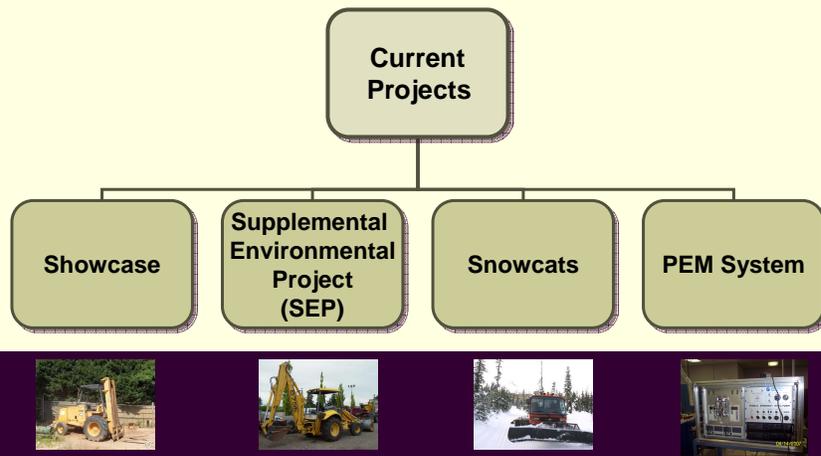




# In-Use Retrofit Demonstration Projects



# Demonstration Projects



# Showcase Goals



California Environmental Protection Agency



- Demonstrate the Effectiveness and Durability of Diesel Particulate Filters (DPFs)
  - Reduce PM (level 3) & NOx Emissions
    - Support Off-Road Regulation
    - Support Verification Section

With DPF

Without DPF

# Showcase Project Participants



California Environmental Protection Agency

## Fleet Owner Participants

- Eighteen Fleet Owners
  - 5 Public Fleets
  - 13 Private Fleets
- Total of 230 Vehicles

Private	Public
Community Recycling & Resource Recovery	<b>CALTRANS</b>
Albert W. Davies	City of Burbank
Recycled Materials Company of CA	City of LA, Department of Environmental Affairs
Dan Copp Crushing	County Sanitation
ECCO Equipment Corp.	Culver City
Griffith Company	
Peed Equipment Company	
Altfillisch Contractors, Inc.	
Reed Thomas Company	
Shimick Construction Co.	
Skanska USA Civil West California District	
Tiger 4 Equipment Leasing	
Sukut Equipment Inc	

# Showcase Project Participants



California Environmental Protection Agency

## Emission Control Manufacturer Participants

- 16 Manufacturers
- 29 Systems:
  - 11 Active DPFs
  - 18 Passive DPFs
  - 8 PM + NOx Devices
  - 7 Fuel Borne Catalyst Systems

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California Environmental Protection Agency

### SHOWCASE PROGRAM RETROFIT STATUS

Participating Manufacturers	No. Data Logged	Temp Profile	No. Retrofits	Total Vehicles
Aaqui	NA	NA	NA	NA
Caterpillar	0	0	0	5
CDT	4	4	0	17
DCL	3	1	0	13
Dinex	10	10	0	17
Donaldson	6	6	0	12
ECS	3	0	0	27
Huss	16	0	0	27
Johnson Matthey	0	0	1	3
Mann-Hummel	3	0	0	13
Nett Tech	9	9	0	27
Purem	0	0	0	16
Recat-ESW/ETI	4	3	0	6
Rypos	0	0	0	4
Sud Chemie	0	0	2	21
Extengine	5	4	0	12



# Status of Showcase Project

California Environmental Protection Agency

- **Contracts:** Most of the contracts between MSRC and Fleet Owners have been completed.

- **63 Vehicles Data Logged.**
  - Fleet Owners and Device Manufacturers are determining proper location for DPF installation.
  - Devices are currently in design phase

- **Vehicles Retrofitted**

230 vehicles are participating.

- **Currently 3 vehicles have been retrofitted.**

- Dinex proposes to begin installation by end of June
- Nett Tech is scheduled to begin retrofits beginning July

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# Project Issues

California Environmental Protection Agency

- **Drop Out**
  - **Technology**
    - JM SCRT
    - Donaldson DPF SCR
    - Huss MSCR
  - **Device Manufacturer**
    - Aaqius

- **Economic Effects**
  - Reduction in job availability
  - Vehicles out-of-service

- **Others**

- **Rematch**
  - Vehicles Retired
  - Vehicles Replaced
  - Vehicle's Temp profile
  - Fleet Preference

- **Pricing**
  - Submitted prices differ from actual cost

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# SEP

## SUPPLEMENTAL ENVIRONMENTAL PROJECT PHASE I, II, III

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# SEP

## Objectives

- Same as Showcase
- Help fill gaps in Equipment Matrix
- Demonstrate Additional Technologies



## Funding

- \$750,000 from fines imposed by US EPA against Chevron and Valero
- **Chevron - Phase 1**
  - Settlement agreements stipulate money be spent on retrofit of off-road equipment by June, 2008 for total cost of \$300,000
  - 3 fleets have been selected for retrofitting



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# SEP I Participants



California Environmental Protection Agency

Participating Manufacturers	Participating Fleet Owners
DCL	County of Sanitation Districts of Los Angeles County
Rypos	Los Angeles County Department of Beach and Harbor
Nett Tech	LA County Public Works
Extengine ADECII	
ECS	
Huss	
Mann Hummel	
Sud Chemie	
Recat	

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# SEP I UPDATES



California Environmental Protection Agency

- **SEP I is in its final stage of completion**
- 15 vehicles have been successfully retrofitted with DPFs
  - 8 Passive DPF Devices
  - 5 Active DPF Devices
  - 3 NOx Control Systems
- ALL Vehicles have been data-logged
- Expenditures met the budgeted numbers (\$317,000)
- ARB has received positive input from both participating Fleet Owners and Device Manufacturers
- **SEP Phase II is currently in progress with Valero**
  - SEP Phase II cost: \$200,000
  - SEP Phase III cost: \$200,000





## SEP I Vehicle Matrix

Retrofit Complete (Vehicle #)	YR	HP	Tier	description	Hrs YR	Proposed Device	Active/ Passive/ Nox Control
1182	2000	315	1	Wheel Loader	1500	Exengine ADECII	Active/ Nox
26701	1999	230	1	Excavator	1800	Rypos HDP	Active
6727A/B	2003	550 400	2	Scraper 657E	1700	DCL Mine X	Passive
6768	1998	105	1	Wheel Loader	2000	Nett Tech	Passive/ Nox
61620	2007	125	3	John Deere	1400	ECS Assisted	Active
61619	2007	125	3	John Deere	1400	ECS Assisted	Active
47121	2000	185	1	Motorgrader	620	Recat- ESW DC	Active
60654	2006	125	2	Tractor	2100	Sud Chemie	Passive
60656	2006	125	2	Tractor	1200	Recat ESW	Active
69061	2000	89	1	Wheel Loader	677	Mann Hummel	Active
69060	1999	80	1	Wheel Loader	500	Mann Hummel	Active
72204	1995	105	0	Wheel Loader	400	Huss FS-MD	Active
61621	2007	125	3	John Deere Tractor	1200	DET	Passive
61623	2007	125	3	John Deere Tractor	1200	DET	Passive <sup>13</sup>



## SEP I Issues

California Environmental Protection Agency

Vehicle ID	Incident Date	Issue	Manufacturer Info	Notes	No of reset (s)
72204	04/22/08	Exhaust Leak	Huss	Repair done 4/23/08	
69061 #1	5/06/08	DPF light came on	Mann/Hummel		
69060	5/11/08	Exhaust Leak/loose bolts	Mann/Hummel	Repair complete-clarified pipe was not removed	
69061 # 2	5/20/08	DPF Light came on	Mann/Hummel	6/4-added additive. downloaded data/reset the computer	1
47121	5/21/08	Connection pipe btwn turbo charger & DPF fell off	Recat	waiting for some part/req DM's analysis & status rep-6/9	
60656	5/22/08	Exhaust Leak	Recat	Part shipped-5/27-repair on 5/27	
6768	5/22/08	Broken Backpressure Line	Nett Tech	DM replacement received	1
1182	6/20/08	High Exhaust Back Pressure	Extengine	Device manufacturer notified	14



# SEP I Installation Phase



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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





## California Environmental Protection Agency



### 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



## California Environmental Protection Agency



### Vehicle Information 6768

Year	1998
Horsepower	105
Tier	1
Description	Wheel loader
Hrs/Yr	2000
Active/Passive/ Nox	Passive, Nox Control
Proposed Device	Nett Tech0 Passive SCR





### California Environmental Protection Agency



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



### California Environmental Protection Agency



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





### California Environmental Protection Agency



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



### California Environmental Protection Agency



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





### California Environmental Protection Agency



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



### California Environmental Protection Agency



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





## California Environmental Protection Agency



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



## California Environmental Protection Agency



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





### California Environmental Protection Agency



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



### California Environmental Protection Agency



Vehicle Information 61623	
Year	2007
Horsepower	125
Tier	3
Description	John Deere Tractor
Hrs/Yr	1200
Active/Passive/ Nox	Passive
Proposed Device	DET





## Snowcat Project



## 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
- **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 DPFs.

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



# Portable Emission Measurement System (PEMS)



California Environmental Protection Agency



- Gaseous Emissions:
  - THC, NOx, NO, NO2, CO, CO2



- Exhaust Flow Measurement



- PM by:
  - Mass
  - Soot
  - Electric Mobility



- Delivery by July, 2008.

## Contacts



California Environmental Protection Agency

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>

Erik White, Chief  
Heavy-Duty Diesel In-Use Strategies Branch  
(916) 322-1017, [ewhite@arb.ca.gov](mailto:ewhite@arb.ca.gov)