



Department of Energy
Office of Science
Washington, DC 20585

Office of the Director

April 6, 2023

Dr. Bruce Hungate
Regents' Professor, Biological Sciences
Northern Arizona University
SLF Building 17, Room 300A
600 South Knoles Drive.
Flagstaff, Arizona 86011

Dear Dr. Hungate:

The mission of the Department of Energy (DOE) Biological and Environmental Research (BER) program is to support transformative science and scientific user facilities to achieve a predictive understanding of complex biological, earth, and environmental systems for energy and infrastructure security, independence, and prosperity. The program seeks to understand the biological, biogeochemical, and physical processes that span from molecular and genomics-controlled scales to the regional and global scales that govern changes in watershed dynamics, climate, and the earth system.

Additionally, DOE (and its predecessor entities) has a long history of supporting basic research to understand the effects of radiation on living systems. Most recently, BER's Low Dose Radiation Research (LDRR) program addressed the effects of low dose radiation on cells and human health in the context of DOE's legacy nuclear weapons production programs, and the safe use of nuclear energy. This program was initiated in 1998 and was completed in 2016 as BER shifted its portfolio more towards DOE's bioenergy and environmental science needs. The findings from the LDRR program advanced our understanding of the effects of low dose radiation on biological systems, but many challenges remain. Radiation at high doses is well known to be carcinogenic; however, the health effects of low dose radiation exposure (<100mGy) more broadly encountered by the general public from the natural environment (local geology), certain occupations, and more recent medical diagnostics and treatments, are not well known. While the LDRR program expanded our knowledge of how cells react and adapt to low level radiation exposure, these largely molecular-level observations have not readily translated into improved capabilities for assessing the risks of cancer in humans due to low dose radiation exposure.

The Office of Science is proposing funding in the Fiscal Year 2024 President's Budget Request to initiate a basic research program to study the effects of low dose radiation on human health, which will be overseen and managed by BER. This is in response to considerable interest from Congress to re-establish the LDRR in BER over the past several years. As such, I am requesting that the Biological and Environmental Research Advisory Committee (BERAC) provide input on the potential scope of an impactful low dose radiation research program in BER that draws on DOE's unique research and

enabling capabilities that could complement ongoing efforts in other agencies. As part of your deliberations, consideration should be given to (a) a previous BERAC report that looked at the past BER-led program on low dose radiation research (https://science.osti.gov/-/media/ber/berac/pdf/charges/Low_Dose_letter_and_BERAC_report.pdf), (b) a recent National Academies report (<http://nap.edu/26434>), (c) a recent report from the National Science and Technology Council (<https://www.whitehouse.gov/wp-content/uploads/2022/01/LDR-Report-2022.pdf>), (d) any other reports or studies relevant to this charge, and (e) the complementary role that a revived BER program in low dose radiation might play, given DOE missions, compared to the missions of other agencies, such as the National Institutes of Health (NIH), Department of Homeland Security (DHS), Environmental Protection Agency (EPA), and the National Aeronautics and Space Administration (NASA).

In formulating potential research opportunities for a low dose radiation research program, BERAC should consider the following items:

- Are there existing technical capabilities and areas of foundational science expertise within BER that could be employed in low dose radiation research (e.g., genomics, instrumentation, computation)?
- Can a program of basic research be identified using DOE capabilities to make specific advances towards understanding the effects of low dose radiation exposure on human biological systems?
- Is the identified program non-duplicative and complementary to efforts in other agencies (e.g., NIH, DHS, EPA, NASA) and would there be opportunities to leverage such efforts?

This program assessment and subsequent report should provide sufficient information for BER to initiate a new and focused low dose radiation research program. The report should be presented at the Spring BERAC meeting in 2024, with an interim presentation on progress and preliminary findings at the Fall BERAC meeting in 2023.

Sincerely,



Asmeret Asefaw Berhe
Director, Office of Science

cc. Gary Geernaert, SC-33
Tristram West, SC-33