IN THE OFFICE OF THE STATE ENGINEER
OF THE STATE OF NEVADA

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IN THE MATTER OF APPLICATIONS 53987 THROUGH 53992, INCLUSIVE, AND 54003 THROUGH 54021, INCLUSIVE, FILED TO APPROPRIATE THE UNDERGROUND WATERS OF CAVE VALLEY, DRY LAKE VALLEY, DELAMAR VALLEY AND SPRING VALLEY (HYDROGRAPHIC BASINS 180, 181, 182, AND 184), LINCOLN COUNTY AND WHITE PINE COUNTY, NEVADA.

DECLARATION OF ASHOK K. SINGH

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I, ASHOK K. SINGH, do hereby declare under penalty of perjury that the following is true and correct:

1. I am over the age of 18, and not a party within this administrative hearing. I am submitting this declaration for the purpose of documenting my anticipated testimony that might be considered to be expert opinions, within the applicable statutes, rules and regulations, and which may be expressed during hearing testimony. This declaration and the related and referenced documents also provide a summary of the basis for those opinions and a summary of the data and information I considered in forming my opinions.

2. I am a Professor of Statistics at the University of Nevada, Las Vegas. A copy of my curriculum vitae ("CV") is a Southern Nevada Water Authority ("SNWA") exhibit for these proceedings.

3. I received my doctorate in statistics from Purdue University in 1977.

4. I have previously performed statistical data analysis for SNWA. This involved fitting different probability models to data provided by SNWA.

5. I have previously testified and given depositions in various litigations, providing statistical data analysis. These are listed in my CV.

6. SNWA is using a simple and practical statistical method to identify triggers in Spring Valley, Dry Lake Valley, Delamar Valley, Cave Valley, and adjacent basins within the analysis area as part of its Clark, Lincoln, and White Pine Counties Groundwater Development Project ("GDP") monitoring, management and mitigation ("3M") program.

7. SNWA required a statistical method to quantify changes in baseline data in order to establish trigger limits at various sites using a statistical methodology which can be applied throughout the life of the GDP 3M program.

8. A robust baseline data set is required to reduce errors and identify trends.

9. With my assistance, SNWA performed a multiple linear regression using ordinary least-squares to construct a model to fit time-series data for various sites within the 3M program.

10. SNWA modeled seasonal trends using the seasonally adjusted linear regression ("SALR") method.

11. SNWA set a prediction interval for a control limit at 99.7%, which is a commonly used interval based on 3-times the standard deviation.

12. The SALR method accounts for seasonal variability and when combined with a prediction interval for a control limit at 99.7%, is a reasonable choice to establish triggers.

13. A prediction interval calculated using the SALR method based upon data which demonstrates no seasonality and has no linear trend is equivalent to the 3-times standard deviation about the mean of the same data.

14. In collaboration with SNWA, I have developed a method protocol for identifying a trigger using prediction intervals to estimate whether a statistically significant departure from a hydrologic baseline time series data set has been observed and have demonstrated the effectiveness of using the method protocol.

15. This method is used by SNWA for setting triggers at monitoring well sites or springs within the 3M program.

16. I reviewed regional hydrologic and baseline data to apply the method protocol, and have demonstrated the effectiveness of using the prediction interval.

17. I reviewed Appendix A of SNWA's report titled "Technical Analysis Report Supporting the Spring Valley and Delamar, Dry Lake, and Cave Valleys, Nevada, 3M Plans." Based on that review, I determined that SNWA applied the statistical procedures correctly while adhering to standard methods and that SNWA's final processed data coincides with industry standards.

18. I reviewed sections of SNWA's report titled "Technical Analysis Report Supporting the Spring Valley and Delamar, Dry Lake, and Cave Valleys, Nevada, 3M Plans" regarding statistical methods for setting triggers for shrubland resources. SNWA set a prediction interval for a control limit at 95%, which is a commonly used interval based on 2-times the standard deviation. This is a reasonable choice to establish triggers for the shrubland resources within the 3M program.

19. I am prepared to testify and respond to any questions or examination within the scope of the work as described herein.

FURTHER YOUR DECLARANT SAYETH NAUGHT

Dated this 22nd day of June, 2017 in Las Vegas, Nevada.

ASHOK K. SINGH