Office of Inspector General

OFFICE OF CYBER ASSESSMENTS AND DATA ANALYTICS

SPECIAL REPORT

THE DEPARTMENT OF ENERGY'S CONSIDERATIONS AND USE OF DATA ANALYTICS

DOE-OIG-24-14
March 2024

Department of Energy
Washington, DC 20585

March 14, 2024

MEMORANDUM FOR THE SECRETARY

SUBJECT: Special Report on The Department of Energy's Considerations and Use of Data Analytics

The use of data analytics allows an organization to evaluate transactional data in support of decision making regarding policy, program operations, resource allocations, risk management, and mission outcomes. Effective enterprise data analytics and its supporting foundational infrastructure enable modern and more effective management approaches.

Numerous Federal laws and provisions have been established over the years to ensure that the management and use of data is prioritized within Federal agencies. Supplemental guidance and leading practices from a variety of recognized sources build on existing Federal legal provisions and requirements that can help agencies incorporate sound data analytics practices to combat fraud and ensure integrity, efficiency, and integration of programs and operations. For instance, the Office of Management and Budget developed the *Federal Data Strategy* in 2019 that established 40 principles and practices designed to enable agencies to fully leverage data as a strategic asset by supporting strong data governance. Organizations such as the Department of Defense have demonstrated the effective use of data analytics.

Despite increased Federal efforts to promote information as a valuable national resource and strategic asset, and the progress made by comparable peers, the Department of Energy lacks the data and governance structure necessary to make critical decisions or gain visibility into program objectives. The Department's distributed and decentralized environment further exacerbates already existing data access and management challenges that hinder its ability to provide effective oversight and detect fraud, enhance data-driven management, realize performance improvement, and reduce risk to Federal resources.

For over 30 years, the Department has been a mainstay on the Government Accountability Office's High-Risk List for its acquisition and management of contractor resources that, taken together, execute approximately 90 percent of its base appropriation. The Government Accountability Office also reported in 2017 that the Department's failure to adopt common minimum data standards across the complex may have inhibited effective contractor oversight.

We highlighted in recent *Management Challenges* special reports the growing gaps in the Department's adoption and use of data analytics, concurrent challenges with supporting data access, and the need for officials to take urgent action. Key Department risks such as

cybersecurity, maintaining and rebuilding human capital, and recapitalizing physical infrastructure are all representative, enterprise-wide challenges that require support from data analytics powered by transactional and authoritative data.

Notably, the Department relies upon management and operating contractors within its National Laboratories and production facilities to leverage cutting edge talent and America's industrial know-how to work the most difficult science and engineering challenges. Although some sites may use data analytics, especially in support of mission operations, the Department has not effectively leveraged its many experts within its complex to develop and implement an enterprise-wide data analytics program.

The urgency to implement effective data analytics is growing.

The Infrastructure Investment and Jobs Act, the Inflation Reduction Act of 2022, and the Puerto Rico Energy Resilience Fund authorized an increase of approximately $99 billion in Department funding, established 72 new programs, and imposed aggressive timelines. As the Department launches many projects funded by the new spending, it is imperative that leadership emphasize the collection and use of high-quality, well-managed data. Doing so would allow the Department to much more effectively manage the risks associated with implementing legislation while supporting the development of useful and timely metrics to ensure better outcomes. By prioritizing the use of data analytics, officials would improve the Department's oversight of operations and expenditures related to the new legislation and reduce the risk of fraud, waste, and abuse.

This report was developed using agile oversight methods supported by the Council of the Inspectors General on Integrity and Efficiency. It is the first in a series of reports that the Office of Inspector General will issue to fulfill my commitment to advance integrity, management excellence, and proactive oversight with the increased use of data management and analytics. Each of these reports will identify specific actions to enhance data-driven decision making and the stewardship of Federal resources with the use of data analytics. Management concurred with our prospective considerations and indicated that actions were planned to enhance the Department's use of data analytics.

Teri L. Donaldson
Inspector General

cc: Deputy Secretary
Chief of Staff
Administrator, National Nuclear Security Administration

Department of Energy
Office of Inspector General

The Department of Energy's Considerations and Use of Data Analytics
(DOE-OIG-24-14)

WHY THE OIG PERFORMED THIS REVIEW

The unprecedented funding received by the Department of Energy through recent spending bills underscores the importance of increasing the adoption of data analytics. Specifically, the various funding measures authorized a substantial increase in funding, established 72 new programs, and imposed aggressive timelines on the Department. The scale and magnitude of these funding measures introduce an increased risk for fraud, waste, and mismanagement within the Department. The use of data analytics would greatly improve efficiency and enable much more effective oversight of the implementation of these funding provisions.

What Did the OIG Find?

While Federal efforts to promote information as a valuable national resource and strategic asset have increased, the Department often lacks the data necessary to make critical decisions, evaluate and effectively manage risks, or gain visibility into program results. The Department relies on contractors to execute much of its diverse mission, creating a decentralized environment in which authoritative source data may be uncollected or is collected and stored in various systems and databases throughout the complex. This presents data access, management, and analytics challenges that hinder the Department's ability to enhance data-driven decision making, detect fraud, and ensure appropriate stewardship of Federal resources. This report introduces the legal framework and leading practices supporting the use of data access, management, and analytics while highlighting past data management and analytics shortcomings within the Department.

What Is the Impact?

The Department is often hampered by data access and data management challenges. Because authoritative source data is stored in a multitude of systems maintained throughout the complex, the Department's ability to perform comprehensive and timely analytics is limited. Absent a coordinated and federated approach using common data standards with different use cases for various programs, efforts to monitor contractor costs and manage fraud risks may continue to be hampered. This will ultimately result in unidentified fraud, waste, and abuse of the Department's resources.

What Is the Path Forward?

This report offers prospective considerations for Department leadership to enhance fraud detection, payment integrity, data-driven decision making, risk management, and stewardship of Federal resources. Management concurred with our prospective considerations.

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INTRODUCTION

The enormous volume of data generated by Federal agencies, including the Department of Energy, requires effective data management and lends itself to the use of data analytics[1]—the application of data science to draw insights from data.[2] A successful data management and analytics strategy allows officials to make better and more informed decisions about agency operations. For instance, the use of data analytics allows an organization to evaluate transactional data in support of decision making regarding program operations, resource allocations, risk management, and mission outcomes. Data analytics activities can include a variety of techniques such as data cleaning, data mining, descriptive statistics, and predictive modeling that would enable the Department to identify potential fraud or improper payments. Data quality must be complete, accurate, and timely to successfully use data analytic techniques. The Department has an excellent opportunity to improve the effectiveness and efficiency of its programs by harnessing data to draw insights on performance and compliance.

Data management is a crucial first step to employing effective data analytics. Data management is the practice of collecting, organizing, improving, protecting, and storing an organization's data so that it can be analyzed for business decisions. A strong data governance structure is the framework for ensuring that data is transparent, accessible, and of sufficient quality so that the mission is supported and necessary improvements to the efficiency and effectiveness of operations are made. Data governance ensures that data is managed in accordance with policies and best practices and helps organizations make decisions about disparate data that originated in multiple places. Because data is often collected and stored in various systems and databases, a cohesive and comprehensive data repository is necessary to provide meaningful insights and correlations used to inform decision making and improve performance.

Image Source: auth0.com

The unprecedented funding received by the Department through recent spending bills heightens the importance of managing data in a way that is accessible and usable for program management and oversight, including increasing the adoption of data analytics and data-driven management. Specifically, the Infrastructure Investment and Jobs Act, the Inflation Reduction Act of 2022, and the Puerto Rico Energy Resilience Fund authorized an increase of approximately $99 billion in funding for the Department, established 72 new programs, and imposed several aggressive timelines on the Department. For instance, the Infrastructure Investment and Jobs Act created 56

[1] Data analytics is the application of data science, analyzing raw data from various technologies, tools, and processes to identify trends, variances, and anomalies and drawing conclusions about the information.
[2] This report is primarily focused on business and administrative data and not operational and mission data such as scientific research, national security, or environmental cleanup data.

new programs and provided the Department up to $48 billion to be disbursed through grants and cooperative agreements to third parties. The legislation also expanded the Department's total loan authority to an estimated $385 billion. The Inflation Reduction Act of 2022 provided the Department funding for two rebate programs, which will be administered by the Department's Office of State and Community Energy Programs. Initial efforts by the Office of Inspector General (OIG) identified potential improvements related to the data being collected by recipients and information being shared across recipients, which could help with the identification and prevention of fraud.

Despite increased Federal efforts to promote information as a valuable national resource and strategic asset, the Department often does not use available data to make critical decisions or gain visibility into program performance. As the largest civilian contracting agency in the Federal Government, the Department relies on contractors to execute much of its diverse mission and spends approximately 90 percent of its annual budget on contracts to operate its laboratories and facilities. This creates a distributed and decentralized environment in which the Department and its contractors collect and store authoritative source data in various stove-piped systems and databases throughout the complex. As a result, data management and analytics challenges hinder the Department's ability to detect fraud, enhance data-driven decision making, and ensure stewardship of Federal resources. While we acknowledge that the Department faces many challenges related to its dependence on contractors, opportunities exist for collaboration across the contractor community related to data analytics, especially as it relates to best practices, use of various analytic techniques, and areas with a high risk of fraud and waste.

Our report introduces the legal framework and leading practices supporting the use of data analytics. Although this report did not include an analysis of data analytics capabilities currently performed throughout the Department, it highlights past oversight efforts related to the insufficient use of data analytics within the Department. The report offers prospective considerations for the Department to advance the integrity, management excellence, and oversight of Department programs with the use of data analytics.

Legal Framework Guiding the Use of Analytics

Federal laws and legal provisions have been established over the years to ensure that agencies prioritize the management and use of Government data within Federal agencies. For instance, the Paperwork Reduction Act[3], the E-Government Act of 2002,[4] the Privacy Act of 1974,[5] the Federal Information Security Modernization Act of 2014,[6] and the Information Quality Act[7] laid the foundation to promote stewardship and management of Government information. In more recent years, legal provisions have been established to promote the use of data analytics to increase operational efficiencies, reduce costs, improve services, and support mission needs. For example, the following requirements directly support the need for the Department to have a comprehensive and effective data analytics capability:

[3] 44 United States Code (U.S.C.) § 3501
[4] Pub. L. No. 107-347, 116 Stat. 2899 (2002) (codified in 44 U.S.C. § 3501 note)
[5] 5 U.S.C. § 552a
[6] Pub. L. No. 113-283
[7] Pub. L. No. 106-554 (2000) (codified in 44 U.S.C. § 3501(d)(1) and 3516)

- Executive Order (EO) 13642, *Making Open and Machine Readable the New Default for Government Information*, issued in May 2013, requires that the Office of Management and Budget (OMB) issue an Open Data Policy to advance the management of Government information as an asset. The Open Data Policy requires agencies to collect or create information in a way that supports downstream information processing and dissemination activities to include using machine-readable and open formats, data standards, and common core and extensible metadata for all new information creation and collection efforts. The Open Data Policy also emphasizes the need for building or modernizing information systems in a way that maximizes interoperability and information accessibility, maintains internal and external data asset inventories, enhances information safeguards, and clarifies information management responsibilities.

- The Fraud Reduction and Data Analytics Act of 2015 (Pub. L. No. 114-186) establishes requirements to improve Federal agency financial and administrative controls for assessing and mitigating fraud risks using data analytics. Agencies are required to collect and analyze data to monitor fraud trends; use the data to continuously improve fraud prevention controls; and use monitoring, audit, and investigation results to improve fraud prevention, detection, and response activities.

- The Foundations for Evidence-Based Policymaking Act of 2018 (Pub. L. No. 115-435) reinforces longstanding principles underlying Federal policies supporting information quality, access, protection, and use. It mandates that agencies make data accessible and that data management and data governance requirements such as establishing enterprise-wide policy, strategy, standards, and governance are outlined. It also requires agencies to identify a list of methods and analytical approaches that may be used to develop evidence to support policymaking. After its issuance, OMB issued memoranda[8] to aid in the development and implementation of planning and evaluation activities. The memorandums provide examples for agencies to draw upon as they build evaluation capacity, develop policies and procedures, and carry out evaluations to support evidence-based policymaking.

- The Payment Integrity Information Act of 2019 (Pub. L. No. 116-117) consolidates select provisions of the Fraud Reduction and Data Analytics Act of 2015, the Improper Payments Information Act of 2002, the Improper Payments Elimination and Recovery Act of 2010, and the Improper Payments Elimination and Recovery Improvement Act of 2012 to improve efforts to identify and reduce Government-wide improper payments. An interagency payment integrity working group was required to be established to improve the sharing and development of data analytics techniques to help prevent and identify potential improper payments, including those resulting from fraud. Each agency was also required to provide a statistically valid estimate of improper payments using a

[8] OMB Memorandum M-19-23, *Phase 1 Implementation of the Foundations for Evidence-Based Policymaking Act of 2018: Learning Agendas, Personnel, and Planning Guidance*; and OMB Memorandum M-20-12, *Phase 4 Implementation of the Foundations for Evidence-Based Policymaking Act of 2018: Program Evaluation Standards and Practices.*

methodology developed and provided by OMB if the agency's programs were susceptible to improper payments. Over the years, the Department concluded that its programs were not susceptible.

- OMB Memorandum M-21-19, *Transmittal of Appendix C to OMB Circular A-123, Requirements for Payment Integrity Improvement*, aims to ensure that Federal agencies focus on identifying, assessing, prioritizing, and responding to payment integrity risks to prevent improper payments in the most appropriate manner. Appendix C to OMB Circular A-123, modified by M-21-19, explicitly states that the use of a robust data analytics capability is not only beneficial for identifying overpayments after they have occurred, but it can also move an agency from a reactive "pay and chase" model to a predictive approach to identify improper and unknown payments before they occur. Agencies are encouraged to continually evaluate their payment process to identify areas that could be improved through the application of automation and data management principles, which can be accomplished through a wide range of analytics techniques such as rule-based, anomaly detection, predictive analysis, network/link analytics, or text analytics.

As the use of data analytics continues to increase, it is likely that additional requirements promoting data stewardship and management will be developed and emphasized by Federal authorities.

Leading Practices to Prevent Fraud, Waste, and Abuse

Building on existing Federal legal provisions and criteria, supplemental guidance has been developed to help agencies incorporate sound data analytics practices to combat fraud and ensure integrity in programs and operations. We identified several leading practices that can be leveraged by the Department, as data analytics initiatives and capabilities are developed and implemented.

Federal Data Strategy

In March 2018, the President's Management Agenda established a Cross-Agency Priority Goal focused on Leveraging Data as a Strategic Asset to establish best practices for how agencies manage and use data. This included the development of the first ever, enterprise-wide *Federal Data Strategy* which established standards and leading practices aimed to improve the Federal Government's approach to data stewardship and the leveraging of data to create value. The strategy established 40 leading practices to reinforce themes related to building a culture that values data and promotes public use, identifying data needs to answer key agency questions, and assessing and balancing the needs of stakeholders. The importance of championing data use, coordinating and sharing data assets across programs and agencies, and effectively presenting data insights to a broad set

of audiences was emphasized within the strategy. Other leading practices in the strategy include inventorying data assets, protecting data integrity through state-of-the-art data security practices, diversifying data access methods, and leveraging data standards.

Government Accountability Office's Fraud Risk Framework

The Government Accountability Office (GAO) developed *A Framework for Managing Fraud Risks in Federal Programs* (GAO-15-593SP, July 2015) to identify and conceptualize leading practices designed to combat fraud and manage fraud risks. Longstanding industry practices and considerations related to the use of data analytics that enable managers to effectively use data to mitigate the likelihood and impact of fraud were incorporated. The established leading practices include, among other things, building support within the program for data analytics initiatives, designing data analytic tests to consider known fraud schemes, identifying suspicious activity or transactions through data mining, and ensuring data analytics results are usable by the intended audience. *A Framework for Managing Fraud Risks in Federal Programs* also emphasizes the importance of combining data across programs and from separate databases within an agency, pursuing access to necessary data, applying system edit checks to ensure data meet requirements, and conducting data matching to verify key information.

Data Management Body of Knowledge

The Data Management Body of Knowledge (DMBOK), released by DAMA International, is an authoritative reference which serves as a leading best practices framework for data management professionals, and it has been adopted by other Federal agencies. The DMBOK provides a functional framework for the implementation of enterprise data management practices, including guiding principles, widely adopted practices, methods and techniques, functions, roles, deliverables, and metrics. The DMBOK establishes a common vocabulary for data management concepts and serves as the fundamental reference guide structured around the following knowledge areas: data governance, data architecture, data modeling and design, data storage and operations, data security, data integration and interoperability, document and content management, reference and master data, data warehousing and business intelligence, metadata, and data quality.

Other Data Analytics Practices

Practice guides and other materials that explain how data analytics can be used to help manage fraud risk have also been issued by the Institute of Internal Auditors, the American Institute of Certified Public Accountants, and the Association of Certified Fraud Examiners. While tools and techniques may vary, data analytic tests can be performed to identify indicators of improper cost charges, fraud risk, or actual fraudulent activities. For instance, analytic tests may include the calculation of statistical parameters to identify outlying transactions, classification to find patterns and associations among groups of data elements, stratification of numeric values to

identify unusual values, and joining different data sources to identify inappropriately matching values. The 2023 book, *Data Science in Context: Foundations, Challenges, and Opportunities*, was co-authored by leaders in the field with current and past affiliations with academic and industry leaders, and it provides a useful framework for data management and analytics. The publication highlights the need to use data analytics to form insights and draw conclusions. It also emphasizes the link between statistics, operations, and computing.

The Federal Chief Data Officers (CDO) Council recently issued a paper, *The Progress and Promise of Federal Enterprise Analytics*, to help agencies implement key components of an enterprise-wide analytics program to transition from basic data collection to leveraging data as a strategic asset. Further, results from the annual Federal CDO Council Survey indicated that CDOs play a key role in the implementation of an enterprise-wide analytics program.

Demonstrated Success Within the Federal Community

Data analytics successes have been realized throughout the Inspector General community. A recent and remarkable use of data analytics was the work performed by data scientists at the Pandemic Response Accountability Committee's Pandemic Analytics Center of Excellence. Their work contributed to charges brought against thousands of individuals who allegedly defrauded the COVID-19 Economic Injury Disaster Loan program and the Paycheck Protection Program—both COVID-era financial programs. The Pandemic Response Accountability Committee has used data analytics as a tool to identify more than $60 billion that has been lost or stolen from COVID-related Federal funding programs. The U.S. Small Business Administration Inspector General put the estimated loss figure at over $200 billion.

Similarly, the U.S. Department of Health and Human Services OIG's Consolidated Data Analysis Center employs a team of highly trained data analysts, scientists, and statisticians to identify trends, detect anomalies, and uncover potential vulnerabilities affecting programs and beneficiaries. Advanced data analytics have been used by the U.S. Department of Health and Human Services OIG to identify fraud and abuse across multiple internal programs, including one telemedicine health care fraud scheme that resulted in approximately $1.1 billion in alleged losses.

> "The sustainment of the [analytics center] and its capabilities will ensure that our Federal Government is equipped with resources to face avoidable oversight risks when our country encounters its next crisis that requires emergency relief funding and effective oversight of that funding, as well [sic] the annual Federal Government funding that Congress appropriates."
>
> - Michael Horowitz, Department of Justice Inspector General
> Testimony before the House Committee on Oversight and Accountability

Other Federal agencies have demonstrated success with data management and analytics. For instance, data efforts at the Department of Defense leverage the *Department of Defense Data*

Strategy: Unleashing Data to Advance the National Defense Strategy which provides the vision, focus areas, guiding principles, essential capabilities, and goals necessary to transform the agency into a data-centric enterprise. In February 2022, the Department of Defense also established a Chief Digital and Artificial Intelligence Office to perform several functions critical to the acceleration of the agency's adoption of data analytics and artificial intelligence (AI). The functions included leading and providing oversight of strategy and policy and enabling the development of technical solutions in these areas. We noted that the Department of Defense's business analytics platform makes data widely accessible, understandable, and usable across the enterprise to inform actionable insights, decisions, and outcomes.

Oversight Supporting the Increased Need for Data Analytics

Past work performed by the GAO and the OIG has identified the Department's weaknesses related to the lack of use of data analytics to protect against fraud and mismanagement of funds (Appendix 2).

Government Accountability Office

The GAO's report on *Department of Energy: Use of Leading Practices Could Help Manage the Risk of Fraud and Other Improper Payments* (GAO-17-235, March 2017) recommends that the Department implement leading practices for managing its risk of fraud, including designing and implementing specific control activities, such as data analytics, to prevent and detect fraud and other improper payments. In its most recent status update to the GAO, the Department indicated that it developed and began implementing a multi-year plan to establish a Fraud Risk and Data Analytics Framework. The Department noted that efforts were also underway to identify data analytics capabilities that were already being implemented to mitigate fraud risk in six focus areas, including rebates, grants, loans, cybersecurity, labor charging, and materials and service. While this is a step in the right direction, it is concerning that the Department still had not fully addressed the GAO's recommendation almost 7 years later. The Department is still working to complete the remaining actions of its Fraud Risk and Data Analytics Framework. The Department also recently indicated that a second survey of its data analytics capabilities may be warranted because the results of the initial survey, conducted in November 2022, demonstrated that much work remained.

> "Without permanent [G]overnmentwide analytics capabilities to assist the oversight community, agencies will have limited resources to apply to non-pandemic programs to ensure robust financial stewardship, as well as better prepare for applying financial and fraud risk management practices to future emergency funding."
>
> - Rebecca Shea, Government Accountability Office
> Testimony before the Subcommittee on Oversight & Committee on House Ways and Means

The GAO report also includes a recommendation to help ensure that sufficiently detailed transaction-level cost data is maintained to employ data analytics as a tool to perform cost-surveillance activities. The GAO noted that, at a minimum, cost data should represent a full data

population and include details necessary to determine the nature of each transaction. At the time the recommendation was made, Department officials non-concurred and stated that the recommendation established "overly prescriptive" requirements that could result in significant, costly changes to contractors' financial systems. To date, the Department has not set or enforced common minimum standards for transactional data quality across its contractors, nor does it have a repeatable way of accessing transactional data. This is shortsighted. The OIG has already observed that the lack of effective data management has resulted in delays and significant additional effort while attempting to obtain financial data from various Department locations to conduct statutorily required incurred cost audits. Implementing improvements will enable the Department to use the same authoritative data in its program management and oversight activities. While the use of common minimum standards presents challenges due to the Department's dependence on contractors, opportunities exist for the Department to use common data to improve its operations and decision making.

Since 1990, the GAO has designated the Department's contract and project management practices as high-risk programs and operations that are vulnerable to waste, fraud, abuse, or mismanagement. This designation was earned for various reasons, including the Department's history of noncompetitive awards, cost and schedule overruns, inadequate oversight of contracts, and an inability to hold contractors accountable. In 2023, the GAO updated the title of this high-risk area from Contract and Project Management to Acquisition and Program Management to capture the full range of struggles with acquisition processes, program management, and financial management. For instance, the GAO's report *DOE Nuclear Cleanup: Clear Guidance on Categorizing Activities and an Assessment of Contract Cost Effectiveness Needed* (GAO-23-106081, August 2023) identifies that the Office of Environmental Management did not consistently track data and information in a way to maximize its decision making for improving site cleanup progress.

The GAO has issued a series of reports[9] on the National Nuclear Security Administration's (NNSA) implementation of common financial reporting and has indicated that progress has been made; however, additional opportunities exist related to the collection of complete standardized data for program management purposes. The GAO stated that while NNSA's Program Offices have taken steps to improve the collection and use of common financial data, there is inconsistency to the extent that Program Offices use common financial data and request additional data from management and operating contractors. NNSA indicated that, once fully matured, its financial integration efforts will contribute significantly to the agency's data analytics capabilities.

The Department's ability to address these struggles would be far less difficult if it would further implement comprehensive data analytics approaches. The increased adoption of data analytics practices and capabilities would allow the Department to turn the page on past performance and oversight failures by enabling data-driven management, performance improvement, and risk reduction.

[9] GAO series of reports on NNSA's financial reporting data includes *GAO-23-106069* (June 2023), *GAO-22-104810* (February 2022), and *GAO 20-180* (January 2020).

Office of Inspector General

Recent OIG reports identify the benefits of establishing a robust data analytics effort as an effective tool to help the Department determine whether payment reporting sites were accurately reporting improper payment information. For instance, our report on *The Department of Energy's Payment Integrity Reporting in the Fiscal Year 2020 Agency Financial Report* (DOE-OIG-21-27, May 2021) recognizes that the establishment of a data analytics program can move an agency from a "pay and chase" model to a predictive approach, allowing the Department to identify improper payments before they occur. The report also highlights that the use of data analytics can help identify above average payments to a vendor, duplicate payments, and excess purchase orders.

Most recently, our report on *The Department of Energy's Payment Integrity Reporting in the Fiscal Year 2022 Agency Financial Report* (DOE-OIG-23-22, May 2023) shows that fiscal year 2021 improper payments were reported at slightly over $80 million, and the report further indicates that the increased use of data analytics at Department Headquarters and field sites could result in more efficient and accurate identification of improper payments. We recommended that the Office of the Chief Financial Officer expand data analytics capabilities to identify potential root causes for improper payments that could result in the Department's improper payment rate exceeding OMB thresholds. Coupled with the influx of funding received under recent spending bills, the Department concluded that it may soon breach OMB's $100 million threshold for being susceptible to improper payments. This likely scenario underscores the importance for the Department to integrate and use data analytics and other leading practices to manage this risk.

The OIG also emphasized the importance of modernizing oversight by using systems and data for the purpose of running data analytics in its past two reports that identify management challenges. Our Special Report on *Management Challenges at the Department of Energy — Fiscal Year 2022* (DOE-OIG-22-11, November 2021) highlights several challenges complicating implementation of the Department's Fraud Risk and Data Analytics Framework. Specifically, we note that the Department faced obstacles related to limited oversight resources, inventorying data assets, developing human capital, and limited access to data—all key enablers of integrating data analytics. For the third consecutive year, we identified data access/analytics related issues in our most recent Special Report on *Management Challenges at the Department of Energy — Fiscal Year 2024* (DOE-OIG-24-05, November 2023). This report also emphasizes the significance of using data analytics to address challenges resulting from increased funding received under new spending bills. The OIG concluded that the Department has not kept pace with Federal requirements pertaining to the use of data analytics.

Initial Department of Energy Progress

Currently, the Department's use of data analytics is primarily limited to its centralized systems for financial management and procurement. In November 2022, the Department issued a survey to programs and field sites to establish a baseline of data analytics capabilities being performed in areas related to rebates, grants and cooperative agreements, loans, cybersecurity, labor charging, and materials and services. While this initial attempt was a step in the right direction, the survey results identified widespread data literacy and data quality shortcomings across the reporting entities. The survey also revealed that the practice of data analytics is performed

through a variety of means throughout the Department. For example, data analytics capabilities at some reporting entities consisted only of maintaining spreadsheets and manual reconciliation efforts while other sites reported more modern practices in some areas.

Efforts are underway at the Department to increase data literacy, emphasize data quality, and understand the potential uses of data. The Department indicated that a Data Analytics Working Group comprised of Headquarters and Field Office personnel was established to leverage and integrate various data analytic efforts across the enterprise. An innovation hub is also being created to encourage the sharing of ideas and skillsets between subject matter experts and to educate and empower data analytics novices. As noted above, NNSA has also taken steps to improve its collection and use of common financial data. Further, the Office of the Chief Financial Officer indicated that it has established dashboards in response to prior OIG reports that could be used to support analytics related to internal controls. The Department also hired a new CDO in June 2023 who is focused on understanding the Department's data needs and has identified the tenets for a Department Enterprise Data Management Program which could enable a more strategic approach to data. Management noted it has initiated foundational activities through the Department Enterprise Data Management Program, including restructuring and rechartering the Department's Data Governance Board; publishing a data management lexicon to standardize data terms; and identifying all statutory requirements and legislative drivers pertaining to enterprise data, among other things. However, management also indicated that the Department needs to develop a formal data and analytics function with appropriate resources if it is to be successful.

While still early, the Department's CDO is reporting unmet data management and data analytics requirements and has published themes aligned with Federal mandates and guidance.

Impacts

Without a coordinated and federated approach using common data standards, efforts to monitor Federal and contractor costs and performance and to manage fraud risks will continue to be hampered. For instance, many of the issues identified by the GAO and the OIG during past reviews have demonstrated that oversight efforts are limited by a lack of effective data and information management practices. The Department's decision making will be ill-informed without effective data management and analytics processes in place to help guide decisions using real and authoritative data.

Information provided by the Department's CDO indicated that without robust data management practices, organizations waste considerable time on data preparation with data scientists spending 50 percent of their time trying to find, improve, and validate data. A 2021 study, *The Impacts of Bad Data Quality*,[10] also indicates that the average firm loses 30 percent of its revenue due to poor data quality.

Going forward, if the Department does not make progress improving its data collection and information sharing protocols, it is unlikely that it will be able to move away from a "pay and

[10] *Delpha - The Impacts of Bad Data Quality*

chase" model to one that increasingly emphasizes prevention, early detection, and response related to the unprecedented new spending. Without improvements, we do not see a path for the Department to sufficiently enhance its operations to warrant removal from the GAO's High-Risk List.

The ability of the Department to implement the various aspects of EO 14028, *Improving the Nation's Cybersecurity*, issued in May 2021, will also be hampered by its limited data management and analytics capabilities. For instance, the EO requires agencies to advance towards implementation of a Zero Trust Architecture to improve cybersecurity, visibility, and controls, among other things. Effective management of data to help improve an agency's security posture is one of five pillars required for successful implementation of a Zero Trust Architecture. The EO also directs agencies to centralize and streamline access to cybersecurity data to drive analytics for identifying and managing cybersecurity risks. While the Department has initiated some actions in response to the EO, much work is needed. On October 30, 2023, the President issued EO 14110, *Safe, Secure, and Trustworthy Development and Use of Artificial Intelligence*. This EO requires the Secretary of Energy to develop and implement a plan for developing the Department's AI model evaluation tools and testbeds. The EO also requires agencies to take actions to support more effective enterprise-wide inventory, data, and workforce management processes surrounding the agency's AI activities. Developing a robust enterprise data management and governance structure will be vital to the Department's ability to achieve the use of AI.

Prior to EO 14110, the Department had already set a goal of becoming a leader among Federal agencies in the development and deployment of AI technology. To do so, the Secretary created the Artificial Intelligence and Technology Office to foster the strategic coordination and development of AI capabilities across the Department by serving as the central point of coordination for the broad and extensive capabilities of the Department and its National Laboratories. In December 2023, the Department created the Office of Critical and Emerging Technology led by a Director who also serves as the Department's Chief AI Officer.

Prospective Considerations

Much work remains for the Department to provide effective oversight of expenditures, ensure stewardship of resources, and enhance operational efficiencies. The following considerations are critical to enhancing the detection of fraud, payment integrity, operational efficiency and integration, data-driven decision making, and the stewardship of Federal resources with the use of data analytics:

1. Develop and implement a data governance structure, strategy, implementation plan, and capstone policy that will inform operating directives, roles and responsibilities, and how to address the use of data analytics, data interoperability, and data quality. For instance, the Department should consider:

    - Moving the Department from reliance on a reactive "pay and chase" model to a predictive, preventative approach for managing operations and providing effective oversight.

    - Establishing metrics and key performance indicators to monitor progress and performance towards data management, governance, and analytics goals.

    - Implementing a data stewardship program to identify and manage the Department's data sets.

    - Developing a portfolio of high-priority, high-value enterprise data analytics use cases to focus its efforts with identified and empowered Department leaders as champions. The portfolio should include supporting business cases for investments to build underlying capabilities, rationalized technical infrastructure, and momentum and confidence across stakeholders.

2. Assess and identify resource needs, including policy, process, workforce, and information technology to modernize the Department's oversight processes with the use of effective data analytics.

3. Adopt a coordinated approach for establishing and enforcing common minimum data standards; shared, policy-compliant access to authoritative data; and accountability on implementation via transparency and consistent contract language.

Management Comments

Management concurred with each of the prospective considerations in our report. Management stated that an Enterprise Data Management Program was created in September 2023 to recharter the enterprise Data Governance Board, execute cross-Department engagements, assess resource needs, and meet Federal legislative requirements for compliance on data management, security, and public availability. The Enterprise Data Management Program will continue to engage relevant Department stakeholders to design a Data Strategy and Implementation Plan to drive progress and maturity in data capabilities, enhance workforce skills, and foster a data-driven culture. Management further stated that a collaborative effort will be employed to meet requirements for the strategic management of data within the Department. Management's comments are included in Appendix 3.

Office of Inspector General Response

Management's comments and planned corrective actions were responsive to our prospective considerations. Management should coordinate its future efforts to ensure that a strong data analytics program is implemented enterprise-wide.

Appendix 1

Commonly Used Terms

Artificial Intelligence	AI
Chief Data Officers	CDO
Data Management Body of Knowledge	DMBOK
Department of Energy	Department or DOE
Executive Order	EO
Government Accountability Office	GAO
National Nuclear Security Administration	NNSA
Office of Inspector General	OIG
Office of Management and Budget	OMB

Appendix 2

Related Reports

Office of Inspector General

- *The Department of Energy's Payment Integrity Reporting in the Fiscal Year 2022 Agency Financial Report* (DOE-OIG-23-22, May 2023)
- *Semiannual Report to Congress for Period Ending March 31, 2023* (DOE-IG-0083, May 2023)
- *Management Challenges at the Department of Energy — Fiscal Year 2023* (DOE-OIG-23-08, November 2022)
- *Management Challenges at the Department of Energy — Fiscal Year 2022* (DOE-OIG-22-11, November 2021)
- *The Department of Energy's Payment Integrity Reporting in the Fiscal Year 2020 Agency Financial Report* (DOE-OIG-21-27, May 2021)
- *The Transition to Independent Audits of Management and Operating Contractors' Annual Statements of Costs Incurred and Claimed* (DOE-OIG-21-26, April 2021)

Government Accountability Office

- *DOE Nuclear Cleanup: Clear Guidance on Categorizing Activities and an Assessment of Contract Cost Effectiveness Needed* (GAO-23-106081, August 2023)
- *National Nuclear Security Administration: Additional Actions Could Improve Efficiency of Common Financial Reporting* (GAO-23-106069, June 2023)
- *High-Risk Series: Efforts Made to Achieve Progress Need to Be Maintained and Expanded to Fully Address All Areas* (GAO-23-106203, April 2023)
- *National Nuclear Security Administration: Actions Needed to Improve Usefulness of Common Financial Data* (GAO-22-104810, February 2022)
- *Department of Energy: Use of Leading Practices Could Help Manage the Risk of Fraud and Other Improper Payments* (GAO-17-235, March 2017)

Pandemic Recovery Accountability Committee

- *Semiannual Report to Congress: October 1, 2022 – March 31, 2023*

Appendix 2

- *Lessons Learned in Oversight of Pandemic Relief Funds UPDATED* (June 2022)
- *UPDATE: Top Challenges in Pandemic Relief and Response* (February 2021)

Management Comments

Department of Energy
Washington, DC 20585

February 21, 2024

MEMORANDUM FOR THE OFFICE OF THE INSPECTOR GENERAL

FROM: CHRISTOPHER S. JOHNS
DEPUTY CHIEF FINANCIAL OFFICER

SUBJECT: Draft Special Audit Report on the DOE's Considerations and Use of Data Analytics (A23TG010, DOE-OIG-24-XX)

Thank you for the opportunity to review and comment on the subject draft report. The Office of the Chief Financial Officer (OCFO) appreciates the auditors' audit work and concurs with the considerations shared with the Department. The OCFO's responses and technical comments are enclosed.

If there are any questions regarding this response, please contact Karin Dasuki, Director, Office of Finance and Accounting on (301) 903-1708.

Enclosure

Enclosure

Management Response
OIG Draft Special Report: "The Department of Energy's Consideration and use of Data Analytics (A23TG010, DOE-OIG-24-XX)"

Prospective Considerations #1:

Develop and implement a data governance structure, strategy, implementation plan, and capstone policy that will inform operating directives, roles, and responsibilities, and how to address the use of data analytics, data interoperability, and data quality. For instance, the Department should consider:

- Moving the Department from reliance on a reactive "pay and chase" model to a predictive, preventative approach for managing operations and providing effective oversight.
- Establishing metrics and key performance indicators to monitor progress and performance towards data management, governance, and analytics goals.
- Implementing a data stewardship program to identify and manage the Department's data sets.
- Developing a portfolio of high-priority, high-value enterprise data analytics use cases to focus its efforts with identified and empowered Department leaders as champions. The portfolio should include supporting business cases for investments to build underlying capabilities, rationalized technical infrastructure, and momentum and confidence across stakeholders.

DOE Response:

1) ***Agree***

The Office of the Chief Financial Officer (OCFO) will support and partner with DOE's Chief Data Officer (CDO) in the Office of the Chief Information Officer (OCIO) in meeting requirements for the strategic management of data under the purview of OCFO.

DOE OCFO leverages automated GRC tools to minimize 'pay and chase' such as duplicate payments and detection of duplicate orders. DOE also utilizes Treasury databases before payment batches are sent for disbursements, such as the Do Not Pay databases. Additionally, Office of Finance and Accounting has been building staff level capabilities to use data analytics and data science disciplines based on the established Fraud Risk framework.

Prospective Considerations #2:

Assess and identify resource needs, including policy, process, workforce, and information technology to modernize the Department's oversight processes with the use of effective data analytics.

Enclosure

Management Response
OIG Draft Special Report: "The Department of Energy's Consideration and use of Data Analytics (A23TG010, DOE-OIG-24-XX)"

DOE Response:

1) Agree

We will continue to assess needed resources within funding limitations as well as recruitment and information technology constraints. We will continue to collaborate with the OCIO to support the development of a data governance framework to promote the effective use of data analytics. Current reality in our operating model is limited due to limitations to data and access to expertise and tools that are available at the lab level but unavailable to OCFO.

Prospective Considerations #3:

Adopt a coordinated approach for establishing and enforcing common minimum data standards; shared, policy-compliant access to authoritative data; and accountability on implementation via transparency and consistent contract language.

DOE Response:

1) Agree

The OCFO will support DOE's CDO to meet Federal data management drivers that are based on OPEN Government Data Act of 2013, the Foundations for Evidence-Based Policymaking Act of 2018, the Federal Data Strategy, OMB M-22-09 and Executive Order 13950.

Department of Energy
Washington, DC 20585

February 26, 2024

MEMORANDUM FOR TERI L. DONALDSON
INSPECTOR GENERAL

FROM: ANN DUNKIN
CHIEF INFORMATION OFFICER

SUBJECT: Draft Special Audit Report on the DOE's Considerations and Use of Data Analytics (A23TG010, DOE-OIG-24-XX)

Thank you for the opportunity to review and comment on the subject draft report. The Office of the Chief Information Officer appreciates the auditors' thorough and necessary work in the department's considerations and use of data analytics and generally concurs with the considerations shared with the Department. Following this transmittal is IM's responses and technical comments for further consideration in the attached.

If you have any questions regarding this response, please contact Robert King, Chief Data Officer, Office of the Chief Information Officer at Robert.King@hq.doe.gov

Sincerely,

Ann Dunkin
Chief Information Officer

Enclosure

Management Response
OIG Draft Special Report: "The Department of Energy's Consideration and use of Data Analytics (A23TG010, DOE-OIG-24-XX)"

Prospective Considerations #1:

Develop and implement a data governance structure, strategy, implementation plan, and capstone policy that will inform operating directives, roles and responsibilities, and how to address the use of data analytics, data interoperability, and data quality. For instance, the Department should consider:

- Moving the Department from reliance on a reactive "pay and chase" model to a predictive, preventative approach for managing operations and providing effective oversight.
- Establishing metrics and key performance indicators to monitor progress and performance towards data management, governance, and analytics goals.
- Implementing a data stewardship program to identify and manage the Department's data sets.
- Developing a portfolio of high-priority, high-value enterprise data analytics use cases to focus its efforts with identified and empowered Department leaders as champions. The portfolio should include supporting business cases for investments to build underlying capabilities, rationalized technical infrastructure, and momentum and confidence across stakeholders.

DOE Response:

1) *Agree*

The Office of the Chief Data Officer (OCDO) established an Enterprise Data Management (EDM) Program in September 2023, which has been focused to date on progressing many of the considerations noted above, including restructuring, and rechartering the enterprise Data Governance Board and executing cross-Department engagements to inform a forthcoming draft of an Enterprise Data Strategy (targeted for Q3 FY '24). These engagements have also uncovered initial high-value analytics use cases to inform strategic investments.

The IM, CDO, and EDM Program will continue to engage relevant Departmental stakeholders to design a Data Strategy and Implementation Plan with tactical KPIs that drives progress and maturity in the required enterprise-level foundational data capabilities, workforce skills, and data-driven culture. As resources are made available, IM, CDO and EDM Program will also continue to integrate with existing relevant working groups, to include with OCFO, to support initiatives that specifically focus on maturing capabilities to enable proactive performance, fraud, and improper payments oversight and monitoring.

Prospective Considerations #2:

Assess and identify resource needs, including policy, process, workforce, and information technology to modernize the Department's oversight processes with the use of effective data analytics.

DOE Response:

1) *Agree*

The CDO and EDM Program will continue to work and assess resource needs within funding limitations, towards achieving goals established through the enterprise Data Strategy and Implementation Plan and as prioritized by the governance structures of the DGB. However, Given the current size of the EDM, there will be a need for expanded and dedicated resources. We will continue to mature the enterprise Data Governance Board functions and collaborate with additional tiers of governance through IM to support the development of a data governance framework to promote the effective use of data analytics.

Prospective Considerations #3:

Adopt a coordinated approach for establishing and enforcing common minimum data standards; shared, policy-compliant access to authoritative data; and accountability on implementation via transparency and consistent contract language.

DOE Response:

1) *Concur*

As resources allow, the CDO and EDM Program will leverage the enterprise Data Governance Board and additional dedication functions, as provisioned, to meet the various Federal legislative requirements for compliance on data management, security, public availability, and more based on statutes such as, but not limited to, the OPEN Government Data Act of 2013, the Foundations for Evidence-Based Policymaking Act of 2018, the Federal Data Strategy, OMB M-22-09 and Executive Order 13950. Additional support and clarity pertaining to the application of common data standards, and other requirements associated with federal statutes and guidance, to DOE contractors may be required at some point from the IG and Office of the General Council. There may be support necessary to also influence specific actions and outcomes associated to the contractor performance evaluation criteria.

The EDM program will also focus on coordinating policy activities to promote efficient and effective integration and curation of administrative, operational, science and research data, analytics, and Artificial Intelligence products (AI) products that increase the value and usability of Departmental data through enterprise-wide data lifecycle management best practices.

FEEDBACK

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Office of Inspector General (IG-12)
Department of Energy
Washington, DC 20585

If you want to discuss this report or your comments with a member of the Office of Inspector General staff, please contact our office at 202–586–1818. For media-related inquiries, please call 202–586–7406.