I. Introduction

This brief addresses a single legal issue raised by six closely related contentions sponsored by the State of Nevada1 regarding the analysis in the U.S. Department of Energy’s (DOE or Department) Total System Performance Assessment (TSPA) of climate change during the first 10,000 years after disposal at the Yucca Mountain repository. The legal issue, as approved by CAB 4 in its October 23, 2009, “Order (Identifying Phase 1 Legal Issues for Briefing), is as follows:

Whether 10 C.F.R. § 63.305 requires DOE to project future levels of anthropogenic greenhouse gas emissions such as CO₂ and

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1 In their May 11, 2009 “Memorandum and Order (Identifying Participants and Admitted Contentions),” Construction Authorization Boards (CAB) 01, 02 and 03 admitted for hearing Nevada Safety Contentions 009, 010, 011, 012, 013 and 019, all relating to the treatment of human-induced, or “anthropogenic,” climate change in the TSPA during the first 10,000 years after disposal. See U.S. Dep’t of Energy (High Level Waste Repository), LBP-09-06, 69 NRC ___ (slip op. at 126). The CABs also identified these as “legal” contentions to be briefed. See id.
evaluate the impact of these gases on future climate at Yucca Mountain in the 10,000-year performance assessment, or whether it is sufficient under that regulation for DOE to analyze the effects of anthropogenic greenhouse gas emissions on future climate based upon the historical geologic record.2

As discussed below, the regulatory history of 10 C.F.R. § 63.305 makes clear that NRC intended that prediction of future changes in climate over the next 10,000 year period be based on the geologic record.

II. Argument

The full text of the regulatory provision at issue here, 10 C.F.R. § 63.305, is as follows:

Required characteristics of the reference biosphere

(a) Features, events, and processes that describe the reference biosphere must be consistent with present knowledge of the conditions in the region surrounding the Yucca Mountain site.

(b) DOE should not project changes in society, the biosphere (other than climate), human biology, or increases or decreases of human knowledge or technology. In all analyses done to demonstrate compliance with this part, DOE must assume that all of those factors remain constant as they are at the time of submission of the license application.

(c) DOE must vary factors related to the geology, hydrology, and climate based upon cautious, but reasonable assumptions of the changes in these factors that could affect the Yucca Mountain disposal system during the period of geologic stability, consistent with the requirements for performance assessments specified at

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§ 63.342.\textsuperscript{3}

(d) Biosphere pathways must be consistent with arid or semi-arid conditions.

Nothing in the plain language of the regulation is inconsistent with DOE’s position. Moreover, the relevant statutory and regulatory background conclusively establishes that this provision should be read to authorize usage of the geological record to determine the potential for climate change in the first 10,000 year period. More specifically, in the Energy Policy Act of 1992 (EPAct 1992), Congress instructed EPA to contract with the National Academy of Sciences (NAS) to provide “findings and recommendations on reasonable standards for protection of the public health and safety” for the Yucca Mountain Site, and “[to] promulgate, by rule, public health and safety standards” for the site “based upon and consistent with the [NAS] findings and recommendations.”\textsuperscript{4} Congress then instructed the NRC to modify its regulations “as necessary, to be consistent with” the EPA’s standards.\textsuperscript{5}

In 1995, NAS produced the report that Congress requested. That report refers to the geologic record as the basis for quantifying future climate parameters and for bounding uncertainty in those parameters.\textsuperscript{6} Based upon the NAS Report, the EPA, in turn, promulgated 40 C.F.R. § 197.15. In promulgating this regulation, the EPA required DOE to project changes in climate specifically based on the geological record because it found that “[t]he evidence

\begin{footnotesize}
\begin{enumerate}
\item 10 C.F.R. § 63.342(c)(2) specifies how climate change should be assessed during the period from 10,000 years after disposal through the period of geologic stability. That regulation provides for the use of a constant-in-time deep percolation rate to represent the effects of climate change between 10,000 and 1,000,000 years after closure, and includes no requirement to separately assess the effects of anthropogenic greenhouse gas emissions. The contentions addressed in this brief do not allege non-compliance with 10 C.F.R. § 63.342.
\item Id. § 801(b)(1).
\end{enumerate}
\end{footnotesize}
preserved in the relatively recent geologic record provides a means to reasonably bound the range of possible conditions.”

As Congress mandated, the NRC’s current regulations are “consistent” with that EPA standard and should be interpreted to authorize use of the same geological-record standard. In fact, the NRC promulgated 10 C.F.R. § 63.305 using language essentially identical to that found in EPA’s regulation at 40 C.F.R. § 197.15. Moreover, the NRC’s explanations of this regulation are likewise consistent with those of the EPA and specifically refer to use of the geological record. In the Statements of Consideration for § 63.305, the NRC stated as follows what it meant by “cautious but reasonable assumptions” for purposes of this regulation in this specific context:

The natural systems of the biosphere are allowed to vary (e.g., climate change) because the geologic record provides evidence of past climate over a long time frame, which provides a strong basis for predicting future changes.

Thus, the NRC expected and intended that the geologic record would be used to project future climate change over the next 10,000 years. The NRC reaffirmed its approach in further rulemaking action just this year. In March 2009, in the Final Rule on the Implementation of a Dose Standard After 10,000 Years, the NRC relied once again on the analysis in the NAS Report. In response to a comment asking whether future climate can be “bounded by the observed range of conditions over the past glacial-interglacial cycles,” the NRC explained that

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8 Compare 10 C.F.R. § 63.305 with 40 C.F.R. § 197.15.
10 10 C.F.R. § 63.305(c).
“[a]ll climate predictions are based on and calibrated to evidence of past climates contained in the geologic record.”\footnote{Implementation of a Dose Standard After 10,000 Years, 74 Fed. Reg. 10,811, 10,818 (Mar. 13, 2009) (emphasis added).}

Even aside from this extensive evidence as to the intent of Congress, the EPA, and the NRC on this point, reliance on the geological record is consistent with § 63.305. To be sure, there is solid evidence of human-induced global warming.\footnote{See, e.g., U.S. Global Change Research Program, \textit{Global Climate Change Impacts in the U.S.}, (Cambridge Univ. Press 2009), \textit{available at www.globalchange.gov/usimpacts}.} However, the United States and other countries have started to take steps to mitigate such human-induced global warming. Especially given the fact that society has begun to address this issue and the dire consequences for civilization of not dealing with this matter, it would be utterly speculative to project the effect of human activity out over a 10,000-year period. In this context, and again bearing in mind the 10,000-year timeframe, the “cautious” and “reasonable” way of proceeding – and thus the way that is sufficient to satisfy § 63.305 – is to rely upon the geologic record for assumptions on climate change as intended by Congress, the NRC, and the EPA.
III. **Conclusion**

The Board should conclude that it is sufficient to satisfy the requirements of § 63.305 for DOE to rely upon the use of the robust geologic record to vary climate in the performance assessment.

Respectfully submitted,

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