**PRAMP and LICA visit WBEA Field Operations Centre (April 25-26)**

**Summary Prepared by Lily Lin and Michael Bisaga**

**Notes**

* Reporting
  + Overview of data validation/verification process.
  + Software used for reporting
    - LoggerNet (Campbell) is used to poll the Campbell dataloggers. Mass Data System (MDS) is populated with the data that are polled from the stations. MDS is used for reporting functions including data validation.
    - MDS has many pre-set functions to streamline reporting functions. Once data QA/QC is completed, all data tables and charts are printed using pre-programmed templates which are used in the final report; this eliminates the need for finicky and time-consuming manual editing and formatting.
    - Report summary, field note compilation, and operations overview are compiled manually.
    - Programming support is needed for MDS customization.
  + Report review process and report certification
    - AMD requirements for data validation and review are followed.
    - 5-minute data is used for data validation instead of hourly data. Hourly data is re-averaged once 5- minute data validation is complete. By handling data validation in this manner, both 5-minute data and hourly data are valid.
    - 10-second data is used for analyzer troubleshooting and diagnostic purposes.
    - At least two people perform data QA/QC cross check.
    - Field technicians are assigned a group of stations; daily data is reviewed by designated field technician. Data technician (Kendra) and data lead (Mike) review data at least every couple days.
    - Integrated sample results are briefly reviewed.
    - Final report is reviewed and certified by data lead.
  + Annual report preparation process
    - MDS has pre-set templates for annual report functions. MDS generates data tables and charts using pre-set templates that meet annual reporting needs.
    - No data QA/QC is performed at this point.
  + AirData Warehouse data preparation and submission
    - Once data QA/QC is completed, MDS has an output function that creates an upload file compatible with the AirData Warehouse.
    - Currently, WBEA does not submit reports through emails due to the size of the reports.
    - Data submission is performed by data lead.
    - Report/data upload to WBEA website is performed by data technician.
* Data management
  + Historical data storage
    - “File Hold” software is used to store and manage historical files.
    - The software is used to track file version of documents, who created the file, who performed edition, etc. version # is assigned automatically.
    - Historical data is saved in File Hold in Cloud.
  + Daily data review process
    - “Doc it” software is used for daily data review; this is ‘in-house’ software created by two contract staff at WBEA.
    - Field techs have remote access to the software to view data. A summary is produced that highlights if a particular analyzer failed the daily zero/span check. Three-day data trend is often used to determine if analyzers are performing well. A “zoom-in” function allows the technician to view data in small scale (for example, 1 and 10 second increments).
    - Field tech decides if they need to change their schedule and troubleshoot an analyzer, and not wait for a supervisor’s directions to do so; each technician is given ‘ownership’ of a group of stations and stewards their successful operation.
    - Data technician and data lead serve as the second resources of data validation/ interpretation for field tech.
    - Currently, MDS is kept 1) server in Calgary, and 2) backup computer in WBEA office. WBEA is working on putting the entire MDS onto a cloud-based hosting service.
* Quality assurance and control processes
  + Controlled document management
    - Historical data, chain of custody documents are stored in Doc-it Software.
    - “Stock Management” software is used to manage cylinder usage, inventory, purchase order, claiming insurance, etc
    - It is still a work-in-progress but WBEA is using in-house software to manage controlled documents and develop frequency of document review systems
    - SOPs and QAP are posted on WBEA website as a measure of transparency.
    - LogMeIn is used to remotely access some data functions.
  + Process for of review and updating SOPs, QAP, etc
  + Backup systems?
    - WBEA is working to push all data and document management functions to a cloud-based system; internal deadline is end of 2018.
* WBEA’s direction for data acquisition and control systems
* Shop management
  + Inventory management
    - “Stock Management” software is used to manage inventory.
  + Preventative maintenance
    - Each field technician is assigned a group of stations to steward; WBEA does not change the assignment often. Field technicians are assigned 100% responsibility for their stations including scheduling routine and preventative maintenance.
    - Wiki web calendar is used for viewing operations-wide staff availability and certain sampling and monitoring tasks. This calendar can be viewed by all WBEA personnel.
  + Parts inventory management/Spare analyzers/equipment management
    - Analyzers that stay in the shop have tag on them; they are either out of service and awaiting repair (red tag) or good for service (green tag).
    - Analyzers are always bench tested before they are deployed in the field.
    - WBEA does not move analyzers from one station to another often. Each analyzer is assigned to a specific station. Analyzers that require shop maintenance will be removed from station, a spare analyzer from the shop will be installed. Once the repair is done, the analyzer is back to its home AQM station.
  + Operations overview using WBEA’s ‘hired-staff’ model
    - Currently, five field techs manage 28 stations. Two for integrated sample change out. Two people have a primary function of performing data QA/QC. 1~2 people specialize in perform system programming, coding and maintenance.
  + Field staff management, vehicles, calibration gear
    - WBEA has developed a stand-alone calibration gas/calibrator system. Each new gas received from the supplier must be verified and pass the certified gas audit (CGA) before it is used in the field.
    - Calibrator check is performed quarterly. Flow is compared against WBEA standard.
    - WBEA has temperature/RH/BP standard that is used to audit met systems that are being used in the field.
    - Internal station audit is scheduled and performed using their standard.
  + Shop Tour
    - Shop has three benches that mimic the design of the real AQM trailer. Analyzers are tested the way same as in the field; this approach provides a good environment for field tech training.
  + Training programs and documentation
* Station visit:
  + HVAC systems
    - Bard unit is suggested. Routine maintenance should be done to ensure the HVAC performance. Window unit is not recommended.
  + Modem and communications systems, firewalls, stability, recovery after power outage
  + Canister sampling systems, routine checks
  + Interior layout
    - All tubing/cable are tightened and on the analyzer shelf and around the edge of station. No loose wires are seen. All pumps are kept in the pump cabinet with proper ventilation system.
    - As each station has its own calibration gear, including calibrators, calibration gases, no analyzer move around is needed. This is probably a reason the station remains new, clean and no scratch.
    - Station floor is covered by rubber mat, which reduces slip hazard.

**Learnings**

* Avoid catering to contractor limitations. Ensure our needs are being met.
* PRAMP has challenges associated with equipment ownership. Consider approaching AEP about developing a multi-year capital plan.
* WBEA is a strong supporter of the Campbell Data Logger, LoggerNet, and Mass Data System (MDS). LICA has recently purchased four met towers that have a Campbell Logger and use will use LoggerNet to poll data. We will use this opportunity to explore the system and become familiar with how it can be customized.
* WBEA is willing to provide field/instrument training on PRAMP/LICA personnel. WBEA can perform ‘internal’ station audits and verify calibration gear used in the PRAMP/LICA AQM stations. WBEA willing to rent out equipment if spares are available.

**Action Items**

* Implement 5-min data validation.
* Implement web-based calendar for TPMs.
* Coordinate WBEA audit of PRAMP network this summer.
* Transition to one-month delayed reporting of integrated sample results (for example, if sample is collected in March, results will be included in the May report).
* Implement cloud-based Dr. Das Envista ARM (instead of physical PC); use existing hardware as the on-site cloud back-up in the LICA server room. A cloud-based system will improve security, ease of access, backup, etc.
* Investigate add-on and custom functions of Envista ARM once PRAMP/LICA DACS are running, including:
  + MaintainView for documenting field work in electronic log book,
  + SiteView Web function, features a customizable front page where stations can be placed on a map for a quick network view to verify if any issues with monitoring exist.
  + Functions that may be useful for tradeshow and open house, such as Mobile Web, Mobile Apps, etc