

NOTE: The measures discussed in this document represent possible controls the OTC is evaluating for potential NO<sub>x</sub> and VOC emission reductions. No decision has yet been made by the OTC states to pursue these measures for inclusion in a state implementation plan.

## **Discussion Paper for Potential Measures to Reduce Drayage Truck Emissions Prepared for the Ozone Transport Commission (OTC)**

**Name of potential measure:** Port Emission Reduction Measures—Drayage Vehicles

### **Background:**

Marine ports are a major source of pollutant emissions including nitrogen oxides (NO<sub>x</sub>), fine particulate matter (PM<sub>2.5</sub>), hydrocarbons (HC), carbon monoxide (CO), and sulfur oxides (SO<sub>2</sub>). Port-related emissions contribute to poor air quality in the Ozone Transport Region. In addition, the effects of diminished air quality are experienced disproportionately in areas closer to the ports.

Port emissions can be separated into five main sources: ocean-going vessels, drayage trucks, railroad locomotives, cargo handling equipment, and harbor craft. The measure being considered here addresses emissions from drayage trucks. At the Port Authority of New York and NJ (PANYNJ), drayage trucks contribute 25% of total NO<sub>x</sub> emissions and 12% of total PM<sub>2.5</sub> to the total port emissions inventory. They are also responsible for significant CO, VOC, and SO<sub>2</sub> emissions.

Drayage trucks are vehicles over 33,000 pounds GVWR that pick up and deliver containers, bulk, and break-bulk goods to and from ports and intermodal yards. Along with locomotives, drayage trucks connect marine ports to their inland shipping hubs. Drayage truck emissions occur while they are waiting in line to enter port, while idling inside the port awaiting their freight transfer, and in transit between the port and the source or destination of their freight. A survey of truck drivers operating drayage trucks in the PANYNJ found that the average wait time to enter the port is 50 minutes and to on- or off-load their cargo takes an additional 2 hours 20 minutes.<sup>12</sup>

### **Existing regulations that apply to drayage trucks:**

In the OTC region, the emissions regulations that apply to drayage trucks are those that also apply to other heavy-duty motor vehicles. For example, Washington, DC and each state in the OTR have some form of anti-idling regulation for on-road vehicles including drayage trucks. To date, there are no regulations that apply exclusively to drayage trucks.

The PANYNJ has completed its emissions inventory<sup>13</sup> and is considering a suite of regulatory and voluntary measures to achieve emissions reductions. Other states and port authorities are offering financing incentives to truck owners to upgrade their vehicles (see Additional measures, below).

Outside the OTC region, the California Air Resources Board (CARB) has created a Drayage Truck Registry and beginning in 2010 will enforce model year requirements and emission control standards on all trucks calling on the port. CARB's drayage truck rule is similar to the measure described below, with two differences: 1) the first phase begins in 2010, instead of 2011, and 2) during the first phase, MY 1994-2003 trucks must be equipped with verified diesel emission control systems (VDECS) to control PM.

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<sup>12</sup> Starcrest 2008. "Drayage Truck Characterization Survey at the Port Authority and the Global Marine Terminals." Starcrest Consulting Group, December, 2008.

<sup>13</sup> Available at: <http://www.panynj.gov/about/pdf/2006-BASELINE-MULTI-FACILITY-EMISSIONS-INVENTORY.pdf>.

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**Description of the measure being considered:**

At the request of PANYNJ, EPA's subcontractor (Eastern Research Group) modeled several options for modernizing the fleet of drayage vehicles calling on PANYNJ. This included a variety of potential MY and emission control requirements and considered different phase-in schedules for their implementation. The measure considered here has two phases. Phase I, which begins in January 2011 would require pre-1994 trucks calling at the PANYNJ to be replaced by 2004 or newer models. Phase II would take effect in January 2017 and require that all pre-2007 trucks be replaced by 2007 or newer trucks.

**Emissions estimates:**

In the OTC region, an estimate of drayage emissions has been developed for only the PANYNJ and Hampton Roads facilities. NESCAUM has used data from the PANYNJ inventory prepared by Starcrest in 2008.<sup>14</sup> In it, port emissions are broken down into the five sources listed above, and there is considerable detail regarding the data collection and emissions estimates for drayage truck emissions. We use this inventory as a basis to estimate drayage inventories for other ports in the region.

In order to estimate the impact of the measure discussed in this paper, it was necessary to estimate drayage emissions for other ports in the OTR. To do this, we assume a relationship between emissions and tonnage of freight. In this way we established a port drayage emission factor with the unit tons of pollutant per million tons of freight shipped. We apply the PANYNJ's ratio of emissions to tonnage to all OTC ports.<sup>15</sup> This gives a rough idea of port emissions throughout the region, and enables us to estimate potential emission reductions.

**Emission benefits from control measure:**

The Eastern Research Group analysis mentioned above describes emissions reductions that can be achieved through the introduction of a number of different control strategies at the PANYNJ. One scenario evaluates emissions saved by replacing pre-1994 drayage vehicles with 2004 vehicles in 2011, and subsequently replacing pre-2007 trucks in 2017 with 2007 trucks. The results of the analysis show that with implementation of this strategy, the PANYNJ would realize annual reductions of 17% in NOx and 15% in PM from drayage trucks. The annual benefits continue for 24 years. Table 1 shows NESCAUM's estimated baseline drayage emissions for each port in the OTR as well as the estimated annual and lifetime impacts from expansion of the control measure.

**Major Issues:**

It will be important to consider whether state air quality agencies or port authorities are better positioned to implement rules that apply to drayage trucks specifically, and to ports in general. One option is for states to take the lead in regulating port activity. This route would ensure equal treatment of all ports within a single state and would provide greater emission reduction benefits, especially if identical measures are adopted throughout the OTR. Another option is to encourage the ports to voluntarily take action such as the drayage truck rule described above. PANYNJ has taken the initiative to create an emissions inventory and examine a broad range of emission reduction options. Because of its size, PANYNJ may be in a unique position among OTR ports to act on its own. Other ports may prefer their autonomy in choosing which measures are most appropriate to curb their emissions. A third option is for states and port authorities to work jointly to reduce emissions. In addition to CARB's drayage truck regulation (see above), the Ports of Los Angeles, Long Beach, and Oakland are charging gate fees to fund cleaner trucks.

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<sup>14</sup> The PANYNJ, Port Commerce Department, 2006 Baseline Multi-Facility Emissions Inventory.

<sup>15</sup> Tonnage data for all ports comes from the American Association of Port Authorities' (AAPA) "2007 US Port Rankings by Tonnage."

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The facilities of different ports in the OTR vary considerably which affects the logistics and feasibility of implementing state- or region-wide port measures. For example, ports without gates would have a hard time charging gate fees or regulating which MY trucks enter port grounds. Therefore, if even if a state-wide regulation is adopted, enforcement cost and capability would vary significantly from port to port within the state, potentially creating a situation where older trucks are merely funneled to the ports without gates, rather than taken off the road.

Opposition to a drayage truck measure will likely come from the trucking industry. The PANYNJ estimates that 15% of its drayage truck engines are MY 1993 or older, all of which would need to be replaced if this regulation is implemented. Discussions with trucking companies suggest that profit margins are very slim, and any requirements forcing owners to make what they consider unnecessary capital investments will likely face resistance. California is currently encountering significant opposition to their truck retrofit rule.

Another concern is the fate of the retired drayage trucks. Though lacking access to the region's ports, they still may be utilized in other shipping activities. A question to consider is whether additional measures need to be taken to ensure that total emissions are reduced not re-categorized.

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Table 1. States' port emissions and drayage regulation impact.<sup>16</sup>

STATE	PORTS	Annual freight (mill tons)	NOx			PM		
			2006 Emissions (tpy)	Annual Benefit—10% (tpy)	Lifetime Benefit—24 years (tons)	2006 Emissions (tpy)	Annual Benefit—9% (tpy) <sup>17</sup>	Lifetime Benefit (tons)
<b>NY/NJ</b>	<b>PANYNJ</b>	<b>157</b>	<b>1935</b>	<b>190</b>	<b>4555</b>	<b>54</b>	<b>5.0</b>	<b>131</b>
CT	New Haven, Bridgeport	17	212	21	499	6	0.5	13
DE	New Castle, Wilmington	11	137	13	324	4	0.4	9
MA	Boston, Fall River	26	320	31	755	9	0.8	20
MD	Baltimore	41	508	50	1197	14	1.3	31
ME	Portland, Searsport	26	320	31	755	9	0.8	20
NH	Portsmouth	4	50	5	117	1	0.1	3
NJ	Paulsboro, Camden-Gloucester	45	553	54	1302	15	1.4	34
NY	Albany, Buffalo, Port Jefferson	10	125	12	295	3	0.3	8
PA	Pittsburgh, Marcus Hook, Penn Manor, Chester	103	1263	124	2976	35	3.3	78
RI	Providence	9	114	11	268	3	0.3	7
VA	Hampton Roads	55	673	66	1587	19	1.7	42
	<b>TOTAL</b>	<b>504</b>	<b>6210</b>	<b>610</b>	<b>14629</b>	<b>173</b>	<b>16.0</b>	<b>396</b>

**Control Cost Estimate:**

EPA has estimated the cost to modernize the PANYNJ fleet according to this plan to be \$84 million. This cost will be spread between the two phases of the proposed plan. The first phase which takes effect in 2011 will affect 1,688 vehicles, and the second phase which begins 2017 will affect 13,535 vehicles. Lifetime NOx and PM savings as a result of this program are 7,770 tons and 200 tons, respectively. The cost is \$10,810 per ton of NOx and \$420,000 per ton of PM.

**Additional measures in the region:**

In Maryland and Virginia, temporary financing programs have been created to retrofit or replace older drayage trucks. In Maryland, the National Clean Diesel Campaign (NCDC) has committed \$500,000 to the Port of Baltimore for its retrofit/replacement program. The Port of Virginia's Green Operator (GO) Program has received funding from the Virginia DEQ for 100% rebates on purchases of verified emission control devices, up to \$6,000 per device.

**Benefit for other pollutants:**

In addition to reducing NOx and PM, this measure will reduce HC, global warming agents CO<sub>2</sub> and black carbon, as well as toxins such as formaldehyde and acetaldehyde.

<sup>16</sup> PANYNJ drayage emissions were calculated using MOBILE 6.2. According to EPA, NOx emissions for heavy-duty trucks are "higher than previously estimated" by MOBILE 6.2 and PM emissions are "significantly higher." Please see [EPA Releases MOVES2010 Mobile Source Emissions Model: Questions and Answers](#).

<sup>17</sup> One decimal place is shown in this column to indicate non-zero emission levels.

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**Potential Stakeholders:**

American Trucking Association  
State motor transport associations  
Local port authorities  
Port Authority of New York and New Jersey

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