Implementing Gold Standard Science

at the

U.S. Department of the Interior

Report to the Office of Science and Technology Policy

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Executive Summary

On May 23, 2025, President Trump issued Executive Order 14303, *Restoring Gold Standard Science*, directing all federal agencies to implement policies and practices that uphold the highest standards of scientific integrity, transparency, reproducibility, and public trust. On June 23, 2025, the Office of Science and Technology Policy (OSTP) issued guidance, *Implementing Gold Standard Science in the Conduct & Management of Scientific Activities*. This additional guidance outlined the immediate actions and deliverables, including public implementation plans, internal compliance metrics, and scientific integrity standards, including defining nine core tenets of Gold Standard Science (Box 1).

President Trump declared all agency heads and employees must adhere to a standard of trust and reproducibility governing the use, interpretation, and communication of scientific data. The implementation of the Executive Order and the subsequent OSTP guidance will ensure that federally funded research is transparent, rigorous, and impactful, and that Federal decisions are informed by the most credible, reliable, and impartial scientific evidence available. Federally funded research should withstand scrutiny, foster cross disciplinary collaboration, and remain free from bias or undue influence. Restoration of the gold standard for science, including data transparency and acknowledgement of scientific uncertainties and assumptions, will increase the public faith in scientific enterprise and institutions and spur innovation, which will contribute to American leadership in science and technology.

Box 1. Executive Order 14303 lays out nine core tenets of Gold Standard Science, as well as the need to improve the use, interpretation, and communication of scientific data. Gold Standard Science means science conducted in a manner that is:

1. Reproducible;
2. Transparent;
3. Communicative of error and uncertainty;
4. Collaborative and interdisciplinary;
5. Skeptical of its findings and assumptions;
6. Structured for falsifiability of hypotheses;
7. Subject to unbiased peer review;
8. Accepting of negative results as positive outcomes; and
9. Without conflicts of interest.

The Department of the Interior (Department) oversees a broad portfolio of science-driven missions that directly impact the stewardship of the Nation's natural and cultural resources, including mineral and energy development, land management, conservation and water infrastructure, and population management (Box 2). The Department produces, funds, and

relies upon scientific work that informs the decisions of significant public, environmental, and economic consequence across its bureaus.

The Department is well-positioned to meet the requirements of the Executive Order, with strong scientific capacity across its bureaus and offices. However, uneven policy maturity and execution among the bureaus provides ample room for improvement. This report provides the Department's initial compliance assessment, including a summary of the differences in bureau-specific execution, and identifies key opportunities to improve compliance. The American people will benefit from updated scientific integrity policies, unified peer review procedures, improvements in data infrastructure and accessibility, and more uniform standards for scientific reproducibility. Clearer requirements for funded scientific work conducted under contracts and grants, including an educational and curriculum review related to scientific activities, and improved transparency of scientific policies for the public will allow the Department to fully align with the Executive Order and corresponding OSTP guidance. Informed by the findings of this initial assessment, the Department has initiated a comprehensive action plan to institute improvements.

Box 2. Science is developed, funded, and relied upon to inform decisions across the Department of the Interior's bureaus and offices, including:

- Bureau of Indian Affairs (BIA)
- Bureau of Indian Education (BIE)
- Bureau of Land Management (BLM)
- Bureau of Ocean Energy Management (BOEM)
- Bureau of Reclamation (BOR)
- Bureau of Safety and Environmental Enforcement (BSEE)
- Bureau of Trust Funds Administration (BTFA)
- National Park Service (NPS)
- Office of Insular Affairs (OIA)
- Office of Surface Mining Reclamation and Enforcement (OSMRE)
- U.S. Fish and Wildlife Service (USFWS)
- U.S. Geological Survey (USGS)

I. Current Compliance Status

The Executive Order outlines nine core tenets of Gold Standard Science to ensure science is rigorous, relevant, and ethical; transparent and leads to open data; and is subject to unbiased peer review (Box 1).

Per the Executive Order, agencies shall revoke any organizational or operational changes, designations, or documents that were issued or enacted pursuant to the Presidential Memorandum of January 27, 2021 (*Restoring Trust in Government Through Scientific Integrity and Evidenced-Based Policymaking*), which was revoked by Executive Order 14154 on January 20, 2025. Executive Order 14303 further directs agencies to establish internal processes to evaluate alleged violations of its requirements, under the direction of a senior appointee. Until agencies issue new policies, scientific integrity is governed by the policies in place during the first Trump Administration.

The Department demonstrates a solid foundational alignment with Gold Standard Science, but there are some gaps and inconsistencies to work through between the various bureaus and offices. For example, bureau-level disparities in policies, the absence of unified data infrastructure and opportunities for public review of policies or access to data, and lack of standardized grant and contract language constrain the Department's ability to fulfill the goals of the Executive Order Department-wide. The compliance status set forth below reflects the current policies, guidance, and standards in place following the reinstatement of directives from President Trump's first administration. At the Department, these include the version of 305 Department Manual (DM) 3 dated December 16, 2014, titled "*Integrity of Scientific and Scholarly Activities*" and a corresponding Scientific Integrity Procedures Handbook. It also includes Secretarial Order (SO) 3369, dated September 28, 2018, titled "*Promoting Open Science*."

Scientific Integrity Policy

The Department maintains a Departmental Scientific Integrity Policy, established in 305 DM 3 *Integrity of Scientific and Scholarly Activities,* and a corresponding Scientific Integrity Procedures Handbook. This policy, issued by the Office of the Deputy Secretary, is designed to set the Departmental standards of scientific integrity across all bureaus and offices. The policy applies broadly to employees, political appointees, contractors, cooperators, partners, permittees, lessees, grantees, and volunteers who engage in, supervise, manage, or influence scientific activities. It also oversees those who communicate scientific information or use it in policy, management, educational curriculum, or regulatory decisions.

The policy and associated Handbook provide Department-wide instruction and guidance to promote the rigor, quality, and robustness of all aspects and stages of scientific activities. It sets clear expectations for how scientific and scholarly information is considered in Departmental

decision-making and education. The goals of the policy are to ensure that the Department is making decisions based on science and scholarship: 1) that are respected as credible; 2) that science is conducted with integrity and excellence; 3) that there is a culture of scientific and scholarly integrity that is enduring; 4) that scientists and scholars are widely recognized for excellence; and 5) that employees are proud to uphold the high standards and lead by example. The policy establishes a code of scientific and scholarly conduct, outlining the expectations for ethical behavior, transparency, and accountability in scientific endeavors. It also details a formal process for addressing scientific integrity violations, including preliminary reviews, inquiries, and potential investigations at the bureau and Departmental levels. Additionally, the policy articulates expectations for truthful and transparent scientific communication, including education.

To support transparency and maintain public trust, the Department utilizes a Scientific Integrity website that includes the full text of policies and supporting documents, including related Departmental Manual chapters, the Code of Conduct, points of contact within the scientific integrity space, annual reports, a list of closed scientific integrity investigations, Frequently Asked Questions, and other resources to help employees and the public understand the policy's scope and implementation.

Peer Review Procedures

While the Department does not currently maintain a single, unified Department-wide peer review policy, several of its bureaus have developed and implemented their own peer review frameworks in accordance with the Office of Management and Budget's Final Information Quality Bulletin for Peer Review (2004). These bureau-level policies vary significantly in scope, rigor, and transparency.

The USGS has established one of the more comprehensive peer review systems within the Department. Its Fundamental Science Practices framework mandates rigorous internal and external peer review for all scientific publications. Many review records are made publicly accessible, as are all final science products. Similarly, BOEM and BSEE have formal peer review policies that guide the review of influential scientific information, though the level of public transparency and consistency in implementation varies.

The Office of the Assistant Secretary for Indian Affairs has adopted a peer review policy that applies to the BIA, BIE, and BTFA, ensuring that scientific and technical information used in decision-making is subject to peer review. The USFWS incorporates internal peer review into its broader Information Quality Guidelines and makes some internal peer review plans, including Endangered Species Act listing decisions and biological opinions, available via a public website. However, public access to all of USFWS' internal peer review plans and outcomes remains limited, which impacts transparency and stakeholder engagement. NPS maintains a peer review archive for influential scientific information, though the completeness and timeliness of entries

vary across parks and regions. OSMRE and BOR provide only brief policy statements on peer review.

Overall, the Department's bureau-level peer review policies range from minimal to moderately robust and all with benefit from a sophisticated review. Some bureaus are not fully integrated with Department-wide scientific integrity and information quality policies, and few are tailored to the unique scientific missions of each bureau. This fragmented approach presents an opportunity for the Department to consider developing a more cohesive, Department-wide peer review policy that ensures consistency, transparency, and scientific rigor across all the Department's science activities.

Open Science & Data Sharing

The Department has prioritized the importance of expanding open science and public access to data, aligning with federal requirements and public demands for transparency, accountability, and scientific integrity. By reinstituting Secretarial Order 3369, *Promoting Open Science*, the Department reaffirms its commitment to ensuring that decisions are based on the best available science and that the public has meaningful access to the data, methodologies, and analyses that inform those decisions. The Secretarial Order emphasizes that scientific information used in rulemaking and policy development must be transparent, reproducible, and accessible, enabling the public to evaluate and engage with the science behind federal actions.

The Department's open data efforts are coordinated through its Chief Data Officer, Evaluation Officer, and Statistical Official, who oversee the Department's data governance, open science, and information sharing strategies. The Department maintains the official inventory of Departmental datasets, as required under the OPEN Government Data Act of 2019, including geospatial information, environmental and hazards monitoring, wildlife tracking, land use planning, and research data. Bureaus and offices within the Department are required to provide and maintain metadata descriptions of their respective data inventories for the consolidated Departmental inventory. Metadata describing the public data in the Departmental inventory are delivered to the federal open data platform, data.gov, as mandated by the OPEN Data Act and the Office of Management and Budget Memoranda M-13-13 and M-25-05, helping to ensure that scientific outputs are findable, accessible, and reproducible by researchers, policymakers, and the public.

Though the foundation for a centralized and publicly accessible data-sharing platform exists at the Department, bureaus such as USGS, USFWS, BOEM, and others individually maintain their own scientific repositories that house critical datasets, models, analytical tools, and publications. While these decentralized systems reflect the unique missions and scientific priorities of each bureau, they are often developed and maintained independently, resulting in bureau-level platforms with inconsistent metadata standards, documentation practices, and levels of public accessibility. This fragmentation creates significant barriers to scientific

transparency and collaboration. Researchers, policymakers, and the public frequently encounter challenges in discovering, comparing, or reproducing scientific products across the Department due to incompatible formats, incomplete metadata, or limited searchability. The lack of a unified structure that supports interoperable open science impedes interdisciplinary collaboration and reduces the efficiency of the Department's scientific enterprise.

Reproducibility Standards

The Department has established foundational expectations for scientific reproducibility through 305 DM 3 *Integrity of Scientific and Scholarly Activities*. This policy identifies reproducibility as a core principle of scientific integrity, requiring that all scientific and scholarly work be conducted with objectivity, clarity, and transparency. It applies broadly to Department employees, contractors, and partners, and emphasizes that scientific information used in decision-making must be well-documented and verifiable. However, while 305 DM 3 affirms the importance of reproducibility, it does not provide detailed procedures or standardized tools for ensuring it exists across all bureaus.

At the bureau level, reproducibility practices vary. USGS leads with its Fundamental Science Practices, which mandate peer review, data archiving, metadata standards, and documentation of methods and models to support replication. Other bureaus, such as BOEM and USFWS, incorporate reproducibility principles through their information quality guidelines, but these are not uniformly enforced or consistently made public. Bureaus like BLM and NPS reference reproducibility in internal guidance, but lack formalized, departmentally aligned standards.

II. Current Compliance Gaps

Scientific Integrity Policy

The Department's Scientific Integrity Policy is currently undergoing an evaluation to align more closely with the requirements and expectations of the Executive Order on Restoring Gold Standard Science. The Executive Order emphasizes the need for federal science to be transparent, rigorous, and free from political interference. It highlights past failures where scientific evidence was misrepresented or selectively used, thereby undermining public trust. In this context, the Department's policy must address: 1) how dissenting scientific views are treated; 2) how open debate is encouraged; and 3) how protections are enforced for employees who raise alternative perspectives based on data. Revising Departmental policy (305 DM 3) will allow the Department to begin resolving these issues, including specificity to ensure that diverse scientific viewpoints are not only tolerated but actively considered in decision-making processes, education, and scientific communication.

To meet the expectations of the Executive Order, the Department must also strengthen its internal culture of scientific openness by institutionalizing protections against censorship or retaliation for expressing scientifically valid but non-majority views. This includes revising the policy to explicitly support the free exchange of ideas, even when those ideas challenge prevailing assumptions or past or current agency positions. Additionally, there is a growing recognition of the need for comprehensive staff training on scientific integrity principles, scientific communication including education and curriculum, and the importance of fostering a respectful environment for scientific discourse. Such training would help ensure that all personnel understand their responsibilities under the policy, effectively communicate scientific findings including associated error and uncertainty, are equipped to uphold the standards of scientific excellence and impartiality envisioned by the Executive Order, and engage in productive science-based discourse with colleagues.

Peer Review Procedures

The Department of the Interior's current approach to peer review is undergoing evaluation. One of the critical gaps already identified in the current framework is the lack of a unified, Department-wide peer review policy. While several bureaus have developed their own peer review protocols, these vary widely in scope, rigor, and public accessibility, leading to inconsistencies in how scientific information is vetted and communicated.

To meet the standards of Gold Standard Science outlined in the Executive Order, the Department will move toward a standardized peer review process, particularly for Influential Scientific Information (ISI) and Highly Influential Scientific Assessments (HISA). These categories of information have significant implications for public policy and resource management and therefore demand the highest levels of scientific scrutiny. USGS Fundamental Science Practices

offer a strong foundation for such a process, with its structured internal and external peer review protocols, clear documentation, and public accessibility of final products. Building a Department-wide peer review policy would help ensure consistency, scientific rigor, and transparency across all Departmental bureaus.

A critical component of this modernization effort is the public posting of peer review plans and results for all ISI and HISA. Currently, only a few bureaus provide access to peer review documentation including models, and even then, the information is often limited, fragmented or outdated. To align with the Executive Order's emphasis on transparency and public trust, the Department should establish a federated, publicly accessible online platform that houses all peer review plans, reviewer comments and author responses (where appropriate), and final decisions for ISI and HISA. This platform would serve as a single source for stakeholders, researchers, and the public, reinforcing the Department's commitment to open science and evidence-based decision-making.

Additionally, the Department will consider implementing training for staff, including scientists and science-support roles, and leadership on the updated peer review policy and its role in upholding scientific integrity. This training would ensure that all personnel understand the expectations for peer review, the criteria for ISI and HISA, and the importance of transparency in scientific communication. Currently, the Department offers Scientific Integrity training modules, which is a required training by some bureaus. This training could be updated to align with 305 DM 3 and implemented Department-wide. By institutionalizing these practices, the Department can better safeguard against scientific bias, promote diverse viewpoints, and fulfill its mission with the highest standards of credibility and public accountability.

Open Science & Data Sharing

The Department has made meaningful progress in advancing open science, but there is additional need around a more integrated and standardized approach using a federated model for data sharing to increase transparency, accessibility, and scientific rigor by collaborating through shared standards, governance, and infrastructure. Open science at the Department must go beyond making data available - it must ensure that the entire scientific process, from data collection and modeling to peer review and publication, is transparent, reproducible, and accessible to the public, stakeholders, and decision-makers.

Currently, bureaus such as USGS, USFWS, BLM, BOEM, and others maintain their own scientific repositories, which include datasets, models, and analytical tools. However, these resources are often siloed across bureau-specific platforms with inconsistent metadata standards, documentation quality, and aggressively shielded from the public. This fragmentation and opacity hinder the ability of researchers, policymakers, and the public to discover, compare, or reproduce scientific products across the Department. Bureaus also use inconsistent technological approaches to facilitate transparency and public access. To fully realize the vision

of open science, the Department must leverage a federated model for data and systems to treat reviewed publications, datasets, models, decision-support tools, and analytical methods as a Departmental asset. Through the use of key practices like data mesh, data stewardship, and federated data platforms, there would be an increase in public accessibility of federally funded scientific activities, promote interdisciplinary collaboration, reduce duplication of effort, and enhance the credibility and utility of the Department's scientific enterprise. To address these issues, there is a growing need for a federated, interoperable and standards-based architectural foundation that fosters an open science infrastructure to support standardized documentation, enhance discoverability, and ensure that federally funded science is accessible, transparent, and reproducible across disciplines, the public, and stakeholder communities. Furthermore, a federated model would supplement and accelerate additional policies on AI, data shared governance, and technological innovation.

A critical component of the implementation of Executive Order 14303 is the standardization of how uncertainty is communicated, particularly for ISI and HISA. Peer reviewed publications, datasets, models, decision-support tools, and analytical tools often inform Departmental decisions, yet the treatment of uncertainty across these products varies widely across bureaus and disciplines. The Department should adopt best practices for quantifying and standardized approaches for conveying uncertainty. Best practices include clear communication of assumptions, confidence levels, limitations, and potential sources of error.

To support these goals, the Department should implement a federated model enabling search, access, and queries allowing information to be publicly available which would include access to: 1) the policies and status of peer reviews; 2) scientific integrity policies and case resolutions; and 3) any scientific information used in Department decision-making. This would enhance transparency, promote accountability, and support informed public engagement. By integrating bureau-level science, standardizing uncertainty reporting, and creating a federated model to open science infrastructure, the Department can fulfill the mandates of the Executive Order and establish itself as a leader in federal scientific transparency and integrity.

Reproducibility Standards

There is no uniform Department-wide policy or framework that mandates reproducibility standards across all bureaus. This leads to inconsistencies in how data, models, and methods are documented and shared. While some bureaus maintain public repositories, there is no federated Department platform that aggregates all scientific outputs, making it difficult for the public or other researchers to access and replicate findings across the Department. Additionally, model documentation and code sharing are not consistently required or enforced, particularly for ISI and HISA, where reproducibility is most critical.

To close these gaps, the Department should establish a Department-wide reproducibility policy that sets minimum standards for data archiving, metadata quality, model transparency, and

methodological documentation. This policy should include requirements for reproducibility checklists and standardized uncertainty templates for all ISI and HISA products. This information should be included in an open science and reproducibility platform that houses peer reviewed publications, datasets, models, and supporting documentation from all bureaus. This would not only enhance transparency and scientific rigor but also fulfill the Executive Order's mandate to make federal science more accessible, accountable, and trustworthy.

Contracting & Grants Integration

The Department oversees a wide range of scientific activities through both federal contracts and financial assistance mechanisms, including grants and cooperative agreements. These mechanisms are governed by the Office of Grants Management (PGM) within the Department's Office of Policy, Management and Budget (PMB), which provides policy, oversight, and leadership for financial assistance across the Department. While the Department's scientific integrity policy (305 DM 3) applies broadly to all individuals and entities involved in Department-funded science, including contractors, grantees, volunteers, and cooperators, it does not yet fully reflect the expanded requirements of the Executive Order.

The Executive Order mandates that all federally supported science, whether conducted internally or externally, must meet the same standards of transparency, integrity, reproducibility, and public accessibility. This includes ensuring that contractors and grantees adhere to the same expectations for data sharing, peer review, uncertainty communication, and scientific independence as federal employees. While the Department's current policies acknowledge these principles, they are not yet systematically embedded in grant and contract solicitations, cooperative agreements, terms and conditions, or performance monitoring frameworks.

To achieve full compliance with the Executive Order, the Department must revise its contracting and grants guidance to explicitly require that all scientific work funded by the Department follows standardized peer review procedures, especially for ISI and HISA; includes clear data management and sharing plans, with expectations for public access to datasets, models, and methods; uses standardized processes and established best practices on uncertainty to communicate assumptions, limitations, and confidence levels; documents reproducibility standards, including metadata, code availability, and methodological transparency; and protects scientific independence, ensuring that external researchers are free from political or financial interference in the conduct or communication of their work.

Additionally, the Department will develop a centralized and publicly available compliance tracking system that monitors whether contractors and grantees meet these requirements. This would not only enhance accountability but continue to demonstrate the Department's leadership in implementing the principles of Gold Standard Science across all its federally funded scientific investments.

Transparency & Public Access

Transparency and public access are essential when federal funds are used in science, including educational curricula. Ensuring public access to federally funded science builds trust, promotes interdisciplinary collaboration, fosters accountability, and upholds the highest standards of scientific and educational integrity. The Department currently lacks a centralized, publicly accessible dashboard that tracks key indicators of scientific transparency and accountability, including publicly accessible scientific integrity policies, peer review compliance, data-sharing status, curricula, and the resolution of scientific integrity cases. Further, there is no unified data infrastructure nor portal to ease public access. This absence represents a significant gap in meeting the standards outlined in Gold Standard Science. The Executive Order calls for federal agencies to uphold the highest standards of scientific integrity, ensure transparency in the development and use of science, and foster public trust through open access to scientific information.

III. Implementation Plan

In alignment with governing laws and regulations and grounded in the principles of the nine core tenets of Gold Standard Science, the Department will implement a series of actions, including issuing a Secretarial Order and rulemaking aimed at upholding scientific integrity and restoring public trust in federal science. All agency heads and employees will be directed to adhere to the rules governing the use, interpretation, and communication of scientific data as established in Executive Order 14303 and Secretarial Order 3369 Amendment 1. Through these actions, the Department will begin a comprehensive review of all scientific integrity and peer review policies and will revise and unify the Department's policies to ensure compliance with Executive Order 14303, OSTP guidance, and Secretarial Order 3369 Amendment 1.

The Department's Office of the Chief Information Officer (OCIO) will direct the planning and coordination with the Department's bureaus and offices to publish all scientific data, methodologies, models, and assumptions used in decision-making across the Department. OCIO will coordinate with all Scientific Integrity Officers, Chief Data Officers, and Data Stewards within bureaus and offices to collect this information and ensure it's publicly accessible to the extent permitted by law.

All bureaus and offices must prioritize the use of publicly available, reproducible, and peer reviewed science. When decisions are based on scientific conclusions that lack public data, peer review, or reproducibility, a justification must be provided explaining the rationale for their use. In addition, decisions must address alternative conclusions or data sets that exist in conflict with the Department's conclusion.

Furthermore, all contracts, grants, cooperative agreements, and other arrangements involving third-party scientific research must include provisions allowing the Department to publicly release associated data, methodologies, and findings.

The Assistant Secretary - Policy, Management and Budget (ASPMB) will lead several key initiatives, including revising 305 DM 3 to align with Executive Order 14303 and initiating a rulemaking process to solicit public input on making scientific information publicly available. The Assistant Secretary will also report to OSTP within one year on the implementation progress, including:

- How the Department is embedding the tenets of Gold Standard Science into its agency actions and scientific activities;
- Development of standardized metrics to evaluate adherence to these tenets and their impact on scientific quality;
- Training plans for personnel;
- Strategies for leveraging technology, including the use of AI tools, in implementing Gold Standard Science;

- Collect and review educational materials and curricula; and
- Challenges encountered during implementation.

Additionally, ASPMB will establish a process to review new funding opportunities and discretionary grants to ensure alignment with agency priorities and national interests, as outlined in Section 3(a) and 3(b) of Executive Order 14303.

In alignment with the President's Executive Order 14303, *Restoring Gold Standard Science* and the corresponding OSTP guidance, *Implementing Gold Standard Science in the Conduct & Management of Scientific Activities*, the Department is committed to restoring the gold standard for science by embedding transparency, rigor, and impartiality into every facet of our research and decision-making processes. Through strengthened data governance, scientific integrity and peer review processes, and a culture of cross-disciplinary collaboration and robust debate, the Department is well-poised to lay the foundation for a more trustworthy and innovative scientific enterprise. These reforms will not only ensure that federally funded research withstands scrutiny and remains free from bias or undue influence, but also reaffirms our responsibility to the American public—to deliver credible, reproducible science that informs sound policy and sustains U.S. leadership in science and technology.