

## **West Campus Cogeneration Facility Air Quality Monitoring Technical Data**

### **Air Monitor**

A Rupprecht & Patashnick Co., Inc. (R&P) Series 1400a continuous monitor is used to sample particulate matter measuring 2.5 micrometers or less (PM<sub>2.5</sub>). This monitor measures the ambient particulate mass concentration in real time and is used in ambient air monitoring networks worldwide. The instrument includes the Tapered Element Oscillating Microbalance (TEOM), which is used to make direct measurements of the particle mass, collected in real time on a filter.

### **Monitor Operation**

The TEOM measures the mass collected on an exchangeable filter cartridge by monitoring the corresponding frequency changes of a tapered element. The sample flow passes through the filter, where particulate matter collects, then continues through the hollow tapered element into an active volumetric flow control system and vacuum pump. As more particulate mass collects on the exchangeable filter, the tube's natural frequency of oscillation decreases. A direct relationship exists between the tube's change in oscillation frequency and the mass on the filter. The TEOM technology enables accurate mass determinations in real time.

The particle size separation takes place as the sample proceeds through the PM<sub>2.5</sub> inlet. The flow splitter separates the total flow into two parts; a main flow that enters the sensor unit through the sample tube, and the auxiliary (bypass) flow. The total flow and each part of the flow after separation is maintained at a constant volume by a mass flow controller that is corrected for local temperature and barometric pressure. The monitoring station flow is set at a flow rate of 3 l/min. The main flow passes through the exchangeable TEOM filter in the mass transducer, and then proceeds through an air tube and in-line filter to a mass flow controller. The bypass flow is filtered in the large bypass in-line filter before it enters a second mass flow controller. A single pump provides the vacuum necessary to draw the sample stream through the system.

The system is climate controlled using an R&P Series 1400a enclosure. The enclosure is equipped with heating and air conditioning, as well as a phone jack for the data modem. It is constructed of painted aluminum and has locking door hatches. It meets federal compliance monitoring siting requirements, as the inlet is more than 2 meters from the ground surface.

### **Automated Measurement System Added**

The monitor is also being equipped with a Series 8500 Filter Dynamics Measurement System (FDMS) automated particulate matter mass measurement system, which is designed to provide representative short-term reading of semi-volatile PM<sub>2.5</sub> components. This will provide more information than a conventional monitoring system and will improve the accuracy of the PM<sub>2.5</sub> measurements by 30-40% during periods of low ambient air temperatures.

### **Remote Data System**

The Series 1400a Monitor has a standard modem installed, in order to access the data remotely. The AK Protocol, a communication protocol, used in combination with the RPComm software program, will be used to exchange data remotely between the Series 1400a Monitor and a PC.

RPComm is a communications software package developed by R&P for the Windows PC operating system to provide interactive remote communications with R&P instrumentation. RPComm enables the user to:

- Download data stored in the instrument
- Schedule automatic data downloads
- View and graph downloaded data
- View a real-time graph of selected variables
- Remotely operate the unit using a virtual keypad