# ENVIRONMENTAL PROTECTION AGENCY (EPA) Projects to Improve Air Quality at Ports – 2013 DERA Funding Opportunity Request for Proposals (RFP)



#### EPA-OAR-OTAQ-14-02

### PORT OF SEATTLE DRAYAGE TRUCK REPLACEMENT PROJECT

**Applicant Information:** 

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**Project Partner:** 

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**Eligible Entity:** The Port of Seattle is a Municipal Corporation of the State of Washington with jurisdiction to construct, maintain and operate transfer and marine terminal facilities including jurisdiction over transportation and air quality throughout its facilities.

**Project Location:** The drayage trucks targeted for replacement operate primarily in and around Port of Seattle terminals and industrial, commercial and residential areas of Seattle, WA, and also

travel throughout King County, WA, and Pierce County,

WA.

**Total Project Cost:** \$ 3,200,000 **EPA Funds Requested:** \$ 1,200,000

**Mandatory Match:** \$ 2,000,000 (Truck owner share)

**Technology:** Vehicle Replacement of Diesel Drayage Trucks

**Short Project Description:** This project will provide incentives to replace 40 older heavy-duty diesel drayage trucks with trucks powered by 2010 or newer diesel engines (or alternative –fueled trucks with equivalent emissions). Old trucks will be scrapped. This project will supplement an operating truck scrapping program with incentives for 40 additional trucks, and will leverage EPA funds with previously secured grants and port funds. Puget Sound Clean Air Agency is a project partner, performing key tasks in implementing the project.

#### SECTION 1. PROJECT SUMMARY AND OVERALL APPROACH

**Project description and background:** The Port of Seattle (Port) requests U.S. Environmental Protection Agency (EPA) Clean Diesel Funding Assistance to replace 40 diesel-powered, heavy-duty Class 8 drayage trucks that serve Port of Seattle marine terminals with trucks having 2010 model year engines or newer. This is a "shovel-ready" project that will leverage EPA funds with the Port's existing truck scrapping program (Scrappage and Replacements for Air in Puget Sound 2 – or ScRAPS2). The Puget Sound Clean Air Agency (Agency), which is the Port's partner on the current ScRAPS2 program, will also partner on this project.

The Port's current ScRAPS2 program will scrap and replace approximately 180 trucks with pre-2007 engines, using a combination of previously obtained grants and port funds, from May 2015 through June 2015. The current ScRAPS2 program provides incentives of \$20,000 per truck to replace older trucks with those having a 2007 or newer engine.

Seaport Truck Scrappage and Replacements for Air in Puget Sound

For this project, EPA funds will be used to offer an incentive of \$30,000/truck for 40 additional trucks that are replaced with a 2010-engined (or newer) truck instead of a 2007- to 2009-engined truck. The EPA-funded incentives will also apply to replacement trucks with alternative-fueled engines that achieve the equivalent emissions of a 2010-certified engine (such as compressed natural gas or liquefied natural gas). Should a 2010-engined truck be available for less than \$60,000, the level of incentive will be reduced so that EPA pays no more than 50%.

The Port will pay the administrative costs to add a DERA grant award to the existing truck replacement program; these costs are expected to be about \$216,000; therefore EPA dollars can be stretched to maximize the number of replacement trucks with 2010 or newer engines.

This EPA-funded project can commence almost immediately upon acceptance of a grant award. It will run concurrently with the existing ScRAPS2 program until July 31, 2015 and beyond, if necessary, through October 31, 2015

**Scrappage and replacement requirements:** Once an eligible truck owner has been approved for the program and has arranged to purchase a replacement truck, the old truck will be scrapped. Scrapping will be managed by the Agency.

**Drayage operating guidelines and replacement criteria:** The currently funded ScRAPS2 project is developing operating guidelines to ensure that old trucks have the appropriate operating history at the Port and that replacement trucks are operated in a manner consistent with the definition of a drayage truck.

**Attrition information:** Since the Port does not allow drayage trucks with pre-1994 engines to access its marine terminals, the oldest trucks replaced under the program will be no more than twenty years old, well within the thirty-year lifespan assumed for on-road vehicles. Trucks used for drayage are typically purchased as retired long-haul trucks when they have on average 150,000 miles per truck of remaining life. They may spend an additional 10 or more years in the drayage business. The target drayage truck pool for this project consists of independent owner-operators and small trucking companies that do not have established fleet turnover schedules based on years of service.

The means by which the project reduces diesel emissions: This project will replace 40 trucks with pre-2007 engines with 40 trucks having 2010 engines, which will achieve significant and immediate diesel emission reductions.

This project will result in the following lifetime emission reductions:

- Particulate matter (PM<sub>2.5</sub>) by 84%
- Oxides of nitrogen (NO<sub>x</sub>) by 78%
- Hydrocarbons (HC) by 92%
- Carbon monoxide (CO) by 94%

**Verified and/or certified technologies to be used:** The project will replace existing Class 8 diesel-powered trucks using 1994–2006 engines with trucks having 2010 or newer heavy-duty diesel engines equipped with diesel particulate filters (or catalyst-equipped, in the case of trucks with CNG or LNG engines).

Number, type, typical use, and ownership of trucks targeted for replacement: The drayage trucks to be replaced are owned by either independent owner-operators or licensed motor carriers. The trucks are typically Class 8 models with approximately 500 horsepower. Engine years range from 1994 to 2006. The trucks are used to move containerized cargo in and out of marine terminals. The typical trip ranges from a short round-trip haul to/from local rail yards in Seattle, to increasingly longer trips to local distribution centers in Seattle, south King County, and Pierce County. A smaller percentage of trucks carry freight from eastern Washington to the Port. A significant portion of trucks calling at Port of Seattle also work part of the time at the Port of Tacoma, which is located in the Tacoma/Pierce County PM<sub>2.5</sub> nonattainment area. The average distance traveled per year is 25,000 miles.

**Rationale for chosen diesel emission reduction solution:** Drayage trucks pull heavy loads and typically have shorter duty cycles than long-haul trucks. Retrofits are not always suitable in these conditions. As indicated by EPA's requirements for drayage trucks in the RFP, vehicle replacement is the preferred approach.

Additionally, a 2010-engined truck provides numerous operational benefits such as reduced maintenance needs, improved reliability and longer lifespan vs. a 2007-engined truck, which is the targeted level of improvement in the Port's existing ScRAPS2 program. The Port's trucking community has expressed interest in going beyond the 2007-engined trucks, and by offering the option of a higher incentive level for truck replacement, the newer, cleaner 2010-engined trucks will become a more affordable option.

#### **Detailed timeline and milestones:**

Date	Task/Milestone	Responsible Entity
May–Jun 2014	Execute grant award agreement with EPA and obligate funds	Port
Jun 2014	Review partner and consultant contracts and amend if needed	Port
Jul 2014	Begin processing DERA-funded supplemental incentives of \$30,000 each for replacement of 40 old trucks with 2010-engined trucks as part of Port's current ScRAPS2 program	Port/Agency
Jul 2014	Submit quarterly progress report to EPA (May – Jun 2014)	Port
Oct 2014	Submit quarterly progress report to EPA (Jul – Sep 2014)	Port
Jan 2015	Submit quarterly progress report to EPA (Oct – Dec 2014)	Port
Apr 2015	Submit quarterly progress report to EPA (Jan – Mar 2015)	Port
Jul 2015	Submit quarterly progress report to EPA (Apr – Jun 2015)	Port
Sept 2015	Close trucker outreach center and stop accepting new participants	Agency
Oct 2015	Complete processing of all pending truck scrapping/replacements	Agency
Oct 2015	Submit quarterly progress report to EPA (Jul – Sep 2015)	Port/Agency
Dec 2015	Complete project and submit final report to EPA	Port/Agency

**Roles and responsibilities**: The Port will be the recipient under this grant and will partner with the Puget Sound Clean Air Agency (Agency) to implement it. The Port will manage and administer the grant, and will submit all necessary progress reports and invoices to the EPA. It will identify and contract with a consultant to assist with grant administration, project controls and auditing services. The Port will also lead outreach efforts to the trucking community.

The Agency will staff the truck outreach center, develop processes and application materials, develop appropriate checks and balances to prevent fraud, process applications for truck incentives, arrange for truck scrapping, and issue incentives. The Agency will also identify and enter into agreements with truck dealers to ensure that participating dealers will agree to honor ScRAPS2 vouchers issued by the Agency. These vouchers will be redeemable as individual incentive payouts for specific, pre-approved trucks on behalf of specific, pre-approved truck owners.

**Restriction for mandated measures:** The Port is undertaking this voluntary emissions reduction effort as a means of achieving the Northwest Ports Clean Air Strategy's air quality goals and emission reduction targets. There are no legal mandates requiring emission reductions from these trucks.

#### SECTION 2. ENVIRONMENTAL RESULTS – OUTPUTS AND OUTCOMES

#### **Anticipated Outputs and Outcomes:**

Activities	Outputs	Outcomes											
Scrap 40 older heavy- duty, diesel-powered	40 drayage trucks replaced with trucks	Annual emission reductions of (in tons per year <sup>1</sup> ):											
drayage trucks and	powered by MY 2010	NO <sub>x</sub> PM <sub>2.5</sub> HC CO											
replace with newer models	or newer engines or non-diesel engines	21.69 0.73 0.73 5.06											
models	Dissemination of	Health benefits of \$670,000/year <sup>2</sup>											
	project information via community and trucker engagement	Reduced exposure along densely populated transportation corridors											
	events, list serves, press releases, and website	Reduced exposure in disproportionately affected communities											
		Increased public awareness of the project and results											
		Accelerated progress toward implementing the Northwest Ports Clean Air Strategy											

<sup>&</sup>lt;sup>1</sup> The Port used the EPA's Diesel Emission Quantifier (DEQ) to calculate these emission reductions. The following input values were used: average replacement year of 2015; annual VMT of 25,000; average idling time of 600 hrs/year; average fuel consumption of 5.5 mpg; fleet engine year distribution is proportional to target fleet distribution.

<sup>&</sup>lt;sup>2</sup> The Port used the DEQ to estimate health benefits, assuming that trucks were in King County, WA, 80% of the time and in Pierce County, WA, 20% of the time.

**Performance Measures:** The Port will assign a project manager to oversee this effort. The project manager will:

- Oversee project partners and a grant management/project controls/audit services consultant to ensure successful completion of contract requirements.
- Submit quarterly progress reports to the EPA, including project progress on expenditures purchases and other fiscal activities, as well as outputs and outcomes.
- Use data from radio frequency identification (RFID) truck tags to measure the sustainability of the project via truck visits, fleet age and related statistics.

The Agency project manager will:

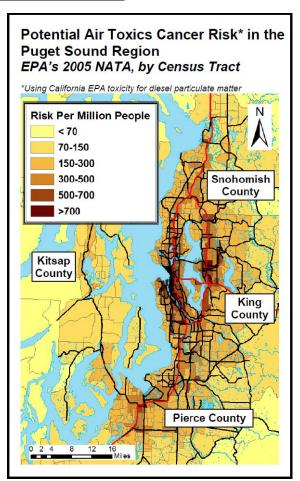
- Track and report progress on the number of trucks scrapped and replaced.
- Track and report progress on emission reductions using EPA's Diesel Emission Quantifier or equivalent methodology.

**Linkage to EPA Strategic Plan:** By reducing emissions from diesel-powered drayage trucks, this project directly supports the EPA's strategic goal to take action on climate change and improve air quality by eliminating emissions of toxic diesel particulate matter and reducing local and regional air pollution.

#### SECTION 3. BENEFITS TO COMMUNITIES AND PUBLIC HEALTH

Seattle's Duwamish Valley, the hub of most of the port's marine terminals along with other industrial uses, is home to some of the city's most ethnically diverse and lowest-income neighborhoods. According to a 2011 report produced by the City of Seattle and the King County Department of Public Health, area residents are more likely than the King County average to: live in poverty, be foreign born, have no bachelor's degree, and have no health insurance. An EPA study also found that the area's childhood asthma hospitalization rate ranged from 265.1 to 299.1 per 100,000, well above the King County average of 129.7 hospitalizations per 100,000. Additionally, a 2005 National Air Toxics Assessment identified the air in these communities as having the highest annual average diesel particulate matter in King County and placed this region in the top 5 percent of the nation for potential cancer risk from air toxics.4

The project will help to mitigate these health discrepancies by replacing older, dirtier trucks with newer, cleaner trucks equipped with better emissions reduction capability. It will result in an annual reduction of approximately 0.73 tons of particulate matter (PM), 21.69 tons of nitric oxides (NOx), 0.73 tons of HC, and 5.06 tons of CO, as estimated by EPA's Diesel Emissions Quantifier (DEQ). As a result, the surrounding community will experience a



<sup>&</sup>lt;sup>3</sup> Linn Gould and BJ Cummings, *Duwamish Valley Cumulative Health Impacts Analysis* (Seattle, WA: Just Health Action and Duwamish River Cleanup Coalition/Technical Advisory Group, March 2013).

<sup>&</sup>lt;sup>4</sup> United States Environmental Protection Agency, *National-scale Air Toxics Assessment for 2005* (Washington, DC: Office of Air Quality Planning and Standards, 2011).

reduction in exposure to harmful emissions, providing residents a healthier and safer environment. The DEQ estimates that this project will provide \$670,000 in health benefits each year.

Additionally, the project will help retain existing family-wage jobs in the community by assisting local-haul truck owners and operators to upgrade to more-efficient and cleaner vehicles. The local pool of drayage truck owner-operators consists predominantly of immigrants from Eastern Europe, Africa and Asia, many of whom come from low-income households and have low English-language proficiency.

More broadly, this project will contribute to achieving the emissions reduction goals the Port has set via the Northwest Ports Clean Air Strategy (NWPCAS), first adopted in 2008. The Port conducted various stakeholder outreach efforts in 2012 and 2013 to get input on key elements of an update to the NWPCAS (adopted in December 2013). This included meetings with community and neighborhood groups, trucking companies, truck drivers, and the Seattle City Council. The Port will continue to engage these groups as it implements its truck scrapping program and refines its emissions reduction program in the years to come.

#### **SECTION 4. PARTNERSHIPS**

The Port has a working partnership in place with the Puget Sound Clean Air Agency (Agency), the regional government agency with jurisdiction over air quality in King, Kitsap, Pierce and Snohomish counties in Washington State. The Port and the Agency have executed an interlocal agreement, per the State of Washington Interlocal Cooperation Act, for the Agency to assist the Port in developing and implementing a truck scrapping and replacement program, using previously acquired grant and Port funds, which will launch in May 2014 and run through June 2015. Per that agreement, the Port will reimburse the Agency for time and materials spent to implement the Port's second truck scrapping and replacement program, Scrappage and Replacement for Air in Puget Sound (ScRAPS2). ScRAPS2 will focus on replacing 180 pre-2007-engined drayage trucks with trucks that have 2007 or newer engines. Key tasks that the Agency will undertake include: operating a truck outreach center on a Port-owned marine terminal; developing application and program processes, instituting measures to prevent fraud; processing applications for truck incentives; assessing old and replacement trucks; arranging for scrapping of old trucks; issuing incentive payments; tracking emissions reductions associated with project activity; and maintaining up-to-date records and reports. The Agency will also be a partner on this EPA-funded project.

The Port also has a working partnership with the companies who operate the Port's marine terminals. The terminal operators will contribute to the project's success by carrying out the existing tariff and lease agreements with the Port to enforce the Port's RFID Truck Tag program, which allows terminal access only to those trucks that are registered in the Port's Drayage Truck Registry and meet the Port's clean truck requirements.

# SECTION 5. PROMOTING & SUSTAINING EFFORTS TO REDUCE EMISSIONS FROM PORT AREAS

Reducing emissions from drayage trucks is one element of the broader-based Northwest Ports Clean Air Strategy (NWPCAS), a plan to reduce diesel particulate matter and greenhouse gas emissions from port-related activity, which was initially adopted by the Port Commission in January 2008 and updated in December 2013. The NWPCAS includes a goal of reducing diesel particulate matter by 75% in the year 2015 and 80% by the year 2020, from a 2005 baseline. Progress in achieving these goals will be measured by periodic updates to the Port's emissions inventory and published in annual progress reports. The Port is also implementing its "Century Agenda," a comprehensive vision and strategic plan for the next quarter-century, which includes objectives to reduce air pollutants and carbon emissions.

Truck owners participating in the program will retain ownership of the replacement trucks. They will be required to commit to continue regularly performing drayage at the Port at a set frequency for the length of the program agreement. The Port's marine terminals require all container trucks to have a valid RFID tag in order to gain access. Data from the RFID tracking system may be used to indicate the frequency of truck visits.

#### **SECTION 6. DIESEL REDUCTION EFFECTIVENESS**

As shown in the attached fleet description, the average engine model year of the current target fleet is 1999. Each drayage truck replaced by this project will meet EPA's diesel reduction effectiveness criterion of replacing 1994-2006 engine model year vehicles with a 2010–engined or newer truck. Based on the lifetime projected pollution reductions and EPA's share of the project costs, this project is quite cost-effective:

	NO <sub>x</sub>	$PM_{2.5}$	HC	CO
Lifetime Reduction (tons)	321.6	10.3	9.6	64.9
EPA Cost-Effectiveness (\$/ton)	\$477	\$13,899	\$13,515	\$1,977

#### SECTION 7. PAST PERFORMANCE – PROGRAMMATIC CAPABILITY AND REPORTING

The Port of Seattle has expertise in managing grant agreements with a broad range of federal sources, including FEMA, FAA, FHWA and EPA. Recent grant awards include three American Recovery and Reinvestment Act grants, which are known for their stringent reporting requirements. The Port has also successfully managed grant projects undertaken by the ports of Everett and Tacoma, the Seattle Fire Department, and a number of private maritime companies such as SSA, Eagle Marine Services and Total Terminals International. To manage these grants, the port maintains a permanent, experienced staff capable of managing difficult reporting requirements. For all grants the Port has accounting procedures in place that are compliant with state and federal auditing and reporting requirements, including on-time submittal of required progress reports and final reports. The Port is subject to annual external Single Audits and has complied with all the requirements described in OMB Circular A-133 Compliance Supplement that are applicable to each of its major federal programs.

The Port's last grant agreement with the EPA concluded more than three years ago. Two more recent examples of federal grant agreements are provided below:

#### 1) Port Security Grant Program (PSGP) awarded to Port of Seattle

Agreement Number: 2009PUR10214

Funding Agency: Federal Emergency Management Agency (FEMA)

CFDA Number: 97.116

Port of Seattle Police Department used this \$794,040 Recovery Act grant to procure a real-time-imaging sonar system. The grant was awarded in 2009. Final reports were submitted and reimbursements were received in 2012. The sonar system procurement required significant research and design work over several years. Reporting was required quarterly throughout this process. Even under the more-stringent Recovery Act requirements, which in this case required reporting to both FEMA and to the Department of Justice, the port fulfilled its responsibilities on a timely basis. Each report consisted of a short narrative and a detailed budget that included personnel costs, procurements, service contracts, etc.

#### 2) Federal Aviation Administration grants to Port of Seattle for pre-conditioned air program

Agreement Numbers: 3-53-0062-123 (Phase 1); 3-53-0062-125 (Phase 2)

Funding Agency: Federal Aviation Administration (FAA)

CFDA Number: 20.106

The Port of Seattle received two FAA Voluntary Airport Low Emissions grants for \$18.3 million and \$3.6 million to deliver preconditioned air to loading gates at Seattle-Tacoma International Airport. This program is expected to cut CO<sub>2</sub> emissions by over 40,000 metric tons annually by allowing aircraft at gates to shut off their engines and auxiliary power units. Although the grant agreement will not formally conclude until fall 2014, all funds have been spent. Detailed reporting was required for each installment/reimbursement the port received. This included reporting on work performed by all contractors and subcontractors in order to comply with the FAA's Disadvantaged Business Enterprise Program and

labor and equal employment opportunity regulations. Weekly performance reports also included estimates of percent completion, descriptions of work completed and summaries of lab and field testing.

In addition, the Port's partner on this project, Puget Sound Clean Air Agency, also has received many federal grant awards, including several under the DERA program, and has a long track record of successfully managing and implementing federally funded diesel emission reduction projects. One example is provided below:

## 3) Diesel Emission Reduction Act grant to Puget Sound Clean Air Agency for Harley Marine Tugboat Engine Repower (2011)

Agreement Number: DE-00J44801

Funding Agency: US Environmental Protection Agency

CFDA Number: 66.039

In August 2011 the Agency was awarded a grant to replace the propulsion and auxiliary engines on a tugboat with current-tier engines. The project manager submitted complete progress reports to EPA on time. The project was completed under budget and the project manager worked closely with EPA to handle delays that arose due to the tug owner's operational requirements (availability of replacement tugs during the repower).

#### SECTION 8. STAFF EXPERTISE AND QUALIFICATIONS

The Port and its partner, the Puget Sound Clean Air Agency (Agency), employ experienced grant managers, financial managers, air resource specialists, public affairs specialists and others necessary for this project's success.

In addition to this general project and grant management expertise, both the Port and Agency have staff with experience designing and carrying out truck scrapping and replacement programs. From 2009 to 2011, the Port, in partnership with Puget Sound Clean Air Agency, successfully administered the Scrappage and Retrofits for Air in Puget Sound (ScRAPS) Program. The ScRAPS program provided financial and technical assistance for over 240 drayage truckers calling at the Port's marine terminals to upgrade their trucks to meet 1994 emission standards. Additionally, Agency staff who have been designated to manage the Port's ScRAPS2 program played key roles in designing and implementing a separate ScRAPS project for the City of Tacoma from 2011-2012, which was funded by a federal CMAQ grant and replaced or retrofitted over 130 trucks. Both Port and Agency staff will incorporate lessons learned on the previous ScRAPS projects to ensure continued success.

#### SECTION 9. BUDGET DETAIL

This application requests a total of \$1,200,000 in EPA funds toward the full project cost of \$3,200,000. Of this total, \$1,200,000 will be used to provide 40 incentives of \$30,000/truck replacement so that cleaner, 2010-engined trucks can be purchased instead of less-expensive 2007- to 2009-engined trucks. Individual truck owners will pay approximately 63% of the purchase price, based on an average cost of \$80,000. Should a 2010-engined truck be available for less than \$60,000, the level of incentive will be reduced so that EPA pays no more than 50%. Lower-than-anticipated truck prices, and thru lower incentive levels, may enable the Port to replace more than 40 trucks. The Port will pay for all project administration costs, which are expected to be approximately \$216,000.

**Program Income:** The interlocal agreement with the Puget Sound Clean Air Agency will specify that any program income from truck scrapping will go back into the program to enable replacement of additional trucks.

#### **Project Budget:**

	EPA Funding	Cost-Share – Truck Owners
Personnel		
TOTAL PERSONNEL	0	0
Fringe Benefits		
TOTAL FRINGE BENEFITS	0	0
Travel		
TOTAL TRAVEL	0	0
Equipment		
TOTAL EQUIPMENT	0	0
Supplies		
TOTAL SUPPLIES	0	0
Contractual		
TOTAL CONTRACTUAL	0	0
Other - 40 truck replacements (EPA funded incentives @ \$30,000 each; truck owner share \$50,000 each)	\$1,200,000	\$2,000,000
TOTAL OTHER	\$1,200,000	\$2,000,000
Indirect Charges		
TOTAL INDIRECT	0	0
TOTAL FUNDING	\$1,200,000	\$2,000,000
TOTAL PROJECT COST	\$3,200	,000

### SECTION 10. EXPENDITURE OF AWARDED GRANT FUNDS

The Port and Agency will already be running a ScRAPS2 project, using previously awarded grant funds and Port funds, by the time a DERA grant is awarded. The workplan developed per the interlocal agreement between the Port and the Agency identifies project milestones, as well as procedures for carrying out project elements, recordkeeping and reporting. The Port will also contract with a consultant firm to perform grant management, project control and compliance auditing services. Periodic meetings between Port staff, Agency staff and consultants will address progress and challenges.

Another critical element of the project's success will be getting potential truck owners to participate. As an adjunct to the ScRAPS2 program, the Port will provide information and referrals about other financial resources available to truckers at the truck outreach center. It will also host training sessions on operating a small business and truck maintenance, as well as broader-scale trucker resource fairs. Information will be disseminated on a ScRAPS2 website, via email messages, and by distributing flyers at terminal gates.

#### SECTION 11. APPLICANT FLEET DESCRIPTION (attached)

### Applicant Fleet Description Projects to Improve Air Quality at Ports - 2013 DERA Funding Opportunity

Project Name	Organization Performing Project	TargetFleet	Number of Vehicles	City	County	State	Region	Funding Amount	Additional Funding Source	Additional Funding Amount	Public Benefit
Port of Seattle Dravage Truck											
Replacement		Drayage/Short									
Project	Port of Seattle	Haul	40	Seattle	King	WA	10	\$1,200,000	(1) Truck Owners	\$2,000,000	ves

Fleet Information: Fleet consists of 40 trucks that will be upgraded. These trucks have engine model years ranging from 1994 - 2006 as indicated below.  Current Vehicle Information  Current Vehicle Information											New Vehicle/Technology Information																				
Vehicle Type	TargetFleet	Class/ Equipment	Serial and/or VIN # of engine and/or vehicle	Engine Make	Engine Model	Engine Family Name (If unregulated, then		Engine Model Year	Horsepower	Displacement pe	er Current Tier Level	Current Standard Level for PM and NOx or NMHC+NOx	Fuel Type	Amount of Fuel Used (gal/year)	Annual Miles per vehicle (Highway)	Annual Usage Rate (Hours per engine) (Nonroad)	Idling Hours (per	Year of Retrofit Action	Technology Type		Verified Technology Model	New Engine Family Name (Replacements/ Repowers)	New Engine Model Year (Replacements/	New Engine	New Engine Displacement per Cylinder (Liters)	New Tier Level (Nonroad replacements/ Repowers/ Upgrades)	New Standard Level for PM and NOx or NMHC+NOx		Annual Idling Hours Reduced (per engine)		Technology Unit Installation Cost
On Highway	Drayage/Short Haul		varies	varies	varies	varies	3	1994	varies	varies	, , , , , ,		Diesel (ULSD), 15 ppm	4,545	25,000	3	600	2015	Vehicle/Equip ment Replacement	varies	varies	varies	2010	varies	varies	15		Diesel (ULSD), 15 ppm	0		
On Highway	Drayage/Short Haul	Class 8B	varies	varies	varies	varies	3	1995	varies	varies			(ULSD), 15 ppm	4,545	25,000	8	600	2015	venicle/Equip ment Replacement	varies	varies	varies	2010	varies	varies			(ULSD), 15 ppm	0		
On Highway	Drayage/Short Haul	Class 8B	varies	varies	varies	varies	3	1996	varies	varies			(ULSD), 15 ppm Diesel	4,545	25,000	7	600	2015	vehicle/Equip ment Replacement Vehicle/Equip	varies	varies	varies	2010	varies	varies			(ULSD), 15 ppm Diesel	0		
On Highway	Drayage/Short Haul	Class 8B	varies	varies	varies	varies	4	1997	varies	varies			(ULSD), 15 ppm	4,545	25,000	7	600	2015	ment Replacement Vehicle/Equip	varies	varies	varies	2010	varies	varies			(ULSD), 15 ppm Diesel	0		
On Highway	Drayage/Short Haul	Class 8B	varies	varies	varies	varies	6	1998	varies	varies			(ULSD), 15 ppm Diesel	4,545	25,000	9	600	2015	ment Replacement Vehicle/Equip	varies	varies	varies	2010	varies	varies			(ULSD), 15 ppm	0		
On Highway	Drayage/Short Haul	Class 8B	varies	varies	varies	varies	6	1999	varies	varies			(ULSD), 15 ppm Diesel	4,545	25,000	14	600	2015	ment Replacement Vehicle/Equip	varies	varies	varies	2010	varies	varies		1	Diesel (ULSD), 15 ppm Diesel	0	<u> </u>	
On Highway	Drayage/Short Haul	Class 8B	varies	varies	varies	varies	5	2000	varies	varies			(ULSD), 15 ppm Diesel	4,545	25,000	14	600	2015	ment Replacement Vehicle/Equip	varies	varies	varies	2010	varies	varies		1	(ULSD), 15 ppm Diesei	0	<u> </u>	
On Highway	Drayage/Short Haul	Class 8B	varies	varies	varies	varies	2	2001	varies	varies			(ULSD), 15 ppm Diesel	4,545	25,000	12	600	2015	ment Replacement Vehicle/Equip	varies	varies	varies	2010	varies	varies			(ULSD), 15 ppm Diesel	0	<u> </u>	
On Highway	Drayage/Short Haul	Class 8B	varies	varies	varies	varies	3	2002	varies	varies			(ULSD), 15 ppm Diesel	4,545	25,000	5	600	2016	ment Replacement Vehicle/Equip	varies	varies	varies	2010	varies	varies			(ULSD), 15 ppm Diesel	0	<u> </u>	
On Highway	Drayage/Short Haul	Class 8B	varies	varies	varies	varies	2	2003	varies	varies			(ULSD), 15 ppm Diesel	4,545	25,000	7	600	2016	ment Replacement Vehicle/Equip	varies	varies	varies	2010	varies	varies			(ULSD), 15 ppm Diesel	0	<u> </u>	
On Highway	Drayage/Short Haul	Class 8B	varies	varies	varies	varies	2	2004	varies	varies			(ULSD), 15 ppm Diesel	4,545	25,000	5	600	2016	ment Replacement Vehicle/Equip	varies	varies	varies	2010	varies	varies			(ULSD), 15 ppm Diesel	0	<u> </u>	
On Highway	Drayage/Short Haul	Class 8B	varies	varies	varies	varies	1	2005	varies	varies			(ULSD), 15 ppm Diesel	4,545	25,000	3	600	2016	ment Replacement Vehicle/Equip	varies	varies	varies	2010	varies	varies			(ULSD), 15 ppm Diesel	0	<u> </u>	<u> </u>
On Highway	Drayage/Short Haul	Class 8B	varies	varies	varies	varies	1	2006	varies	varies			(ULSD), 15 ppm	4,545	25,000	3	600	2016	ment Replacement	varies	varies	varies	2010	varies	varies			(ULSD), 15 ppm	0		