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Wednesday, August 11th, 2021

To: Laboratory Analysis Branch (LAB) Staff and Fayette Regional Office (FRO) Staff participating in Carbonyl Sample collection, storage, and transport.

RE: Fisher Brand Traceable Min-Max Thermometer Usage and Record Keeping

All:

The newly distributed Fisher Brand min-max thermometers are employed for Urban Air Toxics (UAT) and Photochemical Assessment Monitoring Station (PAMS) carbonyl sample transportation temperature monitoring. The devices are critical in ensuring to our auditing bodies, both internal and external, that the integrity of our cooling modalities is above reproach. These devices have been employed because of an audit outcome related to carbonyls sample transport and are now required per DAQ standard operating procedures. To ensure that the devices are utilized interchangeably between operators the following will constitute as a reference:



Figure 1 - Fisher Brand Min-Max Thermometer

I. Min-Max Thermometer Setup

Each time new AAA batteries are installed into the thermometer; the device will need to be configured for the date and time. A quick self-test will occur after the unit powers on, and the minutes counter will begin to flash. **Set** the minutes by pressing the **min/max** button. The button can be held to increase the time rapidly until the button is released. **Press** the **in/date** button to store the setting. Next, the hour will begin to flash. **Set** the hour by pressing the **min/max** button until the correct hour is displayed. **Press** the **in/date** button to store the setting. After the time is set, the date will begin to flash. The **month** indicator will blink and can be incremented by **pressing** the **min/max** button until the correct month is displayed. **Press in/date** to store the value. Subsequently, the **day** indicator will begin to blink and can be **set** by pressing the **min/max** button until the correct value is displayed. **Set** the day by pressing the **in/date** button to store the value.

Note: If at any time during the setup if a button is not pressed for 15 seconds the unit will revert to temperature logging and the displayed date and time will be stored. The date is also displayed as day then month. (E.g., 8/11 would display as 11.8)



II. General Operation Guidelines

The min/max temperature device should be stored at conditions near where the device is going to measure and monitor. For carbonyls work, the temperature probe should be kept in a refrigerator or freezer until it will be used to transport samples. The target temperature for carbonyls storage is 4°C and below. The min/max temperature device always logs temperature when it is powered on, be sure to leave it only at the desired conditions to be monitored for the UAT and PAMS carbonyl samples (cold storage).

While conducting sample transport, the cooler should first be lined with ice or ice packs on the bottom of the cooler. A pocket should be made in the center for the carbonyl sample cartridge to be placed. The probe of the min-max thermometer must be placed on top of and come in contact with the sample cartridge as shown below in Figure 2:



Figure 2 - Standard Cartridge Packing

The cooler is then to be filled with ice or ice packs until full. Ice can be placed inside Ziploc bags to prevent messy transport and clean up of the coolers after shipment. After packing the cooler, the chain of custody (COC) and sample information form (SIF) are to be placed inside a Ziploc bag and placed on top of the ice pack. The data logger for the min-max thermometer is then placed on top of the COC/SIF Ziploc as shown in Figure 3:



Figure 3 - Completely Packed Cooler, Ready for Transport

III. Recalling Stored Memories

To **recall** stored memories, **press** the **min/max** button. The display will indicate the minimum outdoor temperature (the temperature of the probe), the maximum outdoor/probe temperature as well as the maximum indoor temperature (the temperature of the unit) and the minimum indoor/unit temperature. To clarify, outdoor temperature is equal to the probe temperature and is the only temperature to be considered. The display will also show when the minimum and maximum temperature occurred while cycling through the **min/max** button. The probe temperature will display with the word **OUT** next to the temperature reading as displayed below in Figure 4:



Figure 4 - Fisherband Min-Max Themometer Out/Probe Temperature

Upon receipt at the LAB, the receiving staff member should cycle through the min/max temperature device and record the minimum and maximum indoor (probe) temperatures on the comment section of the carbonyl sample information form (SIF) as well as the serial number of the min/max unit.

IV. Clearing Stored Memories

After a sample has been returned to the LAB and the temperature information recorded in the SIF the unit can be placed back into cold storage. When the temperature device is to be deployed again either by the LAB or FRO the memory must be cleared. To clear the stored memories, **press** the **min/max** button until the desired memory is displayed. This will be the first set of indoor/outdoor memories observed. **Press** the **in/date** button and the memory will be cleared. **Repeat** this process to clear each memory stored. Conduct this process while the probe temperature is within cold storage conditions. Proceed with field work. When the reset is successful --.- will appear through the temperature reading as shown below in Figure 5:



Figure 5 - Fisherbrand Min-Max Themometer Memory Reset

V. Troubleshooting

There are no serviceable parts on the min/max thermometer. If readings seem unrealistic or the screen is faint or hard to read, change the batteries and conduct the setup detailed in section I. Create a bath of ice water and submerge the probe. Allow the probe to equilibrate for at least 5 minutes. If the unit does not read near 0°C, alert the LAB for a replacement unit.

If there are any further questions about temperature monitoring instructions, recordkeeping, or SOP information please do not hesitate to contact Brian Velleco (<u>brian.velleco@ncdenr.gov</u>).

Regards,

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