

UNITED STATES OF AMERICA  
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the matter of	)	
	)	
POWERTECH (USA) INC.	)	Docket No. 40-9075-MLA
	)	ASLBP No. 10-898-02-MLA-BD01
(Dewey-Burdock In Situ Uranium	)	
Recovery Facility)	)	November 5, 2014

SUPPLEMENTAL DECLARATION OF DR. HANNAN LAGARRY

I, Dr. Hannan LaGarry, hereby declare as follows:

1. I am an expert in the above-captioned proceeding; my testimony, CV and area of expertise are already in the record. To summarize, I am a stratiagrapher, geologic mapper, and a full-time professor at Oglala Lakota College in Kyle, South Dakota. In preparing this declaration, I relied on the expertise gained through my training and experience in reviewing and interpreting borehole logs and other geologic data to create and review narratives, representations, and maps of subsurface geology and hydrogeology.
2. My testimony herein is based on my review of the testimony and exhibits submitted by both NRC Staff and Powertech to the Nuclear Regulatory Commission Atomic Safety and Licensing Board. My testimony is also based on my ongoing, but not-yet-complete, review of Powertech's disclosure of bore logs, maps, and other data. My testimony is also based on my review and opinions offered before and during the hearing in Rapid City, South Dakota. My recent review confirms the opinions and testimony I have presented, each of which are incorporated by reference into this testimony.
3. **Opinion 1:** It is my expert opinion that NRC-directed "spot check" of 34 borehole logs from somewhere between 1750 and 6000 available borehole logs does not provide a scientifically recognized analysis that can support any hydrogeological conclusion about the project area.
  - a. **Basis for Opinion 1:** In my professional experience, there are numerous methodologies for analyzing the raw data contained in borehole logs. There are also numerous methodologies for presenting the results of the analysis of the raw data. Modern methods typically result in GIS/three-dimensional visualization and modeling of systems or similar computer modelling based on the raw data in borehole logs. A copy of the website is attached to confirm the widespread and accepted use of these methodologies within the profession.

A “spot check” of borehole logs is not proper where analysis has not been carried out and recorded by GIS/three-dimensional visualization and modeling or similar technique. The NRC Staff testimony indicates that Powertech has not conducted the necessary mapping of available data. In such a circumstance, NRC Staff’s conclusions are not reliable where NRC Staff accepts assertions of scientific fact made by Powertech that are not supported by accepted methodologies used to review data in borehole logs.

The NRC Staff testimony makes no mention of the information contained in the drillers’ notes. Drillers’ notes are an important source of interpretive information, often revealing information not disclosed by sliding logs. For example, drillers’ notes can reveal the location of caves, artesian water, and the intermittent absence of confining layers. Although my review is not complete, the drillers’ notes I have reviewed do contain this type of information.

4. **Opinion 2:** The NRC “spot check” of 37 random data points does not provide a statistically reliable testimony or basis for any conclusions regarding confinement or hydrology.

a. **Basis for Opinion 2:** I teach various math and statistics courses at Oglala Lakota College. Multivariate statistics is one of the formal research tools required for my PhD in Geology from the University of Nebraska-Lincoln. I am charged with review of research students at OLC who frequently apply statistical methods in their capstone research sequence required for their BS in Natural Science. NRC Staff’s “random” analysis lacks the basic safeguards applicable to those who would rely on statistical methods.

The minimum number of data points for a statistically valid and meaningful sample is generally 10%. In the Powertech instance the minimum acceptable sample size would be a randomly selected sample of at least 175 borehole logs. Based on the recent disclosure of over 4,000 previously withheld borehole logs, the appropriate sample would be 10% of the entire set, or about 575+ borehole logs checked.

NRC Staff presents no basis for its so-called “random” selection. Without such information, professionals in my field cannot accept such assertions where it is possible that the limited data set resulted in poor methodology that is the hallmark of modern junk science. Having examined only 37 data points out of thousands available, NRC would have failed my Math 123 Introduction to Statistics class. None of my student researchers would be allowed to publish or present their research findings had they made such a fundamental error.

In my experience and training, NRC Staff’s methodology is fundamentally flawed and the testimony based on the NRC Staff’s review cannot be relied upon for any legitimate scientific purpose.

5. I am prepared to testify in person and answer the Board's questions about my expert opinion that NRC Staff's testimony lacks scientific method and credibility regarding hydrogeology of the project area where the testimony is based on a "spot check" of 37 raw, "random" data points out of thousands. I am prepared to testify and answer questions about my expert opinion that NRC Staff's attempt to review and confirm 37 raw data points is meaningless where NRC Staff and Powertech have not deployed the analytical, visualization, and modeling techniques used to interpret and communicate the information contained in the 28 boxes and 4 file cabinets of raw data.
6. Once I conduct my ongoing review, I will be prepared to answer questions the Board may have regarding my future opinions and testimony.

*I declare under penalty of perjury that the foregoing is true and correct of my own knowledge. Executed in accord with 10 CFR 2.304(d).*

Executed in Chadron, Nebraska on November 5, 2014

A handwritten signature in black ink, appearing to read "Hannan LaGarry". The signature is written in a cursive style with a large, looping initial 'H'.

---

Hannan E. LaGarry, Ph.D.

**Paper No. 201-6**

**Presentation Time:** 9:40 AM-9:55 AM

## ***DATA SUFFICIENCY, EIS DEVELOPMENT, AND REGULATORY DECISION MAKING: THE ROLE OF GIS***

**[FARRELL, David A.](#)**<sup>1</sup>, SIMS, Darrell<sup>1</sup>, MACKIN, Patrick<sup>1</sup>, FEDORS, Randall<sup>1</sup>, NECSOIU, Marius<sup>1</sup>, GLENN, Chad<sup>2</sup>, SNYDER, Amy<sup>3</sup>, and ILLMAN, Carla<sup>4</sup>, (1) Center for Nuclear Waste Regulatory Analyses, Southwest Rsch Institute, 6220 Culebra Rd, San Antonio, TX 78238, dfarrell@swri.edu, (2) U.S. Nuclear Regulatory Commission, 11555 Rockville Pike, Rockville, MD 20852, (3) U.S. Nuclear Regulatory Commission, 11555 Rockville Pike, Rockville, TX 20852, (4) 2004 Rochester Ct, Iowa City, IA 52245

Data collection, processing, and interpretation are important aspects in the development of environmental impact statements (EISs), and in regulatory decision-making. From a cost-benefit perspective, there exists an optimal amount of data that is required for these tasks. While little data can lead to inappropriate actions and poor decisions, excessive data collection can lead to increased project cost with minimal benefit. Geographic information systems (GISs) provide a tool for categorizing and organizing spatio-temporal data at sites. Visualization of this data within a well organized GIS provides an important approach to assessing data sufficiency through visual examinations of the spatial and temporal distributions of the data at the scales of the processes active at the site; the hazards present at the site; and vulnerable regions, ecologies, and communities that may be affected by the site. Through spatio-temporal data processing, visualization, and comparison within a GIS framework, important data gaps and uncertainties may be identified. This work presents a GIS/three-dimensional visualization and modeling system that is consistent with U.S. Nuclear Regulatory Commission (NRC) and the Council for Environmental Equality regulations for preparing EISs that are consistent with the guidance outlined in the National Environmental Policy Act. The GIS/three-dimensional visualization and modeling system incorporates a wide range of spatio-temporal data; supports data visualization, processing and integration; is applicable to regulatory decision-making; and is portable. This system has been used in NRC evaluations of data sufficiency and accuracy.

[2002 Denver Annual Meeting \(October 27-30, 2002\)](#)

Session No. 201--Booth# 0

[Characterizing Geochemical Processes: When Is There Sufficient Information?](#)

Colorado Convention Center: A201

8:00 AM-12:00 PM, Wednesday, October 30, 2002

---

© Copyright 2002 The Geological Society of America (GSA), all rights reserved. Permission is hereby granted to the author(s) of this abstract to reproduce and distribute it freely, for noncommercial purposes. Permission is hereby granted to any individual scientist to download a single copy of this electronic file and reproduce up to 20 paper copies for noncommercial purposes advancing science and education, including classroom use, providing all reproductions include the complete content shown here, including the author information. All other forms of reproduction and/or transmittal are prohibited without written permission from GSA Copyright Permissions.

---