

Comments of Beyond Nuclear on *Leveraging Advances in Modern Science to Revitalize Low-Dose Radiation Research in the United States (2022)*

July 1, 2022

Thank you for the opportunity to comment on the report *Leveraging Advances in Modern Science to Revitalize Low-Dose Radiation Research in the United States (2022)*.

Overall, we would like to congratulate the National Academies of Science, Engineering, and Medicine Committee (hereafter referred to as NAS) on a report that is fairly thorough and thoughtful, both in its consideration of the state of low-dose radiation science and the recommendations that it makes for future research. NAS has recognized impacted communities' and researchers' concerns regarding DOE's conflict of interest and DOE's preoccupation with how research it funds may impact regulations. While the NAS still recommends a place for DOE in this research — we believe in a misguided attempt to placate Congress, and a recommendation we seriously disagree with— they have also recognized that the low dose program would exceed any one agency's capabilities. Therefore, the NAS committee advises a partnership with an agency focused on enhancing health, which we agree is necessary if this research is to proceed.

While we oppose any function for DOE that would allow control over research principles or direction, we recognize that NAS has presented some relevant and actionable steps to ensure that DOE comports with the essential components of any low-dose program as recommended by the NAS committee report. We further recognize that the Consolidated Appropriations Act, 2021 allows for a 2023 GAO review of DOE's progress in establishing a low-dose program, and that it appears, according to NAS's report, that DOE is already appropriating low-dose funds in a manner inconsistent with the Act's direction.

Finally, we strongly support comments submitted previously by members of communities contaminated and impacted by radiation from federal and private nuclear technologies that note it is paramount to allocate funds to clean up contaminated sites and compensate exposed individuals based on what we already know. Acting immediately on the information we already have on radiation's impact would be an additionally advantageous investment for public health. Although this request may be beyond the NAS committee's charge to absorb, it certainly is a request we make of Congress.

Comments to NAS

First, we appreciate that the NAS has recognized some important trends in low-dose radiation science, among them

- that the LNT model still provides the best fit while recognizing there are processes happening at low doses that could be non-linear and warrant further investigation. (p 50) We feel, however, that it would have been appropriate for the report to also recognize the current scientific consensus behind the LNT model.
- Low-doses delivered over long periods of time have impacts that don't necessarily match impacts from high doses, but can still increase a person's long-term risk of cancer and hereditary disorders. (p 10)

- There is increasing evidence that low-doses may cause non-cancer health outcomes including “cardiovascular disease, neurological disorders, immune dysfunction, and cataracts” (p 14)
- That acute or chronic low doses “indicate a pro-inflammatory immune profile, which might contribute to chronic immune dysfunction and disease” and can change immune system balance to “provide the framework for induction of symptomatic immune dysfunctions that are clinically relevant such as infections, allergies, autoimmunity, and immunoproliferative diseases.” (p 46 & 47)
- That “at low doses and at low-dose rates for low-LET radiation...the repair may be not as efficient as at higher doses” (p 105)
- That some cohorts are underrepresented, namely Pregnant women. (p 116). However we urge future low-dose radiation research to address additional cohorts that may be at higher risk, including Indigenous communities.
- Recognition of the current circumstance where epidemiological studies are unable to provide adequate health impact information at or below 10 milligray and that biological studies can help fill that information gap. (p 88)

Many of the NAS committee’s recommendations for a low-dose research program are well-reasoned and supported by past experience.

We understand the committee was “not tasked with assessing the suitability of DOE to manage the low-dose radiation program or with recommending an alternative management structure”. We are therefore pleased that the committee heard and recognized both the community distrust of DOE, and also distrust from researchers DOE hired for low dose research in the past, including DOE’s preoccupation with how its research might impact regulations. Indeed, as far as the public is concerned, a primary question of any future low-dose research is who or what is in charge of that research, and we are glad NAS understood this implication.

While we appreciate that NAS recognizes a number of essential elements for robust, neutral and rigorous low-dose research, including community input and transparency, we remain concerned that *any* role for DOE puts the neutrality of this research program in jeopardy. For instance, we remain worried NAS still concludes that, given all of the reservations in the report, “DOE is the most viable option for immediately reestablishing a low-dose radiation program” and could establish “most of the essential elements identified by the committee within about 2 years given adequate funding.” The committee’s reason for concluding this is that Congress may lose interest in funding a low dose program. (p 145) So we are left with the untenable position of initially funding questionably neutral research or not funding the research at all.

We are further distressed that at doses below 10 milligray— “representative of the majority of exposures of interest for radiation protection” DOE should take a “leading ... portion of the strategic research agenda...on genome biology...” when NAS recognizes that biological studies in particular could shed light on these lower doses. (p 88 & 143) NAS also envisions a role for NIH in biological research and the public would feel more comfortable if NIH would take as large a share as possible of the research that would be determinative for the impact of doses under 10 milligray.

We appreciate that the NAS committee has elucidated a mechanism by which DOE may be held accountable should they fail to implement the committee's recommendations namely a pending GAO review (details below). This rocky start for the DOE low-dose program further erodes public confidence in the agency.

Comments to Congress:

Congressional committees who would fund low-dose radiation research should take note of a number of recommendations made by the NAS report. Before we mention those, however, we would like to underscore comments made to this committee from members of communities contaminated and impacted by radiation from federal and private nuclear technologies that it is paramount to allocate funds to clean up contaminated sites and compensate exposed individuals based on what we already know. For instance, applying previous National Academies report conclusions and recommendations (such as those in BEIR VII) would be an additionally advantageous investment for public health, rather than just an investment to gain yet more knowledge, which regulators, if history is any guide, may fail to apply.

To the point of ever-greater and expanding exposures to lower doses of radioactivity, the NAS recognizes the need for assessing potential impact from these exposures. NAS makes several recommendations to Congress both on the nature, amount, and timing of research investment, and the DOE's role in the low-dose program. As members of the public, we would like to highlight some of these conclusions and offer further opinions on undertaking the low-dose radiation research program.

1. The report affirms that impacted community engagement is crucial to the success of a low-dose radiation program, including in the development of a research agenda and in advising specific projects via advisory committees and subcommittees (p 140). While we agree with the general recommendation, we urge that engagement should go beyond an advisory role, and instead call for impacted communities to have true oversight and be central to decision making in future low-dose radiation research.
2. The NAS report recommends that such a program be funded with 100 million dollars per year for a period between 10-15 years. NAS notes that anything less will not be enough: "The committee cautions that inadequate funding for the program will lead to continued scientific and policy debates about risks of low doses of radiation and the possible inadequate protection of patients, workers, and members of the public from the adverse effects of radiation" (p 125). We emphasize that the report recommends 10 million dollars be allocated for an "education, outreach, and policy hub," which would be crucial to ensuring the impacted community engagement that the report recommends (p 123).
3. We are grateful that the report notes the importance of adopting best practices when working with Indigenous communities and nations, including undertaking government-to-government consultation, prioritizing trust building, etc (p 130). This should be prioritized going forward. However, we note that the NAS and future entities involved in this work should capitalize "Indigenous," which is a sign of respect and aligns with capitalization of other racial and ethnic identifiers.
4. DOE offices that have historically had radiation research capabilities are currently ill-equipped to carry out low-dose research, ill-equipped to support competitive external grants and contracts, or are uninterested in conducting low-dose research, despite Con-

gress's continuing interest in having DOE's compliance with a "congressional directive to establish the new program." (p 17, 68, 144)

5. Also, while NAS recognizes the Congressional Committees' desires to have DOE central to the low-dose program, it importantly also recognizes the concerns raised by "members of impacted communities about DOE's inherent conflicts with leading low-dose radiation research and by the research community" — concerns that encompass both DOE's commitment to maintaining a program, and to conducting science without factoring in potential implications for regulation. (p 8, 131, 142)
6. NAS, noting that Congress has shown interest in the "committee's views on other government agencies that could be more suitable to manage the program," (p 144) has suggested that NIH could be involved in a cross-institutional effort since "the research agenda proposed by the committee extends beyond any single agency's capabilities, and a partnership with an agency whose mission is to enhance health would be warranted." (p 143 & 146)
7. Of revelatory importance, the report relates what appears to be a misallocation, or misappropriation, of funding that Congress had already given DOE for re-establishing a limited low-dose program:

"Despite authorization to start the program and appropriation of limited funds, DOE has not reestablished a low-dose radiation program of the scale and scope defined in the Consolidated Appropriations Act, 2021. In addition, BER did not direct the limited appropriated funds to support research focused on developing and testing new hypotheses that could provide foundational direction for the new program. Instead, DOE directed appropriated funds to support a project on artificial intelligence (AI) in cancer research carried out at three national laboratories..." (p 18)

8. Members of the public note that since DOE has already appeared to misallocate congressional funding appropriated by the Consolidated Appropriations Act, 2021, Congress should take one of the steps the NAS report suggests in order to hold DOE accountable, namely

"Congress may use the scheduled Government Accountability Office (GAO) review of the low-dose program mandated in the Consolidated Appropriations Act, 2021, § 11001 (see Appendix A) to assess DOE's progress with implementing the recommended essential elements of the program. This review is scheduled to take place in 2023, 3 years after the enactment of the law. If Congress finds that DOE has failed to take steps to (1) initiate a low-dose radiation program of the scale and scope envisioned by Congress, (2) adopt the research agenda recommended by this committee, and (3) implement the essential elements recommended by this committee, it may consider alternatives for placement and management of the low-dose radiation program, for example within NIH, likely as a cross-institutional effort, for example, by NIAID and/or NCI and/or the newly conceptualized ARPA-H."

We note that 2022 is halfway complete, and it appears that DOE has already not established the low-dose program envisioned by Congress with the appropriation granted. We therefore look forward to a 2023 GAO investigation recognizing this DOE shortcoming.

We realize that “alternatives for placement” of the low-dose program will probably necessitate reaching out to other House and Senate committees in addition to those that passed the two laws applicable to this report — The Consolidated Appropriations Act, 2021 (Public Law 116-260), and American Innovation and Competitiveness Act of 2017, Public Law 114-329.

We would also like to remind the House and Senate that continued willingness to support nuclear industries necessitates funding a low-dose research program to the full extent proposed by the NAS report, in addition to addressing current contamination and health impacts. If Congress decides not to fund low-dose research, yet continues to support nuclear technologies, health and environment may very well be at risk according to research reviewed by this NAS report. The NAS report concludes that low-dose research is not just warranted, but technical capabilities for assessing low-dose impacts have never been better (p 1) and will continue to advance.

Further, while the NAS committee states their recommended strategic agenda was developed to be neutral in terms of the impact of the proposed research on assessment of radiation health risks and consequently its potential impact on radiation protection policy and practice in the United States,” (p 12), we are concerned because the Executive Branch has not taken a neutral position, despite the NAS report having done so: “A notable exception to this approach is that of the National Science and Technology Council ...which phrased its priority as ‘defining the threshold of impact for low-dose and low-dose rate,’ implying that such a threshold does exist.” (p 124) The public urges Congressional staff and committees maintain neutrality with regard to potential impact of this research on U.S. regulation and policy, or risk gaining the reputation that DOE currently holds among impacted communities and researchers.

Thank you for the opportunity to comment on the findings and implications of this NAS report. We recognize that these comments are not the end, but the beginning of this process.

These comments are submitted by Cindy Folkers, Beyond Nuclear and supported by Dr. Linda M. Richards, Corvallis, Oregon.