


California Environmental Protection Agency 

# Off-Road Demonstration Projects

## IN USE RETROFIT SECTION


JOHN KARIM



California Environmental Protection Agency 

PRESENTATION  
OUTLINE

- SHOWCASE  
PROJECT
- SUPLMENTAL  
ENVIRONMENTAL  
PROEJCT  
(SEP I,II,III)
- SNOWCATS  
PROJECTS
- Retrofit  
Evaluation  
(PEMS)






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# SHOWCASE PROGRAM





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## Objectives

- Reduce Diesel Emission from Off-Road Equipment (Level III Systems)
- Demonstrate Durability and Effectiveness of DPFs on Off-Road Construction Equipment
- Demonstrate New Emission Control Systems
- Increase Number of Verified Retrofit Devices
- Fill Gaps in Vehicle Matrix
- Update Board Meeting in December



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Air Resources Board

## Role of the fleet owner

- Ensure Vehicles Meet OEM Specifications
- Make Vehicle(s) Available for Retrofitting
- Approve Retrofit Designs and Locations
- Submit Forms - Certification, Confirmation, EQ Information.
- Inform ARB of Any Issues
- Allow Access for Periodic Monitoring
- Allow On-site Emission Testing





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Air Resources Board

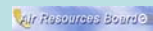
18 Fleets

5 Public  
Fleets13 Private  
Fleets204 Total  
Vehicles

Private	Public
Community Recycling & Resource Recovery Inc.	<b>CALTRANS Division of Equipment</b>
Albert W. Davies, Inc.	City of Burbank Public Works Department
Recycled Materials Company of CA	City of Los Angeles, General Services Department
Dan Copp Crushing	County Sanitation Districts of L.A. County
ECCO Equipment Corp.	City of Culver City Transportation Department
Griffith Company	
PEED Equipment Company	
Altfillisch Contractors, Inc.	
Reed Thomas Company, Inc.	
Shimmick Construction Co.	
Skanska USA Civil West California District Inc.	
Tiger 4 Equipment Leasing	
Sukut Equipment Inc	



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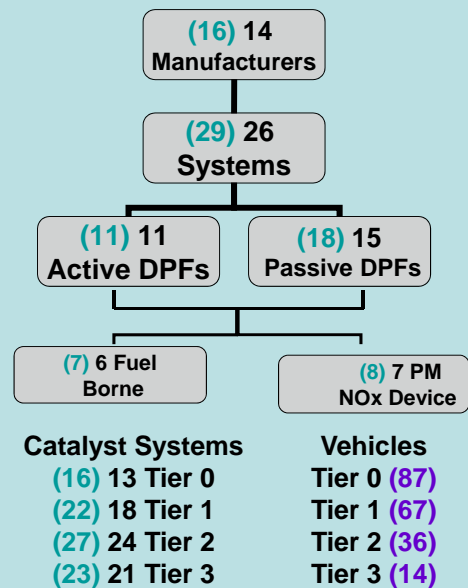



## Role of Device Manufacturers


- Submit Proposal (s)
- Submit Designs and Location of Device to Fleet Owners and ARB
- Install DPF
- Install ARB Approved Data Loggers
- Respond within 24 hrs.
- Implement Warranty and Maintenance Agreement (2707)
- Provide Technical Support
  - 1 YR Fuel Additive Supply
- Obtain Experimental Permit

(626) 575-6848 [rcastro@arb.ca.gov](mailto:rcastro@arb.ca.gov)

## EMISSION CONTROL MANUFACTURER PARTICIPANT LIST







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## Showcase Project Issues

<p><b>Drop Out</b></p> <ul style="list-style-type: none"> <li>• Device Manufacturer             <ul style="list-style-type: none"> <li>• Aaqius</li> <li>• Purem</li> </ul> </li> </ul>	<p><b>Others</b></p> <ul style="list-style-type: none"> <li>• <b>Payment Concerns: Fleet</b> <ul style="list-style-type: none"> <li>• Manufacturers Awaiting PO from Fleet</li> <li>• ARB: Awaiting Response from Manufacturers</li> </ul> </li> <li>• <b>Contracts</b> <ul style="list-style-type: none"> <li>• Fleets / Manufacturers/ MSRC</li> </ul> </li> <li>• <b>Rematch</b> <ul style="list-style-type: none"> <li>• Vehicles Retired/Replaced</li> <li>• Vehicle's Temp Profile: Not Enough Data</li> <li>• Rental Issues: Preference for Passive DPF</li> </ul> </li> </ul>
<p><b>Economic Effects</b></p> <ul style="list-style-type: none"> <li>• Reduction in Job Availability</li> <li>• Vehicles Out-of-Service</li> <li>• Urea Availability (Rentals)</li> </ul>	
<p><b>Pricing</b></p> <ul style="list-style-type: none"> <li>• Submitted Prices Differ from Actual Cost</li> </ul>	



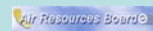
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## Showcase Project Status

<p><b>Contracts:</b></p> <ul style="list-style-type: none"> <li>- Most of the Contracts Between MSRC and Fleet Owners Have Been Completed</li> <li>- Communication Issues (Manufacturers/ Fleets)</li> </ul> <p><b>74 Vehicles Data Logged</b></p> <ul style="list-style-type: none"> <li>- Fleet Owners and Device Manufacturers are Determining Proper Location for DPF Installation</li> <li>- Devices are Currently in Design Phase</li> </ul>	<p><b>Vehicles to be Retrofitted</b></p> <p>—204 Vehicles are Participating</p> <p><b>CDT:</b> 1 Engine Retrofit by End of Oct</p> <p><b>DCL:</b> 5 Engines Retrofit by End of Oct</p> <p><b>Dinex:</b> 5 Engines Retrofit by End of Oct</p> <p><b>Donadlson:</b> 3 Engines Retrofit by End of Oct</p> <p><b>Mann Hummel:</b> 4 Engines Retrofit by End of Oct. 2 Engines Retrofit by End of Nov</p> <p><b>Nett Tech:</b> 4 Engines Retrofit by End of Sept. 5 Engines Retrofit by End of Oct. 1 Engine Retrofit by End of Nov.</p> <p>Expected Retrofits: 28 Vehicles</p>
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Vehicle Information 83N0670 Skanska	
Year	1995
Horsepower	275
Description	Rubber Tired Loaders
Hrs/Yr	1100
Proposed Device	CAT/EUG DPF

Retrofitted  
Vehicles



Vehicle Information 37006 Shimick	
Year	2004
Horsepower	95
Description	Tractors/Loaders/Backhoes
Hrs/Yr	880
Proposed Device	JM CRT



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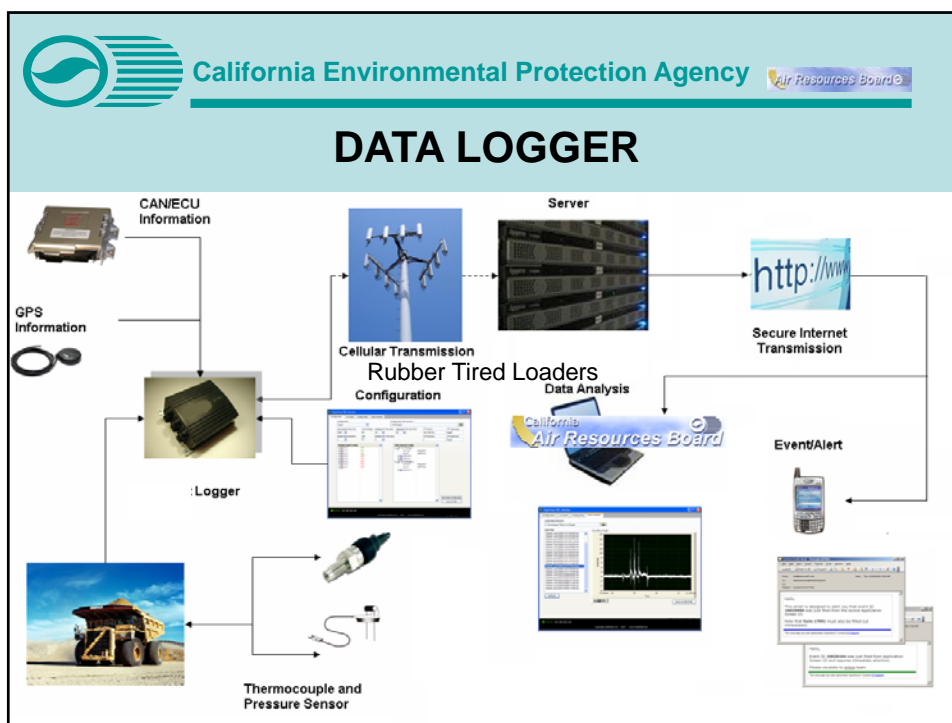
Vehicle Information 325B Community recycling	
Year	1994
Horsepower	168
Description	CAT 325B Excavator
Hrs/Yr	1953/per yr
Proposed Device	Sud Chemie ENVICAT


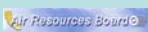
Retrofitted  
Vehicles



Vehicle Information 330D Community Recycling	
Year	1999
Horsepower	222
Description	CAT 330B Excavator
Hrs/Yr	3200/per yr
Proposed Device	Sud Chemie ENVICAT







 **FEATURES SUMMARY** 

Logger Pricing	ServoTech	Data Fleet TOTAL	Data Taker TOTAL	RM TOTAL	CPK TOTAL
<b>Scenario 1</b> Single Unit Temp/BP/RPM (sensor & Freq)	Single Unit Temp/BP/RPM (sensor & Freq)	Remote Data Logger (DF-RDL)	DT80 With extended memory 0-2.5 PSIG	CAN logger	Logger Available
<b>Scenario 2</b> Single Unit Temp/BP/RPM/GPS	Single Unit Temp/BP/RPM/GPS	GPS Antenna (US GlobalSat MR-350P):	Same as quote 1 <b>Garmin GPS18</b> <b>GPS receiver</b>	<b>GSM/GPS</b> antenna- <b>Hirschmann:</b>	<b>NA</b>
<b>Scenario 3</b> Single Unit Temp/BP/RPM/GPS / CAN	Single Unit Temp/BP/RPM/GPS/ CAN	Remote Data Logger (DF- RDL)	Same as Quote 2 <b>Data Taker</b> <b>CANgate</b>	Same as Quote 2	<b>NA</b>
<b>Scenario 4</b> Single Unit Temp/BP/RPM/GPS / CAN/ wireless	Single Unit Temp/BP/RPM/GPS/ CAN/ wireless <b>TBD</b>	Capability to add cellular modem specific to the models supported by Data Fleet	Same as quote 3 plus: <b>CDMA cellular</b> <b>modem (require</b> <b>separate Verizon</b> <b>activation)</b>	Same as quote 3	CAN J 1939  CAN J 1939 & NOx
<b>Scenario 5</b> Ongoing additional costs i.e.	Ongoing additional costs i.e. monthly hosting fees etc <b>NA</b>	Data Hosting /Access (per unit/per mth):	<b>NA</b>	Proemnon Monthly hosting fee- 50MB (unlimited):	<b>SIM Card</b> inclusive data transmission over the I-Net

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**SUPPLEMENTAL  
ENVIRONMENTAL  
PROJECT I,II,III  
PROGRAM**

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**SEP Objectives**

- Reduce Diesel Emission from Off-Road Equipment (Level III Systems)
- Demonstrate Durability and Effectiveness of DPFs on Off-Road Construction Equipment
- **Demonstrate New Emission Control Systems**
- Increase Number of Verified Retrofit Devices
- Fill Gaps in Vehicle Matrix
- Update Board Meeting in December
- Spend \$200,000 in Valero Wilmington Refinery Area (25-mile radius)+

**Role of Fleet Owner**

- Same As Showcase

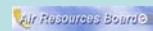
**Role of Device Manufacturers**

- Same As Showcase





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## SEP I RETROFITS



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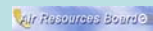
Vehicle Information 6727	
Year	2003
Horsepower	550
Tier	2
Description	657E Scraper
Hrs/Yr	1700
Active/Passive/Nox	Passive
Proposed Device	DCL MINE-X



Vehicle Information 26701	
Year	1999
Horsepower	230
Tier	1
Description	EXCAVATOR, MAT, HANDLING
Hrs/Yr	1800
Active/Passive/Nox	Active
Proposed Device	Rypos HDPF/C



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Vehicle Information 6768	
Year	1998
Horsepower	105
Tier	1
Description	Wheel loader
Hrs/Yr	2000
Active/Passive/Nox	Passive, Nox Control
Proposed Device	Nett Tech Passive SCR



Vehicle Information 61619	
Year	2007
Horsepower	125
Tier	3
Description	John Deere 7520
Hrs/Yr	1400
Active/Passive/Nox	Active
Proposed Device	ECS Assisted Purifier



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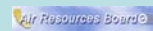
Vehicle Information 61620	
Year	2007
Horsepower	125
Tier	3
Description	John Deere 7520
Hrs/Yr	1400
Active/Passive/Nox	Active
Proposed Device	ECS Assisted Purifier



Vehicle Information 47121	
Year	2000
Horsepower	185
Tier	1
Description	MotorGrader
Hrs/Yr	620
Active/Passive/Nox	Active
Proposed Device	Recat ESE DC-100



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Vehicle Information 60656	
Year	2006
Horsepower	125
Tier	2
Description	Tractor
Hrs/Yr	1200
Active/Passive/Nox	Active
Proposed Device	Recat-ESW Therna Cat System ETI DC-202



Vehicle Information 60654	
Year	2006
Horsepower	125
Tier	2
Description	Tractor
Hrs/Yr	2100
Active/Passive/Nox	Passive
Proposed Device	Sud Chemie ENVICAT



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Vehicle Information 69060	
Year	1999
Horsepower	80
Tier	1
Description	Wheel Loader/ Backhoe
Hrs/Yr	500
Active/Passive/Nox	Active
Proposed Device	Mann Hummel SMF-AR



Vehicle Information 69061	
Year	2000
Horsepower	89
Tier	1
Description	Wheel Loader
Hrs/Yr	677
Active/Passive/Nox	Active
Proposed Device	Mann Hummel SMF-AR



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Vehicle Information 072204	
Year	1995
Horsepower	105
Tier	0
Description	Wheel Loader
Hrs/Yr	400
Active/Passive/Nox	Active
Proposed Device	Huss FS-MD


  

Vehicle Information 61621	
Year	2007
Horsepower	125
Tier	3
Description	John Deere Tractor
Hrs/Yr	1200
Active/Passive/Nox	Passive
Proposed Device	SUD CHEMIE



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<http://www.arb.ca.gov/diesel/showcase/sep2.php>



**California Environmental Protection Agency**  
**AIR RESOURCES BOARD**

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**SEP II**

Thursday, August 7, 2008

**UP LINKS**

- ARB Programs
- Diesel Programs
- Mobile Vehicles and Equipment
- Showcase
- Off Road Diesel Retrofit

**LOCAL LINKS**

- Announcements
- Application Information
- Background
- Contacts
- Equipment Temperature Profiles
- FAQs
- Fleet List
- Join Email List
- Snowcat Reports
- SEP II
- Verification Strategies

**ShowCase / SEP Fleet**

- Login
- Change Password
- Fleet Vehicle List

This Page Last Reviewed: July 30, 2008

**SEP/II UPDATE:**

SEP II is currently underway. The matching process is completed and 12 vehicles have been selected. A list of the vehicles broken down by fleet can be seen below. More information about these vehicles can be obtained on the [Fleet List Page](#).

A meeting is scheduled for Thursday August 7th at the Air Resources Board located at 8855 Telesar Ave. in El Monte from 10:00AM until 12:30PM. The 2 days prior to the meeting August 5th and 6th have been scheduled for fleet visits. Device manufacturers are encouraged to attend these visits as it will allow them to evaluate the vehicles and determine the feasibility of retrofitting these vehicles with their device. Fleet Owners will be present during the visits to answer any question. More details for both events can be found in the agenda available below.

- Meeting Agenda
- SEP II Individual Equipment Info

Fleet	Participating Equipment (by ID#)
City of Long Beach	14267, 14236, 14237, 14239
City of Los Angeles	44021, 44480, 44560, 44780
East Lane	385, 637, 844, 876

**Background:**

In an ongoing effort to improve air quality and reduce airborne pollution the Air Resources Board instituted Supplemental Environment Project II (SEP II). SEP II is targeted particularly at reducing emissions from off road diesel equipment. The project will take place inside a 25-mile radius of the Valero's Wilmington refinery area, which has provided \$200,000 in funding to the project. Objectives of the project include:

- reduction of emissions from off-road diesel equipment (level III) within a 25 mile radius of the Valero Wilmington refinery area
- demonstration of new emissions control systems
- ARB verification of retrofit devices


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<http://www.arb.ca.gov/diesel/showcase/publicfleetlists.php>


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**FLEET VEHICLE LIST**

Tuesday, August 5, 2008 This page last reviewed: August 5, 2008

UP LINKS  
 → ARB Programs  
   → Diesel Programs  
   → Mobile Vehicles and Equipment  
   → Showcase Off-Road Diesel Retrofit

LOCAL LINKS  
 → Announcements  
 → Application Information  
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 → Equipment Temperature Profiles  
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 → Snowcat Reports  
 → SEP II  
 → Verification Strategies



**ShowCase / SEP Fleet**  
 → Login  
 → Change Password  
 → Fleet Vehicle List

Showcase:    
 SEP:   
 SEP II:


**FLEET/BUSINESS: CITY OF LONG BEACH**

**SEP II Vehicles**

Equipment ID	Year	HP	Tier	Engine Family/ID	Description	Serial Number	Hrs/month
14267	2000	86	1	7BJ16643	BACKHOE	4ZN21522	29.9
14336	2005	224	0	4DXL07.1032	Wheel Loader	L120EV54620	106.0
14337	2007	150	3	PE6068L02	TRACTOR	RW7630R000124	123.0
14339	2007	150	3	PE6068L02	TRACTOR	RW7630R000160	104.5


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<http://www.arb.ca.gov/diesel/showcase/sep2.php>


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**SEP II**

Thursday, August 7, 2008 This Page Last Reviewed: July 30, 2008

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**ShowCase / SEP Fleet**  
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**SEP II UPDATE:**

SEP II is currently underway. The matching process is completed and 12 vehicles have been selected. A list of the vehicles broken down by fleet can be seen below. More information about these vehicles can be obtained on the [Fleet List Page](#).  
 A meeting is scheduled for Thursday August 7th at the Air Resources Board located at 9952 Tolstar Ave. in El Monte from 10:00AM until 12:30PM. The 2 days prior to the meeting August 5th and 6th have been scheduled for fleet visits. Device manufacturers are encouraged to attend these visits as it will allow them to evaluate the vehicles and determine the feasibility of retrofitting these vehicles with their device. Fleet Owners will be present during the visits to answer any question. More details for both events can be found in the agenda available below.

→ Meeting Agenda  
 → SEP II Individual Equipment Info

**Contact Info City of Long Beach**

Vernon Helbig, Acting Superintendent of Maintenance  
 • Phone (562) 570-5426  
 • Email [Vernon.Helbig@longbeach.gov](mailto:Vernon.Helbig@longbeach.gov)  
 Ray Ontiveros, Certified Master Technician  
 • Phone (562) 254-6478  
 • Email [Ray.Ontiveros@longbeach.gov](mailto:Ray.Ontiveros@longbeach.gov)

**Background:**  
 In an effort to reduce emissions from off-road diesel equipment (level III) within a 25-mile radius of the Valero Wilmington refinery area, the Resources Board instituted Supplemental Regulations from off-road diesel equipment. The project will take place inside a 25-mile radius of the Valero's Wilmington refinery area, which has provided \$200,000 in funding to the project.

Objectives of the project include:

- reduction of emissions from off-road diesel equipment (level III) within a 25 mile radius of the Valero Wilmington refinery area
- demonstration of new emissions control systems
- ARB verification of retrofit devices


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## Vehicle Information Page


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### SEP II VEHICLE INFORMATION

Tuesday, August 5, 2008

This Page Last Reviewed: July 25, 2008

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  - Diesel Programs
  - Mobile Vehicles and Equipment
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**ShowCase / SEP Fleet**

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[View More Pictures](#)

**Equipment ID: 14267**

Year:	2000
HP:	96
Tier:	1
Engine Family/ID:	7BU16643
Description:	BACKHOE
Serial Number:	4ZU21522
HRs/Month:	29.9

Temperature Profiles For Equipment -- 14267

Temperature Profile	Profile Date	Date Posted

Current Equipment Log Information

This Equipment Has No Log Entries At This Time


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## Equipment Image Gallery


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### EQUIPMENT IMAGE GALLERY

Thursday, August 7, 2008

This Page Last Reviewed: July 26, 2008

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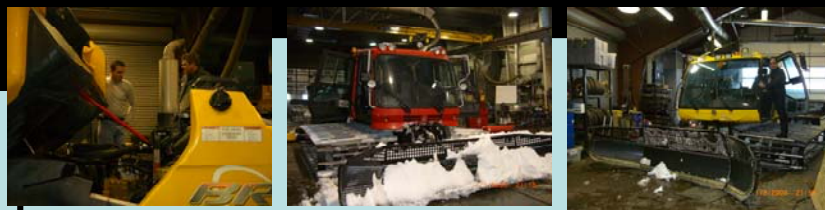




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Air Resources Board

## SNOWCATS PROJECT



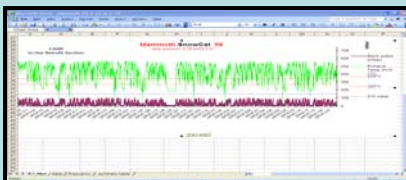
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Air Resources Board

## Snowcat Project


- **Three locations:**
  - Northstar : 5 vehicles
  - Mammoth: 5 vehicles
  - Sugarbowl: 2 vehicles
- **Temperature Profiles**
  - Generated, analyzed and posted on the ARB website for all vehicles

<http://www.arb.ca.gov/diesel/showcase/showcase.htm>
- **Preliminary results** of the temperature profile analysis indicate that vehicles were operating at 400°C or above for 40% of the time regardless of vehicle type.
- **Recommendation:** All vehicles be retrofitted with passive DPFs.
- **Outcome:** Northstar is already retrofitting its vehicles with passive






Portable Emissions Monitoring System



California Environmental Protection Agency Air Resources Board

## PEMS Description

<p><b>Purpose:</b></p> <ul style="list-style-type: none"> <li>To Evaluate Performance of DPF On Off-Road / On-Road Equipment.</li> <li>To Compare On Road Measurement with Engine Dyno Measurements</li> <li>To Evaluate Possibility of Measuring PM Using Low Cost Instruments</li> <li>To Evaluate Different Techniques of Particulate Measurements</li> <li>To Establish a Test Cycle in Order to Evaluate Retrofit Device Performance</li> </ul>	<p><b>Measurement:</b></p> <ul style="list-style-type: none"> <li>Accurately Measures Vehicle Exhaust flow rate from either the engine electronic control module and/or the vehicle exhaust tail pipe</li> <li>NO, NO<sub>2</sub>, CO, CO<sub>2</sub>, THC, PM</li> </ul>
<p><b>Parameters:</b></p> <ul style="list-style-type: none"> <li>Temperature, backpressure, RPM, throttle position, manifold pressure, EGR, atmospheric conditions</li> <li>Monitor engine parameters using the vehicles ECM (When applicable)</li> </ul>	<p><b>Data:</b></p> <ul style="list-style-type: none"> <li>Real time vehicle emission data in engineering units</li> <li>Report vehicle trap efficiency before/after measurement of ETaPS and Dust Track,</li> </ul>

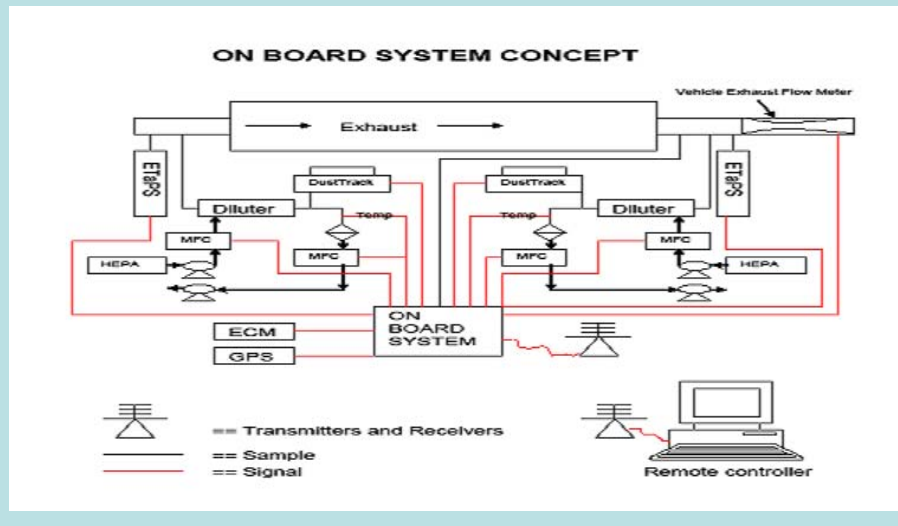




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Air Resources Board

## PEMS Diagram Overview



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## PEMS System



### Gaseous Emissions:

THC, NO<sub>x</sub>,  
NO, NO<sub>2</sub>,  
CO, CO<sub>2</sub>

### Exhaust Flow Measurement

CFV, ECU

### PM by:

Mass  
Soot  
Electric  
Mobility  
QCM

Received Aug,  
2008.

ARB staff  
Training: Sept  
2008





California Environmental Protection Agency

Air Resources Board

## PEMS Training



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## Contacts

**Johnny Karim, Manager**

- **In-Use Retrofit Section**

- **(626) 459-4303, [jkarim@arb.ca.gov](mailto:jkarim@arb.ca.gov)**

- **Website:**

- **<http://www.arb.ca.gov/diesel/showcase/showcase.htm>**