THE UNIVERSITY of NORTH CAROLINA at CHAPEL HILL

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November 16, 2025

Kirsty Kelshaw, Legal Director
CWP Energy Limited
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To Whom It May Concern:

As per our agreement, I have reviewed documents provided to me, namely: Report by Dr Fabian Limberger dated September 2025., Final Technical Report by HMSC Inc dated May 2025., Correspondence from HMSC Inc dated 13 August 2025. I hereby submit my professional assessment and conclusions.

I am currently Full Professor at the University of North Carolina, Chapel Hill, where I have been teaching for 25 years. Prior to this appointment I was Professor at Yale University from 1990-2000.
I have been a leader in my field of observational and computational seismology and I have trained numerous students through the years who continue to publish and contribute significant results. Prior to these academic appointments I worked as a post-doctoral candidate at UC Santa Barbara and as an NSF fellow in Japan. Before completing my PhD at University of Washington, I worked 5 years as an Exploration Geophysicist at Shell Oil Co., Houston TX.

I have no previous knowledge of issues presented in the above-mentioned documents. I know Mike Hasting from collaboration in the 1990s on the Coso Geothermal fields in southern California. Otherwise, I do not know any of the other participants in these reports. I have no ties with CTBTO, or any wind energy companies. I am completely independent and have no stake in any of the discussion presented to me.

I will focus most of my comments on the HMSC document by Hasting and Suárez.

I found the arguments presented by HMSC very convincing. It is a well-known fact and my own personal experience at Parkfield and COSO, CA, that borehole seismic stations are superior to surface installments in terms of noise floor and detection threshold. Borehole sensors can record seismic disturbances significantly lower magnitude than surface stations. Surface noise causes critical degradation of seismic signal when recorded near the surface. This signal-noise ratio of properly installed borehole stations is significantly lower than other installations at the top few meters of earth.

Comparisons presented in the documentation by HMSC were definitive in showing, both in the time and frequency domains, that fidelity is improved by borehole installations. The argument that the borehole recording is somehow 'distorted' (figure 3) seemed spurious to me. If anything, I would argue that the surface station is distorted. The following figure of the Turkey event (Figure 4) is strong evidence in the fidelity of the waveforms at depth.

The signal-2-noise ratio discussion, where the authors argue in favor of borehole installations, seems to me very strong. Both Fourier spectra and spectrogram analysis figures consistently indicate superior observational improvement of borehole instrumentation. Estimates of the actual improvement, in terms of dB reduction is persuasive beyond a doubt, in my opinion. Illustrations in figure 6 of the RodWood letter is convincing evidence in the superior noise reduction of the borehole instrumentation, especially in the presence

of adverse wind conditions. Fourier spectra in figures 7 and 8 show convincingly that across a wide band of frequencies the borehole installations exceed the fidelity of the observations.

There is considerable effort in the reports to distinguish wind noise from forest growth versus ambient anthropogenic noise. The arguments and illustrations appear to me to be complete and convincing. We have long known that surface instruments are sensitive to noise, including acoustic and infrasound signals. My group has published numerous peer reviewed articles on this topic. We know that noise coupling at the surface interface reduces fidelity and introduces spurious noise in seismic observations. Borehole instrumentation reduces some of the negative effects to a considerable extent. The authors of this report successfully argue this case with seismic records and standard analysis. It would have been interesting to see an infrasound sensor as part of the experiments to augment the analysis – one of my own specialties – but that is perhaps a topic of some future research.

In summary, I have no quibble with the scientific analysis and results provided to me on this project. I did not repeat any of the calculations described in the report, but I found the illustrations, tables and subsequent discussion thorough and reliable. The professionalism of the investigators and authors is clear: the report, after some editing might be submittable to a seismic journal to add to the body of literature on this topic.

I have complete confidence the materials I received are scientifically reliable and trustworthy.

November 12, 2025

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Syracuse, New York
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EDUCATION

- B.Sc., Physics, University of Illinois, Urbana, Illinois, 1979
- B.Sc., Mathematics, University of Illinois, Urbana, Illinois, 1979
- Ph.D., Geophysics, University of Washington, Seattle, Washington, 1989

PROFESSIONAL EXPERIENCE

- Chair, Dept. of Geological Sciences, University of North Carolina, Chapel Hill, CB#3315 Mitchell Hall, Chapel Hill, NC 27599-3315. 7/2013-7/2018
- Full Professor, Dept. of Geological Sciences, University of North Carolina, Chapel Hill, CB#3315 Mitchell Hall, Chapel Hill, NC 27599-3315. 7/2006-present
- Associate Professor, Dept. of Geological Sciences, University of North Carolina, Chapel Hill, CB#3315 Mitchell Hall, Chapel Hill, NC 27599-3315. 7/00-7/06
- Associate Professor, Yale University, Dept. of Geology and Geophysics, Kline Geology Laboratory, P.O. BOX 208109, New Haven, CT 06520-8109. 7/97-7/00
- Assistant Professor, Yale University, Dept. of Geology and Geophysics, Kline Geology Laboratory, P.O. BOX 208109, New Haven, CT 06520-8109. 7/90-6/97
- Research Fellow, National Research Center for Disaster Prevention, Tsukuba-City, Japan. 3/90-9/90
- Assistant Research Seismologist I, Institute for Crustal Studies, University of California, Santa Barbara, CA 93106. 5/89-6/90
- Post-Doctoral Research Associate, University of Washington, Seattle, WA 98195. 12/88-4/89
- Graduate Research Assistant, Geophysics Program, University of Washington, Seattle, WA 98195. 9/84-12/88
- Exploration Geophysicist, Shell Oil Company, Woodcreek, P.O. 527, Houston, TX 77001. 7/79-8/84

PROFESSIONAL ACTIVITY

- Editor-in-Chief, Seismological Research Letters 2010-2013

MEMBERSHIP IN PROFESSIONAL SOCIETIES

- American Geophysical Union
- Seismological Society of America
- Society of Exploration Geophysicists
- IRIS: University Representative

HONORS AND AWARDS

- Japan-Science and Technology Agency Fellowship, 1989

- David A. Johnston Memorial Scholarship (Geophysics), 1987
- President, University of Washington Geophysical Society, 1985
- Phi Beta Kappa, 1979
- Edmund J. James Scholar, University of Illinois, 1976-1977
- Dean's list, University of Illinois, 1975-1976

Committee Participation

- IRIS Representative, University of North Carolina
- IRIS Representative, Yale University, 1995-2000
- AGU Press Liaison, 1997-1998
- IRIS, Data Management System Standing Committee

SOFTWARE DEVELOPED:

- Geotouch: Three-dimensional GIS for Geology and Geophysics Geotouch
- Multi-Taper Spectral Methods MTM
- Lees, J. M. (2007), ProfessR: Grades Setting and Exam Maker, Description Programs to determine student grades and create examinations from Question banks. Programs will create numerous multiple choice exams, randomly shuffled, for different versions of same question list ProfessR
- Lees, J. M. (2007), RFOC: Graphics for Spherical Distributions and Earthquake Focal Mechanisms, Graphics for statistics on a sphere, as applied to geological fault data, crystalogaphy, earthquake focal mechanisms, radiation patterns, ternary plots and geographical/geological maps RFOC
- Lees, J. M. (2007), RPMG:Graphical User Interface (GUI) for interactive R analysis sessions, Poor Man's Gui: create interactive R analysis sessions zoeppritz
- Lees, J. M. (2008), RSEIS: Multiple interactive codes to analyze seismic data, via, spectrum analysis, wavelet transforms, particle motion, hodograms RTOMO

CLASSES TAUGHT:

Introduction to Seismology Inverse Theory, Advanced Seismology, Signal Analysis, Active Tectonics, Volcanoes, Data Analysis in the Earth Sciences, Global Plate Tectonics

Publications

Publications