**Purpose:**

To provide instruction in response to temperature alarms, for the storage units of blood and tissue components, to ensure the products remain within the required temperature range.

**Temperature Alarm Guidelines**

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| **Monitored Storage Unit** | **Required (Acceptable) Temperature Range** | **Low Alarm Activation Temp** | **High** |
| Blood Refrigerators | 1° C - 6° C | 1.5° C | 5.5° C |
| Reagent Refrigerator | 2° C - 8° C | 2.5° C | 7.5° C |
| Platelet Incubators | 20° C - 24° C | 20.5° C | 23.5° C |
| Plasma Freezers | -18° C and lower | None | -20° C |
| Ultralow Freezers  | -40° C and lower | -96° C | -65° C |
| Room Temperature | 19.4 – 23.9oC | 19.4 oC | 23.9 oC |
| Humidity | 15 – 65% | 15% | 65% |

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| **Alarms** |
| Transfusion Services Laboratory has a redundant alarm system for all blood, bone, and reagent storage devices. Room temperature and humidity are also monitored by the Temp Trak System.* Temp Trak is a computer monitoring system with pager notification.
* Audible alarms are in place for all units.
* If Temp Trak cannot “hear” a wireless sensor, a Miscommunication occurs resulting in a pager alarm. See “Using the Temp Trak System” SOP.
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| **Step** | **Action** | **Related Documents** |
| * + **Alarm Sounds**
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| **Initial Response for all Alarm Events**  | * Silence audible alarms and/or Temp Trak pager.
* Evaluate storage unit for probable cause of the alarm event, correcting obvious problems immediately.
* Record digital and thermometer temperatures in Temp Trak.
* If Temp Trak is not available, record alarm event on downtime log.
* Start 25 minute timer to insure frequent observations of temperature trending.
* If the storage unit is a portable, consider replacing with a functioning unit.
* Document all actions and findings.
* Clear Temp Trak alert in order to reactivate alarm notification
 | * + Using the Temp Trak System to Monitor Blood Storage Devices
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| **Step** | Action | Related Documents |
| **Additional Investigation Steps** | * + Check the alarm and/or system battery. Replace if needed.
	+ Verify the temperature probe is not out of the solution bottle or has been damaged.
	+ Confirm the Temp Trak probe is connected.
 | OperatorManuals |
| **Acceptable Internal Temperatures**  | Continue to monitor the internal temperature. As long as the internal thermometer readings are within the acceptable range: * Record the temperature every 30 minutes until the alarm issue is resolved and normal alarm function is restored.
* Document the reason in the “Comments/Corrective Action” section.
* Avoid excessive opening and closing of the door(s) to maintain internal temperature.
* It is **not** necessary to move components or bone at this time.
 | Manual Storage Unit Temperature Log |
| **Unacceptable Internal Temperatures** | If the internal thermometer readings are **not** within acceptable range:**Blood storage Refrigerators:** * Record the internal temperature at 15 and 30 minutes.
* If the internal temperature has not returned to the acceptable range **within 30 minutes** or the unit has failed completely,
* Move the contents to an alternate unit.

**Plasma Freezers or Platelet Incubators:*** Record the internal temperature at 15 minutes.
* If the internal temperature has not returned to the acceptable range after 15 minutes or the unit has failed completely,
* Move the contents to an alternate unit.

**Reagent and Sample Storage Units*** Record the internal temperature at 15 and 30 minutes.
* Continue with temperatures every 30 minutes until the temperature is acceptable, contents have been relocated or the TS Manager approves discontinuation.
* Storage temperature is not as critical as blood component storage.
* Relocation of contents can be delayed awaiting consult with TS Manager, TS Leads, and/or Engineering.
 | Packing Components for Return to PSBCManual Storage Unit Temperature Log |

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| **Step** | **Action** | **Related Documents** |
| **Unacceptable Internal Temperatures** **(continued)** | **Notifications*** Contact the Lead Tech, Manager, and/or appropriate service department.
* Portable refrigerators: Notify **Clinical Engineering** to respond STAT (206-744-3496).
* All other storage equipment: Notify **Facilities Engineering** to respond STAT (206-744-3191).
* After hours, page the Nursing Supervisor through the hospital operator. They will contact the engineer on call to respond to TSL.

**NOTE:**  Engineering is expected to respond within 30 minutes of receiving a STAT call. **If NO alternate is available:*** Contact the TS Manager and PSBC Inventory Management
* Make arrangements to return components to PSBC

**Ultralow Freezers (Bone and Tissue Storage Units)*** Record the digital temperature at 15 and 30 minutes.
* Refrain from opening the door.
* Ultra low in OR: Notify OR front desk and deliver the key to them after insuring the freezer is locked.
* Bone freezer contents must be moved if temperature reaches -40oC
* Alternative storage is available in OR.
* If no alternate is available, immediately notify:
	+ **First call** TSL Manager or Medical Director.
	+ Risk Management (744-9574).
	+ Infection Control (744-9560).
	+ Neurosurgery Attending (for autologous cranial bone flaps on call through the hospital operator.
	+ Orthopedic Attending (for all other autologous bone, if any) on call through the hospital operator.
* Leave completed *Manual Refrigerator/Freezer Temperature Logs*in the TSL review file holder.
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| **Remove from Service** | If the storage unit is evaluated as requiring repairs, remove the equipment from service. | Removing Equipment from Service  |
| **Wastage Reporting** | Complete an on-line incident (PSN) and an internal QIM report whenever blood components or bone are wasted due to a malfunctioning storage unit. | Quality Improvement Monitoring FormNonconforming Bone SOP |
| **Step** | **Action** | **Related Documents** |
| **Room Temp and Humidity** | Report directly to Facilities Engineering.  | Removing Equipment from Service |
| **Notifications** | Document equipment problems and their resolution in the Communication Book and include in the shift change report. |  |
| **Bone Freezer Alarms** |
| **Digital Display and Control Panel** | The tissue freezer alarm system is shown in Operators Manual. When an alarm is active, a message appears in the LED message center. * Press the MUTE key to silence the audible alarm for the ring back period.
* The visual alarm will continue until the freezer returns to a normal condition.
* When an alarm condition occurs and then returns to normal, the freezer automatically clears the alarm condition and the message center.
* When multiple alarm conditions occur, active messages are displayed in the message center one at a time, updating at 5 second intervals. Pressing Mute during multiple alarms causes all active alarms to be muted and ring back in 15 minutes.
 | OperatorManuals |
| **Probe Failures** | Probe failures:* If an error is detected with the control probe (PROBE 1 FAIL), the high and low stage compressors will run continuously. As a result, the cabinet temperature will decrease until it reaches the lowest temperature that the refrigeration system can maintain.
* If an error is detected with the heat exchanger probe (PROBE 2 FAIL), the freezer will cycle properly at its temperature set point using a 5 minute step start between the high and low stage compressors.
* If an error is detected with the condenser probe (PROBE 3 FAIL), there is no impact on the performance of the freezer. However, the hot condenser alarm may also occur when the condenser probe fails.

Call the TSL Manager or Medical Director (when time appropriate) regarding any probe failure alarms. Technical service is required. | Operator Manuals |

**References**

AABB Standards for Blood Banks and Transfusion Services, Current Edition

Manufacturer Operator Manuals for Helmer i Series Refrigerators and Freezers

Manufacturer Operator Manual for Helmer Horizon Platelet Incubator

Manufacturer Operator Manual for VWR Tissue Freezers