Transportation Security Administration

Passenger Screening Using AIT

Initial Regulatory Impact Analysis

NPRM

RIN: 1652-AA67

INITIAL REGULATORY EVALUATION,

REGULATORY FLEXIBILITY DISCUSSION,

TRADE IMPACT ASSESSMENT, AND

UNFUNDED MANDATES ASSESSMENT

NOTICE OF PROPOSED RULEMAKING

(49 CFR Part 1540)

Regulatory and Economic Analysis

Office of Security Policy and Industry Engagement

Transportation Security Administration

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LIST OF ABBREVIATIONS

AIT	Advanced Imaging Technology
APL	Applied Physics Laboratory
AQAP	Al Qaeda in the Arabian Peninsula
ATR	Automated Target Recognition
ATSA	Aviation and Transportation Security Act
BLS	Bureau of Labor Statistics
BTS	Bureau of Transportation Statistics
CAFR	City's Annual Financial Report
CBP	Customs and Border Protection
CDRH	Center for Devices and Radiological Health
CFR	Code of Federal Regulations
DHS	Department of Homeland Security
DLA	Defense Logistics Agency
DOT	Department of Transportation
EO	Executive Order
EPIC	Electronic Privacy Information Center
ETD	Explosives Trace Detection
FAA	Federal Aviation Administration
FAT	Factory Acceptance Test
FDA	Food and Drug Administration's
FTE	Full Time Equivalent
FOC	Full Operating Capacity
GDP	Gross Domestic Product

IED	Improvised Explosive Device
IO	Image Operator
IRFA	Initial Regulatory Flexibility Analysis
IRTPA	Intelligence Reform and Terrorism Prevention Act
MTSA	Maritime Transportation Security Act
NAICS	North American Industry Classification System
NIST	National Institute for Standards and Technology
NPRM	Notice of Proposed Rulemaking
OEM	Original Equipment Manufacturer
OMB	Office of Management and Budget
OT&E	Operational Test & Evaluation
PMIS	Performance Management Information System
PMO	Program Management Office
PSP	Passenger Screening Program
QT&E	Qualification Test & Evaluation
RFA	Regulatory Flexibility Act
RIA	Regulatory Impact Analysis
RMAT	Risk Management Analysis Tool
SAT	Site Acceptance Test
SBA	Small Business Administration
SAM	Screener Allocation Model
SME	Subject Matter Expert
SO	System Operator
SSI	Sensitive Security Information

TSA	Transportation Security Administration
TSIF	TSA Systems Integration Facility
TSL	Transportation Security Laboratory
TSO	Transportation Security Officer
UMRA	Unfunded Mandates Reform Act
VSL	Value of a Statistical Life
WTMD	Walk Through Metal Detector

EXECUTIVE SUMMARY

Changes to federal regulations must undergo several types of economic analyses. First, Executive Orders (EO) 13563 and 12866 direct agencies to assess the costs and benefits of available regulatory alternatives and, if regulation is necessary, to select regulatory approaches that maximize net benefits (including potential economic, environmental, public health and safety effects, distributive impacts, and equity). EO 13563 emphasizes the importance of quantifying both costs and benefits, reducing costs, harmonizing rules, and promoting flexibility. Under EO 12866, TSA must determine whether a regulatory action is significant and therefore subject to the requirements of the EO and review by the Office of Management and Budget (OMB). Section 3(f) of the EO defines a "significant regulatory action" as any regulatory action that is likely to result in a rule that: (1) has an annual effect on the economy of $100 million or more, or adversely affects in a material way the economy, a sector of the economy, productivity, competition, jobs, the environment, public health or safety, or State, local or tribal governments or communities (also referred to as economically significant); (2) creates serious inconsistency or otherwise interferes with an action taken or planned by another agency; (3) materially alters the budgetary impacts of entitlement grants, user fees, or loan programs or the rights and obligations of recipients thereof; or (4) raises novel legal or policy issues arising out of legal mandates, the President's priorities, or the principles set forth in the EO.

This proposed rule is a "significant regulatory action" that is economically significant under section 3(f) (1) of EO 12866. Accordingly, OMB has reviewed this regulation. Second, the Regulatory Flexibility Act (RFA) of 1980 requires agencies to consider the economic impact of regulatory changes on small entities. Third, the Trade Agreements Act (19 U.S.C. § 2531-2533) prohibits agencies from setting standards that create unnecessary obstacles to the foreign commerce of the United States. In developing U.S. standards, this act requires agencies to consider international standards and, where appropriate, to use them as the basis for U.S. standards. Finally, the Unfunded Mandates Reform Act of 1995 (UMRA) (Public Law 104-4) requires agencies to prepare a written assessment of the costs, benefits, and other effects of proposed or final rules that include a Federal mandate likely to result in the expenditure by State, local, or tribal governments, in the aggregate, or by the private sector, of $100 million or more annually (adjusted for inflation).

In conducting these analyses on the Passenger Screening Using Advanced Imaging Technology (AIT) notice of proposed rulemaking (NPRM) (also referred to as the AIT NPRM), TSA provides the following conclusions and summary information:

(1) TSA has determined that this NPRM is a significant rulemaking within the definition of EO 12866, as estimated annual costs or benefits exceed $100 million in any year;
(2) TSA's Initial Regulatory Flexibility Analysis suggests that this rulemaking would not have a significant economic impact on a substantial number of small entities under section 605(b) of the RFA;
(3) TSA has determined that this NPRM imposes no significant barriers to international trade as defined by the Trade Agreement Act of 1979; and
(4) TSA has determined that this NPRM does not impose an unfunded mandate on State, local, or tribal governments as defined by the UMRA.

This executive summary highlights the costs of this NPRM, which proposes to codify the use of AIT to screen passengers boarding commercial aircraft for weapons, explosives, and other prohibited items concealed on the body. These costs are incurred by airport operators, the traveling public, Rapiscan, and TSA. Some airport operators incur utility costs for the additional electricity consumed by AIT machines. Although passenger processing with AIT may be slightly longer than a walk through metal detector (WTMD), overall passenger screening system times do not increase with AIT.[1] The small percentage of passengers who choose to opt out of AIT screening will incur opportunity costs due to the additional screening time needed to receive

[1] AIT machines do not reduce total throughput per hour at the current screening environments as x-ray baggage screening operates at lower throughput rates. Passengers experience no additional wait time because passengers wait for their personal belongings after AIT or WTMD regardless of which screening technology is used. Chapter 1 details the assumptions and current state of the passenger screening environment.

a pat-down. Rapiscan, a company that manufactures AIT machines, will incur a cost to remove backscatter AIT units in 2013 that have been deployed in previous years.[2] TSA incurs equipment costs associated with the life cycle of AIT machines (testing, acquisition, maintenance, etc.), personnel costs to hire Transportation Security Officers (TSOs) to operate the AIT machines, utility costs at reimbursed airports, and training costs to train other TSOs to operate AIT machines.

Need for Regulatory Action

In 2010, TSA was sued over its use of AIT by the Electronic Privacy Information Center (EPIC). In the decision rendered by the U.S. Court of Appeals for the District of Columbia Circuit in Electronic Privacy Information Center v. U.S. Department of Homeland Security,[3] the Court directed TSA to conduct notice and comment rulemaking on the use of AIT. However, the Court also allowed TSA to continue using AIT as part of its airport security operations. TSA developed this NPRM to comply with the Court's decision. This NPRM will provide public notice and an opportunity to comment on TSA's use of AIT.

TSA Response

Once TSA was given the responsibility to conduct security screening operations for commercial aviation, the agency deployed various technologies to screen persons and their baggage prior to boarding commercial aircraft. The primary passenger screening technology in place at screening checkpoints prior to the deployment of AIT was the walk-through metal detector (WTMD). WTMDs alarm if a passenger has metallic objects on his person, including such harmful objects as knives and guns. Passengers who alarm the WTMD receive additional screening to resolve an alarm. Current procedures for WTMD alarms allow a passenger to divest metallic objects from his person and pass through the WTMD until the alarm is resolved. If the alarm cannot be

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[2] On December 21, 2012, TSA terminated part of its contract with Rapiscan for the Convenience of the Government since it could not meet development related issues in regards to ATR by the Congressionally-mandated June 2013 deadline. As a result of the contract termination, Rapiscan will pay for the removal of all units still in the field.

[3] 653 F.3d 1 (D.C. Cir. 2011).

resolved with divesting metallic objects and repeating WTMD screening, a TSO performs additional screening to resolve the alarm. If the passenger cannot undergo WTMD screening, the passenger receives a pat-down.

Cost and Baseline

When estimating the cost of a rulemaking, agencies typically estimate future expected costs imposed by a regulation over a period of analysis. As the AIT machine life cycle from deployment to disposal is eight years, the period of analysis for estimating the cost of AIT is eight years. However, as AIT deployment began in 2008, there are costs that have already been borne by TSA, the traveling public, and airport operators that were not due to this rule. Consequently, in the initial regulatory impact analysis for this proposed rule, TSA reports the AIT-related costs that have already occurred (years 2008 - 2011), while considering the additional cost of this rulemaking to be years 2012-2015.[4] By reporting the costs that have already happened and estimating future costs in this manner, TSA considers and discloses the full eight year life cycle of AIT machine deployment. The cost attributed to the NPRM compares the screening environment prior to the deployment and implementation of AIT screening (centered around WTMDs) to the screening environment with AIT technology. Consequently, costs and benefits estimated to result from the provisions of this NPRM are compared to the costs incurred by impacted entities if TSA continued to use WTMD-centered screening.

In this analysis, the number of AIT machines deployed from 2008 to 2011 is known and certain; the estimates for the number of machines deployed from 2012 to 2015 represent TSA's best estimate of AIT acquisition and deployment based on current and expected funding levels for the

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[4] OMB's "Regulatory Impact Analysis: A Primer" states: "The benefits and costs of a regulatory action typically take place in the future." http://www.whitehouse.gov/sites/default/files/omb/inforeg/regpol/circular-a-4_regulatory-impact-analysis-a-primer.pdf . Circular A-4 describes costs and benefits in terms of future or expected costs and benefits (see "Developing Benefit and Cost Estimates," http://www.whitehouse.gov/omb/circulars_a004_a-4/). Circular A-94 instructs that "sunk costs and realized benefits should be ignored" and that "past experience is relevant only in helping to estimate what the value of future benefits and costs might be" (http://www.whitehouse.gov/omb/circulars_a094/).

program. Table 1 and **Error! Reference source not found.** summarize the number of AIT screening machines TSA projects to deploy, by category of airport, over the eight-year analysis period.[5]

Table 1: AIT Newly Deployed by Year by Category of Airport

(AIT Units)

Year	**Category X**	**Category I**	**Category II**	**Category III**	**Category IV**	**Total**
2008	16	14	0	0	0	**30**
2009	0	2	0	0	0	**2**
2010	301	135	20	2	0	**458**
2011	1	42	16	10	0	**69**
2012	179	59	68	83	34	**423**
2013*	0	0	0	0	0	**0**
2014	14	9	1	5	15	**44**
2015	15	10	1	2	17	**45**

* TSA estimates the deployment figures for 2013 based on a weighted average assuming the first 5 months of the year with the Rapiscan units and the last 7 months of the year without the Rapiscan units. See Appendix B for the inputs and estimation for 2013.

[5] TSA categorizes federalized airports into groups as a measurement of passenger flow. Category X has the greatest number of passenger traffic while Category IVs have the least.

Table 2: AIT Units In-Service by Year by Category of Airport

	Category X	**Category I**	**Category II**	**Category III**	**Category IV**	**Total**
2008	16	14	0	0	0	**30**
2009	16	16	0	0	0	**32**
2010	317	151	20	2	0	**490**
2011	318	193	36	12	0	**559**
2012	497	252	104	95	34	**982**
2013*	366	212	99	93	34	**805**
2014	341	193	97	96	49	**776**
2015	356	203	98	98	66	**821**

*Estimates in 2013 reflect a weighted average based on the removal of Rapiscan units. See Appendix B.

Table 3 shows the flow of AIT units throughout the duration of the analysis. Throughout 2013, Rapiscan AIT machine are removed from all TSA checkpoints. The term *newly deployed* refers to the number of additional AIT machines added to TSA checkpoints in the given year. The term *in-service* refers to the total number of current AIT machines actively being used at TSA checkpoints in the given year.

Table 3: Flow of AIT Units In and Out of the Airports

Year	**Rapiscans Deployed** **a**	**Rapiscans Removed** **b**	**In-Service Rapiscans** $c_t = c_{t-1} + a - b$	**L3s Deployed** **d**	**In-Service L3s** $e_t = e_{t-1} + d$	**Total Deployed** $f = a + d$	**Total In-Service** $g = c + e$
2008	0	0	0	30	30	**30**	**30**
2009	0	0	0	2	32	**2**	**32**
2010	250	0	250	208	240	**458**	**490**
2011	0	0	250	69	309	**69**	**559**
2012*	0	76	250	423	732	**423**	**982**
2013	0	174	0	0	732	**0**	**732**
2014	0	0	0	44	776	**44**	**776**
2015	0	0	0	45	821	**45**	**821**

* TSA assumes that the 76 Rapiscans were removed on the last day of 2012 and were in-service for the duration of 2012.

At the end of 2012, 76 Rapiscans AIT machines are removed while the remaining 174 are assumed to be removed on May 31, 2013. To account for Rapiscans removal in 2013, TSA uses a weighted average for its in-service number which is described in full in Appendix B.

TSA reports that the cost of AIT deployment from 2008-2011 has been approximately $841.2 million (undiscounted) and that TSA has borne over 98 percent of all costs related to AIT deployment. TSA projects that from 2012-2015 total AIT-related costs will be approximately $1.5 billion (undiscounted), $1.4 billion at a three percent discount rate, and $1.3 billion at a seven percent discount rate. During 2012-2015, TSA estimates it will also incur over 98 percent of AIT-related costs, with equipment and personnel costs being the largest categories of costs. Table 4 below reports the costs that have already happened (2008-2011) by cost category, while Table 5 shows the additional costs TSA is attributing to this rulemaking (2012-2015).[6] Table 6 shows the total cost of AIT deployment from 2008 to 2015.

Table 4: Cost Summary (Net Cost[7] of AIT Deployment from 2008-2011) by Cost Component (Costs Already incurred in $ 1,000s – undiscounted)

Year	Passenger Opt-Outs	Industry Utilities	TSA Costs				Total
			Personnel	Training	Equipment	Utilities	
2008	$7.0	$5.7	$14,689.1	$389.5	$37,425.2	$18.8	$52,535.3
2009	$32.2	$5.7	$15,618.6	$88.0	$42,563.6	$20.4	$58,328.5
2010	$262.2	$158.2	$247,566.7	$5,332.8	$119,105.4	$241.4	$372,666.6
2011	$1,384.2	$186.7	$284,938.7	$15,354.4	$55,567.2	$269.1	$357,700.2
Total	**$1,685.6**	**$356.3**	**$562,813.0**	**$21,164.7**	**$254,661.3**	**$549.6**	**$841,230.6**

[6] Totals in tables throughout the regulatory evaluation may not sum due to rounding.

[7] TSA removed costs related to WTMD that would have occurred regardless of AIT deployment to obtain an estimated net cost for AIT. TSA shows these assumptions in the Baseline Cost section.

Table 5: Cost Summary (Net Cost of AIT Deployment 2012-2015) by Cost Component

(AIT Costs in $ 1,000s)

Year	**Passenger Opt-Outs**	**Industry Utilities**	**TSA Costs**				**Rapiscan**	**Total**
			Personnel	**Training**	**Equipment****	**Utilities**	**Removal**	
2012	$2,716.5	$325.7	$375,866.9	$12,043.0	$116,499.3	$473.0	$0.0	$507,924.4
2013*	$3,991.7	$329.3	$280,844.3	$4,277.5	$51,588.8	$324.4	$1,809.6	$343,165.7
2014	$4,238.7	$312.0	$263,677.6	$4,190.5	$51,397.8	$317.7	$0.0	$324,134.2
2015	$5,611.8	$300.3	$278,580.2	$4,144.2	$68,052.6	$365.7	$0.0	$357,054.9
Total	**$16,558.7**	**$1,267.3**	**$1,198,969.0**	**$24,655.2**	**$287,538.5**	**$1,480.9**	**$1,809.6**	**$1,532,279.2**
Discounted 3%	$15,265.0	$1,178.9	$1,118,459.3	$23,810.2	$269,233.7	$1,380.7	$1,705.7	$1,431,033.5
Discounted 7%	$13,766.6	$1,075.8	$1,024,344.7	$22,048.8	$247,810.4	$1,263.8	$1,580.6	$1,311,890.7

*Estimates in 2013 reflect a weighted average based on the removal of Rapiscan units. See Appendix B.

**Equipment costs for TSA include acquisition, operation, maintenance, Rapiscan unit removal in 2012 by TSA and reallocation of AIT units.

Table 6: Cost Summary (Net Cost of AIT Deployment 2008-2015) by Cost Component (AIT Costs in $ 1,000s -undiscounted)

Year	**Passenger** Opt-Outs	**Industry** Utilities	**TSA Costs**				**Rapiscan**	**Total**
			Personnel	Training	Equipment	Utilities	Removal	
2008	$7.0	$5.7	$14,689.1	$389.5	$37,425.2	$18.8	$0.0	$52,535.3
2009	$32.2	$5.7	$15,618.6	$88.0	$42,563.6	$20.4	$0.0	$58,328.5
2010	$262.2	$158.2	$247,566.7	$5,332.8	$119,105.4	$241.4	$0.0	$372,666.6
2011	$1,384.2	$186.7	$284,938.7	$15,354.4	$55,567.2	$269.1	$0.0	$357,700.2
2012	$2,716.5	$325.7	$375,866.9	$12,043.0	$116,499.3	$473.0	$0.0	$507,924.4
2013*	$3,991.7	$329.3	$280,844.3	$4,277.5	$51,588.8	$324.4	$1,809.6	$343,165.7
2014	$4,238.7	$312.0	$263,677.6	$4,190.5	$51,397.8	$317.7	$0.0	$324,134.2
2015	$5,611.8	$300.3	$278,580.2	$4,144.2	$68,052.6	$365.7	$0.0	$357,054.9
Total	**$18,244.4**	**$1,623.6**	**$1,761,782.0**	**$45,819.9**	**$542,199.9**	**$2,030.4**	**$1,809.6**	**$2,373,509.9**

*Estimates in 2013 reflect a weighted average based on the removal of Rapiscan units. See Appendix B.

Security Benefits

The operations described in this proposed rule produce benefits by reducing security risks through the deployment of AIT that is capable of detecting both metallic and non-metallic weapons and explosives. The nature of the threat to transportation security has evolved since September 11, 2001. Terrorists continue to test our security measures in an attempt to find and exploit vulnerabilities. The threat to aviation security has evolved to include the use of non-metallic explosives, non-metallic explosive devices, and non-metallic weapons. Below are examples of this threat:

- On December 22, 2001, on board an airplane bound for the United States, Richard Reid attempted to detonate a non-metallic bomb concealed in his shoe.

- In 2004, terrorists mounted a successful attack on two domestic Russian passenger aircraft using non-metallic explosives that were concealed on the torsos of female passengers.
- In 2006, terrorists in the United Kingdom plotted to bring liquid explosives on board aircraft that would be used to construct and detonate a bomb while in flight.
- A bombing plot by Al Qaeda in the Arabian Peninsula (AQAP) culminated in the December 25, 2009 attempt by Umar Farouk Abdulmutallab to blow up an American aircraft over the United States using a non-metallic explosive device hidden in his underwear.
- In October 2010, AQAP attempted to destroy two airplanes in flight using non-metallic explosives hidden in two printer cartridges.
- In a recent terrorist plot thwarted in May 2012, AQAP had developed another non-metallic explosive device that could be hidden in an individual's underwear and detonated while on board an aircraft.

As evidenced by the incidents described above, TSA operates in a high-threat environment. Terrorists look for security gaps or exceptions to exploit. The device used in the December 25, 2009, attempt is illustrative. It was cleverly constructed and intentionally hidden on a sensitive part of the body to avert detection. If detonated, the lives of the almost 300 passengers and crew and untold numbers of people on the ground would have been in jeopardy.

AIT is proven technology and provides the best opportunity to detect metallic and non-metallic anomalies concealed under clothing without touching the passenger and is an essential component of TSA's security plan. Since it began using AIT, TSA has been able to detect many kinds of non-metallic items, small items, and items concealed on parts of the body that would not have been detected using the walk-through metal detector.

In Tables 6 and 7 below, we present annualized cost estimates and qualitative benefits of AIT deployment. In Table 6, we show the annualized net cost of AIT deployment from 2012 to 2015. As previously explained (see footnote 3 above), costs incurred from 2008-2011 occurred in the past and are not considered costs attributable to this proposed rule. However, given the life cycle of the AIT technology considered in this analysis is eight years; we have also added Table 7 showing the annualized net cost of AIT deployment from 2008-2015 (full eight year life cycle including "sunk costs" from 2008 to 2011). While the total costs of AIT deployment for a full eight year life cycle (2008-2015) are higher than the total costs of AIT deployment during the four year period of 2012-2015, the annualized costs ($368,262.8 at 7 percent discount) of the full eight year cycle shown in Table 7 are actually lower than the annualized costs ($387,307.0 at 7 percent discount) of the 2012-2015 deployment shown in Table 6. As previously shown in Tables 3 and 4, AIT deployment costs in 2008 and 2009 are relatively low compared with the later year AIT expenditures, resulting in lower annualized costs for the eight year life cycle of 2008-2015. The costs are annualized and discounted at both three and seven percent and presented in 2011 dollars.

Table 7: OMB A-4 Accounting Statement ($ 1,000s for 2012-2015)

Category	***Primary Estimate***		***Minimum Estimate***	***Maximum Estimate***	***Source Citation (Initial RIA, preamble, etc.)***
BENEFITS					
Monetized benefits	Not estimated		Not estimated	Not estimated	Initial RIA
Annualized quantified, but unmonetized, benefits	0		0	0	Initial RIA
Unquantified benefits	The operations described in this proposed rule produce benefits by reducing security risks through the deployment of AIT technology that is capable of detecting both metallic and non-metallic weapons and				Initial RIA
COSTS					
Annualized monetized costs (discount rate in parentheses)	(7%)	$387,307.0			Initial RIA
	(3%)	$384,986.7			
Annualized quantified, but unmonetized, costs	0		0	0	Initial RIA
Qualitative costs (unquantified)	Not estimated				Initial RIA
TRANSFERS					
Annualized monetized transfers: “on budget”	0		0	0	Initial RIA
From whom to whom?	N/A		N/A	N/A	None
Annualized monetized transfers: “off-budget”	0		0	0	Initial RIA
From whom to whom?	N/A		N/A	N/A	None
Miscellaneous Analyses/Category	***Effects***				***Source Citation (Initial RIA, preamble, etc.)***
Effects on state, local, and/or tribal	None				Initial RIA
Effects on small businesses	No significant economic impact anticipated. Prepared IRFA.				Initial Regulatory Flexibility Act
Effects on wages	None				None
Effects on growth	None				None

Table 8: OMB A-4 Accounting Statement ($ 1,000s for 2008-2015),

(Eight year lifecycle)

<table>
<tr><th>Category</th><th colspan="2">Primary Estimate</th><th>Minimum Estimate</th><th>Maximum Estimate</th><th>Source Citation (Initial RIA, preamble, etc.)</th></tr>
<tr><td colspan="6">BENEFITS</td></tr>
<tr><td>Monetized benefits</td><td colspan="2">Not estimated</td><td>Not estimated</td><td>Not estimated</td><td>Initial RIA</td></tr>
<tr><td>Annualized quantified, but unmonetized,</td><td colspan="2">0</td><td>0</td><td>0</td><td>Initial RIA</td></tr>
<tr><td>Unquantified benefits</td><td colspan="4">The operations described in this proposed rule produce benefits by reducing security risks through the deployment of AIT technology that is capable of detecting both metallic and non-metallic weapons and explosives.</td><td>Initial RIA</td></tr>
<tr><td colspan="6">COSTS</td></tr>
<tr><td rowspan="2">Annualized monetized costs (discount rate in parentheses)</td><td>(7%)</td><td>$368,262.8</td><td></td><td></td><td rowspan="2">Initial RIA</td></tr>
<tr><td>(3%)</td><td>$326,410.1</td><td></td><td></td></tr>
<tr><td>Annualized quantified, but unmonetized, costs</td><td colspan="2">0</td><td>0</td><td>0</td><td>Initial RIA</td></tr>
<tr><td>Qualitative costs (unquantified)</td><td colspan="4">Not estimated</td><td>Initial RIA</td></tr>
<tr><td colspan="6">TRANSFERS</td></tr>
<tr><td>Annualized monetized transfers: “on budget”</td><td colspan="2">0</td><td>0</td><td>0</td><td>Initial RIA</td></tr>
<tr><td>From whom to whom?</td><td colspan="2">N/A</td><td>N/A</td><td>N/A</td><td>None</td></tr>
<tr><td>Annualized monetized transfers: “off-budget”</td><td colspan="2">0</td><td>0</td><td>0</td><td>Initial RIA</td></tr>
<tr><td>From whom to whom?</td><td colspan="2">N/A</td><td>N/A</td><td>N/A</td><td>None</td></tr>
<tr><td>Miscellaneous Analyses/Category</td><td colspan="4">Effects</td><td>Source Citation (Initial RIA, preamble, etc.)</td></tr>
<tr><td>Effects on state, local, and/or tribal</td><td colspan="4">None</td><td>Initial RIA</td></tr>
<tr><td>Effects on small businesses</td><td colspan="4">No significant economic impact anticipated. Prepared IRFA.</td><td>IRFA</td></tr>
<tr><td>Effects on wages</td><td colspan="4">None</td><td>None</td></tr>
<tr><td>Effects on growth</td><td colspan="4">None</td><td>None</td></tr>
</table>

Alternatives

As alternatives to the preferred regulatory proposal presented in the NPRM, TSA examined three other options. The following table briefly describes these options, which include a continuation of the screening environment prior to 2008 (no action), increased use of physical pat-down searches that supplements primary screening with WTMDs, and increased use of explosive trace detection (ETD) screening that supplements primary screening with WTMDs. These alternatives, and the reasons why TSA rejected them in favor of the proposed rule, are discussed in detail in Chapter 3 of this regulatory evaluation.

Table 9: Comparison of Regulatory Alternatives

Regulatory Alternative	Name	Description
1	No Action	Under this alternative, the passenger screening environment remains the same as it was prior to 2008. TSA continues to use WTMDs as the primary passenger screening technology and to resolve alarms with a pat-down.
2	Pat-Down	Under this alternative, TSA continues to use WTMDs as the primary passenger screening technology. In addition, TSA supplements the WTMD screening by conducting a pat-down on a randomly selected portion of passengers after screening by a WTMD.
3	ETD Screening	Under this alternative, TSA continues to use WTMDs as the primary passenger screening technology. In addition, TSA supplements the WTMD screening by conducting Explosives Trace Detection (ETD) screening on a randomly selected portion of passengers after screening by a WTMD.
4	AIT (NPRM)	Under this alternative, the proposed alternative, TSA uses AIT as a passenger screening technology. Alarms would be resolved through a pat-down.

Initial Regulatory Flexibility Analysis

This NPRM proposes to codify the use of AIT to screen passengers boarding commercial aircraft for weapons, explosives, and other prohibited items concealed on the body. TSA identified 102 small entities that could have potentially incurred additional utility costs due to AIT; however, TSA reimburses the additional utility costs for five of these small entities. Consequently, this rule would cause 97 small entities to incur additional direct costs. Of the 97 small entities affected by this proposed rule, 96 are small governmental jurisdictions with populations less than 50,000. A privately-owned airport is considered small under SBA standards if revenue amounts to less than $30 million. TSA identified one small privately-owned airport.

The small entities incur an incremental cost for utilities as a result of increased power consumption from AIT operation. To estimate the costs of the deployment of AIT for small entities, TSA uses the average kilowatt hour (kWh) consumed per unit on an annual basis at federalized airports. Depending on the size of the airport, TSA estimates the average additional utility costs to range from $347 to $1,012 per year while the average annual revenue for these small entities ranges from $69.5 million to $133.1 million per year. Consequently, TSA estimates that the cost of this NPRM on small entities represents approximately 0.001 percent of their annual revenue. Therefore, TSA's Initial Regulatory Flexibility Analysis suggests that this rulemaking would not have a significant economic impact on a substantial number of small entities. Chapter 5 outlines the Initial Regulatory Flexibility Analysis assumptions and the analysis for these estimates.

CHAPTER 1: INTRODUCTION

TSA provides this regulatory evaluation to present an economic analysis of the AIT NPRM. This evaluation describes the previous screening environment—how the checkpoint operated prior to the implementation of AIT (i.e., baseline scenario), discusses required or expected changes to this environment resulting from the provisions of the proposed rule, and assesses the associated costs and burdens placed on impacted industries, governments, and the traveling public resulting from the provisions of the proposed rule.

Background

The nature of the threat to transportation security has evolved since September 11, 2001. Terrorists continue to test our security measures in an attempt to find and exploit vulnerabilities. The threat to aviation security has evolved to include the use of non-metallic explosives, non-metallic explosive devices, and non-metallic weapons. Below are examples of this threat:

- On December 22, 2001, onboard an airplane bound for the United States, Richard Reid attempted to detonate a non-metallic bomb concealed in his shoe.
- In 2004, terrorists mounted a successful attack on two domestic Russian passenger aircraft using non-metallic explosives that were concealed on the torsos of female passengers.
- In 2006, terrorists in the United Kingdom plotted to bring liquid explosives on board aircraft that would be used to construct and detonate a bomb while in flight.
- A bombing plot by AQAP culminated in the December 25, 2009 attempt by Umar Farouk Abdulmutallab to blow up an American aircraft over the United States using a non-metallic explosive device hidden in his underwear.
- In October 2010, AQAP attempted to destroy two airplanes in flight using non-metallic explosives hidden in two printer cartridges.
- In a recent terrorist plot thwarted in May 2012, AQAP had developed another non-metallic explosive device that could be hidden in an individual’s underwear and detonated while on board an aircraft.

As evidenced by the incidents described above, TSA operates in a high-threat environment. Terrorists look for security gaps or exceptions to exploit. The device used in the December 25, 2009, attempt is illustrative. It was cleverly constructed and intentionally hidden on a sensitive part of the body to avert detection. If detonated, the lives of the almost 300 passengers and crew and untold numbers of people on the ground would have been in jeopardy.

Congressional Direction to Pursue AIT

In 2004, Congress authorized TSA to continue to explore the use of new technologies to improve its threat detection capabilities. 49 U.S.C. 44925. Specifically, the law provides:

> Deployment and use of detection equipment at airport screening checkpoints
>
> (a) Weapons and explosives.--The Secretary of Homeland Security shall give a high priority to developing, testing, improving, and deploying, at airport screening checkpoints, equipment that detects nonmetallic, chemical, biological, and radiological weapons, and explosives, in all forms, on individuals and in their personal property . . . the types of weapons and explosives that terrorists would likely try to smuggle aboard an air carrier aircraft.
>
> (b) [The TSA Administrator shall submit]. . . a strategic plan to promote the optimal utilization and deployment of explosive detection equipment at airports to screen individuals and their personal property. Such equipment includes walk-through explosive detection portals, document scanners, shoe scanners, and backscatter x-ray scanners.

Additional references[8] in Congressional reports accompanying appropriations and authorizing legislation demonstrate Congress's continued direction to DHS and TSA to pursue enhanced screening technologies and imaging technology, specifically:[9]

> 1) Explanatory Statement, House Appropriations Committee Print for Consolidated Security, Disaster Assistance, and Continuing Appropriations Act, 2009 (FY09 DHS Appropriations) Pub.L. 110-329 at p. 640:
>
> > The bill provides $250,000,000 for Checkpoint Support to deploy a number of emerging technologies to screen airline passengers and carry-on baggage for explosives, weapons, and other threat objects by the most advanced equipment currently under development. TSA is directed to spend funds on multiple whole body imaging technologies including backscatter and millimeter wave as directed in the Senate report.

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[8] See also, sec. 109 of the Aviation and Transportation Security Act (ATSA), Pub. L. 107-71 (2001), as amended by sec. 1403(b) of the Homeland Security Act of 2002, Pub. L. 107-296, **"**(7) Provide for the use of voice stress analysis, biometric, or other technologies to prevent a person who might pose a danger to air safety or security from boarding the aircraft of an air carrier or foreign air carrier in air transportation or intrastate air transportation" and Title IV of the American Recovery and Reinvestment Act of 2009, Pub. L. 111-5 ". . .for procurement and installation of checked baggage explosives detection systems and checkpoint explosives detection equipment."

[9] Additionally, the following language appeared in S. Rep. No. 111-222, accompanying S. 3602, the Department of Homeland Security Appropriations Bill 2011 at 60-61: "As requested, $192,200,000 is provided to deploy an additional 503 AIT units bringing the total to 1,000. AIT units screen passengers for metallic and non-metallic threats—including weapons, explosives, and other objects concealed under layers of clothing. With this increase, there will be an AIT unit in most Category X, I, and II airports. The Committee is aware of efforts by TSA to deploy automated target recognition [ATR] capability with AIT units in fiscal years 2010 and 2011. ATR displays a passenger's image as a stick figure on a monitor attached to an AIT unit, improving privacy protections and eliminating the need for private rooms to view AIT images." Senate 3602 was not passed by Congress; rather, DHS's 2011 appropriations were provided through a series of continuing resolutions and Pub. L. 112-10, which appropriated funding at essentially the same level as in FY2010. Thus, while of limited legal effect, the statement does express the Senate Appropriation Committee's intent to fund AIT.

2) H. Rep. 110-862 at p. 64, FY09 DHS Appropriations:

> Over the past year, TSA has made some advances in testing, piloting, and deploying next-generation checkpoint technologies that will be used to screen airline passengers and carry-on baggage for explosives, weapons, and other threats. Even with this progress, however, additional funding is necessary to expedite pilot testing and deployment of advanced checkpoint explosive detection equipment and screening techniques to determine optimal deployment as well as preferred operational and equipment protocols for these new systems. Eligible systems may include, but are not limited to, advanced technology screening systems; whole body imagers; . . . The Committee expects TSA to give the highest priority to deploying next-generation technologies to designated Tier One threat airports.

3) S. Rep. 110-396 at p. 60, FY09 DHS Appropriations:

> WHOLE BODY IMAGERS. The Committee is fully supportive of emerging technologies at passenger screening checkpoints, including the whole body imaging program currently underway at Category X airports. These technologies provide an increased level of screening for passengers by detecting explosives and other non-metal objects that current checkpoint technologies are not capable of detecting. The Committee directs that funds for whole body imaging continue to be spent by TSA on multiple imaging technologies, including backscatter and millimeter wave.

4) H. Rep.110-259, at page 363, Conference Report to Implementing Recommendations of 9/11 Commission Act of 2007, Pub.L. 110-53, sec. 1601 - Airport checkpoint screening fund:

> The National Commission on Terrorist Attacks Upon the United States (the 9/11 Commission) asserted that while more advanced screening technology is being developed, Congress should provide funding for, and TSA should move as expeditiously as possible to support, the installation of explosives detection trace portals or other applicable technologies at more of the nation's commercial airports. Advanced technologies, such as the use of non-intrusive imaging, have been evaluated by TSA over the last few years and have demonstrated that they can provide significant improvements in threat detection at airport passenger screening checkpoints for both carry-on baggage and the screening of passengers. The Conference urges TSA to deploy such technologies quickly and broadly to address security shortcomings at passenger screening checkpoints.

In addition, on January 7, 2010, the President issued a "Presidential Memorandum Regarding 12/25/2009 Attempted Terrorist Attack," which charged TSA with aggressively pursuing enhanced screening technology in order to prevent further such attempts.

As adversaries abandon traditional methods of attacking the aviation domain, their attempts grow more sophisticated and involve new means of disruption to aviation security. TSA recognizes the emerging threat of passenger-borne improvised explosive devices (IEDs) and the current trend of these devices transitioning from devices with metallic components to being composed completely of non-metallic components in order to subvert WTMDs. As the previously mentioned terrorist events demonstrate, the threat to aviation security is real and ever-evolving. Non-metallic weapons and explosives are now the foremost threat to commercial passenger aviation.

Section 44925 of the Intelligence Reform and Terrorism Prevention Act (IRTPA), Pub. L. 108-458, 118 Stat. 3638 (December 17, 2004) directs the Secretary of Homeland Security to give a high priority to developing and deploying at airport screening checkpoints equipment that detects non-metallic, chemical, biological, and radiological weapons and explosives that terrorists may try to smuggle on board an aircraft. This equipment addresses these new and evolving security threats to commercial aviation and the inability of WTMDs to detect non-metallic threats. To address the emerging threat of non-metallic weapons and explosives, TSA began an evaluation to determine the maturity and effectiveness of various technologies designed to detect non-metallic threats on passengers. After analyzing the latest intelligence and studying available technologies, TSA determined that the addition of AIT to its layered security approach provided the best opportunity to address the vulnerability of commercial aviation security to the evolving threat of non-metallic weapons and explosives.

In 2007, TSA initiated a pilot operation at several airports to test the detection capability of AIT on passengers who alarmed the WTMD. In 2008, TSA expanded its testing of AIT to additional airports, where AIT was used as the primary screening technology. The December 25, 2009 attempted bombing of Delta Flight 253, although ultimately unsuccessful, further highlighted the increasing need to deploy nationwide a technology or process capable of detecting non-metallic threats on the body. In addition, following that attempted attack, President Obama issued the "Presidential Memorandum Regarding 12/25/2009 Attempted Terrorist Attack," which charged TSA with aggressively pursuing enhanced screening technologies to prevent such attempts in the future, while at the same time protecting passenger privacy.[10] In the wake of the December 25, 2009 attempted aircraft bombing, TSA hastened to expand the deployment and use of AIT as the primary passenger screening technology.

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[10] http://www.whitehouse.gov/the-press-office/presidential-memorandum-regarding-12252009-attempted-terrorist-attack.

Market Failure

The threat of a terrorist attack against the aviation industry is real. Market failure, however, impedes the ability of private firms to provide the socially optimal level of security to prevent these attacks. Regulations are a tool used to correct market failure. In this case, due to the economics of externalities, the free market fails to provide adequate incentive for entities in the aviation industry to make socially optimal investments in security measures that reduce the probability of a successful terrorist attack.

Externalities are a cost or benefit from an economic transaction experienced by parties "external" to the transaction. In the case of commercial aviation, the consequences of an attack or other security incident may be significantly larger than what would be realized by an individual airport operator or commercial aircraft operator. Due to this fact, the private market does not provide the incentive for profit-maximizing firms to unilaterally spend the socially optimal amount of resources to prevent or mitigate a terrorist attack.

Because companies nevertheless likely suffer serious consequences in the case of a terrorist attack, many invest significant resources in implementing security measures. In a competitive marketplace, however, a firm has limited incentive to choose to make additional investments in security over their privately optimal amount. Making security investments above its privately optimal amount would increase a firm's cost of production and put the firm at a disadvantage against competitors who have not made similar investments.

Congress enacted the Aviation and Transportation Security Act (ATSA), Pub. L. 107-71, 115 Stat. 597 (November 19, 2001) to address the existing security measures, which proved to be inadequate to prevent the terrorist attack of September 11, 2001. This statute created TSA and gave TSA authority over security in all modes of transportation. ATSA also transferred responsibility for the screening of all passengers and property carried aboard a passenger aircraft operated by an air carrier or foreign air carrier in air transportation or intrastate air transportation from the private sector to the federal government and corrects the market failure that existed prior to the 9/11 terrorist attacks.

Need for Regulatory Action

In 2010, TSA was sued over its use of AIT by the Electronic Privacy Information Center (EPIC). In the decision rendered by the U.S. Court of Appeals for the District of Columbia Circuit in *Electronic Privacy Information Center v. U.S. Department of Homeland Security*,[11] the Court directed TSA to conduct notice and comment rulemaking on the use of AIT. However, in recognition of its efficacy in the detection of non-metallic threats, the Court also allowed TSA to continue using AIT as part of its airport security operations. TSA developed this NPRM to comply with the Court's decision. This NPRM will provide public notice and an opportunity to comment on TSA's use of AIT.

Equipment

AIT systems are screening devices with the capability to locate potential threats on a person, including those beneath clothing or otherwise obscured. The system displays an image of the passenger without obscuring items. TSA has introduced two different types of AIT to date. The first is the L3 Communications ProVision 100 AIT system (referred to throughout as the L3 units or machines). These systems bounce electromagnetic waves off the body; the reflection of these waves creates an image of the passenger that highlights anomalies.[12] The second system is the Rapiscan Secure 1000 Dual View AIT system (referred to throughout as the Rapiscan units, or machines). These systems scan passengers with low-energy x-ray beams at high speed. Rapiscan machines detect, digitalize, and display the reflection of the beam on a monitor for a TSO to examine for anomalies.

[11] 653 F.3d 1 (D.C. Cir. 2011).

[12] See "Safety of AIT" for a discussion of the safety of the millimeter wave equipment. The Food and Drug Administration has found that millimeter wave is safe and states on its website that "[m]illimeter wave security systems which comply with the limits set in the applicable national non-ionizing radiation safety standard . . . cause no known adverse health effects." http://www fda.gov/Radiation-EmittingProducts/RadiationEmittingProductsandProcedures/SecuritySystems/ucm227201 htm#2. For more information, visit http://www.tsa.gov/ait-how-it-works.

Initially, the images produced by the AIT were transmitted to an Image Operator (IO) stationed in a remote, windowless room unable to see the passenger being screened. The inability of both the AIT machines and the computers used by the IO to store the images provide an additional level of privacy protection. If the IO's interpretation of the image identifies a potential threat, the IO verbally communicates the location of the anomaly via headset to the system operator (SO), who then conducts alarm resolution in accordance with standard operating procedures. TSA refers to these systems throughout as "AIT with IO."

Since then, software has been developed that both eliminates the need for the IO position and provides further privacy protection to passengers. This software, known as Automated Target Recognition (ATR), has the same capabilities as the AIT with IO; however, the AIT system with ATR (referred to throughout as "AIT with ATR") uses algorithms to analyze the same image analysis and determines the location of anomalies found during the scan of a passenger. A monitor attached to the AIT unit then displays a generic outline with highlights marking the location of any anomalies. This software allows the SO to examine the generic figure to locate any anomalies. There is no need for an IO when using AIT with ATR. If no anomalies are detected, the text "OK" appears on the monitor with no outline.

ATR software increases the passenger throughput rate of AIT while simultaneously decreasing the number of officers required to staff and operate the units. Moving forward, TSA plans to only purchase AIT systems that have ATR capability and remove those machines that do not have this capability. ATR development will also eliminate the need to construct remote viewing rooms used by the IO to view the images. ATR software was approved for use by TSA for the L3 units. In 2011, all L3 AIT machines were upgraded with the ATR software. All Rapiscan general-use backscatter units currently deployed at TSA checkpoints are being removed from operation by May 31, 2013.

Changes to the Screening Checkpoint

In order to deploy AIT, TSA made changes to checkpoint functions to include AIT. These changes modify checkpoint configurations and affect staffing levels as well as inform TSA how many AIT machines are necessary to reach full deployment. In addition, the information on checkpoint configurations illustrates how TSA continues to use WTMD alongside AIT.

Prior to AIT deployment, checkpoints consisted of lanes with WTMDs for passenger screening and x-ray machines to screen carry-on baggage. TSA initially deployed WTMDs in configurations, called modsets, of either a 1:1 or 2:2 configuration of x-ray machines to passenger screening technology. The difference between the two modsets implies that there will either be one x-ray and one WTMD or two x-rays and two WTMDs in a configuration. Before 2008, TSA began a checkpoint optimization program, in which TSA removed the second WTMD from 2:2 configurations in favor of a 2:1 configuration. The WTMD maintains a sufficient throughput to support two x-ray machines.

AIT with ATR provides sufficient throughput to handle that of one x-ray machine but not currently sufficient to handle that of two as discussed in the throughput discussion.[13] Therefore AIT has been deployed to date in modsets with two x-ray machines and a co-located WTMD, modsets with one x-ray machine and one co-located WTMD, and modsets with one x-ray machine and no co-located WTMD. Most AIT machines are co-located with a WTMD in a 2:2 configuration.

[13] For 1:1 modsets, TSA only locates an AIT with ATR in a modset with one x-ray machine and one AIT. TSA co-locates AIT with IO with WTMD and one x-ray machine to maintain current throughput levels.

CHAPTER 2: COST OF PROPOSED RULEMAKING

This section outlines TSA's estimates for the cost of AIT deployment. Cost elements include a utility cost to both airport operators and TSA, an opportunity cost for passengers opting out of AIT screening, a personnel cost, a training cost, and a life cycle cost of AIT.[14]

Methodology and Assumptions

The following sections outline the populations and other assumptions used in this analysis. This section presents estimates of the marginal cost of compliance to airport operators, the traveling public, and TSA for AIT screening. When estimating the cost of a rulemaking, agencies typically estimate future expected costs imposed by a regulation over a period of analysis. As the AIT life cycle from deployment to disposal is eight years, the period of analysis for estimating the cost of AIT is eight years. However, as AIT deployment began in 2008, there are costs that have already been borne by TSA, the traveling public, and airport operators that were not due to this rule. Consequently, in the initial regulatory impact analysis for this proposed rule, TSA reports the AIT-related costs that have already occurred (years 2008-2011), while considering the additional cost of this rulemaking to be years 2012-2015. By reporting the costs that have already happened and estimating future costs in this manner, TSA considers the full eight year life cycle of AIT deployment.

TSA uses airport data to inform a number of its estimates, including data related to AIT deployment, checkpoint passenger throughput, and training for 2008 through 2011 of the analysis. TSA also relies on estimates from program office SMEs to project cost estimates incurred in the out years (2012 through 2015) of the analysis. TSA uses several assumptions related to industry size, growth, turnover, and labor costs throughout the regulatory evaluation. Lastly, TSA uses the Passenger Screening Program (PSP) costs to estimate the life cycle cost of AIT. TSA states all dollars in 2011 constant dollars. Using the Bureau of Economic Analysis

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[14] TSA recognizes that some screening services are completed through TSA contracts. The contracted screening is identical to TSA-run screening and fully funded by TSA including staffing, equipment, training, and management at the airport. For the purposes of this evaluation, TSA does not differentiate between the contracted screening and TSA screening.

Gross Domestic Product (GDP) estimates, TSA inflates all historical figures to 2011 dollars, as shown in Table 10.[15]

Table 10: Inflation Index (Stated in 2011 Dollars)

Year	Inflation Index
2008	1.044
2009	1.035
2010	1.021
2011	1.000

Populations

TSA is responsible for screening checkpoints at 446 airports. These federalized airports are regulated under 49 CFR part 1542. TSA will use AITs for primary screening although WTMDs may be used for overflow, expedited screening, and certain other populations, such as crewmembers, passengers 12 years of age and under, and qualified individuals for TSA Pre✓™.[16] Table 11 shows the breakdown of part 1542-regulated airports into TSA's five categories.[17]

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[15] In accordance with Circular A-4, TSA uses a GDP deflator to state all dollars in constant 2011 dollars. The GDP inputs are from the Bureau of Economic Analysis, Table 1.1.9 "Implicit Price Deflators for Gross Domestic Product" from the National Income and Product Accounts Table, found at http://www.bea.gov/iTable/iTable.cfm?ReqID=9&step=1

[16] TSA Pre✓™ allows select frequent flyers of participating airlines and members of U.S. Customs and Border Protection (CBP) Trusted Traveler programs who are flying on participating airlines, to receive expedited screening benefits during domestic travel. For more information on TSA Pre✓™, visit http://www.tsa.gov/tsa-pre%E2%9C%93%E2%84%A2.

[17] TSA categorizes federalized airports into groups as a measurement of passenger flow. Category X has the greatest number of passenger traffic and Category IV has the least.

Table 11: Number of Airports by Category

FAA Category	Number of Airports
X	28
I	57
II	79
III	127
IV	155
Total	**446**

Throughout the deployment of AIT, TSA has experienced changes in the acquisition of allowable technology type as well as the checkpoint strategy of how TSA plans to use AIT. The FAA Modernization and Reform Act of 2012 mandates that, beginning June 1, 2012, TSA "shall ensure that any advanced imaging technology used for the screening of passengers…is equipped with and employs [ATR]; and complies with such other requirements as the Assistant Secretary determines necessary to address privacy considerations" (sec. 828). The TSA Administrator issued an extension under subparagraph (A) of this act, whereby TSA has committed to meet this mandate by June 1, 2013.

All Rapiscan general-use backscatter units currently deployed at TSA checkpoints are being removed from operation by May 31, 2013. These units will not be disposed of but used in other government security functions. Due to security reasons, no Rapiscan machines will be made available to the public.

TSA determined that L3 units in some circumstances could be reallocated to replace the removed Rapiscan machines. The replacement of Rapiscan machines will be based on what equipment is needed to best address security at the airport using TSA's best estimate of the Pre ✓™ lanes expansion, checkpoint configuration and passenger volume at airports and at specific checkpoint lanes. If a Rapiscan unit was originally deployed in an underutilized or unnecessary placement in the airport, no L3 unit will replace the Rapiscan unit. L3 units in underutilized or unnecessary placements in an airport will be reallocated to replace a Rapiscan unit in a high need area. In order to backfill the removed Rapiscan units, TSA will need to reallocate 74 L3 units and reprioritize deployment of 60 already scheduled and purchased L3 machines in 2012 totaling 134 backfill L3 units. As a result, TSA projects the following changes:

- Removal of all 250 Rapiscan machines.
- Backfill of 134 Rapiscan machines with L3 units.

In addition to this policy change, the total deployment number could change as airports may expand or contract their operations or join or drop from the part 1542-regulated airports population due to changing economic conditions. Table 12 shows AIT deployment over the eight-year analysis period. The initial populations in 2008 through 2011 correspond to the numbers of AIT deployed from 2008 through 2011. Program office SMEs estimate the population of AIT deployment in 2012 through 2015. SMEs base these estimates on the current state of the acquisitions and procurement process along with the removal and backfill strategy outlined above.

Table 12: AIT Newly Deployed by Airport Category

(AIT Units)

Year	Category X	Category I	Category II	Category III	Category IV	Total
2008	16	14	0	0	0	**30**
2009	0	2	0	0	0	**2**
2010	301	135	20	2	0	**458**
2011	1	42	16	10	0	**69**
2012	179	59	68	83	34	**423**
2013*	0	0	0	0	0	**0**
2014	14	9	1	5	15	**44**
2015	15	10	1	2	17	**45**

*Estimates in 2013 reflect TSAs current deployment strategy based on the removal of Rapiscan units in 2013.

Because the decision to remove all Rapiscan machines from the airports affects the in-service units in 2013, TSA estimates a weighted average of in-service units and associated costs for year 2013. The weighted average assumes that from January 1st, 2013 to May 31st, 2013 all Rapiscan units are operational in the airports. From June 1st, 2013 to December 31st, 2013 TSA assumes that all Rapiscan machines are removed and all L3 units are reallocated to the new locations. Because TSA already removed 76 Rapiscan units in 2012, only the 174 units removed by Rapiscan will factor into the 2013 weighted average.[18] To estimate the weighted average, TSA estimates a cost of the Rapiscan units in the airport and a cost for after the removed Rapiscan machines. TSA weights the costs of the Rapiscan units by 5/12 to account for the five months

[18] All Rapiscan units will be removed from the Airports by May 31st, 2013 regardless of TSA removing the units or Rapiscan removing the units.

out of the year with Rapiscan units and weights the costs without the Rapiscan units by 7/12 to account for the remaining 7 months of the year. Appendix B outlines the assumptions and inputs necessary to estimate the weighted averages.

Throughput

TSA defines the passenger throughput rate as the number of passengers that a checkpoint configuration can process per hour. This time includes pat-downs and alarm resolutions of a given technology in the configuration. Current passenger throughput rates at TSA checkpoints average approximately 150 passengers per hour for modsets with one x-ray machine, and 300 passengers per hour in modsets with two x-ray machines. The WTMD can handle more passengers than AIT. However, the x-ray screening of carry-on baggage throughput constrains the overall screening process. AIT machines currently have a passenger throughput rate of approximately 115 per hour for AITs with IO, and 240 to 270 with AITs with ATR. Although a configuration with one AIT with IO and one x-ray machine would delay the passenger screening process, TSA never deploys that modset. A modset with one x-ray machine would either have one AIT with ATR or one AIT with IO and a WTMD. AIT with ATR maintains a higher throughput than the x-ray machine and therefore never constrains the screening environment.

Because both versions of AIT may not be able to handle throughput in a modset with two x-ray machines and one passenger screening mechanism by itself, TSA co-locates the AIT with a WTMD to maintain the current throughput rate of 300 passengers per hour. Therefore, the changes to the passenger screening process brought on by AIT do not affect the average time passengers move through a security check point.

An AIT with IO machine co-located with a WTMD and an AIT with ATR do not reduce total throughput per hour as x-ray baggage screening operates at lower throughput rates. Passengers experience no additional wait time because passengers wait for the x-ray screening of their personal belongings after they go through an AIT unit or a WTMD regardless of which screening technology is used.

Growth, Turnover, and Employment Costs

TSA uses historical data from its Performance Management Information System (PMIS) database to estimate the total passenger throughput at checkpoints for 2008 through 2011. To project this number for 2012 through 2015, TSA uses the FAA annual growth rate of 2.5 percent from the 2011 PMIS total as shown in Table 13.[19] To project training populations, TSA assumes a 9.0 percent attrition rate for TSOs.[20] TSA's Office of Human Capital estimates the separation rate from year 2011.

Table 13: Past and Estimated Passenger Throughput

Passenger Throughput	
2008	682,243,994
2009	626,962,827
2010	637,849,358
2011	638,274,548
2012	654,231,412
2013	670,587,197
2014	687,351,877
2015	704,535,674

The TSA Office of Finance and Administration estimates TSO personnel costs. TSA uses the historic fully-loaded FTE annual compensation rate for TSOs inflated to constant 2011 dollars.

[19] FAA Aerospace Forecast FY 2012-2032. Page 68, Passenger Forecasts, http://www faa.gov/about/office_org/headquarters_offices/apl/aviation_forecasts/aerospace_forecasts/2012-2032/media/2012%20FAA%20Aerospace%20Forecast.pdf

[20] The 9.0 percent attrition rate is based on the attrition rate in 2011 as estimated by TSA's Office of Human Capital.

The annual compensation rate assumes the 2011 compensation rate for year 2012 to 2015. To arrive at a fully-loaded hourly compensation rate across the TSO population, TSA divides the annual FTE compensation by 2,080, the number of hours worked per year per employee. Table 14 shows the annual and hourly FTE assumptions used throughout the analysis.

Table 14: TSO FTE Annual and Hourly Compensation Rates[21]

Year	Historic FTE	Annual FTE in 2011$	Hourly FTE in 2011$
2008	$52,549.00	$54,861.16	$26.38
2009	$53,229.00	$55,092.02	$26.49
2010	$55,180.00	$56,338.78	$27.09
2011	$56,772.00	$56,772.00	$27.29
2012 – 2015	$56,772.00	$56,772.00	$27.29

Airport Utility Cost

Airport operators may incur costs for the additional utilities consumed by AIT machines. Likewise, TSA incurs incremental costs from certain airport operators who receive a utility cost reimbursement. Airport operator utility costs increase from the use of AIT, regardless of the modset. In cases where the AIT replaces WTMD, TSA subtracts the WTMD utility costs from the AIT utility costs. Table 15 breaks down the number of AIT units in-service by reimbursed airports and non-reimbursed airports.

[21] TSA rounds all FTE and wages rates to the nearest cent.

Table 15: AIT Units In-service by Reimbursed and Non-reimbursed Airports

Year	AIT Units In-service	AIT Units In-service at Reimbursed Airports	AIT Units In-service at Non-reimbursed Airports
2008	30	23	7
2009	32	25	7
2010	490	296	194
2011	559	330	229
2012	982	581	401
2013*	805	399	406
2014	776	391	385
2015	821	450	371

*Estimates in 2013 reflect a weighted average based on the removal of Rapiscan units. See Appendix B.

TSA estimates the incremental utility costs by multiplying the cost of kilowatt hours (kWh) consumed per unit by the number of units on an annual basis. TSA estimates an average cost per kWh at federalized airports at approximately $0.10 using data available from the U.S. Energy Information Administration.[22] Using this cost, TSA estimates a per-unit daily average cost of $2.23.[23] TSA estimates the utility costs by multiplying the number of units in operation by the

[22] TSA estimates this cost by taking the average of 2007-2011 retail electricity prices for the commercial sector as reported by the U.S. Energy Information Administration (http://www.eia.gov/electricity/monthly/epm_table_grapher.cfm?t=epmt_5_3).

[23] TSA calculates the per-unit utility cost per day as a weighted average of the power used to perform a scan and the power used while the system is idle. TSA assumes that the system will be operational for 16 hours (16 hours / 24 hours) of a day and idle for 8 hours (8 hours / 24 hours) of a day. TSA then estimates the weighted average of kW used per hour by taking the sum of the power consumption when the system is in operation (1.02) multiplied by the fraction of a day the system is in operation (16 hours / 24 hours) and the power consumption when the system is idle (0.70) multiplied by the percent of a day the system is idle (8 hours / 24 hours). This calculation results in an average kW used per hour of 0.9133 ((1.02 x (16/24)) + (0.70 x (8/24))). TSA

per-unit daily average and by the number of operating days. TSA estimates the airport utility costs from 2008-2011 as approximately $356,334 (undiscounted). From 2012-2015, TSA projects the airport utility costs to be approximately $1.3 million undiscounted, $1.2 million with three percent discounting, and $1.1 million with seven percent discounting. Table 16 reports prior year costs (2008-2011), while Table 16 shows the additional costs TSA attributes to this rulemaking (2012-2015).[24]

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then calculates the average kW used per day by multiplying the kW used per hour (0.9133) by 24 hours to obtain an average of 21.92 kWh per day (0.9133 x 24). TSA then multiplies this average number of kWh per day by the cost per kWh ($0.1019) to obtain a per-unit utility cost per day of $2.234 (21.92 x $0.1019). TSA uses $2.234 as the input for all per-unit unity cost for AIT. For WTMDs, TSA follows a similar formulation but assumes that the power consumption while operational and idle is 0.04 kW, with a per-day cost of $0.96 and a per unit cost of $0.098.

[24] For 2008, TSA estimates the annual utility cost to airports by multiplying the number of AITs deployed to non-reimbursed airports (7) by the per-unit daily average utility cost for AITs ($2.234) and by the number of days per year (365). This calculation results in a total utility cost to airports in 2008 for AIT deployment of $5,708 (7 x $2.234 x 365). TSA then estimates the utility cost savings to airports for WTMDs that would be removed in 2008 by multiplying the number of WTMDs removed (0) by the per-unit daily average utility cost for WTMDs ($0.10) and the number of days per year (365). This calculation results in a total utility cost savings to airports for WTMD removal of $0 (0 x $0.10 x 365) in 2008. TSA then calculates the total airport utility cost in 2008 of $5,708 by subtracting the utility cost savings from removal of WTMDs ($0) from the utility cost of AIT deployment ($5,708). TSA repeats this calculation for each year of the analysis period using the estimated numbers of AITs deployed and WTMDs removed for each year.

Table 16: Airport Utility Costs from 2008-2011

(Costs already incurred in $ 1,000s - undiscounted)

Year	**AITs at Non-reimbursed Airports**		**WTMDs at Non-reimbursed Airports**		
	AIT Units In-service a	**AIT Cost** b = a x $2.234 x 365	**Cumulative Removed (WTMD Units)** c	**WTMD Cost** d = c x $0.098 x 365	**Total Cost** e = b - d
2008	7	$5.7	0	$0.0	**$5.7**
2009	7	$5.7	0	$0.0	**$5.7**
2010	194	$158.2	0	$0.0	**$158.2**
2011	229	$186.7	0	$0.0	**$186.7**
Total	**437**	**$356.3**	**0**	**0**	**$356.3**

Table 17: Airport Utility Costs of the Proposed Rule from 2012-2015

(AIT Costs in $ 1,000s)

Year	AITs at Non-reimbursed Airports		WTMDs at Non-reimbursed Airports		Total Cost
	AIT Units In-service a	**AIT Cost** b = a x $2.234 x 365	**Cumulative Removed (WTMD Units)** c	**WTMD Cost** d = c x $0.098 x 365	**Total Cost** e = b - d
2012	401	$327.0	36	$1.3	**$325.7**
2013*	406	$331.1	49	$1.8	**$329.3**
2014	385	$313.9	55	$2.0	**$312.0**
2015	371	$302.5	62	$2.2	**$300.3**
Total	**1563**	**$1,274.5**	**202**	**$7.23**	**$1,267.3**
				3 % Discounting	$1,178.9
				7 % Discounting	$1,075.8

*Estimates in 2013 reflect a weighted average based on the removal of Rapiscan units. See Appendix B.

Passenger Opportunity Cost

Passengers using AIT screening will not experience any increase in wait times as a result of this technology. Any passengers, however, may "opt out" of AIT screening and receive a pat-down by a TSO. These pat-downs can be conducted in the checkpoint area or in a private room. The small percentage of passengers opting out of AIT screening in favor of a pat-down experience increased wait times. TSA estimates the cost to these passengers by calculating the opportunity cost of a passenger's time. Opportunity cost is a measure of the next best use of a resource, or, in this case, of a passenger's time. The opportunity cost of a passenger's time is a measure of the value of time that a passenger must forego from spending on other activities due to their increased time spent in a checkpoint area. Because a passenger's opportunity cost of time is valued based on what they must forego due to increased time in checkpoint areas, opportunity cost varies based on how the foregone time would have been spent (i.e., whether it is work or leisure time). The Department of Transportation's (DOT) Revised Departmental Guidance on Valuation of Travel Time in Economic Analysis estimated an average opportunity cost of a passenger's time of $43.57 per hour based on passenger incomes and purpose of travel (business or leisure).[25] TSA multiplies the opportunity cost of a passenger's time by the amount of time it takes for a pat-down to estimate the cost per passenger. TSA estimates that an additional pat-down costs $0.8726 for 80 seconds per passenger ($43.57 x 0.02 hours).[27]

TSA estimates the number of passengers receiving a pat-down from the historical number of individuals who opt out of AIT screening. From the PMIS, TSA estimates a 1.18 percent opt-out rate since 2009.[28] This percentage reflects the total number of passengers selected for AIT screening but who have opted out since 2009. TSA also uses PMIS data to obtain the total passenger throughput for 2008 through 2011. For years 2012 through 2015, TSA applies the FAA growth rate of 2.5 percent.[29] To estimate the passenger population that opts-out, TSA first estimates the AIT throughput of the total population and then multiplies that population by the 1.18 percent opt-out rate. TSA calculates the total opportunity cost of time by multiplying the total number of passengers assumed to opt out by the cost per pat-down (rounded to the nearest

[25] DOT estimates an hourly rate of $42.10 inflated to 2011 dollars to $43.57. http://ostpxweb.dot.gov/policy/reports/vot_guidance_092811c.pdf

[26] TSA uses $0.871 in the model for the input for passenger opportunity costs.

[27] TSA estimates 80 seconds for a pat-down based on field tests. The 80 second pat-down is equivalent to 0.0222 hours, TSA rounds this input to 0.02 hours.

[28] TSA observed a peak in opt-outs in 2009 (1.6 percent) but observed a steady decline with rates roughly 1 percent as of January 2013.

[29] FAA Aerospace Forecast FY 2012-2032. Page 68, Passenger Forecast, http://www faa.gov/about/office_org/headquarters_offices/apl/aviation_forecasts/aerospace_forecasts/2012-2032/media/2012%20FAA%20Aerospace%20Forecast.pdf

tenth decimal). TSA estimates the passenger opportunity cost from 2008-2011 as approximately $1.7 million (undiscounted). From 2012-2015, TSA projects the passenger opportunity cost to be approximately $16.6 million undiscounted, $15.3 million with three percent discounting, and $13.8 million with seven percent discounting. Table 18 reports prior year costs (2008-2011), while Table 19 shows the additional costs TSA attributes to this rulemaking (2012-2015).[30]

Table 18: Passenger Opportunity Cost from 2008-2011

(Costs already incurred in $ 1,000s - undiscounted)

Year	**Passengers** a	**AIT Throughput Percent of Total Passengers** B	**Number of Opt-Outs** c = a x b x 1.18%	**Total Cost for Opt-Outs** d = c x $0.871
2008	682,243,994	0.1%	8,050.5	$7.0
2009	626,962,827	0.5%	36,990.8	$32.2
2010	637,849,358	4.0%	301,064.9	$262.2
2011	638,274,548	21.1%	1,589,176.0	$1,384.2
Total	**2,585,330,727**		**1,935,282.2**	**$1,685.6**

[30] For 2008, TSA estimates the passenger opportunity cost by first multiplying the number of passengers (682,243,994) by the percent of AIT throughput for total passengers in 2008 (0.10%). This calculation results in a total AIT passenger throughput in 2008 of 682,244 (682,243,994 x 0.10%). TSA then multiplies the AIT passenger throughput in 2008 by the percent of passengers who opted out of AIT screening in 2008 (1.18%). This calculation results in a total number of opt-outs of 8,050.48 in 2008 (682,244 x 1.18%). To obtain the total passenger opportunity cost for opt-outs in 2008, TSA multiplies the number of opt-outs in 2008 (8,050.48) by the passenger opportunity cost per opt-out ($0.871) to obtain a total passenger opportunity cost of $7,012 (8,050.48 x $0.871) in 2008. TSA repeats this calculation for each year of the analysis period using the estimated numbers of passenger opt-outs for each year.

Table 19: Passenger Opportunity Cost of the Proposed Rule from 2012-2015

(Proposed AIT Costs in $ 1,000s)

Year	**Passengers** a[31]	**AIT Throughput Percent of Total Passengers**[32] b	**Number of Opt-Outs** c = a x b x 1.18%	**Total Cost for Opt-Outs** d = c x $0.871
2012	654,231,412	40.4%	3,118,852.0	$2,716.5
2013*	670,587,197	57.9%	4,582,904.7	$3,991.7
2014	687,351,877	60.0%	4,866,451.3	$4,238.7
2015	704,535,674	77.5%	6,442,978.7	$5,611.8
Total	**2,716,706,159**		**19,011,186.7**	**$16,558.7**
			3 % Discounting	$15,265.0
			7 % Discounting	$13,766.6

*Estimates in 2013 reflect a weighted average based on the removal of Rapiscan units. See Appendix B.

[31] TSA rounds the estimated passenger throughput to the third decimal point as inputs for the model.

[32] Although TSA removes Rapiscan AIT machines in 2013, the overall AIT passenger throughput is expected to continue to increase because of TSA's allocation strategy in 2013. This strategy involves relocating underutilized L3 AIT machines, which are capable of processing up to 240 - 270 passengers per hour as opposed to 115 passengers per hour with Rapiscan units, from lower volume airports to higher volume airports. Specific AIT throughput estimates are internal SSI data from TSA's Office of Security Capabilities.

Personnel Cost to TSA

TSA incurs a cost for additional personnel hired to operate AIT machines. TSA estimates this cost using assumptions from TSA's Screener Allocation Model (SAM) that dictates the allocation of personnel to each airport. The SAM estimates a personnel staffing level of 3.5 per lane for lanes with one WTMD. For lanes with a WTMD and an AIT with IO unit, the SAM estimates a 5.0 personnel staffing level. For lanes with a WTMD and an AIT with ATR unit, the SAM estimates a 4.5 personnel staffing level. Therefore, TSA estimates a personnel difference of 1.5 per lane for lanes with AIT with IO (5 – 3.5) and 1.0 per lane for those with AIT with ATR (4.5 – 3.5). The SAM also multiplies this difference by a factor of 3.5 to account for an estimated two shifts per lane per day, seven days of operation, the five day working schedule of a typical TSO, breaks, and any occurrences of sick or annual leave. To summarize, TSA estimates an additional 5.25 personnel (1.5 x 3.5) for each deployed AIT with IO unit and an additional 3.5 personnel (1.0 x 3.5) for each deployed AIT with ATR unit. TSA uses the fully loaded annual compensation rate for these employees estimated in Table 14. Table 20 demonstrates the relationship between AIT modsets and lanes (e.g., for every 1:1 modset is one lane and for every 2:1 modset is two lanes)

Table 20: AIT Modsets and Lanes

Year	**AIT In-service Modsets**		**AIT Lanes In-service**		**AIT Lanes In-service**[33] $e_t = e_{t-1} + c + d$
	1:1 a	2:1 b	1:1 c = a x 1	2:1 d = b x 2	
2008	9	21	9	42	51
2009	10	22	10	44	105
2010	143	347	143	694	942
2011	162	397	162	794	1,898
2012	286	696	286	1,392	3,576
2013*	213	570	213	1,141	4,930
2014	225	551	225	1,102	6,257
2015	240	581	240	1,162	7,659

*Estimates in 2013 reflect a weighted average based on the removal of Rapiscan units. See Appendix B.

Table 21 and Table 22 present the cost incurred by TSA for the additional personnel necessary to operate and screen passengers with AIT machines. TSA estimates the number of personnel to maintain the AIT units in-service at full operating capacity, rounded to the nearest tenth decimal place. Because TSA estimates the total staffing level each year, the personnel populations account for any turnover in TSOs. TSA assumes that the TSO FTE includes training costs and therefore does not estimate the training cost for new hires separately in the section below. TSA estimates the cost of personnel from 2008-2011 as approximately $562.8 million (undiscounted).

[33] TSA estimates the lanes in-service by summing the current lane deployment and all prior year deployment.

From 2012-2015, TSA projects the cost of personnel to be approximately $1.2 billion undiscounted, $1.1 billion with three percent discounting, and $1.0 billion with seven percent discounting. Table 21 reports prior year costs (2008-2011), while Table 22 shows the additional costs TSA attributes to this rulemaking (2012-2015).

Table 21: Personnel Cost from 2008 – 2011

(Costs already incurred in $ 1,000s - undiscounted)

Year	**Lanes In-service Covered by AIT**		**Personnel to Maintain Full Operating Capacity**		***Annual FTE***	**Total Cost**
	with IO *a*	***with ATR*** *b*	***AIT with IO*** *c = a x 5.25*	***AIT with ATR*** *d = b x 3.5*	*e*	***($1,000s)*** *f = (c + d) x e*
2008	51.0	0.0	267.8	0.0	$54,861	**$14,689.1**
2009	54.0	0.0	283.5	0.0	$55,092	**$15,618.6**
2010	837.0	0.0	4,394.3	0.0	$56,339	**$247,566.7**
2011	956.0	0.0	5,019.0	0.0	$56,772	**$284,938.7**
Total	**1,898.0**	**0.0**	**9,964.50**	**0.00**		**$562,813.0**

Table 22: Personnel Cost of the Proposed Rule from 2012 – 2015

(Proposed AIT Costs in $ 1,000s)

Year	**Lanes In-service Covered by AIT**[34]		**Personnel to Maintain Full Operating Capacity**		***Annual FTE***	**Total Cost**
	with IO *a*	***with ATR*** *b*	***AIT with IO*** *c = a x 5.25*	***AIT with ATR*** *d = b x 3.5*	*e*	***($1,000s)*** *f = (c + d) x e*
2012	427.2	1,250.8	2,242.80	4,377.84	$56,772	**$375,866.9**
2013*	119.8	1,233.7	628.91	4,317.98	$56,772	**$280,844.3**
2014	0.0	1,327.0	0.00	4,644.50	$56,772	**$263,677.6**
2015	0.0	1,402.0	0.00	4,907.00	$56,772	**$278,580.2**
Total	**547.0**	**5,213.5**	**2,871.7**	**18,247.31**		**$1,198,969.0**
					3 % Discounting	$1,118,459.3
					7 % Discounting	$1,024,344.7

*Estimates in 2013 reflect a weighted average based on the removal of Rapiscan units. See Appendix B.

Training Cost to TSA

TSA incurs costs to train TSOs to operate and effectively screen passengers with AIT machines. TSOs take initial and recurring training on AIT operation and screening. Recurring training must be completed annually. Lastly, to account for TSA's shift from AIT with IO to AIT with

[34] TSA distributes the lanes between AIT with IO and AIT with ATR in 2012 based on the weighted average of the deployment of AIT type. Of the 982 AIT units deployed in 2012, 250 were AIT with IO and 732 were AIT with ATR. TSA estimates the lanes by technology type such that 25.46 percent (250/982) of the 1678 total lanes go to AIT with IO and 74.54 percent (732/982) of the 1678 lanes go to AIT with ATR. This results in 427.2 (25.46% x 1678) lanes with IO and 1250.8 (74.54% x 1678) lanes with ATR.

ATR, TSA estimates a transition training cost. The five components of training costs, along with their respective time requirements (shown in parentheses), are as follows:

- Initial AIT with IO training (20 hours)
- Recurring AIT with IO training (6 hours)
- Training to transfer from AIT with IO to AIT with ATR (at airports where AIT with IO was deployed prior to ATR development but later upgraded to ATR software) (14.23 hours[35])
- Initial AIT with ATR training (12 hours)
- Recurring AIT with ATR training (6 hours which includes recurring training for the SO position)

Detailed tables on the methodological procedures and calculations of personnel and the training populations are located in the Appendix. The tables below display the final training populations, for both initial and recurring, for both AIT technologies (L3 and Rapiscan).

[35] This estimate is based off the recorded training time of TSOs for two pilot programs conducting this type of training. 14 hours and 14 minutes was the average time spent by between the two programs (14.2333 hours). The AIT to L3 with ATR Differences Pilot courses were presented to a group of 51 participants from September 6th through September 7th, 2012 at both John F. Kennedy International Airport (JFK) and Los Angeles International Airport (LAX).

Table 23: L3 Training Population

	IO			ATR	
Year	**Initial**	**Recurring**[36]	**IO to ATR**	**Initial**	**Recurring**
2008	738.3	0.0	0.0	0.0	0.0
2009	166.2	0.0	0.0	0.0	0.0
2010	3,934.5	0.0	0.0	0.0	0.0
2011	5,650.3	0.0	9,142.0	14,837.3	0.0
2012	0.0	0.0	0.0	699.6	23,268.6
2013	0.0	0.0	0.0	2,156.4	21,811.1
2014	0.0	0.0	0.0	1,891.0	21,810.5
2015	0.0	0.0	0.0	1,870.6	21,568.4

[36] No historical recurring training for IO occurred in years 2008 to 2011.

Table 24: Rapiscan Training Population

	IO			ATR	
Year	**Initial IO[37]**	**Recurring IO**	**IO to ATR**	**ATR Initial**	**Recurring with ATR**
2008	0.0	0.0	0.0	0.0	0.0
2009	0.0	0.0	0.0	0.0	0.0
2010	5,908.2	0.0	0.0	0.0	0.0
2011	5,240.1	6,110.1	0.0	0.0	0.0
2012	1,021.5	10,328.7	14,816.4	0.0	0.0
2013	0.0	0.0	0.0	0.0	0.0
2014	0.0	0.0	0.0	0.0	0.0
2015	0.0	0.0	0.0	0.0	0.0

The following tables summarize the cost to training by the five components of training. To estimate the cost of training, TSA multiplies the assumed populations by the hourly wage rate and the corresponding hours of training. The following tables cover the five components of training. TSA uses the training populations in Tables 23 and 24 as inputs for the five training costs below.

[37] Although deployment for Rapiscan occurs only in 2010, the historic initial training for IO occurred over 2 calendar years. IO training in 2012 only includes initial training due to turnover.

Table 25: Initial AIT w/ IO Training Population and Cost from 2008-2011

(Costs already incurred in $ 1,000s - undiscounted)[38]

Year	Hourly FTE	L3			Rapiscan			Total
	($)	Employees	Hours	Subtotal	Employees	Hours	Subtotal	Total
	a	b	c = b x 20	d = a x c	e	f = e x 20	g = a x f	h = d + g
2008	$26.38	738.3	14,765.0	$389.5	0.0	0.0	$0.0	**$389.5**
2009	$26.49	166.2	3,323.1	$88.0	0	0.0	$0.0	**$88.0**
2010	$27.09	3,934.5	78,690.7	$2,131.7	5,908.20	118,164.0	$3,201.1	**$5,332.8**
2011	$27.29	5,650.3	113,006.0	$3,083.9	5,240.15	104,803.0	$2,860.1	**$5,944.0**
Total		**10,489.2**	**209,784.7**	**$5,693.2**	**11,148.3**	**222,967.0**	**$6,061.1**	**$11,754.3**

[38] For 2008, TSA estimates the initial training cost for AIT with IO by multiplying the estimated number of employees to be trained by the number of training hours per employee and average hourly compensation rate for a TSO. For the L3 technology in 2008, TSA multiplies the number of employees being trained (738.25) by the hours of training per employee (20) and by the average hourly compensation rate ($26.38) to obtain a total initial training cost of $389,501 (738.25 x 20 x $26.38). TSA repeats this calculation for Rapiscan technology to obtain a total initial training cost of $0 (0 x 20 x $26.38). TSA then sums these two costs to obtain a total training cost of $389,501 ($389,501+ $0) in 2008. TSA repeats this calculation for recurring costs for AIT with IO, and for both initial and recurring costs for AIT with ATR. TSA repeats these calculations for each year of analysis period, using the appropriate number of employees to be trained and annual compensation rates for each year.

Table 26: Initial AIT w/ IO Training Population and Cost of the Proposed Rule from 2012-2015

(Proposed AIT Costs in $ 1,000s)

Year	**Hourly FTE**	**L3**			**Rapiscan**			**Total**
	($)	**Employees**	**Hours**	**Subtotal**	**Employees**	**Hours**	**Subtotal**	
	a	b	c = b x 20	d = a x c	e	f = e x 20	g = a x f	h = d + g
2012	$27.29	0.0	0.0	$0.0	1,021.5	20,431.0	$557.6	**$557.6**
2013	$27.29	0.0	0.0	$0.0	0.0	0.0	$0.0	**$0.0**
2014	$27.29	0.0	0.0	$0.0	0.0	0.0	$0.0	**$0.0**
2015	$27.29	0.0	0.0	$0.0	0.0	0.0	$0.0	**$0.0**
Total		**0.0**	**0.0**	**$0.0**	**1,021.5**	**20,431.0**	**$557.6**	**$557.6**
							3 % Discounting	$541.3
							7 % Discounting	$521.1

Table 27: Recurring AIT w/ IO Training Population and Cost from 2008-2011

(Costs already incurred in $ 1,000s - undiscounted)

Year	**Hourly FTE**	**L3**[39]			**Rapiscan**			**Total**
	($)	**Employees**	**Hours**	**Subtotal**	**Employees**	**Hours**	**Subtotal**	
	a	b	c = b x 6	d = a x c	e	f = e x 6	g = a x f	h = d + g
2008	$26.38	0.0	0.0	$0.0	0.0	0.0	$0.0	**$0.0**
2009	$26.49	0.0	0.0	$0.0	0.0	0.0	$0.0	**$0.0**
2010	$27.09	0.0	0.0	$0.0	0.0	0.0	$0.0	**$0.0**
2011	$27.29	0.0	0.0	$0.0	6,116.3	36,697.6	$1,001.5	**$1,001.5**
Total		**0.0**	**0.0**	**$0.0**	**6,116.3**	**36,697.6**	**$1,001.5**	**$1,001.5**

[39] TSA administered no historical L3 recurring training from 2008-2011.

Table 28: Recurring AIT w/ IO Training Population and Cost of the Proposed Rule from 2012-2015

(Proposed AIT Costs in $ 1,000s)

Year	**Hourly FTE ($)**	**L3**			**Rapiscan**			**Total**
		Employees	**Hours**	**Subtotal**	**Employees**	**Hours**	**Subtotal**	
	a	b	c = b x 6	d = a x c	e	f = e x 6	g = a x f	h = d + g
2012	$27.29	0.0	0.0	$0.0	10,328.7	61,971.9	$1,691.2	**$1,691.2**
2013	$27.29	0.0	0.0	$0.0	0.0	0.0	$0.0	**$0.0**
2014	$27.29	0.0	0.0	$0.0	0.0	0.0	$0.0	**$0.0**
2015	$27.29	0.0	0.0	$0.0	0.0	0.0	$0.0	**$0.0**
Total		**0.0**	**0.0**	**$0.0**	**10,328.7**	**61,971.9**	**$1,691.2**	**$1,691.2**
							3 % Discounting	$1,642.0
							7 % Discounting	$1,580.6

Table 29: IO Transition to ATR Training Population and Cost from 2008-2011

(Costs already incurred in $ 1,000s - undiscounted)

Year	**Hourly FTE**	**L3**			**Rapiscan**			**Total**
	($)	**Employees**	**Hours**	**Subtotal**	**Employees**	**Hours**	**Subtotal**	
	a	b	c = b x 14.23[40]	d = a x c	e	f = e x 4	g = a x f	h = d + g
2008	$26.38	0.0	0.0	$0.0	0.0	0.0	$0.0	**$0.0**
2009	$26.49	0.0	0.0	$0.0	0.0	0.0	$0.0	**$0.0**
2010	$27.09	0.0	0.0	$0.0	0.0	0.0	$0.0	**$0.0**
2011	$27.29	9,142.0	130,121.1	$3,551.0	0.0	0.0	$0.0	**$3,551.0**
Total		**9,142.0**	**130,121.1**	**$3,551.0**	**0.0**	**0.0**	**$0.0**	**$3,551.0**

[40] TSA uses 14.2333 as the input for the estimation of IO transition to ATR training.

Table 30: IO Transition to ATR Training Population and Cost of the Proposed Rule from 2012-2015

(Proposed AIT Costs in $ 1,000s)

Year	Hourly FTE	L3			Rapiscan			Total
	($)	Employees	Hours	Subtotal	Employees	Hours	Subtotal	
	a	b	c = b x 14.23[41]	d = a x c	e	f = e x 14	g = a x f	h = d + g
2012	$27.29	0.0	0.0	$0.0	14,816.4	210,886.8	$5,755.1	**$5,755.1**
2013	$27.29	0.0	0.0	$0.0	0.0	0.0	$0.0	**$0.0**
2014	$27.29	0.0	0.0	$0.0	0.0	0.0	$0.0	**$0.0**
2015	$27.29	0.0	0.0	$0.0	0.0	0.0	$0.0	**$0.0**
Total		**0.0**	**0.0**	**$0.0**	**14,816.4**	**210,886.8**	**$5,755.1**	**$5,755.1**
							3 % Discounting	**$5,587.5**
							7 % Discounting	**$5,378.6**

[41] TSA uses 14.2333 as the input for the estimation of IO transition to ATR training.

Table 31: Initial AIT w/ ATR Training Population and Cost from 2008-2011

(Costs already incurred in $ 1,000s - undiscounted)

Year	**Hourly FTE**	**L3**			**Rapiscan**			**Total**
	($)	**Employees**	**Hours**	**Subtotal**	**Employees**	**Hours**	**Subtotal**	
	a	b	c = b x 12	d = a x c	e	f = e x 12	g = a x f	h = d + g
2008	$26.38	0.0	0.0	$0.0	0.0	0.0	$0.0	**$0.0**
2009	$26.49	0.0	0.0	$0.0	0.0	0.0	$0.0	**$0.0**
2010	$27.09	0.0	0.0	$0.0	0.0	0.0	$0.0	**$0.0**
2011	$27.29	14,837.3	178,047.9	$4,858.9	0.0	0.0	$0.0	**$4,858.9**
Total		**14,837.3**	**178,047.9**	**$4,858.9**	**0.0**	**0.0**	**$0.0**	**$4,858.9**

Table 32: Initial AIT w/ ATR Training Population and Cost of the Proposed Rule from 2012-2015

(Proposed AIT Costs in $ 1,000s)

Year	**Hourly FTE ($)**	**L3**			**Rapiscan**			**Total**
		Employees	**Hours**	**Subtotal**	**Employees**	**Hours**	**Subtotal**	
	a	b	c = b x 12	d = a x c	e	f = e x 12	g = a x f	h = d + g
2012	$27.29	699.6	8,395.2	$229.1	0.0	0.0	$0.0	**$229.1**
2013	$27.29	2,156.4	25,877.2	$706.2	0.0	0.0	$0.0	**$706.2**
2014	$27.29	1,891.0	22,692.4	$619.3	0.0	0.0	$0.0	**$619.3**
2015	$27.29	1,870.6	22,447.1	$612.6	0.0	0.0	$0.0	**$612.6**
Total		**6,617.7**	**79,412.0**	**$2,167.2**	**0.0**	**0.0**	**$0.0**	**$2,167.2**
3 % Discounting								$1,999.1
7 % Discounting								$1,803.8

Table 33: Recurring AIT w/ ATR Training Population and Cost from of the Proposed Rule 2012-2015

(AIT Costs in $ 1,000s)[42]

Year	**FTE**	**L3**			**Rapiscan**			**Total**
	($)	**Employees**	**Hours**	**Subtotal**	**Employees**	**Hours**	**Sub-total**	
	a	b	c = b x 6	d = a x c	e	f = e x 6	g = a x f	h = d + g
2012	$27.29	23,268.6	139,611.3	$3,810.0	0.0	0.0	$0.0	**$3,810.0**
2013	$27.29	21,811.1	130,866.4	$3,571.3	0.0	0.0	$0.0	**$3,571.3**
2014	$27.29	21,810.5	130,862.8	$3,571.2	0.0	0.0	$0.0	**$3,571.2**
2015	$27.29	21,568.4	129,410.4	$3,531.6	0.0	0.0	$0.0	**$3,531.6**
Total		**88,458.5**	**530,751.0**	**$14,484.2**	**0.0**	**0.0**	**$0.0**	**$14,484.2**
							3 % Discounting	$13,471.3
							7 % Discounting	$12,289.5

[42] Because ATR is introduced in 2011, TSA does not estimate any recurring training cost from 2008 to 2011.

TSA estimates the cost of training from 2008-2011 as approximately $21.2 million (undiscounted). From 2012-2015, TSA projects the cost of training to be approximately $24.7 million undiscounted, $23.2 million with three percent discounting, and $21.6 million with seven percent discounting. Table 34 reports prior year costs (2008-2011), while Table 35 shows the additional costs TSA attributes to this rulemaking (2012-2015).

Table 34: Training Cost from 2008-2011

(Costs already incurred in $ 1,000s - undiscounted)

Year	**AIT with IO**		**IO to ATR**	**AIT with ATR**		**Total Cost**
	Initial A	**Recurring** **b**	**c**	**Initial** **d**	**Recurring** **e**	f = a + b + c + d + e
2008	$389.5	$0.0	$0.0	$0.0	$0.0	**$389.5**
2009	$88.0	$0.0	$0.0	$0.0	$0.0	**$88.0**
2010	$5,332.8	$0.0	$0.0	$0.0	$0.0	**$5,332.8**
2011	$5,944.0	$1,000.5	$3,551.0	$4,858.9	$0.0	**$15,354.4**
Total	**$11,754.3**	**$1,000.5**	**$3,551.0**	**$4,858.9**	**$0.0**	**$21,164.7**

Table 35: Training Cost of the Proposed Rule from 2012-2015

(AIT Costs in $ 1,000s)

Year	AIT with IO		IO to ATR	AIT with ATR		Total Cost
	Initial a	Recurring b	c	Initial d	Recurring e	f = a + b + c + d + e
2012	$557.6	$1,691.2	$5,755.1	$229.1	$3,810.0	**$12,043.0**
2013	$0.0	$0.0	$0.0	$706.2	$3,571.3	**$4,277.5**
2014	$0.0	$0.0	$0.0	$619.3	$3,571.2	**$4,190.5**
2015	$0.0	$0.0	$0.0	$612.6	$3,531.6	**$4,144.2**
Total	**$557.6**	**$1,691.2**	**$5,755.1**	**$2,167.2**	**$14,484.2**	**$24,655.2**
Discounted 3%	$541.3	$1,642.0	$5,587.5	$1,999.1	$13,471.3	**$23,241.2**
Discounted 7%	$521.1	$1,580.6	$5,378.6	$1,803.8	$12,289.5	**$21,573.6**

AIT Life Cycle Cost to TSA

To estimate the life cycle cost of AIT, TSA divides the cost components into four high-level categories: acquisition, installation, and integration; maintenance; test and evaluation; and program management office (PMO) costs.

TSA's Office of Security Capabilities manages the PSP. The PSP includes several technologies, creating difficulties for estimating a life cycle cost of a single technology. Many of the costs to test, evaluate, maintain, and manage the technologies occur through private contracts covering the suite of technologies, which fosters economies of scale. Because these contracts cover several different technologies, the full contract cost cannot be easily allocated to one particular technology. TSA recognizes that new technologies would likely account for a larger than average share of the contract costs because newer technologies tend to have more complex and costly systems. In the following sections TSA allocates program-level life cycle costs to AIT.

TSA needs to make assumptions on the proportion of contract funds dedicated to AIT implementation. Under this methodology, TSA assumes that the acquisition cost of a technology directly correlates with other life cycle cost components. TSA derives AIT cost estimates from life cycle cost estimates as produced by TSA's Office of Security Capabilities.[43] TSA estimates that the acquisition cost of all AIT units relative to the acquisition costs of all units of the other technologies in TSA's PSP portfolio is approximately 40.5 percent.[44] Throughout this section, the 40.5 percent provides an approximate estimate of the AIT-specific costs when allocating the program level cost to AIT with no additional information.

TSA is removing all units that are not equipped with ATR from its checkpoints. TSA accounts for the removal of all 250 Rapiscan backscatter units by May 31, 2013. To ensure that these airports continue to screen passengers with AIT, TSA will reallocate 74 currently deployed units and reprioritize the deployment of 60 already scheduled L3 machines purchased in 2012.[45] These 134 L3 millimeter units will backfill the needs created by the removal of the Rapiscan machines. Throughout this section, the re-deployment of AIT and the removal of backscatter machines affect the cost elements based on the changes to deployment and the changes to the overall active units in the field.

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[43] Internal document from TSA's Office of Security Capabilities (OSC), "Life Cycle Cost Estimate for Passenger Screening Program" As of June 22nd, 2012, Version 3.8. All estimates in the life cycle section reference this document unless otherwise noted.

[44] In the PSP program, TSA dedicates 40.5 percent of total acquisition costs to AIT in 2013 ($12,042,803 AIT acquisition cost / $29,745,848 total acquisition cost).

[45] TSA purchased these units but never deployed these units in 2012.

Reallocation

TSA accounts for the removal and reallocation of 74 previously deployed L3 AIT units with plans to reinstall them at other airports by May 31, 2013. Based on previous deployments, TSA estimates an average per-unit cost to reallocate an L3 AIT unit at $27,713, as shown in Table 36.[46] This cost includes:

- Systems integration;
- Removal, re-installment, shipping, rigging warehouse, other equipment relocation; and
- Ancillary equipment and infrastructure adjustments.

TSA multiplies the unit cost to allocate the units by the 74 units scheduled for reallocation. The reallocation costs TSA $2.1 million shown in Table 36 below. TSA does not include the costs to reprioritize the 60 L3 units acquired in 2012 in this estimate. In addition, the reallocation estimate does not include the cost to remove the 250 Rapiscan units. The Acquisition, Installation, Integration, Disposal, and Removal section includes these costs.

[46] TSA's Office of Security Capabilities provided the reallocation estimates based on an internal cost model for the reallocation plan.

Table 36: Reallocation Cost of L3 Units in 2013

(AIT Costs in $s)

Cost Category	Per-Unit Cost
Systems Integration Drawing Revisions	$2,500
Cost to Remove AIT	$8,000
Adjust WTMD and Install Security Glass	$1,050
Shipping	$2,200
Rigging Warehouse	$200
Cost to Reinstall	$7,500
Systems Integration Oversight	$3,300
Systems Integration Program Management	$1,520
Other Equipment Relocation at Install Airport	$763
Ancillary Equipment Adjustments	$500
Infrastructure Adjustments	$180
Per-unit Cost to Relocate and AIT	**$27,713**
Total Units Relocated	**74**
Total Cost for Reallocation	**$2,050,762**

Acquisition, Installation, Integration, Disposal, and Removal

TSA estimates acquisition, installation, integration, disposal, and removal costs using the newly deployed AIT technologies. To estimate the acquisition cost of new AIT units, TSA uses the current market prices for the L3 unit and the Rapiscan unit of $148,000 and $159,000, respectively. Based on current contract rates, TSA SMEs estimate the installation cost for the L3 and Rapiscan technology at $5,450 and $2,400, respectively. TSA SMEs estimates the integration cost at $30,000 per unit, regardless of the manufacturer.[47] The integration cost includes the cost of removing the existing technology from the airport but does not include the disposal cost. AIT deployment does not typically replace the current WTMD. Based on the eight-year life cycle of AIT, where the units newly deployed in 2008 will be replaced in 2015. TSA estimates a $550 per-unit disposal cost for the AIT units replaced in 2015.

Under unique circumstances, an AIT will completely replace the WTMD. An AIT will completely replace a WTMD when the surface area of the passenger lanes constrains the modset to one technology. TSA estimates that this configuration occurs in 2012 through 2015 with AIT replacing 56 WTMDs in 2012, 20 WTMDs in 2013, and 10 WTMDs in 2014 and 2015. TSA only includes the disposal cost of the WTMD when the deployment of AIT replaces the WTMD and thereby shortens the expected life cycle of the technology. TSA estimates the additional cost of a WTMD disposal at $550 per unit.[48] The PSP includes an annual Defense Logistics Agency (DLA) Disposition Service cost because this service directly coordinates disposal efforts and disposal is primarily only WTMDs, this cost is not included for AIT. The DLA Disposition Services existed before the onset of AIT and contributes to the optimization strategy of the WTMDs. Although AITs directly increase the number of WTMD disposal, the increased disposal does not affect the DLS Disposition Service functions. For additional clarity, Table 37 breaks down the specific disposal costs for each year, which are then shown as a cost component in Table 40.

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[47] The cost of integration depends on the current configuration of the passenger screening environment; TSA uses the $30,000 estimate as a conservative cost estimate as most reconfigurations cost less than $30,000.

[48] TSA accounts for the removal of the WTMDs through the AIT integration cost; however the physical disposal is not captured in the integration cost.

Table 37: Disposal Cost of the Proposed Rule from 2012-2015

(AIT Costs in $ 1,000s)[49]

Year	**WTMD Replaced by AIT** (WTMD Units) a	**AIT End of Life Cycle** (AIT Units) b	**Total Replaced Units** c = a + b	**Total** d = c x $550
2012	56	0	56	$30.8
2013	20	0	20	$11.0
2014	10	0	10	$5.5
2015	10	30	40	$22.0
Total	**96**	**30**	**126**	**$69.3**
			3 % Discounting	$64.9
			7 % Discounting	$59.7

TSA plans to remove all 250 Rapiscan units by May 31, 2013. Both TSA and Rapiscan will pay for the removal costs. TSA removed 76 Rapiscan machines at the end of 2012 prior to the change in the policy to remove all Rapiscan units.[50] Rapiscan will pay for the removal for the remaining 174 units by May 31, 2013. TSA removed all 76 Rapiscan units from CAT X airports.[51]

[49] Disposal costs occur only in years 2012 through 2015.

[50] TSA originally followed a redeployment plan that moved L3 units with ATR and significantly higher throughput rate than Rapican units without ATR to airports with the highest volume of passenger traffic. The redeployment of Rapiscan units began when TSA anticipated that Rapiscan would deploy ATR units.

[51] The 76 units removed by TSA were in full active use for 2012 and were removed at the end of the year.

TSA assumes a per-unit cost of $10,400 to remove a Rapiscan machine.[52] TSA thus incurs a cost of $790,400 and Rapiscan incurs a cost of $1.8 million as shown in below.

Table 38: Onetime Rapiscan Removal Cost

(AIT costs in $1000s)

Year	Impacted Entity	Removed Rapiscan Units a	Cost per Rapiscan Unit b	Total Cost Removal Cost c = a x b
2012	TSA	76	$10.4	**$790.4**
2013	Rapiscan	174	$10.4	**$1,809.6**

TSA estimates the cost of acquisition, installation, integration, disposal and removal from 2008-2011 as approximately $104.5 million (undiscounted). From 2012-2015, TSA projects the cost of acquisition, installation, integration, disposal, and removal to be approximately $100.3 million undiscounted, $95.8 million with three percent discounting, and $90.3 million with seven percent discounting. Table 39 reports prior year costs (2008-2011), while Table 40 shows the additional costs TSA attributes to this rulemaking (2012-2015).[53] These tables do not include the cost to

[52] TSA bases the $10,400 removal cost on TSA's Office of Security Capabilities cost estimate assuming a $8,000 removal cost, a $2,200 shipping cost and a $200 warehouse rigging cost, as shown in Table 36 above.

[53] For 2008, TSA estimates the total acquisition, installation, integration, and disposal cost by calculating costs for each of these components and summing the results to obtain the total cost. TSA estimates the acquisition cost in 2008 by multiplying the number of units deployed by the per-unit cost for both the L3 and Rapiscan technologies. This calculation results in a total acquisition cost of $4,440,000 (30 x $148,000 (for L3 units)) + (0 x $159,000 (for Rapiscan units)) in 2008. TSA estimates the installation cost in 2008 with a similar calculation using the per-unit installation cost for each AIT unit. This calculation results in a total installation cost of $163,500 (30 x $5,450 (for L3 units))+ (0 x $2,400 (for Rapiscan units)) in 2008. TSA estimates the integration cost in 2008 with a similar calculation using the per-unit integration cost of $30,000 (identical for each AIT model). This calculation results in a total integration cost of $900,000 ((30 + 0) x $30,000) in 2008. TSA estimates the disposal cost in 2008 by multiplying the number of WTMDs to be disposed of in 2008 (0) by the per-unit disposal cost of $550. This calculation results in a total disposal cost for WTMDs of $0 (0 x $550) in 2008. TSA then sums these cost components for a total acquisition, installation, integration, and disposal cost of $5,503,500 ($4,440,000 + $163,500+ $900,000 + 0) in 2008. TSA

Rapiscan to remove their AIT machines. TSA includes the total cost to Rapiscan in the final tables as a separate entity because TSA bears the remainder of the life cycle costs.

Table 39: TSA Acquisition, Installation, Integration, and Disposal Cost from 2008-2011

(Costs already incurred in $ 1,000s – undiscounted)

Year	**L3 Deploy-Ment (AIT Units)** a	**Rapiscan Deploy-ment (AIT Units)** b	**L3 Delayed Deploy-ment (AIT Units)** c	**Acquisition Cost** d = a x $148,000 + b x $159,000	**Installation Cost** e = a x $5,450 + b x $2,400	**Integration Cost** f = (a + b) x $30,000	**Disposal Cost/ Removal** g = (disposed WTMD + AIT) x $550	**Total Cost** h = d + e + f + g
2008	30	0	0	$4,440.0	$163.5	$900.0	$0.0	$5,503.5
2009	2	0	0	$296.0	$10.9	$60.0	$0.0	$366.9
2010	208	250	0	$70,534.0	$1,733.6	$13,740.0	$0.0	$86,007.6
2011	69	0	0	$10,212.0	$376.1	$2,070.0	$0.0	$12,658.1
Total	**309**	**250**	**0**	**$85,482.0**	**$2,284.1**	**$16,770.0**	**$0.0**	**$104,536.1**

repeats these calculations for each year of the analysis period using the appropriate number of deployment of AIT units and subsequent disposal of AIT and WTMD units.

Table 40: TSA Acquisition, Installation, Integration, and Disposal Cost of the Proposed Rule from 2012-2015

(AIT Costs in $ 1,000s)

Year	**L3 Deployment[54] (AIT Units)** a	**Rapiscan Deployment (AIT Units)** b	**L3 Delayed Deployment (AIT Units)** c	**Acquisition Cost** d = a x $148,000 + b x $159,000	**Installation Cost** e = a x $5,450 + b x $2,400	**Integration Cost** f = (a + b) x $30,000	**Disposal Cost/ Removal[55]** g = (disposed WTMD + AIT) x $550	**Total Cost** g = d + e + f + g
2012[56]	423	0	0	$62,604.0	$1,978.4	$10,890.0	$821.2	$76,293.6
2013[57]	0	0	60	$0.0	$327.0	$1,800.0	$11.0	$2,138.0
2014	44	0	0	$6,512.0	$239.8	$1,320.0	$5.5	$8,077.3
2015	75	0	0	$11,100.0	$408.8	$2,250.0	$22.0	$13,780.8
Total	**542**		**60**	**$80,216.0**	**$2,953.9**	**$16,260.0**	**$859.7**	**$100,289.6**
							3 % Discounting	$95,772.6
							7 % Discounting	$90,276.5

[54] The deployment in 2015 includes the 45 new AIT units and the 30 AIT units replacing the 2008 units.

[55] The disposal cost in 2015 includes 10 WTMDs plus the 30 AIT machines from 2008. TSA adds its one-time Rapiscan unit removal cost in 2012 of $790,400 to the disposal cost in 2012.

[56] The L3 units with delayed deployment were a part of the 423 L3 units in 2012. To allocate the life cycle cost, TSA assumes that the installation and integrations costs for the 60 units occur in 2013. In 2012, only 363 (423 – 60) units will be installed and integrated however, TSA acquired all 423 units in 2012.

[57] TSA assumes the L3 units with delayed deployment cost in 2013 only includes the installation and integration cost.

Maintenance

TSA estimates the maintenance cost of AIT services based on out-of-warranty maintenance, call center services, and general maintenance support services. The acquisition price of AIT includes a two-year warranty, thus maintenance costs occur between 2010 and 2015 for units acquired in 2008 through 2013. To estimate the maintenance costs based on contracts, TSA divides the maintenance contract total in 2013 by the number of units expected in the field.[58] This results in a per-unit cost of $15,642 per year. TSA multiplies the per-unit cost by the number of out-of-warranty AIT units in-service per year for each year of the analysis period.

Maintenance costs also include a ticketing call center and general maintenance support services.[59] The call center covers the maintenance requests, while the general maintenance support services manage all maintenance-related projects, including day-to-day logistics. TSA uses contractors to supply these services for the suite of PSP technologies. To allocate the cost to AIT, TSA scales the annual maintenance cost by the relative cost of maintenance for all other technologies, estimated at 19.3 percent in 2013.[60] TSA uses this percentage for all years of the analysis period. From this methodology, the call center costs $14,787,267 annually (19.3 percent x $76,617,964) while the general maintenance support services cost $5,762,579, annually (19.3 percent x $29,857,921).[61] TSA estimates the cost of maintenance, call centers, and support services from 2008-2011 as approximately $83.2 million (undiscounted). From 2012-2015, TSA projects the cost of maintenance, call centers, and support services to be approximately $117.6 million undiscounted, $109.0 million with three percent discounting, and $99.1 million with

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[58] Siemens – HSTS04 – 09 – C – CT3173 contract supports the out-of-warranty maintenance with an estimated $15,642 per-unit cost.

[59] These services, as a part of the larger PSP, existed before and after the onset of AIT. TSA estimates a constant cost for these services each year since the contract remained unchanged by AIT and thus independent of the AIT units deployed.

[60] In the PSP program, TSA dedicates 19.3 percent of total maintenance costs to AIT in 2013 ($12,875,901 AIT maintenance cost / $66,638,785 total maintenance cost).

[61] Siemens – HSTS04 – 09 – C – CT3173 contract supports the call center; Logical Essence – HSTS04 – 09 – C – CT3101 and GST – Task Order 2 – HSTS04 – 10 – J – CT305 provide general support services.

seven percent discounting. Table 41 reports prior year costs (2008-2011), while Table 42 shows the additional costs TSA attributes to this rulemaking (2012-2015).[62]

Table 41: Maintenance Costs, Call Center, and Support Services from 2008-2011

(Costs already incurred in $ 1,000s – undiscounted)

Year	**Units In-service** a	**Out-of-Warranty Maintenance** b = a x $15,642	**Call Center** c = $14,787,267	**Support Services** d = $5,762,579	**Total** e = b + c + d
2008	0	$0.0	$14,787.3	$5,762.6	$20,549.8
2009	0	$0.0	$14,787.3	$5,762.6	$20,549.8
2010	30	$469.3	$14,787.3	$5,762.6	$21,019.1
2011	32	$500.5	$14,787.3	$5,762.6	$21,050.4
Total	**62**	**$969.8**	**$59,149.1**	**$23,050.3**	**$83,169.2**

[62] For 2008, TSA estimates the total maintenance, call center, and support services costs by calculating the costs for each of these components and summing the results to obtain the total cost. TSA estimates the maintenance cost by multiplying the number of AIT units in-service by the per-unit maintenance cost of $15,642 to obtain a total maintenance cost of $0 (0 x $15,642) in 2008. TSA then adds to this maintenance cost the annual call center cost ($14,787,267) and annual support services cost ($5,762,579) to obtain a total maintenance, call center, and support services cost of $20,549,846 ($0 + $14,787,267 + $5,762,579) in 2008. TSA repeats these calculations for each year of the analysis period using the appropriate number of AIT units assumed to be out of warranty in each year.

Table 42: Maintenance Costs, Call Center, and Support Services of the Proposed Rule from 2012-2015

(AIT Costs in $ 1,000s)

Year	**Units In-service** a	**Out-of-Warranty Maintenance** b = a x $15,642	**Call Center** c = $14,787,267	**Support Services** d = $5,762,579	**Total** e = b + c + d
2012	490	$7,664.6	$14,787.3	$5,762.6	$28,214.4
2013	309	$4,833.4	$14,787.3	$5,762.6	$25,383.2
2014	732	$11,449.9	$14,787.3	$5,762.6	$31,999.8
2015	732	$11,449.9	$14,787.3	$5,762.6	$31,999.8
Total	**2,263**	**$35,397.8**	**$59,149.1**	**$23,050.3**	**$117,597.2**
				3 % Discounting	$109,034.5
				7 % Discounting	$99,073.2

Test and Evaluation

Before any new technology enters the field, TSA performs several stages of testing and evaluation. This section outlines these stages of testing and evaluation, from before procurement to final deployment.

In the initial stage, TSA performs qualification test and evaluation (QT&E). QT&E is a critical phase that evaluates a system's ability to meet the technical requirements specified by TSA and reflects the first test stage prior to procurement. QT&E occurs at two facilities, the Transportation Security Laboratory (TSL) and TSA Systems Integration Facility (TSIF). These two facilities perform testing independently on each technology. To estimate the cost for AIT testing, TSA scales the total cost of the facilities by the 40.5 percent acquisition price ratio developed earlier to estimate a cost of $5,896,778 for QT&E ($7,279,973 per facility x 2 facilities x 40.5 percent). QT&E occurs when TSA first considers a technology and in any subsequent upgrades of that technology, which TSA assumed to occur every two years.[63]

Next, TSA performs the operational test and evaluation (OT&E). This sequence of testing independently validates the extent to which candidate systems are operationally effective and suitable in the airport environment as well as safety testing for radiation emission. TSA estimates that, for each technology, 15 OT&Es will occur for a total cost of $613,905 ($40,927 per OT&E × 15 OT&Es per technology). Again, TSA assumes this cost occurs for each manufacturer initially and for subsequent upgrades every two years. In 2014, after the removal of the Rapiscan units, OT&E only occurs for the L3 technology.

The next two stages of testing consist of the factory acceptance test (FAT) and the site acceptance test (SAT). FATs are conducted at the Original Equipment Manufacturer (OEM) facility and SATs are conducted on-site at the airports. Both are conducted through TSA's Test & Evaluation Support Services contracts. A FAT and a SAT occur for each unit before initial deployment. Based on current TSA cost data, a FAT and a SAT cost $501and $864 per unit, respectively.[64] FATs and SATs occur for the 60 L3 units with delayed deployment, however the FAT occurs in 2012 and the SAT occurs in 2013. For the reallocated L3 units, TSA includes SAT costs in the reallocations costs under the Systems Integration costs in Table 36.[65]

TSA incurs program management costs (PMO) to run and facilitate the various stages of testing. Because TSA manages all technologies under this contract, TSA applies the 40.5 percent acquisition price ratio to the total cost of support services. PMO testing costs $1,383,095

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[63] To be conservative, TSA assumes the full QT&E cost for each upgrade. QT&E tends to be less extensive for subsequent upgrades compared to the full testing of the new technology.

[64] FAT and SAT costs are based on the Battelle HSTS04-05-D-DEP027 contract costs in 2009 inflated to 2011 dollars.

[65] FATs already occurred for these 60 AIT units when the units were originally deployed.

annually (40.5 percent x $3,415,049). TSA estimates these costs separately from the general PSP PMO cost.

Finally, TSA uses a large contract that supports engineering services, changes, and initiatives. TSA accounts for the research and additional cost of upgrading the technology from AIT with IO to AIT with ATR and other subsequent research and development associated with the AIT platform. Again, this large contract covers the suite of technologies in the PSP. To allocate a portion of these costs to AIT, TSA scales the total cost by the 40.5 percent acquisition price ratio and estimates a cost of $18,802,859 million (40.5 percent x $46,426,811). This cost occurs in the years prior to testing.

TSA estimates the cost of testing and evaluation from 2008-2011 as approximately $55.4 million (undiscounted). From 2012-2015, TSA projects the cost of testing and evaluation to be approximately $54.7 million undiscounted, $50.6 million with three percent discounting, and $45.8 million with seven percent discounting. Table 43 reports prior year costs (2008-2011), while Table 44 shows the additional costs TSA attributes to this rulemaking (2012-2015).[66]

[66] For 2008, TSA estimates the testing and evaluation cost by calculating the costs for each of the components of testing and evaluation and summing the results to obtain the total cost. TSA estimates the QT&E cost at $5,896,778 in 2008. TSA estimates the OT&E cost by multiplying the OT&E cost for each technology ($613,905) by two to account for each technology, resulting in a total OT&E cost of $1,227,810 ($613,905 x 2) in 2008. TSA estimates the FAT/SAT cost by multiplying the number of AIT units deployed in 2008 (30) by the combined total FAT/SAT cost of $1,365 ($501 + $864), resulting in a total cost FAT/SAT cost of $40,950 (30 x $1,365) in 2008. TSA includes only engineering services ($18,802,859) in odd years, so engineering services cost is not incurred in 2008. TSA then sums the cost in 2008 for QT&E ($5,896,778), OT&E ($1,227,810), FAT/SAT ($40,950), and PMO ($1,383,095) to obtain a total cost for testing and evaluation of $8,548,633 in 2008. TSA repeats these calculations for each year of the analysis period using the appropriate number of AIT units and system upgrades in each year.

Table 43: Testing and Evaluation Cost from 2008-2011

(Costs already incurred in $ 1,000s – undiscounted)

Year	**QT&E Cost** a = $5,896,778 (every 2 years)	**OT&E Cost** b = 2 x $613,905 (every 2 years)	**FAT/SAT Cost** c = AIT newly deployed x ($501+ $864)	**PMO Cost** d = $1,383,095 (every 2 years)	**Engineering Services Cost** e = $18,802,859 (every 2 years)	**Total Cost** f = a + b + c + d + e
2008	$5,896.8	$1,227.8	$41.0	$1,383.1	$0.0	$8,548.6
2009	$0.0	$0.0	$2.7	$0.0	$18,802.9	$18,805.6
2010	$5,896.8	$1,227.8	$625.2	$1,383.1	$0.0	$9,132.9
2011	$0.0	$0.0	$94.2	$0.0	$18,802.9	$18,897.0
Total	$11,793.6	$2,455.6	$763.0	$2,766.2	$37,605.7	$55,384.1

Table 44: Testing and Evaluation Cost of the Proposed Rule from 2012-2015

(AIT Costs in $ 1,000s)

Year	**QT&E Cost** a = $5,896,778 (every 2 years)	**OT&E Cost** b = 2 x $613,905 (every 2 years)	**FAT/SAT Cost** c = AIT newly deployed x ($501+ $864)[67]	**PMO Cost** d = $1,383,095 (every 2 years)	**Engineering Services Cost** e = $18,802,859 (every 2 years)	**Total Cost** f = a + b + c + d + e
2012	$5,896.8	$1,227.8	$525.6	$1,383.1	$0.0	$9,033.2
2013	$0.0	$0.0	$51.8	$0.0	$18,802.9	$18,854.7
2014	$5,896.8	$613.9	$60.1	$1,383.1	$0.0	$7,953.8
2015	$0.0	$0.0	$102.4	$0.0	$18,802.9	$18,905.2
Total	**$11,793.6**	**$1,841.7**	**$739.8**	**$2,766.2**	**$37,605.7**	**$54,747.0**
					3 % Discounting	$50,618.4
					7 % Discounting	$45,826.1

Program Management Office Cost

Several PMO costs occur to manage the PSP. PMO costs for the PSP include budget and financing, acquisition program documentation, deployment support, program support, testing and evaluation planning, communications support, executive support and other costs relating to managing the program. To run the PSP program, TSA provides internal PMO support and outside contractor support.[68] Because PMO support is less related to the cost of technologies and

[67] TSA assumes that the 2013 delayed deployment L3 units underwent FATs in 2012 and SATs in 2013. FATs occur before acquisition while SATs occur at deployment to the airport.

[68] Delloitte – HSTS04 – 08 – F – CT8600 contract supports the PSP program.

more related to the day-to-day support of the program, TSA is unable to directly allocate spending specifically to AIT. However, TSA estimates that 10 percent of the total PSP cost is dedicated to PMO. To indirectly account for these costs to AIT, TSA estimates a hypothetical PMO cost of 10 percent of the total cost of AIT. To estimate an annual PMO cost, TSA multiplies the total AIT cost by 10 percent and then divides the PMO cost evenly over the eight years ($515,723,196 x 10 percent / 8 years = $6,446,540).

TSA estimates the cost of PMO from 2008-2011 as approximately $25.8 million (undiscounted). From 2012-2015, TSA projects the cost of PMO to be approximately $25.8 million undiscounted, $24.0 million with three percent discounting, and $21.8 million with seven percent discounting. Table 45 reports prior year costs (2008-2011), while Table 46 shows the additional costs TSA attributes to this rulemaking (2012-2015).

Table 45: PMO Cost from 2008-2011

(Costs already incurred in $ 1,000s – undiscounted)

Year	**AIT Cost** a_1	**PMO Cost** $b = \sum(a_{1+} a_2) \times 10\% / 8$	**AIT Total Cost** c = a + b
2008	$34,602.0	$6,446.5	$41,048.5
2009	$39,722.3	$6,446.5	$46,168.9
2010	$116,159.6	$6,446.5	$122,606.1
2011	$52,605.5	$6,446.5	$59,052.0
Total	$243,089.4	$25,786.2	$268,875.5

Table 46: PMO Cost from of the Proposed Rule 2012-2015

(AIT Costs in $ 1,000s)

Year	**AIT Cost** a_2	**PMO Cost** $b = \sum(a_{1+} a_2) \times 10\% / 8$	**AIT Total Cost** $c = a + b$
2012	$113,541.2	$6,446.5	$119,987.8
2013	$46,375.9	$6,446.5	$52,822.5
2014	$48,030.9	$6,446.5	$54,477.5
2015	$64,685.8	$6,446.5	$71,132.3
Total	$272,633.8	$25,786.2	$298,420
	3 % Discounting	$23,962.4	$279,337.9
	7 % Discounting	$21,835.8	$257,011.6

Baseline Cost

To estimate the net cost of AIT, TSA accounts for the costs that would have occurred without the introduction of AIT. TSA estimates the total number of WTMDs that would be in operation independent of the deployment of AIT based on the screening environment prior to 2008 projected for 2008 through 2015. TSA subtracts these WTMD related costs from the total AIT costs, because these costs would have occurred even if AIT had not been deployed. For the baseline, TSA assumes that WTMD continues as the primary technology in the airport screening environment. To estimate the cost of using WTMD, TSA uses the cumulative total WTMD data for 2008 through 2011. Before AIT, TSA was undergoing an optimization plan for WTMD eliminating modsets using two WTMD and one personal item x-ray machine in favor of one WTMD and one personal item x-ray machine. For the baseline assumptions, TSA assumes this process would continue and optimization would be reached at 1,333 WTMD by 2014.[69] To project the number of WTMD in 2013, TSA assumes the midpoint of the known WTMD in 2012[70] and the optimization level of 1,333 in 2014. TSA assumes no acquisition, installation, or integration costs for the baseline because no new equipment would be purchased under the optimization strategy.[71] In addition, TSA assumes that no new testing and evaluation costs would be incurred under the baseline scenario. WTMD related costs subtracted from AIT costs include a maintenance cost and PMO cost. The process of estimating WTMD related costs parallels the methodology used for estimating the cost of AIT.

TSA assumes an annual maintenance cost of $721 per WTMD.[72] As with AIT, maintenance costs also include a ticketing call center and general maintenance support services. To allocate the cost to WTMDs, TSA scales the annual maintenance cost by the relative cost of maintenance to all other technologies. The WTMD maintenance cost comprises 1.7 percent of total maintenance costs in the PSP. Because WTMDs are the veteran technology, TSA assumes the cost to the call center and maintenance support services to be less than that of the new AIT. Multiplying the total contract cost by 1.7 percent, TSA estimates the cost of the call center to be $1,302,505 annually ($76,617,964 x 1.7 percent) and the general maintenance support services to be $507,585 annually ($29,857,921 x 1.7 percent).[73] TSA nets out these costs from the AIT total costs to only estimate the incremental cost of AIT over the baseline. For example, as discussed above, TSA assumes that 40.5 percent of these maintenance contracts are dedicated to AIT.

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[69] Although TSA estimates 821 total AIT units in the field in 2015, the reallocation strategy hinges on using WTMD for low utilization lanes, smaller airports and the Pre✓™ program included in the 1,333 estimate of WTMD.

[70] TSA uses known number of WTMDs in the field in 2012 up until May 2012.

[71] Based on the current fleet of WTMDs, TSA assumes the optimization strategy would target units nearing the end of their lifecycle and therefore does not consider an additional disposal cost for end of life cycle for WTMDs.

[72] Siemens – HSTS04 – 09 – C – CT3173 contract supports the out-of-warranty maintenance. Based on the contract TSA estimates the out-of-warranty maintenance cost at $721 per WTMD.

[73] Siemens – HSTS04 – 09 – C – CT3173 contract supports the call center; Logical Essence – HSTS04 – 09 – C – CT3101 and GST – Task Order 2 – HSTS04 – 10 – J – CT305 provide general support services.

However, without AIT, 1.7 percent of these contracts would cover the services for WTMD. By netting out these costs, TSA estimates the additional cost of AIT to the PSP.

As with AIT total costs, TSA assumes a level of PMO costs for WTMDs. As before, this cost reflects 10 percent of the total estimated costs distributed evenly over the eight-year analysis period, or $308,482 ($24,678,544 x 10 percent / 8 years). TSA estimates the baseline cost from 2008-2011 as approximately $14.2 million (undiscounted). From 2012-2015, TSA projects the baseline cost to be approximately $12.9 million undiscounted, $12.0 million with three percent discounting, and $11.0 million with seven percent discounting. Table 47 reports prior year costs (2008-2011), while Table 48 shows the additional costs TSA attributes to this rulemaking (2012-2015).[74] TSA subtracts this cost from the total AIT cost to obtain the estimated cost above the baseline.

[74] For 2008, TSA estimates the baseline cost by calculating the costs for maintenance, disposal, and PMO separately and then summing the results to obtain the total cost. TSA estimates the WTMD maintenance cost in 2008 by multiplying the cumulative number of WTMDs deployed (2,087) by the per-unit maintenance cost ($721) and adds to this cost the estimated call center cost ($1,302,505) and general maintenance cost ($507,585). This calculation results in a total maintenance cost of $3,314,817 ((2,087 x $721) + $1,302,505 + $507,585) in 2008. TSA estimates the PMO cost by multiplying the sum of maintenance costs by 10 percent, resulting in a total PMO cost of $308,482 ($24,678,544 x 10% / 8 years) in 2008. TSA then sums these cost components to obtain a total baseline cost of 3,623,299 ($3,314,817 + $308,482) in 2008. TSA repeats these calculations for each year of the analysis period using the appropriate number of WTMD units in each year.

Table 47: Cost of a WTMD Centered Screening Environment in the Absence of AIT from 2008-2011

(Costs already incurred in $ 1,000s – undiscounted)

Year	**Baseline Cumulative WTMD** a	**Maintenance Cost** b = a x $721 + $1,302,505+ $507,585	**PMO Cost** c = ∑b x 10%/ 8 years	**Total Cost** d = b + c
2008	2,087	$3,314.8	$308.5	**$3,623.3**
2009	2,062	$3,296.8	$308.5	**$3,605.3**
2010	1,917	$3,192.2	$308.5	**$3,500.7**
2011	1,895	$3,176.4	$308.5	**$3,484.9**
Total	**1,895**	**$12,980.2**	**$1,233.9**	**$14,214.2**

Table 48: Cost of a WTMD Centered Screening Environment in the Absence of AIT for 2012-2015[75]

(WTMD Costs in $ 1,000s)

Year	**Baseline Cumulative WTMD** a	**Maintenance Cost** b = a x $721 + $1,302,505+ $507,585	**PMO Cost** c = ∑b x 10% / 8 years	**Total Cost** d = b + c
2012	1,900	$3,180.0	$308.5	**$3,488.5**
2013	1,617	$2,975.9	$308.5	**$3,284.4**
2014	1,333	$2,771.2	$308.5	**$3,079.7**
2015	1,333	$2,771.2	$308.5	**$3,079.7**
Total	**1,333**	**$11,698.3**	**$1,233.9**	**$12,932.2**
			3 % Discounting	$12,037.3
			7 % Discounting	$10,992.4

Total Life Cycle Costs

TSA estimates the life cycle costs of AIT accounting for the acquisition, installation, integration, maintenance, testing and evaluation, and PMO costs. To estimate the impact on society, TSA nets out the assumed baseline costs of WTMDs. TSA estimates the total life cycle cost from 2008-2011 as approximately $254.7 million (undiscounted). From 2012-2015, TSA projects the total life cycle cost to be approximately $287.6 million undiscounted, $267.4 million with three percent discounting, and $246.1 million with seven percent discounting. Table 49 reports prior

[75] This table reflects TSA's best estimate of the cost of the screening environment absent AIT from 2012 to 2015.

year costs (2008-2011), while Table 50 shows the additional costs TSA attributes to this rulemaking (2012-2015).[76]

Table 49: TSA Total Life Cycle Cost from 2008-2011

(Costs already incurred in $ 1,000s – undiscounted)

Year	**Acquisition/ Installation/ Integration/ Disposal/ Removal Cost** a	**Maintenance Cost** b	**Testing and Evaluation Cost** c	**PMO Cost** d	**L3 Reallocation** e	**Baseline Cost** f	**Total Cost** f = a + b + c + d + e - f
2008	$5,503.5	$20,549.8	$8,548.6	$6,446.5	$0.0	$3,623.3	**$37,425.2**
2009	$366.9	$20,549.8	$18,805.6	$6,446.5	$0.0	$3,605.3	**$42,563.6**
2010	$86,007.6	$21,019.1	$9,132.9	$6,446.5	$0.0	$3,500.7	**$119,105.4**
2011	$12,658.1	$21,050.4	$18,897.0	$6,446.5	$0.0	$3,484.9	**$55,567.2**
Total	$104,536.1	$83,169.2	$55,384.1	$25,786.2	$0.0	$14,214.2	**$254,661.3**

[76] These totals do not reflect the cost to the Rapiscan Company to remove their technology, TSA includes these costs in the final summary tables.

Table 50: TSA Total Life Cycle Cost of the Proposed Rule from 2012-2015
(AIT Costs in $ 1,000s)

Year	Acquisition/ Installation/ Integration/ Disposal/ Removal Cost** a	Maintenance Cost b	Testing and Evaluation Cost c	PMO Cost d	L3 Re-allocation e	Baseline Cost f	Total Cost f = a + b + c + d + e - f
2012	$76,293.6	$28,214.4	$9,033.2	$6,446.5	$0.0	$3,488.5	**$116,499.3**
2013*	$2,138.0	$25,383.2	$18,854.7	$6,446.5	$2,050.8	$3,284.4	**$51,588.8**
2014	$8,077.3	$31,999.8	$7,953.8	$6,446.5	$0.0	$3,079.7	**$51,397.8**
2015	$13,780.8	$31,999.8	$18,905.2	$6,446.5	$0.0	$3,079.7	**$68,052.6**
Total	**$100,289.6**	**$117,597.2**	**$54,747.0**	**$25,786.2**	**$2,050.8**	**$12,932.2**	**$287,538.5**
3% Discounting	$95,722.6	$109,034.5	$50,618.4	$23,962.4	$1,933.0	$12,037.3	**$269,233.6**
7% Discounting	$90,276.5	$99,073.2	$45,826.1	$21,835.8	$1,791.2	$10,992.4	**$247,810.4**

*Estimates in 2013 reflect a weighted average based on the removal of Rapiscan units. See Appendix B.

** Removal cost for TSA includes 76 Rapiscan unit removals in 2012 by TSA.

TSA Utility Costs

As previously mentioned, TSA incurs an increase in the cost of utilities from the added power consumption of AIT machines at reimbursed airports. The methodology to estimate the increased utility costs parallels the methodology used for industry costs; the airport utilities section describes the derivation of the electricity cost. TSA estimates the TSA utility costs from 2008-2011 as approximately $549,600 (undiscounted). From 2012-2015, TSA projects the TSA utility costs to be approximately $1.5 million undiscounted, $1.4 million with three percent discounting, and $1.3 million with seven percent discounting. Table 51 reports prior year costs (2008-2011), while Table 52 shows the additional costs TSA attributes to this rulemaking (2012-2015).[77]

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[77] TSA calculates the per-unit utility cost per day as a weighted average of the power used to perform a scan and the power used while the system is idle. TSA assumes that the system will be operational for 16 hours (16 hours / 24 hours) of a day and idle for 8 hours (8 hours / 24 hours) of a day. TSA then estimates the weighted average of kW used per hour by taking the sum of the power consumption when the system is in operation (1.02) multiplied by the fraction of a day the system is in operation (16 hours / 24 hours) and the power consumption when the system is idle (0.70) multiplied by the percent of a day the system is idle (8 hours / 24 hours). This calculation results in an average kW used per hour of 0.9133 ((1.02 x (16/24)) + (0.70 x (8/24))). TSA then calculates the average kW used per day by multiplying the kW used per hour (0.9133) by 24 hours to obtain an average of 21.92 kWh per day (0.9133 x 24). TSA then multiplies this average number of kWh per day by the cost per kWh ($0.1019) to obtain a per-unit utility cost per day of $2.234 (21.92 x $0.1019). TSA uses $2.234 as the input for all per-unit utility cost for AIT. For WTMDs, TSA follows a similar formulation but assumes that the power consumption while operational and idle is 0.04 kW, with a per-day cost of $0.96 and a per unit cost of $0.098.

Table 51: TSA Utility Costs from 2008-2011

(Costs already incurred in $ 1,000s – undiscounted)

Year	**AITs at Reimbursed Airports**		**WTMDs at Reimbursed Airports**		**Total Cost** e = b - d
	AIT Units In-service a	**AIT Cost** b = a x $2.234 x 365	**Removed WTMD Units (Cumulative)** c	**WTMD Cost** d = c x $0.098 x 365	
2008	23	$18.8	0	$0.0	**$18.8**
2009	25	$20.4	0	$0.0	**$20.4**
2010	296	$241.4	0	$0.0	**$241.4**
2011	330	$269.1	0	$0.0	**$269.1**
Total	**674**	**$549.6**	**0**	**$0.0**	**$549.6**

Table 52: TSA Utility Costs of the Proposed Rule from 2012-2015

(AIT Costs in $ 1,000s)

Year	AITs at Reimbursed Airports		WTMDs at Reimbursed Airports		Total Cost
	AIT Units In-service a	**AIT Cost** b = a x $2.23 x 365	**Removed WTMD Units (Cumulative)** c	**WTMD Cost** d = c x $0.10 x 365	**Total Cost** e = b - d
2012	581	$473.8	20	$0.7	**$473.0**
2013*	399	$325.3	27	$1.0	**$324.4**
2014	391	$318.8	31	$1.1	**$317.7**
2015	450	$366.9	34	$1.2	**$365.7**
Total	**1821**	**$1,484.9**	**112**	**$4.0**	**$1,480.9**
				3% Discounting	$1,380.7
				7% Discounting	$1,263.8

*Estimates in 2013 reflect a weighted average based on the removal of Rapiscan units. See Appendix B.

Total Cost

TSA reports that the net cost of AIT deployment from 2008-2011 has been approximately $841.2 million (undiscounted) and that TSA has borne over 99 percent of installation and operational costs related to AIT deployment. TSA projects that from 2012-2015 total AIT-related costs will be approximately $1.5 billion (undiscounted), $1.4 billion at a three percent discount rate and $1.3 billion at a seven percent discount rate. During 2012-2015, TSA estimates it will also incur over 98 percent of AIT-related costs with equipment and personnel costs being the largest categories of costs. Table 53 below reports the costs that have already happened (2008-2011) by cost category, while Table 54 shows the additional costs TSA is attributing to this rulemaking (2012-2015).

Table 53: Net Cost Summary of AIT Deployment from 2008-2011 by Cost Component

(Costs already incurred in $ 1,000s - undiscounted)

Year	Passenger Opt-Outs	Industry Utilities	TSA Costs				Total
			Personnel	Training	Equipment	Utilities	
2008	$7.0	$5.7	$14,689.1	$389.5	$37,425.2	$18.8	$52,535.3
2009	$32.2	$5.7	$15,618.6	$88.0	$42,563.6	$20.4	$58,328.5
2010	$262.2	$158.2	$247,566.7	$5,332.8	$119,105.4	$241.4	$372,666.6
2011	$1,384.2	$186.7	$284,938.7	$15,354.4	$55,567.2	$269.1	$357,700.2
Total	**$1,685.6**	**$356.3**	**$562,813.0**	**$21,164.7**	**$254,661.3**	**$549.6**	**$841,230.6**

Table 54: Cost Summary of Proposed Rule (Net Cost of AIT Deployment 2012-2015) by Cost Component

(AIT Costs in $ 1,000s)

Year	Passenger Opt-Outs	Industry Utilities	TSA Costs				Rapiscan	Total
			Personnel	Training	Equipment **	Utilities	Removal	
2012	$2,716.5	$325.7	$375,866.9	$12,043.0	$116,499.3	$473.0	$0.0	$507,924.4
2013*	$3,991.7	$329.3	$280,844.3	$4,277.5	$51,588.8	$324.4	$1,809.6	$343,165.7
2014	$4,238.7	$312.0	$263,677.6	$4,190.5	$51,397.8	$317.7	$0.0	$324,134.2
2015	$5,611.8	$300.3	$278,580.2	$4,144.2	$68,052.6	$365.7	$0.0	$357,054.9
Total	**$16,558.7**	**$1,267.3**	**$1,198,969.0**	**$24,655.2**	**$287,538.5**	**$1,480.9**	**$1,809.6**	**$1,532,279.2**
Discounted 3%	$15,265.0	$1,178.9	$1,118,459.3	$23,810.2	$269,233.7	$1,380.7	$1,705.7	$1,431,033.5
Discounted 7%	$13,766.6	$1,075.8	$1,024,344.7	$22,048.8	$247,810.4	$1,263.8	$1,580.6	$1,311,890.7

*Estimates in 2013 reflect a weighted average based on the removal of Rapiscan units. See Appendix B.

**Equipment costs for TSA include acquisition, operation, maintenance, Rapiscan unit removal in 2012 by TSA and reallocation of AIT units.

Qualitative Impacts

This section describes qualitatively the potential impacts AIT has on privacy and health and the steps TSA has implemented to address any concerns passengers may have on both issues.

Privacy

TSA has addressed privacy concerns by removing all AIT machines without ATR from its checkpoints. As part of the Federal Aviation Administration Modernization and Reform Act of 2012, Congress mandated that all AIT units must be equipped with ATR by June 1, 2012.[78] As permitted by law, the deadline was extended to June 1, 2013. All of the millimeter wave units have been equipped with the ATR software. Rapiscan general-use backscatter units, without ATR, currently deployed at TSA checkpoints are being removed from operation by Rapiscan.[79] By June 1, 2013, only AIT equipped with ATR will be used at TSA checkpoints.

Machines equipped with ATR software create a generic outline that is displayed on a screen located on the AIT equipment and is viewable by the public. The software auto-detects anomalies concealed on the body that are then resolved through additional screening. The use of the ATR software enhances passenger privacy by eliminating the individual image as well as the need for a TSO to view the image for anomalies. ATR-enabled units deployed at airports are not capable of storing or printing the generic outline that will be visible to passengers (for additional discussion on AIT equipment and privacy safeguards see NPRM section III. *AIT Screening Protocols*). Examples of the generic outline that the ATR software produces are available on TSA's web site.[80] Even before the development of the ATR software, TSA instituted rigorous safeguards to protect the privacy of individuals who are screened using AIT. In addition, as noted by the Court in EPIC, the DHS Chief Privacy Officer has conducted several Privacy Impact Assessments (PIAs) on the use of AIT equipment to ensure that the public's privacy concerns related to AIT screening are adequately addressed. The PIA describes the strict measures TSA uses to protect privacy. The most recent update to the PIA is posted on the DHS website (http://www.dhs.gov/xlibrary/assets/privacy/privacy-pia-tsa-ait.pdf) is available in the docket for this rulemaking.

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[78] P.L. 112-95

[79] http://blog.tsa.gov/2013/01/rapiscan-backscatter-contract html.

[80] http://www.tsa.gov/ait-how-it-works

TSA's currently deployed AIT equipment do not produce photographs, nude or otherwise, nor do the units produce identifiable images of individuals that would enable personal identification. To protect passenger privacy, for the backscatter AIT machines, TSA requirements dictate that a filter be applied that displays body contours and outlines, rather than a detailed image of a person's anatomy. Prior to the ATR upgrade on the millimeter wave AIT equipment, imaging software was required to blur the face on the resulting image. While more graphic images purportedly from the AIT machines have been circulated in the media, those images are not the type used by TSA's AIT equipment.

All images generated by an AIT unit without the ATR software are viewed by a trained TSO in a locked, remote location. The anonymity of the individual being screened is preserved, since the TSO assisting the individual at the AIT unit never views the image, and the TSO viewing the image never sees the individual being screened. No TSA personnel are permitted to view both the image and the individual. The two TSOs communicate using wireless headsets. If an anomaly is discovered on the image, TSA procedures require TSOs to use additional inspection methods to determine whether the anomaly is a threat. These methods may include visual inspection, and/or a pat-down to resolve the anomaly.

The AIT equipment that TSA deploys currently does not store, export, or print any images. Storage capability is disabled prior to deployment and TSA airport personnel are not able to activate the storage capability. In addition, the backscatter images are transmitted securely between the unit and the viewing room so they cannot be lost, modified, or disclosed. The images produced by the backscatter units are encrypted during transmission.[81] The images are deleted from the display in the viewing room when the individual is cleared. TSOs in the viewing room are prohibited from bringing electronic devices such as cameras, cell phones, or other recording devices into the room. Violations of these procedures subject the TSO to disciplinary action, which could include termination.

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[81] Prior to the ATR upgrade, images transmitted by the millimeter wave units were in a proprietary format that could only be viewed with proprietary equipment.

Finally, to give further effect to the Fair Information Practice Principles that are the foundation for privacy policy and implementation at DHS, individuals may opt-out of the AIT in favor of physical screening. TSA also provides notice of the use of AIT and the opt-out option at the checkpoint so that individuals may exercise an informed judgment on AIT.

TSA believes it has adequately addressed privacy concerns by removing all AIT machines without ATR from its checkpoint, adopting the use of ATR software in all its new machines and by providing an "opt-out" measure where the passenger can have a pat-down done by a TSO of the same gender. The additional time spent in the pat-down is captured in the Passenger Opportunity Cost Section of this Initial Regulatory Impact Analysis. TSA seeks comments on any aspect of privacy not addressed or any additional sources of information.

Health

AIT equipment has been subject to extensive testing that has confirmed that it is safe for individuals being screened, equipment operators, and bystanders. The exposure to ionizing x-ray beams emitted by the backscatter machines that are being removed pursuant to statue, as well as the non-ionizing electromagnetic waves from the millimeter wave machines is well within the limits allowed under relevant national health and safety standards. Prior to procuring and deploying both backscatter and millimeter wave AIT equipment, TSA tested the units to determine whether they would be safe for use in passenger screening. As explained below, TSA determined that the general-use backscatter and millimeter wave technologies were safe for use in screening the public because the x-ray and radio waves emissions were so low as to present a negligible risk to passengers, airline crew members, airport employees, and TSA employees (for discussion on AIT safety see NPRM section C *Safety of AIT*).

1. Millimeter Wave Units

The millimeter wave AIT systems that will be the only technology deployed at the checkpoint as of June 1, 2013 use nonionizing radio frequency energy in the millimeter wave spectrum to generate a three-dimensional image based on the energy reflected from the body. Millimeter wave imaging technology meets all known national and international health and safety standards. In fact, the energy emitted by millimeter wave technology is 1,000 times less than the international limits and guidelines. The millimeter wave AIT systems that TSA uses must comply with the 2005 Institute of Electrical and Electronics Engineers, Inc. Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields (IEEE Std. C95.1™-2005) as well as the International Commission on Non-Ionizing Radiation Protection Guidelines for Limiting Exposure to Time-Varying Electric, Magnetic, and Electromagnetic Fields, Health Physics 74(4); 494-522, published April 1998. TSA's millimeter wave units are also consistent with Federal Communications Commission OET Bulletin 65, Health Canada Safety code 6, and RSS-102 Issue 3 for Canada. The FDA has also confirmed that millimeter wave security systems that comply with the IEEE Std. C95.1™-2005 cause no known adverse health effects.[82]

2. Backscatter Units

As required by statute, TSA will remove all currently deployed Rapiscan backscatter units by May 31, 2013. When in use, TSA addressed potential health concerns regarding the ionizing radiation emitted by general-use backscatter technology, TSA's procurement specifications required that the backscatter units must conform to American National Standards Institute/Health Physics Society (ANSI/HPS) N43.17, a consensus radiation safety standard approved by ANSI and HPS for the design and operation of security screening systems that use ionizing radiation .[83] The ANSI/HPS N43.17 standard was first published in 2002 and revised in 2009.[84] The

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[82] http://www fda.gov/Radiation-EmittingProducts/RadiationEmitting.ProductsandProcedures/SecuritySystems/ucm227201.htm.

[83] American National Standards Institute is a private, non-profit organization that administers and coordinates the U.S. voluntary standards and conformity assessment system. The Institute oversees the development and use of voluntary consensus standards by providing neutral, third-party accreditation of the procedures used by standards developing organizations, and approving their documents as American National Standards. Health Physics Society is a scientific organization of professionals who specialize in radiation safety. Its mission is to support its members and to promote excellence in the science and practice of radiation safety. As an independent nonprofit scientific organization, HPS is not affiliated with any government or industrial organization or private entity.

[84] American National Standard. "Radiation Safety for Personnel Security Screening Systems Using X-Ray or Gamma Radiation," ANSI/HPS N43.17 (2009); Health Physics Society; McLean, VA. Copies can be ordered at: http://webstore.ansi.org/faq.aspx#resellers.

annual dose limits in ANSI/HPS N43.17 are based on dose limit recommendations for the general public published by the National Council on Radiation Protection and Measurements in Report 116, "Limitations of Exposure to Ionizing Radiation."[85] The dose limits were set with consideration given to individuals, such as pregnant women, children and persons who receive radiation treatments, who may be more susceptible to radiation health effects. Further, the standard also takes into consideration the fact that individuals are continuously exposed to ionizing radiation from the environment. The ANSI/HPS N43.17 sets the maximum permissible dose of ionizing radiation from a general-use system per security screening at 0.25 microsieverts.[86] The standard also requires that individuals should not receive 250 microsieverts or more from a general-use x-ray security screening system in a year.

The radiation dose (effective dose) a passenger receives from a general-use backscatter AIT screening has been independently evaluated by the Food and Drug Administration's (FDA's) Center for Devices and Radiological Health, the National Institute for Standards and Technology, and the Johns Hopkins University Applied Physics Laboratory (JHU/APL). All results affirmed that the effective dose for individuals being screened, operators, and bystanders was well below the dose limits specified by ANSI.[87] These results were confirmed in a report issued by the DHS Office of Inspector General (OIG) in February 2012.[88] The OIG report found that the independent surveys show that backscatter radiation levels are below the established limits and that TSA complied with ANSI radiation safety requirements.

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[85] The National Council on Radiation Protection and Measurements was founded in 1964 by Congress to cooperate with the International Commission on Radiological Protection, the Federal Radiation Council, the International Commission on Radiation Units and Measurements, and other national and international organizations, both governmental and private, concerned with radiation quantities, units, and measurements as well as radiation protection. The report is available at www ncrponline.org.

[86] The biological effect of radiation is measured in sieverts (Sv). One sievert equals 1,000 millisieverts and one millisievert equals 1,000 microsieverts.

[87] TSA's website at www.tsa.gov contains many articles and studies that discuss AIT safety, including a description of the built-in safety features of the Rapiscan Secure 1000, an Archives of Internal Medicine report on the risks of imaging technology, the FDA evaluation of backscatter technology, and other independent safety assessments of AIT.

[88] Department of Homeland Security, Office of Inspector General, "Transportation Security Administration's Use of Backscatter Units," OIG-12-38, February 2012.

Typical doses from backscatter machines are no more than 0.05 microsieverts per screening, well below the ANSI/HPS N43.17 maximum dosage of 0.25 microsievert per screening. An individual would have to have been screened by the Rapiscan Secure 1000 more than 13 times daily for 365 consecutive days before exceeding the ANSI/HPS standard.

By comparison, a traveler would have to be screened 2,000 times to equal the dosage received in a single chest x-ray, which delivers 100 microsieverts of ionizing radiation. A typical bite-wing dental x-ray of 5 microsieverts would be equivalent to 100 screenings, and a two-view mammogram that delivers 360 microsieverts would be equivalent to 7,200 screenings.[89] A passenger on a one-way trip from New York to Los Angeles is exposed to approximately four microsieverts of ionizing radiation per hour of flight.[90]

ANSI/HPS also reflects the standard for a negligible individual dose of radiation established by the National Council on Radiation Protection and Measurements at 10 microsieverts per year. Efforts to reduce radiation exposure below the negligible individual dose are not warranted because the risks associated with that level of exposure are so small as to be indistinguishable from the risks attendant to environmental radiation that individuals are exposed to every day.[91] The level of radiation issued by the Rapiscan Secure 1000 is so low that most passengers would not have exceeded even the negligible individual dose. In fact, an individual would have to be screened more than 200 times a year by a Rapiscan Secure 1000 before they would exceed the negligible individual dose and, even then, would be below the ANSI/HPS N43.17 standard.

The European Commission released a report conducted by the Scientific Committee on Emerging and Newly Identified Health Risks (SCENIHR) on the risks related to the use of security scanners for passenger screening that use ionizing radiation such as the general-use

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[89] HPS Fact Sheet: Radiation Exposure from Medical Exams and Procedures, January 2010, http://www hps.org/documents/Medical_Exposures_Fact_Sheet.pdf.

[90] http://www radiationanswers.org/radiation-sources-uses/natural-radiation.html.

[91] The World Health Organization estimates that each person is exposed, on average, to 2.4 millisieverts (i.e., 2400 microsieverts) of ionizing radiation each year from natural sources. www.who.int/ionizing_radiation/about/what_is_ir/en/index2 html.

backscatter AIT machines.[92] The committee found no short term health effects that can result from the doses of radiation delivered by security scanners. In the long term, it found that the potential cancer risk cannot be estimated, but is likely to remain so low that it cannot be distinguished from the effects of other exposures including both ionizing radiation from other natural sources, and background risk due to other factors.

The ANSI/HPS N43.17 standard also requires that any general-use backscatter machine have safety interlocks to terminate emission of x-rays in the event of any system problem that could result in abnormal or unintended radiation emission. The Rapiscan Secure 1000 had three such features.[93] First, the unit was designed to cease x-ray emission once the programmed scan motion ends. That feature could not be adjusted. Second, the unit was programmed to terminate emission once the requisite number of lines of data necessary to create an image was received. Both of these automatic features reduced the possibility that emissions could continue if the unit malfunctions. Finally, the unit had an emergency stop button that would terminate x-ray emission.

Upon installation, a radiation emission survey was conducted on each Rapiscan Secure 1000 to ensure the unit operated properly. Preventive maintenance checks, including radiation safety surveys, were performed at least once every six months and after any maintenance that affected the radiation shielding, shutter mechanism, or x-ray production components, after any incident where damage was suspected, or after a unit was moved. The U.S. Army Public Health Command also conducted an independent radiation survey on deployed systems. The report confirmed that the general-use backscatter units tested were well within applicable national safety standards.[94]

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[92] The SCENIHR is an independent committee that provides the European Commission with the scientific advice it needs when preparing policy and proposals relating to consumer safety, public health and the environment. The committee is made up of external experts. The report can be found at http://ec.europa.eu/health/scientific_committees/emerging/docs/scenihr_o_036.pdf

[93] TSA's website contains a link to Rapiscan's safety features.

[94] The report is available on TSA's web site at http://www.tsa.gov/research/reading/xray _screening_technology_safety_reports.shtm.

The DHS Office of the Chief Procurement Officer is also requesting the National Academy of Sciences to convene a committee to review previous studies as well as current processes used by DHS and equipment manufacturers to estimate radiation exposure resulting from backscatter x-ray advanced imaging technology (AIT) systems used in screening air travelers and provide a report with findings and recommendations on: (1) whether exposures comply with applicable health and safety standards for public and occupational exposures to ionizing radiation, and (2) whether system design (e.g., safety interlocks), operating procedures, and maintenance procedures are appropriate to prevent over exposures of travelers and operators to ionizing radiation. This study will not address legal, cultural, or privacy implications of this technology.

TSA does not include economic costs to the public associated with the use of the AIT machines because radiation exposure and doses received from ionizing and non-ionizing rays are negligible and do not attribute any significant risk as a result of their use in screening. In addition, while the radiation risk from X-ray screening is extremely low, passengers may choose to opt out of AIT screening and receive a pat down. TSA seeks comments on any aspect of health not addressed or any additional sources of information.

CHAPTER 3: ANALYSIS OF ALTERNATIVES

OMB Circular A-4 requires TSA to consider regulatory alternatives to the provisions of the NPRM. The subsequent sections qualitatively analyze the costs of each alternative, and it also discusses the rationale for rejecting alternatives in favor of the proposed provision.

Consideration of Regulatory Alternatives

In order to mitigate a vulnerability of existing aviation security, TSA sought to identify a means to detect non-metallic items concealed underneath the clothing of passengers traveling on commercial aircrafts. Through risk analysis, laboratory testing, and field testing, TSA identified several solutions capable of detecting non-metallic items. Although numerous technologies and processes were examined by TSA as potential solutions, only the top four alternatives are presented in this analysis. In Table 55, TSA presents the requirements of each alternative**.**

Table 55: Descriptive Summary of Regulatory Alternatives

Regulatory Alternative	**Name**	**Description**
1	No Action	Under this alternative, the passenger screening environment remains the same as it was prior to 2008. TSA continues to use WTMDs as the primary passenger screening technology and to resolve alarms with a pat-down.
2	Pat-Down	Under this alternative, TSA continues to use WTMDs as the primary passenger screening technology. In addition, TSA supplements the WTMD screening by conducting a pat-down on a randomly selected portion of passengers after screening by a WTMD.
3	ETD Screening	Under this alternative, TSA continues to use WTMDs as the primary passenger screening technology. In addition, TSA supplements the WTMD screening by conducting ETD screening on a randomly selected portion of passengers after screening by a WTMD.
4	AIT (NPRM)	Under this alternative, the proposed alternative, TSA uses AIT as a passenger screening technology. Alarms would be resolved through a pat-down.

Regulatory Alternative 1 – No Action

Under this alternative, TSA imposes no change to the passenger screening environment pre-2008. TSA continues to use WTMDs as the primary passenger screening technology and resolves alarms with a pat-down. WTMDs do not screen passengers specifically for non-metallic items under this alternative. While a pat-down may detect a non-metallic threat, this alternative uses a pat-down to resolve an alarm triggered by metallic objects.

Recent events highlight the need for a technology or process capable of detecting non-metallic threats concealed on passengers. In addition, this alternative fails to meet the instruction provided in the Presidential Memorandum Regarding 12/25/2009 Attempted Terrorist Attack, issued January 7, 2010.[95] While this alternative imposes no additional cost burden, it falls short in addressing or mitigating the threat to aviation security posed by non-metallic explosives and weapons. For this reason, TSA rejected this alternative in favor of deploying AIT to screening checkpoints.

Regulatory Alternative 2 – Pat-Down

Under this regulatory alternative, TSA continues to use the WTMD as the primary passenger screening technology and supplements WTMD screening with a pat-down. In this alternative, TSA would conduct a pat-down on a high volume of randomly selected passengers. This pat-down consists of a thorough physical inspection capable of detecting metallic and non-metallic items concealed under passengers' clothing undetected by the WTMD. Pat-downs have long been one of the many security measures TSA and other nations' transportation security agencies use to help detect hidden and dangerous items. Performing pat-downs on a high volume of randomly selected passengers address the threat of metallic and non-metallic weapons and explosives for a random sample of passengers; however, this strategy employs a substantial amount of resources with human capital and their respective ancillary costs to meet the security standard and throughput rate of AIT.

The main advantage of this alternative involves the use of currently deployed WTMD technology. This alternative imposes minimal technology acquisition costs to TSA. Although TSA still needs to replace WTMDs after their useful life, this alternative avoids the resource cost to test and evaluate a new technology, the upfront cost of acquiring a new technology, and the cost to deploy and integrate the new technology into checkpoints.

[95] http://www.whitehouse.gov/the-press-office/presidential-memorandum-regarding-12252009-attempted-terrorist-attack

The main disadvantage of this alternative is that it does not screen passengers with the same level of security as an environment with AIT because not every passenger would receive a pat-down, thereby reducing the overall capability to detect non-metallic threats.

The second main disadvantage with this alternative is the length of time required to perform a pat-down. Based on field tests, the pat-down procedure takes, on average, 80 seconds to perform. Therefore, performing pat-downs on a significant number of passengers necessitates a substantial increase in staffing levels to maintain the current passenger throughput level (approximately 150 passengers per hour per lane). Without a staffing increase, passenger wait times and the associated opportunity cost increases. In addition increased queue times may create a risk to security as increased traffic throughput may be more difficult to control.

Additionally, as AIT represents a machine-based methodology, a screening environment centered on AIT provides a more consistent outcome over time. Further, TSA anticipates future advancements to AIT in detection capability, throughput, and privacy protection. Due to the reasons outlined above, TSA opted to reject implementing a random pat-down on a high volume of passengers to supplement WTMD screening for non-metallic explosives and weapons.

Regulatory Alternative 3 – Explosives Trace Detection Screening

Under this regulatory alternative, TSA continues to use the WTMD as the primary passenger screening technology and performs an ETD screening on a randomly selected population of passengers after WTMD screening. ETD screening involves swabbing a surface or individual and then testing the swab for traces of explosives. Additional ETD screening was found to somewhat address the threat of non-metallic explosives, but did not provide the same level of security as AIT due to the ETD being limited to explosives detection and not other non-metallic anomalies.

There are a number of disadvantages to this alternative. Although ETDs would help reduce the risk of non-metallic explosives being taken through the checkpoint, ETDs cannot detect other dangerous items such as weapons and IED components made of ceramics or plastics, whereas AIT is capable of detecting any anomaly concealed under clothing.

Second, incorporating ETD screening into the current checkpoint screening process can negatively impact the passenger's screening experience. Based on field tests, an ETD screening—from swab to test results—takes approximately 20-30 seconds. This would slow passenger throughput to levels below the current rate of 150 passengers per hour per lane, thereby increasing passenger wait times and the associated opportunity cost.

Third, while mechanical issues with ETDs are rare, throughput depends on the reliability and mechanical consistency of these machines. In the rare instance where an ETD may experience a mechanical issue, throughput may slow down for an extended period of time. Additionally, false alarms can and do occur from some innocuous products that may contain trace amounts of chemicals found in explosive materials, which may also impede throughput until the alarm is resolved.

Finally, this alternative requires an increase in ETD consumables, including swabs and gloves. This imposes a significant cost to keep sufficient amounts of these consumables in stock at all airports where TSA conducts screening.

The logistical concerns of implementing this alternative, in addition to the limited capability of ETD screening to detect other non-explosive threats, are the reasons TSA rejected this alternative in favor of deploying AIT to mitigate the threat to aviation security posed by both metallic and non-metallic weapons and explosives.

Regulatory Alternative 4 – Advanced Imaging Technology (NPRM)

The deployment and use of AIT as a means of screening passengers is the preferred alternative. TSA began deploying AIT machines to screening checkpoints in 2008. Currently, WTMDs and AIT machines are deployed as passenger screening technologies. Of these, only AIT is capable of detecting both metallic and non-metallic threats.

AIT safely screens passengers for metallic and non-metallic threats, including weapons, explosives, and other prohibited objects concealed under layers of clothing, without physical contact. AIT not only enhances security, it reduces the need for a pat-down among individuals with medical implants such as a pacemaker or a metal knee replacement. Based on field tests, a passenger can be screened by an AIT machine in 12 seconds, as opposed to the 80 seconds needed for a pat-down. AIT screening, however, is optional for all passengers. Passengers who opt out of AIT screening receive alternative screening, including a thorough pat-down to ensure an equivalent level of security.

AIT has a number of advantages over the other alternatives. AIT maintains a lower personnel cost and a higher passenger throughput rate than either the random pat-down of a high volume of passengers or ETD screening of people (Alternatives 2 and 3). ATR software development shifts anomaly detection from human image interpretation to an automated system. AIT systems with ATR alleviate passenger privacy concerns by eliminating observation of an individual's image. Further, the ATR software platform is upgradable, which leaves opportunity for future advancement towards faster processing times and enhanced aviation security.

The disadvantages of AIT include the cost and complexity of testing and evaluating a new technology, acquiring the technology, and integrating the technology into checkpoint configurations and standard operating procedures. In addition, AIT screening has resulted in an increase in staffing over baseline (Alternative 1) levels, and costs to train TSOs to operate AIT exceed what would have been imposed on TSA under some of the other alternatives considered.

Lastly, there exists potential for negative public perception of the health impacts from the use of backscatter AIT machines. Backscatter technology has been independently evaluated by the Food and Drug Administration's (FDA) Center for Devices and Radiological Health (CDRH), the National Institute for Standards and Technology (NIST), and the Johns Hopkins University Applied Physics Laboratory (APL), and all results confirm that the radiation doses for the individuals being screened, operators, and bystanders are well below the dose limits specified by the American National Standards Institute.[96] While TSA ensures the impact of backscatter and

[96] ANSI/HPS N43.17 – 2002, American National Standard Radiation Safety for Personnel Screening Systems Using X-rays, ANSI/HPS N43.17 – 2009 Final for Publication, American National Standard Radiation Safety for Personnel Screening Systems Using X-ray or Gamma Radiation, U.S. Food and Drug Administration Title 21, Volume 8, Chapter I Food and Drug Administration Department of Health and Human Services, Subchapter J Radiological Health, Part 1002 Records and Reports (Reference [3])

millimeter wave technologies are within industry standards, it may not be accepted by a portion of the flying public, increasing passenger opportunity costs as a result of opting out of the AIT screening in favor of a pat-down. TSA's Performance Management Information System (PMIS) reports that the opt-out rate peaked in December of 2010 at 1.6 percent but steadily declined to 0.9 percent as of January 2013.

After weighing the advantages and disadvantages of each alternative, TSA elected to deploy AIT as a means of screening passengers to mitigate the vulnerability that exists with the inability of WTMDs to detect non-metallic threats. TSA requests public comment on all of the alternatives considered, as well as any additional alternatives that TSA does not include here but should consider in the future.

CHAPTER 4: BENEFITS OF PROPOSED RULEMAKING

The background section (Chapter 1) of this document and the NPRM preamble present a thorough discussion of the need for and the qualitative benefits of the AIT technology. The following section summarizes the benefits of the deployment of AIT as explained in the NPRM.

How This Regulation Increases Security

AIT is the most effective technology available to detect non-metallic anomalies concealed under clothing without touching the passenger and is an essential component of TSA's security.[97] Since TSA began using AIT, TSA has been able to detect many kinds of non-metallic items, small items, and items concealed on parts of the body that would not have been detected using the walk-through metal detector. Specifically, since January, 2010, this technology has helped TSA officers detect hundreds of prohibited, dangerous, or illegal items concealed on passengers.[98] TSA's procurement specifications require that any AIT system must meet certain thresholds with respect to the detection of anomalies concealed under an individual's clothing. While the detection requirements of AIT are classified, the procurement specifications require that any approved system be sensitive enough to detect small items.

Experience has confirmed that AIT will detect metallic and non-metallic items, including material that could be in various forms concealed under an individual's clothing. Instances of non-metallic items found using AIT have been discussed on TSA's blog.[99] A non-metallic martial arts weapon called a "Tactical Spike" was discovered in the sock of a passenger in

[97] TSA bases this claim on comparative analysis conducted by TSA's Office of Security Capabilities in lab and field tests on AIT and alternative methods.

[98] Remarks of TSA Administrator John S. Pistole, Homeland Security Policy Institute, George Washington University, November 10, 2011.

[99] Http://blog.tsa.gov.

Pensacola, Florida after being screened by AIT.[100] AIT has proven to be very effective at detecting objects intentionally hidden by passengers, which could pose a threat. Some of the items discovered concealed on passengers during AIT screening are small items, such as weapons made of composite, non-metallic materials, including a three inch pocket knife hidden on a passenger's back; little packets of powder, including a packet the size of a thumbprint; and a syringe full of liquid hidden in a passenger's underwear.[101] A plastic dagger hidden in the hemline of a passenger's shirt was detected using AIT[102] and a plastic dagger concealed inside a comb was detected in a passenger's pocket.[103] AIT's capability to identify these small items is important because in addition to weapons and explosive materials, TSA also searches for improvised explosive device components, such as timers, initiators, switches, and power sources. Such items may be very small. AIT enhances TSA's ability to find these small items and further assists TSA in detecting threats.

AIT is also effective in detecting metallic items. In December, 2011, a loaded .38 caliber firearm in an ankle holster was discovered during AIT screening of a passenger at Detroit Metropolitan Airport.[104] The versatility of AIT in detecting both metallic and nonmetallic concealed items makes it more effective and efficient than metal detectors as a tool to protect transportation security.

In addition, risk reduction analysis shows that the chance of a successful terrorist attack on aviation targets generally decreases as TSA deploys AIT. However, the results of TSA's risk-

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[100] "TSA Week In Review: Non Metallic Martial Arts Weapon Found with Body Scanner," http://blog.tsa.gov/2011/12/tsa-week-in-review-non-metallic-martial.html.

[101] "Advanced Imaging Off To a Great Start," April 20, 2010, at http://blog.tsa.gov/2010/04/advanced-imaging-technology-off-to html and "Advanced Imaging Technology – Yes, It's Worth It," March 31, 2010, at http://blog.tsa.gov/2010/03/advanced-imaging-technology-yes-its html.

[102] "TSA Week in Review: Plastic Dagger Found With Body Scanner," May 4, 2012, at http://blog.tsa.gov/2012/05/tsa-week-in-review-plastic-dagger-found html.

[103] "TSA Week in Review: Comb Dagger Discovered With Body Scanner, 28 Loaded Guns, and More," August 17, 2012 at http://blog.tsa.gov/2012/08/tsa-week-in-review-comb-dagger html.

[104] http://blog.tsa.gov/2011/12/loaded-380-found-strapped-to-passengers.html.

reduction analysis are classified. TSA estimates that from 2013 to 2015 total throughput of AIT increases from 57.9 percent to 77.5 percent resulting in more effective and efficient screening of passengers as illustrated in Table 18 and Table 19 in the passenger opportunity cost section.

TSA operates in a high-threat environment. Terrorists look for security gaps or exceptions to exploit. Devices have been, and will continue to be, constructed and intentionally hidden on parts of the body not detectable by current security protocols. Since 2001the use of non-metallic bombs highlight the adaptive and determined nature of terrorists. Terrorists adapt and evolve to attempt to evade detection , and as historical evidence shows, have developed weapons not detectable by WTMDs. AIT enhances the passenger screening environment twofold: AIT can detect non-metallic items as well as detect items concealed on sensitive parts of the body. AIT represents TSAs best available security measure against these emerging and changing threats.

To analyze the potential consequences of an attack that could be prevented by AIT technology, TSA evaluates the consequences associated with an IED attack where a passenger detonates the bomb while the aircraft is in flight. AIT prevents this type of scenario when AIT detects the necessary explosives before the terrorist reaches the aircraft.

When a terrorist detonates a bomb on a commercial aircraft, the bomb destroys the aircraft and kills all passengers and crew. Upwards of 300 people will be killed immediately onboard while, depending on where the aircraft falls, many more people will be killed by the falling debris. In addition to the lives lost, the bomb will cause considerable property damage. Damages include the high cost of the aircraft itself in addition to the property damage resulting from the falling debris. In a heavily populated area, the falling debris has potential to generate considerable damages to buildings, roadways and general infrastructure.

In addition to the direct impacts of a terrorist attack in terms of lost life and property, there are other more indirect impacts, particularly on aviation based terrorist attacks, that are difficult to measure. For example, one study estimates the 9/11 attacks as causing a .5 percentage decrease in GDP growth (or $60 billion dollars) and an upper bound estimate of twice that or $125 billion (in 2006 dollars).[105] Also, as noted by Cass Sunstein in the Laws of Fear, "*…fear is a real social cost, and it is likely to lead to other social costs. If, for example, people are afraid to fly, the economy will suffer in multiple way*s…"[106]

In addition, another study estimates at least 1,200 additional driving deaths were attributable to the effect of 9/11 as people substituted less-safe surface transportation for safer air transportation (as noted by these authors "*Our results show that the public response to terrorist threats can create unintended consequences that rival the attacks themselves in severity*." [107] In conclusion, as devastating as the direct impacts of a successful terrorist attack can be in terms of the immediate loss of life and property, avoiding the impacts of the more difficult to measure indirect effects are also substantial benefits of preventing a terrorist attack.

Advantages and Disadvantages of Regulatory Alternatives

TSA examined several different means to mitigate against the emerging non-metallic threats. TSA, as described in the alternative section, identified four alternatives to AIT screening:

- No action alternative
- Pat-Down
- ETD Screening
- AIT

Table 56 describes the four alternatives along with the advantages and disadvantages of each. Through risk analysis, laboratory testing, and field testing, TSA identified several solutions

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[105] S. Brock Blomberg and Gregory D. Hess "*Estimating the Macroeconomic Consequence of 9/11*," Peace Economics, Peace Science and Public Policy, Volume 15 Issue 2 Article7, 2009. http://research.create.usc.edu/nonpublished_reports/166/

[106] Cass R. Sunstein, "Laws of Fear" p.127, 2005.

[107] Blalock et al, "*The Impact of 9/11 on Road Fatalities: The Other Lives Lost to Terrorism*" February 2, 2005. Abstract and page 1. http://papers.ssrn.com/sol3/papers.cfm?abstract_id=677549

capable of detecting non-metallic items. After weighing the advantages and disadvantages of each alternative, TSA elected to deploy AIT as a means of screening passengers to mitigate the vulnerability that exists with the inability of WTMDs to detect non-metallic threats. AIT reflects the best option to detect non-metallic weapons.

Table 56: Advantages and Disadvantages of Regulatory Alternatives

Regulatory Alternative	Name	Description	Advantages	Disadvantages
1	No Action	The passenger screening environment remains unchanged. TSA continues to use WTMDs as the primary passenger screening technology and to resolve alarms with a pat-down.	• No additional cost burden. • No additional perceived privacy concerns.	• Fails to meet the January 7, 2010 Presidential Memorandum[108] • Does not mitigate the non-metallic threat to aviation security
2	Pat-Down	TSA continues to use WTMDs as the primary passenger screening technology. TSA supplements the WTMD screening by with a pat-down on a randomly selected portion of passengers.	• Thorough physical inspection of metallic and non-metallic items. • Uses currently deployed WTMD technology. • Minimal technology acquisition costs	• Employs a substantial amount of human resources. • Increase in perceived privacy concerns. • Not every passenger is screened for non-metallic items. • Increased wait times

[108] http://www.whitehouse.gov/the-press-office/presidential-memorandum-regarding-12252009-attempted-terrorist-attack

Regulatory Alternative	Name	Description	Advantages	Disadvantages
3	ETD Screening	TSA continues to use WTMDs as the primary passenger screening technology. TSA supplements the WTMD screening by conducting ETD screening on a randomly selected portion of passengers after screening by a WTMD.	• Somewhat addresses the threat of non-metallic threats.	• Does not detect non-explosive non-metallic anomalies. • Increased wait times and associated passenger opportunity cost of time • Increase in ETD consumable
4	AIT (NPRM)	TSA uses AIT as a passenger screening technology. Alarms would be resolved through a pat-down.	• Safely screens passengers for metallic and non-metallic threats • Maintains lower personnel cost and higher throughput rates than the alternatives • ATR software alleviates passenger privacy concerns	• Incremental cost of acquisition to TSA • Incremental personnel cost to TSA • Incremental training cost to TSA • Potential for negative public perception on health and privacy concerns

CHAPTER 5: INITIAL REGULATORY FLEXIBILITY ANALYSIS

The Regulatory Flexibility Act (RFA) at 5 U.S.C. 603 requires agencies to consider the economic impact its rules will have on small entities. In accordance with the RFA, TSA has prepared an Initial Regulatory Flexibility Analysis (IRFA) that examines the impacts of the proposed rule on small entities (5 U.S.C 601 et seq.). A small entity may be:

- A small 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 (15 U.S.C 632)
- A small not-for-profit organization
- A small governmental jurisdiction (locality with fewer than 50,000 people).

The definition of a small business varies from industry to industry, to properly reflect industry size differences. In this IRFA, TSA uses the SBA small business size standards for each relevant industry.

This IRFA addresses the following:

- A description of the reasons that action by the agency is being considered;
- A succinct statement of the objectives of, and legal basis for, the proposed rule
- A description – and, where feasible, an estimate of the number – of small entities to which the proposed rule will apply;
- A description of the projected reporting, recordkeeping, and other compliance requirements of the proposed rule, including an estimate of the classes of small entities that will be subject to the requirements and the types of professional skills necessary for preparation of the reports or records;
- An identification, to the extent practicable, of all relevant Federal rules that may duplicate, overlap, or conflict with the proposed rule; and

- A description of any significant alternatives to the proposed rule that accomplish the stated objectives of applicable statutes and may minimize any significant economic impact of the proposed rule on small entities, including alternatives considered.

Description of the Reasons that Action by the Agency is Being Considered

In the decision made by the U.S. Court of Appeals for the District of Columbia Circuit in *Electronic Privacy Information Center v. U.S. Department of Homeland Security*, the Court directed TSA to conduct notice and comment rulemaking on the use of AIT. This NPRM proposes to codify TSA's current use of AIT to conduct passenger screening.

Succinct Statement of the Objectives of, and Legal Basis for, the Proposed Rule

Pursuant to Congressional mandate, TSA is required to "provide for the screening of all passengers and property, including United States mail, cargo, carry-on and checked baggage, and other articles, that will be carried aboard a passenger aircraft…"[109] The proposed rule adds a provision to 49 CFR part 1540 to clarify that this screening may include the use of AIT.

The main objective of the proposed rule is to codify the use of AIT as a means of screening passengers prior to entering the sterile area of an airport regulated under 49 CFR part 1540. This NPRM complies with the decision by U.S. Court of Appeals for the D.C. Circuit in *Electronic Privacy Information Center v. U.S. Department of Homeland Security*.

Description of and, Where Feasible, an Estimate of the Number of Small Entities to which the Proposed Rule will Apply

TSA's IRFA suggests that this rulemaking would not have a significant economic impact on a substantial number of small entities under section 605(b) of the RFA. An airport owned by a governmental entity is considered a small entity under the RFA if the owning government has a population of less than 50,000 people. Privately-owned airports are classified in NAICS code

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[109] 49 U.S.C. 44901.

488119. A privately-owned airport is considered small under SBA standards if annual revenue amounts to less than $30 million.

In addition, this Initial Regulatory Impact Analysis includes costs to a business (costs incurred by Rapiscan). Costs incurred by Rapiscan are not direct costs due to requirements of this rule. Costs incurred by Rapiscan are due to the terms its contract with TSA. Nonetheless, TSA investigated if Rapiscan would be classified as a small business under the Regulatory Flexibility Act. TSA does not consider Rapiscan to be a small entity based on the employment size of their parent company, OSI Systems, Inc. OSI Systems is classified as NAICS code "Semiconductor and Related Devices Manufacturing" (334413). OSI Systems reports having 4,000 employees, which exceeds the 500 employee threshold to be considered small under SBA size standards for that industry.[110]

The owning entity of each airport was determined from FAA data, which lists the owners of all airports. The population served is based primarily on U.S. Census data (for counties and cities). Revenue data for counties and cities with populations above 25,000 are based on 2007 U.S. Census City and County Data book.[111] For those jurisdictions where revenue figures could not be found in the Census City and County data books, revenue data are taken from one of the following sources:

- The city's annual financial report (CAFR), when available online.
- www.city-data.com, a web site that compiles data from various government databases.
- The owner's annual financial report to the FAA.[112]

[110] http://files.shareholder.com/downloads/OSIS/2340310712x0x611139/7CC050BD-4B0D-4756-B76A-150EED5FBA20/OSI_Systems_Annual_Report_2012.pdf, Page 8 lists the approximate number of employees.

[111] The 2007 Census City and County Data book states revenue data in constant 2002 dollars. TSA uses a 2002 GDP factor of 1.230 to convert all revenue data to constant 2011 dollars. http://www.census.gov/statab/ccdb/cc07_tabB13.pdf.

[112] The FAA financial data cover only airport revenues and, therefore, understate the financial resources of the owning government.

TSA scales all revenue data to 2011 dollars. To avoid double-counting the population, for airports that are owned by both a county and one or more cities within that county, the population is for the county only, while revenue is from both the county and the city.[113]

Of the 446 federalized airports, TSA has identified a total of 102 small entities that may incur additional utility costs due to this rule. Small governmental jurisdictions make up 101 of the 102 small entities. TSA also identified one privately owned business; however TSA was unable to determine from publically available data if it is a small entity. To be conservative, TSA assumes the entity is a small business. Of the 101 small governmental jurisdictions, TSA reimburses the additional cost of utilities for 5 of them. Consequently, this rule causes 96 governmental jurisdictions to incur additional direct costs. Including the one small business, TSA estimates 97 small entities or 22 percent of all airports (97/446) will incur additional direct costs. Table 57 displays the number of airports and the number of small airports by category. The following section estimates the impact on these small entities by the relevant airport categories: Category II, III, and IV.

[113] TSA does not use county populations when cities and counties are geographically independent.

Table 57: Affected Small Entities

FAA Category	Number of Airports	Number of Small Entities	Number of Small Entities Reimbursed
X	28	0	0
I	57	0	0
II	79	6	1
III	127	16	1
IV	155	80	3
Total	**446**	**102**	**5**

Description of the Projected Reporting, Recordkeeping and Other Compliance Requirements of the Proposed Rule, Including an Estimate of the Classes of Small Entities that Will be Subject to the Requirement and the Type of Professional Skills Necessary for Preparation of the Report or Record

The proposed rule imposes no recordkeeping and reporting requirements.

Estimated Cost and Impact as a Percentage of Revenue

In this IRFA, TSA includes the additional utility costs incurred by airport operators but does not include the passenger opportunity cost incurred by individuals for opting out of AIT. As defined by the RFA, an individual is not considered to be a small entity. Additionally, the opting out delay has a minimal impact as it is estimated at 80 seconds and represents an opportunity cost of approximately one dollar per occurrence.

Small entities incur an incremental cost for utilities as a result of increased power consumption from AIT operation. To estimate the costs the deployment of AIT has on small entities TSA uses the average kilowatt hour (kWh) consumed per unit on an annual basis at federalized airports.

TSA estimates an average cost per-kWh at these airports at $0.10 using data available from the U.S. Energy Information Administration.[114] Using this cost TSA estimates a per-unit daily average cost of $2.23.[115] TSA estimates the cost of utilities by multiplying the number of units in operation by the per-unit daily average and by the number of operating days. This cost varies by category of airport because FAA categorizes airports by size and TSA deploys more AIT units to larger airports. As shown in Table 58, TSA estimates that category II, III, and IV airports will incur an average annual increase in utility costs of $1,012, $629 and $347 on an annual basis, respectively.

Table 58: Average Utility Cost for Small Entities by Airport Category ($)

FAA Category	**Number of AIT Units** a	**Cost per Unit per Day** b	**Total Cost per Year** c = a x b x 365	**Number of Airports** d	**Average Cost per Airport** e = c / d
II	98	$2.23	$79,910	79	$1,012
III	98	$2.23	$79,910	127	$629
IV	66	$2.23	$53,817	155	$347

[114] TSA estimates this cost by taking the average of 2007-2011 retail electricity prices for the commercial sector as reported by the U.S. Energy Information Administration (http://www.eia.gov/electricity/monthly/epm_table_grapher.cfm?t=epmt_5_3).

[115] TSA calculates the per-unit utility cost per day as a weighted average of the power used to perform a scan and the power used while the system is idle. TSA assumes that the system will be operational for 16 hours (16 hours / 24 hours) of a day and idle for 8 hours (8 hours / 24 hours) of a day. TSA then estimates the weighted average of kW used per hour by taking the sum of the power consumption when the system is in operation (1.02) multiplied by the fraction of a day the system is in operation (16 hours / 24 hours) and the power consumption when the system is idle (0.70) multiplied by the percent of a day the system is idle (8 hours / 24 hours). This calculation results in an average kW used per hour of 0.9133 ((1.02 x (16/24)) + (0.70 x (8/24))). TSA then calculates the average kW used per day by multiplying the kW used per hour (0.9133) by 24 hours to obtain an average of 21.92 kWh per day (0.9133 x 24). TSA then multiplies this average number of kWh per day by the cost per kWh ($0.1019) to obtain a per-unit utility cost per day of $2.234 (21.92 x $0.1019). TSA uses $2.234 as the input for all per-unit unity cost for AIT.

TSA estimates that of the 102 entities assumed to be small by SBA standards, 97 entities do not receive reimbursement from TSA. TSA estimates the average additional utility costs to range from $347 to $1,012 per year while the average annual revenue for these small entities ranges from $69.5 million to $133.1 million per year. Consequently, TSA estimates that the cost of this NPRM on small entities represents approximately 0.001 percent of their annual revenue. The remaining 5 entities receive reimbursement for their utilities and are therefore unaffected from an increase in utility costs as a result of AIT deployment. Table 59 summarizes the impacts of AIT deployment on small entities as a percentage of revenue.

Table 59: Ratio of Revenue to Compliance Costs for Small Governmental Jurisdictions Owning Part 1542 Airports ($)

FAA Category	Average Annual Revenue Per Small Entity[116] a	Average Annual Utility Costs b	Cost as a Percent of Revenue c = b / a
II	$133,082,989	$1,012	0.0008%
III	$95,391,288	$629	0.0007%
IV	$69,523,104	$347	0.0005%

Identification, to the Extent Practicable, of All Relevant Federal Rules that May Duplicate, Overlap, or Conflict with the Proposed Rule

The Agency is unaware of any Federal rules which may duplicate, overlap, or conflict with the proposed rule.

[116] As revenues for the one privately-owned airport are not publicly available, TSA does not include their revenue in the average revenue estimation.

Description of any Significant Alternatives to the Proposed Rule that Accomplish the Stated Objectives of Applicable Statutes and that Minimizes any Significant Economic Impact of the Proposed Rule on Small Entities.

As alternatives to the preferred regulatory proposal are explained in the NPRM, TSA examined three additional options. Chapter 3 of this initial RIA explains these alternatives in more detail. The following table briefly describes these options, which include a continuation of the current screening environment (no action), increased use of physical pat-down searches that supplements primary screening with WTMDs, and increased use of ETD screening that supplements primary screening with WTMDs.

Table 60: Comparison of Regulatory Alternatives

Regulatory Alternative	Name	Description
1	No Action	Under this alternative, the passenger screening environment remains the same as it was prior to 2008. TSA continues to use WTMDs as the primary passenger screening technology and to resolve alarms with a pat-down.
2	Pat-Down	Under this alternative, TSA continues to use WTMDs as the primary passenger screening technology. In addition, TSA supplements the WTMD screening by conducting a pat-down on a randomly selected portion of passengers after screening by a WTMD.
3	ETD Screening	Under this alternative, TSA continues to use WTMDs as the primary passenger screening technology. In addition, TSA supplements the WTMD screening by conducting ETD screening on a randomly selected portion of passengers after screening by a WTMD.
4	AIT (NPRM)	Under this alternative, the proposed alternative, TSA uses AIT as a passenger screening technology. Alarms would be resolved through a pat-down.

The no action alternative imposes no incremental burden on small entities; however this alternative fails to detect non-metallic objects. The pat-down alternative imposes a heavy burden on TSO staffing but no incremental burden on small entities. Although small entities would not be directly burdened under this alternative, performing pat-downs on a significant number of passengers necessitates a substantial increase in TSA staffing levels to maintain the current passenger throughput level. Without a staffing increase, passenger wait times and the associated opportunity cost increases. Finally, ETD would generate both a utility cost for small entities and a large amount of consumables for TSA and ETDs cannot detect dangerous items such as weapons and IED components made of ceramics or plastics whereas AIT is capable of detecting any anomaly concealed under clothing.

After weighing the advantages and disadvantages of each alternative, TSA elected to deploy AIT as a means of screening passengers to mitigate the vulnerability that exists with the inability of WTMDs to detect non-metallic threats. TSA requests public comment on all of the alternatives considered, as well as the impacts on small entities.

Preliminary Conclusion

Based on this preliminary analysis, TSA believes that deployment of AIT would not have a significant economic impact on a substantial number of small entities under section 605(b) of the RFA. TSA requests comment on all aspects of this analysis.

CHAPTER 6: INTERNATIONAL TRADE IMPACT ASSESSMENT

The Trade Agreement Act of 1979 prohibits Federal agencies from establishing any standards or engaging in related activities that create unnecessary obstacles to the foreign commerce of the United States. The Trade Agreement Act does not consider legitimate domestic objectives, such as safety, unnecessary obstacles. The statute also requires that international standards be considered and, where appropriate, that they be the basis for U.S. standards. TSA has assessed the potential effect of this NPRM and has determined this proposed rule would not have an adverse impact on international trade.

CHAPTER 7: UNFUNDED MANDATES REFORM ACT ANALYSIS

Title II of the Unfunded Mandates Reform Act of 1995 (UMRA), Public Law 104–4, establishes requirements for Federal Agencies to assess the effects of their regulatory actions on State, local, and tribal governments and the private sector. Under section 202 of the UMRA, TSA generally must prepare a written statement, including a cost-benefit analysis, for proposed and final rules with ''Federal mandates'' that may result in expenditures by State, local, and tribal governments, in the aggregate, or by the private sector, of $100 million (adjusted for inflation) or more in any one year. Before TSA promulgates a rule for which a written statement is needed, section 205 of the UMRA generally requires TSA to identify and consider a reasonable number of regulatory alternatives and adopt the least costly, most cost effective, or least burdensome alternative that achieves the objectives of the rule. The provisions of section 205 do not apply when they are inconsistent with applicable law. Moreover, section 205 allows TSA to adopt an alternative other than the least costly, most cost-effective, or least burdensome alternative if the Administrator publishes with the final rule an explanation why that alternative was not adopted. Before TSA establishes any regulatory requirements that may significantly or uniquely affect small governments, including tribal governments, it must develop under section 203 of the UMRA a small government agency plan. The plan must provide for notifying potentially affected small governments, enabling officials of affected small governments to have meaningful and timely input in the development of TSA regulatory proposals with significant Federal intergovernmental mandates, and informing, educating, and advising small governments on compliance with the regulatory requirements.

TSA has determined that this rule does not contain a Federal mandate that may result in expenditures of $142 million or more in any one year (when adjusted for inflation) in 2011 dollars for either State, local, and tribal governments in the aggregate, or by the private sector. TSA will publish a final analysis, including its response to public comments, when it publishes a final rule.

APPENDIX A: TRAINING POPULATIONS FOR L3 and Rapiscan Units

TSA incurs costs to train TSOs to operate and effectively screen passengers using AIT machines. TSOs take initial and recurring training on AIT operation and screening. Recurring training must be completed annually. Additionally, to account for TSA's shift from AIT with IO to AIT with ATR, TSA estimates a transition training cost. The five components of training costs, along with their respective time requirements (shown in parentheses), are:

- Initial AIT with IO training (20 hours)
- Recurring AIT with IO training (6 hours)
- Training to transfer from AIT with IO to AIT with ATR (at airports where AIT with IO was deployed prior to ATR development but later upgraded to ATR software) (14.23 hours)
- Initial AIT with ATR training (12 hours)
- Recurring AIT with ATR training (6 hours)

Table A1 displays the number of additional units of AIT in the field based on technology, both for L3 and Rapiscan units. These data inform TSA on future training costs. This appendix will describe the L3 AIT actual and training population, then Rapiscan units estimated training population.

Table A1: Actual Number of Additional AIT Units in Field by Technology

Year	Rapiscan	L3	Total
2008	0	30	30
2009	0	2	2
2010	250	208	458
2011	0	69	69

Table A2: Estimated Number of Additional AIT Units in Field by Technology

Year	Rapiscan	L3	Total
2012	0	423	423
2013	0	0	0
2014	0	44	44
2015	0	45	45

For 2008-2011, TSA uses historical data on training populations to estimate training costs.[117] Historical data on training populations include counts for both initial training for new hires and initial training for employees entering the labor force due to turnover.

[117] Because TSA uses historical data, some of the estimates appear inflated based on prior assumptions on AIT staffing needs. In TSO training, TSA TSOs repeat courses and TSOs take courses outside of their necessary curriculum. However, TSA is unable to separate the mandatory training from the non-mandatory training.

Table A3: Unadjusted Historical Counts of the L3 Training Population[118]

Year	Employees in Initial Training (Historical) a	Cumulative Training Population b = ∑a	Recurring Training Population[119]
2008	1,006	1,006	0
2009	206	1,212	0
2010	5,828	7,040	0
2011	21,306	28,346	0

To project populations needing training in future years, TSA estimates the training populations in each year using the number of newly deployed AIT (Table A2, L3 Column) units multiplied by estimated need for TSOs to maintain full AIT coverage (0.0 TSOs per AIT).[120] TSA estimates the population in future years needing training based on the number of newly deployed AIT units and not on historical population data.

TSA also estimates the population of TSOs entering the labor force due to turnover. To estimate the turnover for the TSO population, TSA multiplies the prior year cumulative training population by the assumed 9.0 percent turnover rate from TSA's Office of Human Capital. For

[118] Unadjusted training populations includes the population trained as new hires. Below, TSA nets out these populations to avoid double counting.

[119] TSA administered no historical L3 recurring training from 2008-2011.

[120] Originally, the training estimate for full capacity included an additional 250 Rapiscan units which would require 1,312.5 TSOs (250 x 5.25 TSOs per Rapiscan unit) and 265 L3 units which would require 927.5 additional TSOs (265 x 3.5 TSOs per L3 unit). We took out this level of personnel from the previous estimate and concluded that the number of TSA trained by the end of 2011 is such that no new TSOs (beyond turnover) need to be trained in 2012 - 2015.

example, in 2012, TSA estimates the population of 2,551.1 L3 trained TSOs entering the labor force due to turnover (Table A4 Column B) by multiplying the 2011 cumulative population (28,346 from Table A3 Column B, 2011) by 9.0 percent. For each year, TSA then estimates the total population receiving initial training (Table A4 Column C) by summing the employees hired entering the labor force due to the additional deployment of AIT units (Table A4 Column A) and employees entering the labor force due to turnover (Table A4 Column B). Lastly, to estimate the population needing recurring training in each year (Table A4 Column E), TSA subtracts the initial training populations (Table A4, Column C) from the cumulative training population (Table A4, Column D). The cumulative training population is derived by adding the initial training population (Table A4 Column A) to the previous year's cumulative population. For example, in 2012 TSA adds the 0 additional employees receiving initial training to the cumulative population of 2011 (Table A3, Column B, 2011) to estimate the cumulative population training.

Table A4: Unadjusted Projection of the L3 Training Population

Year	**Employees in Initial Training** **a = AIT newly deployed x 0.0***	**Turnover** **$b = b^{**}_{-1}$ x 9.0%**	**Initial Training Population** **c = a + b**	**Cumulative Training Population** **$d = b_{-1} + \sum a$**	**Recurring Training Population** **e = d - c**
2012	0	2,551.1	2,551.1	28,346.0	25,794.9
2013	0	2,551.1	2,551.1	28,346.0	25,794.9
2014	0	2,551.1	2,551.1	28,346.0	25,794.9
2015	0	2,551.1	2,551.1	28,346.0	25,794.9

* Based on the number of TSA trained by the end of 2011, the removal of the Rapiscan units and the reallocation of L3 units in the field lowered the staffing need such that no new TSOs (beyond turnover) need to be trained in 2012 - 2015.

**b_{-1} denotes the cumulative population from column B Table A2 in 2011

TSA estimates the population of TSOs entering the labor force due to the deployment of AIT. Table A5 displays the personnel to maintain full operating capacity previously calculated and displayed in the initial RIA (Tables 18 & 19). To separate the TSO population into the two companies, TSA estimates a constant TSO population hired on Rapiscan units (2,236.0) based on the number of lanes covered by Rapiscan deployment and the additional TSOs per lane. L3 personnel due to the AIT deployment (Table A5 Column D) is estimated by subtracting the Rapiscan population (Table A5 Column C) from the total population of AIT with IO (Table A5 Column A) and AIT with ATR (Table A5 Column B).

Table A5: Number of Personnel Hired Due to the AIT Deployment

Year	**Personnel to Maintain Full Operating Capacity**		***Rapiscan Cumulative Personnel due to the AIT Deployment***	***L3 Cumulative Personnel due to the AIT Deployment***
	AIT with IO *a*	***AIT with ATR*** *b*	*c = c**	*d = a + b - c*
2008	267.8	0		267.8
2009	283.5	0		283.5
2010	4,394.3	0	2,242.8	2,151.5
2011	5,019.0	0	2,242.8	2,776.2
2012**	2,242.8	4,377.84	2,242.8	4,377.8
2013	0	4,378.50		4,378.5
2014	0	4,644.50		4,644.5
2015	0	4,907.00		4,907.0

c*- TSA estimates a constant TSO population trained on Rapiscan units (2,242.8) by assuming the 250 Rapiscan units deployed cover approximately 425.9 lanes and requiring an additional 5.25 TSOs per lane (427.2 lanes x 5.25 TSOs).

** In December 2012, 76 Rapiscan machines were removed, however, it is assumed the training requirements for these machines were met in 2012.

As in the cost section above, the personnel population that TSA calculates based on AIT deployment does not account for new personnel needs due to turnover. TSA estimates the personnel in each year that have been hired due to the newly deployed AIT units and entered the labor force due to turnover using the same 9.0 percent turnover rate for the cumulative personnel estimate for the prior year. For example, the 24.1 personnel hired in 2009 due to turnover (Table A6 Column C, 2009) is 9.0 percent of the 267.8 cumulative personnel in 2008 (Table A5 Column D: Table A6 Column A). The population estimate for total initial training for personnel hired due to the newly deployed AIT units (Table A6 Column D) includes the initial training of new personnel (Table A6 Column B) and the initial training of personnel entering the labor force due to turnover (Table A6 Column C). TSA then estimates the population of personnel hired due to the AIT deployment that need recurring training (Table A6 Column E) by subtracting the initial training population (Table A6 Column D) from the cumulative personnel population in (Table A6 Column A) each year. Because TSA estimates the personnel costs in terms of FTE, the tables show the FTE equivalent of new hires rounded to the nearest tenth decimal.

Table A6: Personnel Included in the L3 Training Population

Year	Cumulative Personnel due to the AIT Deployment a	Initial Training from AIT Deployment for Personnel due to the AIT Deployment $b = a - a_{-1}$	Initial Training from Turnover for Personnel due to the AIT Deployment $c = a_{-1} \times 9.0\%$	Total Initial Training Population for Personnel due to the AIT Deployment $d = b + c$	Recurring Training Population for Personnel due to the AIT Deployment[121] $e = a - d$
2008	267.8	267.8		267.8	0.0
2009	283.5	15.8	24.1	39.8	0.0
2010	2,151.5	1,868.0	25.5	1893.5	0.0
2011	2,776.2	624.8	193.6	818.4	0.0
2012	4,377.8	1,601.6	249.9	1851.5	2,526.3
2013	4,378.5	0.7	394.0	394.7	3,983.8
2014	4,644.5	266.0	394.1	660.1	3,984.4
2015	4,907.0	262.5	418.0	680.5	4,226.5

[121] TSA administered no recurring training for L3 units from 2008 to 2011.

To estimate the training populations, TSA subtracts the personnel estimates above from the original training estimates. Table A7 combines the data from Tables A4 and A6 to calculate net initial and recurring training populations. In order to estimate net initial training population (Table A7 Column E), TSA subtracts the initial training from the AIT deployment (Table A6 Column D: Table A7 Column C) from the historical total initial training population (Table A3 Column A) and the forecasted initial training population (Table A4 Column C: Table A7 Column A). The same methodology is done to estimate net recurring training population. Net recurring population (Table A7 Column F) is the difference of recurring training population from the AIT deployment (Table A6 Column E: Table 7 Column D) from total recurring training population (Table A4 Column E: Table A7 Column B).

Table A7: Summary of L3 Training Populations

Year	**Unadjusted Initial Training Population** **a**	**Unadjusted Recurring Training Population** **b**	**Total Initial Training Population for personnel hired due to the AIT Deployment** **c**	**Recurring Training Population for personnel hired due to the AIT Deployment** **d**	**Adjusted L3 Initial Training** **e = a - c**	**Adjusted L3 Recurring Training** **f = b - d**
2008	1,006.0	0.0	267.8	0.0	738.3	0.0
2009	206.0	0.0	39.8	0.0	166.2	0.0
2010	5,828.0	0.0	1,893.5	0.0	3,934.5	0.0
2011	21,306.0	0.0	818.4	0.0	20,487.6	0.0
2012	2,551.1	25,794.9	1,851.5	2,526.3	699.6	23,268.6
2013	2,551.1	25,794.9	394.7	3,983.8	2,156.4	21,811.1
2014	2,551.1	25,794.9	660.1	3,984.4	1,891.0	21,810.5
2015	2,551.1	25,794.9	680.5	4,226.5	1,870.6	21,568.4

Next, TSA uses the estimated initial (Table A7 Column E) and recurring training populations (Table A7 Column F) in each year to allocate the training costs between the five different training categories: initial with IO, recurring with IO, transition from IO to ATR, initial ATR, and recurring ATR. TSA introduced the ATR technology in 2011, therefore all initial and recurring trainings from 2008 to 2010 is for initial IO training. In 2011 when ATR was introduced, TSA estimates the IO to ATR training population, which is outside the initial training population, based on TSA training records for 2011. TSA splits the initial population between IO and ATR based on historical training counts in 2011 with 72 percent of TSO trained on ATR.

Finally, TSA assumes all initial and recurring training from 2012 to 2015 involves ATR technology.

Table A8: L3 Training Population by Training Type

	IO			ATR	
Year	**Initial**	**Recurring**[122]	**IO to ATR**	**Initial**	**Recurring**
2008	738.3	0.0	0.0	0.0	0.0
2009	166.2	0.0	0.0	0.0	0.0
2010	3,934.5	0.0	0.0	0.0	0.0
2011	5,650.3	0.0	9,142.0	14,837.3	0.0
2012	0.0	0.0	0.0	699.6	23,268.6
2013	0.0	0.0	0.0	2,156.4	21,811.1
2014	0.0	0.0	0.0	1,891.0	21,810.5
2015	0.0	0.0	0.0	1,870.6	21,568.4

TSA uses the same methodology to calculation training populations for the Rapiscan technology with some minor modifications. The same tables that were presented for L3 technology are presented below with any slight modifications detailed in footnotes.

The rest of the tables show these same calculations for the Rapiscan technology.[123]

[122] No historical recurring training for L3 units occurred in years 2008 to 2011.

Table A9: Unadjusted Historical Counts of the Rapiscan Training Population

Year	Employees in Initial Training (Historical) a	Cumulative Training Population $b = \sum a$	Recurring Training Population $c = b - a$
2008	0	0	0
2009	0	0	0
2010	8,151	8,151	0
2011	5,442	13,593	8,151

[123] Although the historical populations for the Rapiscan technology seem disproportionately high in comparison to their deployment numbers, TSA mainly deployed the Rapiscan units to large airport hubs, and thus observed a higher than average number of employees trained per Rapiscan unit.

Table A10: Unadjusted Projection of the Rapiscan Training Population

Year	Employees in Initial Training a = AIT newly deployed x 0.0	Turnover $b = c_{-1} \times 9.0\%$	Initial Training Population c = a + b	Cumulative Training Population $d = c_{-}*_{1} + \sum a$	Recurring Training Population e = d -c
2012	0	1,223.4	1,223.4	13,593.0	12,369.6
2013	0	0.0	0.0	13,593.0	0.0
2014	0	0.0	0.0	0.0	0.0
2015	0	0.0	0.0	0.0	0.0

c_{-1} denotes the population from Column C Table A9 in 2011

TSA estimates separately the personnel hired due to the AIT rule by the L3 and Rapiscan technologies. For the Rapiscan technology, TSA estimates the total staffing needs in 2010 as 2,242.8 personnel, based on the 250 Rapiscan units deployed in 2010, and then repeats this calculation for future years.[124]

[124] As discussed above, the deployment of AIT with IO in 2010 is equal to the one time deployment of the 250 Rapiscan units.

Table A11: Personnel Included in the Rapiscan Training Population

Year	**Cumulative Personnel due to the AIT Deployment** **a**	**Initial Training from AIT Deployment for Personnel due to the AIT Deployment[125]** **$b = a - a_{-1}$**	**Initial Training from Turnover for Personnel due to the AIT Deployment** **c = a x 9.0%**	**Total Initial Training Population for personnel due to the AIT Deployment** **d = b + c**	**Recurring Training Population for personnel due to the AIT Deployment** **e = a - d**
2008	0.0	0.0		0.0	0.0
2009	0.0	0.0	0.0	0.0	0.0
2010	2,242.8	2,242.8	0.0	2242.8	0.0
2011	2,242.8	0.0	201.9	201.9	2,040.9
2012	2,242.8	0.0	201.9	201.9	2,040.9
2013	0.0	0.0	201.9	201.9	0.0
2014	0.0	0.0	0.0	0.0	0.0
2015	0.0	0.0	0.0	0.0	0.0

[125] TSA estimates the initial population trained on Rapiscan AITs assuming 250 Rapiscan AITs covering approximately 427 lanes requiring an additional 5.25 TSOs per lane (427.2 lanes x 5.25 TSOs).

Table A12: Summary of Adjusted Rapiscan Training Populations

Year	Unadjusted Initial Training Population a	Unadjusted Recurring Training Population b	Total Initial Training Population for personnel hired due to the AIT Deployment c	Recurring Training Population for personnel hired due to the AIT Deployment d	Adjusted Rapiscan Initial Training e = a - c	Adjusted Rapiscan Recurring Training f = b - d
2008	0.0	0.0	0.0	0.0	0.0	0.0
2009	0.0	0.0	0.0	0.0	0.0	0.0
2010	8,151.0	0.0	2,242.8	0.0	5,908.2	0.0
2011	5,442.0	8,151.0	201.9	2,040.9	5,240.1	6,110.1
2012	1,223.4	12,369.6	201.9	2,040.9	1,021.5	10,328.7
2013	0.0	0.0	0.0	0.0	0.0	0.0
2014	0.0	0.0	0.0	0.0	0.0	0.0
2015	0.0	0.0	0.0	0.0	0.0	0.0

Table A13: Rapiscan Training Population by Training Type

	IO			ATR	
Year	**Initial IO**[126]	**Recurring IO**	**IO to ATR**	**ATR Initial**	**Recurring with ATR**
2008	0.0	0.0	0.0	0.0	0.0
2009	0.0	0.0	0.0	0.0	0.0
2010	5,908.2	0.0	0.0	0.0	0.0
2011	5,240.1	6,110.1	0.0	0.0	0.0
2012	1,021.5	10,328.7	14,816.4	0.0	0.0
2013	0.0	0.0	0.0	0.0	0.0
2014	0.0	0.0	0.0	0.0	0.0
2015	0.0	0.0	0.0	0.0	0.0

[126] Although deployment for Rapiscan occurs only in 2010, the historic initial training for IO occurred over 2 calendar years. IO training in 2012 only includes initial training due to turnover.

APPENDIX B: COST ESTIMATE EXPLANATION OF 2013 RAPISCAN TECHNOLOGY REMOVAL

All Rapiscan general-use backscatter units currently deployed at TSA checkpoints are being removed from operation by May 31, 2013. TSA plans to remove all Rapiscan units from airports and complete the Rapiscan backfill by May 31st, 2013. To estimate the impact of the mid-year removal and replacement of the Rapiscan unit, TSA estimates a weighted average for 2013. TSA only applies the weighted average for cost elements that depend on the number of active units in the field because these costs will only occur during a portion of the year before the removal of Rapiscan units. These cost elements include the utility cost for industry and TSA, passenger opportunity cost, personnel cost, and maintenance cost. In contrast, TSA does not apply the weighted average to costs that depend on the deployment of AIT units, or to one-time costs like the removal of Rapiscan units.

Table B 1 shows the AIT units (both L3 and Rapsican units) in-service in the various airport categories in 2013. TSA assumes that 2013a reflects the active units at the start of 2013 while 2013b reflect only the L3 units originally deployed and utilized for backfill. The estimate of active units at the start of 2013 (2013a in Table B 1) include the Rapiscan units to be removed by the company. In 2012, before the TSA decision to remove the Rapiscan units from the airports, TSA removed 76 units. These 76 units are not included in the 2013a estimates. The difference between the 2013a and 2013b active AIT units is the 174 units that the Rapiscan removes. To estimate the cost of AIT in 2013, TSA weights the 2013a number of AIT units in each airport category by 5/12 (for the initial 5 months of the year where both Rapiscan and L3 units are in use) and the 2013b number by 7/12 (to account for the 7 months out of the year where only the L3 units are in use). The resulting weighted number of AIT units for each airport category is shown in Table B 1. This appendix outlines the inputs and assumptions made to estimate the weighted average 2013 figures.

Table B 1: AIT units In-service in the Field for 2013, Weighted and Unweighted Totals

	Cat X	Cat I	Cat II	Cat III	Cat IV	Total
2013a	421	252	104	95	34	**906**
2013b	327	184	96	91	34	**732**
Weighted Average	**366**	**212**	**99**	**93**	**34**	**805**

Airport Utility Cost

To estimate the airport utility cost for non-reimbursable AITs in 2013, TSA first estimates the number of AIT units in use at the start of 2013 (2013a). The active AIT units in 2013 includes the 341 L3 units already in the field and the Rapiscan units removed by Rapiscan in 2013 (155). This figure does not include the Rapiscan units removed by TSA, because the cost estimate for 2012 utilities includes these units. The total number of non-reimbursable AITs in 2013a is 496 (341 L3 units + 155 Rapiscan units removed by the company). Next, TSA combines the 496 units estimated for 2013a and the 2013b estimate of L3 units already in the field (341) as described above to obtain a weighted average of 406 units for 2013. TSA then calculates the airport utility costs for 2013 using the weighted average number of AIT units and the costs per kWh for AITs and WTMDs, as described in Tables 15 and 16 of the Regulatory Evaluation.

Table B 2: Airport Utility Costs in 2013

(AIT costs in 1000s)

Year	AITs		WTMDs		Total Cost
	Units In-service	***AIT Cost***	***Removed WTMDs***	***WTMD Cost***	
	a	b = (a x $2.23 x 365)	c	d = (c x $0.10 x 365)	**= *b* - *d***
2013a	496	$404.4	49	$1.8	**$402.7**
2013b	341	$278.1	49	$1.8	**$276.3**
Weighted Total	**406**	**$331.0**	**49**	**$2.00**	**$329.0**

Passenger Opportunity Cost

To estimate the passenger opportunity cost for opting out of AIT in 2013, TSA only changes the assumption of the AIT throughput percent of total passengers. Based on the initial estimate of AIT throughput, TSA assumes that 55 percent of passengers go through AIT units at the start of 2013 (2013a). Once the reallocation of L3 units and removal of Rapiscan units occurs, TSA projects that the percent of AIT throughput will increase to 60 percent (2013b). TSA bases this increase in the percent of AIT passenger throughput on an optimization strategy involving strategically located L3 units at check points with high capacity. Similar to the weighted average calculations shown above, TSA calculates a weighted average percent AIT throughput by combining the 2013a and 2013b percentages of AIT passenger throughput, as shown in Table B 3. TSA then calculates passenger opportunity costs in 2013 using the weighted average AIT throughput percent, as described in the Regulatory Evaluation in Tables 17 and 18.

Table B 3: Passenger Opportunity Cost in 2013

(Proposed AIT Costs in $ 1,000s)

Year	**Passengers** **a**[127]	**AIT Throughput Percent of Total Passengers** **b**	**Number of Opt-Outs** **c = a x b x 1.18%**	**Total Cost for Opt-Outs** **d = c x $0.871**
2013a	670,587,197	55.0%	4,352,111	$3,790.7
2013b	670,587,197	60.0%	4,747,757	$4,135.3
Weighted Total	**670,587,197**	**58%**	**4,582,905**	**$3,991.7**

Personnel Cost

To estimate the personnel cost in 2013, TSA again calculates a weighted average based on the number of active units at the start of 2013 (2013a) and the number of L3 units originally deployed and utilized for backfill (2013b). Table B 4 presents the estimates for the number of

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[127] TSA rounds the estimated passenger throughput to the third decimal point as inputs for the model.

AIT units and lanes covered by AIT for both 2013a and 2013b for each AIT technology (IO and ATR). TSA then calculates the personnel cost in 2013 using the weighted average number of AIT units and lanes covered by AIT, and the additional personnel needed to be hired, as described in the Regulatory Evaluation in Tables 20 and 21.

Table B 4: Personnel Cost in 2013

(AIT costs in 1000s)

Year	AIT Units In-service		Lanes In-Service Covered by AIT		Additional Personnel		Annual FTE	Total
	with IO	with ATR	with IO	with ATR	AIT with IO	AIT with ATR		
	a	b	c	d	e = c * 5.25	f = d * 3.5	g	h = (e + f) * g
2013a	174	732	287.5	1,209.5	1,509.38	4,233.24	$56.8	$326,019.7
2013b	0	732	0.0	1,251.0	0.00	4,378.50	$56.8	$248,576.2
Weighted Total	**73**	**732**	**119.8**	**1,233.7**	**628.91**	**4,317.98**		**$280,844.3**

Training Cost

TSA makes training and hiring decisions at the start of the year. Because TSA knows that the Rapiscan units will be removed and that several L3 units will be redistributed at the start of 2013, TSA does not include the cost to train new personnel on the Rapiscan units. Because of the removal Rapiscan units, TSA has a large enough currently trained population to operate the number of AITs planned throughout 2015. Only recurring training costs occur in 2013 and beyond.

AIT Lifecycle Cost

To estimate the AIT lifecycle cost in 2013, TSA first estimates the number of AIT units in-service at the start of 2013 (2013a). These AIT units represent those whose 2-year warranties are expiring. Therefore, the AIT units represented in this section represent deployment numbers from two years ago. As shown in Table B 6, the number of AIT units in-service in 2013 includes 309 L3 units and 250 Rapiscan units. The total number of AITs in-service in 2013a is thus 559 (309 L3 units + 250 Rapiscan units). Next, TSA combines the 559 units estimated for 2013a and 2013b estimate of number of L3 units in-service (309) as described above to obtain a weighted average number of AIT units in-service for 2013. TSA then calculates the AIT lifecycle cost for 2013 using the weighted average number of AIT units in-service and the various lifecycle costs, as described in Tables 35 and 49 of the Regulatory Evaluation.

Table B 5: Maintenance Costs, Call Center, and Support Services in 2013

(AIT costs in 1000s)

Year	AIT Units In-service	Out-of-Warranty Maintenance	Call Center	Support Services	Total
	a	b = a x $15,642	c = $14,787,267	d = $5,762,579	e = b + c + d
2013a	559	$8,743.9	$14,787.3	$5,762.6	$29,293.7
2013b	309	$4,833.4	$14,787.3	$5,762.6	$25,383.2
Total Weighted	**413**	**$6,463.0**	**$14,787.0**	**$5,763.0**	**$27,013.0**

TSA Utilities Cost

To estimate the utility cost to TSA in 2013, TSA first estimates the number of the AIT units in-service at reimbursed airports in 2013 (2013a). The AIT units in-service at reimbursed airports in 2013a includes 391 L3 units and the Rapiscan units removed by Rapiscan in 2013 (19). The number of AITs in-service in 2013a is thus 410 (391 L3 units and Rapiscans + 19 Rapiscan units removed by the company). Next, TSA combines the 419 units in-service estimated for 2013a and 2013b estimate of L3 units in-service in the field (391) as described above to obtain a weighted average of 399 units in-service for 2013. TSA then calculates its utility costs for 2013 using the weighted average number of AIT units in-service and the per kWh costs for AITs and WTMDs, as described in Tables 50 and 51 of the Regulatory Evaluation.

Table B 6: TSA Utility Costs in 2013

(AIT costs in 1000s)

Year	**AITs**		**WTMDs**		**Total Cost**
	AIT Units In-service	***AIT Cost***	***Removed WTMD***	***WTMD Cost***	
	a	b = (a x $2.23 x 365)	c	d = (c x $0.10 x 365)	***= b - d***
2013a	410	$334.3	27	$1.0	**$333.4**
2013b	391	$318.8	27	$1.0	**$317.9**
Weighted Total	**399**	**$325.0**	**27**	**$1.00**	**$324.0**