



Clearing the Air

Reducing Diesel Pollution in West Oakland

**A West Oakland Environmental Indicators Project Report
by the Pacific Institute
in conjunction with the Coalition for West Oakland Revitalization
November 2003**

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The following technical reports are available online at: www.pacinst.org/diesel

1. TIAX Diesel Truck Study (TIAX, 2003)
2. West Oakland Diesel Particulate Matter Emissions Inventory and Air Quality Monitoring Study (Pacific Institute (PI), 2003)
3. Summary of Studies (PI, 2003)
4. Data Gap Analysis (PI, 2003)

Acknowledgements

We would like to thank the following funders who have generously supported the diesel study, and the Pacific Institute's Environmental Indicators Project: California Department of Health Services, the East Bay Community Foundation, Evelyn and Walter Haas, Jr. Fund, Firedoll Foundation, The San Francisco Foundation, Sustainable Communities Leadership Program, Wallace Alexander Gerbode Foundation, United States Environmental Protection Agency, and the Vanguard Foundation.

The authors would like to thank the Natural Resource Defense Council (NRDC) for providing pro bono use of their Aethalometer to conduct the indoor air monitoring study, assisting in interpreting its results, and providing technical assistance.

We also thank all those who provided feedback on the final report: Diane Bailey (NRDC), John Brock, Richard Grow, Pam Tsai (all USEPA). Organizations listed for identification purposes only.

We would also like to thank agencies and elected officials who helped us obtain information, including: Bill Aboudi (AB trucking), Office of Vice Mayor Nancy Nadel, and the Port of Oakland's Sharon Maves and Tim Leong. We want to thank Mike Chan (TIAX) for his early mornings and our friends at Jubilee West Ayinde and Kriztina for always making room for us. All conclusions and errors are, of course, our own.



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Clearing the Air



Reducing Diesel Pollution in West Oakland

Diesel exhaust — the black smoke coming out of buses, trucks, trains, and ships — is the number one toxic air pollutant in California.¹ Chemicals in diesel pollution can cause cancer, harm the reproductive system and aggravate or cause asthma. New research shows that West Oakland, California, a neighborhood surrounded by freeways and bordered by the Port of Oakland, suffers from far more than its fair share of this toxic pollution. Fortunately, there are a host of innovative solutions to reduce this pollution without harming the Port or local businesses.

West Oakland is a small neighborhood on the shores of the San Francisco Bay, where residents live near thousands of moving and stationary sources of diesel pollution.

Container trucks carry goods to and from the Port of Oakland, U.S. Postal Service trucks carry mail to a major distribution center, and trucks and automobiles move overhead on freeways that surround the community. Looking towards the bay, one can see cranes, trains and ships at the Port, moving goods through West Oakland to supply businesses and people in the entire United States.

Many residents of West Oakland are very concerned by the levels of air pollution in their neighborhood, and have identified reducing diesel pollution as a major priority for improving community health.⁴

Key Findings

West Oakland residents face dangerous amounts of diesel soot in the air:

Some West Oakland residents are exposed to roughly five times more diesel particulates than residents in other parts of Oakland.

West Oakland residents may have an increased risk of one extra cancer per 1,000 residents due to diesel particulate exposure over a lifetime.

There is far more diesel pollution in West Oakland than in the rest of the State/Region:

There are 6 times more diesel particulates emitted per person and over 90 times more diesel particulates per square mile per year in West Oakland than in the State of California.²

Diesel pollution is everywhere in West Oakland:

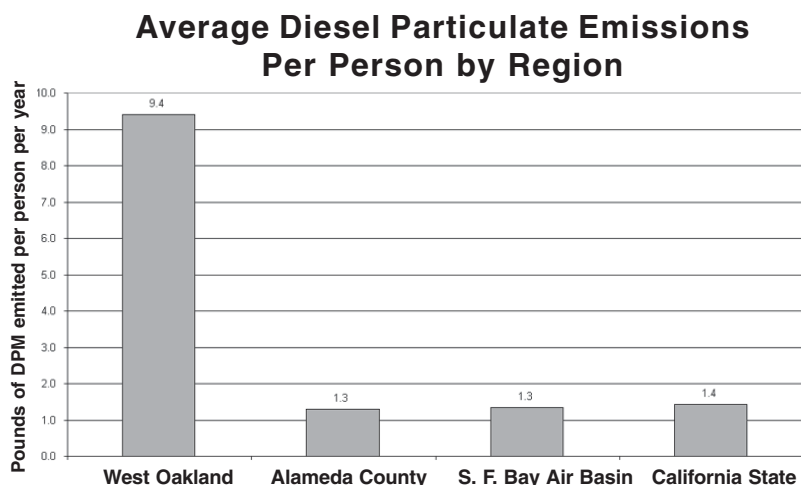
The amount of toxic soot produced by trucks traveling in West Oakland in one day is the same amount produced by 127,677 cars—this is enough cars to cover all the streets in West Oakland, four cars wide and two cars deep.³

2 Clearing the Air

Over the last year, the Pacific Institute has worked closely with the West Oakland Environmental Indicators Project and the Coalition for West Oakland Revitalization to develop and carry out a series of studies to identify and measure sources of diesel pollution in the area and find workable solutions to reduce this toxic air pollution. Through this research we have found:

Average diesel emissions in West Oakland are over 90 times higher per square mile than the average for the rest of California.⁵

There is also 7 times more diesel exhaust per person in West Oakland than in Alameda County as a whole. The toxic diesel soot emitted in West Oakland affects Californians from West Oakland to Fresno, but people in West Oakland bear the brunt of the exposure.



Compared to other parts of Oakland, some residents in West Oakland breathe air that has roughly five times higher levels of toxic diesel particulates.⁶

West Oakland residents may have an increased health risk of one extra cancer case for every thousand residents due to diesel particulate pollution exposure over a lifetime. This is over five times the risk that residents in other parts of Oakland face from diesel pollution.⁷

Exposure to diesel may increase the risk of asthma, heart disease, and premature death.

*Asthma is epidemic in West Oakland: children here are 7 times more likely to be hospitalized for asthma than the average child in the state of California.⁸ Recent studies have shown that diesel exhaust cannot only make asthma worse, but may actually **cause** asthma.⁹ Too many residents in West Oakland suffer from asthma, and diesel pollution may worsen this problem. Children are particularly susceptible to diesel exhaust because they breathe faster, are more active outdoors, and have sensitive lungs.*

Diesel exhaust has been under-regulated for decades in the United States.

While regulations are finally beginning to catch up to address the problem, these regulations primarily affect newer trucks and may take several decades to make a dent in the health risks posed by diesel pollution. Meanwhile, people continue to get sick, be hospitalized, and miss school or work, all from high levels of diesel pollution.

The good news is there are solutions!

While our studies confirmed what many residents already knew – that West Oakland faces a disproportionate burden of environmental and health threats from diesel pollution – we also found that there are many opportunities to reduce diesel pollution and truck impacts in West Oakland. Most importantly, many of these ideas can significantly clean the air, can be implemented right now, and can improve the health of residents as well as the local economy. In addition, longer-term solutions are also available. These recommendations are outlined on page 12.

West Oakland: Our Neighborhood

West Oakland is a diverse community of nearly 22,000 people on the San Francisco Bay.¹⁰ Three freeways, the Port of Oakland, and the Oakland Army Base bound the neighborhood. According to the City of Oakland, over 20 truck-related businesses operate within the neighborhood, as well as a major U.S. Postal Service distribution center.¹¹

The Port of Oakland is an international cargo transportation and distribution hub, and the fourth busiest marine port in the United States.¹² Every day, thousands of diesel trucks travel through West Oakland to drop off and pick up containers from docked ships at the Port. Over 1.7 million TEUs (twenty foot equivalent containers) were transferred at the Port in 2002. Trucks transported a great majority of these containers, about 80% in 1997.¹³ The Port estimates that its planned expansion will almost double the amount of truck traffic in the area — generating 22,000 truck trips per day by 2010.¹⁴ A study conducted in 2001 for the City of Oakland estimated that about 2,941 truck trips per day through the neighborhood were from the U.S. Postal Service and other truck related businesses in West Oakland.¹⁵



“This experience was unlike any other. The truckers were very enthusiastic about the study. They gave me information that would normally be difficult to obtain, like how long they wait in line to enter the Port and what this means for business.”

-Zuri Maunder (Idling Observer, Truck Study)

The West Oakland Environmental Indicator Project: Our Vision

In 2002, West Oakland residents identified diesel pollution as their number one environmental concern through the Environmental Indicators Project. The West Oakland Environmental Indicators Project (WO EIP), a resident led initiative to identify and address environmental concerns, began as partnership between the Pacific Institute, an Oakland-based non-profit research organization, and the 7th St./McClymonds Corridor Neighborhood Improvement Initiative. It is now a fully community-run initiative based at the Coalition for West Oakland Revitalization (CWOR). In the West Oakland Environmental Indicators report and in West Oakland’s Clean Air Goals, residents identified reducing truck traffic through the neighborhood and reducing diesel pollution as key goals of their Clean Air Campaign.

To support these goals, the WO EIP Resident Committee decided to undertake a community-based research effort to answer community questions about diesel trucks and pollution, and to better understand truck traffic in West Oakland.

“Black soot covers my window sills, my blinds, and my heating vents. It is a constant cleaning dance to even control it. No wonder, that my four grandchildren, my son and myself have asthma. There is also a Head Start and three child care centers in my building where many of the children also suffer from asthma. The air monitoring study has given me an idea of just what we are breathing each day”

-Margaret Gordon, WO EIP Committee, Air Monitoring Study Participant

The ultimate goal of this work was to arm West Oakland residents with information and tools to reduce diesel pollution and truck impacts in their community. While there are a number of significant sources of diesel pollution in West Oakland, such as ships, cranes, and other on-site equipment, this initial study focused on truck traffic because trucks more directly impact residents’ quality of life, the safety of children playing in the streets, neighborhood aesthetics, and noise pollution.

Community Driven Research West Oakland Diesel Truck Study

With support from the United States Environmental Protection Agency and the California Department of Health Services, West Oakland residents and organizations partnered with the Pacific Institute to design and conduct their own neighborhood study of diesel trucks. The research began with a series of meetings of the West Oakland EIP Committee to decide what questions they wanted to have answered in a diesel truck study.

The Pacific Institute then reviewed previous studies on truck traffic from the Port of Oakland and the City to find areas where community questions still needed to be answered.¹⁶ Some community concerns that had not been addressed in these studies were the number of trucks traveling on residen-

tial or prohibited streets, the amount of time trucks were idling at the Port of Oakland, and information on what residents were actually breathing.

The focus of the first part of the study was to understand truck patterns and behavior so that we could identify alternatives to reduce pollution and truck impacts. Residents first identified and prioritized key neighborhood locations where trucks were traveling and where they had seen trucks idling. The West Oakland EIP Committee hired TIAX, LLC, a transportation technologies consulting firm, to help conduct this research.

TIAX trained ten West Oakland residents to be truck observers. These observers learned how to identify container and non-container trucks, 2-axle and 3-axle trucks, and identify which way trucks were traveling.¹⁷ The study focused on trucks used to haul containers to and from the Port of Oakland.

Over the course of the July 2003 study, West Oakland residents documented truck traffic in the community and truck idling at the Port of Oakland. Residents conducted truck counts on 5 neighborhood streets on three days, and observed idling for two full 24-hour periods at the Port of Oakland.

What we found is that on a daily basis, hundreds of trucks were traveling on residential streets in West Oakland – some illegally. Trucks were traveling through West Oakland neighborhoods to find truck services, like fuel, truck repair, food, and overnight parking. We also found a significant number of trucks using streets that are prohibited for trucks over 4 ½ tons. The idling observations showed us that trucks idle outside terminal gates an estimated combined 280 hours per day. Idling observers found that most trucks were idling and waiting inside of terminal gates where we could not count them or talk to the truck drivers. Based on a small sample of truck drivers, we conservatively estimated that each truck spends about 1.5 hours per trip idling or crawling to deliver or pick-up a container.¹⁸

West Oakland Indoor Air Monitoring

Although counting trucks gave us insight into traffic patterns, it did not tell residents how much diesel particulate matter they were actually breathing on a day-to-day basis, and how that might affect their health. To answer this question, the Pacific Institute and West Oakland residents teamed up with the Natural Resources Defense Council to conduct limited air monitoring for diesel particulates in and near their homes.

Diesel exhaust is composed of a complex mixture of gases and particles. Gases in diesel exhaust include carbon monoxide, nitrogen compounds, sulfur compounds, and many highly toxic and/or carcinogenic compounds, including formaldehyde, acetaldehyde, acrolein, and benzene. The black soot, or particulate matter (PM), in diesel exhaust has numerous compounds like carbon, sulfate, nitrate, and metals. Diesel particulate matter (DPM) is among the most toxic substances in diesel exhaust. DPM is different than other forms of particulate matter in both its chemical composition and its size composition: Approximately 80–95% percent of particles in diesel exhaust are less than 1 micron in size.¹⁹ These tiny particles can carry toxic chemicals deep into the lungs where our bodies have a harder time removing them. The ultrafine particles are so small they can enter the bloodstream directly, where toxins on those particles may have direct contact with body tissues.

There are two existing air monitoring stations in West Oakland. These air monitoring stations measure, among other things, the level of particulate matter and fine particulate matter in the air.²⁰



Fenix Barbour documents trucks travelling along 7th Street. The tally sheet documented which direction trucks were traveling, if they were container or non-container trucks, and if they were 2-axle or 3-axle vehicles.

However, these monitors do not measure what fraction of this particulate matter is the more toxic diesel particulate matter. Because diesel particulates are more hazardous (in terms of both cancer and asthma) than other forms of particulate matter (such as dirt, road dust, or gasoline exhaust), we decided to measure DPM directly inside several West Oakland homes.

By using a device called an Aethalometer,²¹ which measures black carbon particles in the air, we were able to get a minute-by-minute reading of what people are breathing. Diesel exhaust is one of the major sources of black carbon in the air, so a black carbon reading gives us a good sense of what portion of the particles in the air are the more toxic diesel particles. Using this black carbon measure we can calculate the concentration of diesel particulate matter in the air.

Using the Aethalometer, we measured black carbon in two homes in West Oakland. These homes were located near 7th Street, and Peralta and 9th Street. The results we found were shocking. The West Oakland residents we studied

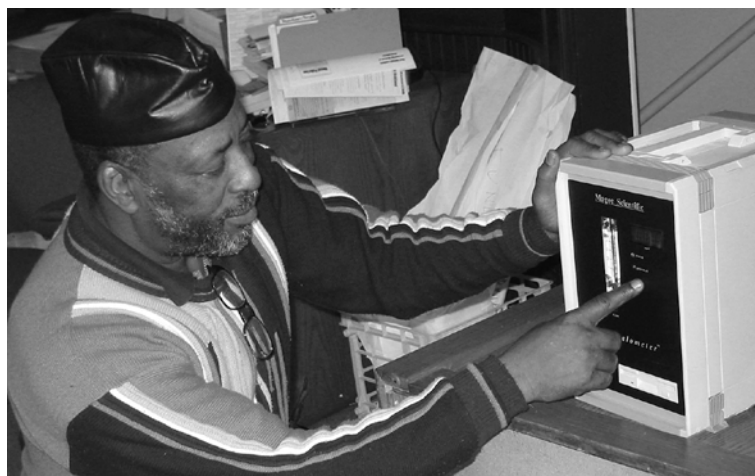
are breathing diesel particulate matter in the air that was roughly five times more concentrated than in other parts of Oakland. West Oakland residents have over five times greater risk of developing cancer from this increased exposure to diesel exhaust than residents in other parts of Oakland.

Solutions : Reducing Diesel Pollution and Impacts from Trucks

Given the prevalence of diesel pollution in West Oakland, and the growing body of evidence on diesel's toxicity, reducing diesel

pollution is critical to protecting the health of residents in the area. Through the work of West Oakland residents on the WO EIP Committee, our contractor, TIAX, and the Pacific Institute, we have come up with a number of alternatives to reduce diesel pollution and truck impacts in West Oakland.

While this list does not represent all the available options, it does represent the community's current ideas around reducing diesel pollution. We hope that this list can be the springboard for further ideas and, more importantly, the implementation of solutions to reduce diesel pollution. The list is divided into three goals: reducing the impact of trucks, reducing diesel emissions, and improving community health. In each section, the recommendations are organized from short-term, "low-hanging fruit," to long-term solutions.



Monsa Nitoto, Executive Director of Coalition for West Oakland Revitalization, examines the indicator lights on the aethalometer. The aethalometer takes minute-by-minute samples of black carbon in the air. Measuring black carbon gives us a sense of how much diesel particulate matter is in the air.

GOAL: Reduce Impact of Trucks on West Oakland Community**Recommendation: Increase Enforcement/Penalties on Prohibited Routes**

From our truck counts study and interviews with community members, we found that many trucks travel on West Oakland streets illegally. These trucks release diesel exhaust right near homes and create safety problems for families and children. While there are signs that prohibit trucks over 4.5 tons and speed bumps on certain streets, we still found that at least 40 container truck trips per 8-hour day travel illegally on these streets. This does not include non-Port related trucks, and is a conservative estimate based on limited observations on a few street corners over three days.

While traffic barriers will limit truck traffic on neighborhood streets, installation of these barriers may take several years to implement. In the interim, the West Oakland EIP Committee would like to see increased enforcement and deterrence for trucks traveling and parking on prohibited streets. The Committee would like to work with the Oakland Police Department, the Port, and truck drivers to discourage trucks from traveling on neighborhood streets or parking illegally. This can be done through a community enforcement program, where residents can immediately report illegal truck traffic to the Police Department or the Port. The Police Department and the Port should also create a better system to track residents' truck related complaints and help them target recurring problems.

Recommendation: Create a Designated Truck Route (that does not travel through the neighborhood)

The West Oakland EIP Committee believes that residents should be involved in deciding how trucks travel through their neighborhood on their way to and from the Port of Oakland and other businesses. Truckers should have clear signs that get them as quickly as possible from their entrance point to the freeway or to the Port of Oakland without traveling on residential streets. The West Oakland EIP committee would like to assemble various stakeholders from the community, truck related businesses, trucking companies, the Port, the City of Oakland, USPS, and other interested parties to discuss how the existing truck routes were generated, why trucks may be deviating from them, and the need to re-route trucks out of residential areas and directly to the Port or other businesses. We should ensure that all affected residents can be involved in making this decision. Once the truck route has been agreed upon, it needs to be communicated effectively to truckers and businesses that generate truck trips.

Recommendation: Pass an Ordinance Prohibiting Overnight Truck Parking in Residential Areas

Residents throughout West Oakland are not only impacted by air pollution from truck traffic but also the everyday blight of parked trucks and cabs. The West

Oakland EIP committee would like the City of Oakland to adopt an ordinance prohibiting all trucks from parking overnight in residential areas, while ensuring West Oakland resident truck drivers have safe parking at the Port of Oakland.

Recommendation: Install Traffic Barriers on Prohibited Streets

To increase traffic safety and reduce emissions in the prohibited areas, the City of Oakland should install traffic barriers to prevent truck traffic. The City should work with residents to determine what type of barriers and how many barriers should be installed in this neighborhood. Roundabout barrier designs may be more useful for this application, which will allow residents' vehicles to pass through while prohibiting truck travel. Installing these barriers will force trucks to use major streets such as 7th Street, I-880 Frontage Road, Mandela Parkway, and West Grand Avenue, which are designed to handle truck traffic.

Recommendation: Decrease Truck Traffic by Increasing Percentage of Containers Moved by Rail

Per container, rail traffic produces much less diesel pollution than truck traffic.

Recommendation: Provide Truck Services at the Port of Oakland

We must ensure that truckers find all the services they need on the grounds of the Port of Oakland, instead of traveling into West Oakland. Providing truck services at the Port of Oakland would eliminate hundreds of truck trips per day into West Oakland. Truck stops with fueling, truck repair, and food and beverage services should be provided. These stops should not allow overnight parking or in any other way attract trucks to come to West Oakland, but should be designed to serve trucks that travel to the community currently. West Oakland businesses that now serve truckers should be offered the opportunity to move their businesses to the Port of Oakland or the Army Base. This is particularly important for businesses providing truck repair and fueling services. If these businesses are moved, the properties should be re-zoned to exclude truck repair and fueling stations. These Port of Oakland truck stops should also preferentially hire West Oakland residents to provide much needed jobs for the community.

GOAL: Reduce Diesel Emissions from Trucks

Recommendation: Provide Financial Incentives to Replace Older Trucks

While pre-1987 truck engines make up 10 percent of the truck engines used at Port terminals, they generate 20 percent of the DPM emissions. Replacing these trucks with new engines is a good strategy to reduce emissions. We recommend that the Port of Oakland and the Bay Area Air Quality Management District implement an incentive program to remove old truck engines servicing Port terminals. We recommend that the truckers be paid a \$15,000

subsidy per truck to pay for engine upgrades, also called engine “re-powers,” to encourage truckers to modernize their trucks. Alternately, the Port of Oakland and the Regional Air District could subsidize a minimum of \$10,000 for truck replacement with Model Year 1996 trucks or younger.

This incentive program should be an ongoing program that targets the oldest 7 to 10 percent of the truck fleet for replacement or re-powering annually. With an annual effort to remove all of the oldest trucks operating within the terminals, the Port of Oakland will not only help reduce pollution in West Oakland’s air, but help make the entire Bay Area cleaner.

Recommendation: Regulate Idling within Port Terminals

Since we found that a lot of the idling at the Port of Oakland was taking place within terminal gates, we recommend that the Bay Area Air Quality Management District (BAAQMD) also regulate idling emissions *within* Port terminal gates. A recent state bill, AB 2650, regulates truck idling outside terminal gates to 30 minutes at all California ports.

An estimated 20 pounds per day or 3 tons per year of DPM emissions comes from trucks idling at the Port terminals. These emissions are expected to increase as Port activity expands from the current level of 6,300 truck trips per day to the proposed level of 14,219 over-the-road truck trips per day. BAAQMD should regulate idling time to 30 minutes or less *inside* terminal gates. Alternately, BAAQMD should regulate by permit the number of trucks within terminal gates. If there is more idling than allowed, or terminals generate more than a certain amount of DPM emissions per day from trucks and other equipment, the terminal should be required to reduce emissions from idling trucks, particularly through more efficient systems.

Recommendation: Provide Electrified Parking Spaces to Reduce Unnecessary Idling

Installing electrified parking spaces so that trucks can plug into an electrical grid instead of leaving their engines running while waiting at the terminal is a relatively simple solution. If the BAAQMD regulated terminal idling activities, the terminals would be motivated to develop systems to make delivery and pick-up of containers more efficient.



West Oakland not only has a high concentration of truck traffic, but is also bounded on each side by freeways. Trucks and cars idling overhead also contribute to poor local air quality.

Recommendation: Continue to test cleaner fuels and technologies

It is recommended that the Port of Oakland continue performing demonstration tests on state-of-the-art DPM emission control technologies. For example, the Port of Oakland is about to embark on a demonstration test using diesel emulsion fuel with a local fleet. Through demonstration tests like this, the Port may find new technologies that provide significant emission benefits to the community. In addition to diesel emulsion fuels, technologies such as diesel particulate filters, diesel oxidation catalysts, and biodiesel should be evaluated.

Recommendation: Develop a Biodiesel Consortium

Biodiesel is a diesel replacement fuel made from natural, renewable sources such as new and used vegetable oils and animal fats. The results from the US EPA TIER I Health and Environmental Effects Testing for biodiesel found substantially reduced emissions of unburned hydrocarbons, carbon monoxide, sulfates, and particulate matter. There remain concerns around engine compatibility, the extension of diesel engine warranties when biodiesel is being used, and the cost of biodiesel (which can be up to twice as expensive as regular diesel).



In the shadows of cranes, hundreds of containers wait to be loaded on ships, trains, and trucks at the Port of Oakland.

Residents and others are excited about the idea of fueling engines outside of the petroleum economy, and creating a greener economy through recycled oil biodiesel. The West Oakland EIP Committee also sees an opportunity to partner with the City of Berkeley (a biodiesel user), the City of Oakland, the Port, truckers, and other to develop a biodiesel manufacturing plant that could reduce the cost of biodiesel, provide jobs to West Oakland residents, and reduce air pollution.

GOAL: Improve Community Health

Recommendation: Create a Healthy Homes Project

Indoor air monitoring data suggests that West Oakland residents may be exposed to high levels of diesel particulate matter in their homes and work places. Homes on major truck thoroughfares may experience exceptionally poor indoor air quality.

The WO EIP Committee would like the Alameda County Public Health Department and the California Department of Health Services to help sponsor a Healthy Homes Project, where technology and design measures (such as HEPA filters, ventilation systems, and green barriers) can be installed to reduce the amount of dangerous pollution residents breathe inside their homes. City and state housing codes should also incorporate requirements and recommendations for cleaning indoor air in polluted communities.

Recommendation: Support a Community Fund

All of Oakland benefits from the economic growth that the Port of Oakland generates. However, West Oakland residents bear the brunt of the pollution and health problems from the Port's maritime activities.²² For trucks that travel through the community, and perhaps other mobile and stationary sources at the Port that produce harmful air emissions, the West Oakland EIP would like a fee gathered (either from the Port itself, shipping lines, or terminal operators) to be deposited in a community fund. With this fund, the community could help support pollution reduction efforts, build an asthma clinic, offer more health education, and implement a Healthy Homes project.

In Conclusion

Our study has confirmed that children and families in West Oakland are severely impacted by diesel pollution and truck traffic. The good news is that there are a host of solutions to address this problem, and many can be implemented right away. Diesel pollution affects all of us, including healthy people who live far from West Oakland. We hope — now that the true toll of diesel pollution and truck traffic is becoming clearer — that key stakeholders, including the Port of Oakland, the U.S. Postal Service, federal, state and local agencies, truckers, and other businesses will join together with the residents of West Oakland to make this community cleaner, safer, and healthier.

Endnotes:

¹ According to the California Air Resources Board 2002 Almanac, the Health Risk estimate from diesel particulate matter (DPM) for California and for the San Francisco Bay Area Air Basin is almost 10 times higher than that for the other 9 toxic air contaminants (TACs) studied. **Source:** ARB. 2002. *2002 California Almanac of Emissions and Air Quality*. Chapter 5: Toxic Air Contaminants, Air Quality and Health Risk. p.265.

² See the "West Oakland Diesel Particulate Matter Emissions Inventory and Air Quality Monitoring Study" (www.pacinst.org/diesel) for diesel emission inventory for West Oakland and CARB 2002 Almanac for diesel emissions for Alameda County, San Francisco Bay Area Air Basin and the State of California for 2000.

³ See the "West Oakland Diesel Particulate Matter Emissions Inventory and Air Quality Monitoring Study" (www.pacinst.org/diesel) for diesel emission inventory for West Oakland for the calculations of the equivalent number of cars on West Oakland streets.

⁴ Pacific Institute and 7th Street McClymonds Corridor. 2002. *Neighborhood Knowledge for Change: The West Oakland Environmental Indicators Project*. Oakland, CA: Pacific Institute.

⁵ See the "West Oakland Diesel Particulate Matter Emissions Inventory and Air Quality Monitoring Study" (www.pacinst.org/diesel) for diesel emission inventory for West Oakland and CARB 2002 Almanac for diesel emissions for Alameda County, San Francisco Bay Area Air Basin and the State of California for 2000.

⁶ See the "West Oakland Diesel Particulate Matter Emissions Inventory and Air Quality Monitoring Study" (www.pacinst.org/diesel) for analysis of air monitoring in West Oakland.

⁷ Based on a unit risk of 300 excess cancer cases per microgram of exposure per cubic meter, over a 70 year lifetime. **Source:** California Air Resources Board. 2002. *2002 California Almanac of Emissions and Air Quality*. Chapter 5: Toxic Air Contaminants, Air Quality and Health Risk. p.209. See the "West Oakland Diesel Particulate Matter Emissions Inventory and Air Quality Monitoring Study" (www.pacinst.org/diesel) for analysis of air monitoring and health risk in West Oakland.

⁸ Pacific Institute and 7th Street McClymonds Corridor. 2002. *Neighborhood Knowledge for Change: The West Oakland Environmental Indicators Project*. Oakland, CA: Pacific Institute.

⁹ Pandya et al. 2002. Diesel Exhaust and Asthma: Hypotheses and Molecular Mechanisms of Action. *Environ Health Perspectives* 110 (S1): 103–112. Also, extensive cohort studies with children in more and less polluted areas of Southern California showed that children living in areas with higher measured levels of NOx and particulate matter exhibited the highest incidences of new asthma cases (Kunzli et al. 2003. *Breathless in Los Angeles: The Exhausting Search for Clean Air*. *American Journal of Public Health* 93:1494–1499).

¹⁰ Census 2000 figures for West Oakland (Census Tracts 4015-4019, 4021-4027). Alameda County Department of Public Health. 2001. *Community Information Book: West Oakland*. Oakland, CA. p.10.

¹¹ Harding ESE. 2001. *West Oakland Particulate Emissions Study, Oakland, California*. Harding ESE Project No. 48168 005, Prepared for the City of Oakland Environmental Services Division. September 24, 2001. Novato, CA.

¹² Port of Oakland website. <http://www.portofoakland.com/maritime/factsfig.asp>. Alternatively, according to the U.S. Bureau of Transportation Statistics, the Port of Oakland ranked fifth in thousands of TEUs moved, behind the Ports of Los Angeles, Long Beach, New York/New Jersey, and Charleston in 2000 and 2001. The point is that activity at the Port of Oakland is important locally, regionally, nationally and internationally.

¹³ Port of Oakland Department of Environmental Assessment and U.S. Department of the Navy. 1997. *Disposal and Reuse of Fleet and Industrial Supply Center Oakland, Vision 2000 Maritime Development*. Final Environmental Impact Statement / Environmental Impact Report. ACH # 96062010. San Bruno and Oakland, CA. p. J-4.3.

¹⁴ Port of Oakland Department of Environmental Assessment and U.S. Department of the Navy. 1997. *Disposal and Reuse of Fleet and Industrial Supply Center Oakland, Vision 2000 Maritime Development*. Final Environmental Impact Statement / Environmental Impact Report. ACH # 96062010. San Bruno and Oakland, CA. p. J-4.3. This EIS / EIR estimates that of 22,210 truck trips in 2010 under the Reduced Harbor Fill Alternative, 14,219 will be over-the-road weekday truck trips and 7,992 will be to and from rail (intramodal).

¹⁵ Of those 2,491 truck trips per day, 947 were from the U.S. Postal Service Distribution Center, generating 65 of 171.6 pounds of DPM per day. **Source:** Harding ESE. 2001. *West Oakland Particulate Emissions Study, Oakland, California*. Harding ESE Project No. 48168 005, Prepared for the City of Oakland Environmental Services Division. September 24, 2001. Novato, CA. Table 2.

¹⁶ See full report at www.pacinst.org/diesel for more details. These results are reviewed in the "Summary of Studies" section of the full report.

¹⁷ These were the methods used in the Port of Oakland's traffic impact study conducted by Dowling Associates (2001), as reported in TIAX LLC (2003). **Source:** (1) Dowling Associates. 2001. Port Traffic Data Collection Study, submitted to the Port of Oakland. DRAFT version March 15, 2001. (2) TIAX LLC. 2003. *Container Truck Traffic Assessment and Potential Mitigation Measures for the West Oakland Diesel Truck Emission Reduction Initiative*. Report to the Pacific Institute, prepared September 14, 2003. Technical Report TR-03-176; TIAX LLC Case D5247. Cupertino, CA.

¹⁸ These results are presented in detail in the TIAX report, available at www.pacinst.org/diesel. **Full Citation:** TIAX LLC. 2003. *Container Truck Traffic Assessment and Potential Mitigation Measures for the West Oakland Diesel Truck Emission Reduction Initiative*. Report to the Pacific Institute, prepared September 14, 2003. Technical Report TR-03-176; TIAX LLC Case D5247. Cupertino, CA.

¹⁹ "Approximately 80% to 95% of diesel particle mass is in the size range from 0.05 to 1.0 microns, with a mean particle diameter of about 0.2 microns." US Environmental Protection Agency (EPA). 2002. *Health Assessment for Diesel Exhaust*. Office of Research Development. EPA/600/8-90/057F May 2002. pp. 2-79. Good, comprehensive summaries with extensive documentation of physical and health effects of diesel exhaust and diesel pollution include: (1) US Environmental Protection Agency (EPA). 2002. *Health Assessment for Diesel Exhaust*. Office of Research Development. EPA/600/8-90/057F May 2002; (2) Natural Resources Defense Council and Coalition for Clean Air. 2001. *No Breathing in the Aisles: Diesel Exhaust Inside School Buses*. Chapter 2. The Serious Health Impacts of Diesel Exhaust, and (3) Clean Air Task Force. 2003. *Diesel Engines: Health and Environmental Impacts*. Fact Sheet. Boston, MA.

²⁰ These monitors are located at the Port and in a residential area in West Oakland. They also measure all criteria air pollutants, including SO₂, NO_x and ozone. Data are available in real-time from the Bay Area Air Quality Monitoring District (BAAQMD) website.

²¹ Magee Scientific, Aethalometer AE42, courtesy of NRDC. **Sources:** (1) Natural Resources Defense Council and Coalition for Clean Air. 2001. *No Breathing in the Aisles: Diesel Exhaust Inside School Buses*. Appendix C. (2) Magee Scientific website: <http://www.mageesci.com/>.

²² Residents in East Oakland and Fruitvale/San Antonio bear pollution from airport-related diesel emissions, over which the Port of Oakland also has jurisdiction.

Summary of Solutions

GOAL: Reduce Impact of Trucks on West Oakland Community	Increase enforcement/penalties on prohibited routes • The WO EIP Committee would like to work with the Oakland Police Department, the Port, and truck drivers to discourage illegal parking and traveling in the neighborhood. • This can be done through a community enforcement program. • The Police Department and the Port should also create a better system to track residents' truck complaints and help them target recurring problems. Create a designated truck route (that does not travel through the neighborhood) • All affected residents and should be involved in deciding how trucks travel through their neighborhood. • Truckers should have clear signs that get them as quickly as possible from their entrance point to the freeway or to the Port of Oakland without traveling on residential streets. • Once the truck route has been agreed upon, it needs to be communicated effectively to truckers and businesses that generate truck trips. Pass an ordinance prohibiting overnight truck parking in residential areas • The WO EIP committee would like the City of Oakland to adopt an ordinance prohibiting all trucks from parking overnight in residential areas, while ensuring safe parking for West Oakland resident truckers at the Port of Oakland. Install traffic barriers on prohibited streets • The City should work with West Oakland residents to determine what type of barriers and how many barriers should be installed in this neighborhood. • Installing these barriers will force trucks to use major streets which are designed to handle truck traffic, and increase traffic safety and reduce emissions in the prohibited areas Decrease truck traffic by increasing percentage of containers moved by rail • Per container, rail traffic produces much less diesel pollution than truck traffic. Provide truck services at Port of Oakland • Providing truck services (fueling, truck repair, food and beverage) at the Port of Oakland would eliminate hundreds of truck trips per day into West Oakland. • These truck stops can provide an electrified queue station where trucks can shut off their engines and plug in. • These stops should not attract additional truck traffic, but should be designed to serve trucks that currently travel through the community. • West Oakland businesses that now serve truckers should be allowed to move their businesses to the Port of Oakland or the Army Base. • If businesses move, the properties should be re-zoned to exclude truck businesses. • These truck stops should also preferentially hire West Oakland residents to provide much needed jobs.
GOAL: Reduce Diesel Emissions from Trucks	Provide financial incentives to replace older (more polluting) trucks • We recommend truckers be paid a \$15,000 subsidy per truck to pay for engine upgrades also known as "re-powers". • Alternately, the Port of Oakland and the Regional Air District could subsidize a minimum of \$10,000 for truck replacement with Model Year 1996 trucks or younger. • This should be an ongoing program that targets the oldest 7 to 10 percent of the truck fleet for replacement or re-powering annually. • This will not only clean West Oakland's air, but also help the entire Bay Area.

Summary of Solutions

Regulate idling within Port terminals • A recent State bill AB 2650, regulates truck idling <i>outside</i> terminal gates to 30 minutes at all California ports. We recommend that the Bay Area Air Quality Management District (BAAQMD) also regulate idling emissions <i>inside</i> Port terminal gates to 30 minutes or less. • BAAQMD should also regulate by permit the number of trucks within terminal gates. • If there is more idling than allowed, or terminals generate more than a certain amount of DPM emissions per day from trucks and other equipment, the terminal should be required to reduce emissions from idling trucks. • If the BAAQMD regulated terminal idling activities, the terminals would be motivated to develop systems to make delivery and pick-up of containers more efficient.	GOAL: Reduce Diesel Emissions from Trucks
Provide electrified parking spaces to reduce unnecessary idling. • Install electrified parking spaces so that trucks can plug into an electrical grid instead of leaving their engines running while waiting at the terminal.	
Continue to test cleaner fuels and technologies • It is recommended that the Port of Oakland continue performing demonstration tests on state-of-the-art DPM emission control technologies. • In addition to diesel emulsion fuels that are now being tested, technologies such as diesel particulate filters, diesel oxidation catalysts, and biodiesel should be evaluated.	
Develop a Biodiesel Consortium • Biodiesel is a diesel replacement fuel made from natural, renewable sources such as new and used vegetable oils and animal fats. • USEPA TIER I Health and Environmental Effects Testing found substantially reduced emissions for biodiesel. • The WO EIP Committee also sees an opportunity to partner with the City of Berkeley (a biodiesel user), the City of Oakland, the Port, truckers, and others to develop a biodiesel manufacturing plant that could reduce the cost of biodiesel, provide jobs to West Oakland residents, and reduce air pollution. • There remain concerns around engine compatibility, the extension of diesel engine warranties when biodiesel is being used, and the cost of biodiesel (which can be up to twice as expensive as regular diesel).	
Create a Healthy Homes Project • The EIP committee would like the Alameda County Public Health Department and the California Department of Health Services to help sponsor a Healthy Homes Project, where technology and design measures (such as HEPA filters, ventilation systems, and green barriers) can reduce the amount of indoor air pollution residents breathe. • City and state housing codes should also incorporate these recommendations.	GOAL: Improve Community Health
Support a Community Fund • All of Oakland benefits from the economic growth that the Port of Oakland generates. However, West Oakland residents bear the brunt of the pollution and health problems from the Port's maritime activities. • For trucks that travel through the community, and perhaps other mobile and stationary sources at the Port that produce harmful air emissions, the WO EIP Committee would like a fee gathered (either from the Port itself, shipping lines, or terminal operators) to be deposited in a community fund.	

The Partners

The Pacific Institute

The Pacific Institute is an independent, non-profit center created in 1987 to conduct research and develop solutions to the related problems of environmental protection, economic development, and human health. Our *Community Strategies for Sustainability and Justice* program was launched in 1995 to assist communities in addressing critical human health and environmental issues. Our goal is to empower community residents so that they can have a real say in their future. Program work includes technical and policy analysis, community education, and leadership development. We initiated our neighborhood environmental indicators project to support Bay Area neighborhoods to utilize data in ways that can strengthen meaningful community participation and sustainable development, influence public policies, and impact economic, social, and environmental conditions that contribute to a community's quality of life.

Program Director: Meena Palaniappan

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The West Oakland Environmental Indicators Project (WO EIP)

WO EIP is a resident-led initiative to identify and address environmental concerns began in 2000 as partnership between the Pacific Institute, an Oakland-based non-profit research organization, and the 7th St./McClymonds Corridor Neighborhood Improvement Initiative. Over the course of three years the WO EIP Committee has met to identify 17 indicators of environmental health, support three community campaigns, influence policies on redevelopment, help shut down Red Star Yeast the largest fixed source of toxic air pollution in the neighborhood and conduct this study of diesel pollution. The EIP Committee is now a community-run initiative based at the Coalition for West Oakland Revitalization (CWOR).

Co-Chairs: Mary Lake and Allen Edson

Coordinating Team Members: Monsa Nitoto, Margaret Gordon, James “Tim” Thomas, and Brian Beveridge

Committee Members: Valerie Allums, Fenix Barbour, James McClendon, Letricia Culbertson, Norma Dillard, Joetta Fitzpatrick, Mary Gilmore, June Gin, Lola Hanif, Dana Harvey, Jumoke Hodge, Ray Kidd, Carl Lester, Fred Merritt, Morris Moton, Nancy Nadel, Arthur O’Neal, Yvonne Smith, Amanda Brown-Stevens Dollie Rambo, Marilyn Williams-Reynolds, Ellen Wyrick-Parkinson

The Coalition for West Oakland Revitalization (CWOR)

CWOR is a non-profit community advocacy organization formed in 1992 to fight for environmental justice rights, racial and cultural equity, a strong community-based economy, and improved physical and social conditions for West Oakland residents. CWOR accomplishes this broad-based mission by operating through its Coalition of residents, property owners, business, non-profit and community based organizations, churches and public and private entities. CWOR is a membership organization with an active, local Board of Directors who enact solutions to community concerns by facilitating a community-led task force efforts. Through CWOR’s Environmental Task Force a Clean Air Coalition was organized in 2001 to help clean the air, protect the health of residents promote positive economic development in the neighborhood, and succeeded in shutting down Red Star Yeast in 2002.

Executive Director: Monsa Nitoto

Executive Administrator: LarSandra Wagner

Community Technical Assistance Coordinator: Azibuike Akaba
