APPENDIX I

Meteorological Station SOP

Standard Operating Procedure
for an
Instrumented Meteorological Tower

1.0 INTRODUCTION

This procedure applies to meteorological instruments, which will be used to monitor the preoperational and operational meteorological conditions at two sites in the vicinity of the proposed Energy Fuels Resources Corporation (EFR) Uranium Mill. The site selection criteria and location of the sites are described in the Energy Fuels Resources Corporation Uranium Mill Licensing Support Ambient Air Monitoring Plan for the Piñon Ridge Mill Site prepared by Kleinfelder West, Inc.

The instrumented meteorological towers will be collecting data at two sites located on the northern (10 meter tower) and eastern (30 meter tower) boundaries of the proposed Energy Fuels Piñon Ridge Uranium Mill site in order to obtain a representative set of data for the assessment.

2.0 METEOROLOGICAL INSTRUMENT INSTALLATION

2.1 Instrument Assembly and Installation

Meteorological instruments will be assembled, installed and prepared for operation with assistance from Inter-Mountain Laboratories (IML) according to the procedure in the manufacturer's operating manuals. IML will also carryout the initial calibration of the instruments.

2.2 Measurements and Instrument List

The following measurements will be made at each site:
Wind Speed and Wind Direction
- Sigma Theta will be calculated from the wind measurements

Vertical Wind Speed
Wind gusts (calculated)
Ambient Temperature
Lapse Rate or Delta-T
Barometric Pressure
Solar Radiation
Relative Humidity with Temperature

The following measurements will be made at the 10m Tower site only:
Precipitation
Evaporation

Please enter date, time, technician name, name of any visitors, and purpose of visit in Site Notebook for any visit to the site.

3.0 TEMPERATURE SENSORS

Two RM Young Model 41342 temperature sensors housed in RM Young Model 43503 aspirated radiation shields will be operated at each of the sites for measuring the lapse rate (or Delta-T).

At the 10m tower site Delta-T will be calculated using measurements at 2m and 10m.

At the 30m tower site Delta-T will be calculated using measurements at 2m and 30m.

3.1 Operation

The temperature sensors will be operated continuously during pre-operational monitoring and operational monitoring.

3.2 Maintenance and Calibration

Temperature sensors are designed to operate with minimal maintenance.

The calibration of the temperature sensors will be checked semi-annually (once every six months) and on an as-needed basis by qualified personnel. If calibration is needed the sensor will be removed and shipped to the manufacturer for recalibration. The removed sensor will be replaced.

Sensors will be removed and replaced annually. The removed sensors will be sent to the manufacturer or other qualified personnel for recertification.

Check fan in the aspirated shield of ground level temperature sensors daily. Verify that it is running and blowing air on the temperature probe.

4.0 RELATIVE HUMIDITY AND TEMPERATURE SENSOR

One Campbell Scientific-Vaisala Model HMP45C Relative Humidity and Temperature Sensor housed in a radiation shield will be operated at each site to measure the ambient temperature and relative humidity.

4.1 Operation

The relative humidity and temperature sensors will be operated continuously during pre-operational monitoring and operational monitoring.

4.2 Maintenance and Calibration

The relative humidity and temperature sensors are designed to operate with minimal maintenance.

The calibration of the relative humidity and temperature sensors will be checked semi-annually and on an as-needed basis by qualified personnel. If calibration is needed the sensor will be removed and shipped to the manufacturer for recalibration. The removed sensor will be replaced.

The relative humidity and temperature sensors will be removed and replaced annually. The removed sensors will be sent to the manufacturer or other qualified personnel for recertification.

5.0 BAROMETRIC PRESSURE SENSOR

Barometric pressure will be measured using the Campbell Scientific CS106 Barometric Pressure Sensor.

5.1 Operation

The barometric pressure sensor will be operated continuously during pre-operational monitoring and operational monitoring.

5.2 Maintenance and Calibration

5.2.1 Maintenance

The barometric pressure sensor is designed to operate with minimal maintenance.

Perform the following checks on a monthly basis:

1. Visually inspect the cable connection to ensure it is clean and dry.
2. Visually inspect the casing for damage.
3. Ensure that the pneumatic connection and pipe are secure and undamaged.

5.2.2 Calibration

The calibration of the barometric pressure sensors will be checked semi-annually and on an as-needed basis by qualified personnel. If calibration is needed the sensor will be removed and shipped to the manufacturer for recalibration. The removed sensor will be replaced.

6.0 WIND SPEED/WIND DIRECTION MONITOR

Wind speed and wind direction will be measured using the R.M. Young Model 05305 Wind Monitor AQ (Air Quality).

6.1 Operation

The wind monitor will be operated continuously during pre-operational monitoring and operational monitoring.

6.2 Maintenance and Calibration

The calibration of the wind monitors will be checked semi-annually and on an as-needed basis by qualified personnel. If calibration is needed the sensor will be removed and shipped to the manufacturer for recalibration. The removed sensor will be replaced.

The wind monitors will be visually inspected daily for proper motion.

7.0 VERTICAL WIND MONITOR

Vertical wind speed will be measured using the R.M. Young Model 27106T Propeller Anemometer and the R.M. Young Model 27106 Propeller Anemometer.

7.1 Operation

The vertical wind sensors will be operated continuously during pre-operational monitoring and operational monitoring.

7.2 Maintenance and Calibration

The calibration of the vertical wind sensors will be checked semi-annually and on an as-needed basis by qualified personnel. If calibration is needed the sensor will be removed and shipped to the manufacturer for recalibration. The removed sensor will be replaced.

The vertical wind monitors will be visually inspected daily for proper motion.

8.0 SOLAR RADIATION SENSOR

Solar Radiation will be measured using the Campbell Scientific LI200X Solar Radiation Sensor.

8.1 Operation

The solar radiation sensor will be operated continuously during pre-operational monitoring and operational monitoring.

8.2 Maintenance and Calibration

8.2.1 Maintenance

The solar radiation sensor is designed to operate with minimal maintenance.

Perform the following checks on a monthly basis:

1. Remove any dust or debris from the sensor with a blast of compressed air or with a soft bristle, camel hair brush.

2. Check that the drain hole next to the surface of the sensor is free of debris.

3. Check the level of the solar radiation sensor using the small bubble level on the base plate of the sensor.

8.2.2 Calibration

The calibration of the solar radiation sensors will be checked semi-annually and on an as-needed basis by qualified personnel. If calibration is needed the sensor will be removed and shipped to the manufacturer for recalibration. The removed sensor will be replaced.

9.0 DAILY INSTRUMENT CHECKS

9.1 Necessary Equipment

Timepiece
Site Notebook
Meteorological Equipment Checklist
Writing Instrument

9.2 Daily Instrument Check Procedure

Note time and date of daily check and technician name in Site Notebook.

1. Record requested information on Meteorological Equipment Checklist (Figure 1).

2. Listen for air moving through the radiation shields of the ground level temperature sensors.

3. Observe movement of wind vane.

4. Observe movement of wind speed propellers.

10.0 WEEKLY INSTRUMENT CHECKS

Note time and date of weekly check and technician name in Site Notebook.

10.1 Necessary Equipment

Timepiece
Site Notebook
Meteorological Equipment Checklist
Writing Instrument

10.2 Weekly Instrument Check Procedure

1. Perform daily instrument check procedure.

2. Record requested information on Meteorological Equipment Checklist (Figure 1).

3. Check the radiation shields of the ground level temperature sensors for debris, and clean if necessary.

11.0 MONTHLY INSTRUMENT CHECKS

Note time and date of monthly check and technician name in Site Notebook.

11.1 Necessary Equipment

Timepiece
Paper towels or wipes
Site Notebook
Meteorological Equipment Checklist
Writing instrument

11.2 Monthly Instrument Check Procedure

1. Perform Daily and Weekly Check Procedures.
2. Record requested information on Meteorological Equipment Checklist (Figure 1).
3. Inspect the Barometric Pressure Sensor (Section 5.2.1)
4. Inspect and clean the Solar Radiation Sensor (Section 8.2.1)

Meteorological Equipment Checklist

Daily Instrument Checks

Date							
Time							
Technician Name							
Visible damage to any meteorological instrument(s)?	Yes No	Yes No	Yes No	Yes No	Yes No	Yes No	Yes No
If Yes, list instrument(s) with damage in the notes section along with the date and type of damage.							
Will damage affect operation?	Yes No	Yes No	Yes No	Yes No	Yes No	Yes No	Yes No
If Yes, damage will affect operation, contact appropriate personnel, see contact list.							
Check Rain Gauge debris screens and collection funnel for debris							
Was debris removed?	Yes No	Yes No	Yes No	Yes No	Yes No	Yes No	Yes No
If Yes, debris was removed, list the date, time and type of debris removed in the notes section.							
Check Evaporation Pan for debris							
Was debris removed?	Yes No	Yes No	Yes No	Yes No	Yes No	Yes No	Yes No
If Yes, debris was removed, list the date, time and type of debris removed in the notes section.							
Observe movement of wind vane							
Observe movement of wind speed propeller							
Observe movement of vertical wind speed propellers							
Listen for air movement through ground level temperature shields							

Notes:

Weekly Instrument Checks

Date:	Time:	Technician Name:					
Add or Remove water to bring water level in Evaporation Pan to designated level	Add Remove					Initial Water Level (in):	
Time water addition/removal started:	Time water addition/removal completed:					Final Water Level {in}:	
Check radiation shields of ground level temperature sensors for debris							
Was debris removed?	Yes No	Yes No	Yes No	Yes No	Yes No	Yes No	Yes No
If Yes, debris was removed, list the date, time and type of debris removed in the notes section.							

Notes:

Monthly Instrument Checks

Date:	Time:	Technician Name:	
Clean Rain Gauge collection funnel		Check drain hole on Solar Radiation Sensor for debris	
Check that the Rain Gauge is level		Inspect and Clean Solar Radiation Sensor	
Check Evaporation Pan for sediment and algae		Verify that Solar Radiation Sensor is level	
Clean the Evaporation Pan if sediment or algae are present		Visually inspect cable connection on the Barometric Pressure Sensor to ensure it is clean & dry	
Check Evaporation Pan & Pipe for leaks		Visually inspect the Barometric Pressure Sensor for damage	
Note any leaks and call appropriate personnel for next steps		Check the pneumatic connection and pipe on the Barometric Pressure Sensor	

Information to be filled in if Evaporation Pan is Emptied.

Start Time for Emptying Pan:	Evaporation Gauge Calibration Start Time:
Reason for Emptying Pan:	Evaporation Gauge Calibration End Time:
End Time for Refilling Pan:	Final Water Level {in}:

Notes:

Figure 1: Example Meteorological Checklist

12.0 CALIBRATION PROCEDURES

The meteorological sensors from each of the towers will be calibrated semi-annually and on an as-needed basis by qualified personnel.

The temperature sensors and relative humidity sensors from each of the towers will be removed and replaced with certified sensors annually.

The removed sensors will be sent to the manufacturer or other qualified personnel for recertification.

13.0 AUDIT PROCEDURES

Independent auditing will be performed on a semi-annual basis by VSI Environmental Monitoring Service. A plan outlining audit procedures and instruments to be used for auditing is provided in the appendices of the Energy Fuels Resources Corporation Uranium Mill Licensing Support Ambient Air Monitoring Plan for the Piñon Ridge Mill Site.

14.0 DATA COLLECTION

Meteorological data will be retrieved on a daily basis via automated Data Collection System (DCS). Retrieved records will be loaded into database format through the use of Loggernet and tabulated into ASCII text files for data submission.

References:

1. Environmental Protection Agency (EPA) Meteorological Monitoring Guidance for Regulatory Modeling Applications (MMGRMA) (EPA-454/R-99-005)
2. R.M. Young Model 41342 Platinum Temperature Probe Instruction Sheet 41342-90, R.M. Young Company, 1997.
3. Campbell Scientific Model HMP45C Temperature and relative Humidity Probe Instructional Manual, Campbell Scientific, Inc., 2007.
4. Campbell Scientific Model CS106 Barometric Pressure Sensor Instruction Manual, Campbell Scientific, Inc., 2007.
5. R.M. Young Models 05103, 05106, and 05305 Wind Monitors Instruction Manual, Campbell Scientific, Inc., 2005.
6. R.M. Young Model 27106T Gill Propeller Anemometer Manual, Manual PN: 27106T-90 R.M. Young Company, REV: B030106.
7. R.M. Young Model 27106 Gill Propeller Anemometer Manual, Manual PN: 27106T-90 R.M. Young Company, REV: D030106.
8. Campbell Scientific Model LI200X Solar Radiation Sensor Instruction Manual, Campbell Scientific, Inc., 1997.
9. Energy Fuels Resources Corporation Uranium Mill Licensing Support Ambient Air Monitoring Plan for the Piñon Ridge Mill Site, 2008.