Uranerz Energy Corporation
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October 23, 2015

Attn: Document Control Desk
Director, Office of Nuclear Material Safety and Safeguards
U.S. Nuclear Regulatory Commission
Washington, DC 20555

Attn: Deputy Director
Division of Decommissioning, Uranium Recovery and Waste Programs
U.S. Nuclear Regulatory Commission
11545 Rockville Pike, Mail Stop T-8F5
Rockville, MD 20852-2738

Re: Semi-Annual Report Uranerz Energy Corporation Nichols Ranch ISR Project SUA-1597

Dear Director and Deputy Director,

This report replaces the Semi-Annual report submitted under cover letter dated July 30, 2015. Per discussion with NRC staff on August 26, 2015, changes to the original report and a replacement of the report were requested. The revisions to the report are as follow:

- Revised Table of Contents
- Effluent monitoring is included as required per 10 CFR 40.65 Section 3.6 Effluent Monitoring Program.
- Appendices D and E were included to support the discussion in Section 3.6.
- Section 3.7 Meteorological Data is included as per required in License Condition 10.15
- Appendix F has been included to support Section 3.7

If you have any questions regarding the provided information, please contact me at 307-265-8900 or by email at mthomas@energyfuels.com.

Sincerely,

Michael P. Thomas
Director ISR Regulatory Affairs
Uranerz Energy Corporation (an Energy Fuels Company)

MT/th

Attachments
January-June 2015 Semi-Annual Report (Replacement)

cc: Ron Linton, NRC Project Manager
Mark Rogaczewski, WDEQ-LQD District III Supervisor
Linda Gersey, NRC (email)

NMSS01

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Nichols Ranch ISR Project
License Number SUA-1597
Docket No.40-9067

Semi-Annual Report

January - June 2015

ENERGY FUELS

List of Appendices

ENERGY FUELS

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ENERGY FUELS

1.0 INTRODUCTION

Uranerz received Source Material License SUA-1597 on July 19, 2011. In accordance with 10 CFR 40.65 and Source Material License SUA-1597 Uranerz Energy Corporation submits the 2015 Semi-Annual Effluent and Monitoring Report summarizing the operational and environmental activities monitored for the Nichols Ranch and Hank Units. Semi-Annual reporting is performed according to SUA-1597 License Condition 11.1 and includes information for the period of January 1, 2015 through June 30, 2015.

2.0 OPERATIONAL MONITORING

2.1 Activities Summary

Uranerz continued production of the Nichols Ranch Unit Production Area #1 (PA#1) during the report period as summarized in Quarterly Reports submitted to the NRC on April 29, 2015 for first quarter and July 28, 2015 for the second quarter. Production continued in PA #1 in Header Houses 1 through 4 and Header House 6 was brought online. Please refer to the Quarterly Reports for additional information (e.g. production and bleed rates) as it is not reproduced in the Semi-annual report.

The NRC performed a routine inspection during the week of March 16, 2015 at the Nichols Ranch Unit. No operational activities occurred at the Hank Unit during the report period. During the preparation of this report, the Environmental Assessment (EA) was approved by the Bureau of Land Management (BLM) for the 280 acres that the BLM manages.

2.2 Excursion Well Status

License Condition 11.1(B) requires a status update of any long term excursion. As reported in the Quarterly Reports mentioned above, no wells were on excursion status during the report period.

2.3 Disposal Well Volumes

License Condition 10.11 requires the volume disposed in each disposal well to be reported annually. Uranerz presently has two permitted deep disposal wells permitted through the Wyoming Department of Environmental Quality, Water Quality Division (WDEQ-WQD), (Permit 10-392). The purpose of the two deep disposal wells is to dispose the wellfield bleed to maintain a hydrologic inward gradient during production. Quarterly and annual reports pertaining to the use of the deep disposal wells are submitted to the WDEQ-WQD. As of the 2nd Quarter 2015 report submitted to WQD, 379,032 barrels (bbls), year to date, have been disposed using the deep wells.

2.4 Flow Rates and Manifold Pressures

Per License Condition 11.1(C), Uranerz is required to record flow rates and manifold pressures daily. A summary of these items was submitted in the above named Quarterly Reports. Otherwise, these records are compiled and available to inspectors on site upon their request.

2.5 Summary of Mechanical Integrity Testing (MIT) Data

The number of wells installed and mechanical integrity test (MIT) status, License Condition 11.1(B), is reported in Quarterly Reports to the NRC. Please refer to Quarterly Reports submitted April 29, 2015 and July 28, 2015.

2.6 Restoration

No areas are in restoration for the reporting period.

3.0 ENVIRONMENTAL MONITORING

3.1 Ground Water Monitoring

In accordance with License Condition 11.5, monitor wells in the production area (perimeter, overlying and underlying wells) are sampled for excursion parameters. Results of the monitor well samples are provided in Quarterly Reports submitted to the NRC.

License Condition 11.7 requires sampling of domestic and livestock wells to be sampled within 1 km of the production area on an annual basis. Collected samples are analyzed at an offsite laboratory for natural uranium, radium-226, and those constituents, chloride, conductivity, and alkalinity, as listed in Section 5.7.8.9 of the license application. The ground water analysis will be included in the Annual and Semi-Annual Effluent Report submitted in January 2016.

The surficial aquifer well, URNZG-15, located in Production Area #1 was sampled during the report period. In accordance with License Condition 11.3(C) the surficial well will be analyzed for parameters listed in Table D6-6a of the license application. Sampling was attempted; however, no water was available to sample during the report period. The sampling dates for the surficial well are as follows.

Date	Water Level Results
1/21/2015	dry
3/6/2015	dry
4/1/2015	dry
5/1/2015	dry
6/9/2015	dry

3.2 Surface Water Monitoring

In accordance with License Condition 11.1(D), Regulatory Guide 4.14 and Section 5.7.7.3.1 of the license application, surface water will be collected and analyzed for total uranium, Th-230, Ra-226, and Pb-210. There are two surface water self-samplers located at the Nichols Ranch Unit. The surface water analysis will be included in the Annual and Semi-Annual Effluent Report submitted in January 2016. As per discussion with NRC staff, the Hank Unit is not operational at this time, therefore, surface water monitoring will not occur until production begins in that area. Baseline sampling for the Hank Unit was completed and approved with the issuance of the NRC license.

3.3 Summary of Unplanned Releases

In accordance with License Condition 11.1(D), reportable unplanned releases are to be reported in the semi-annual report. There were no reportable unplanned releases of production solution during the reporting period.

3.4 Sediment and Soil Sampling

In accordance with License Condition 11.1(D), Regulatory Guide 4.14 and Section 5.7.7.5 of the license application, sediment samples will be collected annually and analyzed for uranium, Ra-226, Pb-210 and Th-230.

Soil samples are also collected annually in the vicinity of where radon is monitored. The sediment and soil analyses will be included in the Annual and Semi-Annual Effluent Report submitted in January 2016.

3.5 Air Particulate, Radon, and Gamma Radiation Monitoring

In accordance with License Condition 11.1, Uranerz maintains an environmental air monitoring program at six locations around the licensed Nichols Ranch facility. These stations are used to monitor air particulates, radon, and passive gamma measurements. Uranerz also maintains radon monitors at four locations surrounding the active wellfield and eight surrounding the CPP. These are compared to background for use in calculating annual dose to the public.

The six air station locations are as follow:

- NA-1 monitors the nearest full time resident at Dry Fork Ranch
- NA-2 is at the southern license boundary and monitors the down wind conditions of the north west winds for the CPP.
- NA-3 is at the northern license boundary and monitors the downwind conditions of south west winds for the wellfield and the CPP
- NA-4 is at the easterly license boundary and is the background station being upwind from the wellfield and the CPP.

- NA-5 is located west of the CPP and monitors the down wind conditions of the easterly winds that occur at night.
- NA-6 is located north east of the CPP and monitors the man camp that is the maximally exposed member of the public.

Air particulate samples are collected weekly and then composited quarterly for analysis by an outside laboratory. Review of the data shows that the concentration of the parameters are less than the 10 CFR 20 Appendix B, Effluent Concentration Limits. Appendix A shows the air particulate data collected from the six air station locations for first quarter 2015.

As mentioned above, radon gas is also monitored continuously at the six air particulate stations for public dose assessment. There are also eight additional radon detectors surrounding the CPP and four surrounding the active wellfield which are used for public dose assessments and for personnel dose assessments. Passive outdoor radon detectors are exchanged quarterly for six locations and semi-annually for the additional locations and the CPP, as required, and sent to Landauer for analysis. The radon monitoring data shown in Appendix B is given as raw data without subtracting the background location. These values are then compared to radon daughter effluent releases found in 10 CFR 20 Appendix B values to assess dose to the public.

Passive gamma radiation is monitored continuously at the six air particulate stations and at other monitoring stations located throughout the licensed area. The other locations are additional data points that are intended to be used for determining dose to the public. The monitoring is performed using Optically Stimulated Luminescence (OSL) dosimeters that are exchanged and analyzed by Landauer quarterly. The passive gamma radiation monitoring data is shown in Appendix C. Data is given as raw data without subtracting the control badge.

3.6 Effluent Monitoring Program

The effluent monitoring program is designed to meet the requirements of 10 CFR 40.65 and is reported in accordance with License Condition 11.1. Sampling occurs inside the central processing plant, Deep Disposal Wells (DDW), and the header houses to measure long-lived particulate effluents. These measurements are measured once a month in accordance with NRC Regulatory Guide 8.30. The results are summarized in Appendix D.

Sampling also occurs inside the central processing plant, DDW, and the header houses to measure radon effluents, using the modified Kusnetz method. These measurements are taken once a month in accordance with NRC Regulatory Guide 8.30. Radon monitoring also includes quarterly samples of at least 10% of operational recovery wells using the modified Kusnetz method as well as measurements of radon emitted from point source tank ventilation located in the CPP using Method 115 from 40 CFR 61 Appendix B. The results are summarized in Appendix E.

The total effluents emitted during the first half of the year of 2015 are a sum of each sources effluents and are calculated for long-lived particulate and radon effluents, as shown below. These

amounts will be compared to operational projections in the license application and will be analyzed and summarized in the annual ALARA report. Average concentrations are taken from Appendix D and Appendix E and the background (BKD) concentration for U-Nat is taken from averaging the concentration of U-Nat for NA-4 for the period monitored (which is 1.4E-22 Ci/ml). The average concentration of radon is taken from averaging the concentration of radon for NR-5 for the period monitored (which is 6.00E-16 Ci/ml).

$$Total\ Effluent\ of\ U-Nat\ (period\ monitored) = (CPP\ \ Ci) + (Header\ House\ Ci) + (DDW\ Ci)$$

$$CPP\ (Ci) = \left[Avg.Conc\left(\frac{Ci}{ml}\right) - BKD\ Conc.\left(\frac{Ci}{ml}\right)\right] * 13{,}500(cfm) * 28{,}316\left(\frac{ml}{ft^3}\right) * 262{,}800(minutes\ of\ operations\ in\ period\ monitored)$$

$$Header\ House\ (Ci) = \left[Avg.Conc\left(\frac{Ci}{ml}\right) - BKD\ Conc.\left(\frac{Ci}{ml}\right)\right] * 1{,}275(cfm) * 28{,}316\left(\frac{ml}{ft^3}\right) * 262{,}800(minutes\ of\ operations\ in\ period\ monitored)$$

$$DDW\ (Ci) = \left[Avg.Conc\left(\frac{Ci}{ml}\right) - BKD\ Conc.\left(\frac{Ci}{ml}\right)\right] * 1{,}275(cfm) * 28{,}316\left(\frac{ml}{ft^3}\right) * 262{,}800(minutes\ of\ operations\ in\ period\ monitored)$$

$$CPP\ (Ci) = (1.31E^{-18} - 1.4E^{-22}) * 13{,}500 * 28{,}316 * 262{,}800 = 1.32E^{-4}\ Ci$$

$$Header\ House\ (uCi) = (1.51E^{-18} - 1.4E^{-22}) * 1{,}275 * 28{,}316 * 262{,}800 = 1.43E^{-5}\ Ci$$

$$DDW\ (uCi) = (1.37E^{-18} - 1.4E^{-22}) * 1{,}275 * 28{,}316 * 262{,}800 = 1.30E^{-5} Ci$$

$$\boldsymbol{Total\ Effluents\ of\ U-Nat\ (period\ monitored) = 1.32E^{-4} + 1.43E^{-5} + 1.30E^{-5} = 1.59E^{-4}\ Ci\ of\ U-Nat}$$

$$Total\ Effluents\ of\ Radon\ and\ its\ Progeny\ (period\ monitored) = (CPP\ \ (Ci)) + (CPP\ Tanks\ (Ci)) + (Header\ House\ (Ci)) + (DDW\ (Ci)) + (Recovery\ Wells\ (Ci) + (Spills\ (Ci))$$

$$CPP\ (Ci) = \left[\left(Avg.Conc\ (WL) * 9.1E^{-14}\left(\frac{Ci/ml}{WL}\right)\right) - BKD\ Conc.\left(\frac{Ci}{ml}\right)\right] * 13{,}500\ (cfm) * 28{,}316\ \left(\frac{ml}{ft^3}\right) * 262{,}800(minutes\ of\ operations\ in\ period\ monitored)$$

$$CPP\ Tanks(Ci) = \left[\left(Avg.Conc\ (WL) * 9.1E^{-14}\left(\frac{Ci/ml}{WL}\right)\right) - BKD\ Conc.\left(\frac{Ci}{ml}\right)\right] * 293\ (cfm) * 28{,}316\left(\frac{ml}{ft^3}\right) * 262{,}800(minutes\ of\ operations\ in\ period\ monitored)$$

$$Header\ House\ (Ci) = \left[\left(Avg.Conc\ (WL) * 9.1E^{-14}\left(\frac{Ci/ml}{WL}\right)\right) - BKD\ Conc.\left(\frac{Ci}{ml}\right)\right] * 1{,}275\ (cfm) * 28{,}316\left(\frac{ml}{ft^3}\right) * 262{,}800(minutes\ of\ operations\ in\ period\ monitored)$$

$$DDW\ (Ci) = \left[\left(Avg.Conc\ (WL) * 9.1E^{-14}\left(\frac{Ci/ml}{WL}\right)\right) - BKD\ Conc.\left(\frac{Ci}{ml}\right)\right] * 1{,}275\ (cfm) * 28{,}316\left(\frac{ml}{ft^3}\right) * 262{,}800(minutes\ of\ operations\ in\ period\ monitored)$$

$$Recovery\ Wells\ (Ci) = \left[\left(\frac{Avg.Conc\ (WL)}{Well} * 9.1E^{-14}\left(\frac{Ci/ml}{WL}\right)\right) - BKD\ Conc.\left(\frac{Ci}{ml}\right)\right] * 110(average\ number\ of\ operational\ recovery\ wells) * 3{,}000\ (emmision\ rate\ in\ \frac{ml}{min}.) * 262{,}800(minutes\ of\ operations\ in\ period\ monitored)$$

$$Spills\ (Ci) = There\ were\ no\ spills\ that\ contributed\ detectable\ amounts\ of\ radon\ to\ the\ environment\ during\ the\ reporting\ period$$

$$CPP\ (Ci) = [(0.00738 * 9.1E^{-14}) - 6.00E^{-16}] * 13{,}500 * 28{,}316 * 262{,}800 = 7.20E^{-3}Ci$$

$$CPP\ Tanks\ (Ci) = [(390 * 9.1E^{-14}) - 6.00E^{-16}] * 293 * 28{,}316 * 262{,}800 = 7.73\ E^{+1}\ Ci$$

$$Header\ House\ (Ci) = [(0.0081 * 9.1E^{-14}) - 6.00E^{-16}] * 1{,}275 * 28{,}316 * 262{,}800 = 1.28E^{-3}\ Ci$$

$$DDW\ (Ci) = [(0.0072 * 9.1E^{-14}) - 6.00E^{-16}] * 1{,}275 * 28{,}316 * 262{,}800 = 4.95E^{-4}\ Ci$$

$$Recovery\ Wells\ (Ci) = [(0.0085 * 9.1E^{-14}) - 6.00E^{-16}] * 110 * 3{,}000 * 262{,}800 = 1.50E^{-5}\ Ci$$

$$\boldsymbol{Total\ Effluents\ of\ Radon\ and\ its\ Progeny\ (period\ monitored)}$$
$$\boldsymbol{= 7.20E^{-3}Ci + 7.73E^{+1}\ Ci + 1.28E^{-3}\ Ci + 4.95E^{-4}\ Ci + 1.50E^{-5}}$$
$$\boldsymbol{= 77.35\ Ci\ of\ Radon\ and\ its\ Progeny\ (assuming\ a\ 1\ to\ 1\ ratio\ with\ radon\ and\ its\ progeny)}$$

3.7 Meteorological Data

In accordance with License Condition 10.15 meteorological data will be collected in order to verify the data to be representative of long term conditions at Nichols Ranch ISR Project. The data collected includes temperature, wind speed and direction. The data was recovered at better than a 98% recovery rate. A wind rose and stability analysis was prepared by a third party laboratory Inter Mountain Laboratories. A copy of the wind rose and stability analysis report is included with this Semi-Annual Report (Appendix F).

A review of the report shows no changes in conditions warranting a change in environmental monitoring stations or radon detectors at this time.

4.0 SUMMARY OF EMPLOYEE URINALYSIS RESULTS

Bioassay samples are collected on all employees at initial hiring. Monthly samples are collected from plant operators. Analysis is performed by an outside laboratory. The bioassay results are summarized annually, pursuant to 10 CFR Part 20, Subpart M and will be included in the Annual and Semi-Annual Effluent Report submitted in January 2016.

5.0 PUBLIC DOSE

10 CFR 20.1301 requires that each NRC licensee conduct their operations in a manner that the total effective dose equivalent (TEDE) to members of the public does not exceed 100 mrem in a year, and that the dose from external sources in any unrestricted area does not exceed 2 mrem in any hour. Additionally, 10 CFR 20.1302 requires licensees to show compliance to these dose limits by demonstrating one of the following:

1. Show by actual measurement or calculation that the TEDE to the public does not exceed 100 mrem; or
2. Show that the annual average concentration of radioactive effluent released at the restricted boundary do not exceed the values in Table 2 of Appendix B in 10 CFR 20. Also that the external dose to an individual continuously present in an unrestricted area would not exceed 2 mrem in an hour.

The public dose data is summarized annually and will be included in the annual review of the radiation protection program in accordance with License Condition 11.2. See section 7.0 for further details.

6.0 SAFETY AND ENVIRONMENTAL REVIEW PANEL (SERP) EVAULATIONS

Per License Condition 9.4E, Uranerz shall furnish, in an annual report to the NRC, a description of such changes, tests, or experiments, including a summary of the evaluations made by the safety and environmental evaluation panel (SERP). A summary of SERPs performed during the annual report period will be included in the Annual and Semi-Annual Effluent Report submitted in January 2016.

7.0 RADIATION PROTECTION PROGRAM

As required by License condition 11.2, the licensee shall submit the results of the annual review of the radiation protection program content and implementation performed in accordance with 10 CFR 20.1101(c). These results shall include doses to individual members of the public. This submittal will occur once the Nichols Ranch facility has processed licensed material for a calendar year. After the year, an ALARA audit will occur and will be submitted as a standalone document. Due to scheduling constraints with a qualified auditor, the audit has been scheduled for mid-September 2015. Upon receipt of the ALARA audit report the results will be reviewed and submitted to the NRC thereafter.

8.0 SURETY

All activities conducted, to date, at the Nichols Ranch ISR Project are covered in the surety estimate as required by License Condition 9.5. The surety estimate is reviewed annually and is to be submitted to the NRC by December 29. The WDEQ-LQD also requires an annual surety review in December. Uranerz, therefore reviews the surety in December, aligning the NRC and LQD surety reviews for consistency, standardization and reduced redundancy.

Uranerz updated the surety estimate and submitted it to the NRC on December 18, 2014. The LQD approved the latest surety on June 16, 2015. The next annual surety review will occur in December 2015.

Uranerz Energy Corporation
Appendix A
Air Particulate Data
January - June 2015

Sample Location	Sample Period	Radionuclide	Concentration (µCi/ml)	Error ±(µCi/ml)	LLD (µCi/ml)	10CFR 20 APP B Table 2 Values (µCi/ml)	Percent Concentration %
NA-1 Air Station Nearest Resident	1st Quarter 2015	U-Nat	1.3E-16	N/A***	1.0E-16	9.0E-14	0.1
		Th-230	ND*	N/A**	1.0E-16	3.0E-14	0.0
		Ra-226	1.1E-16	3.2E-17	1.0E-16	9.0E-13	0.0
		Pb-210	1.7E-14	1.6E-15	2.0E-15	6.0E-13	2.8
		Po-210	3.70E-15	1.0E-15	N/A***	9.0E-13	0.4
	2nd Quarter 2015	U-Nat	1.1E-16	N/A***	1.0E-16	9.0E-14	0.1
		Th-230	ND*	N/A**	1.0E-16	3.0E-14	0.0
		Ra-226	ND*	N/A**	1.0E-16	9.0E-13	0.0
		Pb-210	1.9E-14	2.6E-15	2.0E-15	6.0E-13	3.2
		Po-210	3.8E-15	1.7E-15	2.0E-15	9.0E-13	0.4
	3rd Quarter 2015	U-Nat				9.0E-14	0.0
		Th-230				3.0E-14	0.0
		Ra-226				9.0E-13	0.0
		Pb-210				6.0E-13	0.0
		Po-210				9.0E-13	0.0
	4th Quarter 2015	U-Nat				9.0E-14	0.0
		Th-230				3.0E-14	0.0
		Ra-226				9.0E-13	0.0
		Pb-210				6.0E-13	0.0
		Po-210				9.0E-13	0.0
NA-2 Air Station Downwind Southern Boundary	1st Quarter 2015	U-Nat	2.5E-16	N/A***	1.0E-16	9.0E-14	0.3
		Th-230	ND*	N/A**	1.0E-16	3.0E-14	0.0
		Ra-226	4.0E-16	6.6E-17	1.0E-16	9.0E-13	0.0
		Pb-210	1.7E-14	1.6E-15	2.0E-15	6.0E-13	2.8
		Po-210	2.7E-15	8.9E-16	N/A***	9.0E-13	0.3
	2nd Quarter 2015	U-Nat	ND*	N/A***	1.0E-16	9.0E-14	0.0
		Th-230	ND*	N/A**	1.0E-16	3.0E-14	0.0
		Ra-226	ND*	N/A**	1.0E-16	9.0E-13	0.0
		Pb-210	1.7E-14	1.7E-15	2.0E-15	6.0E-13	2.8
		Po-210	5.7E-15	1.4E-15	2.0E-15	9.0E-13	0.6
	3rd Quarter 2015	U-Nat				9.0E-14	0.0
		Th-230				3.0E-14	0.0
		Ra-226				9.0E-13	0.0
		Pb-210				6.0E-13	0.0
		Po-210				9.0E-13	0.0
	4th Quarter 2015	U-Nat				9.0E-14	0.0
		Th-230				3.0E-14	0.0
		Ra-226				9.0E-13	0.0
		Pb-210				6.0E-13	0.0
		Po-210				9.0E-13	0.0

Uranerz Energy Corporation
Appendix A
Air Particulate Data
January - June 2015

Sample Location	Sample Period	Radionuclide	Concentration (µCi/ml)	Error ±(µCi/ml)	LLD (µCi/ml)	10CFR 20 APP B Table 2 Values (µCi/ml)	Percent Concentration %
NA-3 Air Station Downwind North Boundary	1st Quarter 2015	U-Nat	2.3E-16	N/A***	1.0E-16	9.0E-14	0.3
		Th-230	ND	N/A**	1.0E-16	3.0E-14	0.0
		Ra-226	5.5E-16	9.1E-17	1.0E-16	9.0E-13	0.1
		Pb-210	1.6E-14	1.5E-15	2.0E-15	6.0E-13	2.7
		Po-210	3.5E-15	9.7E-16	N/A***	9.0E-13	0.4
	2nd Quarter 2015	U-Nat	ND*	N/A***	1.0E-16	9.0E-14	0.0
		Th-230	ND*	N/A**	1.0E-16	3.0E-14	0.0
		Ra-226	ND*	N/A**	1.0E-16	9.0E-13	0.0
		Pb-210	1.5E-14	1.6E-15	2.0E-15	6.0E-13	2.5
		Po-210	2.3E-15	9.6E-16	2.0E-15	9.0E-13	0.3
	3rd Quarter 2015	U-Nat				9.0E-14	0.0
		Th-230				3.0E-14	0.0
		Ra-226				9.0E-13	0.0
		Pb-210				6.0E-13	0.0
		Po-210				9.0E-13	0.0
	4th Quarter 2015	U-Nat				9.0E-14	0.0
		Th-230				3.0E-14	0.0
		Ra-226				9.0E-13	0.0
		Pb-210				6.0E-13	0.0
		Po-210				9.0E-13	0.0
NA-4 Air Station Background Site	1st Quarter 2015	U-Nat	1.8E-16	N/A***	1.0E-16	9.0E-14	0.2
		Th-230	1.1E-16	6.4E-17	1.0E-16	3.0E-14	0.4
		Ra-226	2.7E-16	6.4E-17	1.0E-16	9.0E-13	0.0
		Pb-210	1.8E-14	1.7E-15	2.0E-15	6.0E-13	3.0
		Po-210	4.5E-15	1.1E-15	N/A***	9.0E-13	0.5
	2nd Quarter 2015	U-Nat	ND*	N/A***	1.0E-16	9.0E-14	0.0
		Th-230	ND*	N/A**	1.0E-16	3.0E-14	0.0
		Ra-226	ND*	N/A**	1.0E-16	9.0E-13	0.0
		Pb-210	2.0E-14	1.7E-15	2.0E-15	6.0E-13	3.3
		Po-210	3.7E-15	1.1E-15	2.0E-15	9.0E-13	0.4
	3rd Quarter 2015	U-Nat				9.0E-14	0.0
		Th-230				3.0E-14	0.0
		Ra-226				9.0E-13	0.0
		Pb-210				6.0E-13	0.0
		Po-210				9.0E-13	0.0
	4th Quarter 2015	U-Nat				9.0E-14	0.0
		Th-230				3.0E-14	0.0
		Ra-226				9.0E-13	0.0
		Pb-210				6.0E-13	0.0
		Po-210				9.0E-13	0.0

Uranerz Energy Corporation
Appendix A
Air Particulate Data
January - June 2015

Sample Location	Sample Period	Radionuclide	Concentration (µCi/ml)	Error ±(µCi/ml)	LLD (µCi/ml)	10CFR 20 APP B Table 2 Values (µCi/ml)	Percent Concentration %
NA-5 Air Station Downwind West of CPP	1st Quarter 2015	U-Nat	1.2E-16	N/A***	1.0E-16	9.0E-14	0.1
		Th-230	ND*	N/A**	1.0E-16	3.0E-14	0.0
		Ra-226	1.5E-16	5.7E-17	1.0E-16	9.0E-13	0.0
		Pb-210	1.8E-14	1.5E-15	2.0E-15	6.0E-13	3.0
		Po-210	4.5E-15	9.9E-16	N/A***	9.0E-13	0.5
	2nd Quarter 2015	U-Nat	ND*	N/A***	1.0E-16	9.0E-14	0.0
		Th-230	ND*	N/A**	1.0E-16	3.0E-14	0.0
		Ra-226	ND*	N/A**	1.0E-16	9.0E-13	0.0
		Pb-210	1.5E-14	1.4E-15	2.0E-15	6.0E-13	2.5
		Po-210	8.2E-15	1.6E-15	2.0E-15	9.0E-13	0.9
	3rd Quarter 2015	U-Nat				9.0E-14	0.0
		Th-230				3.0E-14	0.0
		Ra-226				9.0E-13	0.0
		Pb-210				6.0E-13	0.0
		Po-210				9.0E-13	0.0
	4th Quarter 2015	U-Nat				9.0E-14	0.0
		Th-230				3.0E-14	0.0
		Ra-226				9.0E-13	0.0
		Pb-210				6.0E-13	0.0
		Po-210				9.0E-13	0.0
NA-6 Air Station Downwind North East of CPP	1st Quarter 2015	U-Nat	1.4E-16	N/A***	1.0E-16	9.0E-14	0.2
		Th-230	ND*	N/A**	1.0E-16	3.0E-14	0.0
		Ra-226	2.8E-16	6.9E-17	1.0E-16	9.0E-13	0.0
		Pb-210	2.1E-14	1.8E-15	2.0E-15	6.0E-13	3.5
		Po-210	3.9E-15	1.0E-15	N/A***	9.0E-13	0.4
	2nd Quarter 2015	U-Nat	1.2E-16	N/A***	1.0E-16	9.0E-14	0.1
		Th-230	ND*	N/A**	1.0E-16	3.0E-14	0.0
		Ra-226	ND*	N/A**	1.0E-16	9.0E-13	0.0
		Pb-210	1.8E-14	1.7E-15	2.0E-15	6.0E-13	3.0
		Po-210	8.8E-15	1.8E-15	2.0E-15	9.0E-13	1.0
	3rd Quarter 2015	U-Nat				9.0E-14	0.0
		Th-230				3.0E-14	0.0
		Ra-226				9.0E-13	0.0
		Pb-210				6.0E-13	0.0
		Po-210				9.0E-13	0.0
	4th Quarter 2015	U-Nat				9.0E-14	0.0
		Th-230				3.0E-14	0.0
		Ra-226				9.0E-13	0.0
		Pb-210				6.0E-13	0.0
		Po-210				9.0E-13	0.0

* Non detectable at the LLD as provided from laboratory
** provided as results from laboratory
*** No result provided from laboratory

Uranerz Energy Corporation
Appendix B
Radon Monitoring
January-June 2015

Location	1st Quarter (µCi/ml)	Uncertainty (µCi/ml)	2nd Quarter (µCi/ml)	Uncertainty (µCi/ml)	3rd Quarter (µCi/ml)	Uncertainty (µCi/ml)	4th Quarter (µCi/ml)	Uncertainty (µCi/ml)	Location Average (µCi/ml)	10CFR 20 APP B Table 2 Values (µCi/ml)
Nichols Ranch Project										
NR-1 (Nearest Resident)	7.00E-10	5.00E-11	3.00E-10	2.00E-11					5.00E-10	1.00E-10
NR-2 (Southern Boundary Downwind)	7.00E-10	5.00E-11	6.00E-10	4.00E-11					6.50E-10	1.00E-10
NR-3 (North Boundary Downwind)	5.00E-10	4.00E-11	3.00E-10	2.00E-11					4.00E-10	1.00E-10
NR-5 (Background)	7.00E-10	5.00E-11	5.00E-10	4.00E-11					6.00E-10	1.00E-10
NR-6 (West of CPP downwind)	5.00E-10	3.00E-11	3.00E-10	3.00E-11					4.00E-10	1.00E-10
NR-7 (North East of CPP Downwind Maximally Exposed Member of the Public)	6.00E-10	4.00E-11	6.00E-10	4.00E-11					6.00E-10	1.00E-10
NR-1 (Duplicate #1)	4.00E-10	3.00E-11	3.00E-10	2.00E-11					3.50E-10	1.00E-10
NR-1 (Duplicate #2)	5.00E-10	4.00E-11	4.00E-10	3.00E-11					4.50E-10	1.00E-10
Nichols Ranch CPP Locations (9 locations changed semi-annually)										
Man Camp	5.00E-10	3.00E-11							3.00E-10	1.00E-10
CPP Ranch (East Side)	7.00E-10	4.00E-11							7.00E-10	1.00E-10
CPP Fence (SW Corner)	6.00E-10	3.00E-11							6.00E-10	1.00E-10
CPP Fence (South Corner)	4.00E-10	3.00E-11							4.00E-10	1.00E-10
CPP Fence (SE Corner)	7.00E-10	4.00E-11							7.00E-10	1.00E-10
CPP Fence (NW Corner)	6.00E-10	3.00E-11							6.00E-10	1.00E-10
CPP Fence (North Side)	6.00E-10	4.00E-11							6.00E-10	1.00E-10
CPP Fence (NE Side)	7.00E-10	4.00E-11							7.00E-10	1.00E-10
CPP Fence (West Side)	6.00E-11	3.00E-11							6.00E-11	1.00E-10

Uranerz Energy Corporation
Appendix B
Radon Monitoring
January-June 2015

Nichols Ranch Wellfield Locations (4 locations changed semi-annually)										
NCBM-5	4.00E-10	5.00E-11							4.00E-10	1.00E-10
NCBM-6	5.00E-10	5.00E-11							5.00E-10	1.00E-10
Wellfield (Fence)	5.00E-10	3.00E-11							5.00E-10	1.00E-10
NR-4 (North Wellfield Boundary)	6.00E-10	3.00E-11							6.00E-10	1.00E-10

MDA for all samples is 3.00E-10

* Values less than MDA

Green box indicates no data was collected during that time due to semi-annual changeout

Appendix C
Passive Gamma Radiation Monitoring
January - June 2015

Location Nichols Ranch Project (2015)	1st Quarter (mrem/quarter)	2nd Quarter (mrem/quarter)	3rd Quarter (mrem/quarter)	4th Quarter (mrem/quarter)	Location Average (Net mrem/quarter)
Control Badge (Nichols Ranch Offices)	48.4	32.8			40.6
NR-1(Nearest Resident)	37.3	42.2			39.8
NR-2 (Southern Boundary Downwind)	40.4	43.1			41.8
NR-3 (North Boundary Downwind)	39.1	38.6			38.9
NR-5 (Background Upwind)	38	38.9			38.5
NR-6 (West of CPP downwind)	36.5	38.7			37.6
NR-7 (North East of CPP Downwind, maximally exposed member of the public)	38.4	42.5			40.5
Quarterly Average**	38.3	40.7			39.5

* Indicates lost badge
** Control Badge data excluded from Average

Appendix D
Effluent Program
Particulates
January - June 2015

Sample Location	Sample Date	Radionuclide	Concentration (µCi/ml)	Error ±(µCi/ml)	MDC (µCi/ml)
CPP*	1/5/2015	U-Nat	5.41E-13	0.00E+00	5.41E-13
Header House**	1/8/2015	U-Nat	1.39E-12	0.00E+00	1.39E-12
DDW***	1/8/2015	U-Nat	1.39E-12	0.00E+00	1.39E-12
CPP*	2/9/2015	U-Nat	1.36E-12	0.00E+00	1.36E-12
Header House**	2/10/2015	U-Nat	2.18E-12	8.67E-13	1.36E-12
DDW***	2/10/2015	U-Nat	1.36E-12	0.00E+00	1.36E-12
Header House**	3/10/2015	U-Nat	1.40E-12	0.00E+00	1.40E-12
CPP*	3/11/2015	U-Nat	1.40E-12	0.00E+00	1.40E-12
DDW***	3/11/2015	U-Nat	1.40E-12	0.00E+00	1.40E-12
Header House**	4/8/2015	U-Nat	1.42E-12	0.00E+00	1.42E-12
CPP*	4/9/2015	U-Nat	1.53E-12	1.03E-13	1.53E-12
DDW***	4/15/2015	U-Nat	1.35E-12	0.00E+00	1.35E-12
DDW***	5/7/2015	U-Nat	1.41E-12	0.00E+00	1.41E-12
Header House**	5/7/2015	U-Nat	1.41E-12	0.00E+00	1.41E-12
CPP*	5/18/2015	U-Nat	1.37E-12	0.00E+00	1.37E-12
DDW***	6/10/2015	U-Nat	1.30E-12	1.05E-13	1.19E-12
Header House**	6/10/2015	U-Nat	1.27E-12	1.03E-13	1.19E-12
CPP*	6/10/2015	U-Nat	1.66E-12	4.38E-13	1.19E-12
		Average CPP measurements	1.31E-12	9.02E-14	1.23E-12
		Average Header House measurements	1.51E-12	1.62E-13	1.36E-12
		Average DDW measurements	1.37E-12	1.75E-14	1.35E-12

*CPP concentrations are taken from an average of six different sampling locations inside the CPP
** Header House concentrations are taken from an average of each operational header house (4 houses were operational January through May, a 5th house was added in June)
***DDW concentrations are taken from an average of each operational DDW (currently 2)

Appendix E
Effluent Program
Radon
January - June 2015

Sample Location	Sample Date	Radionuclide	Concentration (Working Levels)	Error ±(Working Levels)	MDC (Working Levels)
CPP*	1/5/2015	Rn-222 and progeny	0.0070	0.0008	0.0070
Header House**	1/8/2015	Rn-222 and progeny	0.0065	0.0005	0.0065
DDW***	1/8/2015	Rn-222 and progeny	0.0095	0.0025	0.0095
CPP*	2/9/2015	Rn-222 and progeny	0.0066	0.0004	0.0065
DDW***	2/10/2015	Rn-222 and progeny	0.0060	0.0000	0.0060
Header House**	2/10/2015	Rn-222 and progeny	0.0078	0.0025	0.0078
Header House**	3/10/2015	Rn-222 and progeny	0.0093	0.0019	0.0093
DDW***	3/11/2015	Rn-222 and progeny	0.0075	0.0005	0.0075
CPP*	3/11/2015	Rn-222 and progeny	0.0062	0.0004	0.0062
Recovery Wells****	3/26/2015	Rn-222 and progeny	0.0070	0.0007	0.0070
CPP Tanks	3/26/2015	Rn-222 and progeny	2.7725	N/A*****	0.1897
Header House**	4/8/2015	Rn-222 and progeny	0.0083	0.0019	0.0083
CPP*	4/9/2015	Rn-222 and progeny	0.0082	0.0007	0.0082
DDW***	4/15/2015	Rn-222 and progeny	0.0060	0.0000	0.0060
Header House**	5/7/2015	Rn-222 and progeny	0.0075	0.0017	0.0075
DDW***	5/7/2015	Rn-222 and progeny	0.0080	0.0010	0.0080
CPP*	5/18/2015	Rn-222 and progeny	0.0068	0.0007	0.0068
Recovery Wells****	6/9/2015	Rn-222 and progeny	0.0100	0.0018	0.0100
Header House**	6/10/2015	Rn-222 and progeny	0.0092	0.0021	0.0092
DDW***	6/10/2015	Rn-222 and progeny	0.0060	0.0000	0.0060
CPP*	6/10/2015	Rn-222 and progeny	0.0095	0.0024	0.0095
CPP Tanks	6/17/2015	Rn-222 and progeny	389.8250	N/A*****	0.0630
		Average CPP measurements	0.00738	0.00090	0.00737
		Average Header House measurements	0.00808	0.00177	0.00810
		Average DDW measurements	0.00717	0.00067	0.00717
		Average Recovery Wells	0.00850	0.00124	0.00850
		Average CPP Tanks	3.90E+02	N/A*****	6.30E-02

*CPP concentrations are taken from an average of six different sampling locations inside the CPP

** Header House concentrations are taken from an average of each operational header house (4 houses were operational January through May, a 5th house was added in June)

***DDW concentrations are taken from an average of each operational DDW (currently 2)

****Recovery well concentrations are an average of at least 10% of active recovery wells during the sampling period. Each sampling period had an average 14 recovery wells sampled for the ~110 recovery wells operating during the monitoring period.

*****No published way to perform uncertainty calculations with sampling method.

ENERGY FUELS

Appendix F

Meteorological Data

Wind Rose and Atmospheric Stability Analysis

Comparison of Years 2-4 to Baseline Year at Nichols Ranch Site

9 October 2015

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Figures

Tables

Introduction

Baseline hourly meteorological data were collected at the Nichols Ranch site from 6/28/2011 to 7/3/2012. This period was established as the baseline year and results were provided in a previous report. Meteorological monitoring at Nichols Ranch has continued through 10/5/2015, providing complete hourly data for years 2 through 4. This report compares the wind monitoring results from the baseline year with those from subsequent years, in order to demonstrate similar atmospheric stability and wind conditions between the baseline year and years 2 through 4. For simplicity and comparability, each of these monitoring years extends from July 1 through June 30.

Wind Monitoring Results

Yearly Comparisons

Figure 1 shows year-to-year wind roses for Nichols Ranch. Joint wind data recovery exceeded 98% for each of the four years shown. Figure 1 demonstrates that the wind rose pattern is very consistent over time. The highest wind speeds consistently occur from the north-northwest and southwest directions. The dominant wind direction overall is from the east. A previous report demonstrated that this pattern is due mostly to night-time drainage, or downslope convection winds from nearby North Pumpkin Butte.

Project-to-Date Results

Table 1 presents the project-to-date monitoring results for all recorded meteorological parameters. Joint wind speed and wind direction data recovery was 99.1% over the entire monitoring period. East winds accounted for nearly 16% of the total hours.

Figure 2 shows the project-to-date wind rose, which corresponds to the same period of record reported in Table 1. Winds were calm (less than 0.5 m/sec) only 0.2% of the time. Table 2 lists the joint frequencies of wind speed categories and wind direction sectors that make up the project-to-date wind rose.

Figure 1. Nichols Ranch Yearly Wind Rose Comparison

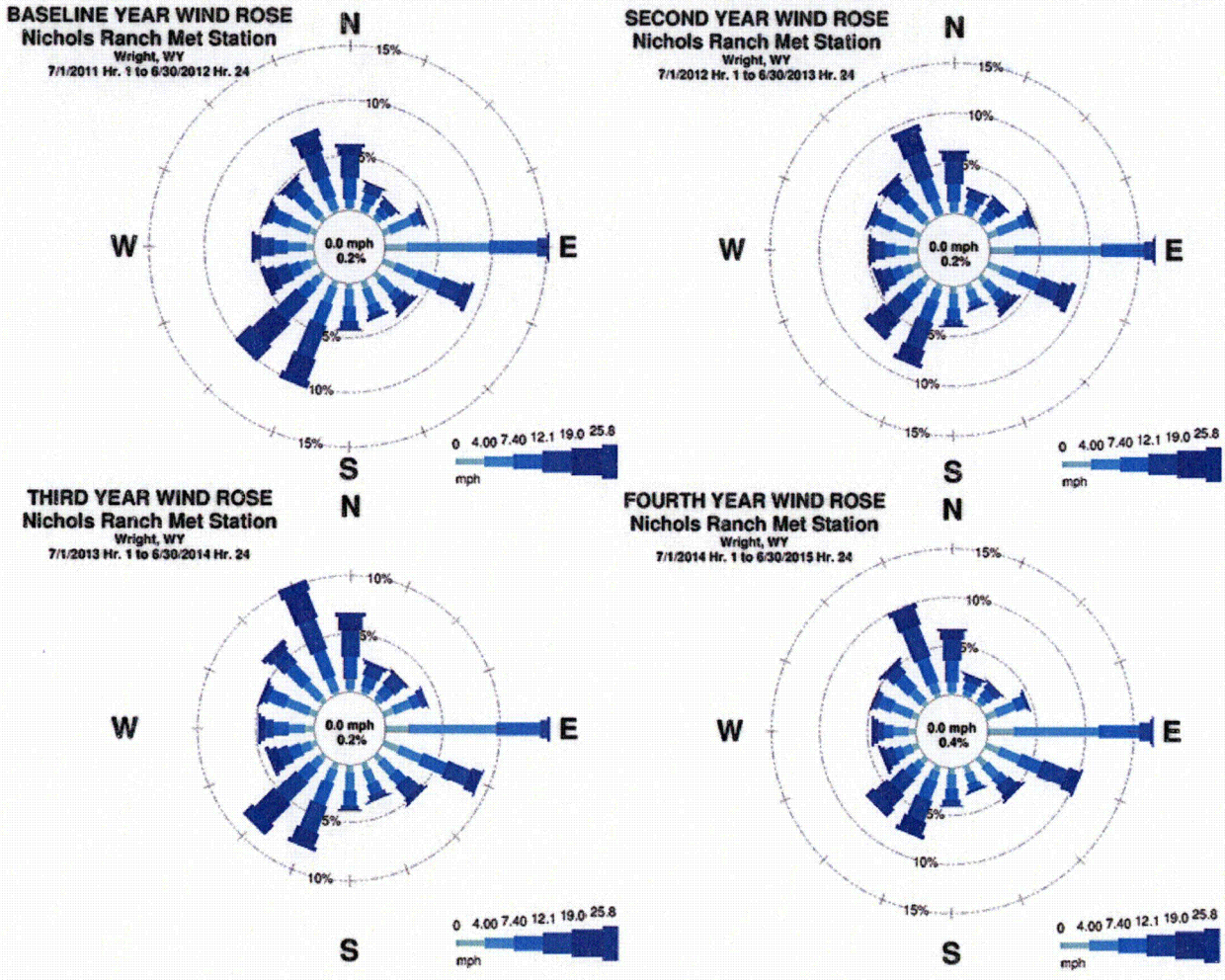


Table 1. Nichols Ranch PTD Meteorological Summary

Nichols Ranch

Meteorological Data Summary

6/28/2011 - 10/5/2015

Hourly Data

	Average/Total	Max	Min
Wind Speed (mph)	10.7	51.3	0.0
Sigma-Theta (°)	16.1	82.7	0.0
Temperature (C)	9.2	38.2	-32.5

Predominant wind direction was from the E sector,
accounting for 15.8% of the possible winds

Data Recovery

Parameter	Possible (hours)	Reported (hours)	Recovery
Wind Speed	37433	37095	99.10%
Wind Direction	37433	37095	99.10%
Sigma-Theta	37433	37095	99.10%
Temperature	37433	36900	98.58%

Figure 2. Nichols Ranch PTD Wind Rose

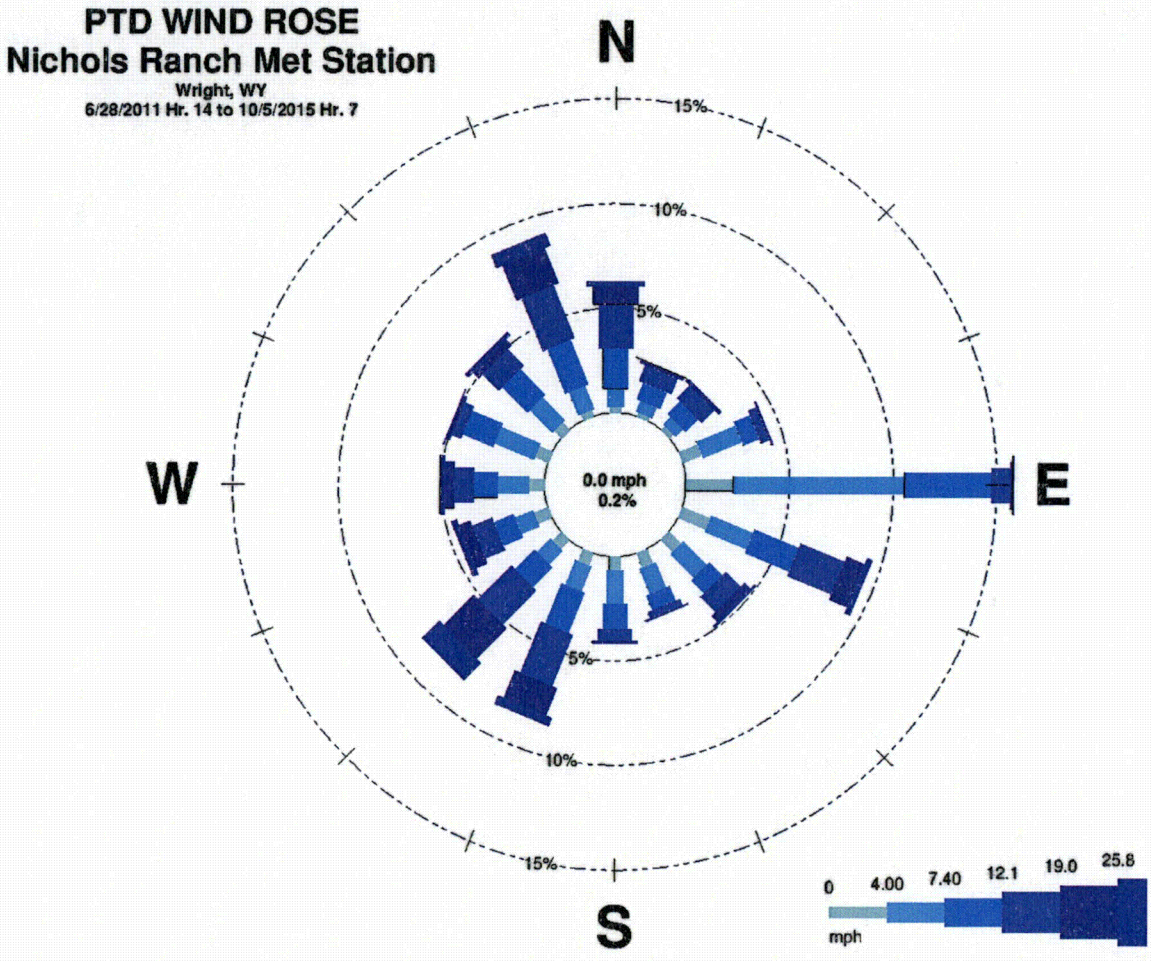


Table 2. Nichols Ranch PTD Wind Rose Matrix

PTD WIND ROSE
Nichols Ranch Met Station
Wright, WY
6/28/2011 Hr. 14 to 10/5/2015 Hr. 7

RELATIVE FREQUENCY (% of Recorded Winds) TABLE

	mph						
Wind Direction	0.0- 4.0	4.0- 7.4	7.4-12.1	12.1-19.0	19.0-25.8	25.8-100.0	Row Tota
0.0 deg.(North)	0.30	0.87	1.91	2.14	0.87	0.22	6.3
22.5 deg.	0.22	0.56	0.87	0.82	0.17	0.00	2.6
45.0 deg.	0.29	0.50	0.86	0.89	0.16	0.00	2.7
67.5 deg.	1.00	2.02	0.85	0.43	0.08	0.00	4.4
90.0 deg.	2.32	8.25	4.21	0.87	0.16	0.00	15.8
112.5 deg.	1.44	2.19	2.32	2.31	0.93	0.26	9.5
135.0 deg.	0.82	1.61	0.90	1.01	0.41	0.10	4.9
157.5 deg.	0.75	1.34	0.75	0.33	0.07	0.00	3.3
180.0 deg.	0.69	1.58	1.23	0.56	0.12	0.00	4.2
202.5 deg.	0.63	1.31	2.08	2.66	1.41	0.42	8.5
225.0 deg.	0.64	0.93	1.34	2.28	2.06	1.15	8.4
247.5 deg.	0.76	0.96	1.03	1.03	0.60	0.27	4.7
270.0 deg.	0.82	1.50	1.16	0.96	0.47	0.20	5.1
292.5 deg.	0.73	2.07	1.59	0.49	0.19	0.00	5.1
315.0 deg.	0.52	1.58	1.73	1.10	0.39	0.18	5.5
337.5 deg.	0.36	1.21	2.30	2.73	1.82	0.65	9.1
	12.30	28.49	25.13	20.61	9.91	3.54	100.0

0 mph (0.2%) INVALID READINGS 339

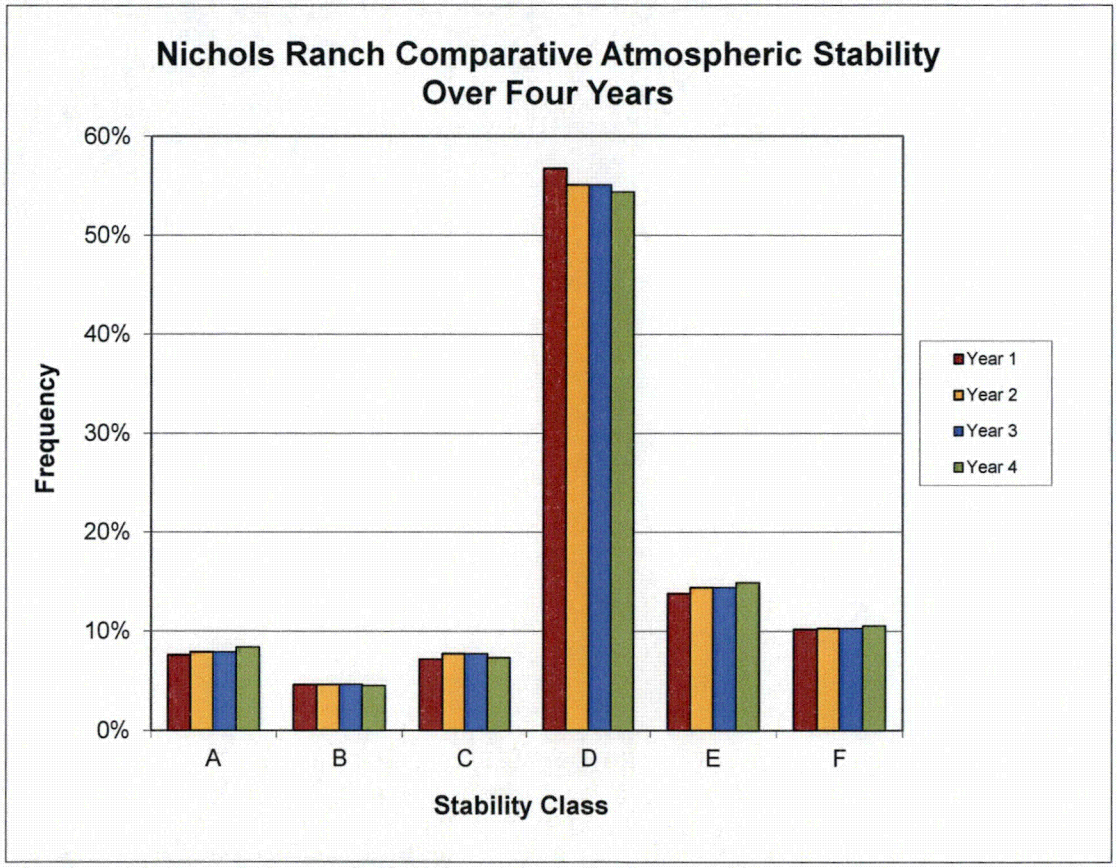
NUMBER OF POSSIBLE READINGS 37434 VALID READINGS 37095 DATA CAPTURE 99.09%

Atmospheric Stability Results

Yearly Comparisons

Figure 3 compares the year-to-year atmospheric stability class distribution for Nichols Ranch. Roughly 56% of the winds at the project site consistently fall into stability class D which represents near neutral to slightly unstable conditions. The light-to-calm winds which accompany stable environments, corresponding to stability class F, are also quite consistent from year to year.

Figure 3. Nichols Ranch Atmospheric Stability Class by Year



The σ_θ method was used to determine the Pasquill-Gifford stability class, where σ_θ refers to the standard deviation of the horizontal wind azimuth angle in degrees. This method is also referred to as the σ_A method in EPA's Meteorological Monitoring Guidance for Regulatory Modeling Applications (February 2000). It is a lateral turbulence based method which uses the standard

deviation of the wind direction in combination with the scalar mean horizontal wind speed. Wind speed and direction data are recorded hourly at a height of 10 meters. To minimize the effects of wind meander, the 1-hour σ_θ is defined using 15-minute σ_θ values which are in turn based on more frequent sampling of wind direction (e.g. every five seconds). According to this method, initial stability classes are assigned based solely on standard deviation of wind direction, or σ_θ. The initial assignments are then adjusted for horizontal wind speed. The magnitude of this adjustment depends on whether the measurement is taken during daylight or nighttime hours, a diurnal dependency that varies with the time of year.

Project-to-Date Results

Table 3 shows the yearly and project-to-date atmospheric stability class distributions. Tables 4 and 5 present the project-to-date joint frequency distribution (JFD) at Nichols Ranch. Stability classes A, B, and C appear in Table 3, while stability classes D, E, and F appear in Table 4. The JFD partitions hourly wind speed and direction by stability class, wind direction sector, and wind speed category. It is the basis for meteorological input to the MILDOS dispersion model.

Table 3. Nichols Ranch Stability Class Distribution

Stability Class	Year 1	Year 2	Year 3	Year 4	Four-Year
A	7.6%	7.91%	7.91%	8.39%	7.66%
B	4.6%	4.63%	4.63%	4.51%	4.54%
C	7.2%	7.73%	7.73%	7.34%	7.57%
D	56.7%	55.08%	55.08%	54.37%	55.97%
E	13.8%	14.39%	14.39%	14.89%	13.98%
F	10.2%	10.25%	10.25%	10.50%	10.29%

Table 4. Nichols Ranch PTD Joint Wind Speed and Frequency Distribution

Stability Class	Wind Direction	Wind Speed (mph) - Four Year Average					
		< 3	4 - 7	8 - 12	13 - 18	19 - 24	> 24
A	N	0.000475	0.002620				
	NNE	0.000534	0.002131				
	NE	0.000475	0.002045				
	ENE	0.001157	0.001814				
	E	0.001543	0.002304				
	ESE	0.002166	0.003052				
	SE	0.001484	0.003600				
	SSE	0.001929	0.003427				
	S	0.001810	0.004694				
	SSW	0.001780	0.003571				
	SW	0.002018	0.003887				
	WSW	0.001543	0.003801				
	W	0.001306	0.005529				
	WNW	0.001157	0.005702				
	NW	0.000920	0.004233				
	NNW	0.000682	0.003168				
B	N	0.000030	0.000518	0.002332			
	NNE		0.000374	0.001152			
	NE	0.000059	0.000230	0.000461			
	ENE	0.000148	0.000403	0.000777			
	E	0.000712	0.000605	0.000777			
	ESE	0.000593	0.001123	0.001440			
	SE	0.000237	0.001353	0.001641			
	SSE	0.000089	0.000835	0.002045			
	S	0.000059	0.001123	0.002160			
	SSW	0.000178	0.000864	0.002332			
	SW	0.000119	0.000777	0.001958			
	WSW	0.000119	0.001123	0.002131			
	W	0.000178	0.001497	0.001929			
	WNW	0.000148	0.001901	0.002332			
	NW	0.000059	0.001123	0.002188			
	NNW	0.000089	0.000576	0.002448			
C	N	0.000030	0.000202	0.004348	0.001987		
	NNE		0.000058	0.001814	0.000576		
	NE		0.000230	0.001353	0.000691		
	ENE	0.000178	0.000403	0.000806	0.000202		
	E	0.000742	0.001670	0.001037	0.000202		
	ESE	0.000267	0.001440	0.002534	0.000547		
	SE	0.000030	0.000547	0.002592	0.001008		
	SSE	0.000030	0.000432	0.001987	0.000749		
	S		0.000547	0.002649	0.000777		
	SSW	0.000030	0.000432	0.004291	0.001785		
	SW	0.000089	0.000461	0.003513	0.001670		
	WSW	0.000178	0.000461	0.003456	0.001123		
	W	0.000148	0.001382	0.003484	0.001440		
	WNW		0.001382	0.004291	0.000893		
	NW	0.000030	0.000864	0.003571	0.001325		
	NNW	0.000030	0.000605	0.004291	0.001785		

Table 5. Nichols Ranch PTD Joint Wind Speed and Frequency Distribution (Cont.)

Wind Direction	Wind Speed (mph) - Four Year Average					
	< 3	4 - 7	8 - 12	13 - 18	19 - 24	> 24
N	0.000119	0.002073	0.010050	0.021511	0.008898	0.003628
NNE	0.000059	0.000893	0.004089	0.008120	0.001901	0.000317
NE	0.000059	0.000979	0.004204	0.008581	0.001872	0.000173
ENE	0.000920	0.008668	0.004607	0.004233	0.000979	0.000058
E	0.002938	0.035822	0.016903	0.009935	0.001757	0.000461
ESE	0.000475	0.005385	0.010971	0.023238	0.009589	0.003657
SE	0.000148	0.001785	0.004348	0.009128	0.004089	0.001757
SSE	0.000030	0.000950	0.003369	0.003024	0.000691	0.000115
S	0.000030	0.001411	0.006997	0.005471	0.001181	0.000173
SSW	0.000089	0.002016	0.012958	0.026204	0.014139	0.006767
SW	0.000148	0.001267	0.006278	0.020964	0.018746	0.015982
WSW	0.000326	0.001382	0.003801	0.008927	0.005932	0.003254
W	0.000534	0.003024	0.005097	0.007919	0.004550	0.002620
WNW	0.000237	0.005414	0.008437	0.004435	0.001929	0.000806
NW	0.000208	0.004175	0.009531	0.010885	0.003686	0.002908
NNW	0.000119	0.003052	0.012670	0.027500	0.018026	0.009906
N	0.000059	0.001209	0.001785			
NNE	0.000089	0.000691	0.001641			
NE	0.000030	0.000691	0.002448			
ENE	0.000979	0.008207	0.003024			
E	0.002522	0.029919	0.033893			
ESE	0.001128	0.004953	0.007372			
SE	0.000445	0.002217	0.001094			
SSE	0.000267	0.001872	0.001094			
S	0.000208	0.002016	0.001872			
SSW	0.000326	0.001382	0.001267			
SW	0.000237	0.000720	0.000893			
WSW	0.000623	0.001152	0.000893			
W	0.000593	0.001901	0.001238			
WNW	0.000712	0.003283	0.002563			
NW	0.000593	0.002304	0.002678			
NNW	0.000267	0.001440	0.003052			
N	0.001246	0.001497				
NNE	0.000890	0.001382				
NE	0.001246	0.001325				
ENE	0.002849	0.003168				
E	0.006676	0.007573				
ESE	0.006023	0.007026				
SE	0.003501	0.007257				
SSE	0.002878	0.006018				
S	0.002641	0.005615				
SSW	0.002136	0.003427				
SW	0.002374	0.002045				
WSW	0.002908	0.001901				
W	0.002819	0.003052				
WNW	0.002581	0.002908				
NW	0.001691	0.002880				
NNW	0.001276	0.002102				