

Exhibit C

BEFORE THE ENVIRONMENTAL QUALITY COUNCIL
STATE OF WYOMING

In re Brook Mining Co., LLC coal mine)	
permit – PT0841)	
)	EQC Docket No. 20-4802
)	
)	

AFFIDAVIT OF GENNARO G. MARINO

I, Gennaro G. Marino, being of lawful age, state as follows:

1. I received my Ph.D. in Civil Engineering in 1985, from the University of Illinois. My thesis topic was related to mine subsidence and structural response to subsidence over room and pillar mines. I presently have a P.E. license in 28 states including Wyoming.
2. Over the course of my career, I have authored over 100 articles and publications on subsidence engineering topics. In 2015, I received Distinguished Alumnus Award from the Civil and Environmental Engineering Alumni Association of the University of Illinois. In 2013, The Academy of Geo-Professionals (AGP) of ASCE recognized me as a Diplomate Geotechnical Engineer (D.GE) for my superior expertise and experience, strong ethics, commitment to life-long learning and continued professional development in the field of Geotechnical Engineering. In 2011, I was selected as the Central Illinois, ASCE Civil Engineer of the Year. Marino Engineering Associates, Inc. (MEA) was chosen as 1st runner-up for the Central Illinois, ASCE Civil Engineering Project of the Year for 2010.
3. Working in the area of mine subsidence for over 40 years in various ore fields in the U.S., I have researched and consulted on all aspects of subsidence engineering with government agencies, engineering and architectural firms, surface owners, as well as pipeline, insurance



and mining companies. My work includes planning, mining and abandonment stages of room and pillar to high extraction workings, as well as related cause and origin investigations.

4. MEA was hired by the Powder River Basin Resource Council (PRBRC) to provide an independent review and analysis of the geotechnical aspects of application for mining by Ramaco of the Brook Mine located just north of Sheridan Wyoming. This application process involved a number of rounds of questions and answers between Ramaco and Wyoming Department of Environmental Quality (DEQ). During this process, I have provided testimony on the Brook Mine application and DEQ's evaluation and requirements of these applications. In addition to providing verbal testimony on May 4, 2017 and May 13, 2020, I have written the following reports based on the mine permit documents.

- a. Report entitled: *Brook Mine Permit Application* dated January 23, 2017
- b. Report entitled: *Review of Brook Mine Application – Rounds 8 to 12* dated April 15, 2020
- c. Email entitled: *Review of EAI Memo Dated June 9, 2020* dated July 30, 2020

These documents are attached. Below is a summary of my comments.

5. Following the Environmental Quality Council hearing in which I participated in 2017, Ramaco had the obligation to revise its mine plan and conduct additional testing and analysis to evaluate subsidence. Yet, the company only drilled and sampled one additional hole for only one seam (the non-split Carney seam). This *single* geotechnical boring insufficiently covers the design for only about 68 acres (in the TR-1 area) of the total 1,960 acres planned for highwall mining (HWM) Moreover, there was no address of multi-seam mining which is likely to occur in the future.
6. The one geotechnical boring which was done in the TR-1 area, which is the proposed first area to be highwall mined, indicated the roof and floor contains anomalous rock conditions

compared to all the other boring drilled in the application area. Therefore, applying these rock conditions and associated test data to the mine design for even TR-1, seems inappropriate.

7. The AAI mine design analyses and associated subsidence potential analyses do not meet the necessary standard for review or provide sufficient assurances that significant subsidence will not occur from the highwall mining proposed throughout the permit area.
8. In essence, there has been no substantive change in the permit application in the Rounds 8 to 12 submittals following the Environmental Quality Council hearing and order. Consequently, the main opinions provided in the January 23, 2017 report remain unchanged.
9. Other key findings MEA made are detailed in the report, and particularly the summary and conclusions on pages 15-17 of the April 15, 2020 report. Since no additional testing and analysis was required prior to permit issuance following the submission of my report and testimony at the informal conference, many of my concerns remain unchanged.
10. In the Conditions for the Brook Mine permit, DEQ has required that Ramaco perform additional geotechnical borings and testing for mine design. This is a definite improvement from previous DEQ reviews. However, the promise of future testing does not forgive the lack of testing prior to permit issuance.
11. Additionally, there are several concerns which can make these imposed Conditions by DEQ essentially meaningless. These concerns are provided below.
 - a. To my knowledge, there is no one qualified at DEQ to review the geotechnical aspects of the mine design. Incredulously, the initial approval of the Brook Mine application was done without any real oversight of the geotechnical materials in the permit. In effect, DEQ was a “pass through” of this submitted

information. This is problematic as this regulatory agency does not comply with the intent of their own Administrative Code.

- b. After the rejection by Wyoming Environmental Quality Council (EQC) of the Brook Mine application, that the DEQ deemed technically complete, and their own acknowledgement of a lack of expertise, DEQ hired an independent consultant (Engineering Analytics, Inc.) to evaluate the mine design in the permit application. As a consequence, there has been an improvement in the related Conditions imposed on Ramaco related to mine design. This is, however, a temporary solution as it does not resolve DEQ's expertise challenges in future monitoring submitted geotechnical data or design analytics of such data. Moreover, even after the numerous rounds of review, the methodology which will be applied to assess the long-term stability of the proposed HWM is unknown.
- c. The same geotechnical engineering expertise deficiency in DEQ in geotechnical mine design also exists assessing surface subsidence potential and the stability of earth slopes from the mining operations despite the steep slopes proposed. These areas still remain essentially unchecked. For example, using the methodology proposed by Ramaco's Consultant, a massive amount of surface subsidence is predicted. This, however, was missed or ignored by DEQ in the review of the approved application. Moreover, there was no stability analyses submitted or even any DEQ comments, on how the final mined slopes will remain stable post-mining.

- d. The outlined promised subsidence mitigation by Ramaco is too ambiguous and can allow some subsidence events to remain untreated.
- e. This lack of future agency and public geotechnical oversight should be remedied. Without input from this expertise, as soon as necessary, a serious precedent of unacceptable related mine regulatory protocols would be established and could continue for the life of the mine.
- f. Therefore, it is recommended that DEQ hire a qualified independent geotechnical consultant to review and regulate all geotechnical aspects of the HWM design of the Brook Mine, (not just related to mine design but for surface subsidence control and mitigation) as well as surface mining.
- g. This is particularly troublesome as the permit does not allow public comment and oversight of other independent geotechnical consultants as the mine is developed which goes against their own geotechnical consultant's advice of approving the application, with provision, for only a small portion of the HWM area (68 acres).

12. A better approach is to require the testing and analysis prior to issuing a permit for each highwall mining area. This will allow the public to review the information and provide comments to the DEQ to assist the agency in its review. This is too important of a subject to allow the permit to be issued with such significant gaps in data and analyses.

I declare under penalty of perjury that the foregoing is true and correct to the best of my knowledge, information and belief and that this declaration was executed in St. Louis County, Missouri on 10/23, 2020.


Gennaro G. Marino

STATE OF MISSOURI)
)
COUNTY OF SAINT LOUIS)

Subscribed and sworn to before me by Gennaro G. Marino this 23 day of October, 2020.


Notary Public

KARA MAYER
Notary Public - Notary Seal
State of Missouri
Commissioned for St. Louis City
My Commission Expires: May 31, 2024
Commission Number: 20037811

My Commission Expires: 05/31/2024