TREASURY INSPECTOR GENERAL FOR TAX ADMINISTRATION

Sixty-Four Percent of the Internal Revenue Service′s Information Technology Hardware Infrastructure Is Beyond Its Useful Life

September 11, 2017

Reference Number: 2017-20-051

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SIXTY-FOUR PERCENT OF THE INTERNAL REVENUE SERVICE'S INFORMATION TECHNOLOGY HARDWARE INFRASTRUCTURE IS BEYOND ITS USEFUL LIFE

Highlights

Final Report issued on September 11, 2017

Highlights of Reference Number: 2017-20-051 to the Internal Revenue Service Chief Information Officer.

IMPACT ON TAXPAYERS

The Sustaining Infrastructure Program manages the replacement of aged information technology hardware infrastructure that provides the foundation for technology services and supports the IRS's most critical business needs. The management, maintenance, and ongoing enhancement of the IRS's information technology are central to the reliability of its operations and to the successful accomplishment of its mission to "provide America's taxpayers top-quality service."

WHY TIGTA DID THE AUDIT

The overall objective of this review was to determine the efficiency and effectiveness of key ongoing or planned activities aimed at addressing the IRS operational challenge of replacing its aged hardware infrastructure.

WHAT TIGTA FOUND

While the Sustaining Infrastructure Program spends on average nearly 99.7 percent of its allocated budget each year, the IRS has not yet achieved its stated objective of reducing its aged information technology hardware to an acceptable level of 20 to 25 percent. In fact, this percentage has steadily increased from 40 percent at the start of Fiscal Year 2013 to 64 percent at the start of Fiscal Year 2017. The IRS estimates that the current replacement cost for its aged information technology hardware is approximately $430 million.

Aged information technology hardware still in use introduces unnecessary risks. TIGTA analyzed 107 incident tickets most likely to involve aged hardware failures in Fiscal Year 2016 and found that the aggregate length of time to resolve the issues was approximately 4,541 hours. These aged hardware failures may have also had a negative effect on IRS employee productivity, security of taxpayer information, and customer service.

Each year, the IRS provides varying amounts of funds to the Sustaining Infrastructure Program from a number of different internal sources, including the IRS's base year operations support appropriation, user fees, and carryover money from previous fiscal years not used by other IRS business units. The IRS has a process in place to monitor each financial plan and identify potential surplus funds. However, additional coordination to identify the availability of surplus funds earlier in the process and development of plans to expeditiously spend these funds on the aged hardware inventory are needed. Such coordination may have resulted in a combined total of up to $67 million in additional unspent funds being available for the Sustaining Infrastructure Program.

WHAT TIGTA RECOMMENDED

TIGTA recommended that the Chief Information Officer conduct additional coordination with the Chief Financial Officer and other business unit executives to identify the availability of additional transfers, reprogramming, and possible carryover funds earlier in the process to maximize their use and develop plans to expeditiously spend any potential surplus funds that might become available to aid in reducing its aged information technology hardware infrastructure.

In response to the report, the IRS agreed with two recommendations and disagreed with one. In its Fiscal Year 2018 budget submission, it requested the realignment of funds and additional multiyear authority. This should be of significant benefit if funded as requested. However, given the substantial portion of its hardware infrastructure that is beyond its useful life, additional actions will likely be needed.

DEPARTMENT OF THE TREASURY

WASHINGTON, D.C. 20220

September 11, 2017

MEMORANDUM FOR CHIEF INFORMATION OFFICER

FROM: Michael E. McKenney
                        Deputy Inspector General for Audit

SUBJECT: Final Audit Report – Sixty-Four Percent of the Internal Revenue
                        Service's Information Technology Hardware Infrastructure Is Beyond
                        Its Useful Life (Audit # 201620014)

This report presents the results of our review to determine the efficiency and effectiveness of key ongoing or planned activities aimed at addressing the Internal Revenue Service operational challenge of replacing its aged hardware infrastructure. This audit is included in our Fiscal Year 2017 Annual Audit Plan and addresses the major management challenge of Achieving Program Efficiencies and Cost Savings.

Management's complete response to the draft report is included as Appendix VII.

Copies of this report are also being sent to the Internal Revenue Service managers affected by the report recommendations. If you have any questions, please contact me or Danny R. Verneuille, Assistant Inspector General for Audit (Security and Information Technology Services).

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Abbreviations

IRS	Internal Revenue Service
SI	Sustaining Infrastructure
TIGTA	Treasury Inspector General for Tax Administration

Background

In Fiscal Year[1] 2016, the Internal Revenue Service (IRS) processed nearly 245 million tax returns and other forms and collected approximately $3.3 trillion in taxes. At the core of the IRS's tax administration is its information technology infrastructure. The IRS information technology infrastructure provides the foundation for technology services, such as server and user computing, network, storage, and communications required for day-to-day operations. The management, maintenance, and ongoing enhancement of its information technology are central to the reliability of its operations to support the increasing number of tax forms submitted and processed and to the successful accomplishment of the IRS's mission to "provide America's taxpayers top-quality service by helping them understand and meet their tax responsibilities and enforce the law with integrity and fairness to all."

The IRS's Information Technology organization provides technology services and solutions that drive effective tax administration, improve service, modernize systems, and ensure the security and durability of IRS information systems and data. The Sustaining Infrastructure (SI) Program was established within the Information Technology Enterprise Services organization to provide for long-term infrastructure sustainability with the flexibility to meet changing business requirements. The SI Program manages a central investment program for the replacement of the IRS's aged information technology hardware that have reached or surpassed their expected useful life span.[2]

Comprised of three employees assigned part-time,[3] the SI Program follows a prioritization process to replace the aged hardware that supports the IRS's most critical business needs. The objective of the prioritization process is to identify, prioritize, and manage information technology investments. This prioritization process requires a coordinated approach across the IRS that involves the SI Program working with various Associate Chief Information Officers along with input from the business units to identify aged hardware replacements each fiscal year. However, SI personnel stated that the replacement of aged hardware may not be fully realized for

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[1] See Appendix VI for a glossary of terms.
[2] The average life span for most information technology hardware is three to five years.
[3] SI Program personnel explained that they are not part of a program office and have other responsibilities in addition to their SI duties.

up to 18 to 24 months from the initial start of the procurement process to installation of the hardware into production.[4]

The IRS has a large and increasing amount of aged hardware, some of which is three to four times older than industry standards. In the IRS's Fiscal Year 2016 President's Budget (dated February 2, 2015), the IRS described that its current state of information technology "infrastructure poses significant risk of failure," and that "it is unknown when these failures could occur, how severe they will be, or whether they will have material impacts on tax administration during the filing season." In this document, the IRS also reported that it is focused on modernizing and consolidating its information technology infrastructure, and as budget reductions continue and new unfunded [legislative] mandates develop, it will largely have to defer upgrades to its aging infrastructure which, in turn, could limit the IRS's ability to perform its mission.

This review was performed in the IRS's Information Technology Enterprise Services organization at the New Carrollton Federal Building, in Lanham, Maryland, during the period July 2016 through March 2017. We conducted this performance audit in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objective. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objective. Detailed information on our audit objective, scope, and methodology is presented in Appendix I. Major contributors to the report are listed in Appendix II.

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[4] The time required to complete procurement of information technology hardware varies between approximately 45 and 345 days and is based on many factors, including the estimated value, the nature of the hardware, competitive or noncompetitive sourcing, a new or existing contract, and whether special internal reviews and approvals are required. Moreover, a lack of subject matter experts to install new technologies could further delay the installation of the hardware.

Results of Review

SI Program officials explained that the IRS follows an enterprise-wide life cycle process to identify, prioritize, and make decisions on funding the replacement of its aged information technology hardware assets. This annual process begins when the SI Program identifies all aged hardware and ranks them in order of criticality based on an applied risk value. Once identified and ranked, owners of the most critically aged hardware that can be replaced within the current budget prepare detailed business cases to request funding for their replacement. The business cases are sent to the SI Program for processing and presented to the Infrastructure Executive Steering Committee for review and approval prior to funding the aged hardware replacement. SI Program officials also explained that they follow a process to help ensure that they do not exceed the SI Program's allocated budget each fiscal year. Based on these processes, the SI Program spent on average nearly 99.7 percent of its allocated budget for Fiscal Years 2013 through 2016, while maintaining a minimum amount in reserves for adjustments of unaccounted expenses. However, additional coordination is still needed to identify the availability of surplus funds earlier in the process to replace the IRS's aged information technology hardware, and a comprehensive guidance document is needed to effectively manage the SI Program.

Additional Coordination With Business Units Is Needed to Improve Replacement of Aged Information Technology Hardware

The SI Program objective and Federal standards for internal controls are outlined in two documents. In the Fiscal Year 2013 Congressional Budget Submission (dated February 13, 2012), the IRS established an objective to reduce its aged information technology hardware to an acceptable level of 20 to 25 percent of its total hardware infrastructure. This objective has been included in each subsequent fiscal year's budget request submission through Fiscal Year 2017.[5] The IRS established this objective based on an information technology asset useful life assessment conducted by an IRS contractor. In addition, according to the Government Accountability Office's *Standards for Internal Control in the Federal Government*,[6] "management should use quality information to achieve the entity's objectives," and the information should be "appropriate, current, complete, accurate, accessible, and provided on a timely basis."

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[5] Starting in Fiscal Year 2014, the Congressional Budget Submission was renamed the President's Budget.
[6] Government Accountability Office, GAO-14-704G, *Standards for Internal Control in the Federal Government* (Sept. 2014).

We reviewed IRS-provided data from Fiscal Year 2013 through the first month of Fiscal Year 2017 related to its aged information technology hardware.[7] For each fiscal year, the IRS did not achieve its stated objective of reducing its aged information technology hardware to an acceptable level of 20 to 25 percent of its total hardware infrastructure. In fact, the IRS's percentage of aged hardware in use or in stock[8] steadily increased from 40 percent at the beginning of Fiscal Year 2013 to 64 percent at the beginning of Fiscal Year 2017, which represents an overall 24 percentage point increase.[9]

At the beginning of Fiscal Year 2017, the number of aged information technology hardware assets was 137,721 out of 216,293, representing 64 percent of the total information technology hardware inventory. The IRS estimates that the current replacement cost for its aged information technology hardware is approximately $430 million. We reported in a previous Treasury Inspector General for Tax Administration (TIGTA) report[10] that the IRS did not achieve its aged information technology hardware inventory goals for Fiscal Years 2008 through 2010. Additionally, in Fiscal Year 2008, the IRS acknowledged that sustaining the information technology infrastructure was one of its highest priorities, but the IRS continues to be unable to achieve its aged information technology hardware inventory objective. With its aged hardware inventory increasing to 64 percent at the beginning of Fiscal Year 2017, the IRS now recognizes its aging information technology infrastructure as its number one Service-wide risk.

Budget assessment

IRS management explained that the past five years have been some of the most challenging from a fiscal perspective, which has impacted their ability to reduce the aged information technology hardware to an acceptable level. Between Fiscal Years 2012 and 2016, the IRS Information Technology organization reported that it allocated $1.359 billion of its funds to implement several unfunded or partially unfunded legislative requirements, including the Patient Protection and Affordable Care Act[11] and the Health Coverage Tax Credit. According to the IRS, this has limited its ability to replace its aged information technology hardware inventory.

We further examined the SI Program's budgets for Fiscal Years 2013 through 2016 and identified that the allocated budgets were not sufficient to adequately address the increasing percentage of aged information technology hardware inventory. For example, at the beginning of Fiscal Year 2016, the replacement costs for the aged hardware were estimated at approximately $459 million, but the SI Program's Fiscal Year 2016 budget was approximately

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[7] The IRS considers a piece of hardware that ages at any point in time during a fiscal year as being "aged" on the first day of the fiscal year.

[8] An information technology hardware asset that is in storage and reserved for future use.

[9] The number of IRS's aged hardware for Fiscal Years 2013 and 2017 were 99,216 and 137,721, respectively.

[10] TIGTA, Ref. No. 2011-20-006, _The Sustaining Infrastructure Program Is Significantly Improved and a Comprehensive Information Technology Infrastructure Strategy Has Been Developed_ p. 16 (Dec. 2010).

[11] Pub. L. No. 111-148, 124 Stat. 119 (2010) (codified as amended in scattered sections of the U.S. Code), as amended by the Health Care and Education Reconciliation Act of 2010, Pub. L. No. 111-152, 124 Stat. 1029.

$172 million, which was a substantial increase from previous fiscal years. However, SI Program personnel explained that they did not receive sufficient funding each preceding fiscal year, and they would need an allocated budget of approximately two and a half times their Fiscal Year 2016 budget to replace all of the IRS's aged information technology hardware. Figure 1 presents our analysis of the SI Program's allocated budgets and obsolescence asset reports, detailing the number and associated replacement costs of total hardware and total aged hardware at the beginning of each fiscal year. See Appendix V for a summary of the IRS's aged information technology hardware by asset category for Fiscal Year 2016.

Figure 1: Summary of the SI Program's Allocated Budgets and Obsolescence Asset Reports for Fiscal Years 2013 Through the First Month of 2017

	Fiscal Year				
	2013	**2014**	**2015**	**2016**	**2017**
SI Program's Fiscal Year Allocated Budget	$135,482,737	$56,685,003	$107,651,417	$171,862,084	Continuing Resolution[12]
Number of Total Assets	248,237	248,940	253,049	220,925	216,293
Number of Total Aged Assets	99,216	128,140	143,020	130,589	137,721
Percentage	40%	51%	57%	59%	64%
IRS Estimated Replacement Cost of Total Assets	$796,661,733	$837,549,135	$813,712,083	$732,957,233	$684,167,322
IRS Estimated Replacement Cost of Total Aged Assets	$405,113,551	$440,493,975	$482,710,171	$458,700,785	$430,250,820
Percentage	51%	53%	59%	63%	63%

Source: TIGTA's analysis of the IRS's allocated budgets and Obsolescence Asset Reports for Fiscal Years 2013 through the first month of 2017.

The IRS does not have an assigned budget dedicated specifically for the SI Program to address its aging hardware. Each year, the SI Program is funded in varying amounts from a number of

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[12] The IRS was operating under a continuing resolution at the time of our review; therefore, the IRS did not yet have an allocated budget for the SI Program for Fiscal Year 2017.

different internal sources, such as from the IRS's base year operations support appropriation, user fees, and carryover money from previous fiscal years not used by other IRS business units.

In fact, the SI Program's Fiscal Years 2014 and 2015 allocated budgets included approximately $20 million and $31 million, respectively, from carryover funds. Carryover funds are those that the IRS did not spend during a fiscal year, a portion of which may be "carried over" for use in a subsequent fiscal year. Congressional approval is required to recover 50 percent of the unobligated funds from the expired appropriation for use in the next fiscal year based on documented IRS needs; the remaining 50 percent is returned to the Department of the Treasury's General Fund. For those two fiscal years, the carryover funds came to the SI Program because one or more IRS business units did not spend their full appropriation in a prior fiscal year. During Fiscal Years 2013 through 2016, a combined total of approximately $169.9 million of the IRS's enacted appropriations was not spent (or obligated to be spent) by the end of the fiscal years.[13]

With additional coordination between the Chief Information Officer, Chief Financial Officer, and the other IRS business unit executives to identify the availability of additional transfers, reprogramming, and possible carryover funds earlier in the process to maximize their use and development of plans to expeditiously spend any potential surplus funds that may become available (using task orders on established contracts, modifying existing contracts, *etc*.), the IRS may have been able to provide the SI Program a combined total of up to $67 million[14] in additional unspent funds during Fiscal Years 2013 through 2016. This represents a significant portion of the funds that expired at fiscal year–end that the IRS was not able to carry over.

IRS management explained that they have a process in place to monitor each financial plan during the fiscal year. The Chief Financial Officer's staff meets twice monthly with executives covering financial management, program budget, and resources to identify potential surplus funds, focusing its effort on the midyear review. Any internal request for transfer of funds between appropriations are evaluated upon mission-critical needs and, if approved by IRS management, the request is placed on a priority list until additional funding is identified and becomes available. According to the IRS, the authority to transfer surplus funds between appropriations within a fiscal year requires an approved budget and congressional approval. IRS management told us that over the past few years, Congress has not approved the budget until several months into the fiscal year, and for the current year, the budget was not approved until May 2017. Moreover, Congress usually does not approve the request for funds transfers until mid-July, and the requested funds do not include any surpluses that may have materialized after the request has been submitted. As such, the IRS's ability to spend these funds for this purpose based on the current process is limited.

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[13] See Appendix IV for an analysis of the IRS's funding and obligations for Fiscal Years 2013 through 2016.
[14] See Appendix IV for calculation of a combined total of up to $67 million in additional unspent funds during Fiscal Years 2013 through 2016.

IRS management stated that 1) approval of inter-appropriation fund transfers earlier in the fiscal year, 2) higher reprogramming of funds authority, and 3) expanded multiple-year or no-year budget authority would help them maximize the use of appropriated funds to replace the IRS's aging information technology hardware.

The IRS has been provided multiyear authority in its Business Systems Modernization appropriation and a limited portion of its Operations Support appropriation (for specific purposes). Expanding multiyear authority for the purpose of replacing critical information technology hardware so that the IRS could draw on unused appropriations at fiscal year–end would provide a significant benefit and potentially help mitigate the risks of aged hardware failure.

Risks due to aged information technology hardware

Aged information technology hardware infrastructure still in use introduces unnecessary risk that excessive system downtime could occur due to hardware failures. As the information technology hardware infrastructure ages, it becomes more difficult to obtain adequate support, and extended support from outside vendors is often very expensive. To determine the scope of this risk, we requested from the IRS all Fiscal Year 2016 incident tickets from the Knowledge Incident/ Problem Service Asset Management system categorized as either Priority Code 1 ("critical") or Priority Code 2 ("high")[15] for all aged information technology hardware. We analyzed the data provided by the IRS to identify the number of incident tickets by hardware asset categories and priority codes to determine the length of time needed to resolve the issues and to determine any potential replacement costs for the aged information technology hardware associated with the incident tickets.

Our analysis identified 107 (5 percent) of 2,268 incident tickets most likely involving an aged hardware failure.[16] We further identified 19 (18 percent) of the 107 incident tickets were related to the Modernized e-File system, a web-based system that allows for electronic filing of tax returns. These incident tickets may have affected taxpayers and tax practitioners using that system because it took the IRS approximately 11 hours to resolve the tickets. While we believe that there are more incident tickets involving aged hardware failures, we limited our analysis to the three cause codes that appear to be specifically related to hardware failures. Figure 2

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[15] Incident tickets are created as part of the IRS's Information Technology Incident Management Process that defines the process and procedures for recording, categorizing, prioritizing, investigating, diagnosing, resolving, dispatching, monitoring, and closing out the incidents. Incident tickets are classified using a priority code number and a priority descriptor.

[16] The data extract included an "Incident Cause Code" field for each record provided by the IRS. We identified three cause codes most likely related to true hardware failures: 1) HW_FAILURE, 2) HARD DRIVE FAIL, and 3) HW_FAIL_MGT_SVC. The data extract also included 44 incident ticket records with an assigned "UNKNOWN" incident cause code, which we excluded from our analysis because we could not determine whether these are directly related to hardware failures.

presents a summary of our analysis on the Priority Code 1 and 2 incident tickets of aged information technology hardware by category for Fiscal Year 2016.

Figure 2: Analysis of Fiscal Year 2016 Priority Code 1 and 2 Incident Tickets for Aged Hardware

Hardware Category Description for Incident Tickets	Incident Priority Code	Number of Incident Tickets	Aggregate Length of Time to Resolve[17]	IRS Estimated Replacement Cost
Auto Call Distributor	1	1	2:14:46	$240,000
Auto Call Distributor	2	1	1:41:54	$240,000
Desktop	2	4	1:59:06	$3,564
High-End Printer	2	2	124:11:00	$5,018
Laptop	2	11	43:33:06	$17,083
Large Server ($100,000 – $1 million)	2	19	Unknown	$4,940,000
Medium Server ($10,000 – <$100,000)	2	33	1,039:16:28	$858,000
Small Server (<$10,000)	2	35	3,285:30:17	$227,500
Small Automated Tape Library (<$51,000)	2	1	42:46:07	$25,000
TOTAL	**–**	**107**	**4,541:12:44**	**$6,556,165**

Source: TIGTA's analysis of Fiscal Year 2016 Priority Code 1 and 2 incident tickets for aged hardware.

The aggregate length of time to resolve these incident tickets was approximately 4,541 hours, and the IRS estimates that the aggregate replacement cost for the associated aged hardware is approximately $6.6 million. However, we believe that the length of time to resolve these tickets is longer than our calculation results. For the "Large Server" hardware category, we identified 19 incident tickets that had negative resolve times (*i.e.*, the resolve time was recorded prior to the problem ticket being reported). IRS personnel explained that these errors may be due to either a system miscalculation or human input error and that they are trying to determine how to prevent this from occurring in the future. Without complete and accurate information, management cannot make informed decisions.

Additionally, we analyzed the data to identify the aged information technology hardware with more than one incident ticket. Aged hardware with multiple incident tickets may indicate the importance of assigning a higher priority to replacing those aged assets. We identified 11 aged hardware components that combined had 53 incident tickets during Fiscal Year 2016. The aggregate length of time to resolve these tickets was approximately 1,951 hours, and the

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[17] The Aggregate Length of Time to Resolve in Figure 2 is in the Hours:Minutes:Seconds format.

replacement cost for this aged hardware is estimated at $656,500. However, because of the resolve time errors identified with the "Large Server" hardware category, we believe that the total aggregate length of time for the 53 incident tickets is longer than what our calculation results indicate. Figure 3 is a summary of the results of our analysis on the Fiscal Year 2016 Priority Code 1 and 2 incident tickets for aged hardware with more than one incident ticket.

Figure 3: Analysis of Fiscal Year 2016 Priority Code 1 and 2 Incident Tickets for Aged Hardware With More Than One Ticket

Hardware Category Description for Incident Tickets[18]	Incident Priority Code	Impacted System	Number of Incident Tickets	Aggregated Length of Time to Resolve	IRS Estimated Replacement Cost
Large Server ($100,000 – $1 million)	2	Business Objects Enterprise	10	Unknown	$260,000
Large Server ($100,000 – $1 million)	2	Business Objects Enterprise	9	Unknown	$260,000
Medium Server ($10,000 – <$100,000)	2	Contact Recording	3	29:53:55	$26,000
Medium Server ($10,000 – <$100,000)	2	Modernized e-File	14	12:20:41	$26,000
Medium Server ($10,000 – <$100,000)	2	Modernized e-File	4	1:56:51	$26,000
Medium Server ($10,000 – <$100,000)	2	Document Control System	2	98:24:05	$26,000
Small Server (<$10,000)	2	Contact Analytics	2	3:27:39	$6,500
Small Server (<$10,000)	2	E-Workforce Management	2	70:45:27	$6,500
Small Server (<$10,000)	2	Contact Recording	3	95:35:38	$6,500
Small Server (<$10,000)	2	Contact Analytics	2	1,225:15:16	$6,500
Small Server (<$10,000)	2	Contact Analytics	2	413:23:54	$6,500
TOTAL	–	–	**53**	**1,951:03:26**	**$656,500**

Source: TIGTA's analysis of Fiscal Year 2016 Priority Code 1 and 2 incident tickets for aged hardware.

To provide further perspective on the negative effect these aged hardware failures may have had on IRS employee productivity, security of taxpayer information, and customer service, the

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[18] Each server listed is a unique piece of equipment.

following are just a few examples of incidents that the IRS reported affecting its ability to conduct daily operations.

- The existing Contact Recording infrastructure is extremely aged and averages one outage per day affecting more than 200 IRS call center employees answering and helping individuals with tax questions.

- The IRS "Web Farm" houses over 500 websites, including IRWeb, and many internal filing season websites in use by all IRS business units. On October 31, 2016, the Taxpayer Advocate's web page went offline, affecting more than 1,700 employees.

- Although the IRS met the Department of the Treasury's 100 percent Personal Identity Verification enablement compliance mandate in Calendar Year 2015, the interim solution that it deployed was not sustainable long term due a lack of operational effectiveness. A Direct Model Personal Identity Verification enablement solution required an updated software feature, which in turn required updated hardware. More than 30 percent of the IRS's installed network equipment had no End-of-Software support[19] and required replacement in order to activate Direct Model Personal Identity Verification enablement. Until the hardware is replaced, no software support means no computer bug fixes, no maintenance releases, and no security patches. This significantly increased the security risk vulnerability of the at-risk equipment. According to the IRS, hardware equipment for the proposed permanent solution is targeted to be installed in August 2017.

Aged information technology hardware still in use introduces unnecessary risks that, when combined with the fact that components of the infrastructure and systems are interrelated and interdependent, may cause a ripple effect, making outages and failures unpredictable and introducing security risks to taxpayer data that IRS systems must protect. More needs to be done to reduce the amount of the IRS's aged information technology hardware inventory in order for the IRS to perform its core tax administration responsibilities and provide taxpayers with top-quality service.

Recommendations

The Chief Information Officer should:

Recommendation 1: Conduct additional coordination with the Chief Financial Officer and other business unit executives to identify the availability of additional transfers, reprogramming, and possible carryover funds earlier in the process to maximize their use and develop plans to expeditiously spend any surplus funds that might become available to aid in meeting the IRS's objective of reducing its aged information technology hardware infrastructure. To further assist

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[19] When a company ends support for a previous version of a software product or service. This may include ending support for security patches or upgrades that are used to protect users from viruses, malware, and other types of cyberattacks.

in this objective, continue working with the Department of the Treasury and the Office of Management and Budget to request expanded flexibility, such as transfer authority between appropriations, and higher reprogramming and multiyear authority. Absent consideration of other higher IRS spending priorities, a greater percentage of the unused funds should be spent in current or subsequent fiscal years for the purpose of replacing critical information technology hardware instead of allowing 50 percent of the unspent funds to expire at fiscal year–end.

> ***Management's Response:*** The IRS disagreed with this recommendation based on actions it had already taken in its Fiscal Year 2018 President's Budget submission. The IRS stated that the Chief Information Officer coordinated with the Chief Financial Officer and other business units this year as the Fiscal Year 2018 President's Budget submission was being developed and requested that surplus funds identified in the Enforcement account be realigned to the Operations Support account, from which the Information Technology organization is funded. In addition, the IRS requested $100 million of the Operations Support account be made available for two years, which is double the amount currently available to the IRS in its Fiscal Year 2017 budget. The IRS believes that these actions satisfy the intent of this recommendation. The IRS also stated that it disagrees with the portion of this recommendation to allocate all surplus funds to aged hardware infrastructure and that it cannot commit to devoting all surpluses to aged hardware infrastructure as other, more pressing unfunded needs might arise.

> ***Office of Audit Comment:*** The IRS's actions should be of significant benefit if funded as requested. However, given the substantial portion of hardware infrastructure that is beyond its useful life, additional actions will likely be needed. We also note that we did not recommend that the IRS allocate all surplus funds to replace aged hardware infrastructure, but a greater percentage of unused funds that would expire at fiscal year-end. Clearly, consideration must be given to other priorities; however, given that IRS's operations depend on its information technology infrastructure, this will remain a very high priority.

Recommendation 2: Implement systemic controls to prevent erroneous incident ticket time entries to the Knowledge Incident/Problem Service Asset Management system for which the incident stop time is earlier than the incident start time.

> ***Management's Response:*** The IRS agreed with this recommendation. The IRS will implement systemic controls to prevent erroneous incident ticket time entries to the Knowledge Incident/Problem Service Asset Management system for which the outage stop time is earlier than the outage start time.

A Comprehensive Guidance Document Is Needed to Effectively Manage Aged Information Technology Hardware

Federal standards for internal controls are outlined in two documents. Office of Management and Budget Circular No. A-130[20] establishes general policy for the planning, budgeting, governance, acquisition, and management of Federal information, personnel, equipment, funds, information technology resources, and supporting infrastructure and services. According to this circular, in support of agency missions and business needs and in coordination with program managers, agencies shall define, implement, and maintain processes, standards, and policies applied to all information resources at the agency. In addition, according to the Government Accountability Office's *Standards for Internal Control in the Federal Government*, management should develop and maintain documentation of its internal control system, implement control activities through defined policies and procedures, and assign responsibilities and delegate authority to key roles throughout the entity.

SI Program officials explained that they established a robust process to identify, prioritize, and make decisions on funding the replacement of the IRS's aged information technology hardware. However, this process is not adequately documented. For example, the IRS does not have a comprehensive guidance document that details its complete processes, policies, and procedures; fully defines the roles and responsibilities; and establishes program objectives and goals to effectively manage its aged information technology hardware. The Internal Revenue Manual, provides instructions for the activities used to manage information technology hardware but not aged hardware.[21] Further, the SI Program's documentation of its processes, policies, procedures, and roles and responsibilities are outlined across three separate guidance documents:

- *Sustaining Infrastructure Process Management Document* (Version 9.0), dated June 20, 2013.

- *Sustaining Infrastructure Program Overview* briefing, dated July 31, 2015.

- *Sustaining Infrastructure Process flowchart*.

During a walk-through of the program, SI Program officials acknowledged that it is difficult to follow everything across three separate guidance documents. They explained that a comprehensive guidance document was not created due to their limited amount of time focusing on program priorities and being part-time employees as well as the impact of the IRS's budget reductions over the past several years. However, SI Program officials agreed that it would be beneficial to develop a comprehensive guidance document to help them better manage the IRS's aged information technology hardware.

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[20] Office of Management and Budget Circular No. A-130, *Managing Information As a Strategic Resource* (July 2016).
[21] Internal Revenue Manual 2.149.3 (Oct. 2015).

Because the IRS does not have a comprehensive guidance document, instructions on how to effectively manage its aged information technology hardware are not clear. Maintaining a complete and comprehensive guidance document with detailed instructions will provide the SI Program with clear direction and assist it with achieving its objective of reducing the IRS's aged information technology hardware infrastructure assets to an acceptable level of 20 to 25 percent.

Recommendation

Recommendation 3: The Chief Information Officer should develop a comprehensive guidance document that details the IRS's enterprise-wide processes, policies, and procedures as well as roles and responsibilities to effectively manage the IRS's aged information technology hardware.

> **Management's Response:** The IRS agreed with this recommendation. The IRS is in the final stages of review for combining the three separate SI Program guidance documents into a comprehensive guidance document.

Detailed Objective, Scope, and Methodology

The overall objective of this review was to determine the efficiency and effectiveness of key ongoing or planned activities aimed at addressing the IRS operational challenge of replacing its aged hardware infrastructure. To accomplish our objective, we:

I. Identified and assessed established key roles and responsibilities for guiding enterprise-wide planning and operational decisions for addressing the IRS's aged information technology hardware.

   A. Reviewed and evaluated key governance documents to manage and monitor the SI Program activities for aged information technology hardware.

   B. Reviewed IRS guidance and other best practices relating to aged information technology hardware management.

II. Determined the status of the Fiscal Years[1] 2013 through 2016 appropriated funds the IRS received to manage and mitigate the risks of its aged information technology hardware infrastructure.

   A. Identified whether the IRS has controls in place to identify, prioritize, and make decisions on funding the replacement of aged information technology hardware.

   B. Obtained and reviewed supporting documentation for the Fiscal Years 2013 through 2016 funding that the SI Program received to address the IRS's aged information technology hardware and related expenditures.

III. Determined the efficiency and effectiveness of the IRS's efforts to manage its aged information technology hardware and mitigate associated operational risks.

   A. Interviewed IRS personnel to evaluate the status of its aged information technology hardware issue.

   B. Assessed the IRS's progress in moving towards its established objective to replace its aged information technology hardware infrastructure.

      1. Identified and obtained supporting documentation for the process that the SI Program has in place to manage and monitor its aged information technology hardware. We analyzed the supporting documentation to measure the IRS's progress in reducing its aged information technology hardware.

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[1] See Appendix VI for a glossary of terms.

2. For the population of all aged information technology hardware as of September 30, 2016, we requested from the IRS all Fiscal Year 2016 incident tickets from the Knowledge Incident/Problem Service Asset Management system categorized as either Priority Code 1 or 2. We analyzed the IRS-provided data to identify the number of incident tickets by hardware asset categories and priority codes, determined the length of time needed to resolve the reported problems, and determined the potential replacement costs for the aged information technology hardware associated with the incident tickets.

We evaluated the reliability of the electronic data received from the IRS to help ensure that the data were reasonably complete and accurate. This was accomplished by recreating the data extract report provided by combining two other IRS-provided reports. We also randomly selected a judgmental sample[2] of 10 of 2,268 records and traced the data received in the data extract report to the IRS's incident ticket database. We determined that the data were sufficiently reliable for purposes of this report.

Internal controls methodology

Internal controls relate to management's plans, methods, and procedures used to meet their mission, goals, and objectives. Internal controls include the processes and procedures for planning, organizing, directing, and controlling program operations. They include the systems for measuring, reporting, and monitoring program performance. We determined that the following internal controls were relevant to our audit objective: Office of Management and Budget Circular No. A-130, *Managing Information As a Strategic Resource*;[3] the Government Accountability Office's *Standards for Internal Control in the Federal Government*;[4] the Internal Revenue Manual; the IRS's Congressional Budget and President's Budget Submissions as well as policies and procedures related to aged information technology hardware management activities.

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[2] A judgmental sample is a nonprobability sample, the results of which cannot be used to project to the population.
[3] Office of Management and Budget Circular No. A-130, *Managing Information As a Strategic Resource* (July 2016).
[4] Government Accountability Office, GAO-14-704G, *Standards for Internal Control in the Federal Government* (Sept. 2014).

Major Contributors to This Report

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Outcome Measure

This appendix presents detailed information on the measurable impact that our recommended corrective actions will have on tax administration. This benefit will be incorporated into our Semiannual Report to Congress.

Type and Value of Outcome Measure:

- Inefficient Use of Resources – Potential; $67 million in appropriated unspent funding by the IRS over a four-year period (see page 3).

Methodology Used to Measure the Reported Benefit:

During Fiscal Years[1] 2013 through 2016, a combined total of approximately $169.9 million from the IRS's enacted appropriations was not spent (or obligated to be spent) by the end of the fiscal years. With additional coordination between the Chief Information Officer, the Chief Financial Officer, and the other IRS business unit executives to identify the availability of additional transfers, reprogramming, and possible carryover funds earlier in the process to maximize their use and development of plans to expeditiously spend any potential surplus funds that may become available (using task orders on established contracts, modifying existing contracts, *etc*.), the IRS may have been able to provide the SI Program a combined total of up to $67 million in additional unspent funds during this four-year period.

This represents a significant portion of the funds that expired at fiscal year–end that the IRS was not able to carryover. The $67 million value of the outcome measure is calculated as follows.

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[1] See Appendix VI for a glossary of terms.

Fiscal Year	2013	2014	2015	2016	Total
Appropriated Resources Enacted	$10,758,053,842	$10,743,474,000	$10,327,000,000	$10,529,000,000	$42,357,527,842
Appropriated Resources Obligated	$10,709,988,356	$10,645,401,952	$10,321,095,452	$10,511,188,387	$42,187,674,147
Amount Not Spent or Obligated at Fiscal Year–End	$48,065,486	$98,072,048	$5,904,548	$17,811,613	$169,853,695
Minimum Amount That Should Remain at Fiscal Year–End	$10,000,000	$10,000,000	$10,000,000	$10,000,000	$40,000,000
Difference	$38,065,486	$88,072,048	$0	$7,811,613	$133,949,147
50% of Difference (*Represents Net Benefit of Obligating by Fiscal Year–End*)[2]	$19,032,743	$44,036,024	$0	$3,905,807	$66,974,574

Source: TIGTA's analysis of budget information provided by the IRS. TIGTA did not independently validate the numbers provided by the IRS.

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[2] Difference totals may not be exactly 50 percent due to rounding.

Summary of the Sustaining Infrastructure Program's Obsolescence Asset Report for Fiscal Year 2016

Fiscal Year 2016				
Hardware Category	**Number of Assets**	**Number of Aged Assets**	**Percentage of Aged Assets**	**IRS Estimated Replacement Cost**
Auto Call Distributor	80	78	98%	$18,720,000
Automated Tape Library Medium ($51,000–$1 Million)	34	30	88%	$10,500,000
Automated Tape Library Small (<$51,000)	208	154	74%	$3,850,000
Desktop	65,328	38,091	58%	$33,939,081
Disk Array Large ($150,000+)	35	28	80%	$26,292,000
Disk Array Medium ($25,000–$150,000)	296	251	85%	$15,938,500
Disk Array Small (<$25,000)	2,405	1,636	68%	$13,742,400
Electronic Key Telephone System	52	43	83%	$5,469,600
Fax Device	6,380	5,344	84%	$4,659,968
IBM Mainframe	6	3	50%	$10,500,000
Laptop	66,194	26,607	40%	$41,320,671
Plotter	246	152	62%	$874,000
Print Output Processing Hardware Large	42	14	33%	$10,500,000
Print System Large	48	9	19%	$5,040,000
Printer High-End	15,958	12,096	76%	$30,348,864
Printer Low-End	36,761	27,873	76%	$12,821,580
Private Branch Exchange	120	79	66%	$51,571,200
Router High-End (>$44,020)	12	2	17%	$105,648

Fiscal Year 2016				
Hardware Category	Number of Assets	Number of Aged Assets	Percentage of Aged Assets	IRS Estimated Replacement Cost
Router Medium ($11,571–$44,020)	117	65	56%	$902,460
Router Low-End (<$11,571)	1,226	680	55%	$4,765,440
Scanner High-End	2,472	2,191	89%	$12,828,305
Scanner Low-End	7,923	5,867	74%	$2,757,490
Server Mega ($1 Million+)	5	3	60%	$5,400,000
Server Large ($100,000-$1 Million)	90	69	77%	$17,940,000
Server Medium ($10,000–$99,999)	1,816	1,205	66%	$31,330,000
Server Small (<$10,000)	5,400	3,630	67%	$23,595,000
Switch High-End (>$110,400)	4	1	25%	$132,480
Switch Medium ($22,561–$110,400)	222	130	59%	$3,519,360
Switch Low-End (<$22,561)	7,103	3,978	56%	$29,520,738
Tape Drive	240	190	79%	$4,446,000
UNISYS Mainframe	2	2	100%	$8,000,000
Voice Messaging System High-End ($100,000+)	22	21	95%	$11,340,000
Voice Messaging System Low-End (<$100,000)	78	67	86%	$6,030,000
Total	220,925	130,589	59%	$458,700,785

Source: TIGTA's analysis of the IRS's Obsolescence Asset Report for Fiscal Year 2016. TIGTA did not independently validate the numbers in the Obsolescence Asset Report.

Glossary of Terms

Term	Definition
Business Objects Enterprise	A software product that provides a comprehensive set of tools for reporting and analyzing data, scheduling and delivering documents, and managing project tasks.
Computer Bug	A defect, imperfection, or malfunction in a computer program.
Contact Analytics	A set of commercial off-the-shelf tools for analyzing the recorded audio component of customer contacts.
Contact Recording	A commercial off-the-shelf software package for recording interactions between IRS customer service personnel and taxpayers or their representatives.
Document Control System	A batch process that allows the Error Resolution System function to pull error documents from blocks of work in order to release carts to files.
E-Workforce Management	A comprehensive resource planning and workforce management application that provides automated tools to forecast, schedule, and track call center workload and staffing requirements.
Fiscal Year	Any yearly accounting period, regardless of its relationship to a calendar year. The Federal Government's fiscal year begins October 1 and ends on September 30.
Health Coverage Tax Credit	A tax credit that pays 72.5 percent of qualified health insurance premiums for eligible individuals and their families.
Internal Revenue Manual	The IRS's primary source of instructions to its employees relating to the administration and operation of the IRS. The manual contains the directions employees need to carry out their operational responsibilities.
IRWeb	IRS's default intranet home page for all of its employees.
Knowledge Incident/Problem Service Asset Management System	Maintains the complete inventory of information technology and non–information technology organization assets, computer hardware, and software. It is also the reporting tool for problem management with all IRS-developed applications and shares information with the Enterprise Service Desk.
Multiple-Year Budget Authority	Funds that are available for obligation for a fixed period of time in excess of one fiscal year.

Term	Definition
No-Year Budget Authority	Funds that remain available for obligation for an indefinite period of time.
Obsolescence Asset Report	An SI Program report that reflects the IRS's number and associated replacement costs of total hardware and total aged hardware.
Personal Identity Verification	A government-issued identity credential that contains a contact and a contactless chip. The cardholder's facial image is printed on the card along with other identifying information and security features that can be used to authenticate the user for physical access to Federally controlled facilities and logical access to Federally controlled information systems.
Priority Code 1 ("critical")	Incidents defined as a severe business disruption, unable to operate, or a critical system component that failed or is severely impaired. The target resolution time is four hours.
Priority Code 2 ("high")	Incidents defined as a major business disruption, a critical user or group that is unable to operate, or the business unit is experiencing a significant reduction in system performance. The target resolution time is eight hours.
Web Farm	Defined as either 1) a website that uses two or more servers to handle user requests or 2) an Internet service provider that provides web-hosting services using multiple servers. It may perform such services as providing centralized access control, file access, printer sharing, and backup for workstation users.

Management's Response to the Draft Report

DEPARTMENT OF THE TREASURY
INTERNAL REVENUE SERVICE
WASHINGTON, D.C. 20224

CHIEF INFORMATION OFFICER

AUG 17 2017

MEMORANDUM FOR DEPUTY INSPECTOR GENERAL AUDIT

FROM: S. Gina Garza
                    Chief Information Officer

SUBJECT: Draft Audit Report- Aging Infrastructure - #201620014

Thank you for the opportunity to review your draft audit report and provide comments related to Aging Infrastructure at the Internal Revenue Service (IRS).

We appreciate your recognition of the efficiency and effectiveness of the Sustaining Infrastructure Program by noting that on average over four fiscal years the IRS obligated nearly 99.7 percent of its allocated budget each year. Replacing aging infrastructure is a high priority for the IRS. However, providing sufficient funding to reduce the aged percentage of infrastructure to industry standards has been challenging. As you are aware, the IRS has faced the challenge of accomplishing its mission with decreased funding levels over several years and, as your report points out, it did so while absorbing $1.3B in costs for unfunded or partially-funded mandates.

We agree with recommendations two and three and disagree with the first recommendation and the underlying premise of the outcome measure. The IRS clearly recognizes the importance of the risks inherent in an aging infrastructure, as is evident in the fact that it has been identified as the Service's number one enterprise risk. Recognizing this, the IRS submitted several recommendations in the Fiscal Year 2018 President's Budget submission which will directly address the funding recommendations you included in your report.

We disagree with the underlying premise that the IRS is using resources inefficiently by not spending all its appropriated funds each fiscal year. As we pointed out during the audit, Congressional approval is required to shift funds between appropriations and, beyond a $5 million limit, among budget activities within an appropriation. Generally, Congress requires Treasury to submit all transfer requests in early summer. We routinely request approval to shift funds and have been successful in re-programming surpluses and carryover funds to aged infrastructure. However, given the timing of the

annual request and how long it takes to receive Congressional approval, we would not be able to utilize surpluses identified late in the fiscal year.

We reviewed Appendix IV of this report as requested and made corrections to the table. The revised table is in Attachment 2.

The IRS values the analysis and recommendations your organization provides to improve our information technology systems and business processes. If you have any questions, please contact me at (240) 613-9373, or contact Joe Sanchez on (240) 613-4334.

Attachments

Draft Audit Report – Sixty-Four Percent of the Internal Revenue Service's Information Technology Hardware Infrastructure Is Beyond Its Useful Life (Audit # 201620014)

RECOMMENDATION #1:

Conduct additional coordination with the Chief Financial Officer and other business unit executives to identify the availability of additional transfers, reprogramming, and possible carryover funds earlier in the process to maximize their use and develop plans to expeditiously spend any surplus funds that might become available to aid in meeting the IRS's objective of reducing its aged information technology hardware infrastructure. To further assist in this objective, continue working with the Department of the Treasury and the Office of Management and Budget to request expanded flexibility, such as transfer authority between appropriations, and higher reprogramming and multi-year authority. Absent consideration of other higher IRS spending priorities, a greater percentage of the unused funds should be spent in current or subsequent fiscal years for the purpose of replacing critical information technology hardware instead of allowing 50 percent of the unspent funds to expire at fiscal year-end.

CORRECTIVE ACTION #1:

We disagree with this recommendation, based on actions we have already taken in the FY18 President's Budget submission. We coordinated with the Chief Financial Officer (CFO) and other business units this year as we developed the FY 2018 President's Budget, and the IRS identified surplus funds in the Enforcement account that we requested be realigned to the Operations Support (OS) account, where IT is funded. In addition, we requested $100M of the OS account be available for two years, which is double the amount currently available to the IRS in the FY17 budget. We believe these actions satisfy the recommendation's intent.

We disagree with the portion of the recommendation that the IRS allocate all surplus funds to aged infrastructure. Addressing aging infrastructure is an IRS priority. However, we cannot commit to devoting all surpluses to aged infrastructure as other, more pressing unfunded needs might arise.

IMPLEMENTATION DATE:

N/A

RESPONSIBLE OFFICIALS:

1

Attachment 1

Draft Audit Report – Sixty-Four Percent of the Internal Revenue Service's Information Technology Hardware Infrastructure Is Beyond Its Useful Life (Audit # 201620014)

N/A

CORRECTIVE ACTION MONITORING PLAN:

N/A

RECOMMENDATION #2:

Implement systemic controls to prevent erroneous incident ticket time entries to the Knowledge Incident/Problem Service Asset Management system where the incident stop time is earlier than the incident start time.

CORRECTIVE ACTION #2:

We agree with this recommendation. The IRS will implement systemic controls to prevent erroneous incident ticket time entries to the Knowledge Incident/Problem Service Asset Management system where the outage stop time is earlier than the outage start time.

IMPLEMENTATION DATE:

December 15, 2017

RESPONSIBLE OFFICIAL:

Associate Chief Information Officer Enterprise Operations

CORRECTIVE ACTION MONITORING PLAN:

We enter accepted Corrective Actions into the Joint Audit Management Enterprise System (JAMES) and monitor them monthly until completion.

RECOMMENDATION #3:

The Chief Information Officer should develop a comprehensive guidance document that details the IRS's enterprise-wide processes, policies and procedures, as well as the roles and responsibilities, to effectively manage the IRS's aged information technology hardware.

CORRECTIVE ACTION #3:

2

Attachment 1

Draft Audit Report – Sixty-Four Percent of the Internal Revenue Service's Information Technology Hardware Infrastructure Is Beyond Its Useful Life (Audit # 201620014)

We agree with this recommendation and are in the final stages of review for combining the three separate Sustaining Infrastructure documents into a Comprehensive Guidance Document.

RESPONSIBLE OFFICIAL:

Associate Chief Information Officer, Enterprise Services

IMPLEMENTATION DATE:

October 31, 2017

CORRECTIVE ACTION MONITORING PLAN:

We enter accepted Corrective Actions into the Joint Audit Management Enterprise System (JAMES) and monitor them monthly until completion.

3

Attachment 2

Draft Audit Report – Sixty-Four Percent of the Internal Revenue Service's Information Technology Hardware Infrastructure Is Beyond Its Useful Life (Audit # 201620014)

Fiscal Year	2013	2014	2015	2016	Total
Appropriated Resources Enacted	$10,758,053,842	$10,743,474,000	$10,327,000,000	$10,529,000,000	$42,357,527,842
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50% of Difference (*Represents Net Benefit of Obligating by Fiscal Year-End*)	$19,032,743	$44,036,024	$0	$3,905,806	$66,974,573

Source: TIGTA's analysis of budget information provided by the IRS. TIGTA did not independently validate the numbers provided by the IRS.