MANAGING ALERTS FROM THE CHECKPOINT WIRELESS MONITORING SYSTEM

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1.0 SCOPE AND APPLICATION

The DEP Central Laboratory uses a CheckPoint Wireless Monitoring System to monitor numerous appliances that must be maintained within specific temperature operating conditions. CheckPoint measures temperature, and other vital parameters, and an alarm will activate when the monitored parameters exceed specific thresholds for more than a pre-set acceptable period of time. The CheckPoint system is principally used to collect temperature metadata and to monitor temperature conditions; it is not used for calibration purposes, even though probe calibration is discussed in this SOP and in references within.

When an alarm activates, CheckPoint alerts users so that corrective action can be taken to save samples at risk of damage or total loss. Samples in the affected unit must be reported with data qualifiers if samples remain outside of acceptable limits for more than 8 hours. CheckPoint electronically stores monitoring data and corrective actions in a SQL database.

2.0 LOGGING INTO CHECKPOINT

Log into CheckPoint software by entering user name and password (**Figure 1**). Contact Scientific Services Support for password information or if an account is locked due to inactivity. CheckPoint is also accessible via a web browser using Remote Desktop Services (RDS). To access OTIS instructions for using RDS open Internet Explorer, go to https://remotedesktop.dep.state.fl.us and follow the instructions. **Note: Your office computer must be on to access RDS.**

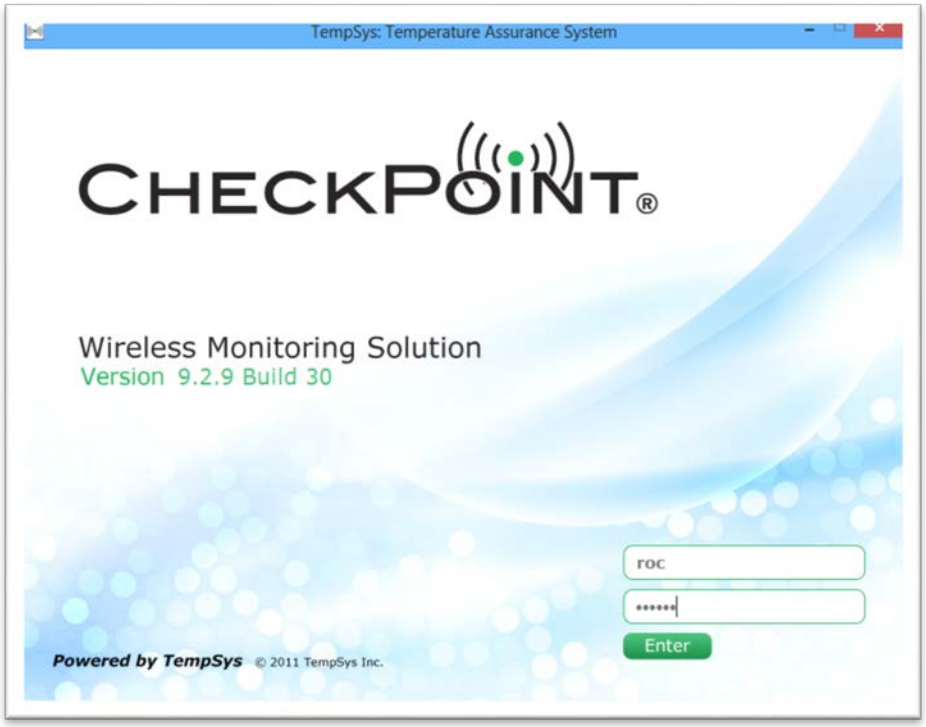


Figure 1 - Rich Checkpoint Login Screen

3.0 EQUIPMENT AND ALERT GROUPS

3.1 CheckPoint (Tempsys) Temperature Assurance Software Program - Version 9.3.11 Build 27, Database revision 2013198 (or more recent updates)

3.2 Access Points and Repeaters - A total of five access Points (CP-G4-Access Point-v4-41005) and five Repeaters (CP-G4-Repeater-41002) are positioned within the laboratory for wireless networking.

3.3 Sensors and Probes - CP-G4-E15 Sensors equipped with SS probe (-40 to 125 ºC) and G4 door access (where needed). A low temperature sensor 42007-L is used for -80ºC applications.

3.4 Fluke 7103 Temperature Calibration Micro-Bath (or equivalent) - Refer to SOP **LB-035** for operational instructions.

3.5 Appliances with Check Point probes are assigned to Equipment Groups based on laboratory sections and temperature monitoring requirements. An appliance can only be assigned to one Equipment Group. Equipment Groups are listed in **Table 1**.

Table 1 - Equipment Groups

CheckPoint Equipment Groups	
24 Hour Alert - Biology	Bench
24 Hour Alert - Nutrients	Inorganics-Metals
24 Hour Alert - Organics	Molecular
24 Hour Alert - Shared	Organics
24 Hour Alert - Soils	PM 2.5

Lab staff can be a member of multiple Equipment Groups. To view Equipment Group members and assigned appliances select *Settings* → *Groups\Email Escalation* from the menu bar, select the group of interest from the list and click the *Edit* button. Staff may elect to receive emails or text message alerts for the appliances in an Equipment Group. To modify Email or Alert Groups, select *Alerts* →*Email & Lamp Groups* from the menu bar, right click the group of interest and select *Edit*.

4.0 TWENTY-FOUR HOUR ALERT EQUIPMENT GROUPS

4.1 Ten appliances that are used for sample storage (**Table 2**) are assigned to 24 Hour Alert Equipment Groups. Chemistry and Biology supervisors rotate 24-hour a day on-call shifts every two weeks to ensure that alerts from these appliances are immediately addressed.

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Table 2- Limits and Locations for Refrigerators and Freezers

Unit ID	Room	Temperature Range	Time Outside Range Before Alarm Activates
Refrigerator 1	C301	0 to 6.0 °C	2 hours
Refrigerator 4	C301	0 to 6.0 °C	30 minutes
Refrigerator 5	C301	0 to 6.0 °C	30 minutes
Refrigerator 6	C301	0 to 6.0 °C	2 hours
Refrigerator 7	C301	0 to 6.0 °C	2 hours
Refrigerator 8	C301	0 to 6.0 °C	2 hours
Biology Walk-in Freezer	B227	-30.0 to -5.0 °C	30 minutes
BOD Room	B212	19 to 21 °C	30 minutes
Biology Walk-in Refrigerator	B227	1 to 6.0 °C	30 minutes
Refrigerator 10	C201	0 to 6 °C	30 minutes

4.2 The supervisor on-call rotation shift schedule is maintained in the "Alarm On-Call" calendar in Outlook Shared Calendars and can be updated as needed. Use the "Alarm On-Call" calendar to adjust the "On Call (Biweekly)" Alert Group in Checkpoint when the on-call shifts rotate. To edit the On Call (Biweekly) Alert Group, select *Alerts→Email & Lamp Groups* from the menu bar. Double-click the On Call (Biweekly) Email group and drag and drop recipient emails or phone numbers as needed. **On-call supervisors are advised to leave their office computers on during their shift to access Checkpoint via RDS, if necessary.**

4.3 When an alarm condition occurs in an appliance listed in Table 2, both a text message and email alert are sent to designated responders to notify them of the alarm so that corrective action can be taken. On any given day, two supervisors are on call and must respond to these alerts. If a supervisor is unable to perform on-call duties it is his/her responsibility to recruit another supervisor to cover their shift and also to edit the "On Call (Biweekly)" Alert Group in CheckPoint (see section 4.2).

5.0 MANAGING ALERTS

5.1. If an email or text alert is received, log into CheckPoint if you have not already done so. Current alerts and a list of equipment viewable by the user is displayed on the dashboard. Locate the sensor of interest in the "Current Alert" window (**Figure 2**). The color-coding for each sensor is: **Green** = Within range; **Red** – Above upper threshold; **Blue** – Below lower threshold.

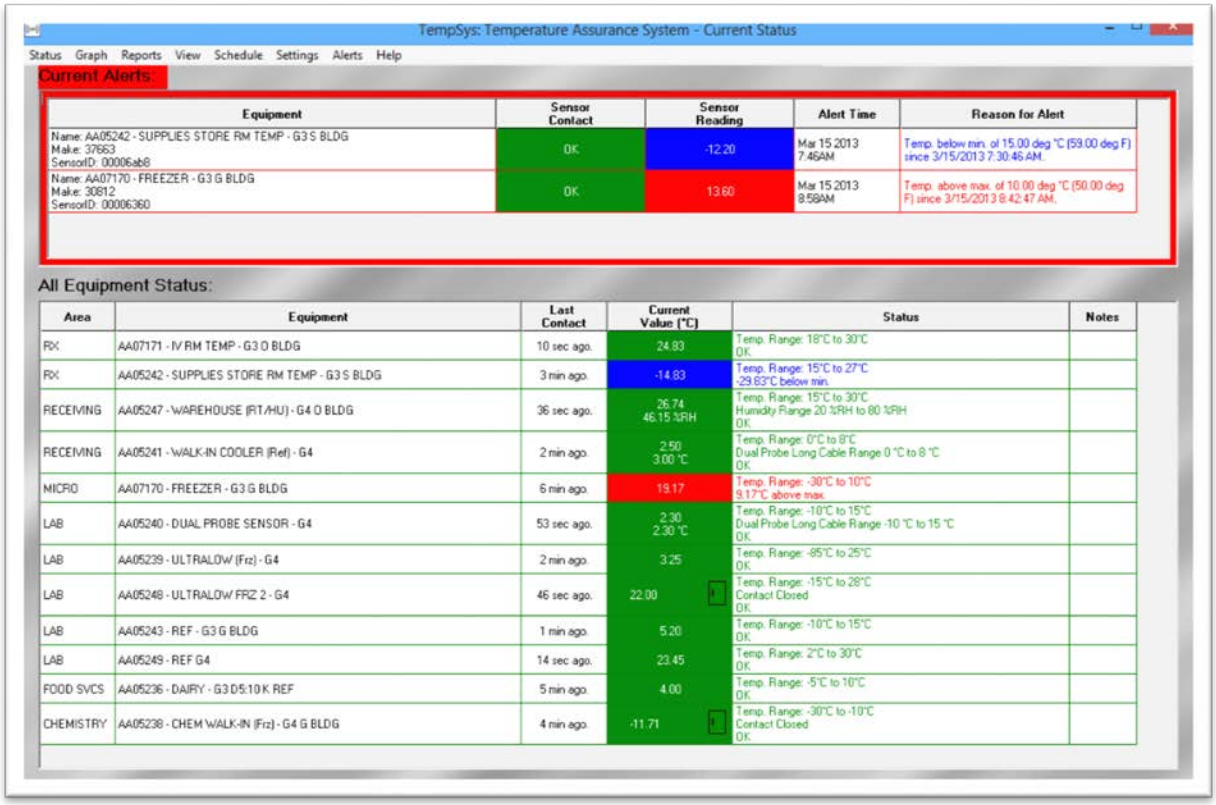


Figure 2 – Check Point Dashboard & System Status

5.2. Generate a graph for the appliance in alarm status. In the Current Alerts window, right click the sensor of interest and select "Graph It" (**Figure 3**).

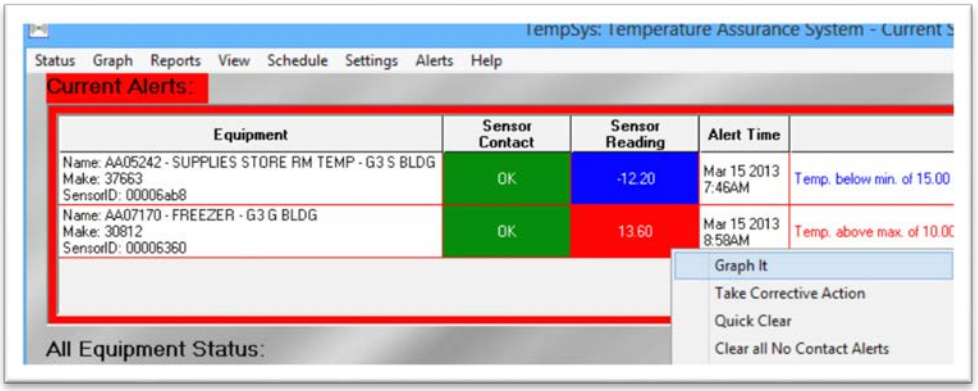


Figure 3 - "Graph It"

The graph in **Figure 4** illustrates that the temperature exceeded the upper threshold triggering an alarm.

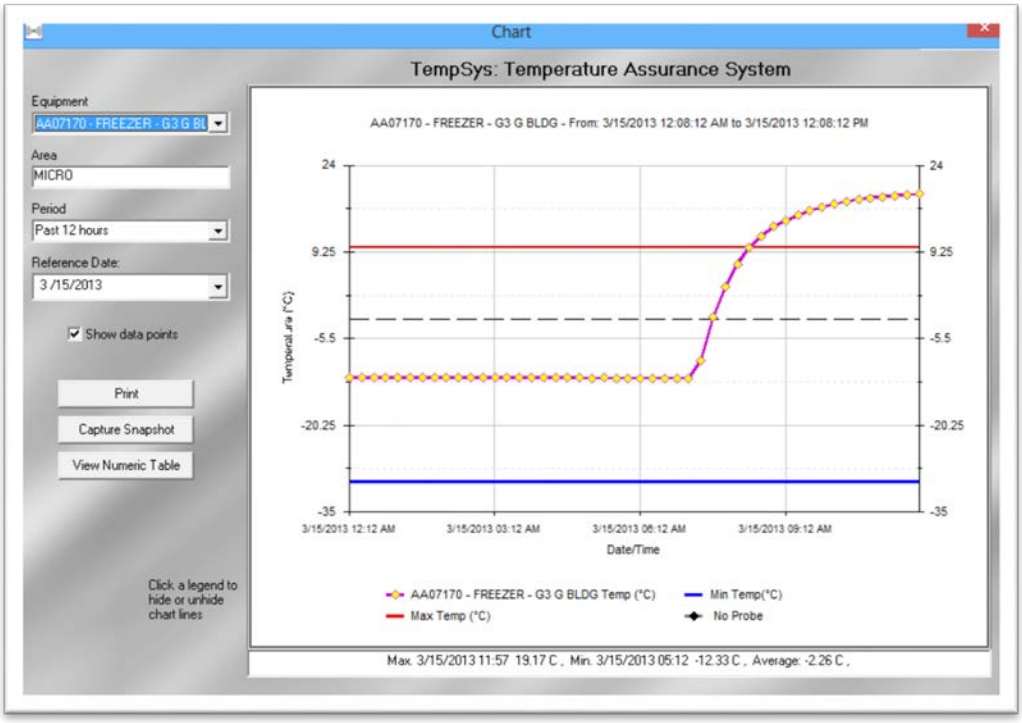


Figure 4 - Temperature Plot

5.3. If possible, physically inspect the appliance to determine the cause of the alarm (e.g., door left open), and correct the issue. If an on-call supervisor determines that repairs are required outside of business hours, contact the appropriate company. For units listed in Table 2, contact Brown's 24-hour service: (850) 877-2226. See **Figure 19** on page 19 for a diagram of rooftop compressor units.

5.4. Move Samples, if required. Samples may not be stored outside their required temperature range for more than 8 hours. If a unit cannot be repaired within that timeframe, transfer the samples to alternate storage locations.

- Samples in most small refrigerators may be moved to the larger walk-in refrigerators.
- Do not transfer samples to refrigerator 9. This unit is used for storage of highly contaminated, flammable waste samples.
- Do not move volatiles analyses (S-VOC.., W-VOC, etc.) samples to either the Biology walk-in refrigerator or refrigerator 5.
- Do not move empty sample containers. If storage space is limited, do not move samples that were collected more than 28 days prior.
- The walk-in freezer contains mostly fish samples and chlorophyll filters. The filters and fish tissue samples can be placed on ice, in a closed cooler in the Biology walk-in refrigerator.

5.5. Take Corrective Action. After addressing the issue causing the alarm (e.g., closing a door that was inadvertently left open), return to the Check Point dashboard, right-click the sensor of interest, and select "Take Corrective Action" (**Figure 5**).

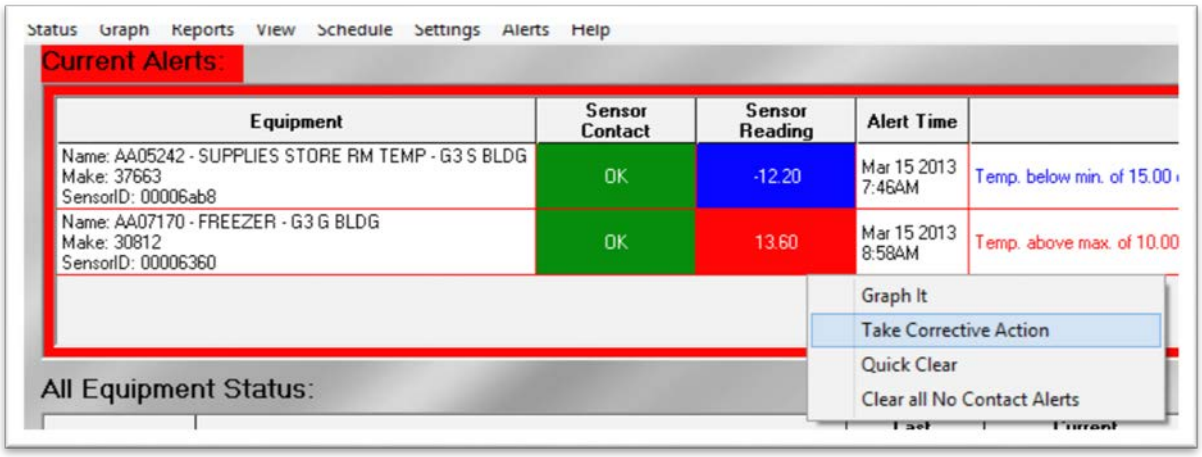


Figure 5 - Take Corrective Action

5.5.1. In the Diagnose Problem screen (**Figure 6)**, check all boxes that apply regarding the alarm and corrective action taken and click Next>>.

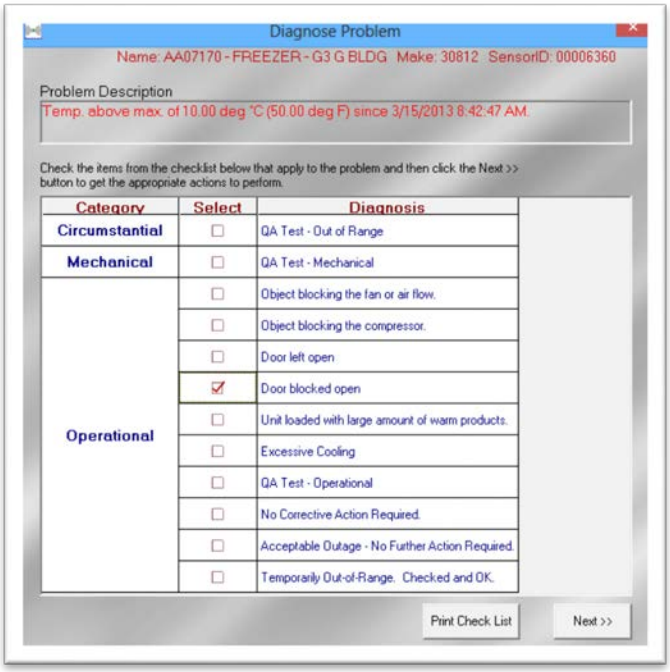


Figure 6 - Diagnosis Problem Documentation

5.5.2. Review the Corrective Actions screen (**Figure 7)**, which provides a detailed summary of the appliance that was in alarm status and the corrective action taken. The Corrective Action in the message box can be customized to contain

specific instructions (e.g., "Contact John Smith at 123-456-7890 for further assistance."). Click Next>>.

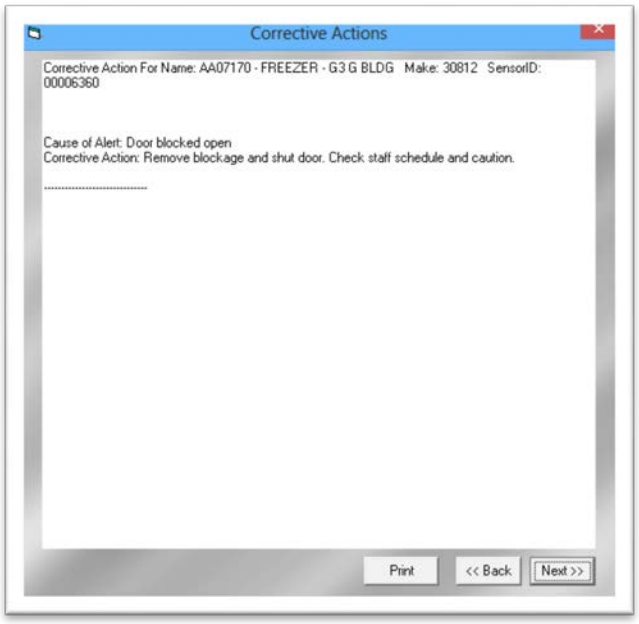


Figure 7 - Corrective Actions - Detailed Summary

5.5.3. Enter in the name and condition of the sample(s) in the upper box, and document the corrective action taken in the lower box (**Figure 8)**. Document all information to ensure compliance with regulatory and QA requirements. Select the appropriate radio button for "Is the equipment working properly": "**Yes**" fully dismisses the alarm with no further action required; "**No**" moves the alert to the "Corrective Action in Progress" window for further follow up. Click Save.

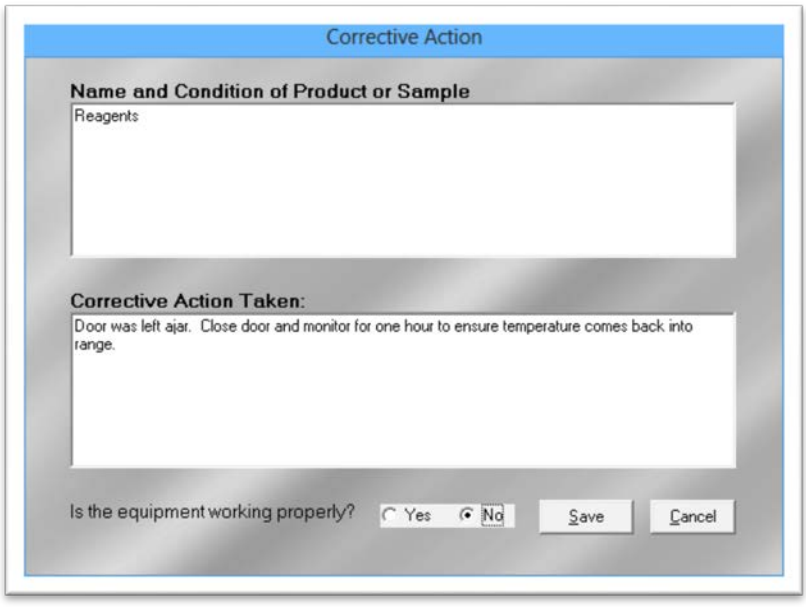


Figure 8 - Document Corrective Action Taken

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5.5.4. If "Yes" is selected, Check Point will prompt the user for their electronic signature (**Figure 9**) and deactivate the alarm. Any recurring alarms are new issues that must be addressed. Check the dashboard to ensure that the alert has been removed from the "Current Alerts" box.



Figure 9 – User's Electronic Signature

5.5.5. If "No" is selected under "Is equipment functioning properly?" the alert will be moved to the Corrective Action in Progress window for further follow up (**Figure 10)**.

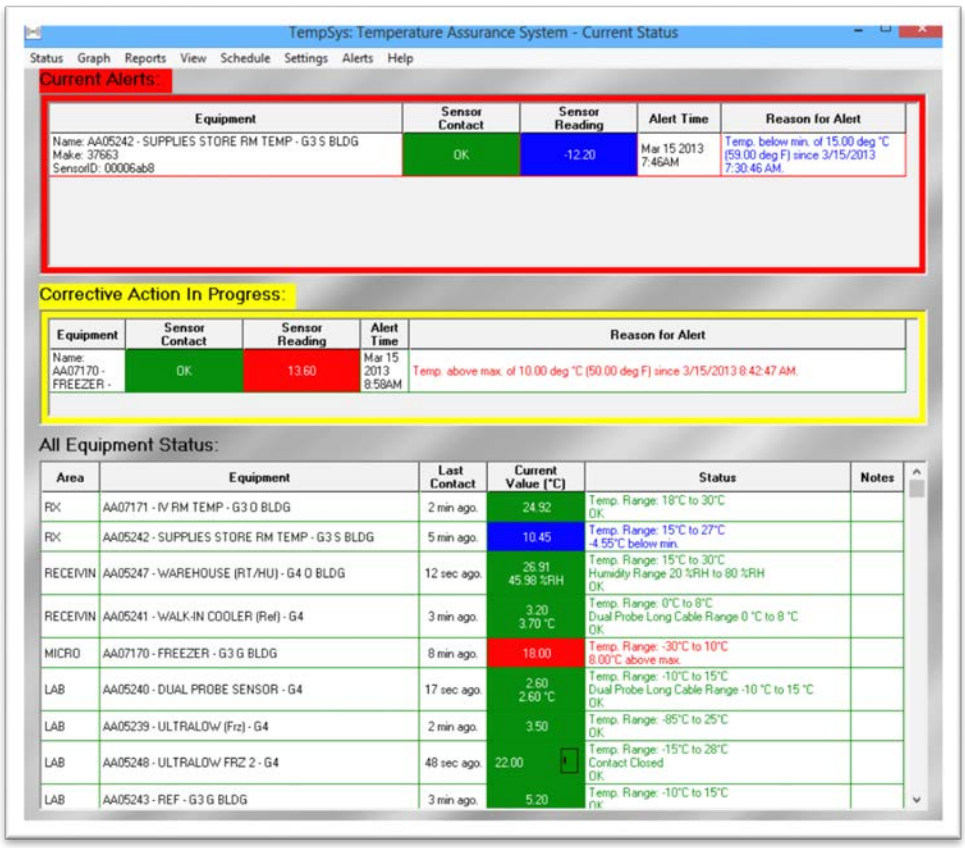


Figure 10 - Alert Moved to Corrective Action in Progress

6.0 CORRECTIVE ACTION IN PROGRESS

6.1 To follow up on an alert that has been moved to the Corrective Action in Progress window, right click on the equipment of interest and select "Process Further" (**Figure 11**).

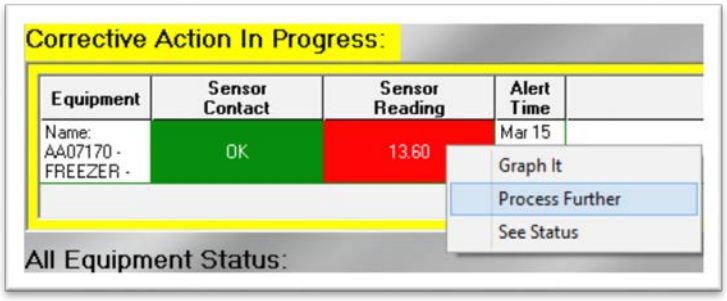


Figure 11 - Corrective Action in Progress Follow Up

Enter relevant information to finalize the corrective action documentation (see **Figure 8**). As with clearing current alerts, an electronic signature is required to complete a corrective action follow-up. When all alerts are addressed, CheckPoint displays "All Equipment Safe. No Alerts".

7.0 SYSTEM VERIFICATION / VALIDATION

Perform regular checks as described below to ensure that any alerts have been addressed and that CheckPoint is properly functioning.

7.1 Daily Status Checks. A CheckPoint Group Administrator from each section shall review the status of the appliances in their group(s) at least once per day. Group Administrators are required to save reports or numeric charts of temperature information including information relevant to their groups.

7.2 Alarm Checks. Each Group Administrator shall conduct high and low alarm checks on sensors within their equipment groups. When testing alarms, it is acceptable to change the Alert Threshold to a value that is less than the usual set point value to expedite Alarm testing. If the Alert Threshold is modified, record the change on the Test Log Sheet (see **Figure 18** on page 17 for an example of an Alarm Test Log Sheet). Once testing is complete, reprogram the Alert Threshold to the original setting. Test the sensors by either changing the alarm threshold minimum and maximum values or by simulating values using an external reference, such as a temperature reference or ice bath.

7.3 Wireless Signal Integrity - Verify the wireless connectivity of the sensor meets Tempsys requirements for link quality and signal integrity by utilizing the CheckPoint Log Analyzer to analyze the G2Log.txt file in the \Windows\Temp directory on the

CheckPoint application server. This function is performed by MesaLabs technical support in the event of connectivity issue.

8.0 ANNUAL PROBE RECALIBRATION

NOTE: **The following steps shall be performed with a buddy / lab-partner.**

8.1 Recalibrate probes annually to a NIST-traceable standard using the lab's Fluke Calibration Bath prior to the probe expiration date (refer to SOP LB-035, Calibration of the Lab Thermometers using a Constant Temperature Calibration Bath). In some cases (e.g., -80 freezers), probes must be exchanged with the new probes that have NIST Certificate of Calibration. Expiration dates are incorporated into the equipment's probe number under *Settings→Equipment* (**Figure 12)**.

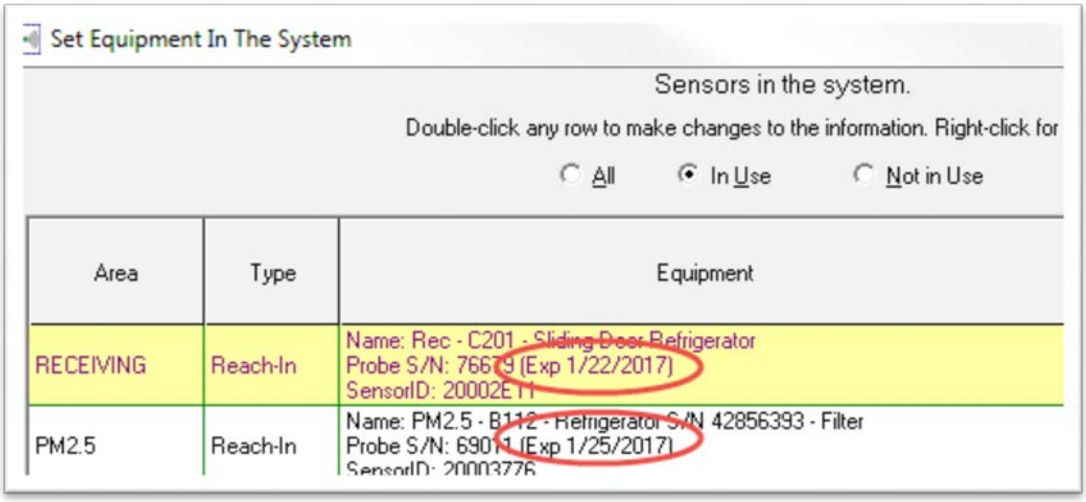


Figure 12 - Probe Expiration Dates

Use the Fluke Oil Bath (or other suitable certified reference standard) to recalibrate in-service probes or to evaluate any temperature probe or sensor that is suspect or requires certification within the operational temperature limits of the Fluke Oil Bath. The Fluke Oil Bath is located in Room B319 (Toxic Weighing). Up to 4 probes may be recalibrated at one time. Recalibrate probes in groups with the same temperature minimum and maximum requirement to expedite the process.

Set a Reminder (optional) that the unit is in calibration within the Tempsys software. Select *Schedule→Task Reminders* from the menu, right-click the window and select *Add Task.* Select the equipment of interest and complete the Reminder Details. In the Message text box, include a comment that explains the reminder, i.e., "Temperature probe calibration check is due on 01/29/2017." Click OK to save.

There are three methods for using the Fluke Oil Bath with the Checkpoint system. Method 1 is preferred unless there is a compelling reason to use another method.

8.2. Fluke Oil Bath Recalibration Method 1 - Recalibrate probe and sensor together. Both the sensor and probe are removed from the appliance and recalibrated at the Fluke Oil Bath. A temporary "Calibration Probe" is enable in Checkpoint to ensure no monitoring data are lost and to identify the recalibration timeframe.

8.2.1. Ensure that a cloned CAL sensor/probe pair has been created in the software. Turn on the Fluke Oil Bath (Bath) and PC in B319 and set upper calibration temperature limit for the Bath. Refer to Calibration of Lab Thermometers Using a Constant Temperature Calibration Bath, LB-035 for setting temperatures for the Bath.

8.2.2. Open the full Checkpoint software (not the Thin Client version) to enable and disable probes. In *Settings,* select *Equipment,* locate the sensor/probe to calibrate in the equipment list, and left-click to highlight. Disable the probe by right-clicking on the highlighted equipment, select *Edit Equipment,* uncheck the Enabled box and click OK.

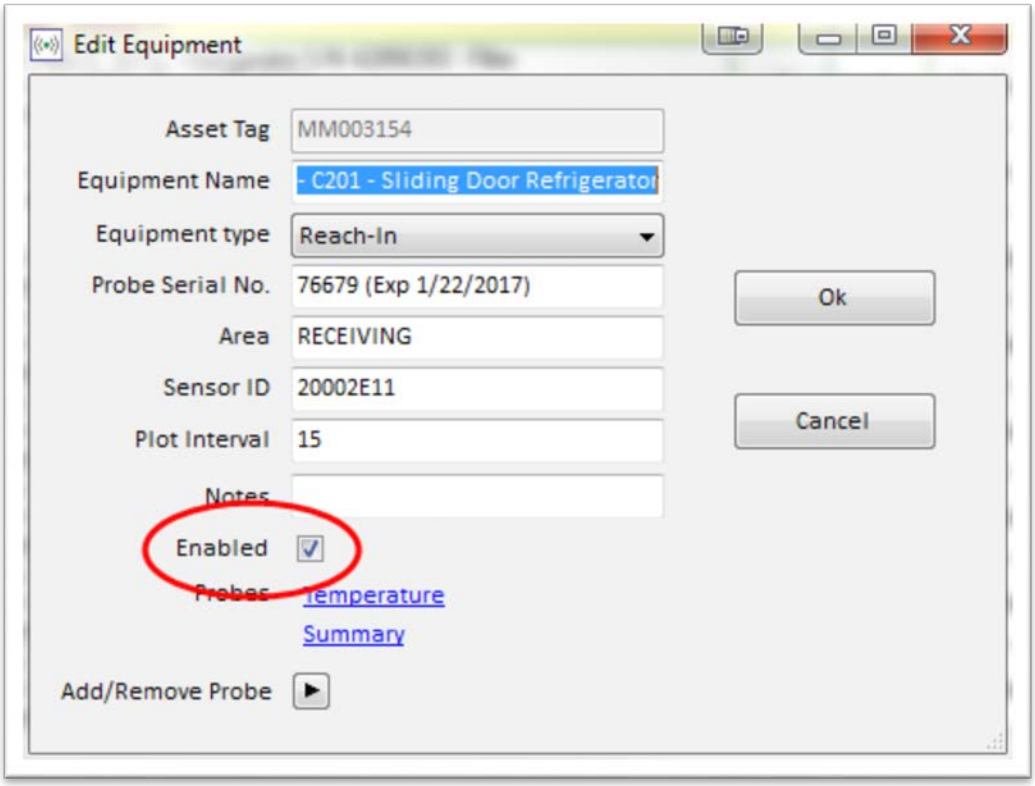


Figure 13 - Enable and Disable Probes

8.2.3. Enable the cloned probe/sensors. Select the Not In Use radio button, locate the "Cal-"version of the sensor/probe in the equipment list, and left-click to highlight. Enable the "Cal-"probe by right-clicking on the highlighted equipment, select *Edit Equipment,* check the Enabled box and click OK. The *Set Equipment In The System* box must be closed before the changes are reflected in the *All Equipment Status* area.

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8.2.4. The sensor and probe may be mounted together inside an appliance. Ensure that the yellow sensor is labeled with the Mesa tag number, unit location, and description to prevent confusion. Remove the probe from the glycol bottle and detach the yellow sensor from the wall of the appliance, keeping the probe and sensor plugged together.



Figure 14 – Sensor and probe mounted inside a refrigerator.

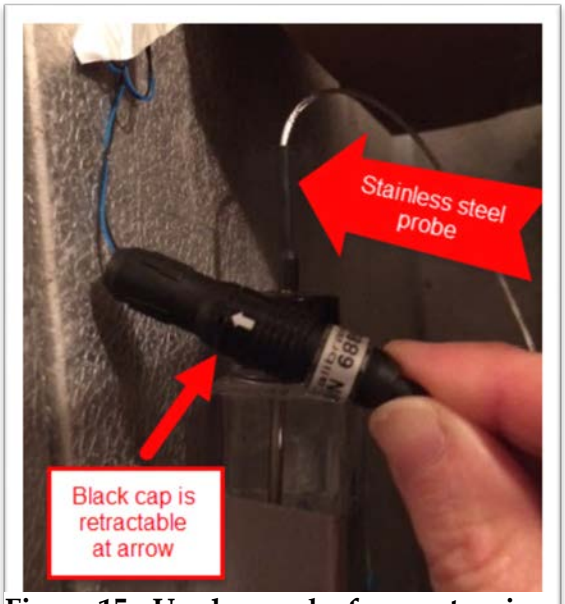


Figure 15 - Unplug probe from extension cable.

Alternately, the sensor is mounted on the outside of the appliance and connected to the probe inside the appliance by an extension cable. Remove the probe from the glycol bottle and disconnect it from the extension cable inside the appliance by pulling back the black cap.

Caution! Do Not Twist the Cap as this can break the connectors. Leave the extension cable in place. Carefully remove the actual sensor and probe from the appliance and immediately reconnect probe to sensor to prevent confusion. Return to B319 with the sensor/probe.

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8.2.5. Insert stainless steel probe into one of the holes in the top of the Bath. Do not insert probe all of the way into the hole as it may stick in the suspension basket. Up to 4 probes may be calibrated at the same time.

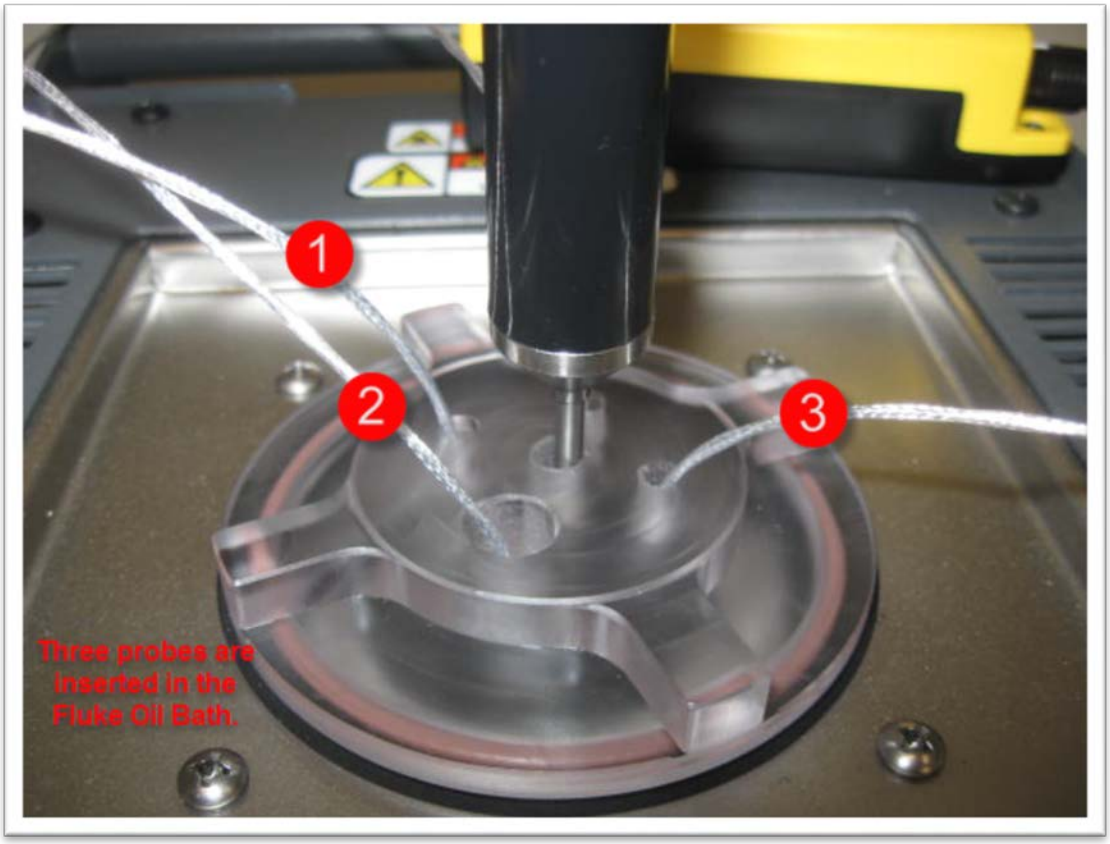


Figure 16 - Probes inserted in Fluke Oil Bath.

8.2.6. Wait for the Bath to reach the set temperature and for the temperature to re-stabilize. The graph scale should range between at least 0.5 degrees and the graph should show a 'boxy' appearance. This process can take from 5 to 10 minutes.

8.2.7. While waiting for the temperature to stabilize, replace the batteries in the yellow sensor and record the date, probe number(s), set temperatures, etc. in the Calibration Log Book. To replace batteries, remove the screw in the upper corner of the sensor and carefully separate the front (yellow) plastic cover from the back (black) base.

8.2.8 Once the "Cal-" sensor/probe temperature has stabilized, check the temperature on the high-accuracy thermometer and then immediately press the sensor button twice to send an instantaneous temperature reading to Checkpoint. Refresh Checkpoint's Equipment Screen under menu item *Status→Refresh* to capture the wireless data from the sensor. Repeat this step at least once to confirm readings. Record the reference and actual temperatures in the Calibration notebook. The temperatures must be within ± 0.5 degrees of the reference temperature to pass recalibration.



Figure 17 - Sensor Button

8.2.9. When all sensor/probes are recalibrated for the first temperature point, reset the Bath to the low temperature and repeating steps above. It may require up to 1 hour for the Bath to stabilize at the new temperature set point depending on the temperature range. The calibration process for each sensor/probe should bracket the expected temperature working range.

8.2.10. Once both maximum and minimum temperatures have been verified, disable the "Cal-"sensor/probe and enable the sensor/probe in Checkpoint. Follow LB-035 to shut down the Fluke Oil Bath.

8.2.10. If the probe fails the calibration verification remove it from service and leave a calibrated temporary probe and sensor in place until a replacement is acquired (if applicable). Contact your Supervisor for additional instructions.

8.2.11. Review all entries in the calibration notebook and document the new probe expiration date in Checkpoint before returning the sensor and probe to the appropriate appliance. Verify that the assigned sensor label information is accurate, press the sensor button twice, and refresh the status in Checkpoint to verify that the probe is connected and in working operation.

8.3. Fluke Oil Bath Recalibration Method 2 - Temporarily suppress the probe from alarming in Checkpoint. Remove only the probe from the appliance (leave the yellow sensor in place). Recalibrate the probe using one of the designated Fluke sensors by the verification process described in section 8.2. Be sure to use the correct sensor type for the probe to ensure a correct and comparable reading.

8.4. Fluke Oil Bath Recalibration Method 3 - Temporarily replace the probe with another calibrated probe during the recalibration process to insure uninterrupted service. Recalibrate the probe using one of the designated Fluke sensors by the verification process described in section 8.2. Be sure to use the correct sensor type for the probe to ensure a correct and comparable reading.

8.5 Final Checklist

1) Have all sensors/probes been reconnected to the correct refrigerators?

2) Have all "Cal-" sensors been disabled and sensor probes re-enabled in CheckPoint? (8.2.10)

3) Has the fluke oil bath been properly shut down in accordance with SOP LB-035?

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Date: _____

Figure 18 - Checkpoint Alarm Test Log Sheet

Notify appropriate staff by email before testing any alarms.

Sensor Name:	Sensor Type & ID No. :
Appliance Manufacturer/ Model #:	Sensor Probe ID.:
Asset Tag ID#:	Sensor Bldg / Rm #:
Reference Thermometer ID:	Calibration Expiration:

Change minimum and maximum temperature to verify alarm system is working.

Minimum temperature: _____ (C) Test minimum temperature: _____ (C)
Maximum temperature: _____(C) Test maximum temperature: _____ (C)
Alert threshold: _____ (hours/minutes) Test alert threshold: _____ (hours/minutes)

Test No	Test Result		Alarm Type		Test Methodology			**Signal Integrity** Link Quality (% LQ)	Notes & Comments
	Pass	Fail	Low Alarm	High Alarm	Change Min	Change Max			

Low temperature reset to correct minimum? _____ *(initial)* _____ *(date)*

High temperature reset to correct maximum? _____ *(initial)* _____ *(date)*

Alert threshold reset to original time? _____ *(initial)* _____ *(date)*

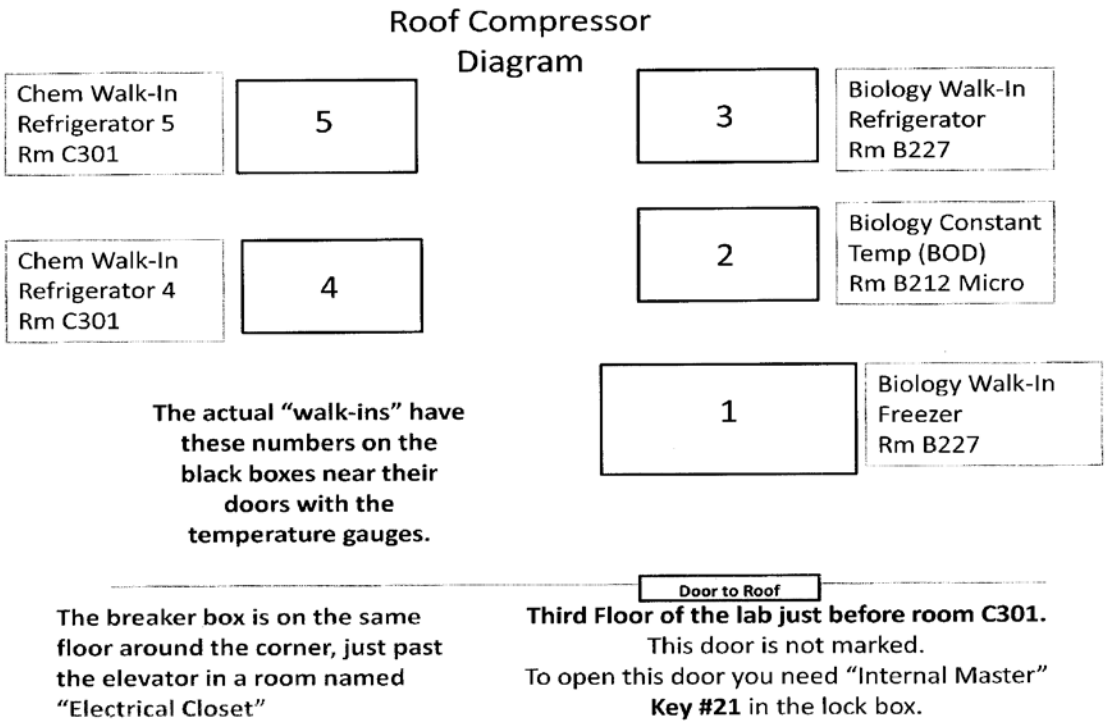
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Table 3 - Recommended Annual System Validation & User Training

#	Description	Notes & Comments
1	Probe Calibrations with a new NIST Certificate of Calibration	Snap Calibration Exchange
2	Replace all sensor batteries at time of yearly calibration or as necessary	Minimum voltage 2.9 V
3	System repairs and preventive maintenance	As needed and where applicable.
4	Update CheckPoint application software on the server and user rich client software, as applicable	Upon approval of update (minor change) or upgrade (major change)
5	System Verification and Validation as set forth in sections 4.1 and 4.2, respectively 4.1 System Status of Health (SOH) Verification 4.1 Alarm Checks & End-to-End System Validation	Procedures and acceptance criteria as approved by customer's QA.
6	User Training (a) Basic User (b) Administrator (c) Basic Installation, Troubleshooting & Preventive Maintenance Training	All attendees must sign Attendance Sheet.
07	SQL Database Backup – IT to verify daily backups of SQL database are successfully completed.	Full backups can also be scheduled within CheckPoint from the Server menu: Schedule → Backup.

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Figure 19 - Roof Compressor Diagram



9.0 NOTES

CheckPoint is compliant with the FDA 21 CFR Part 11 Electronic Records regulation, and meets or exceeds requirements to comply with the following regulatory agencies: Joint Commission, FDA, CAP, AABB, CLIA, USP 797, and State Board of Pharmacy.

Tempsys is accredited by the American Association for Laboratory Accreditation and is an ISO/IEC 17025:2005 & ANSI/NCSL Z540-1-1994ISO/IEC 17025 accredited calibration laboratory. All sensors include a NIST Certificate of Calibration and optional A2LA certification. Tempsys is the manufacturer of the CheckPoint wireless temperature monitoring system and installs, validates, and supports the CheckPoint system.

In Case of Freezer or Refrigerator Breakdown, contact:

Brown's Commercial Refrigeration
4020 Woodville Hwy #D
Tallahassee, FL 32305
24-hour service: **(850) 877-2226**