DPM Workshop

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Elko, Nevada

Diesel Particulate Filter Application
Case Study

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- **Multi pronged approach for DPM control**
  - **Corrective Measures for Existing Ventilation**
  - **Engine Replacement**
  - **Exhaust Filtration**
  - **Upgrade Mine Ventilation Volumes**
  - **Alternative Fuel Trials**

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Exhaust Filtration

- **Assess equipment fleet as to primary sources for DPM**

- **MSHA listing for Particulate Index (P.I.)**

- **P.I. is based on Ventilation Rate to normalize emissions to 1000 μg/m^3**

- **Some of your larger engines may not be your biggest polluters**

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Diesel Particulate

MAJOR EQUIPMENT FLEET

- **40D Truck**   **6**   **475 HP**
- **450/1250 Loader**   **4**   **300 HP**
- **420 Teletram**   **6**   **225 HP**
- **436 Teletram**   **2**   **375 HP**
- **Wagner ST3.5D**   **4**   **200 HP**
- **Elphinstone Loader**   **1**   **165 HP**
- **Getman Carriers**   **11**   **150 HP**
- **Normet Carrier**   **2**   **150 HP**
- **Jumbos**   **10**   **75 HP**
- **Tractors**   **25**   **53 HP**

Exhaust Filtration

- **Target Equipment Requirements for Passively Regenerated Filters**
  - **4 Cycle Engines**
  - **High Duty Cycle**
  - **High Exhaust Gas Temperatures**

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Exhaust Filtration

- **Temperature profiling is imperative**

- **Data logging over several days to gain a good perspective of operating conditions**

- **Test each piece of equipment in a given production cycle**
  - **Eg; Two LHD's, similar configuration, one in remote mucking, the other in manual mucking**

  - **One configuration was successful, the other, marginal**

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4 Channel Data Logger

6" K type Thermocouple

Data Logger, Probe and Case

Toro 40 D Installation

Toro 40 D Installation

Getman A64 Scissors Truck

Getman A64 Installation

Getman A64 Installation

Getman A64 Installation

Kubota M5030 Tractor

Kubota M5030 Tractor

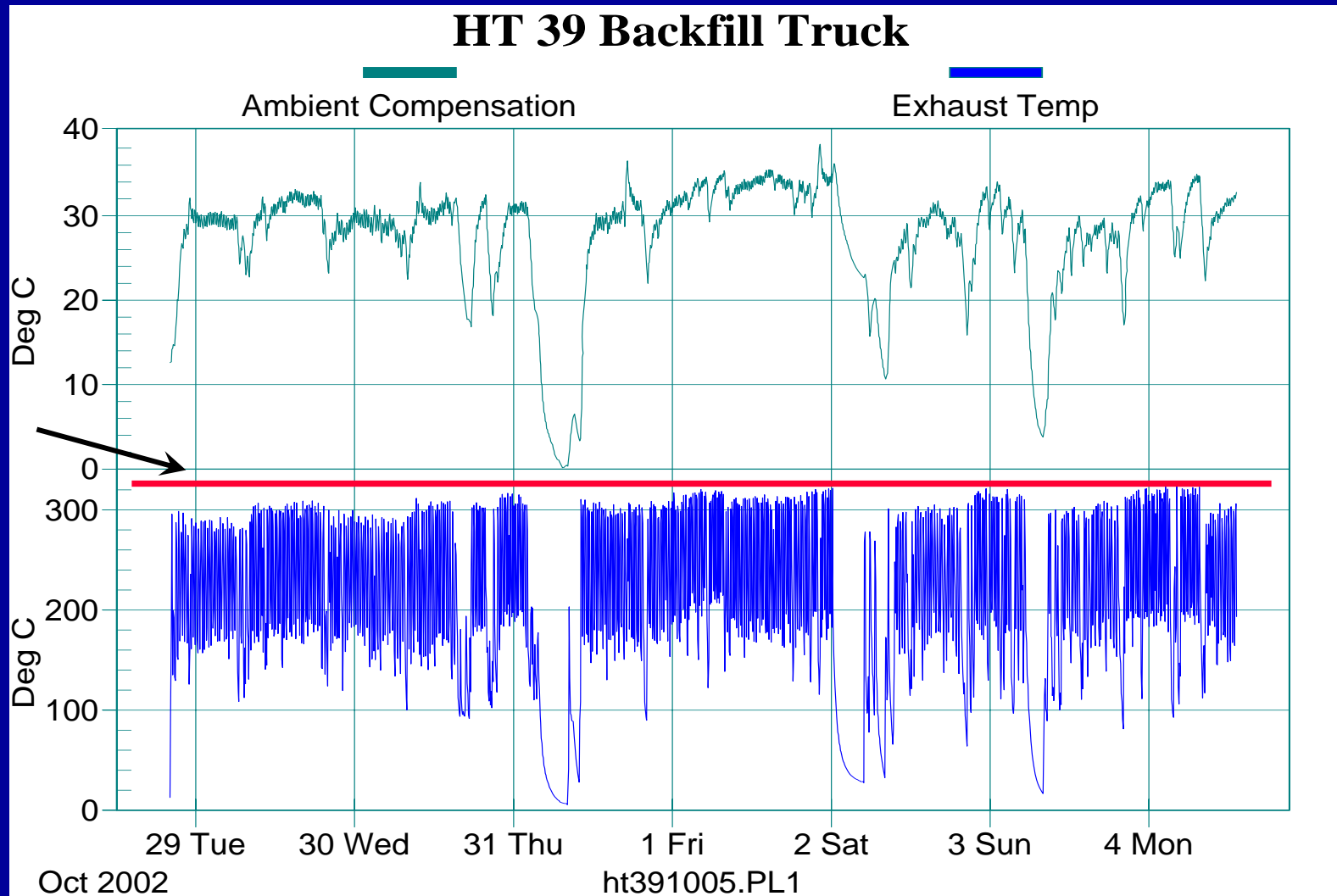# Kubota M5030 Installation

Temperature Profile

Temperature Profile

HT 39 Backfill Truck
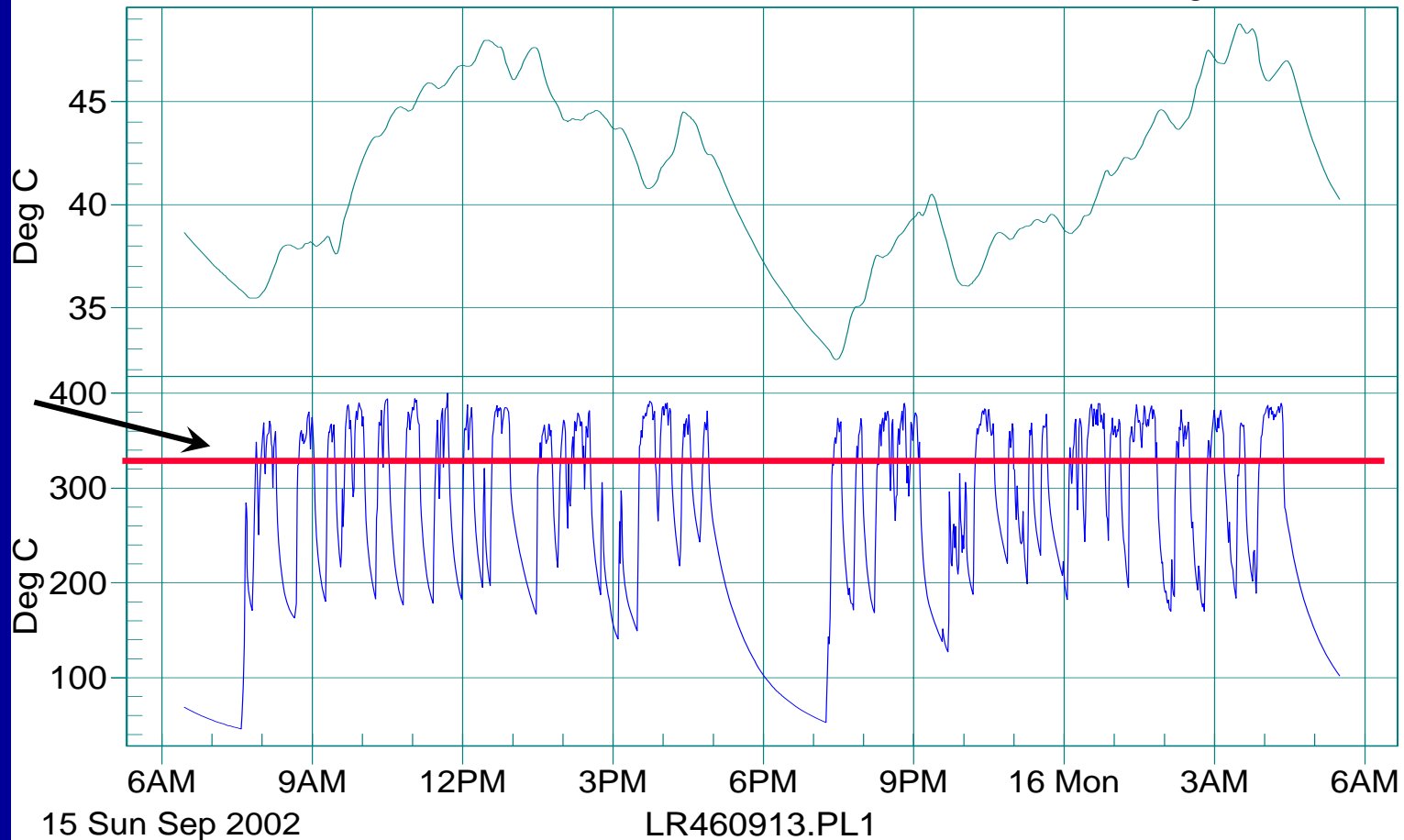
Diesel Particulate Filter Selection Criteria

- **Catalyzed Cordierite Filter**
  - **20 % Duty Cycle exceeds 325 Degrees F**

- **NIOSH Filter Guide**

  - **http://www.msha.gov/nioshmnmfilterselectionguide/MNM_DPF_Questions.htm**

  - **http://www.msha.gov/nioshmnmfilterselectionguide/temp_analysis.htm**
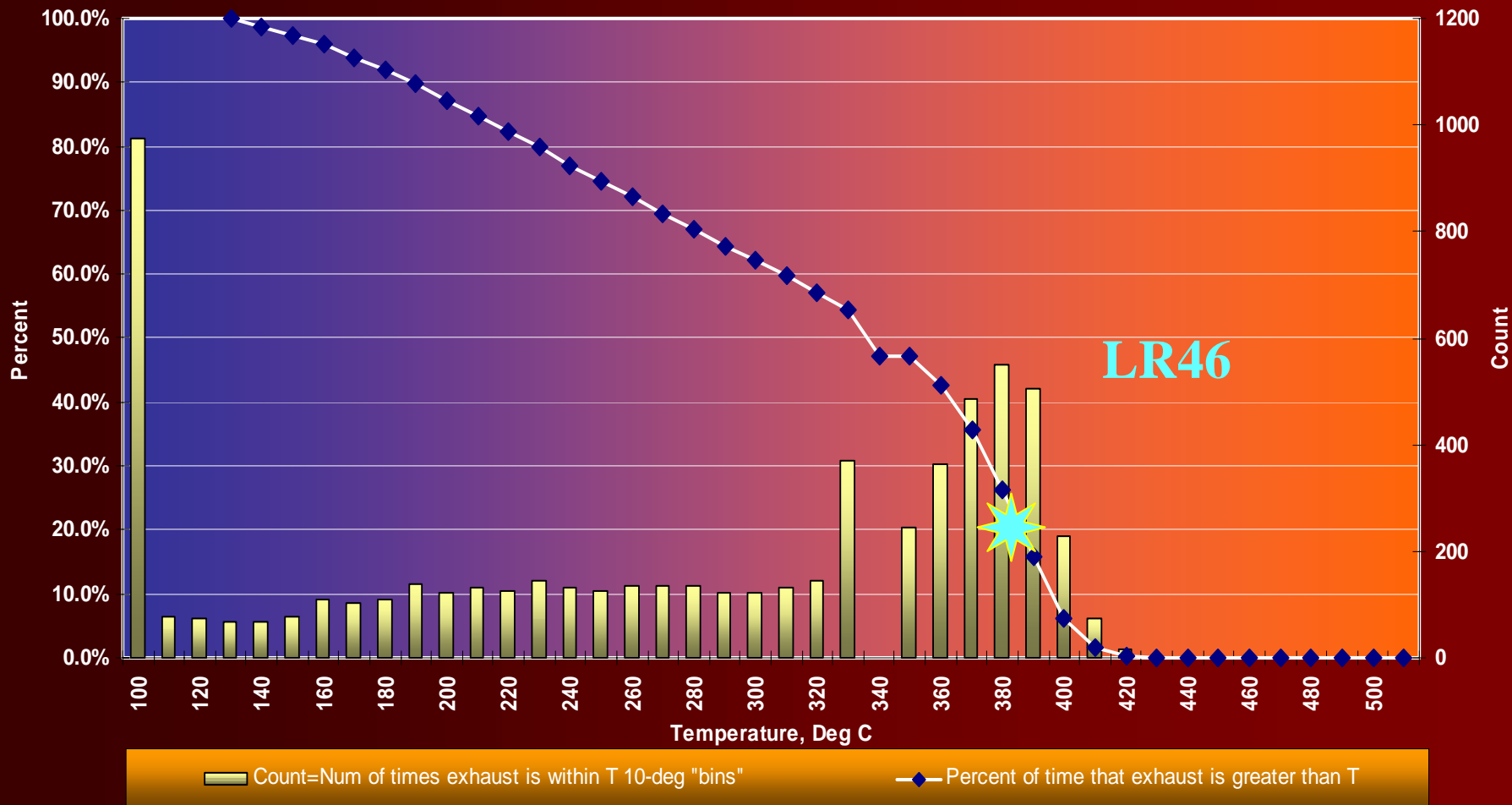
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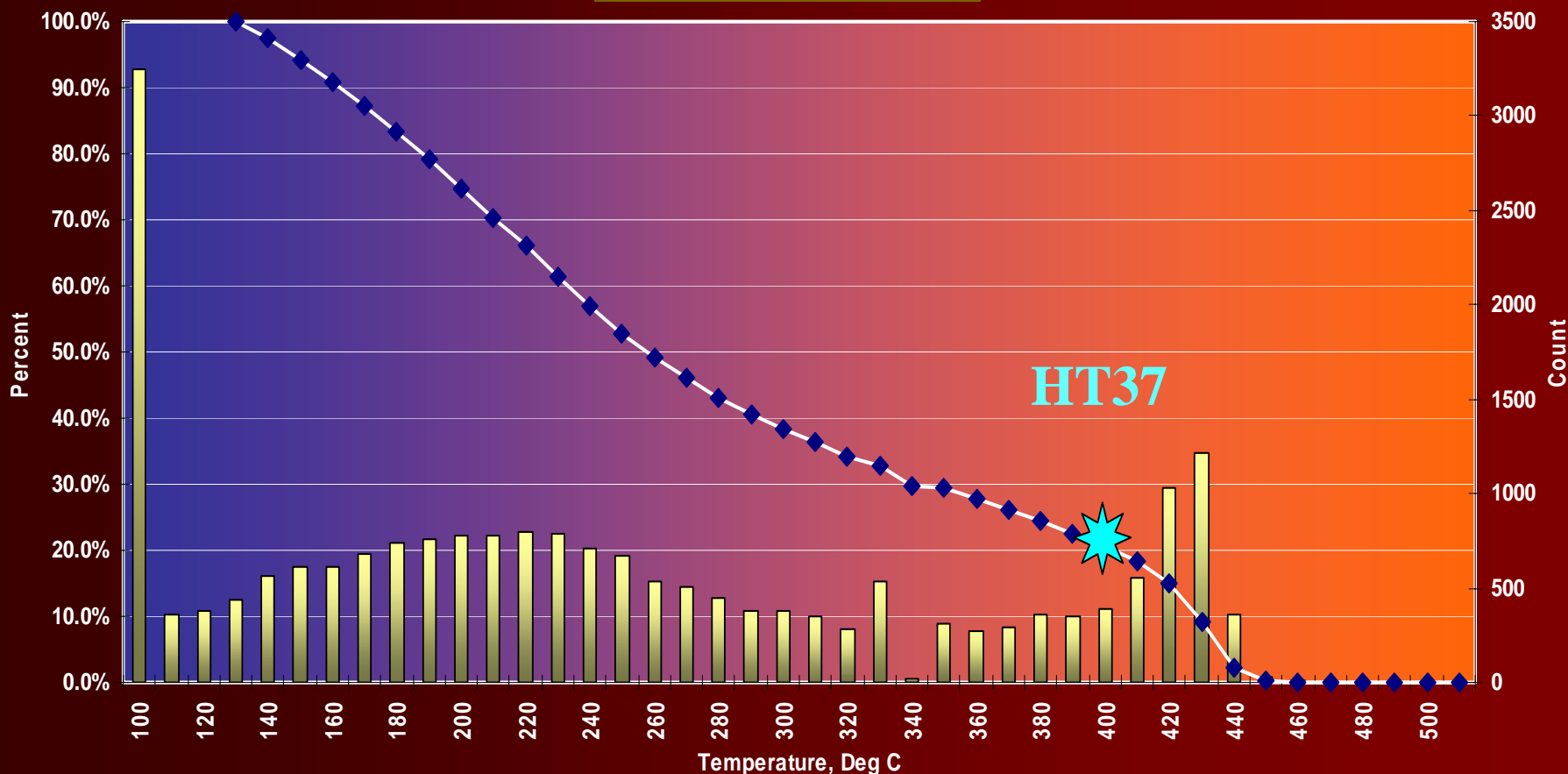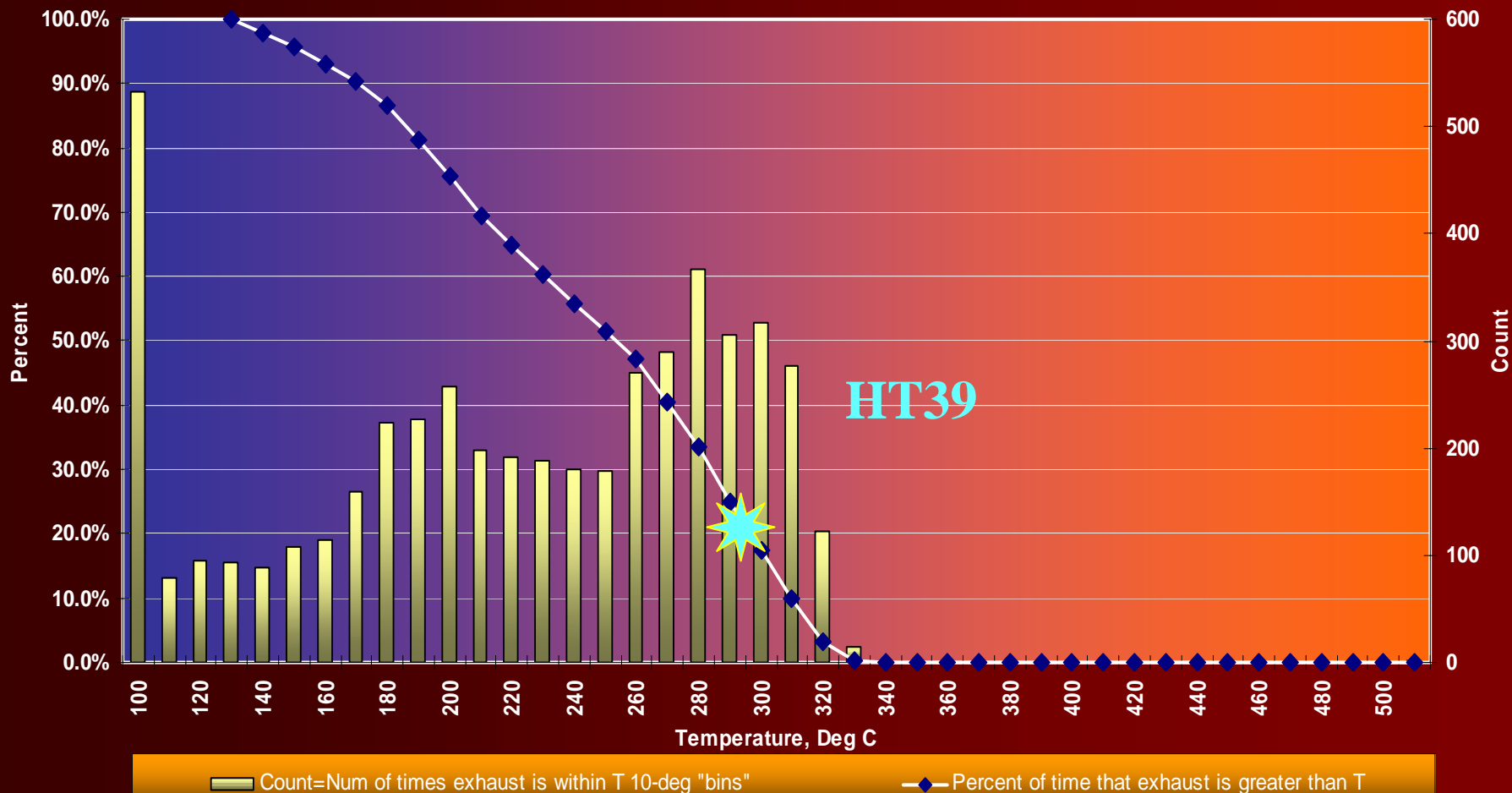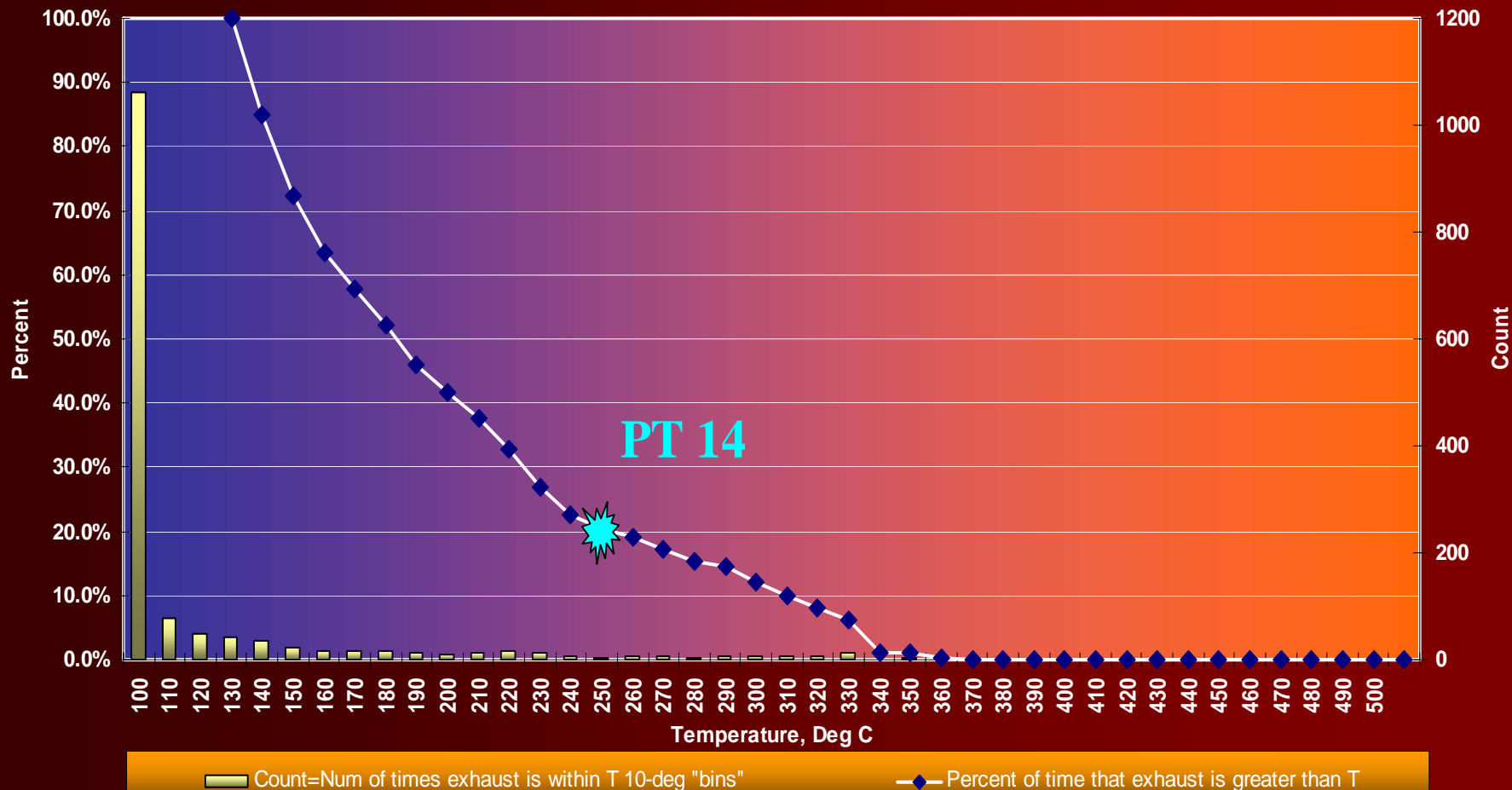
Passive Filter Installation

Active Filter Installation
Getman A64 Powder Truck
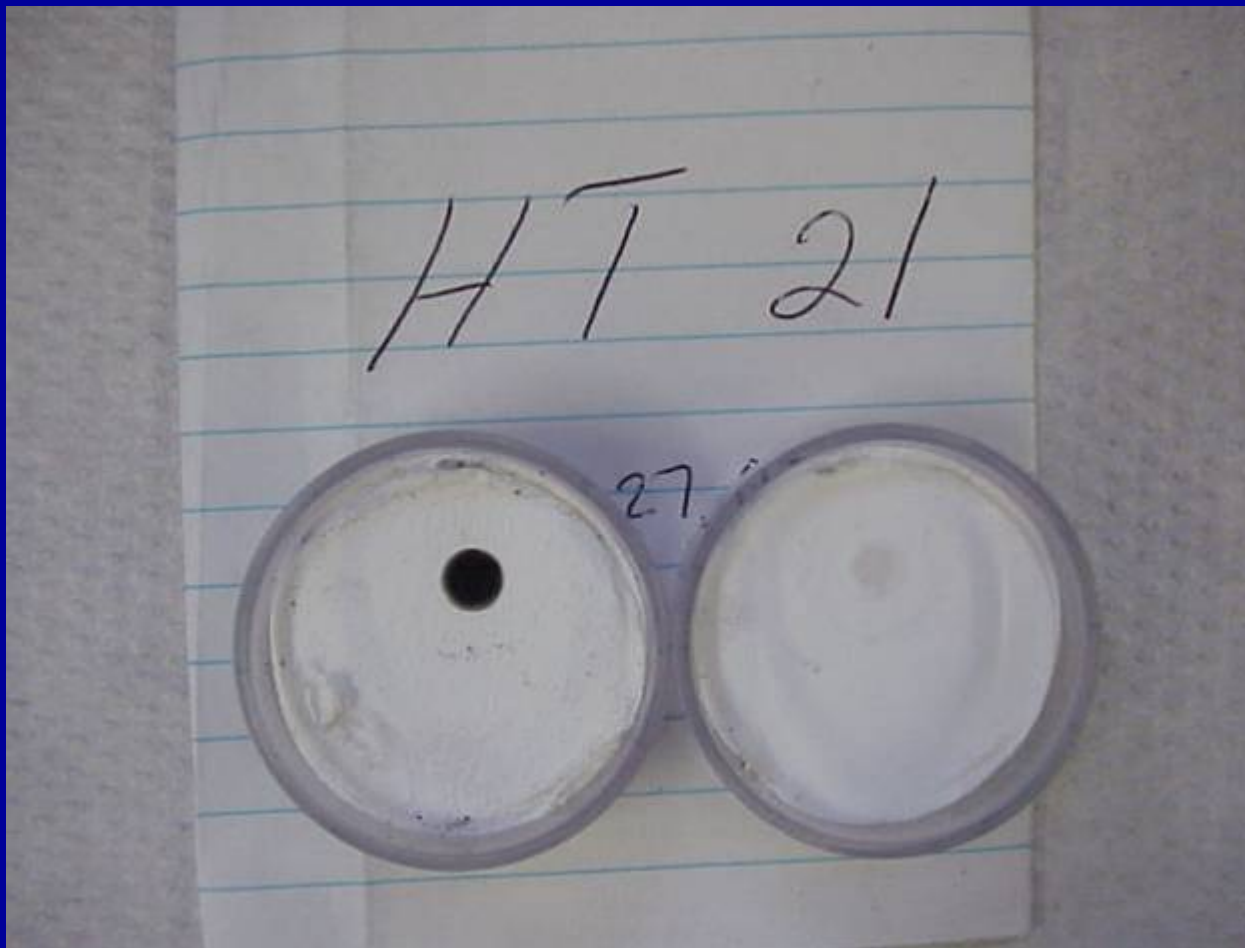
Active Filter
Mounted on Getman Powder Truck

LR46 - 6 Weeks -Filtered Exhaust

LR46 - 1 1/2 Shifts with no Filter

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Pre & Post Filter Samples

Failing Filter
Discharge Side - Soot Ghosting, Rotation

Failed Ceramic - Exhaust Bypass

Active Regeneration Filters
Left – Clean Filter, Right - Soot Loaded Filter

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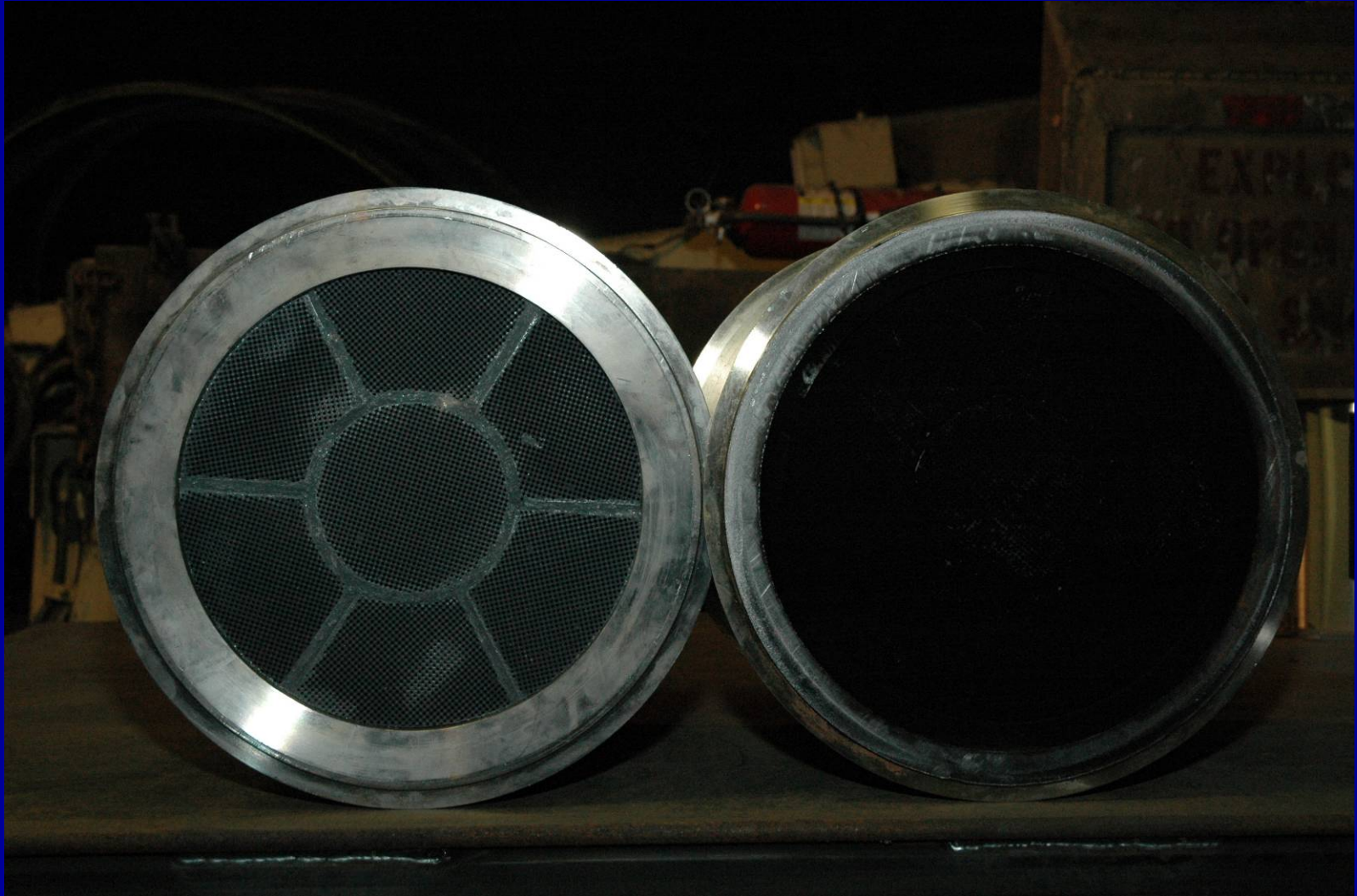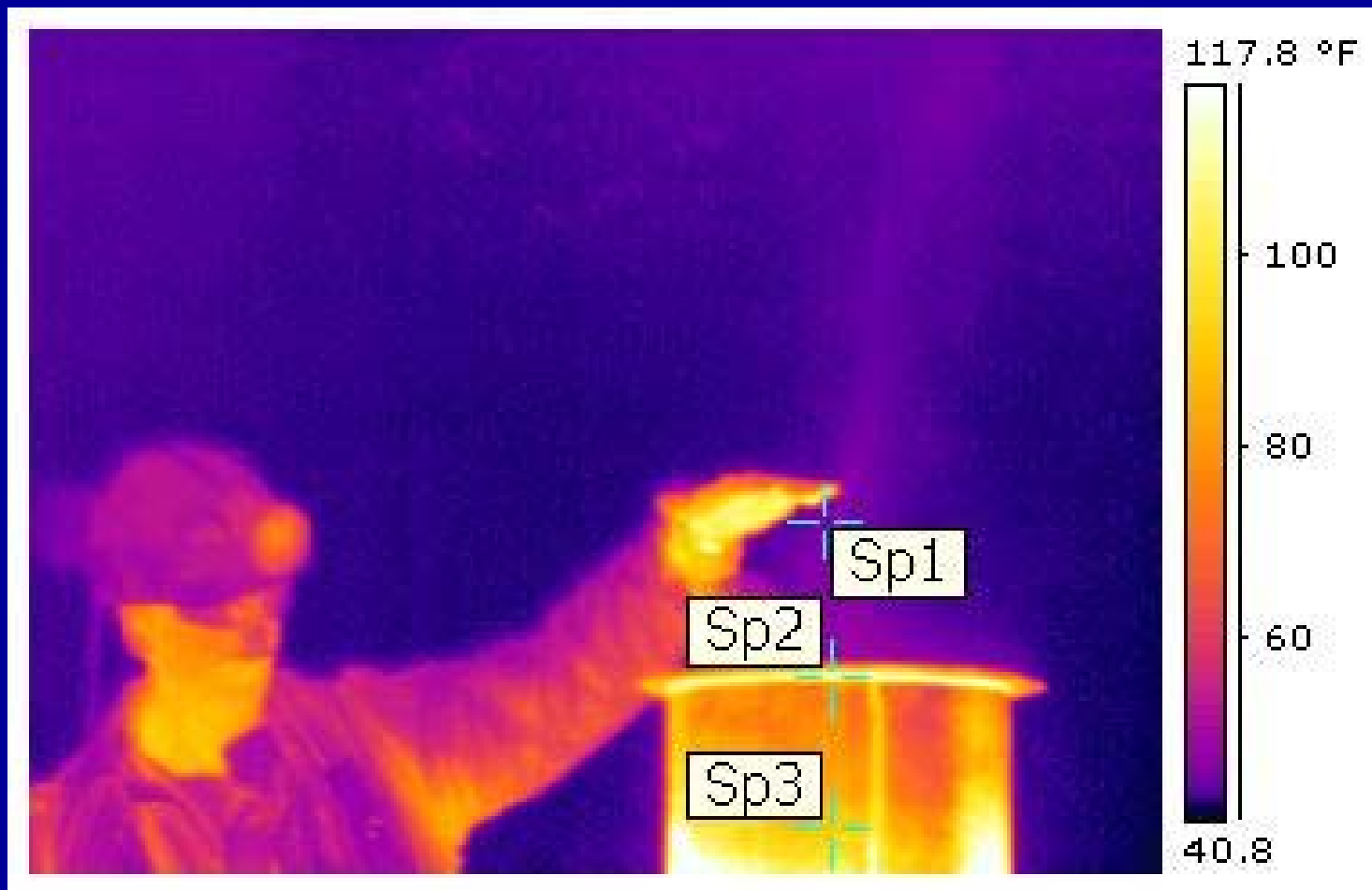
Active Regeneration Station
Control Panels

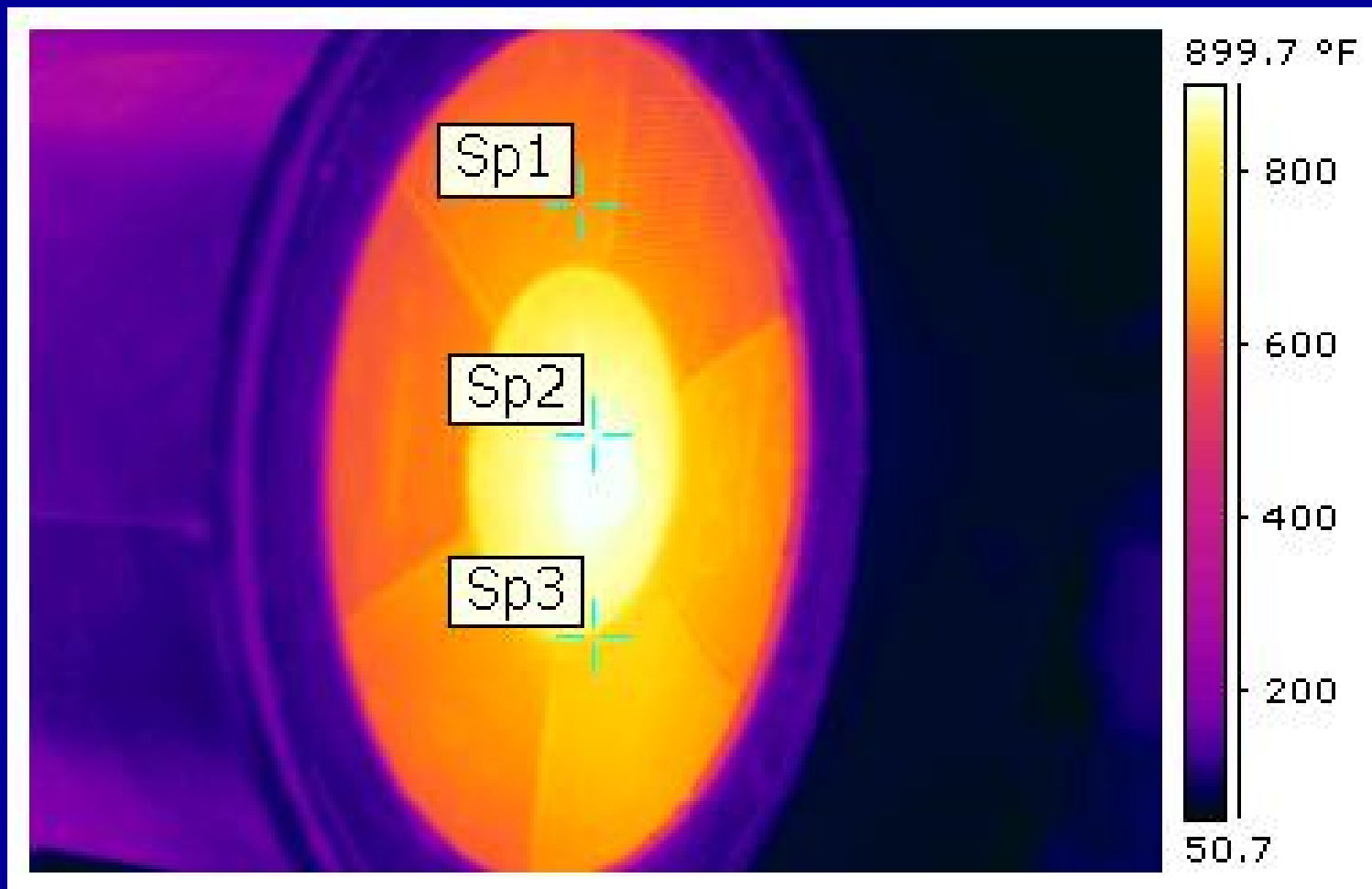# Active Regeneration Station
Heater Bases

Thermograph
Heat Plume of Heating Filter

Thermograph
Discharge side of Regenerating Filter

MSHA Cooperative Test
DPM Sampling - Jan 2003

- **Average Stope Sample - Total Carbon**

- **Stopes tested 675 / 704 / 490 / 446 / 30**

- **Sampler mounted on LR46, outside cab**
  - **Filtered Equipment   :   205 ug/m^3**
  - **Unfiltered Equipment :   1,233 ug/m^3**

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MSHA Cooperative Test
DPM Sampling - Jan 2003

- **Average Stope Sample - Total Carbon**

- **Stopes tested 675 / 704 / 490 / 446 / 30**

- **Sampler mounted on LR46, inside cab**
  - **Filtered Equipment   :   49 ug/m³**
  - **Unfiltered Equipment :   271 ug/m³**

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