PERFORMANCE WORK STATEMENT
PR-ORD-20- 01103
National Academy of Sciences (NAS) Contract #68HERC190011
Task Order #68HERC20F0314

I. TITLE: Strategic Positioning of EPA's Research and Development Enterprise to Inform Future Environmental Protection: The Road Ahead

EAS Short Title: NAS Anticipatory Research Report

II. Task Order Contracting Officer Representative(s):

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III. PERIOD OF PERFORMANCE:
Date of Task Order Award through 33 months following award.

IV. PURPOSE OF TASK ORDER
The NAS shall develop a consensus report to inform how EPA might strategically position its research and development enterprise to support EPA's mission and to anticipate and respond to the future research needs of the Agency. Specifically, building on the 2012 NAS report, *Science for Environmental Protection: The Road Ahead*, the NAS is being requested to provide targeted advice on scientific and technological capabilities that EPA might require to meet the environmental challenges for the coming decades. The NAS shall examine advances in fields of science and ongoing research, and how these advances will impact the types of work done in EPA's Office of Research and Development (ORD) and how that work is accomplished. The NAS report shall span a time horizon of 10-15 years. The NAS study shall provide recommendations (including ones implementable in the near-term) on how ORD should strategically position itself to best take advantage of emerging science and technology to meet the current and future challenges EPA may face to fulfill its mission to protect human health and the environment.

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Statement of Task:
An ad hoc committee of the National Academies of Sciences, Engineering, and Medicine will identify emerging scientific and technological advances from across a broad range of disciplines that EPA's Office of Research and Development (ORD) should consider in its research planning to support EPA's mission for protecting human health and the environment. In addition, the committee will recommend how ORD could best take advantage of those advances to meet current and future challenges during the next 10-20 years.

In carrying out its study, the committee will consider EPA's mission, strategic planning documents, and current initiatives, as well as other broader topics including, but not limited to, biotechnology, data science (along with artificial intelligence and machine learning), climate impacts, environmental monitoring and sensors (outdoor and indoor), and impacts of stressors on ecological and human health. The committee also will consider advances that help EPA better incorporate systems thinking into multimedia, interdisciplinary approaches.

For the scientific and technologic advances it identifies for consideration by ORD, the committee will indicate each particular advance's level of maturity and applicability to issues relevant to EPA's mission, so that ORD may prioritize its approach in responding to the committee's recommendations. The committee will consider the tools ORD has available (intramural research, extramural grants, cooperative agreements, interagency agreements) in recommending how ORD might incorporate those advances into its research and development enterprise. The committee's report will build on relevant past reports, including the National Academies report: "Science for Environmental Protection: The Road Ahead."

V. BACKGROUND

EPA's Office of Research and Development (ORD) provides the science, technical support, technology, and tools to support EPA's mission to protect human health and the environment. Broadly, ORD accomplishes this support through:

1. Research to Inform Agency Priorities – Conduct innovative and anticipatory research to solve longer-term environmental challenges and provide the scientific bases for future environmental protection. This research is applied to the range of EPA program and regional office needs.
2. Targeted Research to Meet Statutory Requirements and Specific Environmental Challenges – Provide research support to EPA program and regional offices, as well as states, tribes, and local communities, to help them respond to current environmental challenges.
3. Scientific and Technical Support – Offer unique expertise and translational capacity to assist EPA programs and regions, local, state and tribal governments, and other Federal agencies as they respond to both emergency and longer-term environmental issues.

The three types of ORD support are complementary. They build off and inform each other, providing the foundation for ORD to inform Agency priorities and decisions, both near and long-term. ORD's capacity to conduct innovative and anticipatory research is necessary to ensure that the latest science and technology informs Agency decision-making and solves longer-term environmental challenges. In addition, since statutes and laws often have lifecycles that differ from the continuous evolution of scientific information, ORD often needs to provide the translational capacity to apply new scientific information within the

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construct of existing statutes and laws. Having the capacity to drive the leading edge of science and to translate, adapt, and apply science to inform decision-making enables ORD to more effectively inform policy-making, and provide scientific and technical support.

Past experience in ORD has demonstrated the importance of understanding how scientific advances can impact the organization and, by extension, the Agency. For example, in the 1980's and 1990's, rapid advances in "-omics" technologies and corresponding developments in bioinformatics and computational methods created a unique opportunity to apply these technologies and approaches to toxicology. Recognizing these scientific advances, a computational toxicology program was established in 2002, with the National Center for Computational Toxicology (NCCT) being formally established in 2004. NCCT initially focused on endocrine disruption. The tools and methods developed during the early days of NCCT were brought to bear in 2010 as the Agency responded to the Deep Water Horizon oil spill, where they provided rapid evaluations of the toxicity of potential dispersants. These advances have enabled ORD to become a world leader in computational toxicology, and to provide critical scientific contributions as the Agency implements the amended Toxic Substances Control Act.

Similar anticipatory actions were conducted by ORD under the Environmental Monitoring and Assessment Program (EMAP, 1994-2006) to monitor and assess the status and trends of the Nation's ecological resources. EMAP developed an innovative probabilistic approach for monitoring ecosystem integrity and dynamics. When originally developed, EMAP demonstrated that a probabilistic approach could sufficiently identify impaired waters under the Clean Water Act (S. 305b). Today, EPA's Office of Water works with state, tribal, and federal partners to design and implement the National Aquatic Resource Surveys (NARS), using probabilistic monitoring to assess the quality of the Nation's aquatic resources. EMAP laid the foundation for this approach. If ORD had not conducted the research to establish EMAP in the 1990's, the Agency would not have had a foundation to develop the NARS Program in the mid-2000's, and provide decision-makers and the public improved, statistically-valid, environmental information.

The National Research Council (NRC) has previously provided insights relevant to ORD anticipatory research, notably in the 2012 report, *Science for Environmental Protection: The Road Ahead.* This report provided recommendations that EPA better integrate systems thinking into its approaches to protecting human health and the environment, enhance science leadership within the Agency, and strengthen scientific capacity both within and outside EPA. The report also identified a number of current and future challenges. It also recommended that EPA develop a scanning capability to foresee emerging scientific approaches, examine ways to improve its management and use of large environmental datasets, build capacity to support innovation in environmental science and technology, and prioritize its research activities in light of an anticipated constrained budgetary environment. It is expected that the NAS will build on this report as well as activities of several of its relevant Boards, including efforts under development within the Environmental Health Matters Initiative (http://nas-sites.org/envirohealthmatters/).

Strategic Planning in ORD

Over the last year, each of ORD's six national research programs developed a Strategic Research Action Plan (StRAP) to plan its research efforts for Fiscal Years 2019-2022. Collectively, the StRAPs lay the foundation for EPA's research programs to provide focused research that meets the Agency's statutory

requirements and the goals outlined in the FY 2018-2022 U.S. EPA Strategic Plan and the Office of Research and Development Strategic Plan 2018 -2022. The StRAPs are designed to guide an ambitious research portfolio that delivers the science and engineering solutions the Agency needs to meet its goals now and into the future, while also cultivating an efficient, innovative, and responsive research enterprise. The strategic directions and outputs identified in each of the six StRAPs serve as planning guides for ORD's four centers to design specific research products to address partner and stakeholder needs. More information about ORD's organization and the StRAPs will be provided to the NAS in advance of the kick-off meeting.

One of ORD's three strategic goals relates to "informing and supporting Federal, state, tribal and local decision making." In developing the StRAPs, the national research programs engaged with and solicited input from a broad array of key stakeholders (https://www.epa.gov/research/epa-research-supports-states). This proposed project and its report will help inform future strategic planning in ORD that promotes these constructive partnerships.

VI. SCOPE OF WORK

This Task Order (TO) builds on the broad recommendations from the 2012 NRC report by requesting the NAS to examine current and anticipated scientific and technological advances, and their potential impacts on ORD and its capacity to provide timely research to inform Agency priorities. The NAS is asked to convene a Committee to identify emerging scientific advances potentially applicable to the Agency's mission, as well as to provide actionable recommendations on how ORD might consider incorporating emerging science into the Agency's research planning, so that ORD becomes an increasingly impactful organization.

VII. DESCRIPTION OF TASKS

For the duration of the project, across all tasks, monthly written progress reports shall be provided to the Contracting Officer (CO), Contract Level COR (CL COR) and Task Order Contracting Officer Representative (TOCOR). These reports shall include a description of the work progress completed, any difficulties encountered, anticipated activities/schedule, and an invoice.

Task 1: Establish a Committee

The NAS shall establish an ad hoc Committee of approximately 16 experts from academia, non-governmental/public interest organizations, private industry, and Federal, state, tribal, and local governments. Committee membership should be balanced with approximately equal participation across the groups identified above and is encouraged to take into account geographical diversity. Collectively, Committee member expertise shall encompass the physical, chemical, biological, environmental, and social sciences; exposure science; public health; engineering; informatics/information technology; risk assessment, risk management, and environmental policy decision-making. The NAS is encouraged to include among the Committee an individual(s) with expertise in strategic foresight and/or identification of new and emerging science and technology. The NAS is also encouraged to include among the Committee an individual(s) with expertise/familiarity in the communication and application of scientific information in environmental policymaking. The membership of the Committee may be modified to prepare for the Title

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42 hiring authority meeting. The Committee membership shall be for 33 months.

Subtask 1.1 – Kickoff meeting

An initial kickoff meeting shall be held between EPA and NAS management for the project to discuss the broad outlines of the requested report, and address any questions raised by the NAS that would inform the development of the Committee.

Task 1. Deliverables

Auto	SubTask	Deliverable	Schedule
1	N/A	Establish a Committee. – Transmit a copy of committee membership to CL COR and TOCOR.	Within 3 months of the date of task order award.
1	1.1	Kickoff Meeting	Within 14 days of the date of task order award.

Task 2: Convene Workshop(s)/Meeting(s) to Support Report Development

The NAS shall convene and hold up to five (5) workshops and/or public meetings, with open and closed portions of the meeting(s), to facilitate the exchange of ideas from Committee members and stakeholders on the topics related to its report. The number of meetings specified in Task 2 should not be construed to include internal Committee meetings necessary to develop a consensus report. One (1) workshop shall be convened to hear perspectives and needs from EPA program and regional leaders, as well as states, on issues of current or emerging concern. Additionally, the workshop should seek the perspective of ORD leadership on the existing and anticipatory research components of ORD's national research programs. Other potential workshop or public meeting topics to support the NAS report development may include discussions on emerging issues in the environmental and human health sciences, strategic foresight, and scientific horizon scanning/scenario planning. Workshops and/or public meetings should include the opportunity for public comment.

Subtask 2.1 – Title 42 Hiring Authority Meeting

At least one (1) meeting (with open and closed portions) should seek the perspective of ORD leadership on EPA's use of the Title 42 Hiring Authority in the past, currently, and into the future. Additional internal Committee meetings will be necessary to develop a consensus report. The Title 42 Hiring Authority is an important flexible hiring mechanism through which ORD can competitively attract and retain expertise and talent. The Title 42 Hiring Authority plays an important role in allowing ORD to anticipate and respond to emerging environmental issues, obtain expertise in advancing fields, and diversify its workforce. In advance of this PWS modification, the Title 42 Hiring Authority has been a focus of discussion between ORD and the Committee.

Advance notice of the workshops and/or meetings identified in this task shall be provided to the TOCOR and CL COR via email 90 days, or as early as practicable, in advance of the time, location, and agenda of all workshops and/or meetings. All communications regarding public meetings should go through the TOCOR nd CL COR. The NAS should also provide an agenda of the public portion of all workshops and/or meetings in accordance with Section 15 of the FACA, which requires a contractor to "summarize" certain aspects of

non-public meetings and make the summary available through their website. If public websites or similar means are used to disseminate information to the public, the TOCOR and CL COR shall be notified of the location of such information (e.g., website addresses, as well as all relevant changes to them).

Task 2. Deliverables

Task	SubTask	Deliverable	Schedule
2		Hold at least one, and up to five workshops and/or public meetings to inform report development.	At least one workshop must be held no later than 6 months after establishing the Committee. All workshops shall be completed within 18 months from the date of task order award.
2	2.1	Hold a workshop/meeting on the Title 42 Authority to seek the perspective of ORD leadership on EPA's use of the Title 42 Hiring Authority in the past, currently, and into the future.	workshop/meeting to seek the perspective of ORD leadership on EPA's Title 42 Authority must be held no later than 8 months after Task Order mod is awarded.

COVID Considerations

The NAS shall conduct some or all meetings, including the workshops, as virtual meetings if face-to face meetings are not possible. Options for face-to-face and virtual meetings shall be included in the proposal.

Task 3: Develop Consensus Report

The Committee shall develop recommendations in a consensus report that identifies, 1) the areas of emerging/evolving science and/or research advances that ORD should consider in its research and organizational planning over the next 10-20 years, and 2) recommendations on potential approaches to incorporate scientific advances and innovative technologies/tools to position ORD to anticipate and respond to future research needs, thereby better meeting the needs of EPA decision-makers. In making its recommendations on approaches, the Committee shall consider the array of current approaches and tools ORD has available to address emerging science (intramural research, grants, cooperative agreements, interagency agreements), and whether a given approach (or combination) would best address a future environmental issue.

The Committee shall consider past reports and analyses by the NAS and/or other organizations, as well as presentations and documentation provided by EPA (e.g., the Strategic Research Action Plans for ORD's national research programs). In identifying emerging scientific advances, the Committee shall indicate how mature an emerging scientific area is, and its applicability to environmental issues, so that ORD may prioritize its approach to responding.

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In performing its task, the Committee should consider the Agency's mission and its current initiatives, and may consider other broader topics including, but not limited to, the following:

- Biotechnology – What recent advances in biotechnology and associated fields warrant the greatest attention and offer potential application to human health and environmental decision making? How should ORD apply advances in biotechnology in its research program?
- Big Data – Are there strategies or actions ORD should take to address the increasing sources, volume, and diversity of data? How should ORD ensure it has capacity to manage, analyze, and share data used to inform Agency decisions?
- Climate Impacts– Are there emerging areas in science and technology that ORD should examine to better understand the role of climate as a stressor (e.g., biodiversity, air quality, etc.)?
- Environmental Monitoring and Sensors – How should ORD capitalize on the rapid advances in sensor technology to better understand environmental exposures? What additional advances in sampling protocols and analytical techniques are needed to understand emerging threats?
- Impacts of Stressors on Ecological and Human Health – Are there new technologies or methodological approaches that can build on existing advances in computational toxicology and computational exposure to address emerging threats and better characterize the impact of stressors? Stressors should be defined broadly to include chemical, biological, radiological, and physical as well as any other environmental factors identified by the Committee.
- Artificial Intelligence (AI)/Machine Learning – AI and/or machine learning are already impacting our lives. How should ORD apply current, and prepare for future, advances in AI/machine learning to enhance our ability to inform innovative approaches to the protection of human health and the environment?
- Cross-cutting topics – Are there opportunities to apply emerging science across fields to advance human health and environmental protection? For example, while EPA collects large and diverse types of monitoring data from numerous sources, we may only use a subset of that information. How might ORD integrate monitoring, big data, and AI to produce an early warning system for environmental and human health issues before they become problems? This is an example of a question that cuts across the topics listed above. The Committee is encouraged to identify other cross-cutting topics, including those involving fields not identified above.

Subtask 3.1 – Prepublication of report

EPA requires that NAS provide a prepublication draft of the report approximately 14 days prior to public release of the report, or 14 days before the end of the period of performance, whichever occurs first.

Subtask 3.2 – Pre-release briefing for ORD

EPA requires that NAS provide briefing for senior ORD leadership on the report, including participation from the Committee members, prior to the public release of the report. The briefing should occur no later than 3 days prior to the public release of the report, or 3 days before the end of the period of performance, whichever occurs first.

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Subtask 3.3 – Release of final reports

The final consensus report should be completed and made publicly available no later than the end of the period of performance.

Task 3. Deliverables

Task	SubTask	Deliverable	Schedule
3	3.1	Prepublication of reports	Approximately 14 days prior to public release of the report and no later than 14 days prior to the end of the period of performance.
3	3.2	Briefing for senior ORD leadership on report.	3 days prior to public dissemination of the report. No later than 3 days prior to the end of the period of performance.
3	3.3	Final report	No later than 33 months after the date of task order award.

VIII. ACCEPTANCE CRITERIA

The Contractor shall prepare high quality products and that are reproducible and transparent. Figures submitted shall be of high quality similar to presentations developed for national scientific forums and should be formatted as jpeg or TIFF files. Deliverables shall be edited for grammar, spelling, and logic flow. The technical information shall be reasonable complete and presented in a logical, readable, manner. Text deliverables shall be provided as 508-compliant documents in Microsoft Word 2010 or compatible format and PDF.

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