

NJ Diesel Retrofit Law:



Private Commercial Buses

Diesel Retrofit Overview

- Directed at reducing diesel emissions and the health impacts associated with diesel exhaust
- Components of the rules:
 - Provides for installation of closed crankcase ventilation systems (school bus)
 - Provide tailpipe retrofits for certain heavy duty diesel engines
 - Reimbursement of purchase and installation costs

Intent of the Diesel Retrofit Law

- Reduce **150 tons** of diesel particulate matter from the air every year.
- Target vehicles that have large operational presence in neighborhoods and have potential to directly expose citizens to diesel particulate matter.
- Prioritizes the reduction of fine particulate matter (PM_{2.5}) in urban communities

Retrofit Law Components

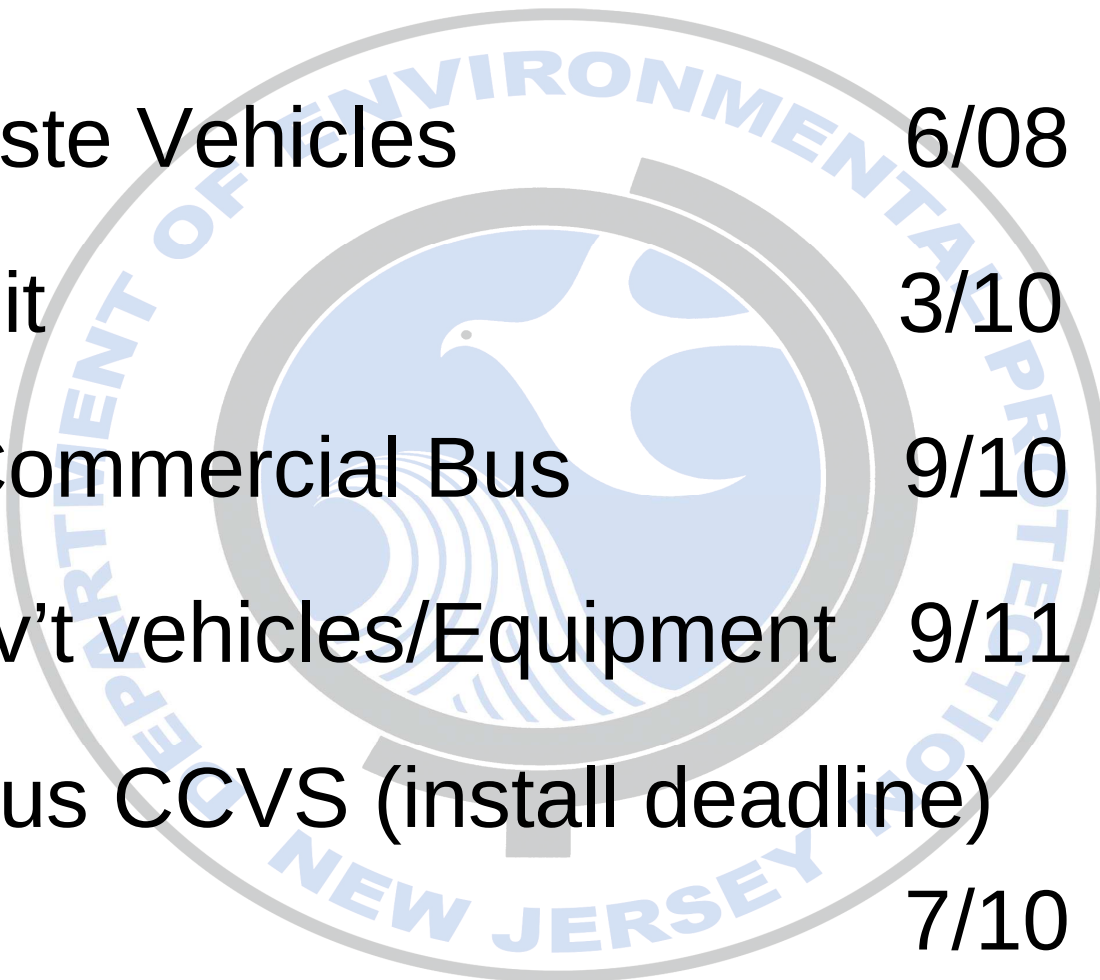
- Compliance burden on vehicle owner
- Submit Inventory / Cost Estimate
 - September 1, 2010 for Private Commercial Buses
- State pays for retrofits
 - State Contract
 - Authorized installers
- Retrofit warranty

Compliance Tools

- Guidance Document
- State Contract - Authorized Installers
- Electronic Submittal through DEPOnline
- Workshops
- www.Stopthesoot.org website
- Listserver messaging system
- Program Staff

Submittal Dates

Inventory, NICs, Fleet plans, Averaging Plans

The logo of the New Jersey Department of Environmental Protection is a circular seal. It features a blue outer ring with the text "DEPARTMENT OF ENVIRONMENTAL PROTECTION" at the top and "NEW JERSEY" at the bottom. Inside the ring is a stylized blue and white bird, possibly a seagull, in flight over wavy lines representing water.

Solid Waste Vehicles	6/08
NJ Transit	3/10
Private Commercial Bus	9/10
Other gov't vehicles/Equipment	9/11
School Bus C CVS (install deadline)	7/10

Devices on Contract

- Designed to capture solids, liquids, and gaseous emissions and treat before exhaust
- Designed to replace muffler
- Application design based on engine/chassis manufacturer for sizing & plumbing
- Particle Filters, Oxidation Catalysts, Flow-Through Filters
- Meet definition of BART
 - USEPA or CARB verified applications

Authorized Installers

- A person/entity who holds a written agreement – service, sales, etc... with one or more retrofit manufacturer
- Must be on State Contract as per regulations
- Provide and install Best Available Retrofit Technology that meets standards referenced in NJ regulations.

Authorized Installer Tasks

- Needs to confirm the device will work with target engine/chassis combination
- Assess vehicle suitability
- Must be manufacturer authorized & trained
- Can provide turnkey cost estimate
- Warranty Coverage
- Product information and training
- Coordinate Reimbursement with State

Choosing an Authorized Installer

- Listed on the state contract
- Familiarity/Comfort Level
 - Prior experience with your vehicles
 - Comfort with brand of products being offered by an installer on your vehicles
- Interviews

Reimbursement

- Reimbursement direct to Authorized Installer on State Contract
- Covered cost
 - BART & ancillary items on vehicle for turnkey installation
 - Installation
- Not covered
 - Consumable items such as replacement filters
 - Device maintenance
 - Existing damage, wear and tear, or modifications precluding installation of BART.
 - Items unnecessary for daily vehicle+retrofit operation
 - Non-contract installations unless under approved grant.

Regulated Vehicles

- School Buses
- Solid Waste Collection Vehicles
- Public & Private Commercial Buses
- Publicly Owned On-Road Vehicles
 - Includes Recycling Trucks
- Publicly Owned Off-Road Equipment

Regulated Vehicles-

Private Commercial Buses

- Private Regulated Commercial Buses that meet the following criteria
 - Leased or operated by a provider of commercial bus service
 - Not owned & operated by NJTransit
 - Not a regulated School Bus
 - Registered in NJ
- GVWR >14,000 lbs
- Diesel bus as defined at NJSA 39:8-60

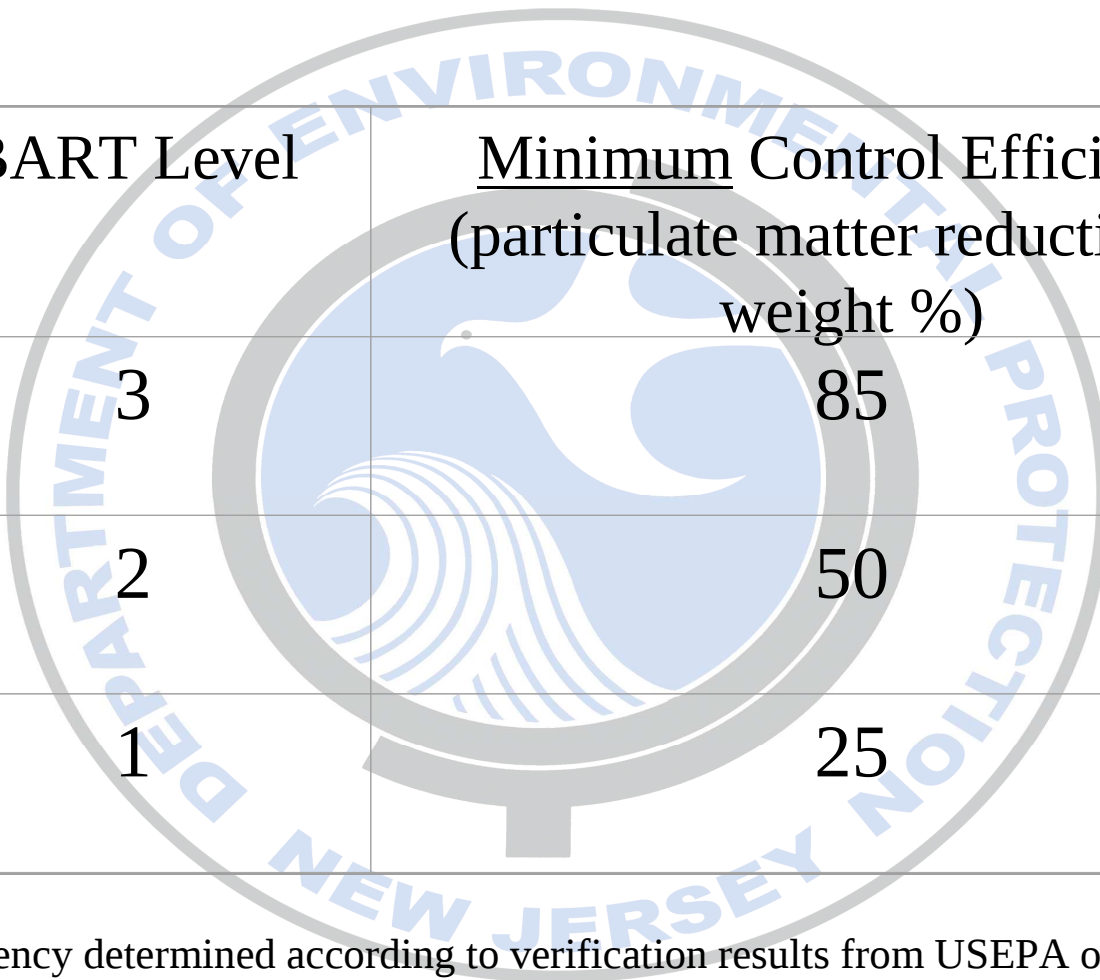
Retrofit Law-General exemptions

- 2007 & newer model year on-road engines
 - Engines meeting the 0.01 g/bhp*hr standard
- Off-road engines meeting 0.015 g/bhp*hr PM standard (~2011 to 2014 phase in)
- First aid, emergency, ambulance, rescue & fire
- Agricultural Vehicles
 - Farm Equipment

What are the retrofits?

- Best Available Retrofit Technology (BART)
 - Attached to exhaust pipe in place of existing muffler
 - 3 main types – Diesel Oxidation Catalyst (DOC), Flow Through Filter (FTF), and Diesel Particulate Filter (DPF)
- Minimum exhaust PM (particulate) emission reductions established by DEP
 - 3 PM reduction levels called BART Levels
- USEPA or CARB verified diesel retrofit emission control and reductions (%)
 - USEPA and CARB restrictions apply on model, year, use, fuel & temperature restrictions

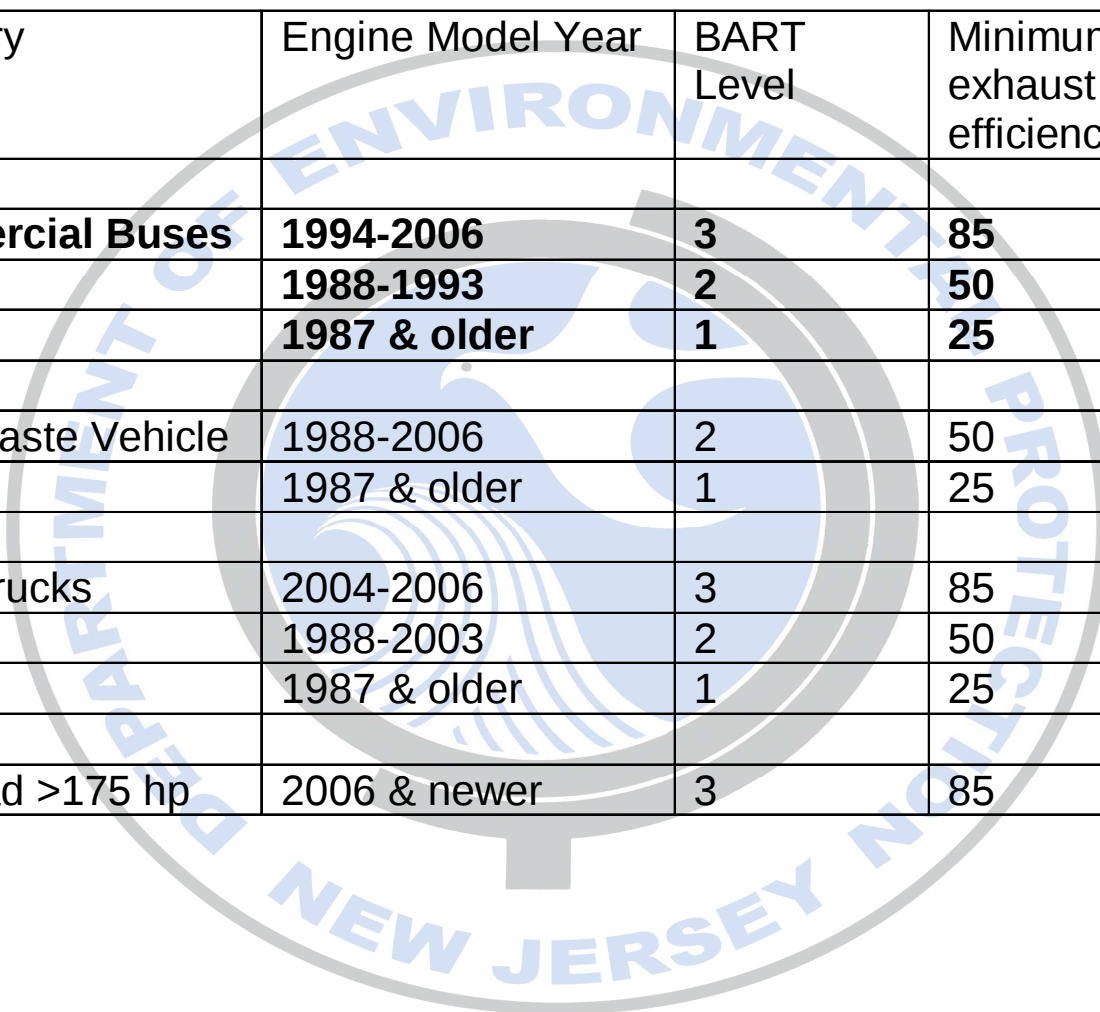
BART Minimum Control Efficiency



BART Level	<u>Minimum</u> Control Efficiency (particulate matter reduction by weight %)
3	85
2	50
1	25

Control Efficiency determined according to verification results from USEPA or CARB

Required Reductions



Category	Engine Model Year	BART Level	Minimum PM exhaust control efficiency level (%)
Commercial Buses	1994-2006	3	85
	1988-1993	2	50
	1987 & older	1	25
Solid Waste Vehicle	1988-2006	2	50
	1987 & older	1	25
Public trucks	2004-2006	3	85
	1988-2003	2	50
	1987 & older	1	25
Off-Road >175 hp	2006 & newer	3	85

Steps to Compliance



Basic Steps

1. Inventory and identify Regulated Vehicles
2. Determine appropriate BART & Installer
3. Submit Inventory and cost estimates
4. DEP review/approve cost estimates
5. Installation
6. Submittals and Recordkeeping
7. One-Time Compliance Inspections

Develop an Inventory

- Inventory/Cost Estimate form
<http://www.stopthesoot.org/retrofit.htm>
- Include all diesel vehicles and equipment (self-propelled only) owned/operated in NJ by your company.
 - Includes leased vehicles.
- Identify regulated vehicles
- Collect general information
 - Chassis and engine make/model year, type
 - VIN, EPA Engine Family Name, GVWR
 - Determine regulated vehicles & compliance method

Regulated Vehicles

- Determine BART level by model year and vehicle type
 - Determine desired BART model – it's your choice
 - Independent research
 - Installer input
 - Choose installer(s) from the state contract
 - Installers offer 1-2 BART brands
 - Can use more than one installer
 - May be needed for unique applications
 - Some exceptions based on vehicle design – space constraints

Determining BART

- Type of vehicle and Engine Model Year
- Examination and Observations by Authorized Installer
 - Exhaust Temperature Profiles
 - Backpressure Monitoring
 - Engine Characteristics (EGR, 4-stroke, etc...)
 - Size & Space Concerns
- Operational Requirements

Cost Estimate Info

- Installer provides cost estimate for each vehicle
- BART Kit at contract discount
 - Labor hours & rate
 - Mobile Install cost– optional
- Exemption or Lower BART Level
 - Document from two installers that indicated required BART Level is infeasible.
- Owner puts info into form.
 - Form is electronic, web entry or upload spreadsheet

Microsoft Excel - BART_Submittal_Spreadsheet_TEMPLATE_101007.xls

File Edit View Insert Format Tools Data Window Help AbleBits.com

Type a question for help

100%

Arial 10 B I U

B12



**State of New Jersey
Department of Environmental
Protection**

**Best Available Retrofit Technology (BART)
Initial Inventory and Cost Estimate**

Add Rows **Delete Rows** **Repeat Row**

	A	B	C	D	E
				(Primary Location)	
	Owner	Vehicle / Equipment Designation	VIN / Serial Number	Street Address, Line 1	Street Address
12	Foster's Hauling				
13					
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Instructions Inventory and Cost Estimate Emissions Validate & Prepare to Submit

Ready NUM

What's on the Form?

- General Information
 - Owner/Contact Person
 - Address/Location of Vehicle
- General Vehicle Information
 - Vehicle Type/Model/Year
 - License Plate/Vehicle Identification Numbers
- Engine Information
 - Horsepower
 - Manufacturer/Year
 - EPA Engine Family Number

What's on the Form?

- BART Information
 - Manufacturer/Make/Model
 - Authorized Installer
- Cost Estimate
 - BART Cost/ Labor Rate and full estimated cost quoted from authorized installer on State Contract
 - Estimated Install Time
- Choose Compliance Method
 - Notice of Intent to Comply, Fleet Plan, Retirement
 - Some vehicles may be “exempt” or non-regulated

Submittal Process

- Owners submit one of four submittal types & full diesel inventory
 - Notice of Intent to Comply (NIC) / Fleet Plan
 - Combined Fleet Plan
 - Fleet Averaging Plan
 - Combined Fleet Averaging Plan

DEP has the authority to reject unreasonable cost estimates

Notice of Intent to Comply

- The regulated vehicle will meet or exceed the prescribed BART level



Fleet Plan

- When prescribed BART level is not feasible for at least one vehicle
- Allows alternate (lower level) BART, repower, rebuild, retirement or exemption
 - Need reports from 2+ Authorized Installers
 - Lower BART level requires DEP approval
 - Fleet Plans are done in combination with NITCs

Combined Fleet Plan

- Same as Fleet Plan PLUS:
 - Two or more fleets can combine all of their diesel vehicles into one submission
 - All owners involved have Shared Liability
 - May be beneficial for smaller diesel fleets
 - For example a municipality combining with county fleet

Fleet Averaging Plan

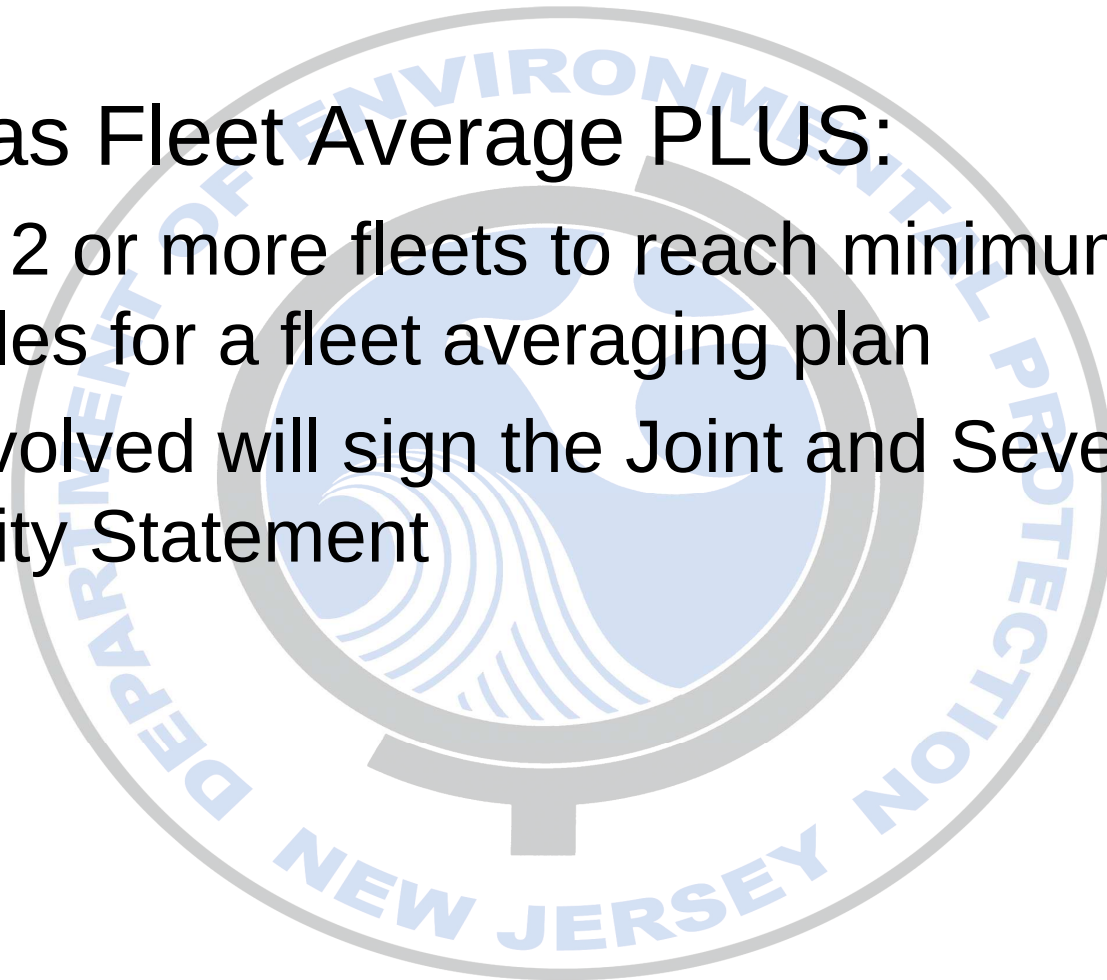
- Option if fleet has 75+ regulated vehicles
 - Trigger- one vehicle that cannot meet BART
- Allows owner to use a combination of alternate (lower level) BART, repower, rebuild, or retirements.
- Can incorporate non-regulated vehicles and equipment to meet the emissions reduction
 - All vehicles in fleet averaging plan become regulated vehicles

Fleet Averaging Plan

- Requires emissions modeling submittals to show same or greater PM benefit and better cost benefit
- Submittal includes inventory of all diesel vehicles in fleet
- Includes cost estimate per vehicle as provided by the authorized installer

Combined Fleet Averaging Plan

- Same as Fleet Average PLUS:
 - Uses 2 or more fleets to reach minimum 75 vehicles for a fleet averaging plan
 - All involved will sign the Joint and Severable Liability Statement



What if my fleet has other regulated vehicles?

- All diesel vehicles in the fleet have to be submitted with this inventory
 - Non-regulated self-propelled only diesels
 - Diesels that will be regulated later, such as off-road equipment
 - Compressors, pumps, other stationary diesels DO NOT go on inventory
- Choose “Non-Regulated/Due Later”
 - As a compliance option in the inventory

Why Collect This Information?

- Information is needed to
 - Prevent fraud/internal controls
 - Pre-populate Compliance Form
 - Verify BART and Authorized Installer, satisfy procurement process
 - Determine funds availability
 - NJDEP's job to deem compliant

DEP review

- Reasonable cost based on state contract rates
- Compliance with Retrofit Law
- Fleet plan and Exemption requests – technical soundness.
- Evaluate Fleet averaging plans
- Outcome is approval, partial approval, or Reject
 - Rejected portions must resubmit

Notification

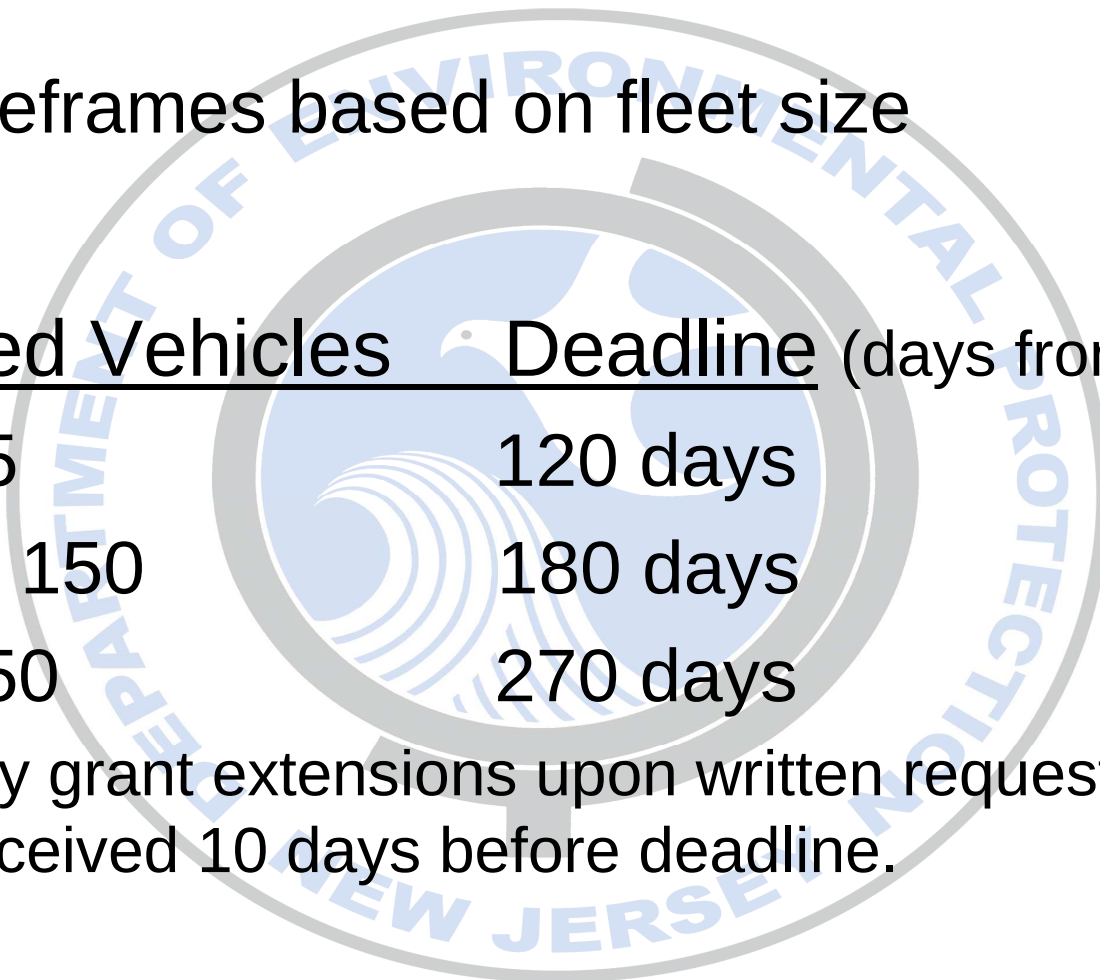
- If costs are reasonable and submittal is administratively complete--> Letter
 - Approval for purchase and installation
- If costs are unreasonable or inventory is administratively deficient--> Letter
 - The DEP will work with owner to identify mutually acceptable BART
 - If no agreement can be reached, then DEP will issue final determination:
 - Identify alternative BART
 - Or provide an exemption

Cost Estimate Approval

- Letter of approval sent to owner
- Letter must be presented to installer
- No installations shall be performed until the DEP confirms that funds are set aside (approval letter)

Install Deadlines

- Install timeframes based on fleet size

The seal of the New Jersey Department of Environmental Protection (NJDEP) is visible in the background. It features a circular design with a bird in flight over a stylized landscape, surrounded by the text "NEW JERSEY DEPARTMENT OF ENVIRONMENTAL PROTECTION".

<u>Regulated Vehicles</u>	<u>Deadline</u> (days from approval)
< 75	120 days
75 - 150	180 days
> 150	270 days

- NJDEP may grant extensions upon written request, for good cause, if received 10 days before deadline.

Installation

- Letter from DEP noticing to begin installation
 - Has location for downloading compliance form
- Use authorized installer on cost estimate
 - Owner coordinates with installer
 - DEP does not coordinate installations
- Coordinate with installer upon receipt of approval letter

Compliance Form

- Compliance form
 - Owner signs after install
 - copy to DEP, original with vehicle
 - due to DEP 5 days after installation (Owner signature)
 - Proof of installation before DEP reimbursement
- Installation verified at next MVC inspection
 - Inspector signs compliance form
 - Owner sends copy of signed form to DEP
 - due 30 days after inspection
- Original stays with vehicle

Compliance Form

- Pre-populated with inventory info
- Key tracking document for state contracting process and program monitoring
 - Documents from owner that the vehicle has been retrofitted
 - Signoff and submittals required in Diesel Retrofit Law

NEW JERSEY DEPARTMENT OF ENVIRONMENTAL PROTECTION
DIESEL RISK REDUCTION PROGRAM
COMPLIANCE FORM – BART

DRRP0001

Vehicle Owner:
Telephone No.:
Address:

Program Interest #:

Vehicle/Equipment Designation:

Vehicle Description and GVWR:

VIN/Serial Number:

Vehicle License Plate State & Number:

Engine Manufacturer and Model Year:

EPA Engine Family:

Retrofit Design/Fleet Plan Option:

Retrofit Make and Model:

Retrofit Device Family Name:

Retrofit Cost (incl. Installation):

Installation Certification:

I hereby certify that the required retrofit devices have been installed on the aforementioned vehicle on the following Date:

I certify under penalty of law that I believe the information provided in this document is true, accurate and complete. I am aware that there are significant civil and criminal penalties, including the possibility of fine or imprisonment or both, for submitting false, inaccurate or incomplete information.

(Print Vehicle Owner Name)

(Vehicle Owner Signature)

(Date)

Vehicle Inspector:

I hereby certify that the retrofit requirement has been met in accordance with the inspection procedure at N.J.A.C. 7:27-32.21.

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attached documents and, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the submitted information is true, accurate and complete. I am aware that there are significant civil and criminal penalties, including the possibility of fine or imprisonment or both, for submitting false, inaccurate or incomplete information.

(Print Vehicle Inspector Name)

(Vehicle Inspector Signature)

(Date)

(DEIC license number - if applicable)

Annual Submittals

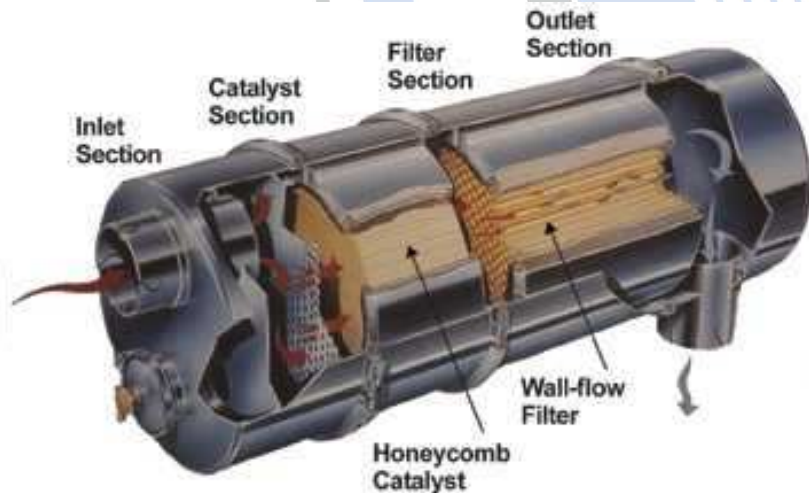
- Required by Diesel Retrofit Law
- A supplement or modification is due annually
 - Anniversary date based on NIC or Fleet Plan
- Update of final approved inventory/cost estimate
 - Shows additions, subtractions to the fleet
 - Changes in compliance methods
 - Can confirm existing fleet with “no change” button
- Similar form to the inventory for changes
- On-line

The seal of the New Jersey Department of Environmental Protection is a circular emblem. It features a central blue globe with white latitude and longitude lines. The globe is set against a background of stylized blue and white waves. The entire emblem is enclosed within a circular border. The words "DEPARTMENT OF ENVIRONMENTAL PROTECTION" are written in blue capital letters along the top arc of the border, and "NEW JERSEY" is written along the bottom arc.

Particulate Control Technology Overview

Tailpipe technologies

- **3 main categories: DOC** (diesel oxidation catalyst), **FTF** (flow through filter), **DPF** (diesel particulate filter)
- Mostly muffler replacements + ancillary



An example of an oxidation catalyst which can reduce particulate matter by 20 - 50 percent.
Photo Courtesy of Johnson Matthey

BART 1

Diesel Oxidation Catalyst (DOC)

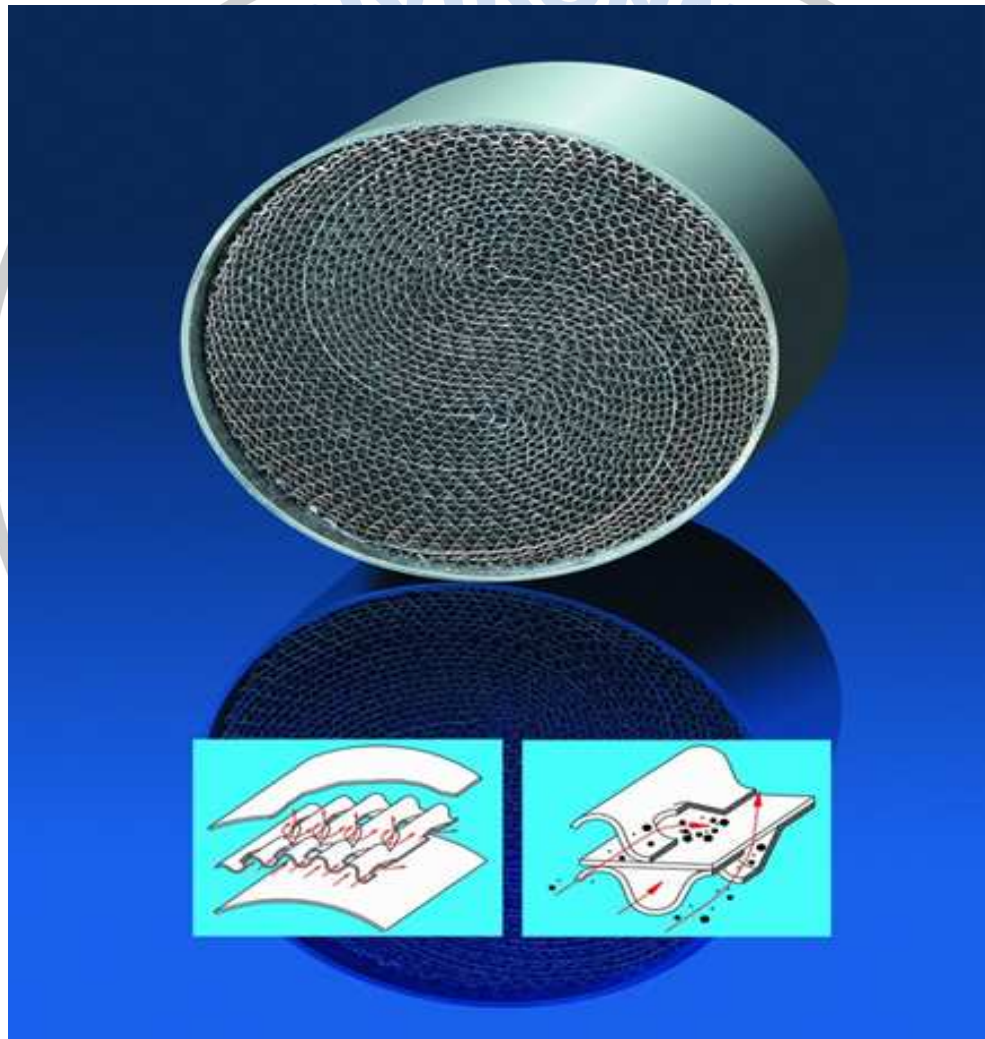
- PM reduction capability of >25%
- Uses a catalytically induced reaction that converts PM, CO and Hydrocarbons to CO₂ and H₂O (platinum or other metals based catalyst)
- Does not use a filter
- Often used in combination with other devices to achieve a higher PM reduction

BART 2

Flow Through Filter (FTF)

- PM reduction capability of >50%
- Exhaust flows through a tortuous path (wire mesh), creating a turbulent condition
 - PM collides with wire mesh (impacting)
- Filter medium has catalyst coating
- PM that is not treated flows out with exhaust

FTF- Cutaway

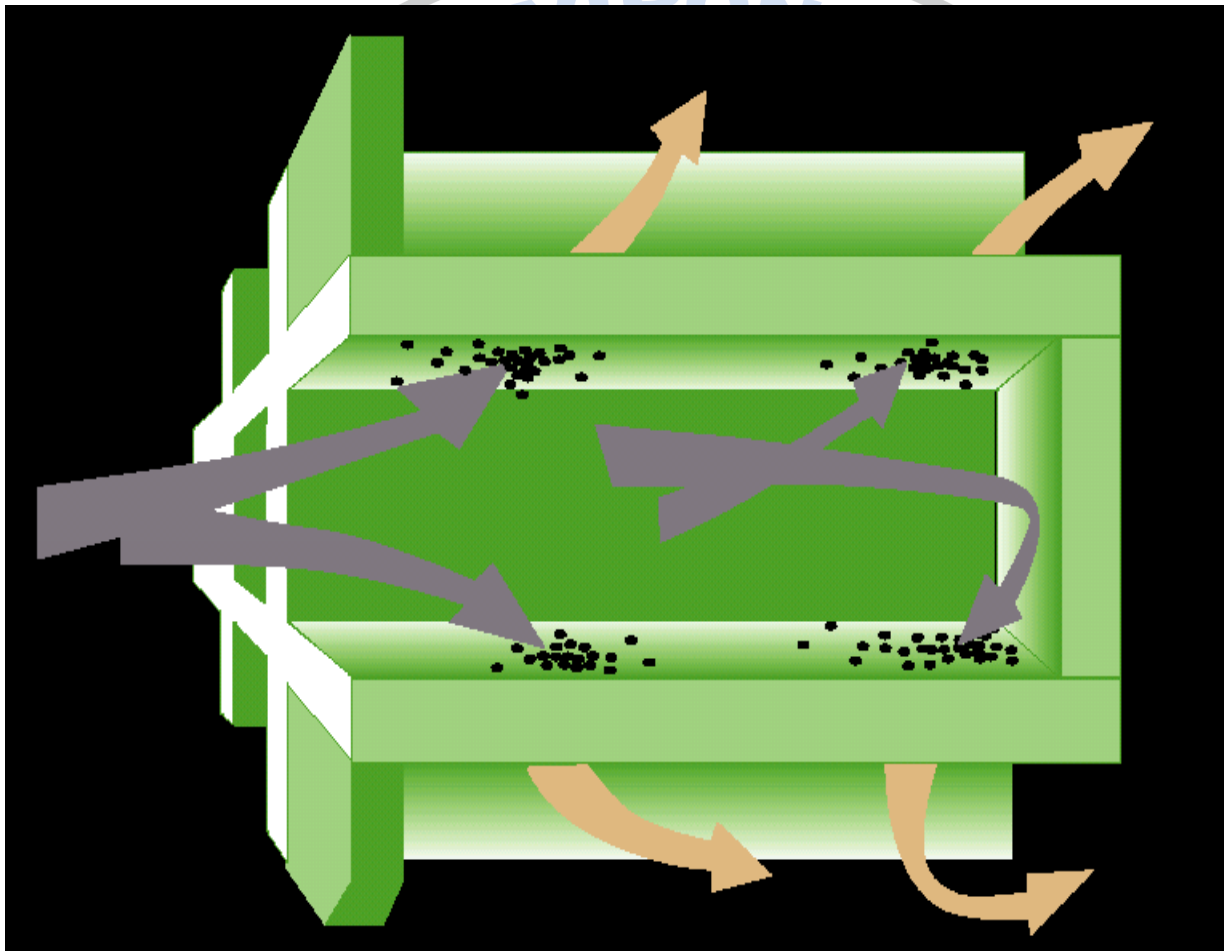


BART 3

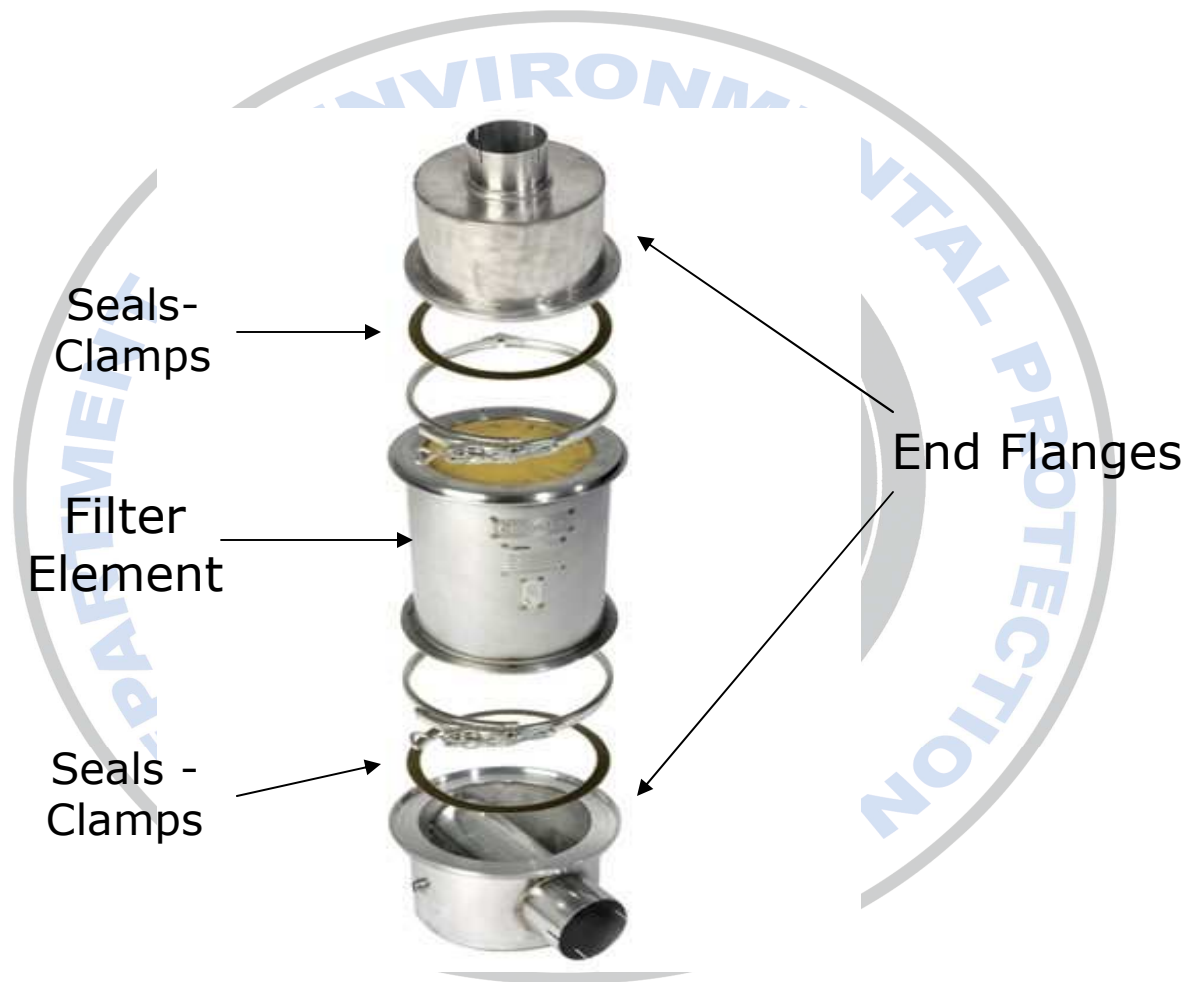
Diesel Particulate Filter (DPF)

- PM reduction capability of $> 85\%$
- Uses a filter to “trap” PM particles in the exhaust
- Two styles of filters
 - Passive
 - Uses a catalyst to reduce PM ignition temperature
 - PM is oxidized via exhaust heat/catalyst
 - Active
 - Uses an external source of heat to oxidize PM trapped in the filter
 - Fuel-fired burner
 - Electric heater
 - Fuel/catalyst induced NO₂ generator

DPF Flow



DPF - Disassembled



BART Examples

Flow Through Filter



DOCs and DPFs



DOC



Retrofit Device Label



Particulate Retrofit Resources

- CARB – California Air Resources Board
www.arb.ca.gov/diesel/verdev/verdev.htm
- USEPA - National Clean Diesel Campaign
<http://www.epa.gov/otaq/retrofit/verif-list.htm>
- Retrofit manufacturers' websites:
 - Caterpillar, Donaldson, Engelhard, HUSS, Engine Control Systems, Cummins Filtration (Fleetgard), Johnson Matthey etc.

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Warranty, Maintenance, On-Road Requirements

BART Warranty & Installation Requirements

- Retrofit Device Manufacturer
 - Warranty for retrofit and engine damage
 - Must repair any damage to vehicle caused by normal use of retrofit
- Authorized Installer
 - Warranty for installation
 - Must repair any damage to vehicle caused by the installation

BART Warranty & Installation Requirements

- Vehicle Owner
 - Must be installed by a manufacturer's authorized installer to be eligible for reimbursement (Statutory requirement)
 - Vehicle has to be in good working order
 - Must maintain BART retrofit device in accordance with manufacturer specifications
 - Good vehicle maintenance prolongs retrofit life

Retrofit Device Warranties

Engine Size & Gross vehicle Rating	Minimum Warranty Period
70-170 HP; GVWR $\leq$ 19,500 pounds	Five years or 60,000 miles
170-250 HP; GVWR $\geq$ 19,500 pounds and $\leq$ 33,000 pounds	Five years or 100,000 miles
>250 HP; GVWR >33,000 pounds	Five years or 150,000 miles
>250 HP; GVWR >33,000 pounds; typically driven >100,000 miles per year; <300,000 miles on odometer at time of installation	Two years, unlimited mileage

Maintenance

- Owners are responsible for
 - Vehicle Maintenance (impacts retrofit device)
 - Retrofit Maintenance
 - Varies by retrofit type
 - includes visual inspection, ash removal
 - General condition
 - Proper operation
 - Repair damage

Responsibility

- Owners
 - Select correct BART for your fleet
 - Fill-out, submit and maintain forms
 - Annual supplements
 - Maintain BART and vehicles
- DEP
 - Work with owners and installers to solve problems
 - Maintain website for data
 - Review submittals
 - Reimbursements
 - Store documentation
 - Guidance to regulated community
 - Ensure compliance

Support Information

- Website at <http://www.stopthesoot.org>
 - Program Info
 - Guidance Documents
 - Contacts
 - Portal for document submittals/updates
 - View state retrofit contracts
 - List Server

CONTACTS

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