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MONTANA FIRST JUDICIAL DISTRICT COURT
LEWIS AND CLARK COUNTY

RIKKI HELD, et al., Plaintiffs, v. STATE OF MONTANA, et al., Defendants.	Cause No. CDV-2020-307 Hon. Kathy Seeley DECLARATION OF STEVEN W. RUNNING IN SUPPORT OF PLAINTIFFS' RESPONSE BRIEF IN OPPOSITION TO DEFENDANTS' MOTION TO PARTIALLY DISMISS FOR MOOTNESS
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Pursuant to MCA §1-6-105, Steven W. Running hereby declares as follows:

1. I am an expert and rebuttal witness in the above-entitled action. I am making this declaration in support of Plaintiffs' Response Brief in Opposition to Defendants' Motion to Partially Dismiss for Mootness. I have personal knowledge of the facts stated herein, except as to those stated on information and belief, and if called to testify, I would and could testify competently thereto.

QUALIFICATIONS & SUMMARY OF EXPERT TESTIMONY

2. In my role as an expert witness in this case, I have been asked to provide testimony in various areas, such as explaining Earth's Energy Imbalance; how the emission of greenhouse gases ("GHGs") to the atmosphere is driving climate change globally and in Montana; the State of Montana's longstanding knowledge of the dangers posed by climate change and fossil fuels; and how human-caused fossil fuel development and the resulting release of CO₂ into the atmosphere are harming Montana's ecosystems, water supplies, communities, and the Plaintiffs themselves. My opinions and conclusions on these issues were contained in an expert report that I jointly prepared with Dr. Cathy Whitlock. Doc. 222, Expert Report (Sept. 30, 2022). In our expert report, we expressly stated: "The opinions expressed herein are based on the data and facts available to us at the time of writing and judged to have a reasonable degree of scientific certainty, unless otherwise specifically stated. Should additional relevant or pertinent information become available, we reserve the right to supplement the discussion and findings in this expert report in this action." Expert Report at 3. I am providing this declaration as a supplement to my expert reports in light of new developments that have occurred since I signed both our expert and rebuttal reports.

3. In my role as a rebuttal witness in this case, Dr. Whitlock and I were asked to respond jointly to the expert reports of Dr. Judith Curry and Dr. Anderson, dated October 27, 2022 and October 28, 2022, respectively. Doc. 240, Rebuttal Report (Nov. 30, 2022). In our rebuttal report, we again reserved the right to supplement our opinions should additional relevant or pertinent information become available. Rebuttal Report at 1.
4. I have published over 300 scientific articles and two books, and have been honored with several awards, including the E.O. Wilson Biodiversity Technology Pioneer Award, and the W.T. Pecora award for lifetime achievement in Earth remote sensing from NASA and U.S. Geological Survey. I currently co-chair the standing Committee for Earth Science and Application from Space of the National Academy of Science. I previously served on the federal Interagency Carbon Cycle Science Committee. I have also served as a Co-Chair of the National Center for Atmospheric Research Community Climate System Model Land Working Group, a Member of the International Geosphere-Biosphere Program Executive Committee, and the World Climate Research Program, Global Terrestrial Observing System. I just completed serving on the advisory NASA Earth Science Subcommittee, and the NOAA Science Advisory Board Climate Working Group.
5. I received my Ph.D. (1979) in Forest Ecology from Colorado State University. Since 1979, I have been with the University of Montana, where I retired in 2017, and now am a University Regents Professor Emeritus of Global Ecology in the College of Forestry and Conservation. I founded the Numerical Terradynamic Simulation Group (NTSG) at the University of Montana in 1983. My primary area of research is the development of global and regional ecosystem biogeochemical models integrating remote sensing with bioclimatology and terrestrial ecology. I am a Team Member for the NASA Earth Observing System (EOS), Moderate

Resolution Imaging Spectroradiometer, and I am responsible for the EOS global terrestrial net primary production and evapotranspiration datasets. Additional information about my background and qualifications is contained in my expert report dated September 30, 2022. Expert Report Attachments 1 and 3.

6. In my expert report, which I co-authored with Dr. Cathy Whitlock, we discussed “recent trends and future projections in temperature, precipitation, snow accumulation and snowmelt, and stream runoff in Montana and explain how they affect terrestrial ecosystems, communities, and the livelihoods of people that depend on these ecosystem services. These projections for Montana’s future are based on continuing or increasing the present rate of greenhouse gas emissions, a certainty that will occur unless we curtail our reliance on fossil fuels.” Expert Report at 1.
7. In preparing our joint expert report, we reviewed a number of different documents and materials, all of which are identified in the Expert Report at Attachment 5, including the Plaintiffs’ Complaint and Defendants’ Answer. Expert Report at 3-4. We were also provided information about Montana’s State Energy Policy Act, which Plaintiffs originally challenged in their Complaint as unconstitutionally promoting fossil fuels as an energy resource in Montana. Expert Report at 4, 39.
8. In our joint Rebuttal Report, we also “reviewed Montana GHG emission data (U.S. EIA 2022) that clearly show that Montana is responsible for a level of GHG emissions far above the national average on a per-person basis. These statewide emissions are exacerbating the current Earth energy imbalance, and thereby locking in additional global warming and the attendant climate impacts.” Rebuttal Report at 9.

THE REPEAL OF THE ENERGY POLICY ACT

9. I have now been informed that the State of Montana has repealed the Energy Policy Act in its entirety, which is new information since we finalized our joint expert report on September 30, 2022. I have also reviewed the Declaration of Plaintiffs' Expert Anne Hedges (dated Feb. 14, 2023), Doc. 300, which describes the legislative process leading to the repeal of the Energy Policy Act.

10. The repeal of the Energy Policy Act does not alter the fundamental conclusions stated in our joint expert and rebuttal reports that any conduct by Defendants "that calls for increasing development and utilization of fossil fuels in Montana . . . can be expected to increase degradation of Montana's environment and cause further harm to Plaintiffs . . ." Expert Report at 39; Rebuttal Report at 9 ("Every ton of fossil fuel that Montana extracts or consumes makes it harder to return to 350 ppm of CO₂ in the atmosphere. When you are already in a dangerous hole, you stop digging."). As explained in our joint expert report, "[t]emperatures in Montana will continue to increase because of ongoing carbon emissions and fossil fuel development and combustion." Expert Report at 39. As long as Defendants continue their activities that "aggressively pursue an *expansion* of fossil fuel utilization and production," examples of which are described in the Complaint at ¶¶ 118-20, and GHG emissions therefrom which are documented in the EIA data we have reviewed, and I have been presented with no factual information to suggest that Defendants have changed course, the harms described in our joint expert and rebuttal reports will continue to worsen. Expert Report at 40; Rebuttal Report at 10 ("As long as temperatures keep going up, the frequency and size of these [ecosystem] disturbances will continue to accelerate.).

11. Therefore, Defendants' repeal of the Energy Policy Act does not undermine or change the underlying opinions and conclusions in our joint expert report that "Montana's ongoing actions to promote the utilization and development of fossil fuels are inconsistent with the need to reduce emissions to stabilize the climate system (Hansen et al. 2013) and will serve to penalize children and future generations, including these 16 youth Plaintiffs, for as far into the future as we can imagine." Expert Report at 39-40. Nor does it undermine or change the underlying opinions and conclusions in our joint rebuttal report. Rebuttal Report at 10.

THE IPCC'S NEW SYNTHESIS REPORT

12. The conclusions in our joint expert and rebuttal reports have been bolstered, with added urgency, by a recent report issued on March 20, 2023 by the Intergovernmental Panel on Climate Change ("IPCC"), the *Summary for Policymakers* for the Synthesis Report of the IPCC Sixth Assessment Report.¹ This report confirms:

Observed increases in well-mixed GHG concentrations since around 1750 are unequivocally caused by GHG emissions from human activities over this period. Historical cumulative net CO₂ emissions from 1850 to 2019 were 2400±240 GtCO₂ of which more than half (58%) occurred between 1850 and 1989, and about 42% occurred between 1990 and 2019 (*high confidence*). In 2019, atmospheric CO₂ concentrations (410 parts per million) were higher than at any time in at least 2 million years (*high confidence*), and concentrations of methane (1866 parts per billion) and nitrous oxide (332 parts per billion) were higher than at any time in at least 800,000 years (*very high confidence*).

IPCC Summary for Policymakers at A.1.3.

13. The IPCC states: "Continued emissions will further affect all major climate system components. With every additional increment of global warming, changes in extremes continue to become larger. Continued global warming is projected to further intensify the

¹ Intergovernmental Panel on Climate Change, *Summary for Policymakers, in Synthesis Report of the IPCC Sixth Assessment Report (AR6)* (2023), available at <https://www.ipcc.ch/report/ar6/syr/>.

global water cycle, including its variability, global monsoon precipitation, and very wet and very dry weather and climate events and seasons (*high confidence*)." IPCC Summary for Policymakers at B.1.3. "Other projected changes include further reduced extents and/or volumes of almost all cryospheric [permafrost, seasonal snow cover, glaciers, the Greenland and Antarctic Ice Sheets, and Arctic Sea ice] elements (*high confidence*) . . ." IPCC Summary for Policymakers at B.1.3. "With further warming, every region is projected to increasingly experience concurrent and multiple changes in climatic impact-drivers. Compound heatwaves and droughts are projected to become more frequent, including concurrent events across multiple locations (*high confidence*)." IPCC Summary for Policymakers at B.1.4. "In the near term, every region in the world is projected to face further increases in climate hazards (*medium to high confidence*, depending on region and hazard), increasing multiple risks to ecosystems and humans (*very high confidence*). Hazards and associated risks expected in the near-term include an increase in heat-related mortality and morbidity (*high confidence*), food-borne, water-borne, and vector-borne diseases (*high confidence*), and mental health challenges (*very high confidence*), flooding in coastal and other low-lying cities and regions (*high confidence*), biodiversity loss in land, freshwater and ocean ecosystems (*medium to very high confidence*, depending on ecosystem), and a decrease in food production in some regions (*high confidence*)." IPCC Summary for Policymakers at B.2.1. "Cryosphere-related changes in floods, landslides, and water availability have the potential to lead to severe consequences for people, infrastructure and the economy in most mountain regions (*high confidence*). The projected increase in frequency and intensity of heavy precipitation (*high confidence*) will increase rain-generated local flooding (*medium confidence*)." IPCC Summary for Policymakers at B.2.1.

14. The IPCC Synthesis Report confirms that “[c]limate change is a threat to human well-being and planetary health (*very high confidence*). There is a rapidly closing window of opportunity to secure a liveable and sustainable future for all (*very high confidence*) The choices and actions implemented in this decade will have impacts now and for thousands of years (*high confidence*).” IPCC Summary for Policymakers at C.1.
15. With respect to our conclusions that every ton of GHG emissions makes the climate crisis worse and that there is a need to urgently and drastically reduce GHG emissions, the IPCC agreed and said: “Continued emissions will further affect all major climate system components, and many changes will be irreversible on centennial to millennial time scales and become larger with increasing global warming. Without urgent, effective, and equitable mitigation and adaptation actions, climate change increasingly threatens ecosystems, biodiversity, and the livelihoods, health and wellbeing of current and future generations. (*high confidence*).” IPCC Summary for Policymakers at C.1.3.
16. The new IPCC report recognizes that “[e]vidence of observed adverse impacts and related losses and damages, projected risks, levels and trends in vulnerability and adaptation limits, demonstrate that worldwide climate resilient development action is more urgent than previously assessed in AR5.” IPCC Summary for Policymakers at C.1.1.
17. The IPCC’s Synthesis Report confirms what Dr. Whitlock and I originally expressed in our joint expert report, “[w]ith little time remaining to avoid locking in irreversible climate impacts, we believe judicial intervention is essential to protect these children and the environment and natural resources they depend on for their well-being and very survival.” Expert Report at 40.

Pursuant to MCA §1-6-105, I declare under penalty of perjury that the foregoing is true and correct.

Executed this 10th day of April, 2023 in Missoula, Montana.



Steven W. Running