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Sierra Club's Attorneys

**BEFORE THE ENVIRONMENTAL QUALITY COUNCIL  
STATE OF WYOMING**

IN THE MATTER OF: ) Docket No. 09-2801  
MEDICINE BOW FUEL & POWER, )  
LLC AIR PERMIT CT-5873 )

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**AFFIDAVIT OF RANAJIT SAHU IN SUPPORT OF  
SIERRA CLUB'S  
MOTION FOR SUMMARY JUDGMENT**

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1. I, Ranajit Sahu, am over 21 years of age and am competent to make this affidavit.
2. The facts and matters stated herein are within my personal knowledge, and are true and correct.
3. I have a Bachelor of Technology degree, with Honours from the Indian Institute of Technology (IIT), a Masters of Science (Mechanical Engineering) degree and a Doctorate in Philosophy (Ph.D), the latter two from the California Institute of Technology (Caltech.).
4. I have over eighteen years of experience in the fields of environmental, mechanical, and chemical engineering including program and project management services as well as design and specification of pollution control equipment.
5. There are reliable, field-tested methods available right now to measure PM2.5 at the Medicine Bow facility. EPA has issued Other Test Method 27 (OTM-27) for filterable PM2.5, which is based on Method 201A, a well-established test method. EPA has also developed a "dilution sampling method" known as Other Test Method 28 (OTM-28), which is capable of measuring both filterable and condensable particulate matter.
6. Technical tools for PM2.5 analysis were available throughout the period of relevance for the Medicine Bow permit.
7. The effectiveness of controls varies with respect to particulate size, and therefore control technologies and/or work practices for PM10 often do not provide for the same level of effective control of PM2.5.

8. Lack of final rules for PM2.5 increments, significant impact levels (SILs) or significant monitoring concentration (SMC) does not affect DEQ's ability to determine whether PM10 is a reasonable surrogate at the Medicine Bow facility. It also does not affect DEQ's ability determine BACT for PM2.5 or demonstrate compliance with PM2.5 NAAQS at the Medicine Bow facility.

9. PM2.5 Monitoring Stations have been in operation for many years.

10. Adequate modeling techniques for PM2.5 have been developed.

11. The technical analysis in Katrina Winborn's Report is incorrect and unsupported.

12. Ms. Winborn has argued, based only on AP-42, that there is a perfect correlation between PM10 and PM2.5 for combustion turbines, under all situations, but there is no technical basis for this assumption.

13. Ms. Winborn cites to a General Electric report in support of her position that PM10 is an appropriate surrogate for PM2.5 from combustion turbines. However, the General Electric report asserts this relationship without any data. The report correctly notes that "Filterable PM from combustion turbines may derive from airborne PM that passes through the gas turbine inlet, particulate matter (inert solids) in the fuel gas supply, airborne construction debris, metallic rust or oxidation products, or mineral and organic impurities in the water used for water injection." There is no support for the assumption that filterable particulate matter in these categories is only limited to sizes of 2.5 microns or smaller.

14. PM10 to PM2.5 emissions from fugitive particulate emission sources will vary significantly depending on numerous factors such as wind velocity, surface friction factor, degree and manner of wear and friability of the materials, and others.

15. Ms. Winborn provides no support for the argument that work practices such as watering and the use of wetting agents will be or should be the same to effectively control PM10 and PM2.5. A given work practice will provide different degrees of control for different sized particles. While these practices, in general, may be the same, the degree to which they are applied (such as amounts, frequency, etc.) will vary depending on whether one is effectively controlling the larger (and harder to entrain) PM10 or the smaller (and therefore easier to entrain) PM2.5.

16. Even if PM2.5 precursors such as NOx and SO2 have BACT emission limits in and of themselves, their emissions could still violate PM2.5 NAAQS.

17. There is no reason why DEQ cannot model PM2.5 from Medicine Bow and compare the results with the proposed PM2.5 Significant Impact Levels in order to assess if cumulative modeling for PM2.5 is required or not.

18. There is no reason why DEQ cannot model PM2.5 from Medicine Bow and compare the results with the proposed PM2.5 Significant Monitoring Concentrations in order to assess if pre-construction monitoring for PM2.5 is required or not.

19. PM2.5 emissions were not modeled and the modeling of PM10 (the assumed surrogate) was not compared to the PM2.5 NAAQS, WAAQS, or the proposed PM2.5 PSD increments.

20. Cold starts are routine, predictable events associated with the normal operation of a coal plant.

21. Malfunctions will occur at the Medicine Bow facility, as with any operating facility.

22. Emissions from cold starts and malfunctions must be included in calculating the potential to emit for any pollutant for a facility.

23. Medicine Bow's SSEM plan does not meet BACT requirements for several reasons. It is non-specific and generally unenforceable. As just one example, the plan states "[S]pecific startup and shutdown operating procedures for all process units shall incorporate the elements of this Plan to the greatest extent possible," which is not an enforceable standard. The SSEM plan is also not BACT because a proper Top-Down BACT analysis was not performed and numerical emissions limits were not found to be infeasible.

24. In order to conduct an engineering evaluation or analysis of the fugitive potential to emit emissions of VOCs or organic HAPs (which are a subset of VOCs in the present instance) from the Medicine Bow facility, there need to be various underlying or supporting documents. These include engineering plans and drawings of sufficient detail to verify asserted component counts, the type and description of the components themselves, a justification for the selection of particular emission factors for particular

components, and supporting documentation about the efficiency with which emissions would be controlled through the LDAR program, which, in turn requires substantial detail of all elements of the LDAR program. This type of documentation was not available in the permit record. As a result, the DEQ could not have conducted an independent engineering analysis or evaluation of Medicine Bow's assumptions, calculations, and conclusions. Nor could I attempt an independent evaluation of Medicine Bow's assertions relating to its fugitive VOC and HAP PTE,

25. The proper choice of emission factors is critical in the determination of projected actual or potential to emit mass emissions from any source. As such, it is one of the more critical assumptions when the issue is the correct determination of the potential to emit for a facility, especially when such a calculation then determines whether a facility will be major or minor and whether regulatory programs such as MACT will be triggered or not. In the present instance, for the calculation of fugitive VOC and HAP emissions from various components such as pumps and valves, etc., Medicine Bow did not support its choice of the SOCMI *average* emission factors for calculating potential to emit as opposed to other SOCMI emission factors that are more appropriate for the estimation of PTE at this particular facility. While the average emission factors may be useful in projecting the facility's actual emissions (for example, for estimating the annual fee payments based on actual emissions), they are inappropriate for estimating its potential to emit VOCs or HAPs.

26. The average SOCFI emission factors that were used for estimating fugitive VOC and HAP emissions from Medicine Bow are not the most accurate emission factors for the components that Medicine Bow will use in its facility. Accurate emission factors and emissions data can be obtained from various vendors of components and/or from measurements and test data that are representative of the components in question, where such components are in use at other facilities. This was not done.

27. Whether or not Medicine Bow is a major source of HAP emissions depends on its potential to emit and not its actual emissions or a future projection of its actual emissions.

28. All components including pumps and valves can leak. The leak rate can depend on numerous factors including but not limited to the component design, its duty and use, the frequency of inspection of the component, the competence and training of the inspectors, the degree of maintenance of the component, management directives and incentives, and others.

29. Just because the leak thresholds are set at any level, such as 500 ppm for valves and 2000 ppm for pumps does not mean that these components cannot leak at far greater rates, including physical dripping of liquids from the components. Thus, assuming that the leak thresholds in the LDAR program are set at 500 ppm and 2000 ppm for the valves and pumps, does not make the fugitive PTE estimate conservative. Additionally, Medicine Bow assumes that the LDAR program will result in a 100%

successful repair rate.<sup>1</sup> This is optimistic and unlikely to occur in practice. Thus, assuming a 100% successful repair rate does not make the calculation conservative. Finally, leak thresholds for other components such as flanges, are not specified. Collectively, these factors make the calculations not conservative.

30. Medicine Bow's estimate of the fugitive VOC or HAP potential to emit (including that for methanol, the HAP that is expected to be emitted in the greatest quantity) are more likely than not underestimates of the potential to emit for the respective pollutants. Certainly, given the closeness of Medicine Bow's methanol PTE emissions to its major source threshold (10 tons/year), Medicine Bow's estimate is not a robust basis to conclude that the methanol PTE will be smaller than 10 tons/year. Reasons for the underestimate of the methanol PTE include but are not limited to: lack of inclusion of emissions from actual leaking components that will go undetected for long periods of time, given the low frequency of inspection contemplated in the LDAR program; lack of basis for the methanol composition assumed in the calculation; lack of basis for the component counts that will emit methanol; and lack of basis for assumed effectiveness of the proposed LDAR program.

31. Medicine Bow does not provide any support for its assumptions relating to durations of startup (cold, warm or otherwise), shutdowns, and malfunctions in its emission calculations. No engineering rationale is

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<sup>1</sup> Medicine Bow, Application Appendix B DEQ 78-233

provided. Thus, all estimates of the VOC or HAP potential to emit from startups, shutdowns, and malfunctions are unsupported and questionable.

32. Medicine Bow assumes that the HP and LP flares will control VOC (and associated HAP) emissions with an efficiency of 98%.<sup>2</sup> There is no support for this assumption. VOCs and associated HAPs are destroyed in high temperature devices. However, the degree of such destruction depends crucially on: the properties of the VOC/HAP in question; the temperature of the device; the residence time of the VOC/HAP in the high temperature region of the device. Flares are not designed to provide any residence time. As such, any destruction of VOC/HAP that can occur in a flare is incidental and not predictable or controllable. Medicine Bow does not provide any engineering design information for its flares that can support its 98% destruction efficiency assumption.

33. The LDAR program proposed for Medicine Bow is not BACT. It was not a result of a proper (or any) top-down BACT analysis. In a proper top-down BACT analysis, various aspects of the LDAR program should have been considered including: various levels of leak thresholds for each of the component types, including the consideration of leak-less technologies, as necessary and appropriate; various inspection frequencies, from daily or more frequent to less frequent intervals; various time periods allowed for fixing leaking components after their discovery, etc. None of this was done. Instead

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<sup>2</sup> Medicine Bow Application Appendix B, DEQ 78-203

the LDAR program chosen was simply based on the corresponding NSPS with a minor adjustment for monitoring frequency. This is not BACT.

34. Medicine Bow and DEQ's rejection of more stringent leak thresholds is improper. Various other jurisdictions such as the MARAMA, the Bay Area AQMD and the South Coast AQMD have adopted rules that require much lower leak thresholds, down to 100 ppm. There is no basis for DEQ and Medicine Bow's contention that lower leak thresholds, combined with an otherwise robust LDAR program, will not result in much lower fugitive VOC emissions than that currently envisioned.

35. Leakless technologies for components such as pumps are not new and are widely available from various vendors. Consideration of leakless technologies as part of LDAR is not improper and does not mean that every component has to be leak less. Of course, to the extent that greater numbers of components are leak less, that implies that overall emissions will be lower.

I swear, under penalty of perjury, that the foregoing is true and correct. Executed on this, the 30<sup>th</sup> day of November, 2009.

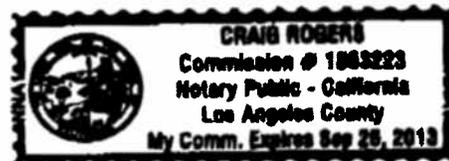
  
Ranajit Sahu  
Sierra Club

Subscribed and sworn before me by Ranajit Sahu on this 30<sup>th</sup> day of November, 2009.

Witness my hand and official seal.

  
Notary Public

My commission expires: Sept 26, 2013.



# CALIFORNIA JURAT WITH AFFIANT STATEMENT

- See Attached Document (Notary to cross out lines 1-6 below)
- See Statement Below (Lines 1-5 to be completed only by document signer[s], not Notary)

AFFIDAVIT OF RAJAJIT SARDU (12 PGS)

Rajajit Sardu  
Signature of Document Signer No. 1

\_\_\_\_\_  
Signature of Document Signer No. 2 (if any)

State of California  
County of Los Angeles

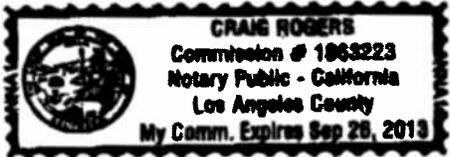
Subscribed and sworn to (or affirmed) before me on this  
30<sup>th</sup> day of November, 2009 by  
Date Month Year  
(1) Rajajit Sardu  
Name of Signer

proved to me on the basis of satisfactory evidence to be the person who appeared before me (.)

(and)  
(2) \_\_\_\_\_  
Name of Signer

proved to me on the basis of satisfactory evidence to be the person who appeared before me.)

Signature [Signature]  
Signature of Notary Public



Place Notary Seal Above

### OPTIONAL

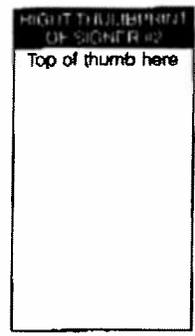
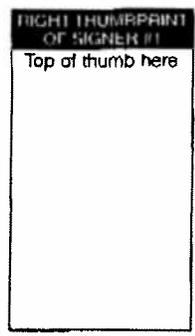
Though the information below is not required by law, it may prove valuable to persons relying on the document and could prevent fraudulent removal and reattachment of this form to another document.

#### Further Description of Any Attached Document

Title or Type of Document: \_\_\_\_\_

Document Date: \_\_\_\_\_ Number of Pages: \_\_\_\_\_

Signer(s) Other Than Named Above: \_\_\_\_\_



## CERTIFICATE OF SERVICE

I hereby certify that I have caused to be served a true and correct copy of the forgoing *Affidavit of Ranajit Sahu in Support of Motion for Summary Judgment* and associated documents via electronic mail on this the 30<sup>th</sup> day of November, 2009 to the following:

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