

## ***Center for Environmental Public Policy***

David Wooley • Executive Director • 415-271-1135 • dwooley@berkeley.edu

Comments on  
***Revised Draft Seaport Air Quality  
2020 & Beyond Plan***

January 31, 2019

Submitted to

Ms. Khamly Chuop,  
Port Associate Environmental Planner/Scientist  
Port of Oakland  
530 Water Street  
Oakland, CA 94607  
[kchuop@portoakland.com](mailto:kchuop@portoakland.com)

### **Introduction and Summary**

The Center for Environmental Public Policy (CEPP) thanks the Port of Oakland Board and Staff for the opportunity to comment on the Revised Draft *Seaport Air Quality Plan* (December 14, 2019). CEPP previously submitted comments on the draft released in Summer 2018<sup>1</sup> and attended and participated in the Taskforce meeting held at the Port on January 10, 2019. CEPP has also participated actively in the West Oakland AB617 implementation process, organized by BAAQMD and West Oakland Environmental Indicators Project (WOIEP).

We open with a note of appreciation for the decision by Port management and staff to produce a Revised Draft, respond to comments on the initial draft and to allow an additional comment period on the Revised Draft. We are strongly supportive of the decision to make air quality improvement a strategic and organizational priority for the Port of Oakland (Port). We support the Port's vision of creating a pathway to zero-emissions for Seaport operations through changes in equipment, operations, fuels, and infrastructure. We support the Port's commitment to undertake regular updates to the plan, and research into the rapidly changing technology and markets for zero emission infrastructure and fleets. These commitments are important to the broader objective of achieving greater equity, and environmental fairness for

---

<sup>1</sup> <https://gspp.berkeley.edu/centers/cepp/news-and-publications/publications>

the people of West Oakland. These commitments are also important to efforts to reduce greenhouse gas emissions that have global equity and existential implications for human populations and economic balance.

The Revised Draft Air Quality Plan comes at a time of rapid changes in transportation, battery-storage and air pollution control technology. In general, we remain supportive of the Plan's aspiration to achieve zero-emissions from operations at the Port. The Revised Plan contains several improvements over the Initial Draft, and we applaud the Port Staff's effort to thoughtfully respond to the first round of comments. We also believe several additional changes would strengthen the Plan and help ensure the Port of Oakland is recognized as a leader in efforts to decarbonize port operations and reduce exposure to diesel particulate matter in nearby residential communities.

The following is a summary of our recommendations, which are addressed in more detail in the discussion that follows this Introduction and Summary.

- **Track Cost/Availability of Electric Drives:** Establish a system by which to collect current information on cost and availability of electric trucks and charging equipment.
- **Find and Fix High Polluting Trucks:** Establish a work group to plan, construct and operate a system to identify highly emitting diesel trucks entering the Port, and to require repair as a condition of Port Access.
- **Trucking Duty Cycle Data Collection:** Establish a research effort to collect information on duty cycle of diesel trucks and cargo handling equipment serving the Port.
- **Electric Supply/Charging Infrastructure Work Group:** Establish a work group of interested stakeholders to regularly meet to discuss and plan electric supply and battery charging infrastructure at or near the Port and to maximize access to state funding for electrification.
- **Distributed Clean Energy Potential Study:** Prepare a renewable energy potential study for land, buildings and equipment at the Port.
- **Differential Ship Berthing and Truck Access Rates:** Establish ship berthing and truck access fees that reward: 1) ships with lower in-transit or at berth emissions; and, 2) zero emission trucks.
- **Vehicle Electrification Goals:** Set more specific goals and target dates by which certain segments of diesel equipment operating within the Port will transition to electrification. At a minimum this should include several hundred yard-trucks, and perhaps a thousand drayage trucks with short-haul duty cycles.
- **Port Emission Inventory:** Revise the Port's emission inventory to include a more complete estimate of emissions from trucks serving the port.

The following discusses these recommendations in greater detail.

### **Track Cost/Availability of Electric Drives**

Costs of electric drive, battery and charging technology are declining very rapidly. Availability of electric powered trucking and cargo handling equipment is expected to expand quickly in 2019-

2021. Sound decisions by the Port, its tenants and supporting service industries, about infrastructure and fleets investment require up-to-date information on equipment price and availability with which to compare to conventional, fossil-fuel powered trucking options. Our general sense is that the Port's assessment of cost and availability of electric-drive and charging technology is somewhat conservative and understates the opportunities that will be presented in the market in the near-term.

For example, the Revised draft states,

'...if HVIP funding continues to be available under the current terms, battery-electric yard tractors could reach cost parity with diesel-fueled equipment by 2027; if no incentive funding is available, cost parity may not be achieved until 2038 or later.'

Other sources suggest parity could occur sooner than 2027, and that in the interim, state financial incentives will create an artificial parity and opportunities to integrate substantial numbers of yard trucks and other diesel equipment into Port, tenant and service industry operations. We acknowledge that reasonable minds may differ on how quickly electric drives will be available in such quality, quantity and price to cost effectively replace other diesel equipment. But trends in battery technology costs suggest that electric drive technology may become competitive with new diesel equipment relatively soon for certain types of equipment, especially if oil prices rise again. The Port, its tenants, and its service industries need access to current and reasonably accurate data on cost and availability. The Port could contract for regular delivery and dissemination of such data, or could generate information from periodic, aggregated, requests for proposals (RFPs) developed collaboratively with other entities operating at the Port. We also encourage the Port to collaborate with other West Coast ports on RFPs, and develop a group buying system to help lower upfront costs of zero-emission equipment.

### **Find and Fix High Polluting Trucks<sup>2</sup>**

Recent studies by UC Berkeley researchers show that a significant percentage of trucks entering the Port have faulty air pollution control systems. A system to "find and fix" these vehicles, coupled with information on state financial assistance for vehicle upgrades and repairs could produce short-term air quality benefits to people of West Oakland. We propose that the Port help assemble and participate in a Work Group to establish such a system, using the Port's authority to control access to Port facilities as a means to enforce correction of emission controls. In appendix A to these comments we set forth a set of objectives for a Work-Group and a set of questions to be addressed.

---

<sup>2</sup> We included a broad initial comment on the creation of a Find and Fix plan in our September comments (pg 9), but have added greater detail on the program implementation in Appendix A. We recognize that the Port does not directly regulate trucks, but we believe that the Port would be within its rights to refuse access to vehicles that are likely in violation of air quality standards. The Center would welcome the opportunity to help convene and manage a work group this subject and to coordinate with BAAQMD and CARB on related monitoring studies.

### **Trucking Duty-Cycle Data**

The Port's commitment to zero emission operations would be aided by collection of data on Trucking Duty-Cycles. Currently there does not appear to be an inventory of the full range of diesel equipment operating within, and around the Port. Such data is needed to help target financial incentives, forecast need for supporting infrastructure and identify those segments of the transport sector that are most ripe for electric drive technology. This data is potentially available from Port Tenants, trucking companies serving Port functions or from private services. The Port, perhaps in cooperation with state agencies or University of California Centers, could collect the data in a form that protects confidentiality, but helps identify trucks that: 1) are approaching retirement; 2) have predictable duty cycles that could be served by electric drives. Our guess is that this data could identify dozens or even hundreds of trucks per year that would be amenable, practically and economically, to electrification. This information will likely be critical as new electric truck models become more available and allow the Port to prepare charging infrastructure and procedures.<sup>3</sup>

### **Electric Supply/Charging Infrastructure Work Group**

The Revised Plan includes several improvements concerning electrification infrastructure, but we believe the process needs to accelerate into order to take full advantage of state funding. A formal work group dedicated to learning, planning and outreach on this subject would help ensure a transparent, inclusive and effective response to rapid changes in technology, funding, and markets.

### **Distributed Clean Energy Potential Study**

Even from a BART train it is apparent that there is a large amount of roof space at the Port that could potentially host solar generation. Similarly, there are likely to be many locations where demand response, targeted energy efficiency retrofits, and batteries would help lower costs of electric supply infrastructure needed for vehicle electrification and help avoid energy demand peaks due to growing vehicle energy charging demand. Wind turbines take up very little surface area and can operate above other port operations (just as they do above agricultural activity in other locations). In anticipation of demand from charging infrastructure, a study of distributed clean energy potential at the Port is necessary to ensure that the Port is able meet increased demand in a sustainable, and economic fashion.

### **Differential Ship Berthing and Truck Access Rates<sup>4</sup>**

---

<sup>3</sup> This could include planning for locations where trucks could charge, how charging fees would be assessed, and forecasted energy demand.

<sup>4</sup> This comment is repeated from CEPP's September 25, 2018 comment letter (See page 4). The Response to Comments addressed our original comment, we still believe that offering differential rates is a feasible and appropriate measure to phase in over time. Other California Ports, such as Los Angeles and Long Beach have developed a plan to charge differential access rates. At a minimum we request that the Port to commit to evaluating the feasibility of an entrance fee structure to be instituted by 2026 (three years after the entry fees for non-near zero trucks will become effective in Los Angeles).

The Port needs a source of revenue to support infrastructure and other expenses of the transition to zero emission operations. It also needs to establish incentives to encourage ship and truck owners to shift equipment to zero carbon technology. The Port should commit to study and establish a set of access charges or preferential access rules that will gradually create revenues and incentives for investment in low carbon vessels and vehicles.

### **Vehicle Electrification Goals**

As was stated in our earlier comments, the Port should establish more precise goals for electrification of yard trucks and other equipment that are amenable to electrification in the near to mid-term.

We recognize the Port's concern regarding the upfront cost of electric equipment, but continue to believe that the reduced operational costs, health benefits, and the availability of incentives will make it economical for the Port to move to electric equipment in the near term. We acknowledge that it is difficult to forecast technology and pricing, but we encourage the Port to set more ambitious measurable targets for electrification. Specifically, we reiterate the goals we stated in our September 2018 Comments:

- Establish a plan to gradually move yard hostler equipment from diesel to electric drive technology, with a goal to replace half of the yard hostler fleet with electric drives by 2025 and complete replacement by 2030.
- Modify port electric supply infrastructure to accommodate a complete yard hostler transition to electric drives by 2030.
- Achieve a gradual/sustained increase in power supply and charging equipment for drayage trucks that bring containers to and from the Port.

### **Port Emission Inventory<sup>5</sup>**

The Port's December 2018 Response to Comments explains that the emission domains in the Emission inventory (EI) were developed in consultation with BAAQMD and CARB and that to expand the domains to include "first point of rest" would "not increase the possibility for meaningful comparison to other ports" (RTC page 14). It further states that the primary function of the EI is to monitor the Port's progress toward the original MAQIP goal for reduction of diesel particulate matter emissions associated with Seaport operations relative to the 2005 baseline (RTC page 14). This does not address the underlying concern that we and other commenters raised—that it is appropriate for the Port to consider emissions from trucks whose primary operation in the region is to conduct Port related business as part of the "Seaport operations." We believe this would be appropriate because the Port has a unique ability to

---

<sup>5</sup> We first raised this concern in our September comment letter (page 4) and are repeating it because we do not believe that it was adequately addressed. In addition to the equipment located directly on Port property, trucks conducting business at the Port are a major source of air pollution and greenhouse gas emissions, both on Port Property and within the surrounding areas. Including these sources in the emission inventory will provide greater clarity to the pollution burden faced by the surrounding communities and illuminate additional strategies to reduce the Port's environmental impact.

influence the behavior of truck operators. Examples of this can be seen through our suggestions for the “Find and Fix High Polluting Trucks” and “Differential Ship Berthing and Truck Access Rates.” Not including these vehicles in the EI and not including them in any metrics may reduce resolve for the Port to take steps to reduce vehicle emissions and reduce the health burden faced by surrounding communities. Programs such as the “Find and Fix” could also reasonably implemented in the short-term as part of an AB 617 measure, at a relatively low cost to the Port. We believe that such programs are innovative, and that the Port should be able to receive credit for their implementation. And one of the best ways to do that is to measure the emission reduction associated with their implementation and give the Port credit for their role in creating such a reduction.

We reiterate that this can be done without disrupting the existing inventory methodology. The Port can add a component to the inventory methodology, in a way that preserves an apples-to-apples comparison between past and future inventories, and with the inventories of other ports. Other ports have adopted this approach.<sup>6</sup>

### **Electricity**

CEPP supports statements in the revised draft plant that establish a presumption that electricity will be predominant source of energy that will replace diesel engines. CEPP supports the following statement in Strategy 3:

Develop Required Infrastructure to Support Pathway to Zero Emissions. Strategy #3 focuses on the infrastructure required to transition to zero-emissions operations, with the presumption that the predominant source of power will be electricity. This will require the Port and its tenants to pay for upgrades to existing systems, increase system resilience (i.e., backup capacity), and build new infrastructure, including information technology systems to improve goods movement efficiency. The Port will plan and coordinate electrical system upgrades in areas served by the Port as a utility. The Port will work jointly with the terminal operators, off-dock tenants, and equipment owners located in these areas. The Port and its tenants will work with Pacific Gas & Electric Company (PG&E) in the PG&E-serviced areas. See Figure 2 for service areas. Strategy #3 provides flexibility for other technology options (such as hydrogen-powered equipment) to provide power for zero-emissions equipment and operations.

We recognize that some forms of propulsion are not amenable to electrification, including long-haul trucks, transoceanic ships and some harbor-craft. The Port will, sooner or later need to assess how to meet fossil-free fuel requirements for these important elements of shipping. The International Maritime Organization (IMO) has already acted to reduce sulfur content of bunker fuel, a move that is causing changes in fuel markets and ship design. It has also set a greenhouse gas emission reduction target that strongly suggests a move, over the long term,

---

<sup>6</sup> Our understanding is that the Port of Rotterdam has adopted this approach to assess 24.8 million tonnes transportation emissions associated with its operations. See, Wuppertal Institute, *Synthesis Report, Deep Decarbonization Pathways for Transport and Logistics Related to the Port of Rotterdam*, April 2018 [https://www.portofrotterdam.com/sites/default/files/wuppertal\\_institut\\_2018\\_decarbonization\\_of\\_transport\\_and\\_logistics\\_synthesis\\_report.pdf](https://www.portofrotterdam.com/sites/default/files/wuppertal_institut_2018_decarbonization_of_transport_and_logistics_synthesis_report.pdf).

away from fossil fuels for ships. The Oakland Port will eventually face market demand for non-fossil fueling infrastructure for ships and long haul trucks.

Now is a good time to begin long range planning to assess how to meet renewable hydrogen, or hydrogen/ammonia demand for ship and long haul trucking. Hydrogen ferries are, or will soon be operating in the San Francisco Bay. The long term competitiveness of the Port of Oakland may depend on early planning to assess how to fuel ships with near zero-carbon fuels, and take advantage of local supplies of renewable hydrogen feedstocks (e.g. EBMUD Wastewater facility, food-agriculture-forestry bio-waste diversion).

### **Conclusion**

The Seaport Air Quality 2020 & Beyond planning process is an opportunity to strengthen the long-term competitiveness and economic viability of Oakland as a major trade portal. The opportunities presented by changes in transport technology, and the emerging crisis over extreme weather events, require strong leadership by the Port and City of Oakland. Action on the recommendations in these comments will help secure long-term fuel cost savings, improve public health, and help stabilize climate. We urge the Board and Staff to take the long view, and in this plan lay a solid foundation for a clean and prosperous Port.

Respectfully submitted,

David Wooley, Director  
Center for Environmental Public Policy  
Goldman School, UC Berkeley  
dwooley@berkeley.edu  
415-271-1135

*The Center for Environmental Public Policy acknowledges the assistance of Andrea Morgan, Simone Cobb and Stacey Davis (CCAP) in the preparation of these comments.*

## APPENDIX A

# Program to Identify High Polluting Trucks and Reduce Emissions

---

*Proposed emission reduction measure for consideration by the West Oakland Community Health Protection Program Steering Committee*

Working Draft 1-22-19

The following is a proposed (draft) description of an emission reduction measure, *Program to Identify High Polluting Trucks and Reduce Their Emissions*, for consideration by the West Oakland Community Health Protection Program Steering Committee. This measure is being developed by the UC Berkeley Center for Environmental Public Policy in consultation with a range of key stakeholders. We encourage others to make use of the generic template to support consistent presentation of potential emission reduction options. The authors welcome feedback on the proposed measure and template.

<b>Short Description of the Proposed Action</b>	<b><i>Establish a new program to identify high polluting trucks and reduce their emissions. Specifically, trucks emitting at elevated levels (above those required under existing state and local regulations) will be identified and abated and repaired.</i></b>
<b>Background/Context</b> <ul style="list-style-type: none"><li>• What is the rationale/justification for the proposed action?</li><li>• What are the gaps in current actions?</li></ul>	<p><i>Heavy duty trucks emit diesel particulate matter (PM), a substance identified by California as a toxic air contaminant based on its potential to cause cancer. According to CARB, diesel PM is also linked to increased hospital admissions for heart disease and respiratory illnesses as well as premature death.<sup>7</sup> Black carbon (BC) is a component of diesel particulate matter and is also linked to health effects, cancer and climate change. Because BC is measurable<sup>8</sup> and is only emitted directly<sup>9</sup>, it can serve as a useful indicator of localized diesel PM emissions from heavy duty vehicles.</i></p> <p><i>California's truck and bus regulation requires heavy duty trucks in California to install diesel particulate filters and upgrade to 2010 model year (or newer) engines no later than 2023. The drayage truck rule already requires use of</i></p>

<sup>7</sup> See [Summary: Diesel Particulate Matter Health Impacts](#) on CARB's web page.

<sup>8</sup> In contrast, diesel PM is defined operationally.

<sup>9</sup> In contrast, PM is both emitted directly and formed in the atmosphere as a result of chemical reactions.



	<p>2007 model year (or newer) engines. These regulations are expected to limit emissions to below 0.01 g/bhp-hr (equivalent to the 2007 PM emission standard for new heavy-duty vehicle <a href="#">highway engines</a>).</p> <p>In registering drayage trucks, registrants must certify that the engine meets the model year standard<sup>10</sup> and indicate the vehicle identification number and model year<sup>11</sup>. However, while truck owners are supposed to ensure that all emission control technologies on the truck are working properly,<sup>12</sup> and the Port of Oakland requires compliance with all CARB requirements,<sup>13</sup> the registration systems (DTR and STEP) do not require proof of clean operation. Recent evidence suggests emissions from some trucks are not controlled as expected.</p> <p>A recent study by Preble et al<sup>14</sup> found 7% of port trucks are high emitters even though they have diesel particle filters. Trucks with failed filters account for 65% of fleet black carbon emissions. The highest emitting fraction of trucks is dominated by trucks equipped with DPF and 2007-2009 model year engines, suggesting that diesel particle filters may be failing with age.<sup>15</sup> Moreover, new results looking at the broader truck fleet operating on highways (not just the drayage truck fleet) from observations at the Caldecott Tunnel in 2018 suggest that 10% of non-drayage, diesel trucks do not have diesel particle filters. It is unclear whether these vehicles are exempt or noncompliant with the Truck and Bus rule. These trucks produce much of the non-drayage truck pollution on the road.<sup>16</sup></p> <p>Existing inspection programs test for compliance with the 40% opacity requirement,<sup>17</sup> but are not comprehensive. For</p>
--	--

<sup>10</sup> <https://www.arb.ca.gov/msprog/onroad/porttruck/DTRApplication.pdf>

<sup>11</sup> [https://www.oakportregistry.com/Help/Port\\_Registry\\_English\\_LMC\\_Tutorial.pdf](https://www.oakportregistry.com/Help/Port_Registry_English_LMC_Tutorial.pdf)

<sup>12</sup> Per the drayage truck rule, as summarized for truck owners:

<https://www.arb.ca.gov/msprog/onroad/porttruck/arbdoc/sumreg.pdf>

<sup>13</sup> All drayage activities at the Seaport must be in compliance with both CARB regulations and the Port's drayage truck ban. <https://www.oaklandseaport.com/seaport-resources/trucker-resources/comprehensive-truck-management-program/>

<sup>14</sup> Preble, CV; Cados, TE; Harley, RA; Kirchstetter, TW, In-Use Performance and Durability of Particle Filters on Heavy-Duty Diesel Trucks, Environmental Science & Technology, 2018. P.11913 DOI:10.1021/acs.est.8b02977.

<sup>15</sup> Ibid. p.11918

<sup>16</sup> Comment from TW Kirchstetter 12-13-18.

<sup>17</sup> No heavy-duty vehicle powered by a 1991 or subsequent model-year diesel engine operating on the highways within the State of California shall exceed 40 percent smoke opacity unless its engine is exempted.

[https://www.arb.ca.gov/enf/hdvp/ccr\\_title\\_13\\_hdvp.pdf](https://www.arb.ca.gov/enf/hdvp/ccr_title_13_hdvp.pdf)

	<p><i>example, the existing mandate for annual self-inspection of heavy duty vehicles, the Periodic Smoke Inspection Program (PSIP), excludes owners of single vehicles as well as out-of-state vehicles. Opacity rules and testing do apply to single vehicle owners and out-of-state trucks. However, field inspections at truck weigh stations may inspect less than 10% of trucks each year and are therefore likely to miss many non-compliant vehicles.</i></p>
<p><b>Description</b></p> <ul style="list-style-type: none"> <li>• Description of the action(s) to be taken to reduce emissions and/or pollution exposure</li> <li>• Description of the mandates and/or incentives that will yield the desired action(s)</li> <li>• Discussion of the existing legal authority and, as applicable, the need for new legal authority</li> <li>• Identification of design issues that will require analysis and decisions</li> </ul>	<p><i>This new program will reduce emissions from heavy duty trucks in West Oakland by: 1) identifying trucks whose emissions level are above what would be expected from trucks utilizing particle filters, 2) notifying truck drivers of their higher-than-expected emissions and the need to abate these emissions, and 3) requiring inspection and, as needed, repair of the faulty equipment.</i></p> <p><i>There are several ways this program could be implemented. Two alternative scenarios are described below:</i></p> <ul style="list-style-type: none"> <li>• <b>An incentive-based approach.</b> <i>Under this approach, once high-emitting trucks are identified, truck drivers/fleet operators would receive notifications of the high emissions levels along with incentives to test and repair the vehicles. Incentives could come from a combination of state funding for repair/retrofit/replacement, warranty enforcement assistance, etc., as discussed below.</i></li> <li>• <b>A mandatory approach</b> <i>(that could also make use of incentives). Under this scenario, once high-emitting trucks are identified, they would receive a notice indicating:</i> <ul style="list-style-type: none"> <li>○ <i>Their emission pre-screening signaled possible exceedance of the opacity standard;</i></li> <li>○ <i>An additional inspection and (as needed) repair must be conducted within a set timeframe, and could be done on-site at the port; and</i></li> <li>○ <i>Trucks failing to comply as required would not be permitted to re-enter the port, pursuant to a new port policy/regulation.</i></li> </ul> </li> </ul>
<p><b>Timeframe for Implementation</b></p> <ul style="list-style-type: none"> <li>• What is the anticipated timeframe for implementation of the action?</li> </ul>	<p><i>The proposed action would be implemented quickly, ideally within [2] years. It would make use of known measurement techniques and remedies. Exact timing to establish a program and begin to complete repairs would depend on:</i></p> <ul style="list-style-type: none"> <li>• <i>The time it takes to design and implement a methodology and plan to identify trucks with high emissions and faulty equipment and to set up notification protocols;</i></li> </ul>

	<ul style="list-style-type: none"> <li>• <i>The time required to designate/establish a facility to undertake testing/inspections (in addition to the current weigh station opacity testing) and repairs and provide the required training;</i></li> <li>• <i>The time needed to define incentives, establish requirements (as applicable), and complete other steps needed for implementation/enforcement.</i></li> </ul>
<p><b>Expected Outcomes and Metrics of Success</b></p> <ul style="list-style-type: none"> <li>• Estimated emissions outcome</li> <li>• Estimated reduction in pollution exposure</li> <li>• Anticipated health benefits</li> <li>• Other expected benefits (e.g., environmental, economic, sustainable development)</li> <li>• Metrics to track implementation of the action(s)</li> <li>• Activity metrics to assess operation of the action(s)</li> </ul>	<p><i>The proposed program is expected to reduce emissions in West Oakland by [X] tons/weekday, amounting to more than [y] tons per year.</i></p> <p><i>The following metrics can be used to monitor progress:</i></p> <ul style="list-style-type: none"> <li>• <i>Siting and installation of new measurement devices at key locations [e.g., traffic light(s) at the port exit(s)].</i></li> <li>• <i>Metrics to track implementation of the program could also include, for example, establishment of a testing/repair facility, establishment of a system to notify trucks, etc.</i></li> <li>• <i>Metrics to track operation of the action could include: Total number of trucks tested over a specified time period; total trucks with elevated readings over the specified time period; percent of trucks with elevated readings completing inspection/repair in the specified timeframe; etc.</i></li> <li>• <i>Metrics to track outcomes could include measurements of truck emissions before and after their repair; ambient pollution measurements in previously identified local hotspots (at the outset and at different points in time); and health indicators.</i></li> </ul>
<p><b>Estimates of Costs and Funding Plan</b></p> <ul style="list-style-type: none"> <li>• Total incremental costs of the action</li> <li>• Estimated cost per unit of outcome</li> <li>• Proposed funding sources</li> </ul>	<p><i>The total estimated cost of the program is [X] dollars (total) or [y] dollars per year. This includes costs borne by the city, the port and truck owners [specify]. These costs are based on estimates of:</i></p> <ul style="list-style-type: none"> <li>• <i>The cost of establishing a BC emissions monitor and automated license plate recognition system near each terminal exit for the Port of Oakland. Estimated technology cost per site: 40K. Additional costs include development costs (for the technology and data systems), operating costs, and ongoing support for data management and processing. (CARB may be able to provide the emissions monitor on an in-kind basis.)</i></li> <li>• <i>The cost of setting up a testing and inspection/repair station (this could entail building a new facility at the port aimed at inspecting heavy duty trucks, or</i></li> </ul>

	<p><i>repurposing an existing facility), as well as unit(s) of mobile inspectors that could travel to other locations in West Oakland.</i></p> <ul style="list-style-type: none"><li>• <i>The cost of replacement options (new traps, others) and tune-ups</i></li><li>• <i>Cost of training people to do testing and repairs, as applicable</i></li><li>• <i>Cost of support for warranty enforcement</i></li><li>• <i>[Cost of electrification/replacement and charging stations]</i></li></ul>
--	---