenger Vessel/ Towboat/ Other	2	\$0	\$0
2		2	\$0	\$0
3*		2	\$0	\$0
4		7	\$455,060	\$65,009
Average Small Passenger		2	\$0	\$0
Average Mixed Use		4	\$227,530	\$32,504

⁹⁸ Costs vary within facility types based on the infrastructure that was already in place before the Pilot. Facilities that needed to do more trenching and utility work would have higher costs than those that already had full connectivity at TWIC access points. For this reason we do not assess whether one is most representative, but use the average to account for those facilities needing significant infrastructure upgrades/investments and those that do not.

Figure D2: Infrastructure Costs per Reader

Participant	Category	TWIC Readers (A)	Infrastructure Costs (B)	Cost Per Reader = (B)/(A)
1	Petroleum	15	\$162,440	\$10,829
2		15	\$301,000	\$20,067
3		1	\$2,000	\$2,000
Average Bulk Liquid		10	\$155,147	\$10,965
1	Break-Bulk	15	\$711,583	\$47,439
2		4	\$8,000	\$2,000
3		6	\$196,376	\$32,729
Average Break-Bulk		8	\$305,320	\$27,389
1	Container	21	\$216,494	\$10,309
2		6	\$15,463	\$2,577
3		11	\$90,000	\$8,182
4		13	\$400,000	\$30,769
5		39	\$592,893	\$15,202
Average Container		18	\$262,970	\$13,408
1	Large Passenger Vessel	5	\$0	\$0
2		27	\$391,396	\$14,496
Average Large Passenger		16	\$195,698	\$7,248
1*	Small Passenger Vessel/ Towboat/ Other	2	\$0	\$0
2		2	\$0	\$0
3*		2	\$0	\$0
4		7	\$350,000	\$50,000
Average Small Passenger		2	\$0	\$0
Average Mixed Use		4	\$175,000	\$25,000

Figure D3: PACS Costs per Reader

Participant	Category	TWIC Readers (A)	PACS Costs (B)	Cost Per Reader = (B)/(A)
1	Petroleum	15	\$272,836	\$18,189
2		15	\$103,500	\$6,900
3		1	\$0	\$0
Average Bulk Liquid		10	\$125,445	\$8,363
1	Break-Bulk	15	\$150,000	\$10,000
2		4	\$138,625	\$34,656
3		6	\$120,983	\$20,164
Average Break-Bulk		8	\$136,536	\$21,607
1	Container	21	\$184,342	\$8,778
2		6	\$138,625	\$23,104
3		11	\$138,625	\$12,602
4		13	\$713,190	\$54,861
5		39	\$646,707	\$16,582
Average Container		18	\$364,298	\$23,186
1	Large Passenger Vessel	5	\$0	\$0
2		27	\$80,283	\$2,973
Average Large Passenger		16	\$40,142	\$1,487
1*	Small Passenger Vessel/ Towboat/ Other	2	\$0	\$0
2		2	\$0	\$0
3*		2	\$0	\$0
4		7	\$69,000	\$9,857
Average Small Passenger		2	\$0	\$0
Average Mixed Use		4	\$34,500	\$4,929

Appendix E: BLS Wages for NAICS 483000, May 2012



U.S. Bureau of Labor Statistics

Occupational Employment Statistics http://www.bls.gov/oes/current/naics3_483000.htm

May 2012 National Industry-Specific Occupational Employment and Wage Estimates NAICS 483000 - Water Transportation

These national industry-specific occupational employment and wage estimates are calculated with data collected from employers of all sizes, in metropolitan and nonmetropolitan areas in every State and the District of Columbia, in NAICS 483000 - Water Transportation.

Additional information, including the hourly and annual 10th, 25th, 75th, and 90th percentile wages, percent of establishments reporting the occupation, and the employment percent relative standard error, is available in the downloadable XLS files.

SOC Major Groups in NAICS 483000 - Water Transportation:

- 00-0000 [All Occupations](#)
- 11-0000 [Management Occupations](#)
- 13-0000 [Business and Financial Operations Occupations](#)
- 15-0000 [Computer and Mathematical Occupations](#)
- 17-0000 [Architecture and Engineering Occupations](#)
- 23-0000 [Legal Occupations](#)
- 27-0000 [Arts, Design, Entertainment, Sports, and Media Occupations](#)
- 29-0000 [Healthcare Practitioners and Technical Occupations](#)
- 33-0000 [Protective Service Occupations](#)
- 35-0000 [Food Preparation and Serving Related Occupations](#)
- 37-0000 [Building and Grounds Cleaning and Maintenance Occupations](#)
- 39-0000 [Personal Care and Service Occupations](#)
- 41-0000 [Sales and Related Occupations](#)
- 43-0000 [Office and Administrative Support Occupations](#)
- 47-0000 [Construction and Extraction Occupations](#)
- 49-0000 [Installation, Maintenance, and Repair Occupations](#)
- 51-0000 [Production Occupations](#)
- 53-0000 [Transportation and Material Moving Occupations](#)

Table E1: NAICS 483000 - Water Transportation

Occupation code	Occupation title	Employment	% of total empl.	Median hourly wage	Mean hourly wage	Annual mean wage	Mean wage RSE
00-0000	All Occupations	5,081,510	100.00 %	\$19.29	\$21.72	\$45,170	0.40%
11-0000	Management Occupations	166,190	3.27%	\$41.27	\$47.96	\$99,750	0.50%
11-1000	Top Executives	67,120	1.32%	\$45.08	\$53.36	\$110,990	0.70%
11-1011	Chief Executives	4,370	0.09%	\$76.16	\$81.22	\$168,940	1.50%
11-1021	General and Operations Managers	62,740	1.23%	\$43.91	\$51.42	\$106,950	0.70%
11-2020	Advertising, Marketing, Promotions, Public Relations, and Sales Managers	9,770	0.19%	\$47.90	\$53.05	\$110,350	1.00%
11-2021	Advertising and Promotions Managers	70	-7	\$42.40	\$47.14	\$98,060	6.50%
11-2022	Marketing and Sales Managers	9,400	0.18%	\$47.74	\$52.94	\$110,120	1.10%
11-2031	Marketing Managers	1,980	0.04%	\$51.34	\$55.16	\$114,740	2.30%
11-3000	Sales Managers	7,420	0.15%	\$46.70	\$52.35	\$108,890	1.10%
11-3011	Public Relations and Fundraising Managers	300	0.01%	\$54.59	\$57.99	\$120,630	3.80%
11-3021	Operations Specialties Managers	61,400	1.21%	\$41.66	\$45.64	\$94,930	0.90%
11-3031	Administrative Services Managers	8,090	0.16%	\$38.15	\$40.95	\$85,170	1.10%
11-3051	Computer and Information Systems Managers	4,030	0.08%	\$52.47	\$55.13	\$114,680	2.40%
11-3061	Financial Managers	5,650	0.11%	\$51.21	\$55.95	\$116,370	1.30%
11-3071	Industrial Production Managers	860	0.02%	\$43.00	\$47.21	\$98,190	3.70%
11-3111	Purchasing Managers	1,080	0.02%	\$48.61	\$52.05	\$108,250	2.70%
11-3121	Transportation, Storage,	38,090	0.75%	\$40.00	\$43.49	\$90,460	0.80%

	and Distribution Managers						
11-3131	Compensation and Benefits Managers	260	0.01%	\$48.70	\$56.17	\$116,820	4.30%
11-9000	Human Resources Managers	2,500	0.05%	\$46.98	\$50.39	\$104,820	1.40%
11-9021	Training and Development Managers	840	0.02%	\$42.70	\$46.20	\$96,100	2.50%
11-9041	Other Management Occupations	27,890	0.55%	\$34.58	\$38.27	\$79,600	1.00%
11-9051	Construction Managers	1,230	0.02%	\$42.58	\$44.05	\$91,620	1.40%
11-9111	Architectural and Engineering Managers	1,260	0.02%	\$59.46	\$65.41	\$136,060	3.50%
11-9131	Food Service Managers	180	-7	\$27.62	\$31.02	\$64,510	5.60%
11-9141	Medical and Health Services Managers	40	-7	\$42.33	\$42.83	\$89,080	3.60%
11-9161	Postmasters and Mail Superintendents	17,930	0.35%	\$31.32	\$31.89	\$66,340	0.10%
11-9171	Property, Real Estate, and Community Association Managers	280	0.01%	\$41.62	\$42.97	\$89,370	3.50%
11-9199	Emergency Management Directors	50	-7	\$42.64	\$43.88	\$91,280	5.20%
2666211	Managers, All Other	6,900	0.14%	\$45.55	\$48.77	\$101,430	1.60%
13-0000	Business and Financial Operations Occupations	95,580	1.88%	\$30.28	\$31.91	\$66,380	0.70%
13-1000	Business Operations Specialists	74,010	1.46%	\$30.04	\$31.65	\$65,830	0.80%
13-1020	Buyers and Purchasing Agents	7,700	0.15%	\$27.16	\$29.09	\$60,510	1.10%
13-1021	Buyers and Purchasing Agents, Farm Products	190	-7	\$27.34	\$28.78	\$59,870	4.90%
13-1022	Wholesale and Retail Buyers, Except Farm Products	1,690	0.03%	\$24.45	\$26.84	\$55,820	3.30%
13-1023	Purchasing Agents, Except	5,820	0.11%	\$27.88	\$29.76	\$61,900	1.00%

	Wholesale, Retail, and Farm Products						
13-1030	Claims Adjusters, Appraisers, Examiners, and Investigators	590	0.01%	\$28.74	\$28.45	\$59,170	1.90%
13-1031	Claims Adjusters, Examiners, and Investigators	590	0.01%	\$28.74	\$28.45	\$59,170	1.90%
13-1041	Compliance Officers	4,730	0.09%	\$33.21	\$32.51	\$67,610	1.60%
13-1051	Cost Estimators	1,490	0.03%	\$27.72	\$29.66	\$61,700	2.40%
13-1070	Human Resources Workers	11,480	0.23%	\$27.42	\$28.78	\$59,860	0.70%
13-1071	Human Resources Specialists	10,150	0.20%	\$26.88	\$28.34	\$58,940	0.70%
13-1075	Labor Relations Specialists	1,330	0.03%	\$31.88	\$32.17	\$66,900	1.10%
13-1081	Logisticians	7,650	0.15%	\$32.16	\$33.59	\$69,860	2.30%
13-1111	Management Analysts	6,640	0.13%	\$34.02	\$36.69	\$76,320	2.40%
13-1121	Meeting, Convention, and Event Planners	160	-7	\$24.34	\$25.05	\$52,110	2.80%
13-1141	Compensation, Benefits, and Job Analysis Specialists	1,620	0.03%	\$29.63	\$30.18	\$62,780	1.40%
13-1151	Training and Development Specialists	7,720	0.15%	\$25.81	\$27.28	\$56,750	1.50%
13-1161	Market Research Analysts and Marketing Specialists	5,100	0.10%	\$32.28	\$33.18	\$69,020	1.70%
13-1199	Business Operations Specialists, All Other	19,110	0.38%	\$32.04	\$33.44	\$69,560	1.40%
13-2000	Financial Specialists	21,580	0.42%	\$31.04	\$32.83	\$68,280	0.80%
13-2011	Accountants and Auditors	16,100	0.32%	\$30.43	\$32.48	\$67,570	0.90%
13-2021	Appraisers and Assessors of Real Estate	60	-7	\$39.31	\$37.25	\$77,470	7.50%
13-2031	Budget Analysts	570	0.01%	\$35.89	\$36.07	\$75,020	1.60%
13-2041	Credit Analysts	220	-7	\$26.17	\$29.75	\$61,870	4.90%

13-2050	Financial Analysts and Advisors	2,820	0.06%	\$32.21	\$34.06	\$70,840	1.60%
13-2051	Financial Analysts	2,810	0.06%	\$32.21	\$34.06	\$70,830	1.60%
13-2061	Financial Examiners	40	-7	\$39.06	\$42.33	\$88,040	8.40%
13-2070	Credit Counselors and Loan Officers	270	0.01%	\$24.64	\$24.84	\$51,680	9.30%
13-2072	Loan Officers	270	0.01%	\$24.75	\$25.04	\$52,080	9.00%
13-2099	Financial Specialists, All Other	1,490	0.03%	\$34.35	\$34.46	\$71,670	1.70%
15-0000	Computer and Mathematical Occupations	27,850	0.55%	\$34.92	\$35.99	\$74,870	1.10%
15-1100	Computer Occupations	26,830	0.53%	\$34.85	\$35.97	\$74,820	1.20%
15-1120	Computer and Information Analysts	4,250	0.08%	\$37.27	\$38.58	\$80,240	1.30%
15-1121	Computer Systems Analysts	3,810	0.07%	\$37.28	\$38.79	\$80,680	1.30%
15-1122	Information Security Analysts	440	0.01%	\$37.21	\$36.76	\$76,450	2.00%
15-1130	Software Developers and Programmers	6,360	0.13%	\$41.34	\$41.53	\$86,390	1.10%
15-1131	Computer Programmers	1,830	0.04%	\$37.56	\$37.29	\$77,560	1.70%
15-1132	Software Developers, Applications	2,690	0.05%	\$43.10	\$43.82	\$91,150	1.70%
15-1133	Software Developers, Systems Software	1,410	0.03%	\$45.21	\$45.40	\$94,440	1.50%
15-1134	Web Developers	440	0.01%	\$31.55	\$32.70	\$68,020	3.70%
15-1140	Database and Systems Administrators and Network Architects	7,920	0.16%	\$37.18	\$38.33	\$79,730	1.50%
15-1141	Database Administrators	1,320	0.03%	\$29.94	\$34.45	\$71,650	1.90%
15-1142	Network and Computer Systems Administrators	5,650	0.11%	\$36.59	\$37.64	\$78,280	1.30%
15-1143	Computer Network Architects	950	0.02%	\$47.44	\$47.87	\$99,570	1.80%
15-	Computer	6,570	0.13%	\$24.88	\$26.12	\$54,340	1.00%

1150	Support Specialists						
15-1151	Computer User Support Specialists	4,730	0.09%	\$23.37	\$25.22	\$52,460	1.50%
15-1152	Computer Network Support Specialists	1,840	0.04%	\$27.53	\$28.44	\$59,170	1.30%
15-1199	Computer Occupations, All Other	1,730	0.03%	\$34.30	\$35.70	\$74,250	1.60%
15-2000	Mathematical Science Occupations	1,020	0.02%	\$36.15	\$36.55	\$76,030	1.80%
15-2031	Operations Research Analysts	890	0.02%	\$38.29	\$37.45	\$77,890	1.90%
15-2041	Statisticians	120	-7	\$30.91	\$30.45	\$63,340	2.70%
17-0000	Architecture and Engineering Occupations	22,980	0.45%	\$30.72	\$36.33	\$75,560	1.00%
17-1000	Architects, Surveyors, and Cartographers	260	0.01%	\$39.13	\$37.36	\$77,710	3.60%
17-1010	Architects, Except Naval	120	-7	\$44.96	\$46.35	\$96,400	3.10%
17-1011	Architects, Except Landscape and Naval	100	-7	\$43.28	\$46.23	\$96,150	3.00%
17-1020	Surveyors, Cartographers, and Photogrammetrists	140	-7	\$28.51	\$29.86	\$62,110	4.50%
17-1021	Cartographers and Photogrammetrists	40	-7	\$30.15	\$32.72	\$68,060	5.90%
17-1022	Surveyors	100	-7	\$27.80	\$28.76	\$59,820	5.70%
17-2000	Engineers	12,830	0.25%	\$39.38	\$41.58	\$86,480	1.30%
17-2011	Aerospace Engineers	1,630	0.03%	\$43.62	\$44.61	\$92,780	1.70%
17-2051	Civil Engineers	1,280	0.03%	\$41.48	\$43.74	\$90,970	2.60%
17-2061	Computer Hardware Engineers	40	-7	\$37.71	\$37.78	\$78,590	3.10%
17-2070	Electrical and Electronics Engineers	660	0.01%	\$38.71	\$40.81	\$84,890	2.50%
17-2071	Electrical Engineers	310	0.01%	\$41.54	\$43.00	\$89,440	2.10%
17-2072	Electronics Engineers, Except Computer	350	0.01%	\$36.10	\$38.89	\$80,890	4.00%

17-2081	Environmental Engineers	160	-7	\$40.37	\$41.72	\$86,780	2.80%
17-2110	Industrial Engineers, Including Health and Safety	4,510	0.09%	\$35.91	\$36.71	\$76,370	1.00%
17-2111	Health and Safety Engineers, Except Mining Safety Engineers and Inspectors	1,180	0.02%	\$34.09	\$35.01	\$72,820	3.30%
17-2112	Industrial Engineers	3,330	0.07%	\$36.38	\$37.32	\$77,620	1.10%
17-2121	Marine Engineers and Naval Architects	1,030	0.02%	\$39.82	\$41.00	\$85,280	3.30%
17-2131	Materials Engineers	210	-7	\$33.56	\$36.40	\$75,700	5.10%
17-2141	Mechanical Engineers	1,150	0.02%	\$40.04	\$41.10	\$85,480	2.30%
17-2171	Petroleum Engineers	650	0.01%	\$57.51	\$68.86	\$143,240	5.70%
17-2199	Engineers, All Other	1,480	0.03%	\$39.48	\$41.05	\$85,390	3.90%
17-3000	Drafters, Engineering Technicians, and Mapping Technicians	9,900	0.19%	\$30.29	\$29.50	\$61,360	0.60%
17-3010	Drafters	300	0.01%	\$26.57	\$28.10	\$58,440	3.50%
17-3011	Architectural and Civil Drafters	40	-7	\$35.87	\$32.71	\$68,030	5.70%
17-3012	Electrical and Electronics Drafters	30	-7	\$24.13	\$22.36	\$46,510	6.30%
17-3013	Mechanical Drafters	180	-7	\$25.86	\$28.47	\$59,220	4.70%
17-3019	Drafters, All Other	60	-7	\$26.91	\$27.11	\$56,390	2.50%
17-3020	Engineering Technicians, Except Drafters	9,490	0.19%	\$30.29	\$29.52	\$61,400	0.60%
17-3021	Aerospace Engineering and Operations Technicians	570	0.01%	\$28.56	\$28.45	\$59,180	6.30%
17-3022	Civil Engineering Technicians	60	-7	\$29.04	\$28.36	\$58,980	4.00%
17-3023	Electrical and Electronics Engineering Technicians	7,700	0.15%	\$30.29	\$29.70	\$61,780	0.50%
17-	Electro-	240	-7	\$27.80	\$28.54	\$59,360	10.30%

3024	Mechanical Technicians						%
17-3025	Environmental Engineering Technicians	50	-7	\$30.58	\$29.64	\$61,640	6.90%
17-3026	Industrial Engineering Technicians	260	0.01%	\$23.40	\$25.52	\$53,080	2.30%
17-3027	Mechanical Engineering Technicians	410	0.01%	\$31.92	\$30.75	\$63,950	3.40%
17-3029	Engineering Technicians, Except Drafters, All Other	210	-7	\$29.86	\$29.76	\$61,900	2.80%
17-3031	Surveying and Mapping Technicians	100	-7	\$32.29	\$31.55	\$65,620	8.20%
19-0000	Life, Physical, and Social Science Occupations	1,200	0.02%	\$29.53	\$32.74	\$68,090	2.30%
19-1000	Life Scientists	110	-7	\$38.42	\$36.76	\$76,450	6.30%
19-1020	Biological Scientists	-8	-8	\$40.81	\$39.13	\$81,400	5.20%
19-2000	Physical Scientists	460	0.01%	\$36.00	\$37.81	\$78,650	3.40%
19-2021	Atmospheric and Space Scientists	50	-7	\$33.05	\$35.34	\$73,510	5.60%
19-2030	Chemists and Materials Scientists	130	-7	\$27.27	\$32.53	\$67,670	6.30%
19-2031	Chemists	130	-7	\$27.27	\$32.53	\$67,670	6.30%
19-2040	Environmental Scientists and Geoscientists	280	0.01%	\$39.09	\$40.49	\$84,220	3.70%
19-2041	Environmental Scientists and Specialists, Including Health	260	0.01%	\$38.29	\$38.22	\$79,500	3.80%
19-3000	Social Scientists and Related Workers	110	-7	\$44.93	\$44.44	\$92,440	5.20%
19-3011	Economists	60	-7	\$53.87	\$51.86	\$107,870	1.90%
19-3030	Psychologists	40	-7	\$33.45	\$36.16	\$75,200	4.90%
19-3032	Industrial-Organizational Psychologists	40	-7	\$33.45	\$36.16	\$75,200	4.90%
19-4000	Life, Physical, and Social	520	0.01%	\$24.44	\$24.96	\$51,920	3.00%

	Science Technicians						
19-4031	Chemical Technicians	130	-7	\$21.76	\$22.66	\$47,130	4.70%
19-4041	Geological and Petroleum Technicians	140	-7	\$27.13	\$27.82	\$57,870	4.80%
19-4090	Miscellaneous Life, Physical, and Social Science Technicians	110	-7	\$26.41	\$27.80	\$57,830	6.30%
19-4091	Environmental Science and Protection Technicians, Including Health	40	-7	\$30.19	\$29.55	\$61,460	7.00%
19-4099	Life, Physical, and Social Science Technicians, All Other	50	-7	\$20.01	\$21.53	\$44,790	4.80%
21-0000	Community and Social Service Occupations	60	-7	\$20.97	\$21.97	\$45,700	4.50%
21-1000	Counselors, Social Workers, and Other Community and Social Service Specialists	60	-7	\$21.41	\$22.40	\$46,600	4.60%
21-1090	Miscellaneous Community and Social Service Specialists	40	-7	\$20.69	\$21.77	\$45,290	6.10%
21-1099	Community and Social Service Specialists, All Other	40	-7	\$21.15	\$22.04	\$45,830	6.10%
23-0000	Legal Occupations	1,890	0.04%	\$51.02	\$56.06	\$116,610	4.10%
23-1000	Lawyers, Judges, and Related Workers	1,270	0.02%	\$65.26	\$71.07	\$147,820	3.00%
23-1010	Lawyers and Judicial Law Clerks	1,260	0.02%	\$65.26	\$71.20	\$148,090	3.00%
23-1011	Lawyers	1,260	0.02%	\$65.26	\$71.20	\$148,090	3.00%
23-2000	Legal Support Workers	620	0.01%	\$25.45	\$25.50	\$53,040	3.40%
23-	Paralegals	310	0.01%	\$30.26	\$29.21	\$60,750	1.90%

2011	and Legal Assistants						
23-2090	Miscellaneous Legal Support Workers	310	0.01%	\$18.60	\$21.82	\$45,390	6.60%
23-2093	Title Examiners, Abstractors, and Searchers	100	-7	\$21.14	\$24.88	\$51,760	8.20%
23-2099	Legal Support Workers, All Other	210	-7	\$18.14	\$20.20	\$42,020	9.70%
25-0000	Education, Training, and Library Occupations	1,010	0.02%	\$22.57	\$25.09	\$52,200	6.60%
25-1000	Postsecondary Teachers	140	-7	-4	-4	\$67,370	12.90%
25-1190	Miscellaneous Postsecondary Teachers	140	-7	-4	-4	\$67,370	12.90%
25-1194	Vocational Education Teachers, Postsecondary	140	-7	\$32.28	\$32.39	\$67,370	12.90%
25-3000	Other Teachers and Instructors	630	0.01%	\$26.03	\$24.95	\$51,890	9.90%
25-3021	Self-Enrichment Education Teachers	-8	-8	\$15.25	\$17.53	\$36,470	7.10%
25-4000	Librarians, Curators, and Archivists	-8	-8	\$18.91	\$19.66	\$40,890	2.80%
25-4010	Archivists, Curators, and Museum Technicians	-8	-8	\$18.79	\$19.37	\$40,290	2.60%
25-4013	Museum Technicians and Conservators	-8	-8	\$18.70	\$19.25	\$40,040	4.40%
25-9000	Other Education, Training, and Library Occupations	110	-7	-4	-4	\$48,880	16.30%
25-9031	Instructional Coordinators	50	-7	\$36.08	\$33.97	\$70,650	5.60%
27-0000	Arts, Design, Entertainment, Sports, and Media Occupations	2,810	0.06%	\$25.04	\$26.77	\$55,670	2.00%
27-1000	Art and Design Workers	720	0.01%	\$19.62	\$20.69	\$43,030	3.80%
27-	Artists and	40	-7	\$28.48	\$32.09	\$66,750	3.10%

1010	Related Workers						
27-1020	Designers	680	0.01%	\$18.84	\$20.03	\$41,670	4.00%
27-1021	Commercial and Industrial Designers	40	-7	\$32.01	\$31.86	\$66,270	3.90%
27-1024	Graphic Designers	270	0.01%	\$23.06	\$23.44	\$48,750	2.30%
27-1025	Interior Designers	70	-7	\$25.70	\$26.38	\$54,870	7.10%
27-1026	Merchandise Displayers and Window Trimmers	270	0.01%	\$11.28	\$12.51	\$26,030	5.50%
27-1029	Designers, All Other	-8	-8	\$27.54	\$27.25	\$56,690	6.00%
27-2000	Entertainers and Performers, Sports and Related Workers	180	-7	\$18.29	\$21.18	\$44,050	13.80%
27-2010	Actors, Producers, and Directors	40	-7	\$20.03	\$34.11	\$70,960	8.60%
27-2040	Musicians, Singers, and Related Workers	80	-7	\$22.41	\$23.03	-4	3.40%
27-2042	Musicians and Singers	80	-7	\$22.41	\$23.03	-4	3.40%
27-3000	Media and Communication Workers	1,660	0.03%	\$29.24	\$30.85	\$64,160	2.60%
27-3031	Public Relations Specialists	820	0.02%	\$31.52	\$33.87	\$70,440	3.10%
27-3040	Writers and Editors	630	0.01%	\$29.79	\$30.37	\$63,170	1.70%
27-3041	Editors	100	-7	\$33.53	\$32.61	\$67,820	2.00%
27-3042	Technical Writers	410	0.01%	\$29.83	\$29.98	\$62,350	2.50%
27-3043	Writers and Authors	120	-7	\$28.35	\$29.83	\$62,040	2.40%
27-3090	Miscellaneous Media and Communication Workers	190	-7	\$17.29	\$19.63	\$40,840	11.10%
27-3091	Interpreters and Translators	110	-7	\$15.34	\$15.87	\$33,020	20.00%
27-3099	Media and Communication Workers, All Other	70	-7	\$24.68	\$25.47	\$52,980	9.80%
27-4000	Media and Communication Equipment Workers	260	0.01%	\$19.21	\$21.29	\$44,290	6.10%
27-	Photographers	200	-7	\$15.22	\$19.01	\$39,530	5.60%

4021	rs						
29-0000	Healthcare Practitioners and Technical Occupations	5,000	0.10%	\$25.66	\$26.86	\$55,860	2.40%
29-1000	Health Diagnosing and Treating Practitioners	690	0.01%	\$34.79	\$39.10	\$81,330	3.20%
29-1051	Pharmacists	160	-7	\$60.96	\$59.88	\$124,540	2.80%
29-1141	Registered Nurses	470	0.01%	\$30.29	\$31.67	\$65,870	2.80%
29-2000	Health Technologists and Technicians	1,430	0.03%	\$13.83	\$15.54	\$32,320	3.10%
29-2041	Emergency Medical Technicians and Paramedics	1,160	0.02%	\$13.54	\$14.84	\$30,860	3.20%
29-2050	Health Practitioner Support Technologists and Technicians	200	-7	\$14.81	\$16.23	\$33,760	5.00%
29-2052	Pharmacy Technicians	200	-7	\$14.81	\$16.23	\$33,760	5.00%
29-9000	Other Healthcare Practitioners and Technical Occupations	2,880	0.06%	\$29.75	\$29.55	\$61,450	2.70%
29-9010	Occupational Health and Safety Specialists and Technicians	2,870	0.06%	\$29.76	\$29.55	\$61,450	2.70%
29-9011	Occupational Health and Safety Specialists	2,530	0.05%	\$30.78	\$30.26	\$62,930	3.00%
29-9012	Occupational Health and Safety Technicians	350	0.01%	\$23.40	\$24.35	\$50,650	2.80%
31-0000	Healthcare Support Occupations	40	-7	\$16.17	\$16.19	\$33,670	5.50%
31-9000	Other Healthcare Support Occupations	40	-7	\$16.17	\$16.19	\$33,670	5.50%
31-9090	Miscellaneous Healthcare Support Occupations	40	-7	\$16.17	\$16.19	\$33,670	5.50%
33-0000	Protective Service	26,120	0.51%	\$13.84	\$16.72	\$34,780	1.50%

	Occupations						
33-1000	Supervisors of Protective Service Workers	910	0.02%	\$27.18	\$29.66	\$61,700	1.50%
33-1010	First-Line Supervisors of Law Enforcement Workers	200	-7	-8	-8	-8	-8
33-1012	First-Line Supervisors of Police and Detectives	200	-7	-8	-8	-8	-8
33-1099	First-Line Supervisors of Protective Service Workers, All Other	690	0.01%	\$24.37	\$26.93	\$56,010	2.20%
33-2000	Fire Fighting and Prevention Workers	100	-7	\$20.63	\$20.54	\$42,720	3.90%
33-2011	Firefighters	100	-7	\$20.30	\$20.47	\$42,580	2.50%
33-3000	Law Enforcement Workers	2,390	0.05%	\$28.61	\$30.81	\$64,080	1.50%
33-3021	Detectives and Criminal Investigators	520	0.01%	\$40.71	\$43.12	\$89,690	1.20%
33-3050	Police Officers	1,840	0.04%	\$25.89	\$27.65	\$57,510	2.00%
33-3051	Police and Sheriff's Patrol Officers	500	0.01%	\$25.88	\$25.57	\$53,190	1.60%
33-3052	Transit and Railroad Police	1,340	0.03%	\$29.39	\$28.42	\$59,120	2.40%
33-9000	Other Protective Service Workers	22,720	0.45%	\$12.92	\$14.70	\$30,590	1.30%
33-9021	Private Detectives and Investigators	930	0.02%	\$30.75	\$30.07	\$62,540	1.40%
33-9030	Security Guards and Gaming Surveillance Officers	6,980	0.14%	\$12.70	\$13.92	\$28,950	1.30%
33-9032	Security Guards	6,980	0.14%	\$12.70	\$13.92	\$28,950	1.30%
33-9090	Miscellaneous Protective Service Workers	14,810	0.29%	\$12.63	\$14.11	\$29,360	1.90%
33-9093	Transportation Security Screeners	830	0.02%	\$15.49	\$16.10	\$33,480	3.60%

33-9099	Protective Service Workers, All Other	13,970	0.27%	\$12.38	\$13.98	\$29,080	1.70%
35-0000	Food Preparation and Serving Related Occupations	7,560	0.15%	\$11.72	\$14.36	\$29,860	2.30%
35-1010	Supervisors of Food Preparation and Serving Workers	860	0.02%	\$18.66	\$22.35	\$46,480	5.50%
35-1011	Chefs and Head Cooks	360	0.01%	\$22.10	\$25.27	\$52,560	4.70%
35-1012	First-Line Supervisors of Food Preparation and Serving Workers	500	0.01%	\$16.85	\$20.23	\$42,080	8.30%
35-2000	Cooks and Food Preparation Workers	3,160	0.06%	\$13.19	\$15.18	\$31,570	3.20%
35-2010	Cooks	2,510	0.05%	\$14.50	\$16.37	\$34,040	3.80%
35-2012	Cooks, Institution and Cafeteria	1,450	0.03%	\$14.41	\$15.47	\$32,180	4.30%
35-2014	Cooks, Restaurant	480	0.01%	\$11.74	\$13.28	\$27,620	6.30%
35-2015	Cooks, Short Order	80	-7	\$10.27	\$12.68	\$26,380	12.10%
35-2019	Cooks, All Other	450	0.01%	\$25.61	\$23.84	\$49,590	4.50%
35-2021	Food Preparation Workers	650	0.01%	\$10.18	\$10.63	\$22,100	1.90%
35-3000	Food and Beverage Serving Workers	2,900	0.06%	\$9.51	\$11.81	\$24,570	3.50%
35-3011	Bartenders	450	0.01%	\$10.35	\$11.94	\$24,830	4.00%
35-3020	Fast Food and Counter Workers	970	0.02%	\$9.63	\$12.78	\$26,570	7.30%
35-3021	Combined Food Preparation and Serving Workers, Including Fast Food	880	0.02%	\$9.36	\$12.60	\$26,210	8.10%
35-3022	Counter Attendants, Cafeteria, Food Concession, and Coffee Shop	90	-7	\$15.29	\$14.59	\$30,350	6.60%
35-3031	Waiters and Waitresses	1,380	0.03%	\$9.39	\$11.25	\$23,400	3.90%

35-3041	Food Servers, Nonrestaurant	100	-7	\$8.90	\$9.68	\$20,140	6.30%
35-9000	Other Food Preparation and Serving Related Workers	640	0.01%	\$9.80	\$11.14	\$23,170	3.60%
35-9011	Dining Room and Cafeteria Attendants and Bartender Helpers	120	-7	\$9.93	\$11.07	\$23,020	4.10%
35-9021	Dishwashers	330	0.01%	\$10.00	\$10.72	\$22,300	5.20%
35-9031	Hosts and Hostesses, Restaurant, Lounge, and Coffee Shop	100	-7	\$9.17	\$9.70	\$20,180	3.10%
35-9099	Food Preparation and Serving Related Workers, All Other	80	-7	\$14.83	\$14.65	\$30,470	7.30%
37-0000	Building and Grounds Cleaning and Maintenance Occupations	33,490	0.66%	\$19.44	\$18.45	\$38,370	0.60%
37-1010	First-Line Supervisors of Building and Grounds Cleaning and Maintenance Workers	700	0.01%	\$18.93	\$20.50	\$42,640	2.50%
37-1011	First-Line Supervisors of Housekeeping and Janitorial Workers	680	0.01%	\$18.69	\$20.24	\$42,110	2.60%
37-2000	Building Cleaning and Pest Control Workers	31,400	0.62%	\$19.29	\$18.31	\$38,080	0.60%
37-2010	Building Cleaning Workers	31,400	0.62%	\$19.29	\$18.31	\$38,080	0.60%
37-2011	Janitors and Cleaners, Except Maids and Housekeeping Cleaners	30,410	0.60%	\$20.05	\$18.47	\$38,410	0.60%
37-2012	Maids and Housekeeping Cleaners	930	0.02%	\$10.51	\$13.39	\$27,850	14.10%
37-2019	Building Cleaning Workers, All	50	-7	\$13.51	\$15.22	\$31,650	13.20%

	Other						
37-3010	Grounds Maintenance Workers	1,400	0.03%	\$24.39	\$20.57	\$42,780	2.60%
37-3011	Landscaping and Groundskeeping Workers	620	0.01%	\$13.24	\$14.36	\$29,880	3.60%
37-3019	Grounds Maintenance Workers, All Other	750	0.01%	\$28.01	\$25.96	\$54,000	1.70%
39-0000	Personal Care and Service Occupations	28,100	0.55%	\$10.34	\$11.53	\$23,990	1.40%
39-1000	Supervisors of Personal Care and Service Workers	740	0.01%	\$17.12	\$18.21	\$37,870	4.10%
39-1021	First-Line Supervisors of Personal Service Workers	740	0.01%	\$17.11	\$18.17	\$37,790	3.60%
39-2000	Animal Care and Service Workers	110	-7	\$14.58	\$15.02	\$31,250	6.90%
39-2021	Nonfarm Animal Caretakers	110	-7	\$14.58	\$15.02	\$31,250	6.90%
39-3000	Entertainment Attendants and Related Workers	1,320	0.03%	\$10.27	\$10.90	\$22,680	2.50%
39-3090	Miscellaneous Entertainment Attendants and Related Workers	530	0.01%	\$9.24	\$10.28	\$21,390	5.40%
39-3091	Amusement and Recreation Attendants	530	0.01%	\$9.24	\$10.28	\$21,370	5.50%
39-6010	Baggage Porters, Bellhops, and Concierges	12,670	0.25%	\$9.60	\$11.12	\$23,120	2.10%
39-6011	Baggage Porters and Bellhops	12,500	0.25%	\$9.53	\$10.97	\$22,820	2.20%
39-6012	Concierges	180	-7	\$24.11	\$21.59	\$44,900	2.40%
39-7010	Tour and Travel Guides	3,110	0.06%	\$13.09	\$13.96	\$29,040	2.40%
39-7011	Tour Guides and Escorts	2,920	0.06%	\$13.03	\$13.95	\$29,020	2.60%
39-7012	Travel Guides	180	-7	\$13.51	\$14.04	\$29,210	4.50%

39-9000	Other Personal Care and Service Workers	10,140	0.20%	\$9.87	\$10.87	\$22,610	2.40%
39-9011	Childcare Workers	7,060	0.14%	\$10.09	\$10.96	\$22,790	3.20%
39-9021	Personal Care Aides	-8	-8	\$9.23	\$9.61	\$19,990	9.50%
39-9030	Recreation and Fitness Workers	70	-7	\$10.54	\$18.88	\$39,270	28.70%
39-9032	Recreation Workers	50	-7	\$9.64	\$10.74	\$22,350	8.50%
39-9099	Personal Care and Service Workers, All Other	2,540	0.05%	\$9.70	\$10.66	\$22,170	3.70%
41-0000	Sales and Related Occupations	71,270	1.40%	\$23.96	\$27.36	\$56,910	1.20%
41-1010	First-Line Supervisors of Sales Workers	4,080	0.08%	\$29.81	\$32.76	\$68,150	2.00%
41-1011	First-Line Supervisors of Retail Sales Workers	1,410	0.03%	\$20.11	\$23.06	\$47,970	3.10%
41-1012	First-Line Supervisors of Non-Retail Sales Workers	2,660	0.05%	\$34.13	\$37.91	\$78,860	2.00%
41-2000	Retail Sales Workers	12,400	0.24%	\$10.97	\$13.13	\$27,310	2.00%
41-2010	Cashiers	3,610	0.07%	\$9.79	\$11.28	\$23,470	2.20%
41-2011	Cashiers	3,610	0.07%	\$9.79	\$11.28	\$23,470	2.20%
41-2020	Counter and Rental Clerks and Parts Salespersons	4,160	0.08%	\$11.54	\$13.71	\$28,530	1.80%
41-2021	Counter and Rental Clerks	3,850	0.08%	\$11.39	\$13.57	\$28,220	1.90%
41-2022	Parts Salespersons	310	0.01%	\$14.27	\$15.52	\$32,280	4.00%
41-2031	Retail Salespersons	4,630	0.09%	\$11.22	\$14.04	\$29,210	3.80%
41-3000	Sales Representatives, Services	42,710	0.84%	\$27.15	\$30.62	\$63,690	1.40%
41-3011	Advertising Sales Agents	50	-7	\$23.37	\$30.29	\$63,010	8.20%
41-3041	Travel Agents	920	0.02%	\$16.69	\$21.19	\$44,070	6.50%
41-3099	Sales Representatives, Services, All	41,720	0.82%	\$27.33	\$30.83	\$64,120	1.40%

	Other						
41-4010	Sales Representatives, Wholesale and Manufacturing	10,500	0.21%	\$25.99	\$29.71	\$61,800	1.90%
41-4011	Sales Representatives, Wholesale and Manufacturing, Technical and Scientific Products	630	0.01%	\$34.41	\$36.80	\$76,530	9.00%
41-4012	Sales Representatives, Wholesale and Manufacturing, Except Technical and Scientific Products	9,870	0.19%	\$25.61	\$29.26	\$60,870	2.00%
41-9000	Other Sales and Related Workers	1,580	0.03%	\$18.23	\$21.50	\$44,720	5.20%
41-9020	Real Estate Brokers and Sales Agents	-8	-8	\$28.64	\$32.28	\$67,140	6.20%
41-9022	Real Estate Sales Agents	60	-7	\$28.62	\$32.42	\$67,430	6.10%
41-9031	Sales Engineers	70	-7	\$31.76	\$34.77	\$72,320	3.70%
41-9041	Telemarketers	440	0.01%	\$11.66	\$13.75	\$28,600	6.80%
41-9090	Miscellaneous Sales and Related Workers	940	0.02%	\$22.01	\$23.71	\$49,320	5.10%
41-9099	Sales and Related Workers, All Other	920	0.02%	\$22.48	\$24.10	\$50,130	5.20%
43-0000	Office and Administrative Support Occupations	1,329,300	26.16%	\$19.93	\$20.26	\$42,150	0.20%
43-1011	First-Line Supervisors of Office and Administrative Support Workers	63,720	1.25%	\$28.68	\$28.38	\$59,020	0.40%
43-2000	Communications Equipment Operators	1,490	0.03%	\$12.24	\$13.11	\$27,280	2.10%
43-2011	Switchboard Operators, Including	1,420	0.03%	\$12.12	\$12.70	\$26,420	2.20%

	Answering Service						
43-2099	Communications Equipment Operators, All Other	50	-7	\$27.93	\$26.18	\$54,450	4.40%
43-3000	Financial Clerks	68,510	1.35%	\$16.77	\$17.52	\$36,450	0.50%
43-3011	Bill and Account Collectors	6,490	0.13%	\$16.10	\$16.69	\$34,710	0.90%
43-3021	Billing and Posting Clerks	15,400	0.30%	\$15.75	\$16.37	\$34,040	0.70%
43-3031	Bookkeeping, Accounting, and Auditing Clerks	38,460	0.76%	\$17.10	\$17.87	\$37,160	0.60%
43-3051	Payroll and Timekeeping Clerks	6,470	0.13%	\$18.22	\$19.00	\$39,510	1.10%
43-3061	Procurement Clerks	1,250	0.02%	\$18.12	\$18.64	\$38,780	1.90%
43-3071	Tellers	200	-7	\$10.37	\$11.26	\$23,420	6.10%
43-3099	Financial Clerks, All Other	240	-7	\$17.34	\$19.19	\$39,910	7.70%
43-4000	Information and Record Clerks	208,820	4.11%	\$16.70	\$16.98	\$35,320	0.60%
43-4011	Brokerage Clerks	450	0.01%	\$23.19	\$22.29	\$46,350	6.80%
43-4021	Correspondence Clerks	380	0.01%	\$15.43	\$16.72	\$34,770	6.30%
43-4041	Credit Authorizers, Checkers, and Clerks	140	-7	\$19.58	\$19.57	\$40,710	2.40%
43-4051	Customer Service Representatives	75,500	1.49%	\$15.87	\$16.66	\$34,640	0.80%
43-4071	File Clerks	1,740	0.03%	\$13.06	\$13.71	\$28,510	1.60%
43-4141	New Accounts Clerks	-8	-8	\$12.57	\$14.60	\$30,360	13.10%
43-4151	Order Clerks	8,560	0.17%	\$14.89	\$15.45	\$32,140	2.30%
43-4161	Human Resources Assistants, Except Payroll and Timekeeping	3,710	0.07%	\$18.41	\$18.86	\$39,220	1.00%
43-4171	Receptionists and Information Clerks	6,580	0.13%	\$12.58	\$13.40	\$27,880	1.00%
43-4181	Reservation and Transportation Ticket	105,480	2.08%	\$18.31	\$17.35	\$36,090	1.00%

	Agents and Travel Clerks						
43-4199	Information and Record Clerks, All Other	6,180	0.12%	\$20.56	\$19.99	\$41,570	1.50%
43-5000	Material Recording, Scheduling, Dispatching, and Distributing Workers	842,930	16.59%	\$23.97	\$21.42	\$44,550	0.30%
43-5011	Cargo and Freight Agents	68,350	1.35%	\$19.43	\$21.05	\$43,770	1.20%
43-5021	Couriers and Messengers	21,300	0.42%	\$12.65	\$13.66	\$28,420	1.90%
43-5030	Dispatchers	81,980	1.61%	\$17.63	\$18.79	\$39,080	0.80%
43-5032	Dispatchers, Except Police, Fire, and Ambulance	81,930	1.61%	\$17.63	\$18.79	\$39,080	0.80%
43-5041	Meter Readers, Utilities	100	-7	\$16.63	\$17.64	\$36,690	5.20%
43-5050	Postal Service Workers	500,970	9.86%	\$25.89	\$23.90	\$49,720	0.30%
43-5051	Postal Service Clerks	71,910	1.42%	\$25.88	\$22.87	\$47,570	0.20%
43-5052	Postal Service Mail Carriers	307,480	6.05%	\$27.16	\$24.47	\$50,890	0.20%
43-5053	Postal Service Mail Sorters, Processors, and Processing Machine Operators	121,580	2.39%	\$25.88	\$23.09	\$48,040	0.40%
43-5061	Production, Planning, and Expediting Clerks	20,020	0.39%	\$23.29	\$22.33	\$46,450	0.70%
43-5071	Shipping, Receiving, and Traffic Clerks	74,450	1.47%	\$14.83	\$16.02	\$33,330	0.70%
43-5081	Stock Clerks and Order Fillers	69,140	1.36%	\$14.05	\$15.24	\$31,710	1.50%
43-5111	Weighers, Measurers, Checkers, and Samplers, Recordkeeping	6,620	0.13%	\$16.63	\$16.78	\$34,890	1.30%
43-	Secretaries	50,060	0.99%	\$16.25	\$17.32	\$36,020	0.60%

6010	and Administrative Assistants						
43-6011	Executive Secretaries and Executive Administrative Assistants	10,590	0.21%	\$22.69	\$23.81	\$49,520	0.90%
43-6012	Legal Secretaries	140	-7	\$24.77	\$23.50	\$48,880	2.80%
43-6014	Secretaries and Administrative Assistants, Except Legal, Medical, and Executive	39,330	0.77%	\$14.77	\$15.55	\$32,330	0.60%
43-9000	Other Office and Administrative Support Workers	93,770	1.85%	\$14.03	\$15.39	\$32,010	0.50%
43-9011	Computer Operators	3,610	0.07%	\$24.73	\$22.25	\$46,270	2.10%
43-9020	Data Entry and Information Processing Workers	7,930	0.16%	\$14.02	\$14.93	\$31,060	1.20%
43-9021	Data Entry Keyers	7,830	0.15%	\$14.02	\$14.86	\$30,910	1.20%
43-9022	Word Processors and Typists	100	-7	\$20.29	\$20.70	\$43,050	5.30%
43-9031	Desktop Publishers	140	-7	\$15.67	\$16.62	\$34,570	4.20%
43-9041	Insurance Claims and Policy Processing Clerks	170	-7	\$20.12	\$20.52	\$42,690	4.80%
43-9051	Mail Clerks and Mail Machine Operators, Except Postal Service	1,120	0.02%	\$11.51	\$12.45	\$25,890	3.90%
43-9061	Office Clerks, General	76,550	1.51%	\$13.73	\$14.96	\$31,110	0.60%
43-9071	Office Machine Operators, Except Computer	730	0.01%	\$15.19	\$14.96	\$31,110	2.90%
43-9081	Proofreaders and Copy Markers	30	-7	\$15.31	\$16.11	\$33,520	3.60%
43-9111	Statistical Assistants	100	-7	\$24.11	\$23.31	\$48,470	2.10%
43-9199	Office and Administrative Support Workers, All Other	3,370	0.07%	\$18.27	\$19.39	\$40,320	1.50%

45-0000	Farming, Fishing, and Forestry Occupations	1,910	0.04%	\$11.47	\$13.33	\$27,730	3.90%
45-1011	First-Line Supervisors of Farming, Fishing, and Forestry Workers	80	-7	\$25.12	\$24.92	\$51,830	7.10%
45-2000	Agricultural Workers	1,320	0.03%	\$10.21	\$11.99	\$24,950	4.00%
45-2011	Agricultural Inspectors	40	-7	\$20.23	\$20.11	\$41,820	5.30%
45-2041	Graders and Sorters, Agricultural Products	320	0.01%	\$9.08	\$11.09	\$23,060	6.90%
45-2090	Miscellaneous Agricultural Workers	950	0.02%	\$10.57	\$11.96	\$24,880	4.00%
45-2091	Agricultural Equipment Operators	290	0.01%	\$13.94	\$14.51	\$30,180	6.00%
45-2092	Farmworkers and Laborers, Crop, Nursery, and Greenhouse	290	0.01%	\$10.51	\$11.83	\$24,610	5.00%
45-2093	Farmworkers, Farm, Ranch, and Aquacultural Animals	350	0.01%	\$9.39	\$10.16	\$21,120	7.10%
45-3000	Fishing and Hunting Workers	-8	-8	\$13.52	\$14.27	\$29,690	10.50%
45-3011	Fishers and Related Fishing Workers	-8	-8	\$13.52	\$14.27	\$29,690	10.50%
45-4000	Forest, Conservation, and Logging Workers	460	0.01%	\$13.97	\$15.13	\$31,470	5.90%
45-4020	Logging Workers	460	0.01%	\$13.97	\$15.13	\$31,470	5.90%
45-4022	Logging Equipment Operators	360	0.01%	\$13.95	\$15.42	\$32,070	7.20%
45-4029	Logging Workers, All Other	50	-7	\$16.86	\$16.80	\$34,950	5.00%
47-0000	Construction and Extraction Occupations	28,560	0.56%	\$22.46	\$23.40	\$48,680	1.50%
47-1011	First-Line Supervisors of Construction Trades and	3,480	0.07%	\$30.49	\$31.19	\$64,870	2.60%

	Extraction Workers						
47-2000	Construction Trades Workers	11,470	0.23%	\$23.01	\$23.10	\$48,060	1.90%
47-2011	Boilermakers	30	-7	\$25.99	\$25.86	\$53,790	4.50%
47-2031	Carpenters	1,260	0.02%	\$17.70	\$19.51	\$40,590	5.10%
47-2061	Construction Laborers	770	0.02%	\$14.81	\$15.10	\$31,410	5.00%
47-2070	Construction Equipment Operators	3,330	0.07%	\$19.24	\$20.67	\$42,980	2.80%
47-2071	Paving, Surfacing, and Tamping Equipment Operators	300	0.01%	\$17.08	\$18.52	\$38,530	4.60%
47-2073	Operating Engineers and Other Construction Equipment Operators	3,030	0.06%	\$19.49	\$20.87	\$43,420	2.90%
47-2111	Electricians	2,600	0.05%	\$27.72	\$28.24	\$58,740	2.10%
47-2140	Painters and Paperhangers	290	0.01%	\$27.03	\$24.99	\$51,980	3.80%
47-2141	Painters, Construction and Maintenance	290	0.01%	\$27.03	\$24.99	\$51,980	3.80%
47-2150	Pipelayers, Plumbers, Pipefitters, and Steamfitters	1,330	0.03%	\$24.11	\$24.84	\$51,680	3.20%
47-2152	Plumbers, Pipefitters, and Steamfitters	1,320	0.03%	\$24.23	\$24.92	\$51,840	3.20%
47-2181	Roofers	-8	-8	\$19.56	\$19.36	\$40,280	7.10%
47-2211	Sheet Metal Workers	1,370	0.03%	\$25.11	\$24.57	\$51,110	3.30%
47-2221	Structural Iron and Steel Workers	60	-7	\$26.61	\$26.60	\$55,330	5.30%
47-3010	Helpers, Construction Trades	70	-7	\$17.39	\$16.32	\$33,940	6.10%
47-3013	Helpers--Electricians	40	-7	\$19.19	\$17.82	\$37,070	6.90%
47-4000	Other Construction and Related Workers	12,880	0.25%	\$20.94	\$21.63	\$45,000	2.00%
47-4011	Construction and Building Inspectors	210	-7	\$28.93	\$29.33	\$61,010	3.20%

47-4041	Hazardous Materials Removal Workers	80	-7	\$17.07	\$20.17	\$41,960	7.20%
47-4051	Highway Maintenance Workers	130	-7	\$16.31	\$16.55	\$34,430	5.00%
47-4061	Rail-Track Laying and Maintenance Equipment Operators	10,360	0.20%	\$21.56	\$21.82	\$45,380	2.00%
47-4090	Miscellaneous Construction and Related Workers	2,000	0.04%	\$17.48	\$20.33	\$42,280	7.60%
47-4099	Construction and Related Workers, All Other	2,000	0.04%	\$17.48	\$20.33	\$42,280	7.60%
47-5000	Extraction Workers	660	0.01%	\$23.47	\$22.74	\$47,290	8.70%
47-5010	Derrick, Rotary Drill, and Service Unit Operators, Oil, Gas, and Mining	320	0.01%	\$24.75	\$23.95	\$49,810	17.30%
47-5012	Rotary Drill Operators, Oil and Gas	120	-7	\$27.65	\$33.43	\$69,540	12.90%
47-5013	Service Unit Operators, Oil, Gas, and Mining	170	-7	-8	-8	-8	-8
47-5031	Explosives Workers, Ordnance Handling Experts, and Blasters	-8	-8	\$16.40	\$20.10	\$41,800	18.20%
47-5071	Roustabouts, Oil and Gas	-8	-8	\$23.81	\$22.85	\$47,530	9.20%
47-5099	Extraction Workers, All Other	100	-7	\$21.24	\$21.24	\$44,180	5.40%
49-0000	Installation, Maintenance, and Repair Occupations	293,330	5.77%	\$23.63	\$24.17	\$50,280	0.60%
49-1011	First-Line Supervisors of Mechanics, Installers, and Repairers	24,970	0.49%	\$32.45	\$32.57	\$67,740	0.50%
49-2000	Electrical and Electronic Equipment Mechanics, Installers,	14,810	0.29%	\$25.81	\$26.50	\$55,120	1.50%

	and Repairers						
49-2011	Computer, Automated Teller, and Office Machine Repairers	-8	-8	\$19.75	\$19.95	\$41,490	3.40%
49-2020	Radio and Telecommunications Equipment Installers and Repairers	-8	-8	\$26.29	\$26.40	\$54,920	3.10%
49-2021	Radio, Cellular, and Tower Equipment Installers and Repairers	60	-7	\$22.35	\$23.73	\$49,360	4.40%
49-2022	Telecommunications Equipment Installers and Repairers, Except Line Installers	-8	-8	\$27.15	\$27.10	\$56,360	3.00%
49-2090	Miscellaneous Electrical and Electronic Equipment Mechanics, Installers, and Repairers	14,230	0.28%	\$25.94	\$26.64	\$55,410	1.50%
49-2091	Avionics Technicians	6,570	0.13%	\$25.91	\$26.42	\$54,940	2.10%
49-2092	Electric Motor, Power Tool, and Related Repairers	40	-7	\$19.34	\$22.31	\$46,410	5.90%
49-2093	Electrical and Electronics Installers and Repairers, Transportation Equipment	6,920	0.14%	\$25.76	\$26.74	\$55,620	2.30%
49-2094	Electrical and Electronics Repairers, Commercial and Industrial Equipment	420	0.01%	\$27.56	\$27.78	\$57,780	2.70%
49-2095	Electrical and Electronics Repairers, Powerhouse, Substation,	210	-7	\$30.50	\$31.17	\$64,820	2.50%

	and Relay						
49-2096	Electronic Equipment Installers and Repairers, Motor Vehicles	50	-7	\$23.69	\$21.46	\$44,630	4.30%
49-3000	Vehicle and Mobile Equipment Mechanics, Installers, and Repairers	180,650	3.56%	\$22.85	\$23.70	\$49,290	0.70%
49-3011	Aircraft Mechanics and Service Technicians	68,690	1.35%	\$27.07	\$28.04	\$58,320	1.20%
49-3020	Automotive Technicians and Repairers	16,310	0.32%	\$20.94	\$21.19	\$44,070	0.70%
49-3021	Automotive Body and Related Repairers	1,760	0.03%	\$20.47	\$20.90	\$43,470	1.50%
49-3023	Automotive Service Technicians and Mechanics	14,550	0.29%	\$21.03	\$21.22	\$44,140	0.80%
49-3031	Bus and Truck Mechanics and Diesel Engine Specialists	73,610	1.45%	\$19.80	\$20.47	\$42,580	0.40%
49-3040	Heavy Vehicle and Mobile Equipment Service Technicians and Mechanics	19,620	0.39%	\$23.84	\$23.47	\$48,820	1.30%
49-3042	Mobile Heavy Equipment Mechanics, Except Engines	2,550	0.05%	\$22.45	\$23.14	\$48,130	2.10%
49-3043	Rail Car Repairers	17,040	0.34%	\$24.00	\$23.53	\$48,940	1.50%
49-3050	Small Engine Mechanics	930	0.02%	\$18.27	\$19.78	\$41,130	6.60%
49-3051	Motorboat Mechanics and Service Technicians	850	0.02%	\$17.82	\$18.50	\$38,490	3.60%
49-3053	Outdoor Power Equipment and Other	-8	-8	\$39.59	\$34.53	\$71,820	7.60%

	Small Engine Mechanics						
49-3090	Miscellaneous Vehicle and Mobile Equipment Mechanics, Installers, and Repairers	1,490	0.03%	\$14.71	\$15.97	\$33,210	3.50%
49-3093	Tire Repairers and Changers	1,490	0.03%	\$14.71	\$15.97	\$33,220	3.40%
49-9000	Other Installation, Maintenance, and Repair Occupations	72,910	1.43%	\$22.33	\$22.00	\$45,760	0.80%
49-9010	Control and Valve Installers and Repairers	1,490	0.03%	\$28.97	\$28.25	\$58,750	3.70%
49-9012	Control and Valve Installers and Repairers, Except Mechanical Door	1,470	0.03%	\$29.08	\$28.29	\$58,840	3.90%
49-9021	Heating, Air Conditioning, and Refrigeration Mechanics and Installers	3,050	0.06%	\$28.01	\$26.22	\$54,530	0.80%
49-9031	Home Appliance Repairers	480	0.01%	\$18.21	\$18.91	\$39,330	4.60%
49-9040	Industrial Machinery Installation, Repair, and Maintenance Workers	9,620	0.19%	\$24.23	\$25.20	\$52,430	3.30%
49-9041	Industrial Machinery Mechanics	5,990	0.12%	\$27.22	\$27.92	\$58,070	2.70%
49-9043	Maintenance Workers, Machinery	3,360	0.07%	\$18.65	\$19.90	\$41,390	3.50%
49-9044	Millwrights	270	0.01%	\$31.86	\$31.01	\$64,500	2.90%
49-9050	Line Installers and Repairers	200	-7	\$33.53	\$33.50	\$69,680	4.10%
49-9051	Electrical Power-Line Installers and Repairers	180	-7	\$34.17	\$34.12	\$70,970	4.30%

49-9060	Precision Instrument and Equipment Repairers	190	-7	\$23.18	\$22.04	\$45,850	3.40%
49-9069	Precision Instrument and Equipment Repairers, All Other	160	-7	\$23.57	\$22.00	\$45,770	7.70%
49-9071	Maintenance and Repair Workers, General	38,700	0.76%	\$22.15	\$21.58	\$44,880	0.60%
49-9090	Miscellaneous Installation, Maintenance, and Repair Workers	19,170	0.38%	\$19.16	\$20.05	\$41,690	1.60%
49-9091	Coin, Vending, and Amusement Machine Servicers and Repairers	180	-7	\$13.95	\$15.03	\$31,260	7.40%
49-9092	Commercial Divers	180	-7	\$18.93	\$23.52	\$48,930	14.00%
49-9095	Manufactured Building and Mobile Home Installers	40	-7	\$13.05	\$14.32	\$29,780	13.90%
49-9096	Riggers	1,690	0.03%	\$17.65	\$19.02	\$39,570	4.90%
49-9097	Signal and Track Switch Repairers	6,350	0.13%	\$25.93	\$25.63	\$53,300	1.20%
49-9098	Helpers--Installation, Maintenance, and Repair Workers	6,420	0.13%	\$12.12	\$13.14	\$27,340	1.60%
49-9099	Installation, Maintenance, and Repair Workers, All Other	4,240	0.08%	\$21.70	\$22.79	\$47,400	2.60%
51-0000	Production Occupations	72,850	1.43%	\$18.44	\$20.20	\$42,020	1.10%
51-1011	First-Line Supervisors of Production and Operating Workers	6,400	0.13%	\$27.18	\$29.16	\$60,660	1.50%
51-2000	Assemblers and Fabricators	11,320	0.22%	\$12.96	\$14.31	\$29,770	2.60%
51-2011	Aircraft Structure, Surfaces, Rigging, and	1,860	0.04%	\$19.34	\$19.19	\$39,920	3.20%

	Systems Assemblers						
51-2020	Electrical, Electronics, and Electromechanical Assemblers	400	0.01%	\$17.42	\$17.61	\$36,630	2.20%
51-2022	Electrical and Electronic Equipment Assemblers	400	0.01%	\$17.42	\$17.61	\$36,630	2.20%
51-2041	Structural Metal Fabricators and Fitters	300	0.01%	\$19.61	\$19.99	\$41,570	7.50%
51-2090	Miscellaneous Assemblers and Fabricators	8,750	0.17%	\$12.03	\$12.91	\$26,860	2.40%
51-2091	Fiberglass Laminators and Fabricators	70	-7	\$17.32	\$17.16	\$35,690	7.10%
51-2092	Team Assemblers	7,140	0.14%	\$12.06	\$12.99	\$27,020	2.60%
51-2099	Assemblers and Fabricators, All Other	1,540	0.03%	\$11.26	\$12.37	\$25,730	5.60%
51-3000	Food Processing Workers	480	0.01%	\$14.01	\$14.81	\$30,810	3.90%
51-3011	Bakers	40	-7	-8	-8	-8	-8
51-3020	Butchers and Other Meat, Poultry, and Fish Processing Workers	240	-7	\$15.01	\$14.69	\$30,550	7.40%
51-3021	Butchers and Meat Cutters	240	-7	\$15.00	\$14.64	\$30,460	8.90%
51-3090	Miscellaneous Food Processing Workers	200	-7	-8	-8	-8	-8
51-3091	Food and Tobacco Roasting, Baking, and Drying Machine Operators and Tenders	-8	-8	\$12.31	\$12.39	\$25,770	4.90%
51-3092	Food Batchmakers	70	-7	\$12.77	\$13.17	\$27,400	5.40%
51-4000	Metal Workers and Plastic Workers	16,520	0.33%	\$20.94	\$21.40	\$44,520	1.40%
51-4010	Computer Control	40	-7	\$19.16	\$19.87	\$41,320	4.00%

	Programmers and Operators						
51-4020	Forming Machine Setters, Operators, and Tenders, Metal and Plastic	-8	-8	\$17.68	\$18.10	\$37,640	9.00%
51-4030	Machine Tool Cutting Setters, Operators, and Tenders, Metal and Plastic	-8	-8	\$15.35	\$16.94	\$35,230	11.00%
51-4031	Cutting, Punching, and Press Machine Setters, Operators, and Tenders, Metal and Plastic	-8	-8	\$13.83	\$15.13	\$31,460	9.70%
51-4033	Grinding, Lapping, Polishing, and Buffing Machine Tool Setters, Operators, and Tenders, Metal and Plastic	-8	-8	\$15.38	\$16.93	\$35,210	13.60%
51-4041	Machinists	6,640	0.13%	\$22.21	\$22.73	\$47,290	2.20%
51-4070	Molders and Molding Machine Setters, Operators, and Tenders, Metal and Plastic	-8	-8	\$14.90	\$16.12	\$33,520	4.60%
51-4072	Molding, Coremaking, and Casting Machine Setters, Operators, and Tenders, Metal and Plastic	-8	-8	\$14.90	\$16.12	\$33,520	4.60%
51-4120	Welding, Soldering, and Brazing Workers	8,670	0.17%	\$20.18	\$20.46	\$42,560	1.20%
51-4121	Welders, Cutters, Solderers, and Brazers	8,610	0.17%	\$20.16	\$20.44	\$42,520	1.20%
51-4122	Welding, Soldering, and Brazing	60	-7	\$23.78	\$23.02	\$47,870	4.70%

	Machine Setters, Operators, and Tenders						
51-4190	Miscellaneous Metal Workers and Plastic Workers	140	-7	\$21.25	\$23.39	\$48,660	8.10%
51-4192	Layout Workers, Metal and Plastic	30	-7	\$20.67	\$21.29	\$44,290	5.90%
51-4193	Plating and Coating Machine Setters, Operators, and Tenders, Metal and Plastic	-8	-8	\$21.77	\$24.64	\$51,250	5.60%
51-5110	Printing Workers	290	0.01%	\$17.30	\$18.34	\$38,140	2.70%
51-5111	Prepress Technicians and Workers	60	-7	\$15.55	\$17.08	\$35,530	8.60%
51-5112	Printing Press Operators	220	-7	\$17.73	\$18.70	\$38,890	2.00%
51-6000	Textile, Apparel, and Furnishings Workers	980	0.02%	\$13.46	\$14.70	\$30,570	2.70%
51-6031	Sewing Machine Operators	100	-7	\$12.80	\$12.74	\$26,500	3.80%
51-6050	Tailors, Dressmakers, and Sewers	80	-7	\$13.66	\$13.51	\$28,100	5.40%
51-6052	Tailors, Dressmakers, and Custom Sewers	60	-7	\$15.05	\$14.87	\$30,930	2.00%
51-6090	Miscellaneous Textile, Apparel, and Furnishings Workers	700	0.01%	\$14.27	\$15.63	\$32,510	4.40%
51-6093	Upholsterers	410	0.01%	\$17.41	\$17.73	\$36,880	3.20%
51-6099	Textile, Apparel, and Furnishings Workers, All Other	-8	-8	\$11.58	\$12.59	\$26,190	4.40%
51-7000	Woodworkers	800	0.02%	\$16.68	\$17.18	\$35,730	4.20%
51-7011	Cabinetmakers and Bench Carpenters	400	0.01%	\$16.70	\$17.67	\$36,750	5.40%
51-7021	Furniture Finishers	230	-7	\$18.20	\$17.93	\$37,290	1.80%
51-7040	Woodworking Machine Setters,	120	-7	\$15.75	\$15.08	\$31,360	5.50%

	Operators, and Tenders						
51-7099	Woodworkers, All Other	-8	-8	\$13.82	\$14.60	\$30,360	2.80%
51-8000	Plant and System Operators	10,250	0.20%	\$30.65	\$29.79	\$61,950	1.00%
51-8010	Power Plant Operators, Distributors, and Dispatchers	50	-7	\$46.85	\$42.77	\$88,960	5.60%
51-8013	Power Plant Operators	40	-7	\$48.76	\$45.15	\$93,910	6.00%
51-8021	Stationary Engineers and Boiler Operators	120	-7	\$31.34	\$30.67	\$63,790	3.90%
51-8090	Miscellaneous Plant and System Operators	10,050	0.20%	\$30.62	\$29.72	\$61,830	1.00%
51-8092	Gas Plant Operators	3,440	0.07%	\$31.07	\$30.43	\$63,290	1.50%
51-8093	Petroleum Pump System Operators, Refinery Operators, and Gaugers	6,290	0.12%	\$30.37	\$29.38	\$61,110	1.40%
51-8099	Plant and System Operators, All Other	320	0.01%	\$30.50	\$28.93	\$60,180	6.00%
51-9000	Other Production Occupations	25,810	0.51%	\$14.66	\$16.41	\$34,130	1.30%
51-9010	Chemical Processing Machine Setters, Operators, and Tenders	410	0.01%	\$26.82	\$26.52	\$55,160	6.60%
51-9011	Chemical Equipment Operators and Tenders	390	0.01%	\$27.13	\$26.80	\$55,750	6.80%
51-9020	Crushing, Grinding, Polishing, Mixing, and Blending Workers	510	0.01%	\$16.45	\$16.49	\$34,310	4.30%
51-9021	Crushing, Grinding, and Polishing Machine Setters, Operators, and Tenders	40	-7	\$17.90	\$19.13	\$39,780	4.30%
51-9023	Mixing and Blending Machine	450	0.01%	\$15.87	\$16.18	\$33,650	4.60%

	Setters, Operators, and Tenders						
51-9030	Cutting Workers	120	-7	\$12.97	\$13.52	\$28,110	5.40%
51-9032	Cutting and Slicing Machine Setters, Operators, and Tenders	100	-7	\$12.96	\$13.64	\$28,380	6.80%
51-9061	Inspectors, Testers, Sorters, Samplers, and Weighers	10,590	0.21%	\$16.56	\$18.54	\$38,570	1.60%
51-9111	Packaging and Filling Machine Operators and Tenders	5,580	0.11%	\$12.90	\$13.44	\$27,960	1.50%
51-9120	Painting Workers	2,960	0.06%	\$18.36	\$19.34	\$40,230	2.10%
51-9121	Coating, Painting, and Spraying Machine Setters, Operators, and Tenders	340	0.01%	\$15.44	\$15.82	\$32,900	4.80%
51-9122	Painters, Transportatio n Equipment	2,610	0.05%	\$18.71	\$19.77	\$41,130	2.20%
51-9190	Miscellane ous Production Workers	5,600	0.11%	\$11.36	\$13.11	\$27,260	3.50%
51-9192	Cleaning, Washing, and Metal Pickling Equipment Operators and Tenders	30	-7	\$8.91	\$9.51	\$19,770	3.90%
51-9193	Cooling and Freezing Equipment Operators and Tenders	250	-7	\$14.19	\$15.44	\$32,110	4.30%
51-9194	Etchers and Engravers	-8	-8	\$11.57	\$12.64	\$26,300	6.50%
51-9196	Paper Goods Machine Setters, Operators, and Tenders	90	-7	\$13.79	\$14.26	\$29,660	6.00%
51-9198	Helpers-- Production Workers	3,730	0.07%	\$10.29	\$12.03	\$25,030	6.90%
51-9199	Production Workers, All Other	1,430	0.03%	\$14.28	\$15.47	\$32,180	4.70%
53-0000	Transportatio n and	2,864,430	56.37 %	\$17.58	\$20.04	\$41,680	0.60%

	Material Moving Occupations						
53-1000	Supervisors of Transportation and Material Moving Workers	132,950	2.62%	\$25.16	\$26.26	\$54,630	0.50%
53-1011	Aircraft Cargo Handling Supervisors	4,910	0.10%	\$21.49	\$23.28	\$48,420	1.70%
53-1021	First-Line Supervisors of Helpers, Laborers, and Material Movers, Hand	52,580	1.03%	\$23.12	\$24.07	\$50,060	0.50%
53-1031	First-Line Supervisors of Transportation and Material-Moving Machine and Vehicle Operators	75,460	1.48%	\$27.13	\$27.99	\$58,220	0.60%
53-2000	Air Transportation Workers	186,910	3.68%	-4	-4	\$80,320	2.30%
53-2010	Aircraft Pilots and Flight Engineers	88,500	1.74%	-4	-4	\$119,850	2.90%
53-2011	Airline Pilots, Copilots, and Flight Engineers	68,090	1.34%	-4	-4	\$131,800	3.00%
53-2012	Commercial Pilots	20,410	0.40%	-4	-4	\$79,970	3.10%
53-2020	Air Traffic Controllers and Airfield Operations Specialists	5,760	0.11%	\$26.48	\$28.73	\$59,750	2.70%
53-2021	Air Traffic Controllers	1,710	0.03%	\$33.45	\$37.41	\$77,820	3.90%
53-2022	Airfield Operations Specialists	4,050	0.08%	\$23.21	\$25.06	\$52,130	2.90%
53-2031	Flight Attendants	92,660	1.82%	-4	-4	\$43,840	1.90%
53-3000	Motor Vehicle Operators	1,527,740	30.06%	\$17.99	\$19.11	\$39,740	0.40%

53-3011	Ambulance Drivers and Attendants, Except Emergency Medical Technicians	1,950	0.04%	\$11.34	\$12.34	\$25,660	3.50%
53-3020	Bus Drivers	262,910	5.17%	\$14.46	\$15.09	\$31,380	0.80%
53-3021	Bus Drivers, Transit and Intercity	70,420	1.39%	\$14.45	\$15.55	\$32,340	1.30%
53-3022	Bus Drivers, School or Special Client	192,490	3.79%	\$14.47	\$14.92	\$31,020	0.90%
53-3030	Driver/Sales Workers and Truck Drivers	1,176,270	23.15%	\$19.55	\$20.47	\$42,590	0.40%
53-3031	Driver/Sales Workers	12,390	0.24%	\$15.58	\$16.49	\$34,290	3.50%
53-3032	Heavy and Tractor-Trailer Truck Drivers	922,190	18.15%	\$19.40	\$20.19	\$42,000	0.40%
53-3033	Light Truck or Delivery Services Drivers	241,680	4.76%	\$20.94	\$21.76	\$45,250	0.80%
53-3041	Taxi Drivers and Chauffeurs	79,690	1.57%	\$11.27	\$12.49	\$25,980	1.30%
53-3099	Motor Vehicle Operators, All Other	6,930	0.14%	\$16.23	\$17.27	\$35,920	2.70%
53-4000	Rail Transportation Workers	107,550	2.12%	\$25.47	\$26.27	\$54,650	1.40%
53-4010	Locomotive Engineers and Operators	42,010	0.83%	\$24.73	\$25.92	\$53,900	1.90%
53-4011	Locomotive Engineers	35,600	0.70%	\$25.51	\$26.72	\$55,570	2.20%
53-4012	Locomotive Firers	1,850	0.04%	\$21.58	\$23.03	\$47,910	2.80%
53-4013	Rail Yard Engineers, Dinkey Operators, and Hostlers	4,560	0.09%	\$19.92	\$20.81	\$43,290	2.10%
53-4021	Railroad Brake, Signal, and Switch Operators	23,590	0.46%	\$24.42	\$23.93	\$49,780	2.40%
53-4031	Railroad Conductors and Yardmasters	38,650	0.76%	\$27.06	\$28.04	\$58,310	1.80%
53-4041	Subway and Streetcar Operators	-8	-8	\$26.64	\$25.31	\$52,650	4.50%
53-	Rail	-8	-8	\$26.93	\$27.44	\$57,080	4.70%

4099	Transportation Workers, All Other						
53-5000	Water Transportation Workers	53,180	1.05%	\$25.67	\$29.63	\$61,620	2.20%
53-5011	Sailors and Marine Oilers	20,950	0.41%	\$18.26	\$19.69	\$40,960	2.20%
53-5020	Ship and Boat Captains and Operators	25,060	0.49%	\$32.71	\$35.45	\$73,740	2.50%
53-5021	Captains, Mates, and Pilots of Water Vessels	22,880	0.45%	\$34.54	\$37.23	\$77,440	2.50%
53-5022	Motorboat Operators	2,180	0.04%	\$14.50	\$16.74	\$34,810	5.00%
53-5031	Ship Engineers	7,160	0.14%	\$35.20	\$38.30	\$79,660	3.60%
53-6000	Other Transportation Workers	53,800	1.06%	\$15.77	\$18.21	\$37,880	1.50%
53-6011	Bridge and Lock Tenders	-8	-8	\$24.25	\$23.04	\$47,920	3.00%
53-6021	Parking Lot Attendants	560	0.01%	\$9.56	\$10.89	\$22,650	4.80%
53-6031	Automotive and Watercraft Service Attendants	1,690	0.03%	\$11.94	\$12.80	\$26,630	3.70%
53-6051	Transportation Inspectors	9,170	0.18%	\$28.58	\$30.70	\$63,860	2.40%
53-6061	Transportation Attendants, Except Flight Attendants	13,090	0.26%	\$12.42	\$13.48	\$28,040	2.40%
53-6099	Transportation Workers, All Other	28,870	0.57%	\$16.25	\$16.77	\$34,890	2.00%
53-7000	Material Moving Workers	802,310	15.79%	\$13.92	\$15.11	\$31,430	0.70%
53-7011	Conveyor Operators and Tenders	13,340	0.26%	\$14.78	\$16.15	\$33,600	1.70%
53-7021	Crane and Tower Operators	6,300	0.12%	\$26.68	\$27.87	\$57,960	3.80%
53-7030	Dredge, Excavating, and Loading Machine Operators	980	0.02%	\$16.84	\$18.74	\$38,980	4.80%
53-7032	Excavating and Loading Machine and Dragline Operators	970	0.02%	\$16.88	\$18.77	\$39,030	4.80%
53-7041	Hoist and Winch Operators	590	0.01%	\$31.55	\$30.11	\$62,630	3.10%
53-	Industrial	127,010	2.50%	\$15.59	\$16.85	\$35,040	1.80%

7051	Truck and Tractor Operators						
53-7060	Laborers and Material Movers, Hand	632,300	12.44%	\$13.34	\$14.33	\$29,800	0.40%
53-7061	Cleaners of Vehicles and Equipment	22,350	0.44%	\$11.32	\$13.41	\$27,890	1.30%
53-7062	Laborers and Freight, Stock, and Material Movers, Hand	526,670	10.36%	\$13.22	\$14.31	\$29,770	0.50%
53-7063	Machine Feeders and Offbearers	21,090	0.42%	\$18.39	\$18.15	\$37,760	0.70%
53-7064	Packers and Packagers, Hand	62,190	1.22%	\$13.19	\$13.50	\$28,080	1.20%
53-7070	Pumping Station Operators	3,610	0.07%	\$27.14	\$26.89	\$55,940	1.60%
53-7071	Gas Compressor and Gas Pumping Station Operators	2,020	0.04%	\$27.69	\$27.93	\$58,090	1.10%
53-7072	Pump Operators, Except Wellhead Pumpers	1,460	0.03%	\$26.42	\$26.12	\$54,320	3.50%
53-7073	Wellhead Pumpers	130	-7	\$19.69	\$19.48	\$40,530	5.90%
53-7081	Refuse and Recyclable Material Collectors	360	0.01%	\$19.44	\$19.54	\$40,650	4.30%
53-7121	Tank Car, Truck, and Ship Loaders	8,530	0.17%	\$20.97	\$22.55	\$46,910	3.40%
53-7199	Material Moving Workers, All Other	9,300	0.18%	\$21.14	\$21.59	\$44,920	3.90%

About May 2012 National Industry-Specific Occupational Employment and Wage Estimates

- (1) Estimates for detailed occupations do not sum to the totals because the totals include occupations not shown separately. Estimates do not include self-employed workers.
- (2) Annual wages have been calculated by multiplying the hourly mean wage by a "year-round, full-time" figure of 2,080 hours; for those occupations where there is not an hourly mean wage published, the annual wage has been directly calculated from the reported survey data.
- (3) The relative standard error (RSE) is a measure of the reliability of a survey statistic. The smaller the relative standard error, the more precise the estimate.
- (5) This wage is equal to or greater than \$90.00 per hour or \$187,199 per year.
- (8) Estimate not released.

Other OES estimates and related information: [May 2012 National Occupational Employment and Wage Estimates \(cross-industry estimates\)](#) [May 2012 State Occupational Employment and Wage Estimates \(cross-industry estimates\)](#) [May 2012 Metropolitan and Nonmetropolitan Area Occupational Employment and Wage Estimates \(cross-industry estimates\)](#) [May 2012 National Industry-Specific Occupational Employment and Wage Estimates](#) [May 2012 Occupation Profiles Technical notes](#)

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Appendix F: Cumulative TWIC Programmatic Costs

In this section, we discuss the history of the TWIC maritime program and the cumulative programmatic costs.

F.1 Transportation Worker Identification Credential

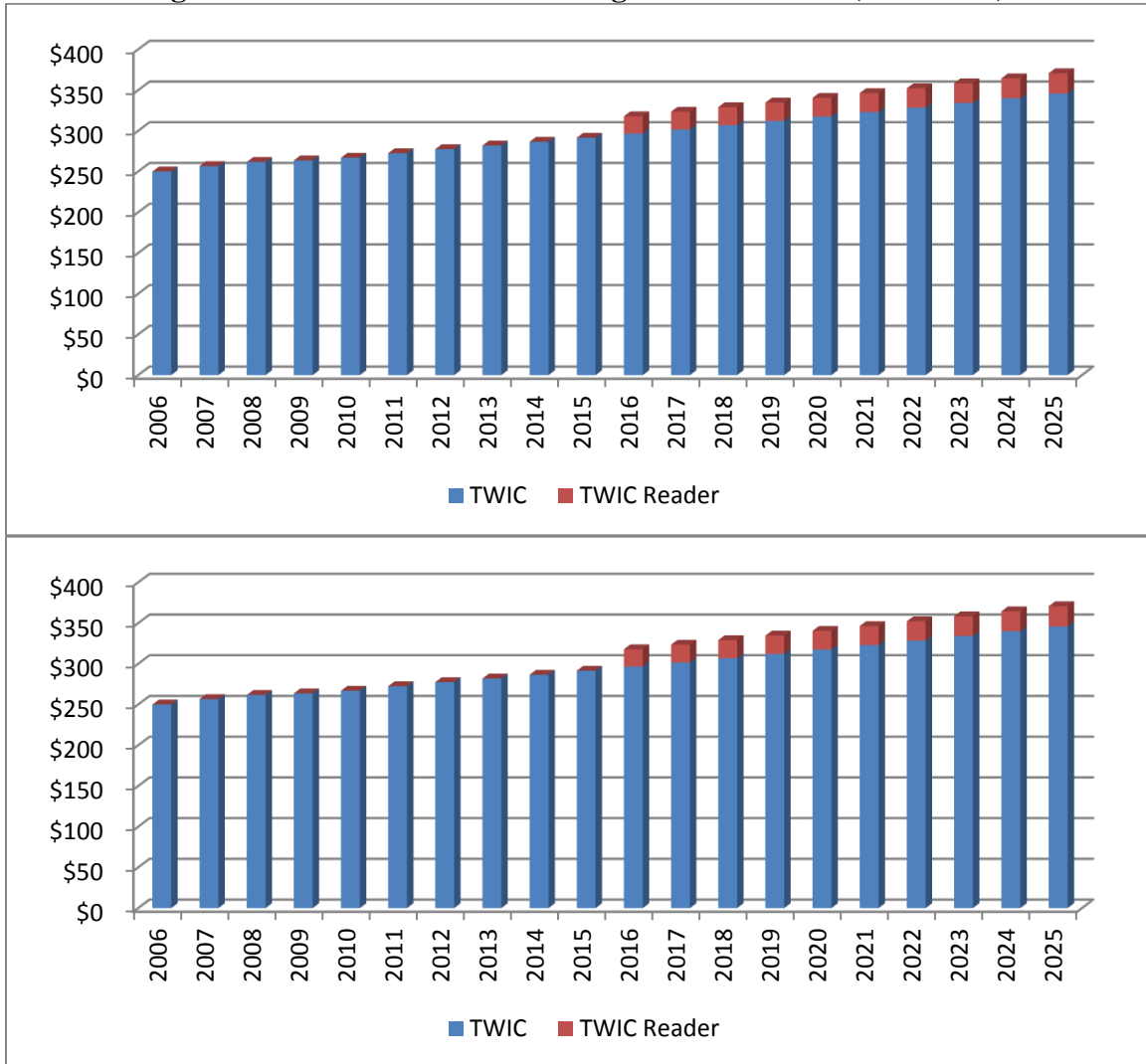
Section 102 of the MTSA requires the Secretary of the DHS to issue a biometric transportation security card to individuals with unescorted access to secure areas of vessels and facilities. Under this authority, DHS, through the Coast Guard and the TSA, published a notice of proposed rulemaking (TWIC 1 NPRM) to implement the TWIC program in the maritime sector. On January 27, 2007, DHS, through the Coast Guard and TSA, issued a final rule (TWIC 1 final rule) that required all credentialed merchant mariners and individuals granted unescorted access to secure areas of MTSA-regulated vessels or facilities to obtain a TWIC. To date, TSA has issued approximately 2.5 million TWIC cards, which have functioned primarily as a visual identity badge.

In this final rule, the Coast Guard requires owners and operators of certain vessels and facilities regulated by the Coast Guard under 33 CFR Chapter I, subchapter H, to use electronic readers designed to work with TWIC as an access control measure. This also adds new requirements associated with electronic TWIC inspection programs, including recordkeeping requirements for those owners/operators required to implement an electronic TWIC inspection program, and amendments to security plans previously approved by the Coast Guard to incorporate TWIC requirements.

F.2 TWIC Programmatic Costs: TWIC Final Rule and TWIC NPRM

Figure F.1 displays an estimation of the costs associated with the TWIC maritime program requirements as codified by the Coast Guard and TSA.

Figure F.1 Overview of TWIC Programmatic Costs (\$ Millions)



The cost estimate for the 2007 TWIC Final Rule contained a variety of costs, such as costs to mariners to obtain TWIC cards and costs to TSA to develop and maintain the TWIC system. The TWIC Reader final rule will not impact most of the costs categories and affected entities listed in the 2007 TWIC Final Rule. There will be no difference in the underlying costs to produce and obtain TWIC cards. Approximately half of the costs for the 2007 TWIC Final Rule will not be impacted by the TWIC Reader final rule, as demonstrated in Table F1.

Table F1 TWIC Programmatic Costs by Cost Component

Component	2007 TWIC 1 Final Rule Cost	TWIC Reader Final Rule Cost*	Impact of Final Rule
Enrollment Opportunity Costs	\$196.70	\$0.00	No change

Enrollment Service Costs	\$94.90	\$0.00	No change
Security Threat Assessments	\$57.90	\$0.00	No change
TSA System Costs	\$44.30	\$0.00	No change
Appeals and Waivers Opportunity Costs	\$5.90	\$0.00	No change
Card Production	\$31.90	\$0.00	No change
Issuance Opportunity Costs	\$329.20	\$0.00	No change
Program Office Support	\$19.90	\$0.00	No change
Operational Costs, Facilities	\$326.50	\$153.64	Cost of readers for 525 facilities
Operational Costs, Vessels	\$638.80	\$0.07	Cost of readers for 1 vessel
Operational Costs, OCS Facilities	\$10.10	\$0.00	No change
TOTAL	\$1,756.10	\$153.71	

* Note: The final rule includes costs due to card replacement and delays due to failed reads.

A subset of facilities and a small subset of vessels will incur additional costs under the final rule to implement electronic TWIC inspection programs. Figure F.3 displays the industry costs for vessels and facilities by year for the TWIC Final Rule and the TWIC Reader final rule. The highest burden occurs in the years in which the readers are installed or replaced. We show costs from 2006-2025 to account for the first year of TWIC 1 through the 10-year period of analysis estimated in this RA for the electronic TWIC inspection requirements.

Table F2 TWIC Costs by Type of Entity

	Vessels			Facilities		
	2007 TWIC 1 Final Rule	Reader Final Rule	Total	2007 TWIC 1 Final Rule	Reader Final Rule	Total
2006	\$639	\$0.00	\$639	\$327	\$0	\$327
2007	\$656	\$0.00	\$656	\$335	\$0	\$335
2008	\$669	\$0.00	\$669	\$342	\$0	\$342
2009	\$674	\$0.00	\$674	\$344	\$0	\$344
2010	\$682	\$0.00	\$682	\$349	\$0	\$349
2011	\$696	\$0.00	\$696	\$356	\$0	\$356
2012	\$709	\$0.00	\$709	\$362	\$0	\$362
2013	\$720	\$0.00	\$720	\$368	\$0	\$368
2014	\$732	\$0.00	\$732	\$374	\$0	\$374
2015	\$745	\$0.00	\$745	\$381	\$0	\$381
2016	\$758	\$0.02	\$758	\$387	\$21	\$409
2017	\$771	\$0.02	\$771	\$394	\$22	\$416
2018	\$784	\$0.02	\$784	\$401	\$22	\$423
2019	\$798	\$0.02	\$798	\$408	\$23	\$430
2020	\$811	\$0.02	\$811	\$415	\$23	\$438
2021	\$825	\$0.02	\$825	\$422	\$23	\$445
2022	\$839	\$0.02	\$839	\$429	\$24	\$453
2023	\$854	\$0.02	\$854	\$436	\$24	\$461
2024	\$869	\$0.02	\$869	\$444	\$25	\$469
2025	\$884	\$0.02	\$884	\$452	\$25	\$477

Appendix G: Costs by Provision

The following tables break down the costs described in the regulatory analysis by the general provision as written in the proposed regulation. The costs by provision have been broken down for vessels and facilities. While we were able to approximate the costs by provision, there is no way to break down the benefits of this rulemaking by provision. The primary provision of this final rule is the electronic TWIC inspection requirements, which spell out whether or not a vessel or facility will be required to implement electronic TWIC inspection programs. The subsequent provisions for security plan amendments, recordkeeping, and CCL updates will only be required if electronic TWIC inspections are required. As such, without the primary requirement in place, the other provisions are not necessary. As such, we view these provisions as complementary and cannot distinguish independent benefits from a specific provision, but rather must consider benefits as a whole.

The following figures detail the costs by provision for the 10-year period of analysis at a 7% discount rate.

Table G1: Ten Year Costs by Provision (7% Discount Rate)

	Vessels	Facilities	Total
TWIC Inspection Requirements			
<i>Risk Group A 101.520</i>	\$22,525	\$144,240,671	\$144,263,195
<i>Risk Group B 101.525</i>			
<i>Risk Group C 101.530</i>			
Security Plan Amendment 104.405; 105.405	\$1,251	\$843,902	\$845,153
Recordkeeping 104.235; 105.225	\$3,956	\$2,616,325	\$2,620,282
Cancelled Card List Updates 101.520	\$9,777	\$5,940,864	\$5,950,641
Total	\$37,509	\$153,641,761	\$153,679,271

Table G2: Annualized Costs by Provision (7% Discount Rate)

	Vessels	Facilities	Total
TWIC Inspection Requirements			
<i>Risk Group A 101.520</i>	\$3,207	\$20,326,626	\$20,329,834
<i>Risk Group B 101.525</i>			
<i>Risk Group C 101.530</i>			
Security Plan Amendment 104.405; 105.405	\$178	\$372,506	\$372,684
Recordkeeping 104.235; 105.225	\$563	\$352,247	\$352,810
Cancelled Card List Updates 101.520	\$1,392	\$845,845	\$847,237
Total	\$5,340	\$21,897,225	\$21,902,565