Supplemental Safety Evaluation Report
for the Strata Energy, Inc. Ross ISR Project,
Crook County, Wyoming,
Materials License No. SUA-1601

Docket No. 040-09091
Strata Energy, Inc.

U.S. Nuclear Regulatory Commission

Office of Federal and State Materials and Environmental Management Programs

April 2014

Background

In its application for the Ross in Situ Recovery (ISR) Project (Strata, 2011a;b;2012), Strata Energy, Inc. (Strata) performed a linear regression analysis between the short- and long-term meteorological (wind direction and speed) data. According to Strata (Strata, 2011a;b;2012), that analysis established a statistically significant correlation between the short- and long-term data in an effort to demonstrate that the short-term data are representative of long-term trends pursuant to Section 2.5.3 Acceptance Criterion (3) of NUREG-1569 (NRC, 2003) and guidance in Regulatory Guide 3.63 (NRC, 1988). In its Safety Evaluation Report (SER), the U.S. Nuclear Regulatory Commission (NRC) staff had determined that the linear regression analysis performed by Strata substantiated that the short-term meteorological data used for assessing radiological impacts from Strata's operations are representative of long-term conditions at or near the project (NRC, 2013;2014). However, upon further review and as discussed below in the "Staff Review and Analysis" section, the NRC staff has determined that it had misapplied interpretations of the linear regression analysis in the original SER and is issuing this supplemental Safety Evaluation Report (sSER) to correct that finding.

Regulatory Requirements

10 CFR Part 40, Appendix A, Criterion 7 requires that "[a]t least one full year prior to any major site construction, a preoperational monitoring program must be conducted to provide complete baseline data on a milling site and its environs."

Regulatory Acceptance Criteria

The NRC staff reviewed the application for compliance with applicable requirements of 10 CFR Part 40, Appendix A, Criterion 7, using acceptance criteria in Section 2.5.3 of NUREG-1569 (the standard review plan (SRP) or (NRC, 2003)) and guidance in RG 3.63 (NRC, 1988).

License applications must include a meteorology program – which is part of the site monitoring programs required by 10 CFR Part 40, Appendix A, Criterion 7 – that is sufficiently complete to allow for estimating doses to workers and members of the public, evaluating environmental impacts from operations, and detecting potential long-term effects. A licensee needs to demonstrate, and NRC Staff verifies, that the meteorological data is representative of long-term trends in accordance with guidance in RG 3.63 (NRC, 1988) for staff to have assurance that the environmental monitoring program includes sampling stations that are properly located.

Staff Review and Analysis

According to RG 3.63, "Onsite Meteorological Measurement Program for Uranium Recovery Facilities—Data Acquisition and Reporting," (NRC, 1988), an onsite meteorological measurement program employs instrument systems physically located on or near the site that are capable of measuring meteorological information representative of the site vicinity. Guidance in RG 3.63 recommends that an applicant collect meteorological measurements at locations that can provide data representative of the atmospheric conditions into which material will be released and transported. An applicant can then use this information to estimate the maximum potential annual radiation dose to the public and environmental impacts resulting from routine release of radioactive materials in gaseous and particulate effluents.

In the license application, as amended, Strata provided an analysis of short and long-term data collected at the Gillette Airport (AP) National Weather Service (NWS) meteorological station (station) and Dry Fork Mine (DFM) station (Strata, 2012). According to Strata, the DFM station is located 25 miles from the proposed Ross ISR Project to the west-southwest and is a meteorological station that conforms to the Environmental Protection Agency's (EPA's) On-Site Meteorological Program Guidance for Regulatory Modeling Applications. Strata obtained Gillette AP NWS station data from mid-1998 through December 2011 from the National Climatic Data Center (NCDC, 2012; Strata, 2012). Strata constructed a 13-year period of record for hourly average wind speeds and wind directions (Strata, 2012), which is presented in SER Figures 2.2-2 and 2.2-3 respectively (NRC, 2014). SER Figure 2.2-2 shows the wind rose for the 13-year period at the Gillette AP and SER Figure 2.2-3 shows the Gillette AP NWS station data during the baseline-monitoring year of 2010 (NRC, 2014). Strata stated that wind speeds and directions collected during the 13-year and 1-year monitoring periods at the Gillette AP were similar, and segregated wind speed and wind direction variables to correlate short-term and long-term frequency distributions. Strata stated that this correlation enables an assessment of how closely the distributions of wind speed class and wind direction frequencies from one year of monitoring at a specific location represent the long-term distributions at that same location (Strata, 2012).

SER Figures 2.2-4 and 2.2-5 compare the wind speed and the wind direction frequency distributions of the 13-year and 1-yr baseline periods at the Gillette AP, respectively (NRC, 2014). Strata stated that the amount of time the wind speed falls within each of the seven wind speed classes and the amount of time the wind blows from each of the 16 cardinal directions is quite similar for the two monitoring periods. Strata conducted linear regression analysis to assess the degree of correlation between 13-year and 1-yr baseline periods at the Gillette AP, which SER Figures 2.2-6 and 2.2-7 illustrate, respectively (NRC, 2014). The regression lines in SER Figures 2.2-6 and 2.2-7 represent the least squares fit to data points (NRC, 2014). Strata concluded that the corresponding coefficient of determination, or R^2, value of 97.8 percent, implies very strong linear correlation because it is close to 100 percent (Strata, 2012). The NRC staff notes that the corresponding R^2 value for the wind direction has a somewhat less least square fit with a correlation value of 91.0 percent.

Strata attributed the lower wind direction correlation to poor data resolution (Strata, 2012). Strata stated that NWS records hourly average wind directions, or azimuth angles, to the nearest 10 degrees, but that each wind direction category spans only 22.5 degrees; therefore, the coarse resolution limits correlation analysis between short- and long-term wind directions. Strata repeated the correlation analysis for the wind speed and wind direction comparing a 17-year period of record to the baseline period of 2010 at the DFM station. SER Figures 2.2-8 and 2.2-9 show R^2 values of 98.7 percent and 96.5 percent for the wind speed and wind direction correlation, respectively (NRC, 2014). Strata concluded that in 2010 DFM experienced wind conditions representative of long term conditions at that site (Strata, 2012).

SER Figures 2.2-10 and 2.2-11 compare Strata's 2011 on site wind speed and wind direction data to the 2010 on site data and calculated R^2 values of 97.5 percent and 96.7 percent, respectively (NRC, 2014). Strata concluded that the data presented at the DFM station demonstrates that the 2010 baseline sampling period is representative of long-term conditions at the DFM station and therefore, the one-year baseline monitoring represents long-term meteorological conditions at the Ross ISR Project site (Strata, 2012).

The NRC staff finds the linear regression analysis performed by Strata demonstrated that a linear relationship existed between the data sets. However, while NRC Staff found the linear regression analysis acceptable in the SER (NRC, 2013;2014), the NRC staff has determined subsequently that neither linear regression nor correlation analyses are appropriate statistical tests for representativeness of data sets. While linear regression and correlation analyses describe relationships between variables, a statistical test for representativeness requires an analysis of data populations (e.g., short- and long-term wind data at a given site).

Acceptable statistical methods to be used to substantiate representativeness are not addressed in RG 3.63 (NRC, 1988). The NRC staff finds the following statistical approaches acceptable: 1) testing summary statistics, such as the mean from the short- and long-term data (see, for example, Chapter 5 of Brooks and Carruthers, 1953), and 2) testing the statistics for similarity or

validity of the data by using a statistical method such as the Student's T test, Chi square test for distribution, Kolmogorov-Smirnov test for distribution, etc., as appropriate (see, for example, Chapter 12 of NRC, 2011). Strata has not provided such tests; therefore, the NRC staff is requiring Strata to substantiate that the short-term meteorological data used for assessing impacts are representative of long-term conditions at or near the project by including a license condition to Strata's operating license.

Evaluation Findings

The NRC staff reviewed the monitoring of meteorological conditions at the Ross ISR Project in accordance with guidance in SRP Section 2.5.3 (NRC, 2003) and RG 3.63 (NRC, 1988). Strata used data from various NWS meteorological stations and one adjacent to the Ross ISR Project to represent conditions at the proposed licensed area.

Based on the NRC staff reviews documented in the SER and supplemented by the review discussed in this sSER, the NRC staff finds that Strata properly collected meteorological data but did not substantiate the data collected at the Ross ISR Project and used for assessing radiological impacts as being representative of expected long-term conditions at and near the site. Therefore, the NRC staff is including the following preoperational license condition in the license:

> At least 90 days prior to the preoperational inspection, the licensee shall submit its analysis of the meteorological data collected to demonstrate long-term meteorological conditions at the Ross ISR Project. The licensee shall continue to collect meteorological data on a continuous basis at a data recovery rate of at least 90 percent and may not commence operations until the data collected are verified in writing by NRC headquarters staff to be representative of long-term meteorological conditions at the Ross ISR Project. The data collected on-site shall include, at a minimum, wind speed, wind direction, an annual wind rose and a summary of the stability classification.
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> To support the verification by NRC headquarters staff, the licensee must submit to the NRC a written justification of the similarity or validity of the data. This justification must include an analysis of the statistical data presented to illustrate confidence in the representativeness of the data.

References

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