Project Plan for the U.S. Nuclear Regulatory Commission Artificial Intelligence Strategic Plan Fiscal Years 2023-2027, Rev. 1

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1 INTRODUCTION

Artificial intelligence (AI) is one of the fastest-growing global technologies. By providing insights into the vast amounts of data generated during the design and operation of nuclear facilities, AI has the potential to enhance decision-making processes for the nuclear industry. As a result, the industry has expressed a growing interest in researching and using AI technologies to improve operational performance and mitigate operational risk. Licensing applications that include the use of AI technologies may be submitted to the U.S. Nuclear Regulatory Commission (NRC) for review and approval as early as 2025. The agency is committed to keeping pace with technological innovations to be in position to review and evaluate the nuclear industry's use of AI in NRC-regulated activities.

For the purposes of this document, AI refers to a machine-based system that can go beyond defined results and scenarios and can emulate humanlike perception, cognition, planning, learning, communication, or physical action. For a given set of human-defined objectives, AI can make predictions, recommendations, or decisions influencing real or virtual environments. An AI algorithm is a computer program that has been trained on a set of data to recognize certain types of patterns. AI uses various types of algorithms to analyze and learn from these data, with the overarching goal of providing solutions that mimic human-based decisions and predictions for problems. Unlike developing and coding a traditional software program with specific instructions to complete a task, AI seeks to learn to recognize patterns and make predictions.

In May 2023, the NRC issued NUREG-2261, "Artificial Intelligence Strategic Plan: Fiscal Years 2023-2027" (Agencywide Documents Access and Management System Accession No. ML23132A305), to communicate its overall vision and supporting goals to ensure the staff's readiness to review the use of AI in agency-regulated activities. The AI Strategic Plan focuses on a broad spectrum of AI subspecialties (e.g., natural language processing, machine learning, deep learning), which could encompass various algorithms and application examples that the NRC has not previously reviewed and evaluated. The plan includes the following five strategic goals:

(1) Ensure NRC readiness for regulatory decision-making.
(2) Establish an organizational framework to review AI applications.
(3) Strengthen and expand AI partnerships.
(4) Cultivate an AI-proficient workforce.
(5) Pursue use cases[1] to build an AI foundation across the NRC.

The "Artificial Intelligence Project Plan," describes how the agency will execute the five strategic goals from the AI Strategic Plan. Revision 1 of the project plan provides an update on the status of the Project Plan strategic goals. Section 2 is organized by each strategic goal and divided into subsections for the primary tasks required to achieve that goal. The tasks are arranged sequentially and include a description, a milestone table with planned start dates and due dates, potential challenges and mitigation strategies, and status. Section 2 has been updated to reflect changes to the timelines for milestones related to the strategic goals and all Gantt charts have been revised to reflect task progress as of fiscal year (FY) 2025. Note that the timelines represent the NRC's current estimates and consider needs as well as available resources. Uncertainties could impact the estimate timelines, particularly in FY 2026 and FY 2027, as the

[1] A use case is a specific situation in which a product or service could be applied.

agency aims to develop or update regulatory guidance and procedures and potentially initiate rulemaking, if necessary, to enable the use of AI in NRC-regulated activities.

The NRC plans to provide opportunities for communicating with external stakeholders to ensure that the agency will be prepared for applicant and licensee plans and improve transparency with the general public. These opportunities include public workshops, conferences, and meetings with the NRC's Advisory Committee for Reactor Safeguards.

2 TASKS FOR ACHIEVING STRATEGIC GOALS

The AI Strategic Plan identifies five strategic goals to ensure the NRC's readiness to review the use of AI in NRC-regulated activities. This AI Implementation Plan provides an update on activities and details to guide the execution of tasks needed to achieve the five strategic goals. Several organizations within the NRC play a significant role in completing the tasks described here and expertise from multiple offices has been required to achieve a successful outcome. The NRC also continues to monitor external factors that may influence the ability to complete these tasks and achieve the strategic goals.

As required by the Foundations for Evidence-Based Policymaking Act of 2018, the NRC developed an agency evidence-building plan to identify and address priority questions relevant to the agency's programs, policies, and regulations (NUREG-2252, Volume 2, "Evidence Building Plan: Fiscal Year 2023," issued September 2023). The NRC leverages the resulting evidence gathered through the execution of the agency's evidence-building plan to support the AI strategic goals. The priority questions cover a broad spectrum of topical areas relevant to the AI Strategic Plan including Priority Question 2, "What data received and maintained would be most beneficial for use in advanced analytical tools (e.g., machine learning, artificial intelligence) to support NRC decision-making?" Further, the AI strategic goals may inform the NRC's use of AI tools for mission support functions and business process improvements.

The NRC issued SECY-24-0035, "Advancing the Use of Artificial Intelligence at the U.S. Nuclear Regulatory Commission" dated April 25, 2024 (ML24086A001), to the Commission summarizing potential AI applications and the staff's overall approach to effectively leverage AI to drive value for the agency and enhance how it meets its mission. SECY-24-0035 highlighted a strategic step for the NRC to develop an enterprisewide AI strategy to advance the use of AI within the agency. The NRC's enterprisewide AI strategy will build on the AI objective and goals included in the "NRC IT Roadmap FY22-FY26" (ML22320A853) and will complement the current AI Strategic Plan by emphasizing an internal focus that prioritizes agency readiness to implement AI, including the requirements outlined in Office of Management Budget (OMB) guidance (OMB Memorandum M-24-10, "Advancing Governance, Innovation, and Risk Management for Agency Use of Artificial Intelligence," dated March 28, 2024). As such, several subtasks in this AI Implementation Plan related to the implementation of internal agency uses of AI will be transitioned to the NRC's enterprisewide AI strategy in spring 2025.

2.1 Strategic Goal 1: Ensure NRC Readiness for Regulatory Decision-Making

This goal focuses on developing the regulatory framework to prepare the staff to assess AI as part of NRC-regulated activities. The NRC conducts research and works with agency stakeholders, other Federal partners, and the international regulatory community to determine the currently available AI standards and identify technical areas where regulatory gaps may exist. The NRC considers unique aspects of AI applications such as the topics shown in Table 2, "Potential AI Technical Considerations for Regulatory Decision-Making," of the AI Strategic Plan. The NRC is maintaining transparency and communicating with agency stakeholders and the public during the development of the AI framework. The successful outcome would be the provision of regulatory guidance and tools for the staff to ensure readiness to review the use of AI in NRC-regulated activities. To meet Strategic Goal 1, five tasks are envisioned as described in the following subsections. Since the issuance of Revision 0, dated September 14, 2023 (ADAMS Accession No. ML23236A279) of the AI Project

Plan, several subtasks have been completed. Figure 1 illustrates the expected timeframe for completing all tasks and subtasks supporting Strategic Goal 1.

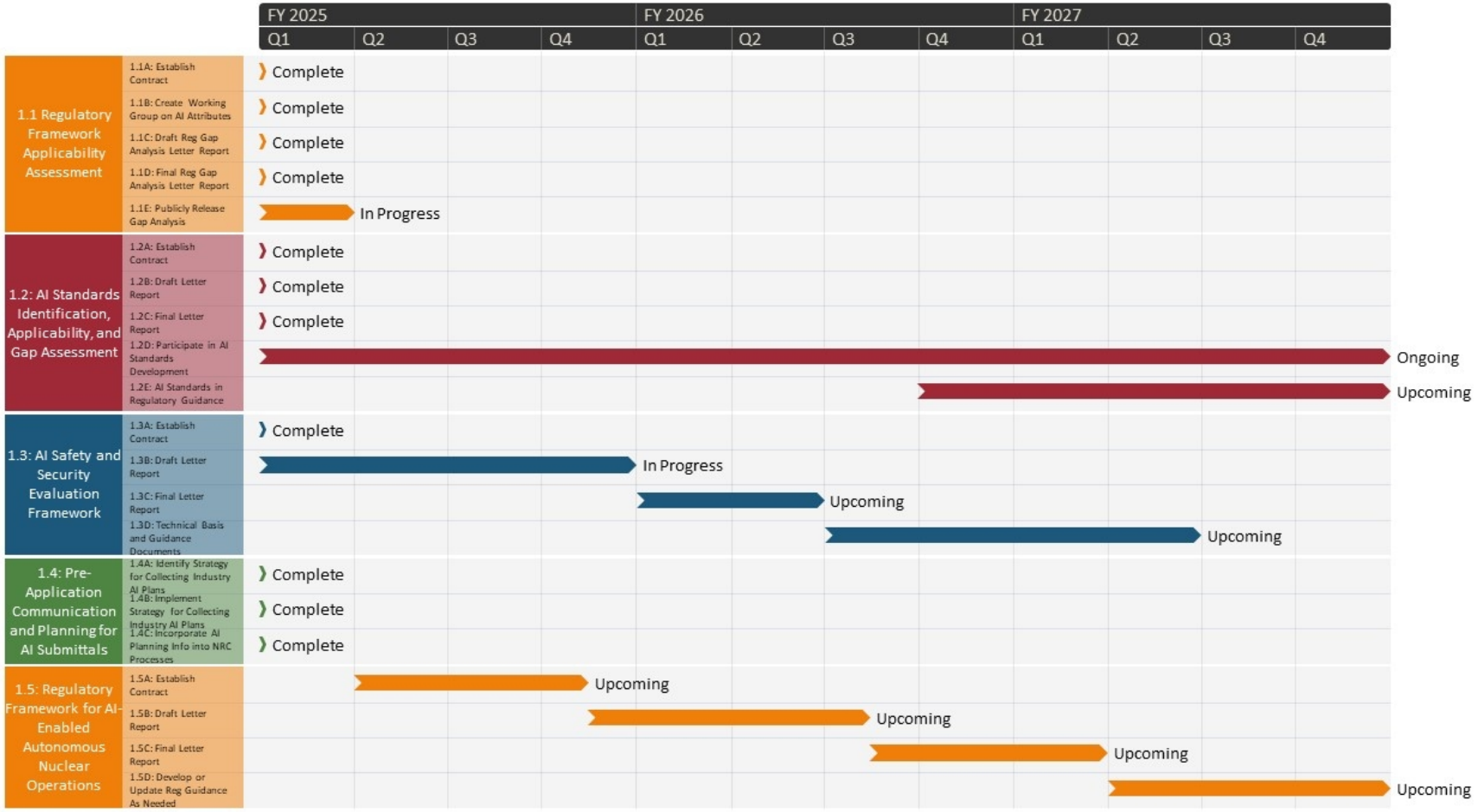

Figure 1 Gantt chart for tasks supporting AI Strategic Goal 1

2.1.1 Task 1.1: Regulatory Framework Applicability Assessment of AI in Nuclear Applications

- Description: The objective of this task is to assess the applicability of the existing regulatory framework, including existing rules and guidance, for licensing and oversight of AI in NRC-regulated activities. The results of this task inform which regulations, regulatory guidance, and inspection procedures need to be updated or created. The results of this task will further provide insights for Task 4.2, which focuses on identifying potential training needs for NRC staff (e.g., inspectors and technical reviewers). The report supporting Task 4.2 will be made publicly available in FY 2025.

- Milestones:

Subtask	Milestone	Planned Dates
1.1A	Issue new contract to support this task.	Completed: FY 2023 Q3
1.1B	Create working group on AI attributes.	Completed: FY 2023 Q3 (ML23114A043)
1.1C	Contractor submits draft regulatory gap analysis letter report for NRC review.	Completed: FY 2024 Q3
1.1D	Contractor issues final regulatory gap analysis letter report to NRC.	Completed: FY 2024 Q4
1.1E	Releases the regulatory gap analysis report	Start: FY 2024 Q4 Due: FY 2025 Q1

- Potential Challenges and Mitigation Strategies: The staff used mitigation strategies to address potential challenges to complete this task.

- Status: Ongoing. Subtasks 1.1A-1.1D are complete and Subtask 1.1E is expected to be completed by FY 2025 quarter (Q)1.

2.1.2 Task 1.2: Standards Applicability Assessment of AI in Nuclear Applications

- Description: A variety of domestic and international organizations are developing various non-nuclear-related AI standards. The objective of this task is to identify and assess existing AI standards and determine their applicability to NRC-regulated activities. The research related to this task will identify areas where gaps in the standards exist and recommend potential updates or new standards. The task involves collaboration with agency stakeholders and the international regulatory community to gather information and perspectives on developing and implementing AI standards. The results of this task will inform the development of an AI framework and regulatory guidance for the staff to assess the use of AI in NRC-regulated activities.

- Milestones:

Subtask	Milestone	Planned Dates
1.2A	Establish new contract (or task order) to support this task.*	Completed: FY 2024 Q1
1.2B	Contractor submits draft letter report for the NRC review.	Completed: FY 2024 Q3
1.2C	Contractor issues final letter report to NRC.	Completed: FY 2024 Q4
1.2D	Participate as committee chair or voting member in AI standard development processes including those for the International Organization for Standardization (ISO)/International Electrotechnical Commission (IEC) AI Standard for Nuclear Applications and National Institute of Standards and Technology (NIST) AI Risk Management Framework.	Ongoing
1.2E	Incorporate AI standards in regulatory guidance based on the outcomes of subtasks 1.2C and 1.2D.	Start: FY 2026 Q3 Due: TBD

* This item will be an optional follow-on task for the contractor in Task 1.1.

- Potential Challenges and Mitigation Strategies: The staff is actively engaging with various external organizations involved in standards development and is staying up to date with the latest developments to ensure the AI standards are incorporated into regulatory guidance in a timely manner.

- Status: Ongoing. Subtasks 1.2A-1.2C were completed ahead of schedule. Subtask 1.2D is ongoing and Subtask 1.2E is projected to begin in FY 2026.

2.1.3 Task 1.3: AI Safety and Security Evaluation Framework for Nuclear Applications

- Description: The objective of this task is to research and develop a comprehensive safety and security evaluation framework for the use of AI in NRC-regulated activities. The framework will consider the unique aspects of AI applications, such as the topics shown in table 2 of the AI Strategic Plan. The task will involve collaboration with stakeholders, Federal partners, and the international regulatory community to gather information and perspectives on the development and implementation of the AI safety and security framework. This task will be developed in conjunction with Task 1.4.

- Milestones:

Subtask	Milestone	Planned Dates
1.3A	Establish contracts to inform the AI safety and security evaluation framework.	Completed: FY 2024 Q4
1.3B	Contractor issues draft letter reports documenting proposed AI safety and security evaluation framework for NRC review.	Start: FY 2024 Q4 Due: FY 2025 Q4
1.3C	Contractor issues final letter reports documenting proposed AI safety and security evaluation framework to the NRC.	Start: FY 2026 Q1 Due: FY 2026 Q2
1.3D	Based on the outcomes of Tasks 1.1, 1.2, and 1.4, and Subtask 1.3C, develop or update regulatory guidance as needed.	Start: FY 2026 Q3 Due: TBD

- Potential Challenges and Mitigation Strategies: The results of Tasks 1.1 and 1.2 will inform the Task 1.3 efforts. Further, Subtask 1.3D may require significant resources in terms of time and budget to develop a comprehensive safety and security evaluation framework. To mitigate this challenge, regulatory guide development staff in the Office of Nuclear Regulatory Research (RES) and rulemaking staff in the Office of Nuclear Material Safety and Safeguards (NMSS) will engage in early and comprehensive communication and coordination on this task. The timeline for creating and updating regulatory guidance or regulations may exceed the timeframe of the AI Strategic Plan, which ends in FY 2027. Industry stakeholders may offer significant feedback on the proposed framework, which could take substantial efforts to understand, evaluate, and resolve.

- Status: Ongoing.

2.1.4 Task 1.4: Preapplication Communication and Planning for AI Submittals

- Description: The objective of this task is to inform the NRC's budget and resource planning for the eventual review of AI-related applications. The NRC sought AI planning information for preapplication activities, topical report submittals, and other licensing submittals from vendors, applicants, and license holders. This will enable the NRC to better understand the industry's planned uses of AI and seek to promote early and

frequent communication between the agency and external stakeholders, despite uncertain timeframes regarding the submission of AI-related applications. The NRC has evaluated various potential processes with varying levels of formality to determine the most effective strategy for information collection, including the use of public meetings and workshops.

The current strategy of AI engagement through partnerships and openness is effective in managing resource timelines and overall agency preparedness for applications. The NRC is active in communicating and collaborating with the industry on deployment of AI tools. As such, Task 1.4 is considered complete with Task 1.4C continuing as needed.

- Milestones:

Subtask	Milestone	Planned Dates
1.4A	Identify strategy for collecting AI planning information from nuclear industry (e.g., regulatory issue summary).	Completed: FY 2024 Q3
1.4B	Implement strategy for collecting AI planning information from nuclear industry.	Completed: FY 2024 Q4
1.4C	Incorporate the AI scheduling information into the NRC's budget and resource planning processes to facilitate the review of AI-related applications (or as needed).	Completed: FY 2024 Q4 (or as needed).

- Potential Challenges and Mitigation Strategies: The staff used mitigation strategies to address the potential challenges to complete this task.

- Status: Completed. Subtask 1.4C is completed and will incorporate AI scheduling information into the NRC’s budget and resource planning processes as needed.

2.1.5 Task 1.5: Develop Regulatory Framework for AI-Enabled Autonomous Nuclear Operations

- Description: The objective of this task is to develop the technical basis and requisite regulatory framework for AI-enabled autonomy in nuclear operations, considering various potential levels of autonomy, staffing plans, and remote operation concepts. This task will involve close coordination with the advanced reactor program leads in the Office of Nuclear Reactor Regulation and rulemaking staff in NMSS and will focus on ensuring that the use of AI-enabled autonomy in nuclear operations meets the NRC’s safety and security standards. The regulatory framework will consider the unique aspects of AI applications including the topics shown in table 2 of the AI Strategic Plan in the context of AI-enabled autonomy in nuclear operations. This task will be developed in conjunction with Task 1.3: AI Safety and Security Evaluation Framework for Nuclear Applications.

- Milestones:

Subtask	Milestone	Planned Dates
1.5A	Establish contract to support this task.	Start: FY 2025 Q2 Due: FY25 Q4
1.5B	Contractor issues draft letter report to the NRC documenting technical basis for regulatory rigor applied to different levels of AI-enabled autonomous operations.	Start: FY 2025 Q4 Due: FY 2026 Q3
1.5C	Contractor issues final letter report to the NRC documenting technical basis for regulatory rigor applied to different levels of AI-enabled autonomous operations.	Start: FY 2026 Q3 Due: FY 2027 Q1
1.5D	Develop or update regulatory guidance (e.g., regulatory guides, inspection procedures) or regulations (e.g., rulemaking), as needed, based on the outcome of Subtask 1.5C.	Start: FY 2027 Q2 Due: TBD

- Potential Challenges and Mitigation Strategies: This task may require significant resources in terms of time and budget to develop a requisite regulatory framework for AI-enabled autonomy in nuclear operations (e.g., rulemaking). To mitigate this challenge, regular communication and coordination will be established with the advanced reactor program staff and rulemaking staff. It is anticipated that the timeline for creating and updating regulatory guidance or regulations may exceed the timeframe of the AI Strategic Plan, which ends in FY 2027. Industry stakeholders may offer significant feedback on the proposed framework, which could take substantial efforts to understand, evaluate, and resolve.

- Status: Not started.

2.2 Strategic Goal 2: Establish an Organizational Framework to Review AI Applications

The successful implementation of the AI Strategic Plan requires effective coordination and collaboration across the NRC. The initial organizational framework for reviewing AI applications includes the management AI Steering Committee (AISC), the staff-led AI Community of Practice (AICoP), and AI Working Groups (AIWGs). The AISC provides cross-office coordination and direction to prepare the agency for the future use of AI in NRC-regulated activities. Furthermore, the AISC ensures a forward-looking, strategic, risk-informed application of AI technologies in the NRC's business processes. The AICoP facilitates the sharing of best practices and lessons learned for reviewing requests that include the use of AI technologies and provides agencywide awareness of active and potential use cases. AIWGs support the AISC's efforts as needed to execute the tasks described in this Project Plan, such as prioritization of AI tasks and funding. As the NRC gains experience in reviewing AI applications, the organizational framework will be adjusted to improve its efficiency and effectiveness. To meet Strategic Goal 2, three tasks were envisioned as described in the following subsections. Figure 2 illustrates the completion, or continued ongoing efforts, of all tasks and subtasks supporting Strategic Goal 2.

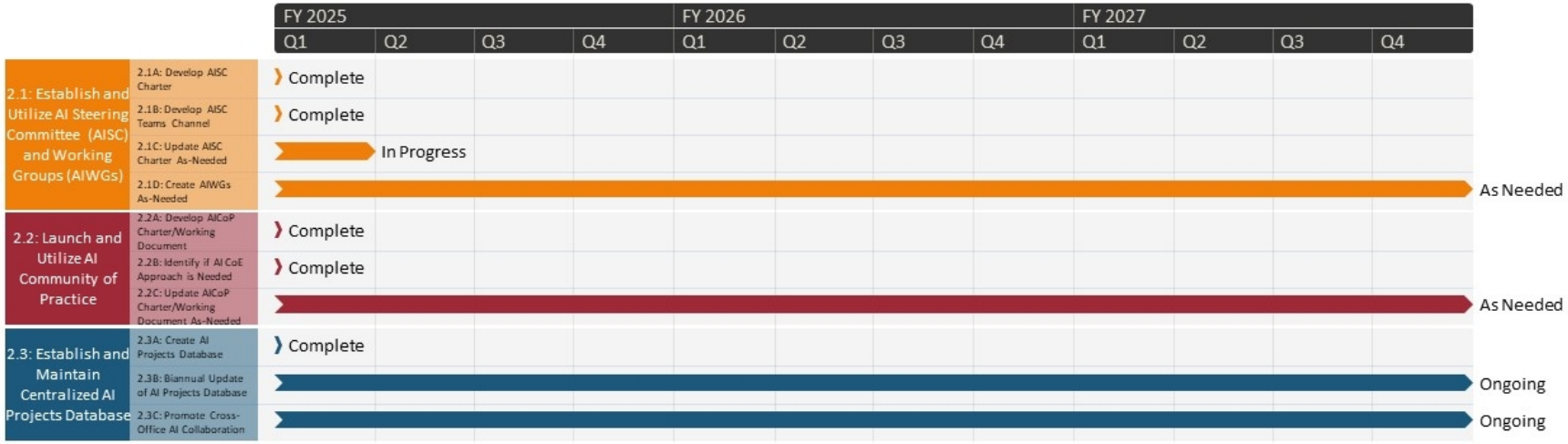

Figure 2 Gantt chart for tasks supporting AI Strategic Goal 2

2.2.1 Task 2.1: Establish and Use AI Steering Committee and Working Groups

- Description: The objective of this task is to establish the AISC to provide cross-office coordination and direction to prepare the agency for the future use of AI in U.S. nuclear facilities and ensure the consistent applications of AI technologies in the NRC's business processes. The AISC includes senior management oversight of the implementation of the AI Strategic Plan. The AISC also includes representatives from each of the leading and supporting offices identified throughout this plan. The AISC guides budgetary recommendations for tasks described in this plan. The AISC engages external subject matter experts with AI expertise to assist with specific issues as needed. The AISC coordinates with the Information Technology and Information Management Portfolio Executive Council to ensure direct prioritization of the activities to achieve the strategic goals outlined in the AI Strategic Plan. Lastly, the AISC creates AIWGs, as needed, to undertake the activities in the AI Implementation Plan.

- Milestones:

Subtask	Milestone	Planned Dates
2.1A	Develop AISC charter to establish structure, scope, roles, and responsibilities.	Completed: FY 2023 Q3
2.1B	Develop AISC Microsoft Teams channel to facilitate information sharing with AISC members.	Completed: FY 2023 Q3
2.1C	Update AISC charter biennially (or as needed).	Start: FY 2024 Q4 Due: FY 2025 Q1 (or as needed)
2.1D	Create AIWGs as needed.	As needed

- Potential Challenges and Mitigation Strategies: The staff used mitigation strategies to address the potential challenges to complete this task.

- Status: Subtasks 2.1A-B are completed. Subtask 2.1C is due in FY 2025 Q1. Subtask 2.1D is ongoing on an as-needed basis.

2.2.2 Task 2.2: Launch AI Community of Practice

- Description: The objective of this task was to establish the AICoP as a collaborative forum to (1) facilitate the sharing of best practices and lessons learned for reviewing requests that include the use of AI technologies and (2) provide agencywide awareness of active and potential use-cases. The AICoP includes lead staff points of contact from each NRC program and regional office who are active in or interested in AI technology, policy, standards, and programs. Lastly, the AICoP includes at least one Senior Executive Service manager and a branch chief.

- Milestones:

Subtask	Milestone	Planned Dates
2.2A	Develop AICoP charter or working document to establish structure, scope, roles, and responsibilities. Review and update charter annually as needed.	Completed: FY 2024 Q1
2.2B	Identify whether there is a need to develop a center of expertise to serve as an aggregation of AI subject matter experts to support AI-related regulatory reviews.	Completed: FY 2024 Q1
2.2C	Update AICoP charter or working document biennially (or as needed).	As needed

- Potential Challenges and Mitigation Strategies: The staff addressed all the potential challenges with mitigation strategies to complete this task.

- Status: Completed. Subtask 2.2C is ongoing on an as-needed basis.

2.2.3 Task 2.3: Establish and Maintain Centralized AI Projects Database

- Description: The objective of this task is to establish and maintain a centralized database that captures all AI-related projects being conducted at the NRC. The database leverages existing platforms to the extent practical and is updated with information on the lead office and division, project title, expected outcome, supporting user office, description of the activity, primary point of contact, and project initiation date. This enables the NRC to maintain an agencywide list of ongoing AI projects, identify areas for potential collaboration and resource sharing, and promote effective communication and coordination. In addition, the database is regularly maintained and updated to ensure the accuracy and completeness of the information.

- Milestones:

Subtask	Milestone	Planned Dates
2.3A	Create and populate an external AI use case database in order to track nuclear industry AI projects and initiatives.*	Completed: FY 2023 Q1
2.3B	Regularly update the database with new and completed nuclear industry AI-related projects and initiatives.	Ongoing
2.3C	Promote collaboration and awareness across NRC offices and divisions by sharing the external AI projects database with the staff and highlighting potential opportunities for collaboration through the AICoP and AISC.	Ongoing

*Note: Subtasks 2.3A-C as applied to development and maintenance of a database to track internal agency AI use cases will be transitioned to the NRC's AI enterprisewide strategy

- Potential Challenges and Mitigation Strategies: No known challenges.

- Status: Completed. Subtasks 2.3B-C are ongoing on an as needed basis.

2.3 Strategic Goal 3: Strengthen and Expand AI Partnerships

The NRC is maintaining and developing strong partnerships with domestic and international counterparts in the nuclear industry and other Government agencies to gain valuable information and leverage resources for safely deploying, overseeing, and evaluating AI technologies. The NRC engages with stakeholders through memoranda of understanding (MOUs), public meetings, and workshops to gather information, collaborate, and influence the development of domestic and international standards and guidance. Incorporating external knowledge and information into the NRC staff knowledge base allows for timely and informed regulatory decision-making. The NRC coordinates external interactions, disseminates information to staff, and supports technical training and workshops to build AI awareness across the agency. This goal will provide established mechanisms to (1) maintain awareness of industry plans, (2) establish communication forums to discuss future plans and regulatory needs, and (3) effectively partner with other Federal agencies and international stakeholders on AI topics of mutual benefit. To meet Strategic Goal 3, three tasks are envisioned as described in the following subsections. Figure 3 illustrates the expected timeframe for completing all tasks and subtasks supporting Strategic Goal 3.

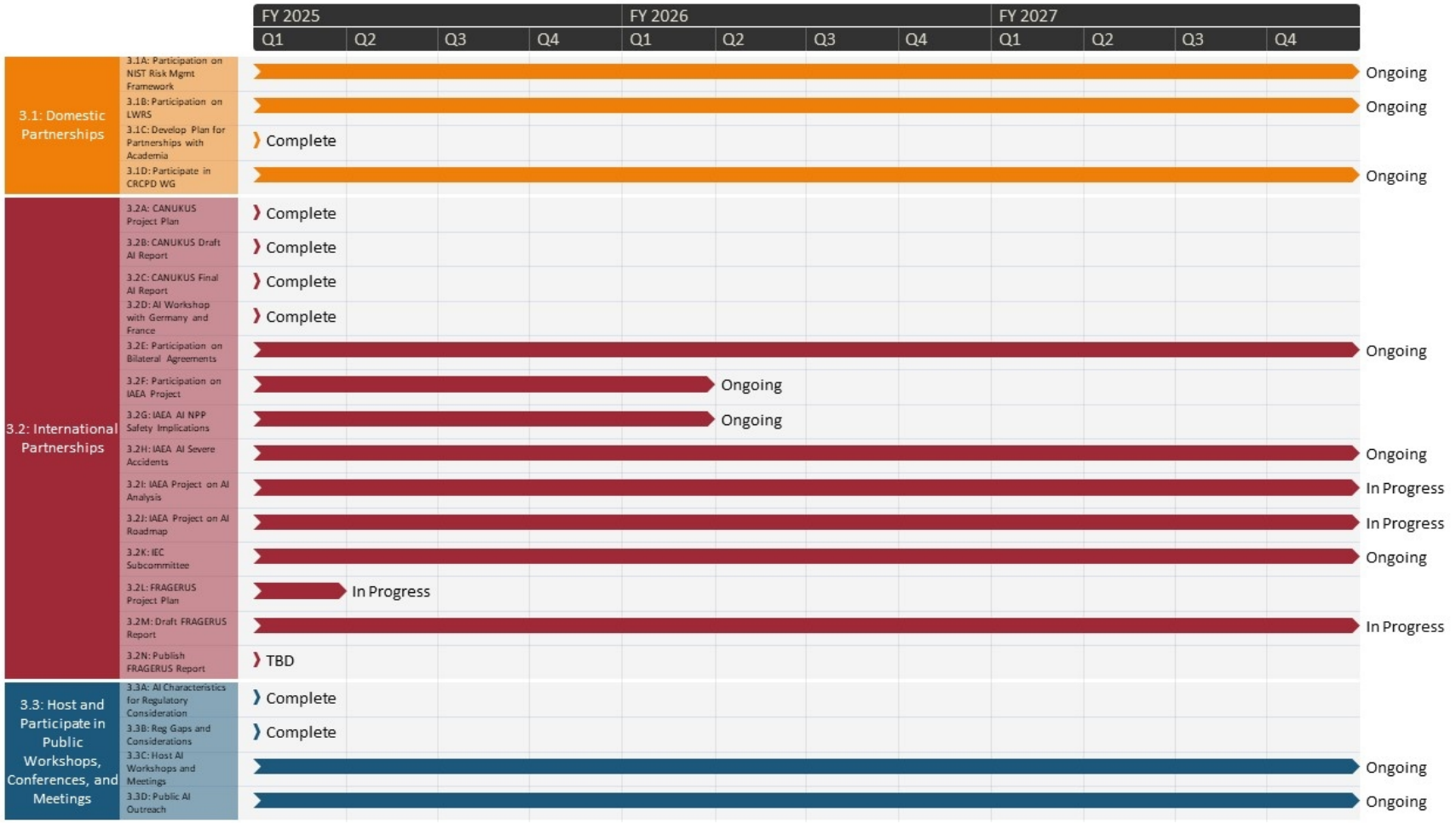

Figure 3 Gantt chart for tasks supporting AI Strategic Goal 3

2.3.1 Task 3.1: Domestic Partnerships

- Description: The objective of this task is to build and maintain partnerships with U.S. Government agencies, national laboratories, nongovernmental organizations, academia, and other research organizations to ensure that the NRC can leverage domestic AI best practices and lessons learned. The NRC has two MOUs with the Electric Power Research Institute and the Department of Energy on data science, AI, and operating experience. These MOUs have served as the foundation of cooperation and collaboration for AI at the NRC. The NRC has also been participating in the NIST AI Risk Management Framework and the NIST Interagency Committee on Standards Policy (ICSP) working group. In addition, the NRC will continue to engage with other Government agencies (e.g., the Federal Aviation Administration (FAA) and the U.S. Food and Drug Administration (FDA)) and nongovernmental professional organizations (e.g., the Conference of Radiation Control Program Directors (CRCPD)) to exchange ideas, practices, and procedures on AI. Lastly, to maintain awareness of AI activities across the Federal Government, the NRC is participating in the Chief Artificial Intelligence Officers and Responsible Artificial Intelligence Officers Councils, and the General Services Administration Governmentwide AICoP.

- Milestones:

Subtask	Milestone	Planned Dates
3.1A	Participate in NIST AI Risk Management Framework and NIST ICSP Working Group.	Ongoing (as needed)
3.1B	Participate in Cooperative Nuclear Safety Research Related to Light Water Reactor Sustainability (LWRS).	Ongoing (monthly)
3.1C	Develop plan for partnerships with academic institutions.	Completed: FY 2024 Q2
3.1D	Participate in CRCPD Working Group G-76 on the use of AI in radiation protection	Ongoing (monthly)

- Potential Challenges and Mitigation Strategies: No known challenges.

- Status: Ongoing. Subtasks 3.1A-B and 3.1D are ongoing and Subtask 3.1C is complete.

2.3.2 Task 3.2: International Partnerships

- Description: The objective of this task is to build and maintain partnerships with international regulatory and research organizations to ensure that the NRC can (1) learn from the experiences of other organizations, (2) share its own best practices and lessons learned, and (3) influence international regulatory practice to promote global nuclear safety. Recognizing that the development of international frameworks for AI is still in its early stages, this task aims to maintain the consistency of the ongoing development of the NRC's AI regulatory framework with proposed revisions to international standards and guidance and seeks to influence revision processes at an early stage with priority given to the most significant standards and guidance. The NRC, along with other member states, continues to work with the International Atomic Energy Agency (IAEA) on several technical meetings on AI. The NRC also has several bilateral agreements on AI activities with Canada, France, Germany, and the United Kingdom of Great Britain and Northern Ireland (UK). These bilateral agreements include cooperative research and information exchanges on regulatory approaches and best practices on AI. For example, Canada and the UK have active research programs and industry intentions to use AI technologies to support autonomous operation. The NRC's annual Regulatory Information Conference will continue to be leveraged to promote in-person exchanges with the agency's international partners.

- Milestones:

Subtask	Milestone	Planned Dates
3.2A	Develop project plan for trilateral activities between the NRC, the Canadian Nuclear Safety Commission, and the UK's Office for Nuclear Regulation (CANUKUS).	Completed: FY 2023 Q2
3.2B	Complete draft trilateral CANUKUS report on AI principles.	Completed: FY 2024 Q2
3.2C	Publish final trilateral CANUKUS report on AI principles.	Completed: FY 2024 Q4
3.2D	Host AI workshop with Germany and France (hybrid format).	Completed: FY 2024 Q1
3.2E	Participate in bilateral agreements with Canada, France, Germany, and the UK.	Ongoing (quarterly)
3.2F	Participate in IAEA project on the deployment of AI Solutions for the Nuclear Power Industry: Considerations and Guidance.	Start: FY 2024 Q1 Due: FY 2026 Q1
3.2G	Participate in IAEA project on safety implications of AI in nuclear power plants.	Start: FY 2024 Q1 Due: FY 2026 Q1
3.2H	Participate in IAEA project on AI and severe accidents.	Ongoing
3.2I	Participate in IAEA project on capitalizing on AI analysis.	Start: FY 2025 Q1 Due: TBD
3.2J	Participate in IAEA project on an AI roadmap.	Start: FY 2025 Q1 Due: TBD
3.2K	Participate in the IEC Subcommittee 45A Working Group 12, "Artificial Intelligence for Nuclear Facilities."	Ongoing (quarterly)
3.2L	Develop project plan for trilateral activities among France, Germany, and the United States (FRAGERUS).	Start: FY 2025 Q1 Due: FY 2025 Q1
3.2M	Complete draft trilateral FRAGERUS report on AI activities.	Start: FY 2025 Q1 Due: TBD
3.2N	Publish final trilateral FRAGERUS report on AI activities.	Start: TBD Due: TBD

- Potential Challenges and Mitigation Strategies: No known challenges.

- Status: Ongoing. Subtasks 3.2A-3.2D have been completed. Subtasks 3.2E-3.2H and 3.2K are ongoing. Subtasks 3.2I-3.2N are projected to begin in FY 2025.

2.3.3 Task 3.3: Host and Participate in Public Workshops, Conferences, and Meetings

- Description: The objective of this task is for NRC staff to participate in AI conferences, workshops, and meetings to continue to build and maintain external partnerships and learn from other organizations. The NRC will also host periodic public workshops and meetings to disseminate agency progress and plans and engage a wide range of stakeholders to obtain feedback on AI topics of interest.

- Milestones:

Subtask	Milestone	Planned Dates
3.3A	Host workshop on AI Characteristics for Regulatory Consideration.	Completed: FY 2023 Q4 (ML23268A314)
3.3B	Host workshop on Regulatory Gaps and Considerations.	Completed: FY 2024 Q4
3.3C	Host periodic public workshops and meetings to discuss AI topics of interest and update the NRC's public AI website, as needed.	Ongoing
3.3D	Participate in external AI workshops, conferences, and meetings.	Ongoing

- Potential Challenges and Mitigation Strategies: No known challenges.

- Status: Ongoing. Subtasks 3.3A-B are completed. Subtasks 3.3C-D are ongoing.

2.4 Strategic Goal 4: Cultivate an AI-Proficient Workforce

This goal focuses on developing the technical information, knowledge, and tools to prepare the staff to review AI applications. To achieve this goal, the NRC will establish a pipeline for AI talent and leverage existing hiring processes. The agency will also invest in comprehensive training programs that range from basic to advanced concepts, applications, and AI tools. A successful outcome of this goal is to ensure that appropriate qualifications, training, expertise, and access to tools exist for the workforce to review and evaluate AI usage in NRC-regulated activities effectively, efficiently and in a timely manner. To meet Strategic Goal 4, three tasks are envisioned as described in the following subsections. Figure 4 illustrates the expected timeframe for completing all tasks and subtasks supporting Strategic Goal 4.

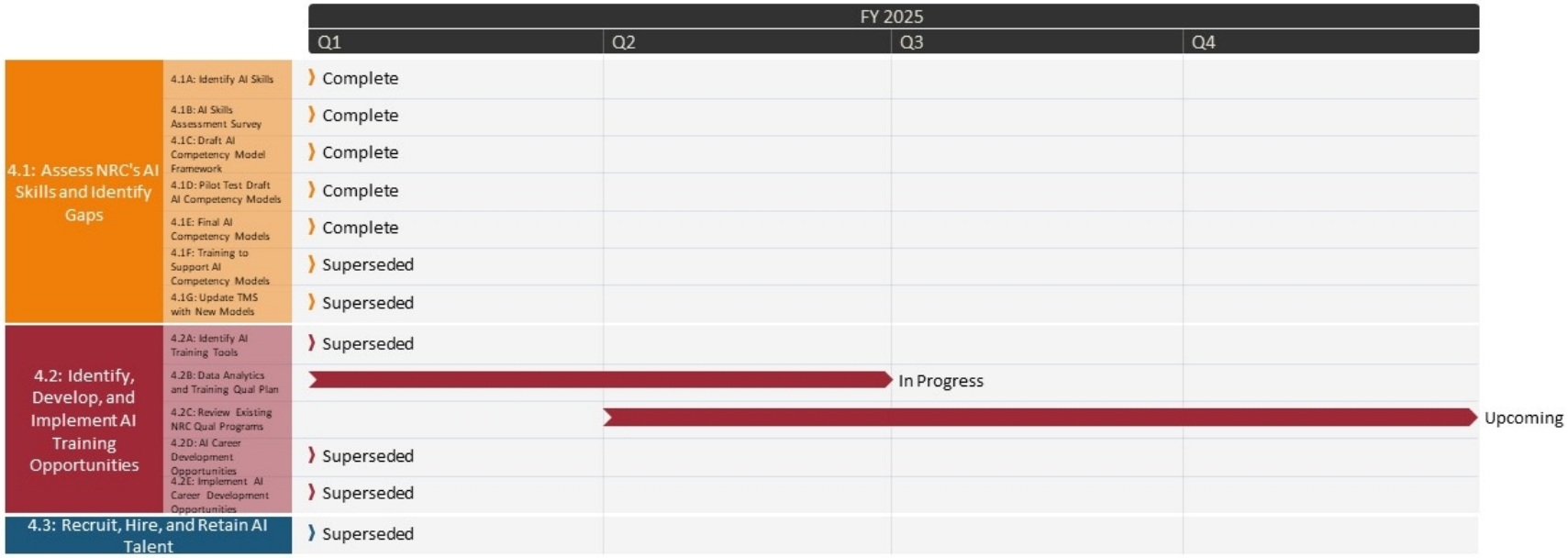

Figure 4 Gantt chart for tasks supporting AI Strategic Goal 4

2.4.1 Task 4.1: Assess the NRC's AI Skills and Identify Gaps

- Description: The objective of this task is to assess the NRC's current AI-related skills and identify skill gaps to ensure that the agency can effectively and efficiently conduct regulatory reviews involving the use of AI. This involve identifying critical skill areas, assessing staff against those skills for various AI-related roles, and updating the existing competency modeling program. Over the last few years, the NRC has developed and implemented a competency modeling program available through the Training Management System (TMS) that could be useful for this task. The Office of Personnel Management (OPM) issued two memoranda dated July 6, 2023 and April 29, 2024, listing general and technical AI competencies and a competency model for AI to implement skills-based hiring. All subtasks leverage the OPM-issued AI competency model information to the extent it is useful for NRC applications.

- Milestones:

Subtask	Milestone	Planned Dates
4.1A	Conduct a literature review, focus groups, or both, to identify and document the AI-related skills needed by the NRC.	Completed: FY 2024 Q1
4.1B	Conduct an AI skills assessment survey.	Completed: FY 2024 Q2
4.1C	Develop a draft AI competency model framework leveraging the OPM's AI competency model.	Completed: FY 2024 Q2
4.1D	Pilot test the draft AI competency model.	Completed: FY 2024 Q3
4.1E	Refine and finalize the AI competency model.	Completed: FY 2024 Q4
4.1F	Develop and deliver training on the AI competency model.	Superseded*
4.1G	Update TMS with the new AI competency model.	Superseded*

*Note: Subtasks 4.1F-G will be transitioned to the NRC's AI enterprisewide strategy.

- Potential Challenges and Mitigation Strategies: The staff used mitigation strategies to address the potential challenges to complete this task.

- Status: Completed.

2.4.2 Task 4.2: Identify, Develop, and Implement AI Training Opportunities

- Description: The objective of this task is to address the AI skill gaps found in Task 4.1 to identify, develop, and implement training and development opportunities. The NRC's data analytics training and qualification program, which includes a tiered approach for identifying skills and training needs for various roles, will serve as a valuable tool for this task. However, periodic updates may be necessary to ensure that the data analytics training and qualification program helps the NRC address the skill gaps identified in Task 4.1. Existing NRC training and qualification programs (e.g., reactor inspector and risk/reliability analyst) will also be reviewed to assess whether any AI-related competencies should be added.

- Milestones:

Subtask	Milestone	Planned Dates
4.2A	Conduct an extensive search of academic and industry publications to identify suitable and effective training tools, courses, and development opportunities beyond those that TMS/Percipio currently offers.	Superseded
4.2B	Update the Data Analytics Training and Qualification Plan to incorporate the most current and effective training resources identified in Task 4.2A. This should include a process for gathering feedback and conducting effectiveness reviews to continually improve the program, along with developing an internal website for easy access.	Start: FY 2025 Q1 Due: FY 2025 Q2
4.2C	Review the NRC's current qualification programs such as the inspector and risk/reliability analyst programs to determine whether they require AI-related competencies. Collaborate with the agency points of contact and implement any necessary updates to the qualification programs.	Start: FY 2025 Q2 Due: FY 2025 Q4
4.2D	Identify and create AI career development opportunities to encourage AI experts to seek new challenges within the NRC, participate in external rotational opportunities, and keep abreast of AI developments. Explore opportunities for personnel exchanges with Federal agencies and eligible organizations through the Intergovernmental Personnel Act Mobility Program.	Superseded*
4.2E	Implement the identified AI career development opportunities and establish a feedback mechanism to ensure that the opportunities are meeting their intended goals and objectives. Make necessary improvements based on the feedback received.	Superseded*

*Note: Subtasks 4.2A, D, and E will be transitioned to the NRC's AI enterprisewide strategy.

- Potential Challenges and Mitigation Strategies: As AI technology continues to evolve rapidly, it may be challenging to keep training materials current and relevant. To mitigate

this challenge, the NRC staff will actively seek new AI training opportunities and leverage them for continuous professional development.

- Status: Ongoing.

2.4.3 Task 4.3: Recruit, Hire, and Retain AI Talent

- Description: The objective of this task is to establish and maintain a pipeline for AI talent and use Federal hiring and retention authorities to maintain a skilled AI workforce. This will involve leveraging existing hiring processes and using the scientific, technical, engineering, and mathematics (STEM) occupations hiring authority to recruit and hire AI talent. In addition, the NRC will develop and update individual development plans, position descriptions, performance plans, and career paths to develop and retain an AI-proficient workforce. The overall objective of this task is to ensure that the NRC has the right number of people with the right skills at the right time in the right places to conduct effective and efficient regulatory reviews and oversight activities involving the use of AI. The outcomes of other tasks, as well as the nuclear industry's plans for using AI, will inform NRC projections of AI staffing demands.

- Milestones:

Subtask	Milestone	Planned Dates
4.3A	Convene an AIWG to support and advise on all tasks under Strategic Goal 4.	Superseded*
4.3B	Considering the outcome of Task 1.4, identify anticipated workload and necessary skill sets to perform future regulatory reviews and inspections. In addition, leverage Strategic Workforce Planning to determine areas where additional hiring is required.	Superseded*
4.3C	Create an AI recruitment strategy that outlines hiring mechanisms, target learning institutions, and professional societies. Identify appropriate recruiting events and career fairs to attract AI talent and develop compelling recruitment materials to promote the NRC and the Federal Government as an attractive employer. Consider how to use the university grant recipient, Nuclear Regulator Apprenticeship Network, summer intern, and co-op programs to support AI recruitment.	Superseded*
4.3D	Create an AI staff retention plan that addresses the needs and concerns of AI personnel. Conduct regular feedback interviews with AI staff (or as needed) to identify areas for improvement and implement strategies to retain AI talent within the NRC.	Superseded*

*Note: Subtasks 4.3A-D will be transitioned to the NRC's AI enterprisewide strategy.

- Potential Challenges and Mitigation Strategies: The potential challenges and mitigation strategies will be covered in the NRC's AI enterprisewide strategy.

- Status: This subtask has been superseded by the NRC's AI enterprisewide strategy.

2.5 Strategic Goal 5: Pursue Use Cases to Build an AI Foundation Across the NRC

This goal focuses on developing and pursuing use-cases to build technical expertise for reviewing the use of AI in NRC-regulated activities and create a cyber ecosystem that supports data science, assessment, and integration of emerging AI tools and hands-on talent development. To achieve this goal, the NRC will undertake research to develop use-cases with data from various sources and in multiple forms and will collaborate with the nuclear industry to pursue potential pilot studies and proofs of concept. The NRC will also investigate (1) improving staff access to software-based AI tools, (2) providing staff access to training and development tools, and (3) facilitating staff engagement in training exercises that may mimic future regulatory reviews. Upon achieving this goal, the NRC will have an information technology (IT) ecosystem that is self-contained and supports end-to-end research and development of AI analysis, integration of emerging AI tools, and hands-on talent development for reviewing AI applications from the nuclear industry. To meet Strategic Goal 5, four tasks are envisioned as described in the following subsections. Figure 5 illustrates the expected timeframe for completing all tasks and subtasks supporting Strategic Goal 5.

Figure 5 Gantt chart for tasks supporting AI Strategic Goal 5

2.5.1 Task 5.1: Proof-of-Concept Applications for AI Test and Analysis

- Description: The objective of this task is to engage with the nuclear industry, while preserving regulatory independence, to identify pilot studies and proof-of-concept test cases that will help the NRC staff gain expertise and facilitate future regulatory reviews. It involves collaboration with licensees, applicants, research organizations, and national laboratories to develop use-cases with data from various sources and in multiple forms. The results of this research will be applied to build technical expertise for reviewing the acceptability of the use of AI in NRC-regulated activities. These joint efforts will help identify challenges associated with the NRC's review of AI applications and licensing actions and may lead to improvements and enhancements in the AI ecosystem for the staff.

- Milestones:

Subtask	Milestone	Planned Dates
5.1A	Considering the outcome of Task 1.4, identify a strategy for seeking pilot studies and proof-of-concept test cases with the nuclear industry	Start: FY 2025 Q2 Due: FY 2025 Q3
5.1B	Create working groups to conduct pilot studies	Start: FY 2025 Q2 Due: FY 2025 Q3
5.1C	Conduct proof-of-concept tests with selected pilot studies and use-cases	Start: FY 2025 Q4 Due: FY 2027 Q4
5.1D	Document lessons learned from conducting the pilot studies and share the NRC's findings as appropriate	Start: FY27 Q1 Due: FY27 Q4

- Potential Challenges and Mitigation Strategies: Limited engagement and collaboration from the nuclear industry, licensees, and applicants may impede the identification of suitable pilot studies and proof-of-concept test cases, potentially causing delays. To mitigate this challenge, the NRC will actively engage with the nuclear industry to identify suitable pilot studies. The NRC's ability to identify pilot studies and proof-of-concept test cases with the nuclear industry will be contingent on the outcome of Task 1.4.

- Status: Ongoing. This task will start in FY 2025.

2.5.2 Task 5.2: Develop and Maintain an AI Ecosystem

- Description: The objective of this task is to establish an ecosystem that supports the NRC's AI activities and regulatory reviews by creating integrated development environments[2], common AI tools, and regulatory sandboxes.[3] The NRC will need to identify and integrate appropriate AI tools and data systems to support the staff in using these tools for regulatory reviews. The agency will also need to maintain and update

[2] An "integrated development environment" refers to a software application that helps programmers develop software code efficiently by combining capabilities such as editing, building, testing, and packaging.

[3] A "regulatory sandbox" refers to an isolated, independent environment, not connected to any other system or process, where innovators can develop and test products and identify limitations and applications of the technology to inform regulatory decisions.

these tools and systems to keep pace with emerging AI technologies. Finally, the NRC will need to train the staff on how to use these tools and systems effectively to support regulatory reviews and assessments. This task is similar to several tasks supporting NUREG-1908, Volume 4, "Information Technology/Information Management Strategic Plan: Fiscal Years 2020-2024," issued November 2019 and the agency's IT Roadmap FY22–FY26. The AISC will ensure that activities are coordinated to ensure efficiency and avoid duplication of effort.

- Milestones:

Subtask	Milestone	Planned Dates
5.2A	Develop and maintain integrated development and test environments for AI-specific regulatory applications, including planning for cloud or hardware solutions.	Superseded*
5.2B	Identify, assess, and acquire AI tools and make them readily available in the NRC's Technical Reference Model.	Superseded*
5.2C	Develop regulatory engagement strategy that enables the NRC staff to test and evaluate AI applications for regulatory reviews.	Start: FY 2025 Q2 Due: TBD
5.2D	Develop and deliver training programs to the NRC staff on how to effectively use the integrated development environments, common data science tools, and regulatory sandboxes to support regulatory reviews and assessments.	Start: FY 2026 Q1 Due: FY 2026 Q4

*Note: Subtasks 5.2A-B will be transitioned to the NRC's AI enterprisewide strategy.

- Potential Challenges and Mitigation Strategies: A potential challenge may be tracking the latest AI developments to ensure that the NRC's AI ecosystem is equipped with the most up-to-date tools and systems. In addition, ensuring that the staff has access to adequate training and support to effectively use AI tools and data systems could be a challenge, given that AI technology can be complex and may require specialized knowledge and skills. To mitigate these challenges, the NRC will actively engage in meetings with partner organizations to learn from their experiences and leverage best practices in developing an AI ecosystem.

- Status: Not started.

2.5.3 Task 5.3: Survey AI Tools and Methods for Safety Evaluation

- Description: The objective of this task is to conduct a survey of existing industrial AI tools and methods, as well as current research and development, to assess their applicability for evaluating AI safety, security, and reliability. The survey will include a review of methods used by other regulatory agencies such as the FAA and the FDA. The objective is to identify the most effective methods and tools for evaluating AI safety, as well as any gaps or limitations in the current regulatory framework that need to be addressed. The survey results will inform the development of new or updated regulatory guidelines for the use of AI in NRC-regulated activities.

- Milestones:

Subtask	Milestone	Planned Dates
5.3A	Establish contract to support this task.	Start: FY 2025 Q1 Due: FY 2025 Q2
5.3B	Contractor issues draft letter report to the NRC documenting the literature survey of industrial AI tools and methods and their applicability to the NRC.	Start: FY 2025 Q2 Due: FY 2026 Q1
5.3C	Contractor issues final letter report to the NRC documenting the literature survey of industrial AI tools and methods and their applicability to the NRC.	Start: FY 2026 Q1 Due: FY 2026 Q2
5.3D	Implement findings from the survey of industrial AI tools and methods.	Start: FY 2026 Q3 Due: FY 2027 Q2

- Potential Challenges and Mitigation Strategies: Discerning which AI methods and tools may be applicable to safety evaluations in the nuclear industry could be challenging. Another challenge could be the lack of standardization and consistency in AI safety evaluations across different regulatory agencies and industries, which may hinder the comparison and evaluation of the effectiveness of different methods and tools in safety applications. To mitigate these challenges, the NRC will actively engage in meetings with partner organizations to learn from their experiences and gain insights into addressing these issues.

- Status: Ongoing.

2.5.4 Task 5.4: Facilitate and Invest in AI Regulatory Research

- Description: The objective of this task is to facilitate and invest in AI regulatory research through a variety of existing research mechanisms coordinated through RES. These research mechanisms include program office work requests, the NRC's Future Focused Research (FFR) program, and the University Nuclear Leadership Program (UNLP). This involves supporting research proposals and development grants that focus on AI-related topics of interest to the NRC. The aim is to proactively continue investing in AI-related regulatory research that improves the agency's ability to address all five AI strategic goals. As an example of the breadth of the UNLP portfolio, in FY 2023, the NRC awarded 22 research and development grants totaling approximately $10.4 million. Of these awarded grants, three research proposals totaling $1.5 million included the use of machine learning or other data science applications.

- Milestones:

Subtask	Milestone	Planned Dates
5.4A	Develop a plan to facilitate AI FFR program.	Completed: FY 2024 Q1
5.4B	Develop a plan to facilitate AI research through the UNLP research and development grant program.	Start: FY 2025 Q1 Due: FY 2025 Q4
5.4C	Monitor the progress of selected research projects and incorporate research outcomes into the NRC's AI regulatory framework.	Ongoing
5.4D	Develop work request agreements (e.g., user need request, research assistance request) as needed to formalize work arrangements including resource needs.	Ongoing

- Potential Challenges and Mitigation Strategies: A potential challenge is that UNLP AI research proposals may have limited relevance for nuclear regulatory purposes. To address this challenge, the NRC can proactively engage in information sharing with university faculty and staff, allowing them to develop a better understanding of the NRC's specific AI needs within the context of nuclear regulation.

- Status: Ongoing. Subtask 5.4A is completed. Subtask 5.4B has not been started, and subtasks 5.4C-D are ongoing.

APPENDIX A: CHANGE HISTORY

Item	Location	Revision	Description
1	Section 2	1	Section updated to reflect completed milestones and capture minor editorial changes.
2	Figures 1-5	1	Gantt charts updated to reflect current status of milestones.
3	Section 2.1.1	1	Subtask 1.1E added to reflect public release of regulatory gap analysis.
4	Section 2.3.2	1	Subtasks 3.2I-N added to reflect additional international partnerships and reports.
5	Section 2.4.1	1	Subtasks 4.1F-G updated to reflect transition to NRC enterprisewide AI strategy.
6	Section 2.4.2	1	Subtasks 4.2A, D, and E updated to reflect transition to NRC enterprisewide AI strategy.
7	Section 2.4.3	1	Subtasks 4.3A-D updated to reflect transition to NRC-enterprisewide AI strategy.
8	Section 2.5.3	1	Subtasks 5.3C-D added to reflect publishing of report on industrial AI tools and implementation of findings.
9	Appendix A	1	New appendix A added to capture document change history.

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