# Analysis of Health Impacts and Safety Risks and Other Issues/Concerns Related to the Transport, Handling, Transloading, and Storage of Coal and/or Petroleum Coke (Petcoke) in Oakland and at the Proposed Oakland Bulk & Oversized Terminal

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# EXECUTIVE SUMMARY

There is substantial evidence that the proposed transport, handling, transloading, storage, and export of coal through the bulk and oversized terminal proposed at the site of the decommissioned Oakland Army Base would endanger the health and safety of people working at or visiting the project site, as well as those living in, recreating in or visiting adjacent communities.

It is very likely that coal dust in the form of fine particulate air pollution ($PM_{2.5}$) from this project would harm human health. Coal dust is generated when coal is fractured during loading and unloading activities, in addition to during transport. Coal dust contains fine particles that become suspended in air and create dangerous air pollution ($PM_{2.5}$).

Due to their proximity to heavily used freeways, truck transport routes, and the Port of Oakland, communities surrounding the proposed terminal site already suffer from exposure to elevated levels of pollution, including $PM_{2.5}$, and the associated chronic and severe health effects. These communities are particularly vulnerable to adverse health effects of pollution due to high rates of poverty and chronic disease.

The $PM_{2.5}$ generated as a result of the proposed project's daily coal transport, transloading and handling is expected to exacerbate existing environmental pollution problems. There is no evidence of a safe level of exposure to $PM_{2.5}$, so any additional increase in the $PM_{2.5}$ to which communities are exposed is expected to lead to additional ill-health in the form of morbidity and/or mortality.

Workers at the terminal will be in closest contact to the coal dust, as it is generated when the coal is transferred between railcars and terminal equipment and eventually into docked ships. In the event of enclosed port facilities as suggested by the project sponsors, concentrations of coal dust within the facilities would be expected to be high. There is evidence that current workplace safety standards, including those for combustible dust, are inadequate to protect the safety of workers, implying that terminal workers (and adjacent communities) will be at risk even if current occupational standards are met.

There is no evidence for a threshold effect for pulmonary effects from respirable coal mine dust exposures, and due to the blending and potentially enclosed handling of coal at the terminal, work conditions may be considered similar to mining conditions.

There are difficult trade-offs for health and safety between enclosing terminal facilities (to attempt to reduce coal dust from contaminating nearby communities) and increasing the risk of devastating explosions or fire due to accumulated combustible dust.

Coal and coal dust from Utah are considered highly volatile. In an emergency situation, such as spontaneous combustion of coal in stationary railcars, spontaneous combustion of coal dust in the facility, explosion of coal gases or coal dust, or a fire at the facility, workers,

adjacent communities, and visitors in the Oakland area will be exposed to coal combustion emissions (coal smoke), which are known to be carcinogenic.

It is likely that hundreds of thousands of people would be exposed to airborne gases and particles, including heavy metals. Coal fires must be controlled in specific ways, so emergency responders must undergo training specific to the facility and the commodity.

There is currently no evidence of relevant regulation that would require coal cars to be covered. There is also no evidence that covered rail cars designed to safely transport coal are in use in the United States, let alone evidence that this technology has been thoroughly tested or approved for use. It has been suggested that transport-related coal dust suppression techniques could include application of chemical surfactants. Other chemicals (freeze conditioning agents) appear likely to be applied during the transport process. Compounds used in both surfactants and freeze conditioning agents present health concerns.

There is no such thing as "clean" coal. Coal from Utah is sometimes referred to as "EPA-compliant" because it has lower sulfur content than other coals. However, it contains high levels of silica and emits high amounts of carbon dioxide and other short-lived climate pollutants, some in the form of health-harming fine particulate matter ($PM_{2.5}$), when combusted.

Coal exported from the proposed terminal would likely be burned in Asia. Emissions from coal burning in Asia negatively affect air quality in the San Francisco Bay Area, contributing to unhealthy levels of $PM_{2.5}$ and ozone. Poor air quality is a cause of ill-health in Oakland and other parts of the Bay Area, particularly among vulnerable populations.

When burned, coal releases large amounts of carbon dioxide, a powerful greenhouse gas. Incomplete combustion of coal also releases other greenhouse gases and short-lived climate pollutants, such as black carbon (or soot) which also is damaging to human health. Continued coal burning will exacerbate climate change and contribute to sea level rise, a well-documented hazard that Oakland will confront this century. There is increasing evidence that climate change contributes to droughts, heat waves, and other extreme weather in California and beyond. Vulnerable populations in the Bay Area are particularly susceptible to the effects of heat waves and other extreme weather events. Climate change also affects infectious disease vectors, increasing the potential for ill-health.

Oakland and the State of California have made significant strides in combatting global warming and have positioned themselves as leaders in environmental protection. The greenhouse gas emissions released when coal that is exported through Oakland is eventually burned will counteract the work done by Oakland, through its Energy and Climate Action Plan, and by California, through the Global Warming Solutions Act of 2006 (AB 32) and related legislation, to mitigate climate change.

## SUMMARY OF FINDINGS

1. It is inevitable that the transport, transloading, handling, storage and export of coal through the proposed terminal will cause workers, adjacent communities, commuters and/or nearby visitors to be exposed to coal dust in the form of fine particulate matter ($PM_{2.5}$). There is no evidence that coal dust in Oakland can or will be fully contained.

2. There is no safe level of exposure to $PM_{2.5}$. Particulate matter in outdoor air pollution causes cancer in humans. There is new evidence that even existing air quality guidelines may not sufficiently protect human health. Any additional $PM_{2.5}$ released as a result of the proposed terminal should be expected to negatively affect the health of workers at the proposed terminal, residents of adjacent communities, and visitors, commuters, and people recreating near the terminal and former Army Base site.

3. Coal and related dust contain substances that are known by the State of California and the World Health Organization to cause cancer or birth defects or other reproductive harm. These substances include respirable crystalline silica (quartz), lead, mercury, arsenic, cadmium, and nickel.

4. Coal dust and other air pollutants emitted at or near the terminal will add to already harmful levels of environmental pollution in West Oakland, East Oakland and Emeryville. The San Francisco Bay Area is currently in non-attainment status for $PM_{2.5}$ and ozone.

5. There is no evidence that covered rail cars are available to safely transport coal to or through Oakland, including at the proposed terminal. Any use of covered rail cars to transport coal would be experimental and should be accompanied by grave concern about health and safety effects on workers, adjacent communities, and any individuals spending time near the rail yards that will serve the terminal.

6. There is no known state or federal law that requires covered containers for coal transport.

7. Bituminous coal is highly volatile and prone to spontaneous combustion. Any fires occurring in rail cars filled with coal, in stockpiles at the terminal, during transloading, handling, or blending, or in docked ships loaded with coal, will release "emissions from combustion of coal," which are substances known by the State of California to cause cancer or birth defects or other reproductive harm.

8. When coal is burned, either because of spontaneous coal combustion or fires at the terminal or intentionally by an end user overseas, mercury will be released in the resulting emissions. Both mercury and methyl mercury, a chemical formed when mercury enters the environment, are substances known by the State of California to cause cancer or birth defects or other reproductive harm.

9. Certain people are at even more risk than others for health problems when exposed to PM2.5 and other components of coal because of their age, current health status, or socioeconomic conditions. Susceptible groups include people with health problems (such as asthma and other pre-existing lung conditions, heart disease, or other chronic and acute diseases), people who are very young or very old (infants, children, and elderly people) and people with suppressed immune systems. Pregnant women are also at particular risk because fetuses' lungs are sensitive to pollution while rapidly developing. Studies suggest that women of color and low income women suffer disproportionately from the adverse birth outcome effects of PM exposure.

10. A portion of PM2.5 is classified as "ultrafine" particulate matter, characterized by having aerodynamic diameter of <0.1 μm. There is mounting evidence that this specific fraction of PM2.5 is even more dangerous to health than generalized PM2.5. Exposure to ultrafine particles may compound the effects of chronic or underlying health conditions, especially those linked to inflammation, such as Type 2 diabetes.

11. BNSF, one of the railroad companies that would service the terminal, has published studies indicating that 500-2000 lbs (one ton) of coal can escape from a single loaded coal car, and perhaps as much as 3% of the load (3600 lbs on a standard car).

12. The World Health Organization (WHO) cites coal dust, along with silica and asbestos, as being responsible for the most occupational lung disease due to any airborne particulate.

13. Given the substantial danger posed by combustible dust known to be produced by handling of coal, it is of concern that the industrial hygiene section of the preliminary operating plan submitted by project sponsors does not mention combustible dust prevention, detection, or emergency protocols.

14. After reviewing information presented by parties from both sides related to air quality impacts of coal transport via rail, the Alameda County Public Health Department found it reasonable to conclude that there will be increased emissions, particularly for those living and working nearby, from fugitive coal dust, resulting in increased health concerns.

15. A study of children living near a coal bulk handling port found increased prevalence of respiratory symptoms in primary schoolchildren exposed to coal dust. This port handled less than 2 million tonnes at its peak, less than a quarter of the proposed capacity of the terminal in Oakland.

16. Coal dust may travel approximately 500 m to 2km (1/3 to 1 ¼ miles) from the train tracks, depending on weather conditions and train speed.

17. If coal were the only commodity to be handled at the terminal, and virtually all of the coal were to be eventually burned in power plants overseas, this burning would generate approximately 23 million metric tons of CO2 per year. This is more than 8 times all of the greenhouse gases emitted in the City of Oakland in 2013, the last year for which data are available.

18. Over just 10 years of full operation (at 9 MMTPA coal), combustion of coal exported through this terminal would likely result in the release of GHGs equivalent to approximately half of California's entire annual carbon budget at current levels. It is also equivalent to all of the greenhouse gas emissions that will need to occur in California between 2020 and 2025 to ensure that California transitions from the 2020 Target (set in The Global Warming Solutions Act of 2006, AB 32) to the 2030 Goal established in Executive Order B-30-15.

19. With the lower estimate of 5 MMTPA of coal handled through the proposed terminal, burning of the commodity shipped through Oakland would still result in annual GHG emissions in excess of 4 times all of those currently emitted in Oakland. (See Figure 25.) The emissions that would result from burning a single year's worth of exported coal (5 million metric tons of coal, a conservative scenario), would be 179 times the amount by which Oakland must reduce its emissions each year to meet its 2020 greenhouse gas emissions target.

20. There is no such thing as "clean" coal. Coal from Utah is sometimes referred to as "EPA-compliant." This simply means that it has lower sulfur content than some other coals, allowing users of the coal to more easily comply with U.S. sulfur dioxide standards without additional air pollution mitigation technology; however it does not mean that emissions from the coal will meet emission standards for any other pollutants.

21. The Alameda County Public Health Department finds that working conditions at the terminal will be dangerous: "…workers at the Terminal, the larger Development Area, and the Port of Oakland are another population that will be impacted and continuously exposed to working conditions dangerous to their health and safety." Despite occupational health regulations and vetted infrastructure designs, buildup of coal dust within industrial settings is a documented problem.

22. Bituminous coal, such as the coal proposed to be handled through this project, is highly volatile.

23. Coal is explosive when in dust or powder form. It does not take much coal dust to cause an explosion, and in fact, the dust may be virtually hardly invisible but still sufficient to cause an explosion.

24. City workers (emergency responders) will be at high risk when responding to coal fires or explosions in large part due to the hidden dangers associated with coal and coal dust fires, which requiring special training and experience to put them out.

25. The National Academy of Sciences, in a review of relevant literature concluded that "air pollution is no longer a local issue. If and when the coal that is exported through this terminal is burned in Asia, some portion of the emissions from the burning of that coal will come back to impact human health in the Bay Area."

26. Measured ozone levels in the Bay Area are above the standards set by the US EPA and the California EPA to protect human health. Ozone in the Bay Area is worsened by pollution coming from distant sources, including coal-burning in China.

27. Climate Change has been called the biggest global health threat of the 21st century. Climate change produces a wide range of mild to devastating effects on human health. In general the most vulnerable people will be most severely affected. The EPA states that, "Our most vulnerable citizens, including children, older adults, people with heart or lung disease and people living in poverty are most at risk to the health impacts of climate change."

28. Emissions from end use of the coal exported through the proposed terminal are an indirect source of greenhouse gas emissions from the project that would have a significant impact on the environment.

29. The health and safety of Bay Area residents, and specifically those in Alameda County, is expected to be affected by climate change over the next few decades. Climate change threatens Oakland specifically, with impacts that are felt as both discrete shocks (coastal floods, increased wildfire risks) and continual or periodic stress (rising seas and droughts). As the climate warms, droughts, extreme heat days, large rainstorms and other abnormal weather patterns are expected to occur more frequently and intensely.

30. Sea level is already rising as a result of human activities. In a recent report on sea level rise and its impact on coastal flooding in the San Francisco Bay Area, Climate Central found that human-caused global sea level rise has caused the number of flood days in San Francisco to increase by 118% over the past 30 years. Sea level has risen at least 4 inches since 1950, and 3.5 inches can be linked to human-caused global sea level rise. Between 1950-2014, 329 flood days (69%) were attributable to anthropogenic global sea level rise in San Francisco. Over the past 10 years alone, 81 flood days (82% of all flood days in that period) were attributable to anthropogenic sea level rise in San Francisco.

# 1. INTRODUCTION

This document is an analysis and summary of findings from and related to the evidence submitted to the public record before, during, and after the Oakland City Council public hearing on the health effects and safety risks of coal and petroleum coke (petcoke) on September 21, 2015.[1] The findings relate to the possible transport, handling, transloading, storage, and export of coal and/or petcoke at a proposed bulk and oversized terminal that would be built on the former Oakland Army Base site adjacent to West Oakland, the Port of Oakland, and Emeryville.

Project sponsors[2] have described a terminal that would handle two commodities simultaneously, operating 24 hours per day nearly every day of year, with a proposed throughput of 5-10 million metric tonnes per year (mmtpa) of a commodity described as "very dusty, exhibits spontaneous combustion behavior, potentially explosive" and believed to be coal or petcoke.[3] Incoming trains would be over 100 rail cars long and there would likely be multiple coal trains arriving at and multiple trains departing from the terminal nearly every day.

Since little information about the terminal design has been provided, this document analyzes the health effects and safety risks of coal transport, handling, and transloading as it pertains to the Oakland Army Base site and adjacent communities and refers to the basis of design documents as examples of the type of design that could be implemented.

There is evidence that coal proposed to be shipped from the Oakland terminal will be mined in and transported from Utah, and will likely be treated with chemical compounds such as surfactants and/or freeze conditioning agents before it enters Oakland.[4]

This document explores the health effects of coal and coal dust, components of coal, chemicals used in production, transport, and maintenance of coal. It also looks at health effects of coal under stable (normal) conditions, burning of coal and emergency disaster situations associated with coal.

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[1] Documents submitted to the public record are available at the following City of Oakland website: http://www2.oaklandnet.com/Government/o/CityAdministration/d/NeighborhoodInvestment/OAK038485

[2] "Project sponsors" refers in this document to California Capital and Investment Group; Oakland Bulk & Oversized Terminal, LLC; Oakland Global Rail Enterprise, LLC; and Terminal Logistics Solutions, LLC.

[3] HDR: Basis of Design, Oakland Bulk and Oversized Terminal, California Capital Investment Group, Preliminary Engineering, Port of Oakland, Oakland, CA, July 16, 2015. In TLS Basis of Design p10. CCIG Oakland Bulk and Oversize Terminal Preliminary Simulation Port of Oakland, July 24, 2015. TLS Basis of Design Section 16-18 p52.

[4] See, for example: Maffly, Brian (2016). "Proponents buried coal's role in Oakland export terminal; now questions remain," Salt Lake Tribune. http://www.sltrib.com/home/3699366-155/proponents-buried-coals-role-in-oakland; Maffly, Brian (2016). "California lawmakers enter the fray over Utah coal exports," Salt Lake Tribune. http://www.sltrib.com/home/3773403-155/california-lawmakers-enter-the-fray-over; Swan, Rachel (2016). "Oakland coal-shipment dustup grows: What will Brown do?" San Francisco Chronicle. http://www.sfchronicle.com/bayarea/article/Developer-planning-Oakland-coal-shipment-an-ally-7116423.php.

# 2. CHARACTERISTICS OF COAL AND ITS COMPONENTS

Coal is a fossil fuel that exists in the form of a brown or black rock that formed in the earth crust over millions of years through organic, predominantly plant matter, accumulation. It is mined in underground tunnels or extracted through surface mining. Coal consists mainly of carbon, but has impurities such as sulfur, lead, and mercury. Some of those components, like silica, are released during physical manipulations (such as vibration), when coal breaks apart and coal dust is created. Some chemicals are bound into coal's chemical structure and are released during burning or combustion, as vapor or in fly ash. Coal is assigned a rank, such as lignite, sub-bituminous, bituminous, or anthracite, based on attributes related to geologic age, such as its specific composition and energy content properties. (**See Appendix A2**.)

Each time coal is handled (mined, transported, transloaded, or coal storage piles are disturbed), coal can break into smaller pieces, generating invisibly small particles that make up coal dust.

Some of the coal dust particles are so small that they cannot be seen without a microscope. These invisible particles, with an aerodynamic diameter less than 2.5 micrometers, are referred to as fine particulate matter ($PM_{2.5}$) and are of most concern because they can be inhaled and travel deep into the human body, and are considered the most harmful to human health.[5]

Many heavy metals (mercury, lead, etc.) and minerals, such as silica (also known as quartz) contained in coal are harmful when inhaled or ingested from environmental accumulation. (See Figure 1 and Section 3.)

Coal and coal dust is known to be capable of self-heating, highly combustible, and explosive, especially in enclosed spaces. Utah coal contains high concentrations of silica and heavy metals and is known to be highly volatile and prone to spontaneous combustion.[6]

[5] EPA 2003, "Particle pollution and your health," https://www3.epa.gov/pm/pdfs/pm-color.pdf.
[6] Coal that has a volatile ratio of >0.12 (12%) is considered highly volatile. Utah coals mined by Bowie Resources have volatile ratios closer to 0.50 (50%). See Section 5.1.

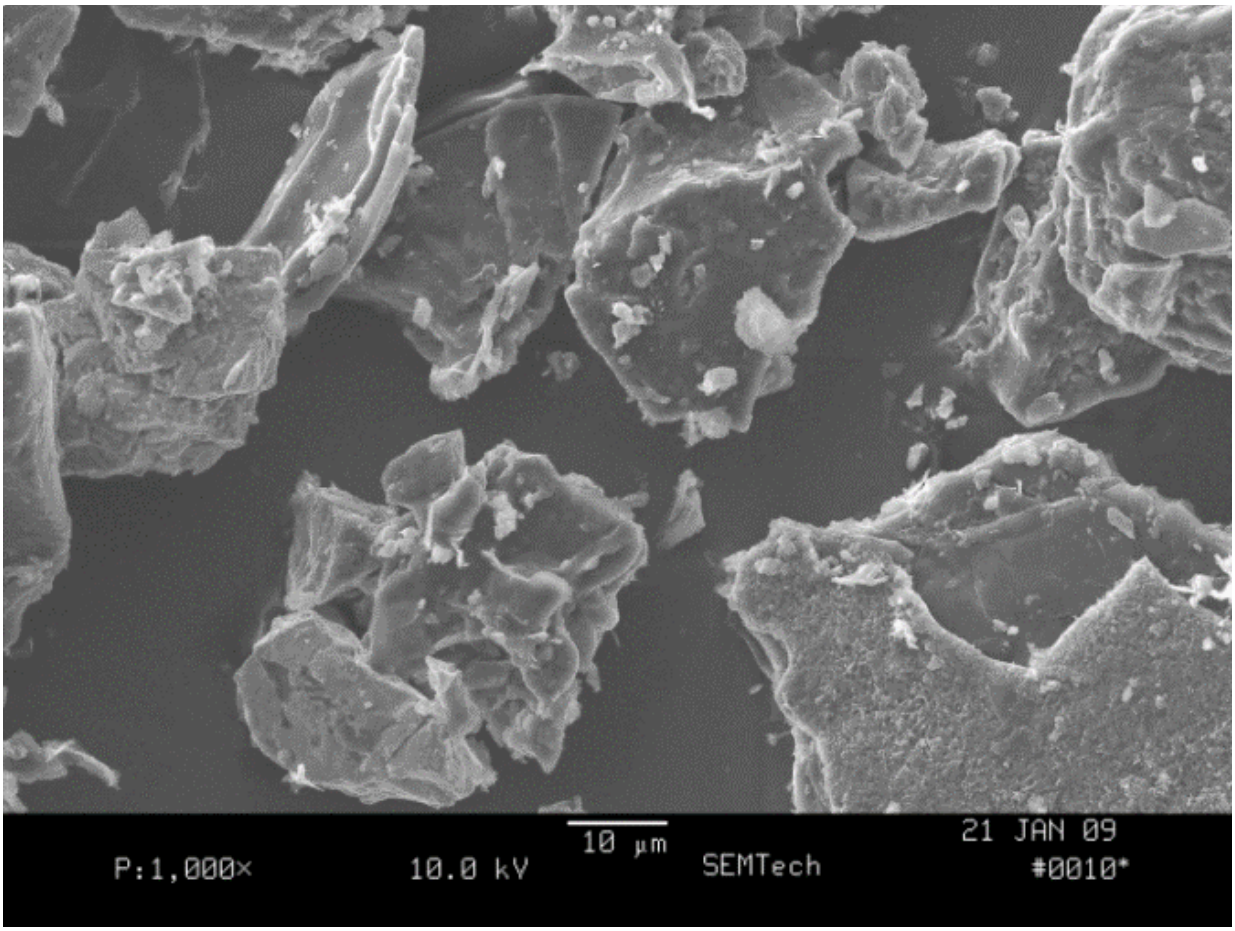


***Figure 1: Coal dust mineral grains, as seen through a scanning electron microscope***[7]

There is no such thing as "clean" coal.[8] Coal from Utah is sometimes referred to as "EPA-compliant." This simply means that it has lower sulfur content than some other coals, allowing users of the coal to more easily comply with U.S. sulfur dioxide standards without additional air pollution mitigation technology;[9] however it does not mean that emissions from the coal will meet emission standards for any other pollutants.

All coals (EPA-compliant or not) emit high levels of greenhouse gases, as well as air pollutants like particulate matter (including black carbon, a short-lived climate pollutant),

[7] Image credit: http://www.atl.semtechsolutions.com/node/52/soot-id

[8] Laura Wisland, Senior Energy Analyst, Union of Concerned Scientists. Testimony September 21, 2015: "Clean coal is a myth. It's true that some coal, like the coal likely to be shipped from Oakland, would have a lower sulfur content than some other sources of coal. But no matter the sulfur content, all coal emits greenhouse gas emissions and other toxic air pollutants like particulate matter, nitrogen oxides that form smog, and other contaminants such as mercury. Burning lower sulfur coal will not shield communities from being exposed to emissions containing these other toxic compounds." Prof. Maximilian Auffhammer, UC Berkeley, testimony on September 21, 2015: "While some of the material in front of you suggests that low sulfur coal will improve environmental quality elsewhere, there is no conclusive evidence that this is the case."

[9] Compliance coal is any coal that emits less than 1.2 pounds of sulfur dioxide per million Btu when burned.

nitrogen oxides (NOx) that form smog, polycyclic aromatic hydrocarbons (PAHs) and other contaminants (such as mercury). The burning of lower sulfur coal will not shield communities from being exposed to emissions containing these toxic compounds.[10] The State of California officially recognized "emissions from combustion of coal" as cancer-causing and has included coal emissions on the list of chemicals known to the state to cause cancer or reproductive toxicity, for the purposes of Proposition 65.[11]

Coal from Utah generally has lower energy content (lower BTUs per unit) than some other types of coal. This means that more Utah coal would need to be burned to produce a given amount of heat and energy output, which could negate perceived emission savings.[12]

## 2.1 Fine particulate matter ($PM_{2.5}$) in coal dust

Coal dust is made up of particles of various sizes, ranging from "coarse" to "fine" and even "ultrafine."[13] Fine particulate matter ($PM_{2.5}$), which includes ultrafine particles, becomes suspended in air. These particles are so small that they cannot be individually seen without magnification. The largest $PM_{2.5}$ particles are at least 20 times smaller in diameter than a typical human hair, and less than 1/30$^{th}$ the size of a grain of fine beach sand.[14] (See Figure 2.)

[10] Laura Wisland, Senior Energy Analyst at the Union of Concerned Scientists. Testimony September 21, 2015.
[11] California Environmental Protection Agency (CalEPA) Office of Environmental Health Hazard Assessment (OEHHA) (2013). "Chemical Listed Effective August 7, 2013 as Known to the State of California to Cause Cancer: Emissions from Combustion of Coal." http://oehha.ca.gov/proposition-65/crnr/chemical-listed-effective-august-7-2013-known-state-california-cause-cancer
[12] Laura Wisland, Senior Energy Analyst at the Union of Concerned Scientists wrote in her testimony: "According to the Energy Information Administration, because sub-bituminous coal has a lower BTU content than other sources of coal, you have to burn more of it to achieve the same energy output, which would likely result in higher overall emissions."
[13] A portion of $PM_{2.5}$ is classified as "ultrafine" particulate matter, characterized by having aerodynamic diameter of <0.1 μm. Ultrafine particles are more toxic to humans than larger particles because they are more efficient at penetrating deep into the alveolar region of the lungs. See Kurth et al. (2014) "Atmospheric particulate matter size distribution and concentration in West Virginia coal mining and non-mining areas," Journal of Exposure Science and Environmental Epidemiology.
[14] EPA, "Particulate Matter: Basic Information," https://www3.epa.gov/pm/basic.html. Accessed 28 April 2016.

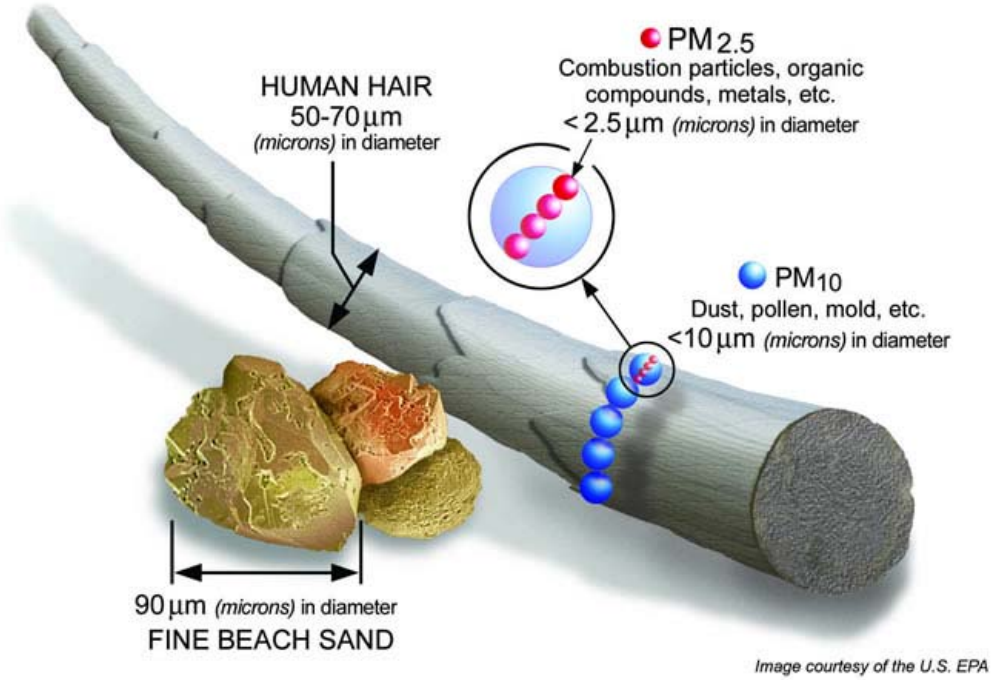


***Figure 2: Diagram showing relative size of $PM_{2.5}$ and other objects. $PM_{2.5}$ is much smaller in diameter than beach sand, human hair, dust, pollen, or mold. It cannot be seen without magnification.[15]***

$PM_{2.5}$ particles can remain suspended in air for relatively long periods of time (hours to weeks), during which they can be carried over long distances.[16] They can also be deposited into the environment close to their point of origin.

Some commenters suggested that coal dust is likely to be removed during the early portions of the train journey between the mining sites and the proposed Oakland terminal. However, even at the end of a long train trip, coal dust will still be generated and will likely escape at and near the terminal.[17]

A prior study of a similar proposed terminal with an enclosed building found increases in PM 2.5 that exceeded NAAQS Standards, even without including background

[15] EPA, "Particulate Matter: Basic Information," https://www3.epa.gov/pm/basic.html. Accessed 28 April 2016.
[16] EPA, "Particulate Matter: Fast Facts," https://www3.epa.gov/pm/fastfacts.html. Accessed 28 April 2016.
[17] See, for example, Jaffe, D. et al. (2015). "Diesel particulate matter and coal dust from trains in the Columbia River Gorge, Washington State, USA," Atmospheric Pollution Research, 946-952. See also Bounds, W. and Johannesson, K. (2007) "Arsenic Addition to Soils from Airborne Coal Dust Originating at a Major Coal Shipping Terminal", Water, Air and Soil Pollution.

concentrations.[18] Background concentrations of $PM_{2.5}$ are already so high in adjacent communities (West Oakland) that they were found by the Bay Area Air Quality Management District (BAAQMD) to exceed the 24-hour PM 2.5 NAAQS standard more than 3 times year.[19]

## 2.2 Toxic elements found in coal and coal dust

### 2.2.a Silica

Coal and coal dust contain respirable crystalline silica (crystalline quartz),[20] which the State of California has recognized as a known carcinogen.[21] Respirable-sized silica particles are liberated during crushing, loading, and dumping of coal.[22] Freshly fractured silica is more toxic than aged silica, therefore when coal breaks apart during transport and unloading, it is likely to be more toxic.[23]

### 2.2.b Heavy Metals

Coal and coal dust also contain metals that are harmful to human health, including mercury, arsenic, cadmium, chromium, lead, and nickel. Many of these metals have been associated with increased risk of cancer, birth defects, genetic defects, endocrine disruption, and neurological damage.[24]

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[18] Testimony of Dr. Muntu Davis, MD, MPH, Director and County Health Officer, Alameda County Public Health Department, October 6, 2015. "Responses to City Administrator's Follow-up Questions and review of HDR Engineering Report."

[19] BAAQMD (2014). "Improving air quality and health in Bay Area communities: Community Air Risk Evaluation Program Retrospective & Path Forward (2004 - 2013)." http://www.baaqmd.gov/~/media/Files/Planning%20and%20Research/CARE%20Program/Documents/CARE_Retrospective_April2014.ashx?la=en. Cited by Muntu Davis, MD, MPH, ACPHD. Testimony of October 6, 2015.

[20] Silicon dioxide (SiO2). "Crystalline" refers to the orientation of SiO molecules in a fixed pattern as opposed to a nonperiodic, random molecular arrangement defined as amorphous. The three most common crystalline forms of free silica encountered in general industry are quartz, tridymite, and cristobalite. The predominant form is quartz. See https://www.cdc.gov/niosh/docs/2011-172/pdfs/2011-172.pdf p.xii

[21] California Environmental Protection Agency (CalEPA) (2005). Chronic Toxicity Summary: Silica (Crystalline, Respirable), CAS Registry Number 7631-86-9. http://oehha.ca.gov/air/chronic_rels/pdf/SILICAcREL_FINAL.pdf. The United States Geologic Survey (USGS) reports that coal samples from Carbon County, Utah and Sevier County, Utah (the two counties in which Bowie Resources operates coal mines) contain up to 84% silica (as determined by coal ash analysis). Bowie Resources reports that coal produced by its mines in Utah contain 58.4-59.7% silica (as determined by ash mineral analysis).

[22] Colinet, J. (2010). Health Effects of Overexposure to Respirable Silica Dust. CDC National Institute for Occupational Safety and Health, Office of Mine Safety and Health Research. Presentation given to Silica Dust Control Workshop, Elko, NV, Sept 28 2010. Referenced in testimony from Phyllis Fox, PE.

[23] Colinet, J. (2010). Health Effects of Overexposure to Respirable Silica Dust. CDC National Institute for Occupational Safety and Health, Office of Mine Safety and Health Research. Presentation given to Silica Dust Control Workshop, Elko, NV, Sept 28 2010. Referenced in testimony from Phyllis Fox, PE.

[24] See also: Alameda-Contra Costa Medical Association, letter sent to Council on 12 Feb 2016 from Arthur Chen, representing 4,200 East Bay physicians.

Though these metals generally exist at relatively low levels in coal dust, they can accumulate in the nearby environment over time if large volumes of coal are transported through or near a community.[25] Over time, the metals can become more bioavailable, especially when exposed to water.[26] Even low levels of exposure to heavy metals found in coal produce debilitating health effects. Cadmium in house dust has been found to contribute to osteoporosis. Outdoors, cadmium also accumulates in vegetables grown in gardens with elevated soil levels of cadmium.[27]

A report submitted by the project sponsors states that trace metals in Utah coal are not a concern. However, the report indicates that the arsenic levels reported in Uinta Basin Utah coal (<8 mg/kg) are up to 11 times higher than the US EPA residential soil-screening level (0.68 mg/kg). The average concentration reported in Uinta Basin coal is 147% of the residential soil screening level, and also significantly higher than the US EPA commercial/industrial level (0.24 mg/kg).[28]

The health and safety report submitted by HDR did not include the California Human Health Screening Levels for soil, which are published by OEHHA.[29] Some of these California levels are lower than those published by the US EPA. For example, the residential basis California human health soil screening level for arsenic is $7.0 \times 10^{-2}$ (0.070) mg/kg. The Uinta Basin average arsenic value reported in the HDR report is 14 times the California screening level (1429%). The maximum arsenic concentration reported for Uinta Basin coal is 114 times (11429%) the California screening level.

### 2.2.c Coal combustion fumes and heavy metals

Heavy metals can become even more harmful to human health when coal burns, as would happen in the event of a fire or explosion at the terminal. Metals, such as mercury, would be released as airborne vapors that could be inhaled by nearby workers and residents. The California Air Resources Board (CARB) has identified lead, another heavy metal released

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[25] Bounds, W. and Johannesson, K. (2007) "Arsenic Addition to Soils from Airborne Coal Dust Originating at a Major Coal Shipping Terminal", Water, Air and Soil Pollution.

[26] Riedel, G. F. et al. (2000). "Temporal and spacial patterns of trace elements in the Patuxent River: A whole watershed approach." Estuaries.

[27] Nawrot, T.S. et al. (2010). "Cadmium exposure in the population: from health risks to strategies of prevention," Biometals.

[28] HDR: Oakland Bulk and Oversized Terminal Air Quality and Human Health and Safety Assessment of Potential Coal Dust Emissions. Prepared for CCIG. Prepared by Edward Liebsch, Michael Musso, HDR Engineering. September 2015. p14.

[29] See California Environmental Protection Agency (CalEPA) (no date). "California Human Health Screening Levels Table 1. Soil Screening Numbers (mg/kg soil) for Nonvolatile Chemicals Based on Total Exposure to Contaminated Soil: Inhalation, Ingestion and Dermal Absorption." OEHHA. http://oehha.ca.gov/media/downloads/risk-assessment/california-human-health-screening-levels-chhsls/chhslstableall_0.pdf. The screening numbers for arsenic are for contamination resulting from human activity.

during coal burning, as a 'toxic air contaminant' with no threshold level of exposure below which there are no adverse health effects determined.[30]

# 3. HUMAN HEALTH EFFECTS AND SAFETY RISKS OF COAL AND COAL COMPONENTS

Project sponsors contend that coal is not harmful because it is not explicitly mentioned on a particular list of toxic substances.[31] However, many of the metals and minerals found in coal and coal dust as well as the emissions caused when coal burns, have been designated as toxic to humans by the California EPA Office of Environmental Health Hazard Assessment (OEHHA).[32]

Coal dust is harmful not only because of its fine particles ($PM_{2.5}$) but also because it contains metals (lead, mercury, arsenic, cadmium, chromium, and nickel) and other substances that cause people to become sick, such as tiny pieces of silica (quartz) that cause chronic scarring in the lungs (leading to silicosis and other respiratory diseases).[33]

## 3.1 Health effects of coal dust

The average person breathes in 2,600 gallons of air each day.[34] As mentioned in the previous sections, among other factors, coal dust is harmful to human health because it contains extremely small particles of coal ($PM_{2.5}$) that become suspended in the air. When $PM_{2.5}$ is inhaled, it can affect lung tissue directly and can enter the bloodstream, spreading deep within the body and damaging other internal organs. (See Section 3.2 for information on the health effects of $PM_{2.5}$.)

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[30] BAAQMD: http://www.baaqmd.gov/research-and-data/air-quality-standards-and-attainment-status. "ARB has identified lead and vinyl chloride as 'toxic air contaminants' with no threshold level of exposure below which there are no adverse health effects determined."

[31] HDR. Oakland Bulk and Oversized Terminal Air Quality and Human Health and Safety Assessment of Potential Coal Dust Emissions. Prepared for CCIG. Prepared by Edward Liebsch, Michael Musso, HDR Engineering. September 2015.

[32] California Environmental Protection Agency (CalEPA) Office of Environmental Health Hazard Assessment (OEHHA) (2013). "Chemical Listed Effective August 7, 2013 as Known to the State of California to Cause Cancer: Emissions from Combustion of Coal." http://oehha.ca.gov/proposition-65/crnr/chemical-listed-effective-august-7-2013-known-state-california-cause-cancer

[33] California Environmental Protection Agency (CalEPA) Office of Environmental Health Hazard Assessment (OEHHA) (2016). State of California Environmental Protection Agency Office of Environmental Health Hazard Assessment Safe Drinking Water and Toxic Enforcement Act of 1986: Chemicals Known to the State to Cause Cancer or Reproductive Toxicity. May 20, 2016. http://oehha.ca.gov/media/downloads/proposition-65//p65single05202016.pdf.

[34] Samet, J. (2014). "Introduction," in *Air Pollution and Cancer,* International Agency for Research on Cancer (IARC). http://www.iarc.fr/en/publications/books/sp161/index.php. This is roughly equivalent to 10,000 liters.

Recognition that long-term respirable coal dust exposure causes irreversible respiratory health effects has been accepted by the medical community for decades.[35] The American Lung Association considers coal dust a source of particulate matter that is dangerous to breathe.[36]

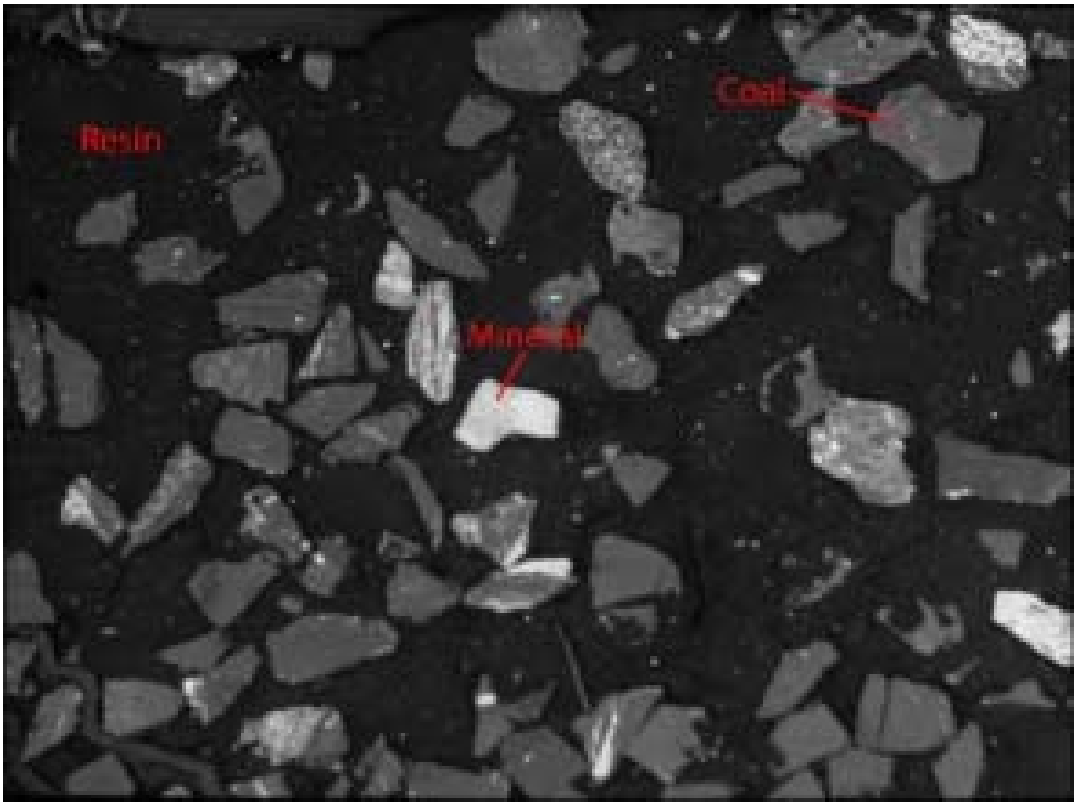


***Figure 3: Backscattered electron image of a cross-section of pulverized coal showing coal particles (gray) and mineral grains (white).[37]***

Exposure to dust from high rank coal,[38] such as the bituminous coal mined in Utah, appears to create greater risks of death, according to the US Department of Labor's Mine Safety and Health Administration.[39] In studying pulmonary diseases linked to coal dust exposure (in

[35] Mine Safety and Health Administration. Final Rule: Lowering Miners' Exposure to Respirable Coal Mine Dust, Including Continuous Personal Dust Monitors. Federal Register Volume 79, Number 84 (Thursday, May 1, 2014), Pages 24814-24994. http://arlweb.msha.gov/regs/fedreg/final/2014finl/2014-09084.asp

[36] East Bay Mayors. "Mayors Opposed to the Shipment of Coal Exports Through Oakland," Letter to City Council, 14 April 2016. (**See Appendix A4.**)

[37] http://www.microbeam.com/methods/computer_controlled.shtml (from Microbeam Technologies Inc.)

[38] See **Appendix A2** for more information on coal ranks. Bituminous and anthracite coals are considered high rank coals.

[39] Mine Safety and Health Administration. Lowering Miners' Exposure to Respirable Coal Mine Dust, Including Continuous Personal Dust Monitors. Federal Register Volume 79, Number 84 (Thursday, May 1, 2014), Pages 24814-24994. http://arlweb.msha.gov/regs/fedreg/final/2014finl/2014-09084.asp. The greater risk of death was associated with CWP and nonmalignant respiratory disease. Also: "Several epidemiological studies have shown that the prevalence of simple CWP and PMF [progressive massive fibrosis] increases with increasing coal rank [McLintock et al. 1971; Lainhart 1969; McBride et al. 1966;1963]." "Recent exposure-

an occupational setting) the federal agency tasked with protecting miners' health and safety has determined that there is not a threshold for safe levels of exposure to coal mine dust.[40] This indicates that there is no established safe level of exposure to respirable coal mine dust.[41] Though an enclosed coal terminal would not likely create a work environment that exactly mimics a mine, health studies among miners are useful in better understanding the effects of occupational exposure to elevated levels of coal dust in confined spaces.

## 3.2 Health effects of exposure to $PM_{2.5}$

There is no safe level of exposure to fine coal dust particles ($PM_{2.5}$). There is no known threshold below which those exposed to a certain level of $PM_{2.5}$ are completely safe. The World Health Organization (WHO), United States Environmental Protection Agency (USEPA), and California Environmental Protection Agency (CalEPA) have specified there is no safe level of exposure to $PM_{2.5}$, based on evidence from scientific studies.[42] A fifteen scientist panel convened by the National Academy of Sciences concluded that there is "no evidence of a threshold below which no adverse health impacts are observed" for exposure to particulate matter.[43]

When concentrations of $PM_{2.5}$ are reduced, related mortality will go down.[44] This indicates that each increase in exposure to $PM_{2.5}$ may contribute to the likelihood of adverse health

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response studies have estimated that the probability of developing PMF over a working lifetime is also higher for miners exposed to respirable dust of high-rank coal [Attfield and Seixas 1995; Attfield and Morring 1992b; Hurley and Maclaren 1987]." NIOSH (1995). Criteria for a Recommended Standard Occupational Exposure to Respirable Coal Mine Dust, 1.1.3. U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES, Public Health Service, Centers for Disease Control and Prevention, National Institute for Occupational Safety and Health Education and Information Division, Cincinnati, Ohio http://www.cdc.gov/niosh/docs/95-106/pdfs/95-106.pdf

[40] The study focused on CWP or other clinically significant pulmonary effects.

[41] Mine Safety and Health Administration. Lowering Miners' Exposure to Respirable Coal Mine Dust, Including Continuous Personal Dust Monitors. Federal Register Volume 79, Number 84 (Thursday, May 1, 2014), Pages 24814-24994. http://arlweb.msha.gov/regs/fedreg/final/2014finl/2014-09084.asp. "Based on its review of the available evidence included in the [quantitative risk assessments] for the proposed and final rules and the Health Effects section of the preamble to the proposed rule, MSHA has determined that the best available epidemiological evidence fails to support a threshold model for either CWP or clinically significant pulmonary effects due to respirable coal mine dust exposures."

[42] World Health Organization (WHO), 2013 "Health effects of particulate matter" http://www.euro.who.int/__data/assets/pdf_file/0006/189051/Health-effects-of-particulate-matter-final-Eng.pdf. See also testimony from Bart Ostro, PhD. Former Chief of the Air Pollution Epidemiology Section, California Environmental Protection Agency (retired), September 16, 2015. and October 1, 2015. Ostro is the author of over 100 peer reviewed publications on the health effects of air pollution and heat waves.

[43] National Academy of Sciences, 2010, Global Sources of Local Pollution: An Assessment of Long-Range Transport of Key Air Pollutants to and from the United States, p17.

[44] World Health Organization (WHO) (2014). Fact Sheet Number 313 "Ambient (outdoor) air quality and health," March 2014. http://www.who.int/mediacentre/factsheets/fs313/en/ "There is a close, quantitative relationship between exposure to high concentrations of small particulates (PM10 and $PM_{2.5}$) and increased mortality or morbidity, both daily and over time. Conversely, when concentrations of small and fine particulates are reduced, related mortality will also go down – presuming other factors remain the same. This allows policymakers to project the population health improvements that could be expected if particulate air pollution is reduced. Small particulate pollution have health impacts even at very low concentrations – indeed

outcomes.[45] (See Figure 4.) Both short term (hours to days) and long term (months to years) exposure to $PM_{2.5}$ leads to negative health impacts.[46] The WHO notes that exposure to outdoor air pollution "is ubiquitous and involuntary," underscoring that anyone living near the terminal in Oakland or Emeryville would have little ability to escape persistent exposure to $PM_{2.5}$ in their own homes and neighborhoods.[47] In the United States, people spend the majority of their time indoors; outdoor-generated $PM_{2.5}$ is the largest contributor to indoor $PM_{2.5}$.[48]

no threshold has been identified below which no damage to health is observed. Therefore, the WHO 2005 guideline limits aimed to achieve the lowest concentrations of PM possible."

[45] Testimony of Bart Ostro, PhD, September 16, 2015. and October 1, 2015. This sentence was reviewed for accuracy by current employees of California EPA, OEHHA, and California Air Resources Board.

[46] Long-term exposure to $PM_{2.5}$ is associated with an increase in the long-term risk of cardiopulmonary mortality by 6–13% per 10 µg/m3 of $PM_{2.5}$. World Health Organization (WHO), 2013 "Health effects of particulate matter" http://www.euro.who.int/__data/assets/pdf_file/0006/189051/Health-effects-of-particulate-matter-final-Eng.pdf There is good evidence of the effects of short-term exposure to PM10 (as well as $PM_{2.5}$) on respiratory health, but for mortality, and especially as a consequence of long-term exposure, $PM_{2.5}$ is a stronger risk factor than the coarse part of PM10 (particles in the 2.5–10 µm range). All-cause daily mortality is estimated to increase by 0.2–0.6% per 10 µg/m3 of PM10.

[47] World Health Organization (WHO), 2013 "Health effects of particulate matter" http://www.euro.who.int/__data/assets/pdf_file/0006/189051/Health-effects-of-particulate-matter-final-Eng.pdf

[48] Turpen, B. (2014). "Characterizing exposures to atmospheric carcinogens," in *Air Pollution and Cancer,* International Agency for Research on Cancer (IARC). http://www.iarc.fr/en/publications/books/sp161/index.php. In addition to $PM_{2.5}$, particle-phase PAHs and ozone, lead, manganese, cadmium, and sulfate found indoors have been reported to be dominated by outdoor sources.

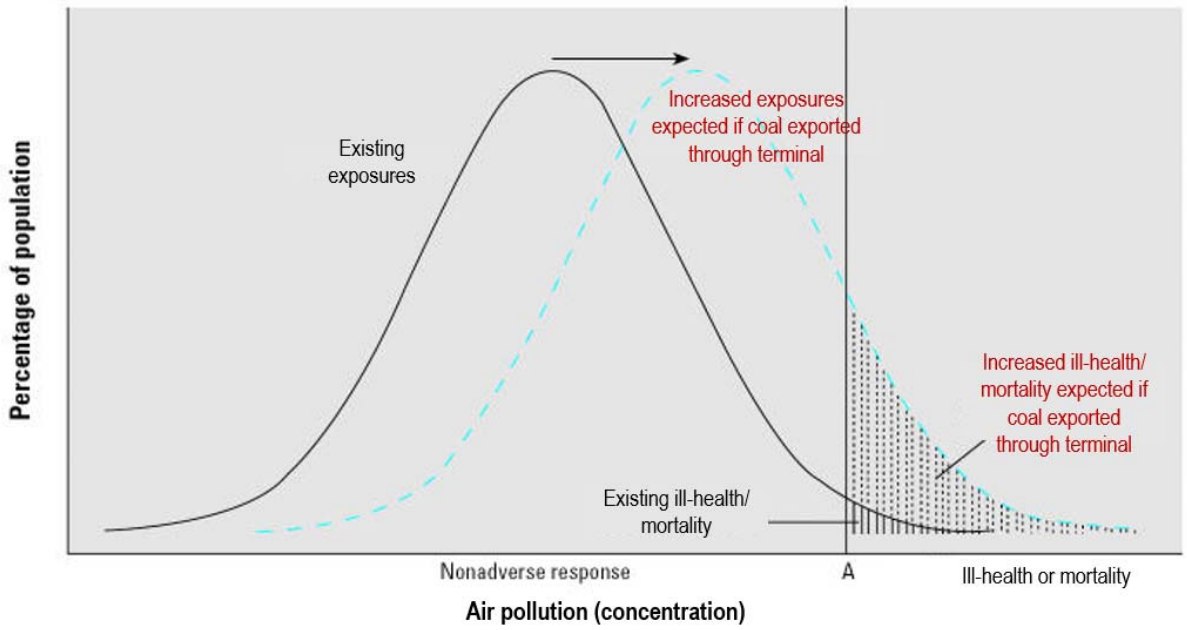


***Figure 4: Illustrative example of how increased air pollution exposures (among workers, adjacent communities, or visitors to the proposed terminal area) resulting from additional air pollution emissions caused by coal transport, handling, storage, and/or export (solid line) would be associated with increased ill-health and/or mortality among the exposed populations. The existing exposure curve, representing current environmental conditions in West Oakland and other adjacent communities, is shown with a solid black line. The increased exposure curve, illustrating the expected effect of increased air pollution from coal transport, handling, storage, and transloading at the proposed terminal, is shown with a dashed blue line. The arrow indicates the change in mean response between the baseline and the exposed populations, as a result of the increased pollution exposure from introduction of coal to the community. The lower shaded area represents the existing ill-health/mortality associated with the existing air pollution in the communities; and the upper shaded area represents the new ill-health/mortality that would be expected if exposures increased among communities at/near the terminal. "A" represents the cut-off between normal and adverse health responses.[49]***

[49] Figure adapted from Woodruff, T. et al. (2007). "Estimating Risk from Ambient Concentrations of Acrolein across the United States," Environmental Health Perspectives. http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1849926/pdf/ehp0115-000410.pdf.

The health effects of inhalable $PM_{2.5}$ are well documented. Studies conducted in California and throughout the world demonstrate important associations between daily exposure to $PM_{2.5}$ and a wide range of health and economic impacts.[50] These impacts include:[51]

- premature death in people with lung or heart disease, such as lung cancer;[52]
- respiratory and cardiovascular illness, such as nonfatal heart attacks, irregular heartbeat, aggravated asthma, and decreased lung function;[53]
- an increase in respiratory problems such as irritation of the airways, coughing, or difficulty in breathing;
- increased emergency room visits and hospital admissions;
- adverse birth outcomes;[54] and
- missed school and work days.

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[50] For example: "[A researcher] examined hospital admissions of children in the Utah valley during 3 consecutive winters. These winters were before, during, and after a strike that closed down a steel mill in the valley that was the largest source of wintertime air pollution. There was a >50% drop in admissions of children for asthma and for pneumonia during the period that the mill was closed and when the pollution was lower. In the following year, admissions went back to previous levels. In a neighboring valley, there was no drop in pollution or admissions in the middle winter. This is as close to a clinical trial as can be found in air pollution epidemiology, and the conclusions are striking. Air pollution is related to serious asthma exacerbation and to pneumonia exacerbation." Schwarz, J. (2004). "Air Pollution and Children's Health," Pediatrics. http://pediatrics.aappublications.org/content/113/Supplement_3/1037.long. This article has been cited 250 times.

[51] Please see East Bay Mayors. "Mayors Opposed to the Shipment of Coal Exports Through Oakland," Letter to City Council, 14 April 2016. (**Appendix A4**) See also testimony submitted by Bart Ostro, PhD, submitted September 16, 2015. and October 1, 2015. On asthma: "In epidemiological studies of asthmatic children, short-term $PM_{2.5}$ exposure was associated with an increase in medication use and respiratory symptoms (i.e., cough, shortness of breath, and chest tightness), and short-term PM10 exposure was associated with morning symptoms and respiratory symptoms. Health effects in asthmatic adults have also been demonstrated (e.g., asthma attacks with short-term PM10 exposure), although the evidence is more limited." Sacks, J. et al. (2011). "Particulate Matter–Induced Health Effects: Who Is Susceptible?" Environmental Health Perspectives. http://ehp.niehs.nih.gov/1002255/. This article has been cited 175 times.

[52] "Studies of long-term exposure to fine particles have found links to cardiopulmonary mortality and strong associations with heart disease. Research on health effects suggests that exposures to fine particles can lead to inflammation which in turn causes exacerbations of lung disease and of increased blood coagulation." BAAQMD (2014). "Improving air quality and health in Bay Area communities: Community Air Risk Evaluation Program Retrospective & Path Forward (2004 - 2013)." http://www.baaqmd.gov/~/media/Files/Planning%20and%20Research/CARE%20Program/Documents/CARE_Retrospective_April2014.ashx?la=en

[53] "[W]e have excellent evidence that changing pollution in the short term produces immediate reductions in asthma exacerbations." Schwarz, J. (2004). "Air Pollution and Children's Health," Pediatrics. http://pediatrics.aappublications.org/content/113/Supplement_3/1037.long. This article has been cited 250 times.

[54] "[P]renatal exposure of populations to prevailing levels of air pollution is associated with early fetal loss, preterm delivery, and lower birth weight." Schwarz, J. (2004). "Air Pollution and Children's Health," Pediatrics. http://pediatrics.aappublications.org/content/113/Supplement_3/1037.long. Also: Lamichhane, D. et al. (2015). "A meta-analysis of exposure to particulate matter and adverse birth outcomes." Environmental Health and Toxicology. http://e-eht.org/journal/view.php?doi=10.5620/eht.e2015011 Also: Parker, J.D. et al. (2011). "The International Collaboration on Air Pollution and Pregnancy Outcomes: initial results." Environmental Health Perspectives. http://www.ncbi.nlm.nih.gov/pubmed/21306972.

***Table 1: Summary of health effects from exposure to $PM_{2.5}$***[55]

| Human body system | Premature death | Illness or ill-health |
|---|---|---|
| **Respiratory** | Mortality from respiratory diseases, including lung cancer | Aggravated asthma, decreased lung function, irritation of airways, coughing, difficulty breathing, increase in hospital admissions |
| **Cardiovascular** | Mortality from cardiovascular diseases | Non-fatal heart attacks, irregular heartbeat |

Because of their age, current health status, and socioeconomic conditions, some people are at even greater risk than others for health problems when exposed to $PM_{2.5}$. Susceptible groups[56] include people with health problems (such as asthma and other pre-existing lung conditions, heart disease, or other chronic and acute diseases), and people who are very young or very old (infants, children, and elderly people) and people with suppressed immune systems. Pregnant women are also at particular risk because fetuses' lungs are sensitive to pollution while rapidly developing.[57] Studies suggest that women of color and low income women suffer disproportionately from the adverse birth outcome effects of PM exposure.[58]

Exposure to $PM_{2.5}$ also affects lung development in young children, including chronically reduced lung growth rate and long-term problems with lung function. Children have greater activity levels than adults and infants take in twice as much air as an adult while not active.[59] Children also spend more time outdoors and exercise more, and therefore they

[55] Please see East Bay Mayors. "Mayors Opposed to the Shipment of Coal Exports Through Oakland," Letter to City Council, 14 April 2016 (**Appendix A4**). Also: Ostro, Bart, PhD. Testimony submitted September 16, 2015 and October 1, 2015.

[56] Please see two definitions cited in Parker, J.D. et al. (2011). ). "The International Collaboration on Air Pollution and Pregnancy Outcomes: initial results." Environmental Health Perspectives. http://ehp.niehs.nih.gov/1002255/. 1) American Lung Association: "Susceptible: greater likelihood of an adverse outcome given a specific exposure, compared with the general population." 2) Pope and Dockery: "Susceptible: characteristics that contribute to increased risk of PM-related health effects (e.g., genetics, preexisting disease, age, sex, race, SES, healthcare availability, educational attainment, and housing characteristics)."

[57] Ostro, Bart, PhD. Testimony submitted September 16, 2015 and October 1, 2015. .

[58] Bell ML, Ebisu K, Belanger K. Ambient Air Pollution and Low Birth Weight in Connecticut and Massachusetts. Environmental Health Perspectives. 2007;115(7):1118-1124. doi:10.1289/ehp.9759. Also: Morello-Frosch R, Jesdale BM, Sadd JL, Pastor M. Ambient air pollution exposure and full-term birth weight in California. Environmental Health. 2010;9:44. doi:10.1186/1476-069X-9-44.

[59] "Children also have greater activity levels than adults and therefore are likely to have increased personal exposures relative to adults because of an enhanced personal cloud of particles. In part, this is the result of the air intake of a resting infant being twice that of an adult. In one study comparing activity patterns in Californian children and adults, children spent an average of 124 minutes per day participating in active sports, walking-hiking, or outdoor recreation, or more than 5 times the 21 minutes per day spent by adults engaging in the same activities." "The role of air pollution in asthma and other pediatric morbidities." Trasande and Thurston, 2005, Allergy and Clinical Immunology. http://www.jacionline.org/article/S0091-6749(05)00306-4/fulltext#sec4.7 This article has been cited 158 times.

breathe a greater amount of pollution per pound of body weight than adults.[60] There is evidence that African American children suffer disproportionately from asthma and are more likely to die from complications of asthma.[61]

***Table 2: Summary of groups particularly susceptible to particulate matter air pollution***[62]

| Susceptibility characteristics | Examples |
|---|---|
| **Age** | Pregnant women (fetuses), infants, children, elderly |
| **Pre-existing illness** | Asthma, Type II diabetes (ultrafine fraction) |
| **Socioeconomic status** | Low income, low educational attainment |

$PM_{2.5}$ includes inhalable particles that are small enough to penetrate the respiratory system, according to the WHO.[63] $PM_{2.5}$ can travel deep into the bronchioles and alveoli, creating irritation in the lungs.[64] This causes the body's immune system to attack the particles, creating inflammation in the surrounding tissue.[65] Due to the chemical composition and the size of coal dust particles, the body cannot remove coal and silica dust in the same way that invading pathogens are killed and removed. These dust particles remain in the lungs, accumulating over time and damaging lung tissue, as the immune system creates even more inflammation when it tries to remove the particles. This creates chronic inflammation that eventually leads to scarring in the lungs, which is visible on x-rays and in scans.[66]

[60] Trasande and Thurston (2005). "The role of air pollution in asthma and other pediatric morbidities." Allergy and Clinical Immunology. http://www.jacionline.org/article/S0091-6749(05)00306-4/fulltext#sec4.7 This article has been cited 158 times.

[61] "In the USA, racial and ethnic disparities in asthma are among the most significant among chronic diseases…African American children are twice as likely as European Americans to suffer from asthma and to die from complications of the disease." White , M. (2016) "Novel genetic risk factors for asthma in African American children: Precision Medicine and the SAGE II Study," Immunogenetics, http://link.springer.com/article/10.1007%2Fs00251-016-0914-1

[62] See for example East Bay Mayors. "Mayors Opposed to the Shipment of Coal Exports Through Oakland," Letter to City Council, 14 April 2016; Ostro, Bart, PhD. Testimony submitted September 16, 2015 and October 1, 2015.

[63] World Health Organization (WHO), 2013 "Health effects of particulate matter" http://www.euro.who.int/__data/assets/pdf_file/0006/189051/Health-effects-of-particulate-matter-final-Eng.pdf

[64] Arnold, .C. (2016) "A Scourge Returns: Black Lung in Appalachia." Environmental Health Perspectives. http://www.ncbi.nlm.nih.gov/pmc/articles/PMC4710586/

[65] Arnold, Carrie.C. (2016) "A Scourge Returns: Black Lung in Appalachia." Environmental Health Perspectives. http://www.ncbi.nlm.nih.gov/pmc/articles/PMC4710586/

[66] Arnold, Carrie.C. (2016) "A Scourge Returns: Black Lung in Appalachia." Environmental Health Perspectives. http://www.ncbi.nlm.nih.gov/pmc/articles/PMC4710586/

*Figure 5: A section of lung shows the ravages of progressive massive fibrosis. The lung itself can appear black due to the slow buildup of coal dust particles over the years.*[67]

A portion of $PM_{2.5}$ is classified as "ultrafine" particulate matter, characterized by having aerodynamic diameter of <0.1 µm. There is mounting evidence that this specific fraction of $PM_{2.5}$ is even more dangerous to health than generalized $PM_{2.5}$.[68] Exposure to ultrafine particles may compound the effects of chronic or underlying health conditions, such as Type 2 diabetes, especially those linked to inflammation.[69]

Ultrafine particles have a larger surface area per unit mass, larger number concentration, and greater alveolar deposition efficiency compared with larger $PM_{2.5}$ particles. These attributes result in ultrafine particles having greater inflammation capabilities.[70] The health effects of ultrafine particles can easily be underestimated in analysis that focuses on $PM_{2.5}$. $PM_{2.5}$ is usually monitored and reported on a mass concentration basis ($\mu g/m^3$). Because ultrafine particles have relatively less mass than larger particles, even when they

[67] Arnold, Carrie.C. (2016) "A Scourge Returns: Black Lung in Appalachia." Environmental Health Perspectives. http://www.ncbi.nlm.nih.gov/pmc/articles/PMC4710586/
[68] Oberdorster, G. and Utell, M. (2002). "Ultrafine Particles in the Urban Air: To the Respiratory Tract— And Beyond?" Environmental Health Perspectives. http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1240959/pdf/ehp0110-a00440.pdf
[69] Vora, R. et al. (2014). "Inhalation of ultrafine carbon particles alters heart rate and heart rate variability in people with type 2 diabetes.." Particle and Fibre Toxicology, DOI: 10.1186/s12989-014-0031-y.
[70] Kurth et al. (2014) "Atmospheric particulate matter size distribution and concentration in West Virginia coal mining and non-mining areas," Journal of Exposure Science and Environmental Epidemiology.

are present in large numbers they contribute little to overall particle mass, and the number concentration of particles is important from a health perspective.[71]

## 3.3 Health effects of exposure to metals in coal dust

Coal dust contains toxic heavy metals such as mercury, lead, arsenic, cadmium, chromium, and nickel.[72] Chronic exposure to the toxic metals in coal have been linked to cancer, adverse birth effects, genetic defects, endocrine disruption, neurological damage, and other severe health outcomes.[73] Children are particularly vulnerable to heavy metals, which can lead to decreases in birth weight and children's growth rate, and intellectual development problems.[74]

The California risk-based screening levels indicate that arsenic levels in Utah coal (1 – 8 mg/kg) are 14 to 114 times higher than the residential soil-screening level (0.07 mg/kg) and are also significantly higher than the commercial/industrial level (0.24 mg/kg).[75] A study of a coal terminal in Virginia found that coal dust contributed to elevated levels of arsenic in soils in the communities near the docks.[76] Arsenic also appears to leach out of coal piles into nearby water when the coal is exposed to rain, something that could happen when stockpiles and loaded or empty rail cars are exposed to rain at the terminal.[77]

Trace metals in coal dust are understood to be the main drivers of oxidative stress[78] from exposure to the dust. Oxidative stress likely contributes to the development of coal

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[71] Kurth et al. (2014) "Atmospheric particulate matter size distribution and concentration in West Virginia coal mining and non-mining areas," Journal of Exposure Science and Environmental Epidemiology.
[72] Ostro, Bart, PhD. Testimony submitted September 16, 2015 and October 1, 2015.
[73] Ostro, Bart, PhD. Testimony submitted September 16, 2015 and October 1, 2015; Alameda-Contra Costa Medical Association, letter 12 Feb 2016, Arthur Chen, representing 4,200 East Bay physicians.
[74] Hu, H. (2002). "Human Health and Heavy Metals Exposure.." In: McCally, Mm ed. *Life Support: The Environment and Human Health,* Cambridge, Mass.: MIT Press; 2002. Cited by Multnomah County Health Department (2013). "The Human Health Effects of Rail Transport of Coal Through Multnomah County, Oregon: A Health Analysis and Recommendations for Further Action." February 2013. Referenced in Muntu Davis, MD, MPH, ACPHD, Feb 9 2016 letter.
[75] HDR: Oakland Bulk and Oversized Terminal Air Quality and Human Health and Safety Assessment of Potential Coal Dust Emissions. Prepared for CCIG. Prepared by Edward Liebsch, Michael Musso, HDR Engineering. September 2015. p14.
[76] Bounds, W. and Johannesson, K. (2007) "Arsenic Addition to Soils from Airborne Coal Dust Originating at a Major Coal Shipping Terminal", Water, Air and Soil Pollution. "[C]oal shipping through the Lambert's Point Docks is adding particulate coal and As to the soils of Norfolk, Virginia…Along with the particulate coal, arsenic associated with the coal is also enriched in these soils by 2 to 20 times over upper crustal abundances, and by ~five times over estimated background soil As concentrations. The data presented here indicate that the Lambert's Point Docks is a significant source of particulate coal to the local environment, and further, that this coal contributes As to the local soils." This study only examined sand-sized particles of coal, so did not capture the contamination associated with finer coal dust in the community.
[77] Bounds, W. and Johannesson, K. (2007) "Arsenic Addition to Soils from Airborne Coal Dust Originating at a Major Coal Shipping Terminal", Water, Air and Soil Pollution.
[78] "Oxidative stress is a disturbance in the oxidant/antioxidant steady state in favor of oxidants, which lead to cellular damage… The oxidative property of coal dusts is primarily attributed to its transition metal constituents, which typically include Fe [iron], Cr [chromium], Co [cobalt], Ni [nickel], Mn [manganese], As

workers' pneumoconiosis (CWP) (known as "Black Lung Disease") and chronic obstructive pulmonary disease (COPD), both serious long-term conditions.[79]

## 3.4 Health effects of exposure to silica in coal dust

Coal dust contains silica (crystalline quartz), which has been recognized by the World Health Organization and the State of California as a carcinogen.[80] Expert testimony states that Utah coals have high levels of silica.[81] Utah coal mines have in recent years received multiple citations and thousands of dollars of fines for violating respirable dust standards, and specifically the respirable dust standard for quartz (crystalline silica).[82]

Exposure to respirable crystalline silica is usually considered an occupational health concern of workers. However, analysis of air samples taken outside of a coal export facility in Seward, Alaska showed that crystalline silica levels could exceed health standards in ambient air collected nearby, indicating that community members were being exposed to unsafe levels of the carcinogen.[83]

Exposure to coal dust with silica can result in silicosis, chronic obstructive pulmonary disease (COPD), pulmonary tuberculosis, chronic renal disease, and lung cancer.[84]

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[arsenic], Zn [zinc], and V [vanadium]." Huang, X. and Finkelman, R. (2008). "Understanding the Chemical Properties of Macerals and Minerals in Coal and its Potential Application for Occupational Lung Disease Prevention," Journal of Toxicology and Environmental Health, Part B.

[79] Huang 2008 Huang, X. and Finkelman, R. (2008). "Understanding the Chemical Properties of Macerals and Minerals in Coal and its Potential Application for Occupational Lung Disease Prevention," Journal of Toxicology and Environmental Health, Part B.

[80] California Environmental Protection Agency (CalEPA) Office of Environmental Health Hazard Assessment (OEHHA) (2016). State of California Environmental Protection Agency Office of Environmental Health Hazard Assessment Safe Drinking Water and Toxic Enforcement Act of 1986: Chemicals Known to the State to Cause Cancer or Reproductive Toxicity. May 20, 2016. http://oehha.ca.gov/media/downloads/proposition-65//p65single05202016.pdf. International Agency for Research on Cancer (IARC) (2012,). "Silica Dust, Crystalline, in the form of Quartz or Cristobalite," in Arsenic, Metals, Fibres, and Dusts: A Review of Human Carcinogens. IARC Monographs on the Evaluation of Carcinogenic Risks to Humans, Vol. 100C http://monographs.iarc.fr/ENG/Monographs/vol100C/mono100C-14.pdf.

[81] See testimony submitted by Dr. Phyllis Fox, PhD, PE, September 21, 2015 and by Prof. Jasmin Ansar, PhD, September 21, 2015 for example.

[82] For example, Bowie Resources Sufco Mine (Sevier County, Utah) was cited and fined for violating CFR §70.100 in 2015 and CFR § 70.101 in 2013. Coal from Sufco Mine contains 59.00% SiO2 (ash mineral analysis). Bowie Resources Dugout Canyon Mine (Carbon County, Utah) was cited (proposed) for violating CFR §70.100 in 2016 and cited and fined for violating CFR § 70.101 (quartz standard) in 2013. Coal from Dugout Canyon Mine contains 58.40% SiO2 (ash mineral analysis). Bowie Resources Skyline Mine (Carbon County, Utah) was cited and fined for violating CFR §70.100 in 2013 and 2014 and cited and fined for violating CFR § 70.101 (quartz standard) twice in 2013. Coal from Skyline Mine contains 59.70% SiO2 (ash mineral analysis).

[83] Crystalline silica levels measured in Seward Harbor air exceeded the OEHHA inhalation chronic reference exposure limit on at least two occasions during the study. Concentrations of crystalline silica averaged 2.22 ug/m3, and were as high as 5.03 ug/m3. The OEHHA REL is 3.0 ug/m3. See Zimmer, H. (2014). "Coal Dust in Alaska: Hazards to Public Health."

[84] Donoghue, A. (2004) "Occupational health hazards in mining: an overview" Occupational Medicine 54:283–289 http://occmed.oxfordjournals.org/content/54/5/283.full.pdf.

Exposure to the respirable fraction of crystalline quartz may promote autoimmune diseases, including rheumatoid arthritis.[85] It can also cause extrapulmonary silicosis, where lesions spread to the liver, spleen, kidneys, bone marrow, and extrathoracic lymph nodes.[86] Long-term exposures to even low levels of silica may lead to the development of chronic bronchitis and emphysema. There is no medication that can reverse damage from silica dust.[87]

Though there is very little known about the differential effects of silica exposure on children, OEHHA cautions that effects on children's respiratory systems could be even more pronounced than for adults, at the same concentration of silica, given that children breathe in more air as compared to their body weight.[88]

## 3.5 Health effects of chemical additives

Project sponsors also contend that the coal they would like to ship from Utah will not have chemical additives.[89] However, it is likely that substances with undisclosed chemical ingredients, such as surfactants/toppers and anti-icers/de-icers/freeze conditioning agents, will be applied to the coal after it is mined and before it reaches Oakland. The use of freeze conditioning agents is required by Union Pacific on coal trains originating in Utah.[90] Freeze conditioning agents include ethylene glycol ("antifreeze"), which is considered a

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[85] Parks et al. (1999. ). "Occupational exposure to crystalline silica and autoimmune disease," Environmental Health Perspectives. http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1566238/pdf/envhper00522-0135.pdf "Autoimmune diseases include scleroderma, rheumatoid arthritis, and systemic lupus erythematosus.."

[86] Occupational Safety and Health Administration (OSHA) [no date]. "Silica, Crystalline Quartz (Respirable Fraction), https://www.osha.gov/dts/chemicalsampling/data/CH_266740.html.

[87] Colinet, J. (2010). Health Effects of Overexposure to Respirable Silica Dust. CDC National Institute for Occupational Safety and Health, Office of Mine Safety and Health Research. Presentation given to Silica Dust Control Workshop, Elko, NV, Sept 28 2010. Referenced in Phyllis Fox, PhD, PE Testimony of September 21, 2015.

[88] "Since children have smaller airways than adults and breathe more air on a body weight basis, penetration and deposition of particles in the airways and alveoli in children is likely greater than that in adults exposed to the same concentration." California Environmental Protection Agency (CalEPA) (2005). Chronic Toxicity Summary: Silica (Crystalline, Respirable), CAS Registry Number 7631-86-9. http://oehha.ca.gov/air/chronic_rels/pdf/SILICAcREL_FINAL.pdf.

[89] HDR. Oakland Bulk and Oversized Terminal Air Quality and Human Health and Safety Assessment of Potential Coal Dust Emissions. Prepared for CCIG. Prepared by Edward Liebsch, Michael Musso, HDR Engineering. September 2015. P11.

[90] See, for example, Union Pacific (2014). Circular 6602-C Item 380-G "Applying on Loading, Handling, Accessorial Charges, Fuel Surcharges and General Rules for Coal Trains Originating in Colo. or Utah." (Issued 2014, Effective January 1 2015): "In order to reduce the possibility of unloading delays due to frozen coal, during the period from November 15th of each year through March 15th of each succeeding year, Shipper or Shipper's Loading Operator shall uniformly treat all coal loaded into railcars with an industry-approved freeze conditioning agent in the quantity and in accordance with the process recommended by the manufacturer of the freeze conditioning agent used." CSX also requires freeze conditioning agents. https://www.csx.com/index.cfm/customers/commodities/coal/news/to-csx-transportation-coal-customers/.

reproductive and developmental toxin, particularly when ingested.[91] As with trace metals, it is of concern that ethylene glycol could enter the environment, including water systems, in Oakland through leaching when coal (in railcars, stockpiles, or fugitive dust form) is exposed to rain or other sources of water over time. (Please see Section 6.2 for more on surfactants.)

## 3.6 Coal combustion fumes and byproducts

Coal combustion fumes are released when coal spontaneously combusts or otherwise catches fire in railcars, while being stored, while being handled at the terminal (see Section 5), and when emissions from post-export coal burning overseas are transported back to Oakland. When coal burns, it emits toxic smoke, containing mercury, lead and other harmful chemicals. Emissions of coal smoke and particulates generated by combustion of coal are listed as carcinogenic by OEHHA.[92] Coal combustion also causes the release of polycylic aromatic hydrocarbons (PAHs), such as benzo(a)pyrene, which are known to cause cancer and reproductive harm.[93] Benzo(a)pyrene is released from coal combustion and is listed as carcinogenic by the State of California and the International Agency for Research on Cancer, and is considered a priority PAH for control by the EPA.[94] (See Section 7.3 for more information on benzo(a)pyrene.)

Lead and mercury, metals found in coal, are classified as hazardous air pollutants.[95] Emergencies at the terminal, such as fires in the coal stockpiles, could expose surrounding communities to airborne lead, as well as mercury.

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[91] "[E]thylene glycol is frequently sprayed on stockpiles to reduce the formation of clumps in the material at frigid temperatures. This allows the material to be screened and/or loaded easier. Ethylene glycol is also applied to material shipped in railroad cars and trucks to or within cold-weather areas in order to prevent the material from forming a frozen mass in the car or truck." Mine Safety and Health Administration (no date), "MSHA's Occupational Illness and Injury Prevention Program Health Topic "Ethylene Glycol". http://arlweb.msha.gov/Illness_Prevention/healthtopics/ethyleneGlycol.HTM. See also See also California Environmental Protection Agency (CalEPA) Office of Environmental Health Hazard Assessment (OEHHA) (2015). "Ethylene Glycol (Ingested) Listed as a Reproductive Toxicant," http://oehha.ca.gov/proposition-65/crnr/ethylene-glycol-ingested-listed-reproductive-toxicant.

[92] California Environmental Protection Agency (CalEPA) Office of Environmental Health Hazard Assessment (OEHHA) (2013). "Chemical Listed Effective August 7, 2013 as Known to the State of California to Cause Cancer: Emissions from Combustion of Coal." http://oehha.ca.gov/proposition-65/crnr/chemical-listed-effective-august-7-2013-known-state-california-cause-cancer

[93] PAHs formed during coal combustion include chrysene, benz(a)anthracene, and benzo(a)pyrene, four- and five-ringed PAHs known to cause cancer in both humans and animals. See also: Zhang, Y. and Shu, T. (2008). "Global atmospheric emission inventory of polycyclic aromatic hydrocarbons (PAHs) for 2004," Atmospheric Environment.

[94] Zhang, Y. et al. (2011). "Transpacific transport of benzo[a]pyrene emitted from Asia," Atmos. Chem. Phys., 11, 11993–12006. www.atmos-chem-phys.net/11/11993/2011/. Also: Also: International Agency for Research on Cancer (IARC) (2012). "Chemical Agents and Related Occupations," Monograph 100F. http://monographs.iarc.fr/ENG/Monographs/vol100F/.

[95] BAAQMD (2016). "Air Quality Standards and Attainment Status," http://www.baaqmd.gov/research-and-data/air-quality-standards-and-attainment-status, accessed 22 Jun 2016. "ARB has identified lead and vinyl chloride as 'toxic air contaminants' with no threshold level of exposure below which there are no adverse

Byproducts of coal combustion, such as coal fly ash, often contain relatively high levels of arsenic, copper, chromium, zinc, antimony, selenium, and cadmium. In emergency situations, when fly ash cannot be controlled with emission reduction technologies (as would be the case if a fire or explosion occurred at the terminal), coal burning will contribute to an increased presence of toxic metals in the air.[96]

There are concerns that those working at or living near the terminal may be exposed to more than just toxic coal smoke if an explosion or fire were to occur. The coal may be treated with chemical additives such as surfactants or anti-icers.[97] The health effects of exposure to combustion fumes associated with these additives are not clear, but could be serious.

Coal combustion also causes the release of tropospheric ozone precursors, such as carbon monoxide (CO), $NO_x$, and volatile organic compounds (VOC). Tropospheric ozone is an air pollutant of serious concern because it can trigger asthma, cause breathing problems and lung diseases, and reduce lung function. (See Section 7.2.)

# 4. COAL AND HEALTH EFFECTS OF COAL IN OAKLAND

Coal dust almost certainly will be generated during transport through Oakland, as well as during the transloading and handling of coal at the proposed terminal facility. It necessarily will be impossible to completely contain this dust, given the physical properties of coal (including its volatility and predisposition to spontaneous combustion).

It is also clear that it will be impossible to completely avoid human exposure to this coal dust in the vicinity of the former Army Base. Even with implementation of the potential mitigation techniques suggested by the project sponsors and suggested by HDR, coal dust will enter Oakland's environment and will affect the health of people working, recreating, and/or residing in the vicinity of the Army Base study area.

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health effects determined." See also See also Environmental Protection Agency (EPA) [no date]. "Initial List of Hazardous Air Pollutants with Modifications," https://www.epa.gov/haps/initial-list-hazardous-air-pollutants-modifications. Accessed 22 June 2016.

[96] International Agency for Research on Cancer (2015). "Outdoor Air Pollution," Monograph 109, p48. http://monographs.iarc.fr/ENG/Monographs/vol109/index.php

[97] See, for example, Union Pacific (2014). Circular 6602-C Item 380-G "Applying on Loading, Handling, Accessorial Charges, Fuel Surcharges and General Rules for Coal Trains Originating in Colo. or Utah." (Issued 2014, Effective January 1 2015). "In order to reduce the possibility of unloading delays due to frozen coal, during the period from November 15th of each year through March 15th of each succeeding year, Shipper or Shipper's Loading Operator shall uniformly treat all coal loaded into railcars with an industry-approved freeze conditioning agent in the quantity and in accordance with the process recommended by the manufacturer of the freeze conditioning agent used."

As identified in previous sections, under stable operating conditions, the major health effects of coal are from exposure to coal dust, including health consequences that stem from the release of $PM_{2.5}$, silica, heavy metals and trace metals. Under emergency conditions, in case of an explosion or spontaneous combustion additional harmful emissions would be released.[98] Some of the populations most likely to suffer negative health effects of coal include workers at and around the terminal and people living in adjacent to the project communities, including children, elderly, pregnant women and individuals with preexisting chronic and acute conditions. In a serious emergency situation those populations will have the greatest risk of injury or even death.

The exact amount of dust emitted in Oakland, either at the terminal or in transport on adjoining train tracks, will depend on the final design of the terminal and other factors. However, previous studies give indications of the magnitude of dust and dust exposure that can be expected. BNSF, one of the railroad companies that would service the terminal, has published studies indicating that 500-2000 lbs (one ton) of coal can escape from a single loaded coal car, and perhaps as much as 3% of the load (3600 lbs on a standard car).[99] (Each train arriving at the terminal is expected to be over 100 cars long and there will likely be multiple trains arriving per day on nearly every day of the year.)

Effects on human health are generally determined by the different levels of exposure to coal and coal dust depending on proximity to the source and concentration on harmful elements.

Workers will be in closest contact to the coal and coal dust, so will likely be in close proximity to the highest concentrations of coal dust during normal operating conditions. Workers will likely be provided with some personal protection gear to minimize exposure. Adjacent communities will likely be exposed to slightly lower concentrations of dust, but since they reside there, they will be exposed up to 24 hours per day, every day of the year and will not have any protection.

Visitors to Oakland, including those using the recreational paths immediately adjacent to the terminal and its storage facilities (including recreational visitors at East Bay Regional Parks facilities), will have shorter-term exposures, but will likely have increased respiration rates and air volume intake due to their physical exertion as they walk, run, bicycle or otherwise move along the paths. It is likely that the number of people in this category who will be exposed will continue to increase in the near future, as recreational paths and facilities are further developed and upgraded.

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[98] For example, carcinogenic emissions from combustion of coal. California Environmental Protection Agency (CalEPA) Office of Environmental Health Hazard Assessment (OEHHA) (2013). "Chemical Listed Effective August 7, 2013 as Known to the State of California to Cause Cancer: Emissions from Combustion of Coal." http://oehha.ca.gov/proposition-65/crnr/chemical-listed-effective-august-7-2013-known-state-california-cause-cancer

[99] BNSF (2011). "BNSF- Customers - What I Can Ship - Coal - Coal Dust FAQs, Mar 2, 2011. File sent as attachment Davis, Muntu, PhD, MPH. Alameda County Public Health Department, Director and County Health Officer. Email to Zoe Chafe, 10 February 2016.

Adjacent communities include infants, children, elders, and those with acute and/or chronic health conditions that would be further exacerbated by increased exposure to $PM_{2.5}$, ozone, and other air pollutants.

***Table 3: Summary of projected dust sources from coal at terminal***

| Dust source | Likelihood of dust release in Oakland | Notes |
|---|---|---|
| **Rail cars being transported through Oakland** | Nearly certain | Coal dust leaks from bottom of rail cars (outlet gates) during transport and movement at terminal. |
| **Rail cars in terminal (bottom-dump)** | Nearly certain[100] | Fine dust settles to bottom of load during journey and will be released at terminal.<br>BNSF testing confirmed leakage of coal dust from "rapid discharge gates."[101] |
| **Open rail cars (full)** | Very likely | Can occur during transport, movement of train cars at or near the terminal, or waiting period before offloading[102] |
| **Open rail cars (empty)** | Nearly certain | Empty rail cars retain coal dust, which would likely become airborne at the beginning of the return journey.[103] |
| **Open storage areas** | Nearly certain | Dust will be blown off any exposed stockpiles, as dust is generated during unloading and blending.[104] |

[100] There was no evidence found suggesting that it is possible to use bottom-dump railcars without dust leaking from the bottom-dump mechanism.
[101] BNSF - Customers - What I Can Ship - Coal - Coal Dust FAQs, Mar 2, 2011. Sent by Muntu Davis, Alameda County Public Health Department on February 9, 2016. "BNSF has done studies over the past three years that have confirmed that while some coal leaks from rapid discharge gates on coal cars, the vast majority of coal dust that is deposited on the railroad right of way comes off of the top of loaded coal cars."
[102] Jaffe, D. et al. (2015). "Diesel particulate matter and coal dust from trains in the Columbia River Gorge, Washington State, USA," Atmospheric Pollution Research, 946-952. http://www.sciencedirect.com/science/article/pii/S1309104215000057
[103] There is no evidence that empty coal cars are or will be required to be treated to prevent dust release.
[104] Commonwealth of Virginia (1997). Report of the Joint Subcommittee Studying Ways to Reduce Emissions from Coal-Carrying Railroad Cars, Senate Document No. 23.

***Table 4: Factors influencing relative levels of exposure to $PM_{2.5}$ from coal dust***

| Population | # of people | Includes vulnerable populations? | Hours exposed per year | Concentration of $PM_{2.5}$ exposure | Other considerations |
|---|---|---|---|---|---|
| **Workers at terminal** | 100-1,000 | Possible | > 2000 hours[105] | Highest | Personal respiratory protection likely to be provided, as required by law. |
| **Adjacent communities** | 10,000-100,000 | Certain[106] | < 8760 hours | Elevated above current non-attainment levels[107] | No personal protection. All people, including most vulnerable individuals, will be exposed to elevated levels. |
| **Visitors and recreational users** | 100-10,000 | Certain[108] | Intermittent | Elevated above current non-attainment levels[109] | Respiratory rate will be elevated and air intake increased due to physical exertion when walking, running, biking, etc. |

## 4.1 Effects of coal on workers' health and safety

People working at or near the terminal will be affected by coal, coal dust and harmful elements in coal at different levels of exposure depending on their proximity to the coal, the length of their exposure and other factors. Workers likely to be exposed include those employed by railroad companies serving the terminal, those working at the terminal itself, and employees at the toll plaza on the eastern span of the San Francisco Bay Bridge, the nearby EBMUD facility, the nearby postal facility, and other workers at adjacent to the project facilities, as well as service workers visiting the terminal and surrounding businesses and facilities.

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[105] The federal government assigns 2,087 hours per year as the value for full time work.

[106] Adjacent communities include infants, elders, and those with chronic diseases including but not limited to asthma and other respiratory illnesses, chronic obstructive pulmonary disease (COPD), and cancer. (See Section 4.2.)

[107] The BAAQMD is currently in non-attainment status for $PM_{2.5}$, meaning that $PM_{2.5}$ concentrations in the Bay Area, and especially in West Oakland, are above the level deemed safe by the US EPA. Shipping coal through this terminal would further elevate $PM_{2.5}$ levels in local communities. BAAQMD (2016). "Air Quality Standards and Attainment Status," http://www.baaqmd.gov/research-and-data/air-quality-standards-and-attainment-status, accessed 22 Jun 2016.

[108] Visitors to the area include infants, elders, and those with chronic diseases, such as asthma and chronic obstructive pulmonary disease (COPD).

[109] The BAAQMD is currently in non-attainment status for $PM_{2.5}$, meaning that $PM_{2.5}$ concentrations in the Bay Area, and especially in West Oakland, are above the level deemed safe by the US EPA. BAAQMD (2016). "Air Quality Standards and Attainment Status," http://www.baaqmd.gov/research-and-data/air-quality-standards-and-attainment-status, accessed 22 Jun 2016. Shipping coal through this terminal would further elevate $PM_{2.5}$ levels in adjacent areas, including recreational paths.

The Alameda County Public Health Department finds that working conditions at the terminal will be dangerous: "…workers at the Terminal, the larger Development Area, and the Port of Oakland are another population that will be impacted and continuously exposed to working conditions dangerous to their health and safety."[110] Despite occupational health regulations and vetted infrastructure designs, buildup of coal dust within industrial settings is a documented problem. A study of United States coal-preparation and mineral-processing plants found that one-third of them had high dust concentrations in localized areas of the plant (up to 11 mg/m3, or more than 5 times the current allowable limit).[111] It is likely that this facility would be considered by OSHA to be a hazardous area Class II ("location in which combustible dusts may or may not be in sufficient quantities to produce explosive or ignitable mixtures") Group F ("Atmospheres containing combustible carbonaceous dusts with 8% or more trapped volatiles such as carbon black, coal, or coke dust") location. Additionally, it is possible that occupational health conditions in this facility would be considered to resemble mining conditions, given the expected blending of the commodity, as indicated in various basis of design documents and health and safety reports.

Workers engaged in handling—and blending—of coal at the proposed project site will work in an environment that can become similar to a coal mine, especially if in an enclosed facility, as proposed in the Basis of Design.[112] "Blending" is mixing of various coals to meet buyer specifications. When lower-quality coals are mixed in, it is possible that they can have higher heavy metal contents.

Prolonged direct occupational exposure to coal dust has been linked to health issues such as chronic bronchitis, decreased lung function, severe emphysema, and cancer.[113] Asthma,

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[110] Davis, Muntu, MD, MPH. Alameda County Public Health Department, Director and County Health Officer. Testimony submitted October 6, 2015. "Responses to City Administrator's Follow-up Questions and review of HDR Engineering Report."

[111] National Institute for Occupational Safety and Health (NIOSH) (1995). Criteria for a Recommended Standard Occupational Exposure to Respirable Coal Mine Dust, 1.1.3. US Department of Health and Human Services, Public Health Service, Centers for Disease Control and Prevention, National Institute for Occupational Safety and Health Education and Information Division, Cincinnati, Ohio http://www.cdc.gov/niosh/docs/95-106/pdfs/95-106.pdf

[112] NIOSH defines a coal mine as "an area of land and all structures, facilities, machinery, tools, equipment, shafts, slopes, tunnels, excavations, and other property, real or personal, placed upon, under, or above the surface of such land by any person, used in, or to be used in, or resulting from, the work of extracting in such area bituminous coal, lignite, or anthracite from its natural deposits in the earth by any means or method, and the work of preparing the coal so extracted, and includes custom coal preparation facilities." See NIOSH Criteria for a Recommended Standard Occupational Exposure to Respirable Coal Mine Dust, 1.1.3. U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES, Public Health Service, Centers for Disease Control and Prevention, National Institute for Occupational Safety and Health Education and Information Division, Cincinnati, Ohio http://www.cdc.gov/niosh/docs/95-106/pdfs/95-106.pdf

[113] "Chronic exposure to coal dust, particularly at high levels, can cause severe emphysema." Utah Department of Health [no date]. "Chronic Obstructive Pulmonary Disease." http://health.utah.gov/asthma/pdfs/work/Respiratory_packet.pdf. See also National Institute for Occupational Safety and Health (NIOSH) (1995). Criteria for a Recommended Standard Occupational

emphysema, and chronic bronchitis contribute more to premature deaths and illness among coal workers than the more widely known coal workers' pneumoconiosis (CWP).[114] Being exposed to coal dust (in mines) appears to contribute to emphysema in the same way that being exposed to cigarette smoke does.[115] Respirable coal mine dust is a known fibrogenic dust, which causes fibrous growths that lead to lung disease. Exposure to coal dust increases laryngeal cancer risk among workers who are exposed to coal dust at any point in their lives. One study identified a "clear and significant dose-response trend" observed among those in the highest exposure category of this laryngeal cancer study, meaning that those who had been exposed to more coal dust were more likely to develop cancer.[116] The WHO cites coal dust, along with silica and asbestos, as being responsible for the most occupational lung disease due to any airborne particulate.[117]

Much of the extensive research on the effects of coal dust on miners' health can guide our understanding of how proposed terminal workers' health will be affected by handling coal, especially if its activities include "blending" of coal.[118] Documents submitted by project

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Exposure to Respirable Coal Mine Dust, 1.1.3. US Department of Health and Human Services, Public Health Service, Centers for Disease Control and Prevention, National Institute for Occupational Safety and Health Education and Information Division, Cincinnati, Ohio http://www.cdc.gov/niosh/docs/95-106/pdfs/95-106.pdf

[114] Huang , X. and Finkelman, R. (2008). "Understanding the Chemical Properties of Macerals and Minerals in Coal and its Potential Application for Occupational Lung Disease Prevention," Journal of Toxicology and Environmental Health, Part B. "OSHA specifies the following "potential symptoms" from exposure to coal dust: "chronic bronchitis; decreased pulmonary function; emphysema." https://www.osha.gov/dts/chemicalsampling/data/CH_228895.html Also, "Emphysema is seen among those exposed to respirable coal dust in a mine environment: "Cumulative exposure to respirable coal mine dust or coal dust retained in the lungs were significant predictors of emphysema severity ($P < 0.0001$) after accounting for cigarette smoking, age at death, and race." Kuempel, E. et al. (2009). "Contributions of Dust Exposure and Cigarette Smoking to Emphysema Severity in Coal Miners in the United States," American Journal of Respiratory and Critical Care Medicine. The first author is associated with NIOSH.

[115] Kuempel, E.et al. (2009). "Contributions of Dust Exposure and Cigarette Smoking to Emphysema Severity in Coal Miners in the United States," American Journal of Respiratory and Critical Care Medicine. """Coal dust exposure and cigarette smoking had similar additive effects on emphysema severity in these models at cohort average values."

[116] Shangina, O. et al. (2006). "Occupational exposure and laryngeal and hypopharyngeal cancer risk in central and eastern Europe." Am J Epidemiol. 164(4):367-75. Cited In Davis, Muntu, PhD, MPH. Alameda County Public Health Department, Director and County Health Officer. Letter to Zoe Chafe, 9 February 2016. "Re: Clarification of 10/6/15 responses to the City Administrator's follow-up questions about the proposed Oakland Bulk and Oversized Terminal project and review of HDR Engineering Report."

[117] East Bay Mayors. "Mayors Opposed to the Shipment of Coal Exports Through Oakland," Letter to City Council, 14 April 2016.

[118] Federal Mine Safety and Health Review Commission, 2013, Secretary of MSHA vs SCH Terminal Company Inc., Docket No. KENT 2013-413 A.C. No. 15-18639-311429, p3-4. https://www.fmshrc.gov/decisions/alj/KENT%202013-413.pdf. "'Coal or other mine' is defined under $3(h)(1) of the Act to mean…the work of preparing coal or other minerals, and includes custom coal preparation facilities…Congress intended MSHA to have a wide range of jurisdiction…Courts have consistently held that that the 'mixing or blending' of coal, when done to meet customer or market specifications, constitutes the 'work of preparing the coal.'" Similarly, in a recent update to a federal rule designed to protect coal miners, the terms "respirable coal mine dust," "coal mine dust,"and "respirable dust"

sponsors indicate that blending is likely to occur.[119] However, it is unclear if any relevant mine dust regulations would be enforceable to protect workers at the terminal in Oakland.

The health effects of coal dust exposure in occupational settings are well-described by Huang et al. (2008): "…[C]oal miners face dangers and hardships that most Americans would find unacceptable in their daily lives. One of the dangers that coal miners face is exposure to dust generated by the various methods employed to extract the coal and transport it out of the mine."[120]

According to NIOSH, the recommended exposure limit (REL) for respirable coal mine dust should apply to workers exposed to respirable coal dust in occupations other than just mining itself.[121] This is because studies of workers exposed to coal outside of coal mines indicate that their exposures can be high enough to cause pneumoconiosis.[122]

The federal agencies tasked with protecting worker health and safety, like the Mine Safety and Health Administration, now state that both coal dust and respirable silica are harmful to health, either when breathed in separately or in combination. When workers are exposed to coal dust, they can develop CWP and severe emphysema, even if the dust does not contain silica; although silica can worsen the effects of respirable coal mine dust on miners' lungs.[123]

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are used interchangeably, illustrating that respirable coal dust, no matter its origin or location, is viewed and regulated with the understanding that it is harmful.

[119] TLS, Basis of Design: Volume 1. Jul 16, 2015. "There is a requirement for segregated storage to blend Commodity A." See p1 and p4.

[120] Huang, X. and Finkelman, R. (2008). "Understanding the Chemical Properties of Macerals and Minerals in Coal and its Potential Application for Occupational Lung Disease Prevention," Journal of Toxicology and Environmental Health, Part B.

[121] National Institute for Occupational Safety and Health (NIOSH) (1995). Criteria for a Recommended Standard Occupational Exposure to Respirable Coal Mine Dust, 1.1.3. US Department of Health and Human Services, Public Health Service, Centers for Disease Control and Prevention, National Institute for Occupational Safety and Health Education and Information Division, Cincinnati, Ohio. http://www.cdc.gov/niosh/docs/95-106/pdfs/95-106.pdf

[122] National Institute for Occupational Safety and Health (NIOSH) (1995). Criteria for a Recommended Standard Occupational Exposure to Respirable Coal Mine Dust, 1.1.3. US Department of Health and Human Services, Public Health Service, Centers for Disease Control and Prevention, National Institute for Occupational Safety and Health Education and Information Division, Cincinnati, Ohio. http://www.cdc.gov/niosh/docs/95-106/pdfs/95-106.pdf. "Dose-response relationships between cumulative dust exposure and cases of respiratory diseases have been studied by NIOSH as part of the National Coal Study." Mine Safety and Health Administration (2014). Final Rule: Lowering Miners' Exposure to Respirable Coal Mine Dust, Including Continuous Personal Dust Monitors. Federal Register Volume 79, Number 84. Pages 24814-24994.

[123] "Based on all of the available evidence, MSHA believes that respirable coal mine dust has a fibrogenic effect on the development of CWP in coal miners independent of the quartz or silica content of the coal. High silica content may accelerate the progression of CWP to PMF, the most severe form of CWP, but there is no evidence to suggest that the presence of silica is a necessary condition for CWP, PMF, severe emphysema, or NMRD mortality." Department of Labor, Mine Safety and Health Administration. (2014). Final Rule: Lowering Miners' Exposure to Respirable Coal Mine Dust, Including Continuous Personal Dust Monitors. Federal Register Volume 79, Number 84 Pages 24814-24994. http://arlweb.msha.gov/regs/fedreg/final/2014finl/2014-09084.asp

Bituminous coal, the kind that will be shipped from Utah, is a substance of such concern to worker health that it is recommended that employees "must wear appropriate impervious clothing and equipment to prevent repeated or prolonged skin contact" as well as "MSHA/NIOSH approved dust respirator" and "splash goggles or shields with safety glasses" to protect eyes and "neoprene or PVC" protective gloves when working with bituminous coal and coal dust.[124]

### 4.1.a Exposure limits for workers

The project proponents repeatedly claim that occupational health standards will guide efforts to protect worker safety.[125] However, workplace coal dust standards do not appear to be successfully preventing disease associated with exposure to the dust.[126] It is now clear that coal miners are dying of Coal Workers' Pneumoconiosis (CWP), even when they started working during the time when NIOSH started to mandate lower dust

[124] Sprague, "Bituminous Coal: Material Safety Data Sheet." TLS Basis of Design Section 8 p8.

[125] See for example HDR. Oakland Bulk and Oversized Terminal Air Quality and Human Health and Safety Assessment of Potential Coal Dust Emissions. Prepared for CCIG. Prepared by Edward Liebsch, Michael Musso, HDR Engineering. September 2015, p16: "As for any industrial facility, worker safety will need to be addressed by conforming to Cal/OSHA standards for dusts in general and for coal dust."

[126] The National Institute for Occupational Safety and Health (NIOSH) reference exposure limit (REL) of 1 mg/m3 (10-hour TWA) for respirable coal mine dust applies to respirable coal mine dust and respirable coal dust in occupations other than mining. (See National Institute for Occupational Safety and Health (NIOSH) (2015). Pocket Guide to Chemical Hazards, Appendix C - Supplementary Exposure Limits, updated Feb 13 2015. http://www.cdc.gov/niosh/npg/nengapdxc.html.) Note that "The REL is equivalent to 0.9 mg/m3 measured according to the ISO/CEN/ACGIH (International Standards Organization/ Comité Européen de Normalisation/American Conference of Governmental Industrial Hygienists) definition of respirable dust." See NIOSH (1995) for more detailed information. The Mine Safety and Health Administration further tightened its regulation of coal dust in 2014 by lowering the allowable concentrations from 2.0 mg/m3 to 1.5 mg/m3 (1500 ug/m3) in a rule that becomes enforceable in August 2016. However, this limit is still higher than that recommended by NIOSH. "After August 1, 2016, the concentration limits for respirable coal mine dust are lowered from 2.0 milligrams of dust per cubic meter of air (mg/m3) to 1.5 mg/m3 at underground and surface coal mines, and from 1.0 mg/m3 to 0.5 mg/m3 for intake air at underground mines and for part 90 miners (coal miners who have evidence of the development of pneumoconiosis). Lowering the concentration of respirable coal mine dust in the air that miners breathe is the most effective means of preventing diseases caused by excessive exposure to such dust." Mine Safety and Health Administration (2014). Final Rule: Lowering Miners' Exposure to Respirable Coal Mine Dust, Including Continuous Personal Dust Monitors. Federal Register Volume 79, Number 84, Pages 24814-24994. http://arlweb.msha.gov/regs/fedreg/final/2014finl/2014-09084.asp See National Institute for Occupational Safety and Health (NIOSH) (2016). "Coal Dust," NIOSH Pocket Guide to Chemical Hazards. http://www.cdc.gov/niosh/npg/npgd0144.html (1.0 mg/m3 time-weighted average) and Kuempel, E. et al. (2009). "Contributions of Dust Exposure and Cigarette Smoking to Emphysema Severity in Coal Miners in the United States," American Journal of Respiratory and Critical Care Medicine.

concentrations in mines and at the surface.[127] Miners working in currently allowable conditions are still developing emphysema as well.[128]

To complicate matters, wetting methods proposed by project proponents to be used to control coal dust at the terminus might place workers at risk by reducing the efficacy of the respirators they would likely be required to wear while in the vicinity of coal or coal dust.[129]

Responding to worries that workers in the United States (including those exposed to coal dust) were being exposed to so much silica that silicosis was a persistent health and safety problem, OSHA adopted a final rule guiding "Occupational Exposure to Respirable Crystalline Silica" just three months ago.[130] California's OEHHA has set a chronic reference exposure level (REL) of 3 µg/m3 for silica (crystalline respirable), based on human health

[127] "Over time since 1995 it has become increasingly apparent that the observed prevalence of CWP in U.S. underground coal miners examined in the Coal Miners' X-ray Surveillance Program (CWXSP) was no longer declining as it had from 1969–1995, but had begun increasing. This situation was first noticed in a 2003 CDC/NIOSH report. This report also drew attention to the fact that CWP was developing in underground coal miners who had spent all of their working life in a working environment where the dust conditions should have been as mandated by the 1969 Coal Mine Act. Based on findings that showed higher CWP prevalences in certain worker groups, the publication raised concerns about possible excessive dust exposures in certain states, at smaller mines, and by some surface and contract miners." National Institute for Occupational Safety and Health (NIOSH) (2011). "Current Intelligence Bulletin 64: Coal Mine Dust Exposures and Associated Health Outcomes," DHHS (NIOSH) Publication No. 2011–172.

[128] Kuempel, E. et al. (2009,). "Contributions of Dust Exposure and Cigarette Smoking to Emphysema Severity in Coal Miners in the United States," American Journal of Respiratory and Critical Care Medicine. "That is, miners working for 45 years (e.g., age 20–65 yr) at 2 mg/m3 would experience a cumulative dust exposure of 90 mg/m3 for 3 years…[T]his cumulative exposure would increase the average emphysema severity index by 99 points, providing additional evidence of the need to reduce exposures to respirable coal mine dust to 1 mg/m3 or less, as recommended by NIOSH."

[129] For example, NIOSH directs that some respirators "should be discarded when [they] become damaged or deformed; no longer forms an effective seal to the face; becomes wet or visibly dirty." National Institute for Occupational Safety and Health (NIOSH) National Personal Protective Technology Laboratory (NPPTL) [No date]. "Section 3: Ancillary Respirator Information," http://www.cdc.gov/niosh/npptl/topics/respirators/disp_part/respsource3healthcare.html. Cited in Davis, Muntu PhD, MPH. Alameda County Public Health Department, Director and County Health Officer. Letter to Zoe Chafe, 9 February 2016. "Re: Clarification of 10/6/15 responses to the City Administrator's follow-up questions about the proposed Oakland Bulk and Oversized Terminal project and review of HDR Engineering Report."

[130] Occupational Safety and Health Administration (OSHA) (2016). Occupational Exposure to Respirable Crystalline Silica: A Rule by the Occupational Safety and Health Administration on 03/25/2016." https://www.federalregister.gov/articles/2016/03/25/2016-04800/occupational-exposure-to-respirable-crystalline-silica. "This final rule establishes a new permissible exposure limit of 50 micrograms of respirable crystalline silica per cubic meter of air (50 µg/m3) as an 8-hour time-weighted average in all industries covered by the rule."

effect studies.[131] Because it is so harmful to humans, silica is regulated at levels much lower than those of generalized coal dust in occupational settings.[132]

### 4.1.b Occupational health and safety procedures

The project sponsors submitted a 655 page preliminary operating plan to the Oakland City Council.[133] Given the substantial danger posed by combustible dust known to be produced by handling of coal, it is of concern that the industrial hygiene section of the operating plan does not mention combustible dust prevention, detection, or emergency protocols.[134] In fact, the entire document contains only passing references to combustible dust. The Operations and Maintenance draft mentions that the site will be evaluated by occupational health professionals for "explosive dust/respirable dust conditions," but does not contain any further detail on dust hazards, housekeeping protocols, suppression techniques, or emergency protocols (besides one-line checklist entries for training and use of "dust suppression" systems on shiploaders and conveyor belts).[135]

## 4.2 Health effects of coal on adjacent communities

Coal dust exposures will add pollution to an already disproportionately burdened community suffering long-standing health risks.[136] The communities adjacent to this project[137] face a combination of conditions that leave them extremely vulnerable to health threats and safety risks from the transport, handling, storage, transloading, and export of

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[131] California Environmental Protection Agency (CalEPA) (2005). Chronic Toxicity Summary: Silica (Crystalline, Respirable), CAS Registry Number 7631-86-9. http://oehha.ca.gov/air/chronic_rels/pdf/SILICAcREL_FINAL.pdf

[132] Fox, Phyllis, PHD, PE. Testimony submitted September 21, 2015. "Environmental, Health, and Safety Impacts of the Proposed Oakland Bulk and Oversized Terminal."

[133] See TLS, "Employee Orientation Procedure: Industrial Hygiene," "Preliminary Operating Plan," p361.

[134] The TLS Preliminary Operating Plan Safety Procedure No. TLS-08 Employee Orientation Procedure also, confusingly, includes sentences that make it appear that this document was prepared for another project site, such as "In the event that a large magnitude earthquake occurs we may be cut off from the rest of Los Angeles."

[135] See TLS Preliminary Operating Plan Operations and Maintenance Plan section 6.5.4, 309 p93 for mention of explosive dust/respirable dust evaluation. Relevant sections that do not include mentions of combustible dust or explosive dust include "Welding procedure," (p123).

[136] English, Paul, PhD, MPH. Testimony submitted September 14, 2015. "RE: Public Health Impacts of Coal Exports at the Former Oakland Army Base." English is a public health epidemiologist with over 25 years of experience and holds a doctorate degree in epidemiology from the University of California, Berkeley, School of Public Health. Also: "Additional fugitive coal dust on top of long-term environmental stress would very likely create cumulative health-related concerns in an already burdened and vulnerable community." Sustainable Systems Research, LLC (1665, p69). "Technical Memorandum Air Quality, Climate Change, and Environmental Justice Issues from Oakland Trade and Global Logistics Center," submitted September 18, 2015, p. 11.

[137] The Alameda County Public Health Department states that "Adjacent Neighbors" should be defined as "all existing and future residents of Oakland that will be impacted," "particularly West Oakland and East Oakland, and existing and future workers at the Oakland Bulk and Oversized Terminal (OBOT), the larger Development Area, and the Port of Oakland." Davis, Muntu, MD, MPH. Alameda County Public Health Department, Director and County Health Officer. Testimony submitted October 6, 2015. "Responses to City Administrator's Follow-up Questions and review of HDR Engineering Report."

coal at the proposed terminal. The communities are home to many residents who are particularly susceptible to the effects of increased air pollution because of their age, socioeconomic status, existing environmental health burdens, and pre-existing health conditions.[138]

The current health outcomes for area residents are described as "grim." When compared to the outcomes for residents in the hillside neighborhoods of Oakland, residents living near the proposed Oakland Bulk and Oversized Terminal area are more likely to suffer from cardiovascular disease, including heart disease and stroke, cancer, and diabetes.[139] They are also more likely to give birth to premature or low birth weight babies.[140] Individuals born in West Oakland have a life expectancy that is 15 years less than individuals born in the Oakland Hills.[141]

[138] Morello-Frosch, R. et al. (2011). Cited in Sustainable Systems Research LLC (1665 p68). "Understanding the Cumulative Impacts Of Inequalities In Environmental Health: Implications For Policy," Health Affairs. http://content.healthaffairs.org/content/30/5/879. For example: "Low neighborhood-level socioeconomic status may also amplify the risk of air pollution–related preterm births, lower birthweight, and adult mortality." Cited in Sustainable Systems Research, LLC. "Technical Memorandum Air Quality, Climate Change, and Environmental Justice Issues from Oakland Trade and Global Logistics Center," submitted September 18, 2015.

[139] Communities for a Better Environment, (2010). East Oakland Diesel Truck Survey Report, www.cbecal.org/wp-content/uploads/2013/01/Diesel-truck-study-FINAL-092710.pdf. Cited in Gutierrez, Irene. Earthjustice. "Re: Proposed Oakland Coal Export Terminal," Testimony submitted September 2, 2015.

[140] Communities for a Better Environment, (2010). East Oakland Diesel Truck Survey Report, www.cbecal.org/wp-content/uploads/2013/01/Diesel-truck-study-FINAL-092710.pdf. Cited in Gutierrez, Irene. Earthjustice. "Re: Proposed Oakland Coal Export Terminal," Testimony submitted September 2, 2015.

[141] Communities for a Better Environment, (2010). East Oakland Diesel Truck Survey Report, www.cbecal.org/wp-content/uploads/2013/01/Diesel-truck-study-FINAL-092710.pdf. Cited in Gutierrez, Irene. Earthjustice. "Re: Proposed Oakland Coal Export Terminal," Testimony submitted September 2, 2015.

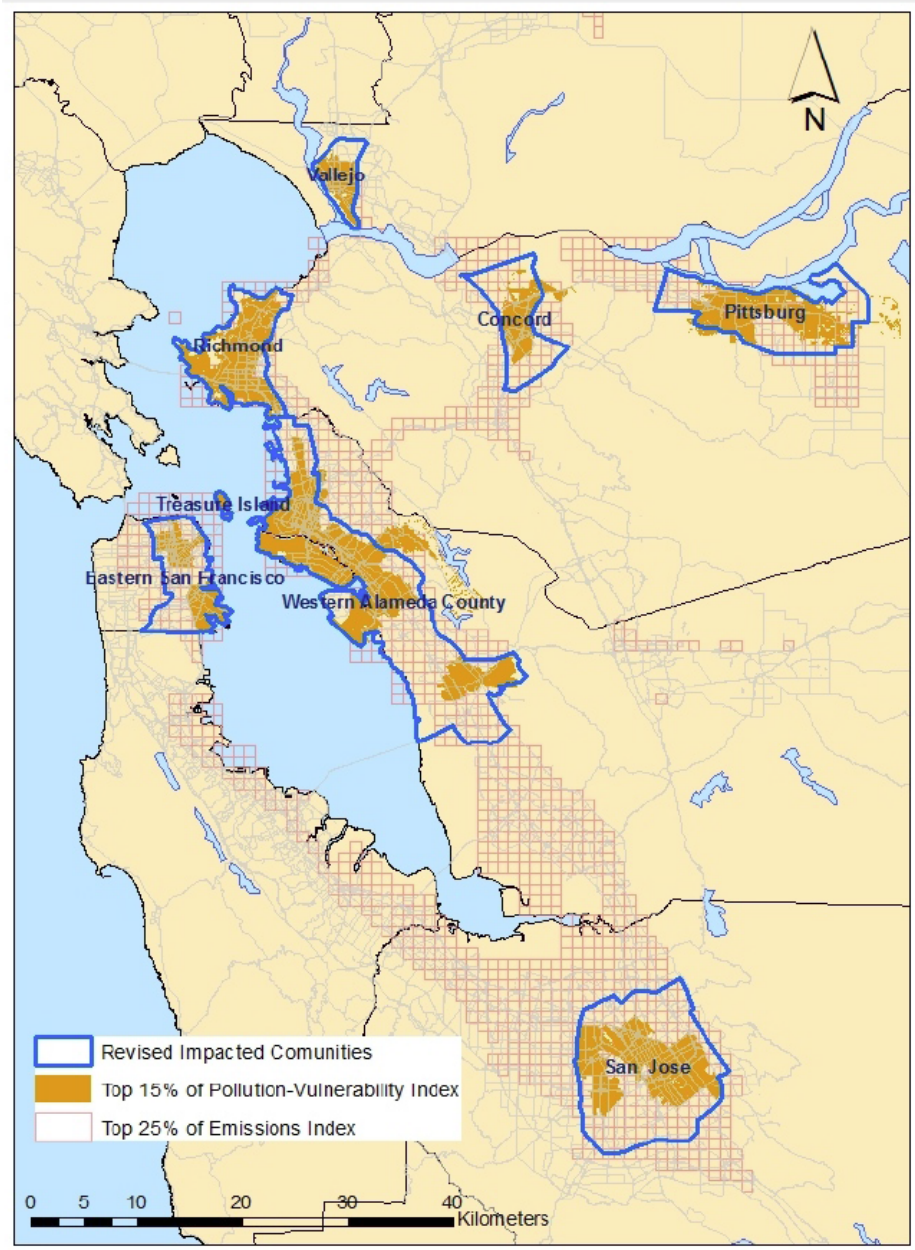


***Figure 6: Map of impacted communities, outlined in blue line, with top 15% of the pollution-vulnerability index (shown in brown), as determined by the BAAQMD. Note that the adjacent communities are within both the top 25% of the emissions index and the Top 15% of the pollution-vulnerability index.***[142]

[142] BAAQMD (2014). "Identifying areas with cumulative impacts from air pollution in the San Francisco Bay Area: Version 2." http://www.baaqmd.gov/~/media/Files/Planning%20and%20Research/CARE%20Program/Documents/ImpactCommunities_2_Methodology.ashx?la=en Referenced in Davis, Muntu, PhD, MPH. Alameda County Public Health Department, Director and County Health Officer. Letter to Zoe Chafe, 9 February 2016. "Re: Clarification of 10/6/15 responses to the City Administrator's follow-up questions about the proposed Oakland Bulk and Oversized Terminal project and review of HDR Engineering Report."

After reviewing information presented by parties from both sides related to air quality impacts of coal transport via rail, the Alameda County Public Health Department found it reasonable to conclude that there will be increased emissions, particularly for those living and working nearby, from fugitive coal dust, resulting in increased health concerns. Of extreme concern is the fine particulate fraction ($PM_{2.5}$) of this coal dust $PM_{2.5}$.[143] The spread of coal dust will be exacerbated by gusts of wind along the Oakland shoreline, by trains passing each other on the tracks near the terminal, and by occasionally extreme meteorological conditions.[144]

Communities to the west of the proposed project site are particularly vulnerable to increases in air pollution, due to their existing health status and environmental health burdens. Moreover, they will suffer greater exposure to the pollution from the project because of the wind patterns, which are expected to convey air pollution toward those communities. Wind analysis from the BAAQMD shows that 100% of the winds in the summertime, when people spend the greatest amount of time outdoors, are from the West. In the winter time, still about 70% of the time, the wind is from the West. Many days have wind speed above 10 mph.[145] (See Figure 7 for a visual representation of annual wind patterns at a nearby site.)

[143] Davis, Muntu, MD, MPH. Alameda County Public Health Department, Director and County Health Officer. Testimony submitted October 6, 2015. "Responses to City Administrator's Follow-up Questions and review of HDR Engineering Report."

[144] Commonwealth of Virginia (1997). Report of the Joint Subcommittee Studying Ways to Reduce Emissions from Coal-Carrying Railroad Cars, Senate
Document No. 23. Also: Simpson Weather Associates, Inc., (1993). "Norfolk Southern Rail Emission Study," December 30. http://leg2.state.va.us/dls/h&sdocs.nsf/By+Year/SD581994/$file/SD58_1994.pdf.
Commonwealth of Virginia (1995). Report of the Joint Subcommittee Studying Ways to Reduce Emissions from Coal-
Carrying Railroad Cars, to the Governor and the General Assembly of Virginia, Senate Document No. 58. http://leg2.state.va.us/dls/h&sdocs.nsf/By+Year/SD581994/$file/SD58_1994.pdf. Cited in Fox, Phyllis, PHD, PE. Testimony submitted September 21, 2015. "Environmental, Health, and Safety Impacts of the Proposed Oakland Bulk and Oversized Terminal."

[145] See Ostro, Bart, PhD. Testimony submitted September 16, 2015 and October 1, 2015. Former Chief of the Air Pollution Epidemiology Section, California Environmental Protection Agency.

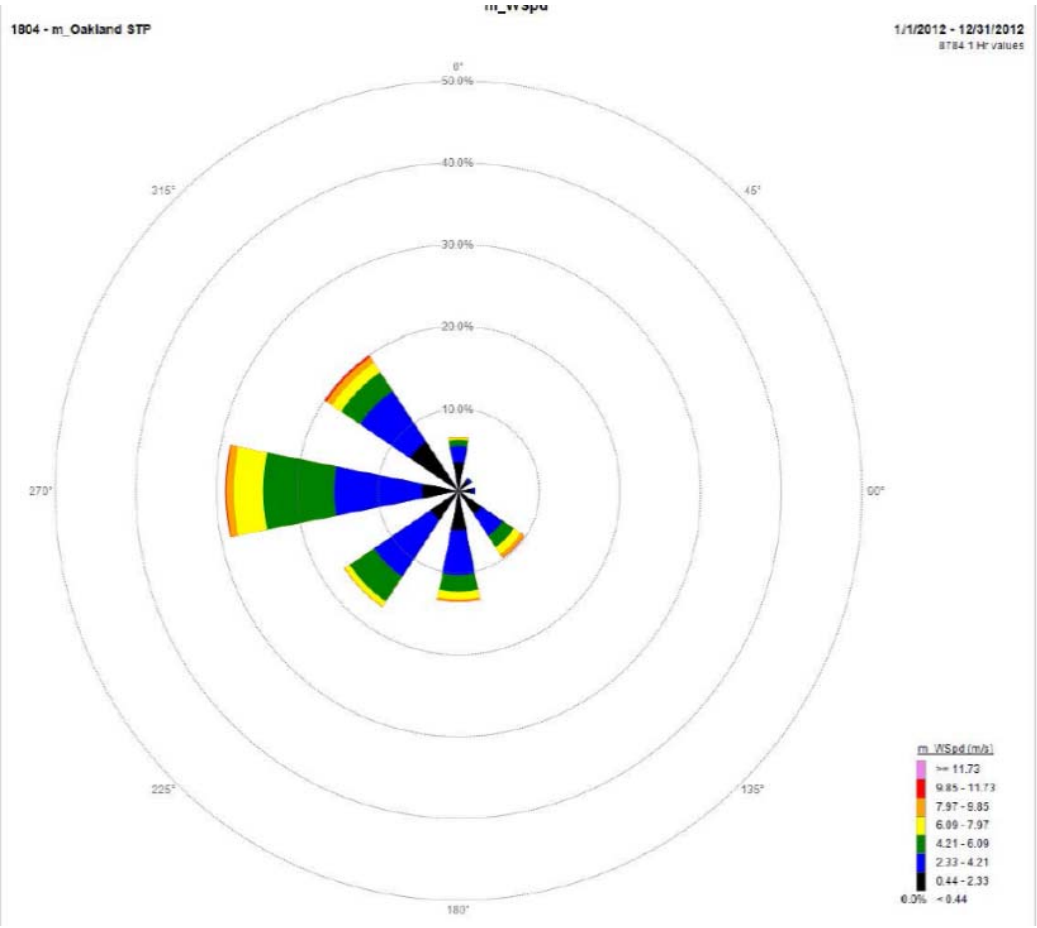


***Figure 7. Wind rose for 2012 at the Oakland sewage treatment plant.***[146] ***This shows that winds predominately blow from the west, toward West Oakland and the East Bay, from the project site.***

There is a high likelihood that adjacent communities will experience very high peaks of $PM_{2.5}$ in their neighborhoods, at concentrations that could cause adverse health effects.[147] Recent studies of trains in Washington State reported the average peak in near-by concentrations of $PM_{2.5}$ of coal trains were twice that of freight.[148] Adding coal dust exposures will add pollution to a minority area already suffering from disproportionate pollution effects and will increase health care costs.[149]

Previous studies done in other parts of the U.S. found that people who live near coal facilities, but do not themselves work in mines and other coal handling facilities, may

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[146] BAAQMD (2013). 2012 Air Monitoring Network Plan, p222. http://www.baaqmd.gov/~/media/Files/Technical%20Services/2012_Network_Plan.ashx

[147] Ostro, Bart, PhD. Testimony submitted September 16, 2015 and October 1, 2015. Former Chief of the Air Pollution Epidemiology Section, California Environmental Protection Agency.

[148] Jaffe, D. et al. (2015). "Diesel particulate matter and coal dust from trains in the Columbia River Gorge, Washington State, USA," Atmospheric Pollution Research, 946-952. http://www.sciencedirect.com/science/article/pii/S1309104215000057

[149] English, Paul, PhD, MPH. Testimony submitted September 14, 2015. "RE: Public Health. Impacts of Coal Exports at the Former Oakland Army Base."

experience higher mortality rates related to heart, respiratory, and kidney problems.[150] These studies found that the following health outcomes were associated with coal activities: increased mortality rates; increased incidence of chronic heart, lung, and kidney disease; increased incidence of adult hospitalizations for chronic pulmonary disorders, hypertension and lung cancer.[151] Coal facilities workers are predominately male. However, described health problems affected both women and men, indicating that those effects are not simply a result of direct occupational exposure of the predominantly male coal miners.[152]

Communities near coal-handling terminals have also seen increases in health problems. In a community near a large coal terminal in Virginia, for example, the number of residents suffering from asthma was found to be more than twice the city and state average.[153] A study of children living near a coal bulk handling port found increased prevalence of respiratory symptoms in primary schoolchildren exposed to coal dust.[154] This port handled less than 2 million tonnes at its peak, less than a quarter of the proposed capacity of the terminal in Oakland.

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[150] Hendryx, M. et al. (2010). "A geographical information system-based analysis of cancer mortality and population exposure to coal mining activities in West Virginia, United States of America," Geospatial Health. 4(2):243–256. Hendryx, M. (2009). "Mortality from heart, respiratory, and kidney disease in coal mining areas of Appalachia." International Archives of Occupational and Environmental Health. 82(2):243–249. Hendryx, M. and Ahern, M. (2008). "Relations between health indicators and residential proximity to coal mining in West Virginia," American Journal of Public Health. 98(4):669–671. Hendryx. M. et al. (2007). "Hospitalization patterns associated with Appalachian coal mining," Journal of Toxicology and Environmental Health, Part A. 70(24):2064–2070. All cited in Multnomah County Health Department, (2013). "The Human Health Effects of Rail Transport of Coal Through Multnomah County, Oregon: A Health Analysis and Recommendations for Further Action." February 2013. Referenced in Davis, Muntu, PhD, MPH. Alameda County Public Health Department, Director and County Health Officer. Letter to Zoe Chafe, 9 February 2016. "Re: Clarification of 10/6/15 responses to the City Administrator's follow-up questions about the proposed Oakland Bulk and Oversized Terminal project and review of HDR Engineering Report." And in Gutierrez, Irene. Earthjustice. "Re: Proposed Oakland Coal Export Terminal," Testimony submitted September 2, 2015.

[151] M. Hendryx, M. M. Ahern, Public Health Rep. 124, 541 (2009). Cited in http://science.sciencemag.org/content/327/5962/148.full and Gutierrez, Irene. Earthjustice. "Re: Proposed Oakland Coal Export Terminal," Testimony submitted September 2, 2015. "Previous research that examined specific forms of mortality in coal mining areas found that chronic forms of heart, respiratory, and kidney disease, as well as lung cancer, remained elevated after adjusting for socioeconomic and behavioral factors. Elevated adjusted mortality occurred in both males and females, suggesting that the effects were not due to occupational exposure, as almost all coal miners are men. These ill nesses are consistent with a hypothesis of exposure to water and air pollution from mining activities. There is evidence that the coal mining industry is a significant source of both air and water pollution."

[152] Hendryx M. (2009). "Mortality from heart, respiratory, and kidney disease in coal mining areas of Appalachia." International Archives of Occupational and Environmental Health. 82(2):243–249. Cited in http://science.sciencemag.org/content/327/5962/148.full and Gutierrez, Irene. Earthjustice. "Re: Proposed Oakland Coal Export Terminal," Testimony submitted September 2, 2015.

[153] Yarnall Loarie, Jessica. "RE: Improper Use of Proposition 1B Trade Corridor Improvement Funds for coal export facility project at Oakland Army Base Redevelopment." Letter to Loretta Dunn, California Transportation Commission, 24 September 2015, p5.

[154] Brabin, B. et al. (1994). "Respiratory morbidity in Merseyside schoolchildren exposed to coal dust and air pollution," Archives of Disease in Childhood. 70: 305-312.

### 4.2.a Existing environmental pollution in adjacent communities

Low income neighborhoods and communities of color are often unjustly burdened by a disproportionate number of hazardous facilities that pollute the air, ground water and soil with toxic contaminants.[155] Residents living near such facilities can be exposed to more pollutants than people who live in more affluent neighborhoods located further from these sources of pollution.[156] In Alameda County, the density of industrial chemical and fuel release sites in very high poverty neighborhoods, such as West Oakland, is four times higher than in affluent neighborhoods. (See Figure 9 for geographic distribution of exposure to toxic air pollutants with cancer risk.)

In part as a result of policies and practices, such as de facto residential segregation, some neighborhoods have fewer resources and weaker infrastructure to support good health. Those neighborhoods often also have higher levels of exposures to multiple stressors that harm health.[157]

The California Environmental Protection Agency (CalEPA) has rated parts of the West Oakland area as some of the highest census tracts in the State burdened by pollution. For example, census tract 4017 in West Oakland is rated at the 78th percentile for overall pollution burden and the top percentile for clean-up sites compared to all other CA census tracts.***[158]*** According to the CalEPA, the community adjacent to the redevelopment area is severely burdened by diesel pollution and hazardous waste exposure.***[159]*** Rsidents in those communities suffer from very high rates of asthma.***[160]*** Additionally, areas of West Oakland

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[155] As noted by the World Health Organization: "[A]lthough all populations are affected by air pollution, the distribution and burden of consequent ill-health are in equitable. The poor and disempowered, including…those living near busy roads or industrial sites, are often exposed to high levels of ambient air pollution, levels that appear to be worsening in many cities." World Health Organization (2015). "Health and the environment: addressing the health impact of air pollution, Report by the Secretariat," Sixty-Eighth World Health Assembly. http://apps.who.int/gb/ebwha/pdf_files/WHA68/A68_18-en.pdf

[156] Morello-Frosch, R. et al. (2011). "Understanding the Cumulative Impacts Of Inequalities In Environmental Health: Implications For Policy," Health Affairs. http://content.healthaffairs.org/content/30/5/879. Cited in Sustainable Systems Research, LLC. "Technical Memorandum Air Quality, Climate Change, and Environmental Justice Issues from Oakland Trade and Global Logistics Center," submitted September 18, 2015.

[157] ACPHD 2015 "East and West Oakland Health Data: Existing Cumulative Health Impacts," September 3, 2015. Presentation and handout for West Oakland Residential Action Council Meeting.

[158] Paul B English, PhD, MPH, 14 September 2015 (1, pg7). English is a public health epidemiologist with over 25 years of experience and holds a doctorate degree in epidemiology from the University of California, Berkeley, School of Public Health.

[159] Cal EnviroScreen Results for Census Tract 6001401700, available at http://oehha.ca.gov/ej/ces2.html. Cited in Earthjustice 252 p5.

[160] Asthma is a chronic lung condition that causes swelling, excess mucus, and narrowing of the airways. An asthma attack occurs when the airways become so swollen and clogged that the person has trouble getting enough air to breathe. There is no cure for asthma, so effective management is essential. See Cal EnviroScreen Results for Census Tract 6001401700, available at http://oehha.ca.gov/ej/ces2.html. Cited in Earthjustice 252 p5. This is a subset of an area stretching from the San Francisco Bay eastward across the city of Oakland that is commonly noted to include the communities of greatest concern regarding asthma burden in Alameda County. Progress in pediatric asthma surveillance II: geospatial patterns of asthma in Alameda County, California. Roberts EM, English PB, Wong M, Wolff C, Valdez S, Van den Eeden SK, Ray GT. Prev Chronic Dis. 2006 Jul;3(3):A92. Epub 2006 Jun 15. http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1637800/. Cited in

have some of the highest rates of emergency room visits for asthma for children in Alameda County.[161] An economic analysis showed that that the highest costs (in Alameda County) to society for treating asthma also occurred in this region.[162] Allowing construction of a coal terminal to go forward will only add to these burdens and creates substantial risks to residents in the community.

BAAQMD has designated Western Alameda County, shaded in red in Figure 10, as an "impacted area," according to analysis of a pollution-vulnerability index. This impacted area includes not only the proposed project site but also the adjacent communities.[163]

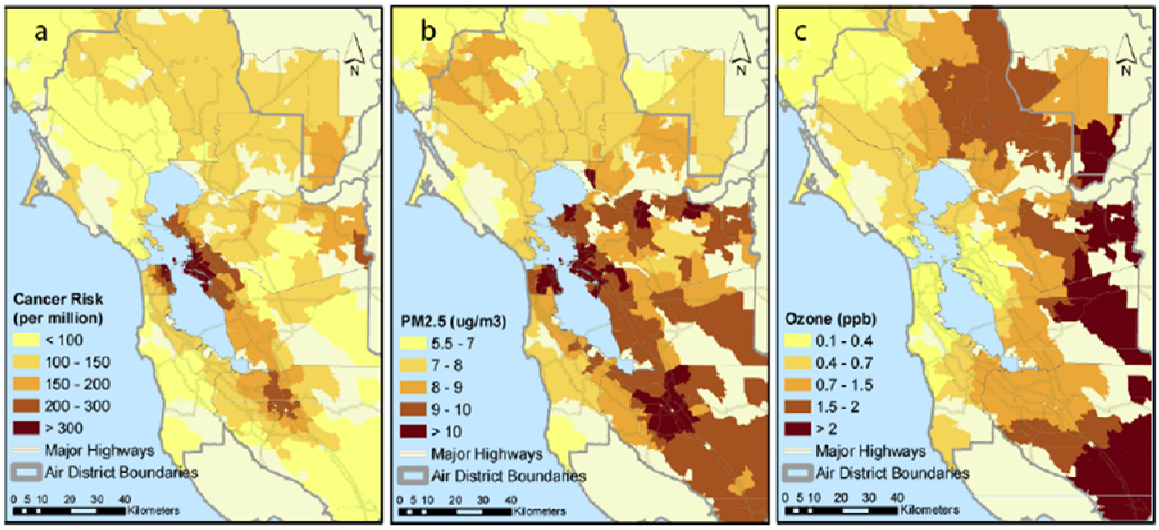


***Figure 8: Cancer risk and air pollution levels mapped to zip code areas: a) cancer risk from air toxics, b) annual $PM_{2.5}$, and c) mean 8-hour ozone above background levels.[164]***

English, Paul, PhD, MPH. Testimony submitted September 14, 2015. "RE: Public Health Impacts of Coal Exports at the Former Oakland Army Base."

[161] Roberts, E. et al. (2006). Progress in pediatric asthma surveillance II: geospatial patterns of asthma in Alameda County, California," Prev Chronic Dis. Cited in English, Paul, PhD, MPH. Testimony submitted September 14, 2015. "RE: Public Health Impacts of Coal Exports at the Former Oakland Army Base."

[162] One ZIP code in the neighborhood of West Oakland, 94607, has been noted to have a pediatric asthma hospitalization rate seven times the statewide average. Roberts, E. et al. (2006). Progress in pediatric asthma surveillance II: geospatial patterns of asthma in Alameda County, California," Prev Chronic Dis. http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1637800/. Cited in English, Paul, PhD, MPH. Testimony submitted September 14, 2015. "RE: Public Health Impacts of Coal Exports at the Former Oakland Army Base."

[163] BAAQMD (2014). "Identifying areas with cumulative impacts from air pollution in the San Francisco Bay Area: Version 2." Referenced in Davis, Muntu, PhD, MPH. Alameda County Public Health Department, Director and County Health Officer. Letter to Zoe Chafe, 9 February 2016. "Re: Clarification of 10/6/15 responses to the City Administrator's follow-up questions about the proposed Oakland Bulk and Oversized Terminal project and review of HDR Engineering Report."

[164] BAAQMD 2014 "Identifying areas with cumulative impacts from air pollution in the San Francisco Bay Area." Referenced in Davis, Muntu, PhD, MPH. Alameda County Public Health Department, Director and County Health Officer. Letter to Zoe Chafe, 9 February 2016. "Re: Clarification of 10/6/15 responses to the City Administrator's follow-up questions about the proposed Oakland Bulk and Oversized Terminal project and review of HDR Engineering Report."

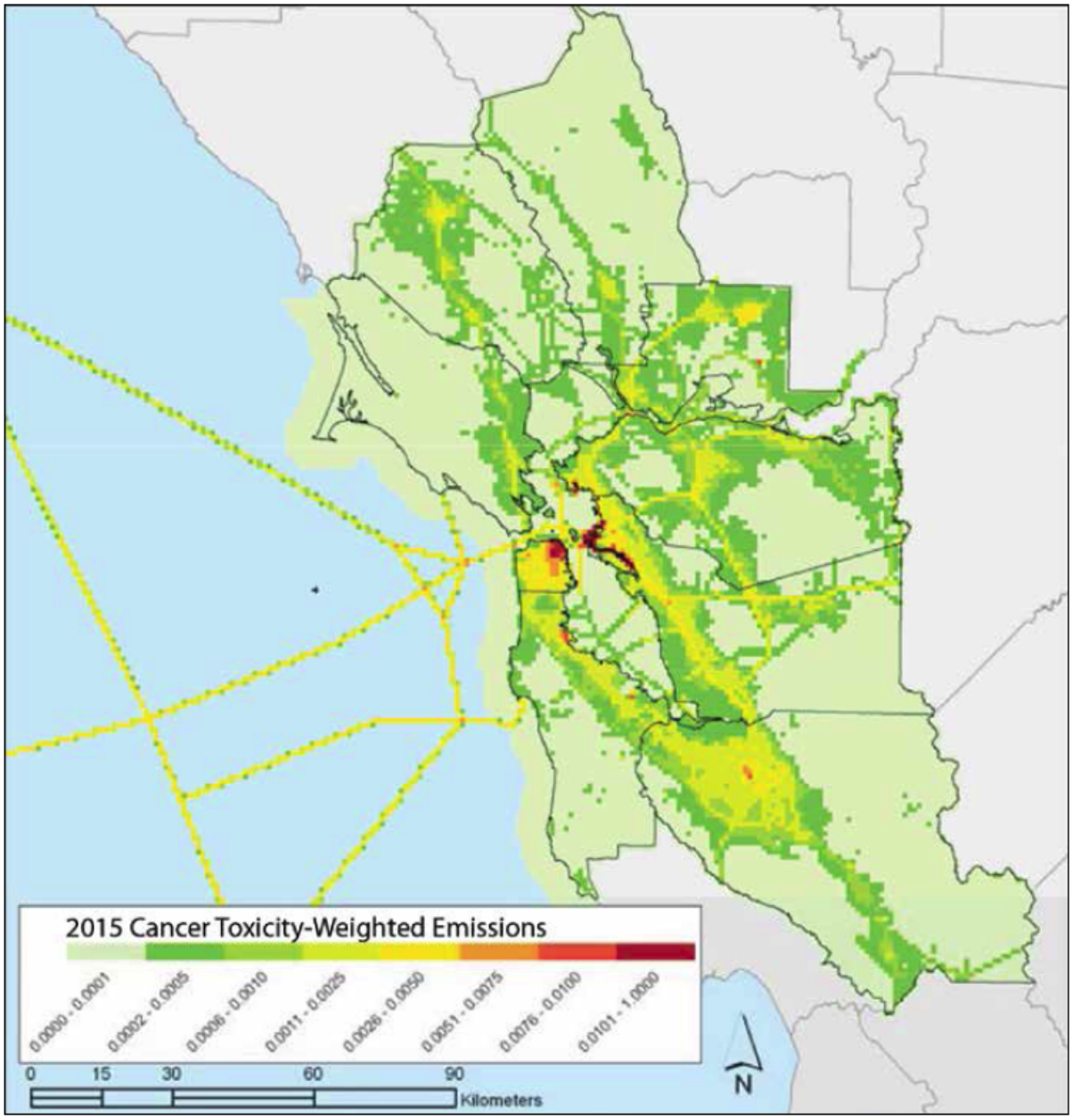


***Figure 9: Projected Bay Area cancer risk-weighted emissions for 2015. This map shows that the adjacent communities have the highest 2015 cancer toxicity-weighted emissions of anywhere in the Bay Area. The pollutants shown here are expressed in pounds per day, with each pollutant multiplied by its respective unit cancer risk factor.[165]***

[165] BAAQMD 2014: Improving air quality and health in Bay Area communities: Community air risk evaluation program retrospective and path forward (2004-2013). April 2014. Referenced in Muntu Davis Feb 10 2016 email.

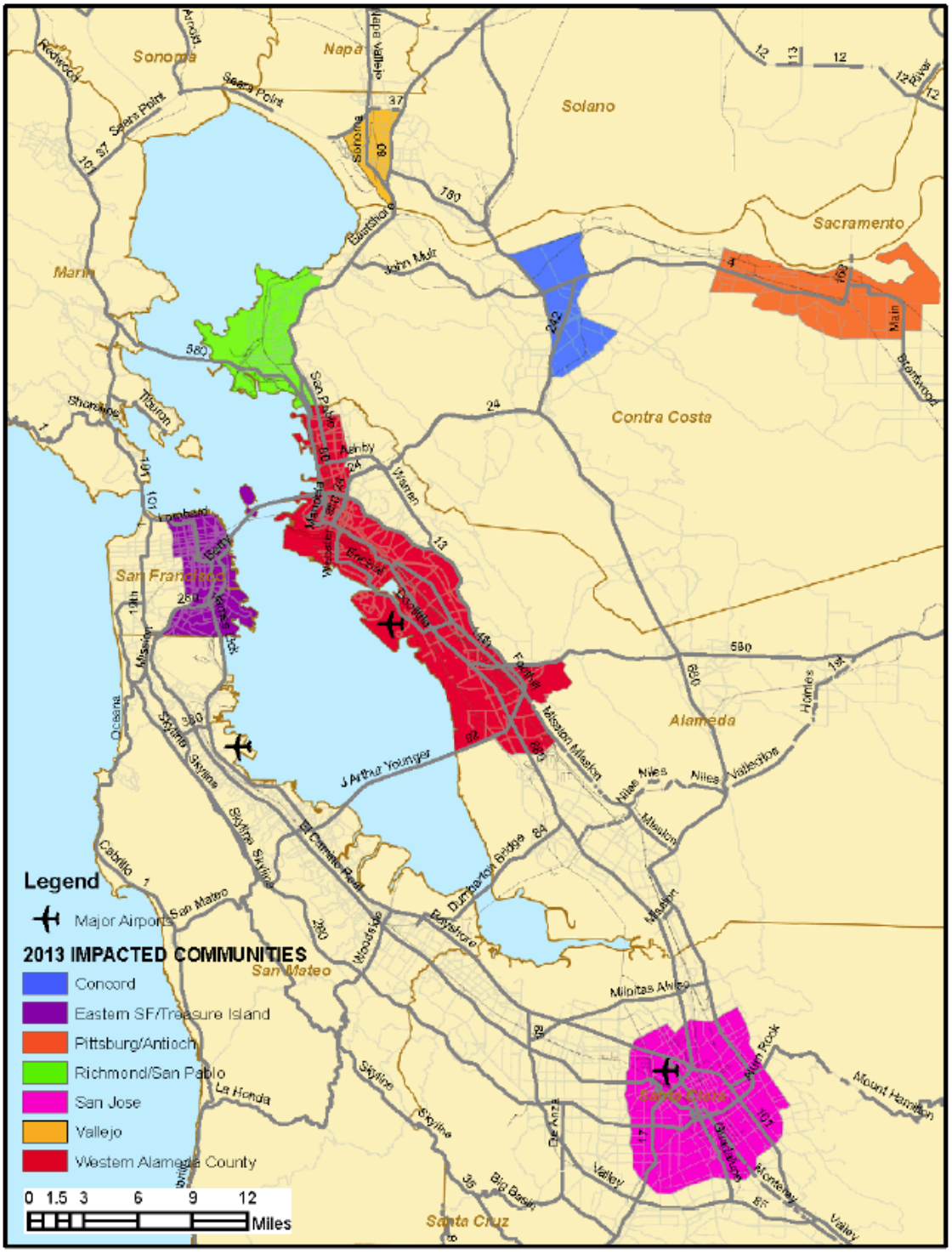


***Figure 10: Impacted communities, as defined by BAAQMD. The methodology for identifying the communities was discussed and reviewed by the Community Air Risk Evaluation (CARE) Task Force[166]***

[166] BAAQMD (2014). "Identifying areas with cumulative impacts from air pollution in the San Francisco Bay Area: Version 2." Referenced in Davis, Muntu, PhD, MPH. Alameda County Public Health Department, Director and County Health Officer. Letter to Zoe Chafe, 9 February 2016.

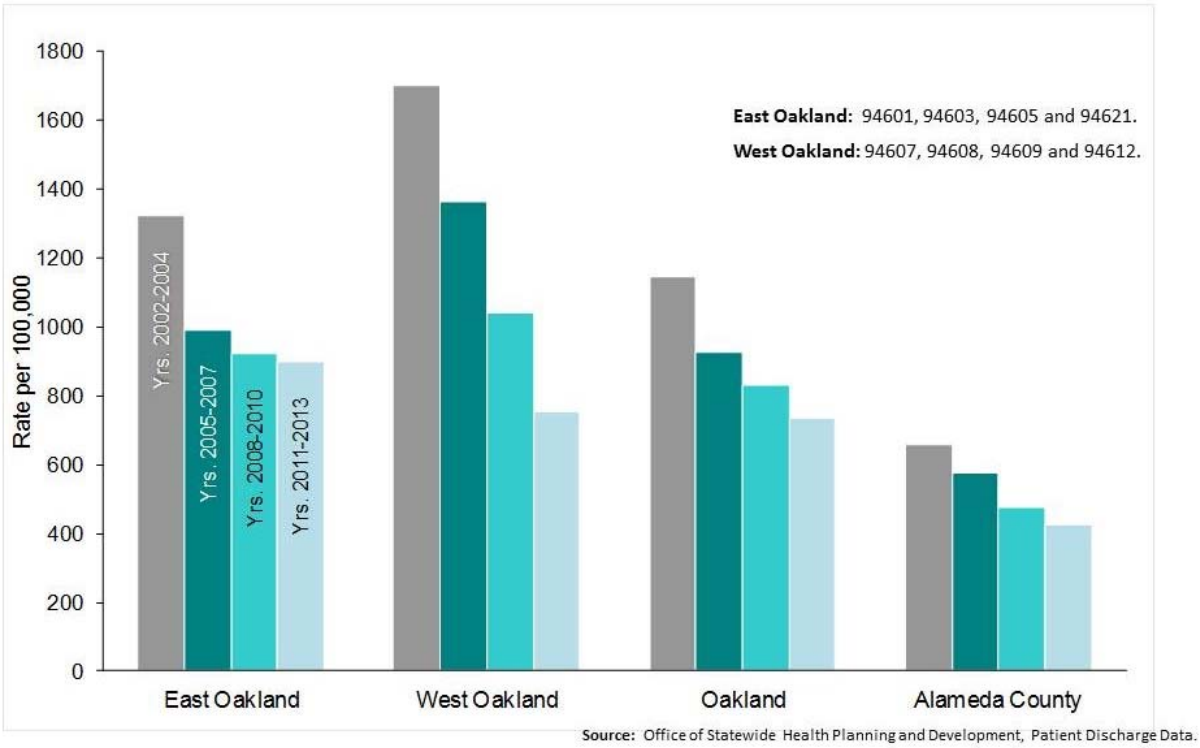


***Figure 11: Asthma Hospital Visits (rate per 100,000), among children <4 years of age, in East Oakland, West Oakland, all Oakland, and all Alameda County.***[167]

Despite the significant decrease in asthma hospital visits from 2002-2013 (See Figure 11: Asthma hospital visits), the most recent pediatric asthma hospital rates in West Oakland and East Oakland are greater than the worst average rate for the time period, for all of Alameda County. Children's health in West Oakland and East Oakland still severely adversely affected by asthma (with approximately 900 asthma-related hospital visits per year per 100,000 residents). If coal trains came through these neighborhoods, it is likely that that the rates would push upward.

[167] Sent by Muntu Davis, powerpoint file, 10 February 2016. Source: Office of Statewide Health Planning and Development, Patient Discharge Data.

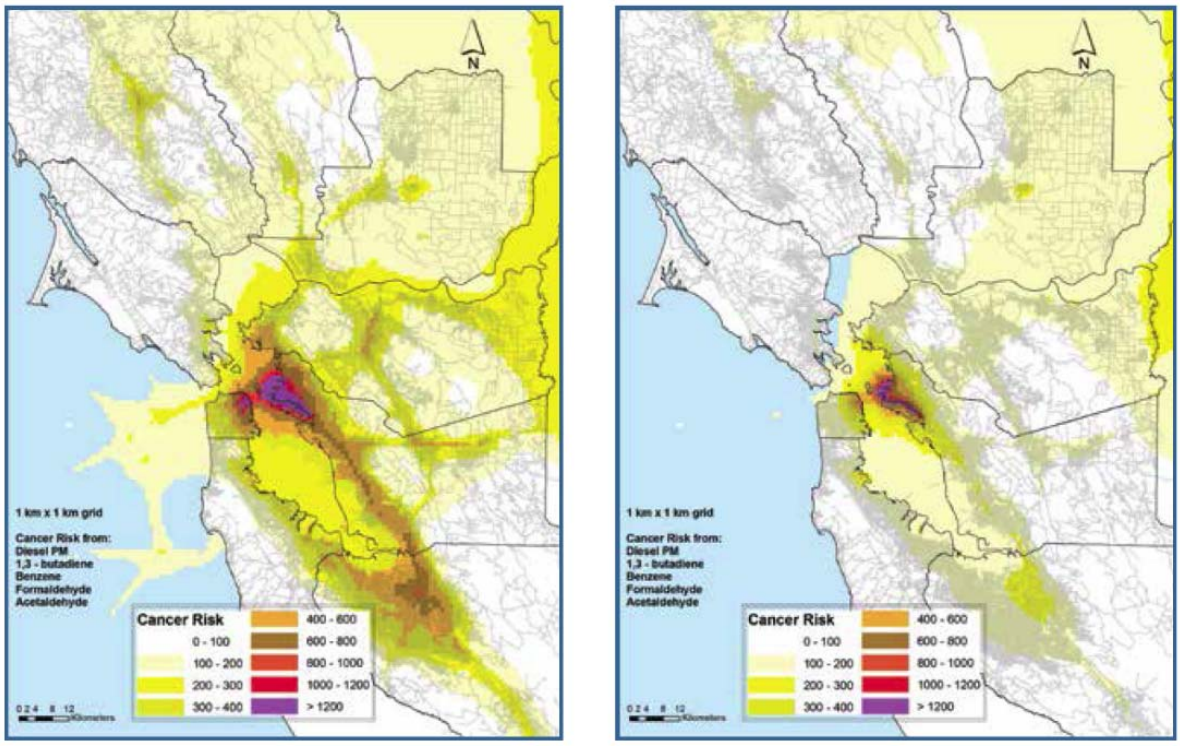


***Figure 12: Potential cancer risk from toxic air contaminants for the Bay Area in year 2005 (left) and 2015 (right).***[168] ***The figure shows risk levels assuming a 70-year exposure at a constant level of emissions. Units are potential excess cancers per million people exposed.***

Figure 12 shows that the cancer risk in many parts of the Bay Area, including adjacent communities, has lessened over the past decade as advances have been made in reducing the very high concentrations of $PM_{2.5}$ and other carcinogenic pollutants found in West Oakland and other parts of Oakland. Despite these improvements, cancer risk from toxic air contaminants remains higher in adjacent communities than anywhere else in the Bay Area.

Recent efforts to begin reversing these high levels of air pollution have been successful. The additional air pollution expected to be generated by the transport, transloading, and handling of coal at the proposed terminal will likely undo the health gains that have started to accrue after many years of hard work.

### 4.2.b Cumulative impacts of pollution in vulnerable communities

Vulnerable members of a community are often referred to as "sensitive receptors," defined by the Alameda County Public Health Department as "members of the population who are particularly sensitive to the effects of air pollutants, such as children, the elderly, and

[168] BAAQMD (2014). "Improving air quality and health in Bay Area communities: Community Air Risk Evaluation Program Retrospective & Path Forward (2004 - 2013)." Referenced in Davis, Muntu, PhD, MPH. Alameda County Public Health Department, Director and County Health Officer. Letter to Zoe Chafe, 9 February 2016. "Re: Clarification of 10/6/15 responses to the City Administrator's follow-up questions about the proposed Oakland Bulk and Oversized Terminal project and review of HDR Engineering Report."

people with respiratory illnesses."[169] Sensitive receptors can also, according to the BAAQMD, be facilities or land uses, such as schools, hospitals, and residential areas, where sensitive receptors live, work, and play.[170] Staff at BAAQMD have been instrumental in developing and defining sensitive receptors and cumulative impacts work.

For vulnerable populations, there is a higher risk of differential exposure, susceptibility and sensitivity, differential preparedness, and differential ability to recover as a result of cumulative environmental stress.[171] For example, there is concern that vulnerable members of the general population may not currently be adequately protected from exposure to respirable silica in outdoor air.[172]

[169] Davis, Muntu, PhD, MPH. Alameda County Public Health Department, Director and County Health Officer. Letter to Zoe Chafe, 9 February 2016. "Re: Clarification of 10/6/15 responses to the City Administrator's follow-up questions about the proposed Oakland Bulk and Oversized Terminal project and review of HDR Engineering Report."

[170] BAAQMD (2014). "Improving air quality and health in Bay Area communities: Community Air Risk Evaluation Program Retrospective & Path Forward (2004 - 2013)." Referenced in Davis, Muntu, PhD, MPH. Alameda County Public Health Department, Director and County Health Officer. Letter to Zoe Chafe, 9 February 2016. "Re: Clarification of 10/6/15 responses to the City Administrator's follow-up questions about the proposed Oakland Bulk and Oversized Terminal project and review of HDR Engineering Report."

[171] EPA (2003). "Framework for Cumulative Risk Assessment," May 2003, EPA/630/P-02/001F; "Concepts, Methods, and Data Sources for Cumulative Health Risk Assessment of Multiple Chemicals, Exposures and Effects: A Resource Document," August 2007, EPA/600/R-06/013F. Cited in Sustainable Systems Research, LLC. "Technical Memorandum Air Quality, Climate Change, and Environmental Justice Issues from Oakland Trade and Global Logistics Center," submitted September 18, 2015.

[172] "EPA concluded that 'for healthy individuals not compromised by other respiratory ailments and for ambient environments expected to contain less than 10% crystalline silica fraction in PM-10, the maintenance of 50 μg/m3 annual NAAQS for PM-10 should be adequate to protect against the silicotic effects from ambient crystalline silica exposures'. This standard was based upon average ambient concentrations of silica in United States and risk was calculated by converting ambient exposures to equivalent occupational exposures. No epidemiological studies were carried out in the community to derive the standards. Considering a maximum of 10% silica in dust, an interim standard of 5 μg/m3 for ambient silica can be assumed." Bhagia, L. (2012). "Non-occupational exposure to silica dust," Indian J Occup Environ Med. http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3683189/ Note that 5 ug/m3 exceeds the OEHHA chronic REL of 3 ug/m3.

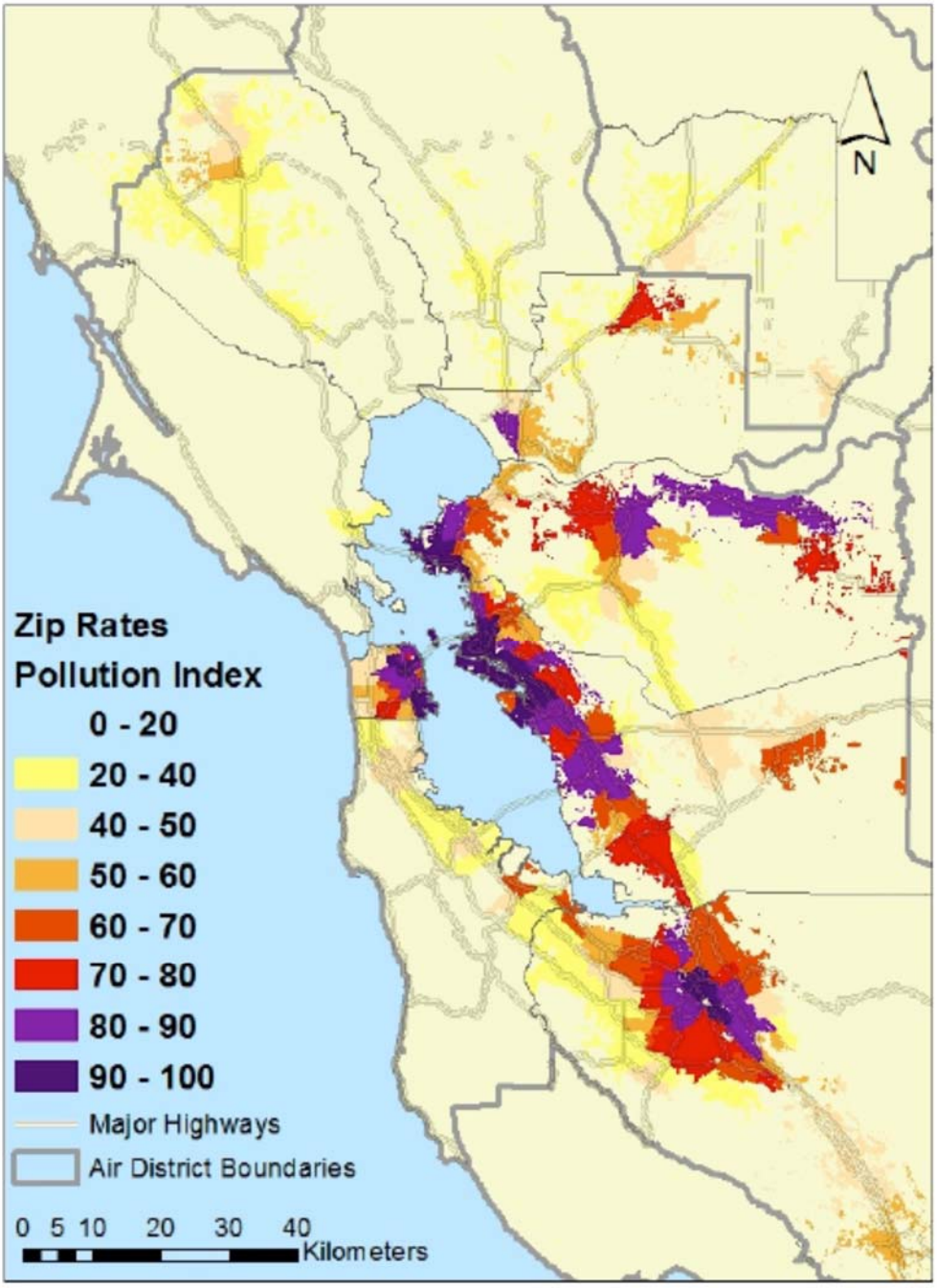


***Figure 13: The pollution-vulnerability index uses information on air pollution levels and health outcomes for each zip code area. Only populated portions of each zip code area are shown.[173] Note that communities adjacent to the proposed project site are among those with the very highest pollution-vulnerability index.***

[173] BAAQMD 2014 "Identifying areas with cumulative impacts from air pollution in the San Francisco Bay Area." (referenced in Muntu Davis Feb 10 2016)

Communities with a predominately low-income population and higher populations of racial or ethnic minorities, coupled with higher combined stressors such as noise, crime, and under-employment have elevated stress levels as well as reduced resiliency to the added health burden of air pollution[174] In combination with reduced access to health care these factors create higher risk of serious health consequences. (See Table 5: Examples of vulnerability factors.)

***Table 5: Examples of vulnerability factors, intermediate outcomes, and health outcomes in vulnerable communities. Based on information provided from BAAQMD 2014.[175]***

| *Vulnerability Factors* | *Intermediate outcomes* | *Health outcomes* |
|---|---|---|
| • Low-income communities<br>• Communities with higher populations of racial or ethnic minorities<br>• Communities with combined stressors (noise, crime, under-employment, etc.)<br>• Underlying chronic health conditions (e.g. hypertension, diabetes, cardiovascular disease,<br>• Malnutrition | • Less access to health care<br>• Elevated stress levels<br>• Reduced resiliency to air pollution and other environmental consequences | • Asthma<br>• Cancer<br>• Heart disease<br>• Stroke<br>• Low birthweight/ premature birth/small for gestational age |

The Alameda County Public Health Department refers the City to the following explanation of "cumulative impact": "[T]he impact on the environment, which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time."[176]

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[174] BAAQMD (2014). "Identifying areas with cumulative impacts from air pollution in the San Francisco Bay Area: Version 2." Davis, Muntu, PhD, MPH. Alameda County Public Health Department, Director and County Health Officer. Letter to Zoe Chafe, 9 February 2016. "Re: Clarification of 10/6/15 responses to the City Administrator's follow-up questions about the proposed Oakland Bulk and Oversized Terminal project and review of HDR Engineering Report."

[175] BAAQMD (2014). "Identifying areas with cumulative impacts from air pollution in the San Francisco Bay Area: Version 2." Davis, Muntu, PhD, MPH. Alameda County Public Health Department, Director and County Health Officer. Letter to Zoe Chafe, 9 February 2016. "Re: Clarification of 10/6/15 responses to the City Administrator's follow-up questions about the proposed Oakland Bulk and Oversized Terminal project and review of HDR Engineering Report."

[176] Davis, Muntu, PhD, MPH. Alameda County Public Health Department, Director and County Health Officer. Letter to Zoe Chafe, 9 February 2016. "Re: Clarification of 10/6/15 responses to the City Administrator's follow-up questions about the proposed Oakland Bulk and Oversized Terminal project and review of HDR Engineering Report." Referencing Department of Transportation Federal Highway Administration, "How and where are direct, secondary, indirect, and cumulative effects and impacts defined?" https://www.environment.fhwa.dot.gov/projdev/qaimpact.asp. The following is additional information on cumulative impacts: "Cumulative impact analysis may be thought of as a comparison of the past, present, and reasonable foreseeable health or condition of a specific resource as described in the following air quality example. The air quality of an area today is in a measurable condition, relative to the National Ambient Air Quality Standards (NAAQS). In the past, perhaps recently, the quality of the air may have been worse, the same, or better than it is today depending on a number of factors such as automobile use, industry, residential

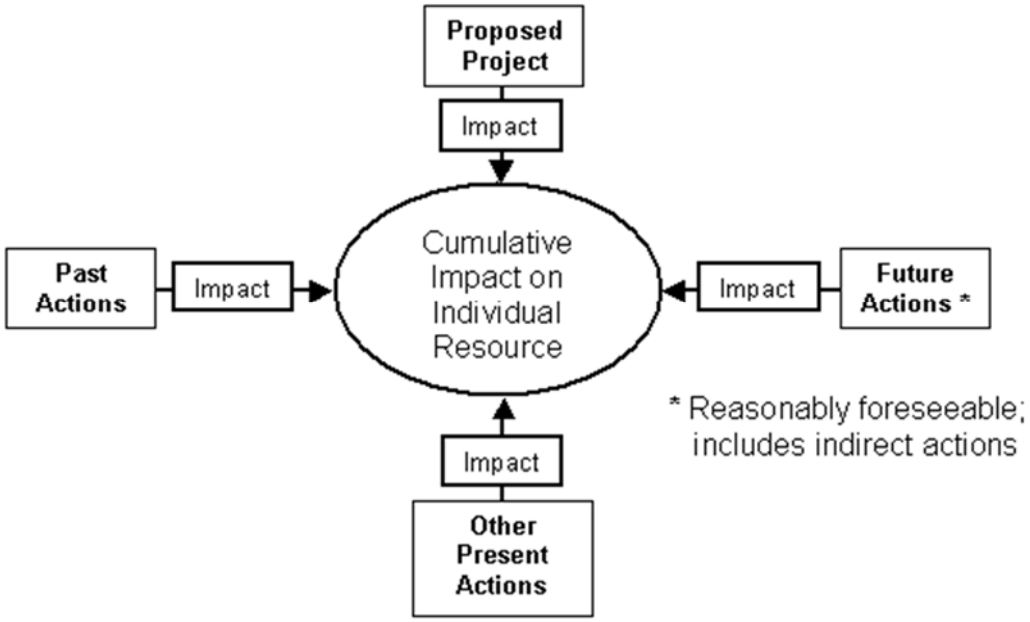


***Figure 14: Cumulative impact diagram.***[177]

A previous analysis of rail transport of coal in Oregon, including spatial analyses, found that the following should be considered vulnerable populations, among others:

development (fireplaces), and climatic conditions. Each of these individual factors may have influenced the positive or negative change in the air quality of the area. The condition of the air today is the result of these factors, which constitutes the past effects of the cumulative impact question. Add the impacts of the proposed project, other occurring activities, and the positive and negative reasonably foreseeable impacts from any source (some of which may be indirect) and the result equates to the air quality cumulative impact."

[177] Department of Transportation Federal Highway Administration, [no date]"How and where are direct, secondary, indirect, and cumulative effects and impacts defined?" https://www.environment.fhwa.dot.gov/projdev/qaimpact.asp.

*Table 6: Examples of vulnerable community or sensitive receptor attributes*

| Category of vulnerability/sensitive receptors | Details |
|---|---|
| **People living close to rail lines carrying coal**[178] | Coal dust may travel approximately 500 m to 2km (1/3 to 1 ¼ miles) from the train tracks, depending on weather conditions and train speed[179] |
| **People who are susceptible because of their age** | Human embryos, infants, children, and older adults[180] |
| **People with underlying acute or chronic health conditions** | Race, ethnicity, income, and/or level of exposure to other health risks[181] |
| **Pregnant women, especially with pregnancy complications** | Exposure to air pollution during susceptible fetal developmental windows leads to poor birth outcomes and risk of disease throughout life[182] |

[178] Multnomah County Health Department (2013). "The Human Health Effects of Rail Transport of Coal Through Multnomah County, Oregon: A Health Analysis and Recommendations for Further Action." Referenced in Davis, Muntu, PhD, MPH. Alameda County Public Health Department, Director and County Health Officer. Letter to Zoe Chafe, 9 February 2016. "Re: Clarification of 10/6/15 responses to the City Administrator's follow-up questions about the proposed Oakland Bulk and Oversized Terminal project and review of HDR Engineering Report."

[179] Trivedi R, Tewary BK, Chakraborty MK. (2009). "Dust dispersion modeling using fugitive dust model at an opencast coal project of Western Coalfields Limited, India. Journal of Scientific and Industrial Research. 68:71–78. In Multnomah County Health Department (2013). See also: Brabin, B. et al. (1994). "Respiratory morbidity in Merseyside schoolchildren exposed to coal dust and air pollution," Archives of Disease in Childhood. 70: 305-312. Cited in Multnomah County Health Department (2013). Referenced in Davis, Muntu, PhD, MPH. Alameda County Public Health Department, Director and County Health Officer. Letter to Zoe Chafe, 9 February 2016. "Re: Clarification of 10/6/15 responses to the City Administrator's follow-up questions about the proposed Oakland Bulk and Oversized Terminal project and review of HDR Engineering Report."

[180] Multnomah County Health Department (2013). "The Human Health Effects of Rail Transport of Coal Through Multnomah County, Oregon: A Health Analysis and Recommendations for Further Action." Referenced in Davis, Muntu, PhD, MPH. Alameda County Public Health Department, Director and County Health Officer. Letter to Zoe Chafe, 9 February 2016. "Re: Clarification of 10/6/15 responses to the City Administrator's follow-up questions about the proposed Oakland Bulk and Oversized Terminal project and review of HDR Engineering Report."

[181] Multnomah County Health Department (2013). "The Human Health Effects of Rail Transport of Coal Through Multnomah County, Oregon: A Health Analysis and Recommendations for Further Action." Referenced in Davis, Muntu, PhD, MPH. Alameda County Public Health Department, Director and County Health Officer. Letter to Zoe Chafe, 9 February 2016. "Re: Clarification of 10/6/15 responses to the City Administrator's follow-up questions about the proposed Oakland Bulk and Oversized Terminal project and review of HDR Engineering Report." The reference notes that "[a] wide body of research has found that race and ethnicity are associated with health status—independent of poverty status—because of stress, access to health care, other factors."

[182] Morello-Frosch, R. and Shenassa, E.D. (2006). "The environmental "riskscape" and social inequality: implications for explaining maternal and child health disparities," Environ Health Perspect, 114(8): p. 1150-3. Also: Nepomnyaschy, L. and N.E. Reichman (2006). "Low birthweight and asthma among young urban children," American Journal of Public Health, 96(9): p. 1604. Also: Barker, D.J.P., (2004). The developmental origins of adult disease. Journal of the American College of Nutrition, 23(6): p. 588S-595S. Langley-Evans, S.C. and S. McMullen (2010). "Developmental origins of adult disease," Med Princ Pract, 2010. 19(2): p. 87-98.

For people who fall into several of the categories listed in Table 6, risks may be multiplied.[183] This means that, young or old residents living in West Oakland, especially those with pre-existing chronic health conditions (such as asthma or diabetes), will likely experience levels of risk (associated with coal transport, handling, and export) far beyond those expected among the general population.[184] (See Table 2: Characteristics of Susceptible Groups.)

## 4.3 Effects of coal on visitors' and recreational users' health

Workers at the terminal and in adjacent areas, and the tens of thousands of residents living downwind of the terminal, are not the only people who will be exposed to coal dust from the proposed project: thousands of visitors to Oakland will be exposed to coal dust each year, including those walking, running, bicycling, rollerblading, skateboarding, or otherwise using the recreational areas designed to be immediately adjacent to the terminal's storage areas, such as Middle Harbor Park.[185]

Conceptual drawings submitted by TLS show that coal would be stored less than one hundred feet from a publicly accessible recreational path and dock immediately adjacent to the terminal. (See Figure 15.)

The East Bay Regional Parks District is actively concerned about the effects of coal dust on constituents who visit parks and public areas near the proposed terminal. Highlighting the risks to those using existing parks and future "Gateway Park,"[186] a regional park currently

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[183] Multnomah County Health Department (2013). "The Human Health Effects of Rail Transport of Coal Through Multnomah County, Oregon: A Health Analysis and Recommendations for Further Action." Referenced in Davis, Muntu, PhD, MPH. Alameda County Public Health Department, Director and County Health Officer. Letter to Zoe Chafe, 9 February 2016. "Re: Clarification of 10/6/15 responses to the City Administrator's follow-up questions about the proposed Oakland Bulk and Oversized Terminal project and review of HDR Engineering Report." The reference notes that "[a] wide body of research has found that race and ethnicity are associated with health status—independent of poverty status—because of stress, access to health care, other factors."

[184] As just one example, people with diabetes who have elevated urinary levels of cadmium may be more susceptible to renal failure. Nawrot, T.S. et al. (2010). "Cadmium exposure in the population: from health risks to strategies of prevention," Biometals.

[185] People engaged in physical activities (bicyclists, pedestrians, runners, etc.) are likely to have increased respiratory rates, meaning that they breathe in more air per unit time than those sitting in the same area. Given the underlying health concerns of the surrounding community, breathing air contaminated by excess particulate matter would increase the likelihood of adverse health events, such as asthma attacks, among those engaged in active transportation.

[186] "The creation of a new park is proposed at the east touchdown of the San Francisco-Oakland Bay Bridge in Oakland, California. The linear park includes approximately 170 acres, from the waterfront near the touchdown of the new East Span to Mandela Parkway in West Oakland. Its working title is Gateway Park. In addition to opening up access to the waterfront and providing vistas of the Bay and the new bridge, the park will connect the East Span bicycle/pedestrian path with the local bike path network and the Bay Trail. Trail users will be in remarkable proximity to historic movement systems such as the Key System train route, as well as contemporary movement systems including municipal utilities, port activities and interstate highways." http://baybridgegatewaypark.org.s3-website-us-west-1.amazonaws.com/plan/index.htm

being developed by approximately ten regional agencies and city government entities,, the Director of the East Bay Regional Park District Board, John Sutter, wrote in an October 2015 letter to Mayor Schaaf, "The risk to our park users is obvious. The grade from the park to the bridge (along the Alex Zuckermann Path) will be uphill thereby exerting bikers, joggers and walkers who will probably inhale coal dust in the process."[187]

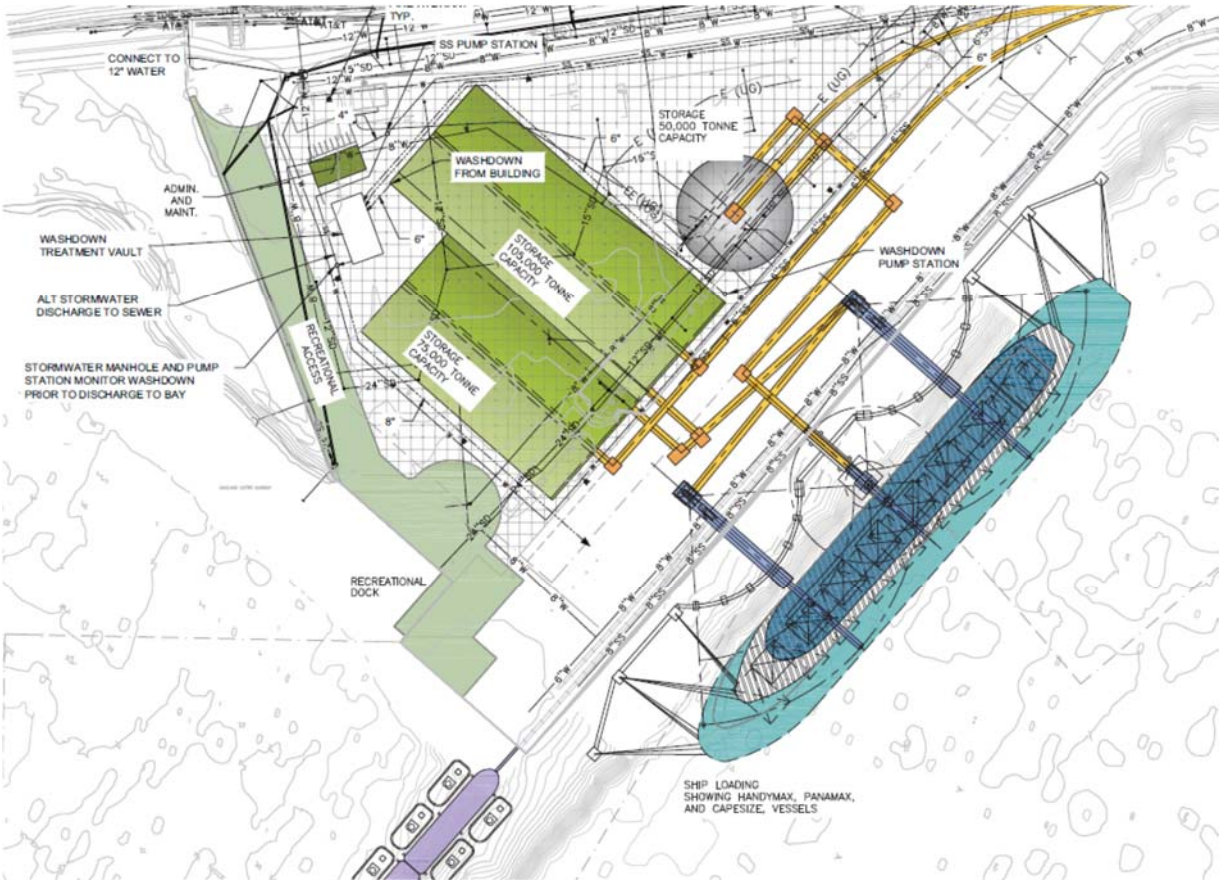


***Figure 15: "Conceptual civil site plan" drawing created by HDR for OBOT/TLS/CCIG in July 2015[188]***

The East Bay Regional Park District passed a resolution in November 2015 explaining that the new eastern span of the Oakland-San Francisco Bay Bridge features the very popular Alexander Zuckermann bicycle and pedestrian path along its southern edge which is now a destination of regional significance; and the pathway will connect to a segment of the Bay Trail on a spit of U.S. Army property located at the east end of the bridge, which is planned to be transferred to the East Bay Regional Park District for the development of Gateway Park; and the possibility of daily release of coal dust directly adjacent to a park is counter to the District's mission to provide healthful recreation and include an environmental ethic in the District's activity; and coal dust presents clear health risks to communities, as tests

[187] Sutter, John. East Bay Regional Park District. Letter to Mayor Schaaf, October 5 2015.
[188] HDR, "Conceptual Civil Site Plan," dated July 17, 2015. Part of TLS Basis of Design documents. Downloaded from http://tlsoakland.com/pdf/19.pdf.

show that coal dust contains substances known to impact human health including arsenic, lead, chromium, nickel, selenium and other toxic heavy metals.

The Alex Zuckermann Path is currently open to the public and is likely to be even more heavily used as it is linked to Treasure Island and other bike infrastructure in the future.

EBRPD is "an active, committed leader in the international Healthy Parks Healthy People movement"[189] which seeks to "reframe the role of parks and public lands as an emerging, powerful health prevention strategy" and "harnesses the power of parks and public lands in promoting the health of people and the environment."[190] Given the elevated levels of respiratory illness and other diseases among those living close to the proposed coal facility, expected air pollution in the park, as a result of this proposed project, is of particular concern.


***Figure 16: Gateway Park (Proposed Plan; Subject to Change)[191]***

There are plans underway to upgrade infrastructure for pedestrians and bicyclists within the former Oakland Army Base and in adjacent neighborhoods. The City is actively seeking funds to attract bicyclists and pedestrians to the area immediately adjacent to the proposed terminal, from the Alameda County Transportation Commission.[192] Among the goals stated by the City in its application is the following: "The project will also improve internal access and safety for pedestrians and cyclists within the former Oakland Army Base, specifically

[189] See East Bay Regional Park Resolution, **Appendix A4**.
[190] See National Park Service Healthy Parks Healthy People US: https://www.nps.gov/public_health/hp/hphp.htm.
[191] Gateway Park: proposed plan, subject to change. Downloaded from http://baybridgegatewaypark.org.s3-website-us-west-1.amazonaws.com/plan/index.htm on 31 May 2016.
[192] "Oakland Army Base transportation infrastructure improvements," City of Oakland application to the Alameda County Transportation Commission 2016 Countywide Transportation Plan, RTP 240024.

along Maritime Street and West Burma and Engineers Road and connections to the adjoining West Oakland neighborhood."[193]

# 5. COAL COMBUSTION, EXPLOSION AND OTHER EMERGENCIES

## 5.1 Self-heating, combustion, spontaneous combustion of coal

Bituminous coal, such as the coal proposed to be handled through this project, is highly volatile. "It is well known that high-volatile bituminous coal is easier to set alight than anthracite with its low volatile matter content. In a situation where coal is present as finely dispersed dust particles, this principle still holds true and more highly volatile coal dust particles are more prone to presenting a dust explosion hazard than coals with low volatiles."[194]

It is not uncommon for coal to self-heat and begin burning without a separate ignition source when it is stored in stockpiles, as proposed in this project, or during train transport, especially if it was previously stored in stockpiles before transport. Self-heating most often occurs in outdoor pile storage, but it is possible with other kinds of storage.[195] Coal has an ignition temperature of 260-265 degrees F.[196]

The (former) United States Bureau of Mines defined the Volatile Ratio as follows: Volatile Ratio = [Volatile Matter Content (%)] / [Volatile Matter Content (%) + Fixed Carbon Content (%)]. Coal with Volatile Ratios in excess of 12% (0.12) can both catch on fire and explode.[197]

[193] Other goals stated on the City's application include: "Improvements to the major thoroughfares on the Army Base will improve pedestrian and bicycle safety, including a bike lane on Maritime Street and other improvements on Burma Road and Engineers Road." (p7) "Bicycle and pedestrian access along Maritime Street will be greatly improved, including linkages to the Bay Trail and future Bay Bridge Path. The right of way safety on Maritime Street in particular is currently extremely poor and will be significantly improved for both pedestrians and bicyclists through the reconstruction and widening of Maritime Street between 7th Street and West Grand Avenue." (p8) See "Oakland Army Base transportation infrastructure improvements," City of Oakland application to the Alameda County Transportation Commission 2016 Countywide Transportation Plan, RTP 240024.
[194] de Corte, GJ and Mangena, SJ. (2004) Thermal Drying of Fine and Ultra-fine Coal, Report No. 2004 – 0255.
[195] https://www.osha.gov/Publications/OSHA_3644.pdf
[196] Sprague, "Bituminous Coal: Material Safety Data Sheet." TLS Basis of Design Section 8 p7.
[197] See for example: Stephan, C. [no date]. "Coal dust explosion hazards." Mine Safety and Health Administration.

***Table 7: Volatile ratio in coal from Bowie Resources mines in Utah[198]***

| Bowie Resources mine name | Volatile matter content (%) | Fixed carbon content (%) | Volatile ratio (%) | Highly volatile? | Prone to coal dust explosion? |
|---|---|---|---|---|---|
| **Dugout Canyon** | 34.80 | 46.70 | 42.69 | **Yes** | **Yes** |
| **Skyline** | 39.20 | 40.80 | 49.00 | **Yes** | **Yes** |
| **Sufco** | 34.00 | 44.50 | 43.31 | **Yes** | **Yes** |

The combustion potential of coal and coal dust is high when (1) the volatile matter content of the coal is high, (2) coal dust composed of very small particles is present, and even more so if (3) methane gas is present, as is foreseen and expected by the project sponsors.[199] Utah coals are considered highly volatile, which means that they give off gases such as methane. When the gases collect in an enclosed area, such as in a covered rail car or an enclosed storage space, concentrations may become high enough to cause threat of a major fire or explosion.

The more coal there is, the more fuel there will be for a fire. If the coal, and especially fine coal dust, is exposed to high heat or an ignition spark (which could be a simple as an electrical or static spark), fire or explosion will result. Coal dust that has formed as a layer on a surface may smolder at first, and this smoldering can cause small explosions that re-suspend coal dust.

Suspended coal dust (dust that is present in the air) has the potential to cause very large, damaging, and potentially fatal explosions. This situation also can occur when large amounts of very fine dust are generated in an enclosed space. These aspects are combined in a metric called the "Minimum Explosive Concentration" (MEC). "The MEC depends on a number of factors, such as the volatile matter content of the coal, the particle size distribution of the coal and also on whether or not a potentially combustible gas such as methane is present. Typical MEC values for medium-volatile bituminous coal are of the order of 40 to 50 g per cubic metre of air."[200]

Spontaneous combustion also is possible in piles of coal dust.[201] Dust explosions and/or fire can occur when coal dust concentrations are high enough, there is an ignition source,

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[198] Data from Bowie Resource Partners LLC websites: http://bowieresources.com/about-us/

[199] "The toxic and explosive gases that may be generated during storage are carbon monoxide from COMMODITY, due to spontaneous combustion, and methane." TLS Preliminary Operating Plan, 309 p167.

[200] de Corte, GJ and Mangena, SJ. (2004) Thermal Drying of Fine and Ultra-fine Coal, Report No. 2004 – 0255.

[201] Sprague, "Bituminous Coal: Material Safety Data Sheet." TLS Basis of Design Section 8 p8. Also: "Small particles of coal require less energy than larger particles to trigger an ignition. The literature suggests that coal particles larger than about 800 microns cannot be ignited easily enough to present a coal dust explosion hazard. Particles smaller than this, however, do contribute to an explosion hazard and the finer the particles, the greater the propensity towards easy ignition. The volatile matter content of the coal also plays a role in this regard and small particles of high-volatile coal require only a relatively small amount of energy for ignition to start. The ultra-fine coal size fraction is typically below 150 microns in size and hence most definitely falls into the size consist of coal that may be considered prone to dust explosions. Spiral-sized coal also contains a relatively large proportion of material that is finer than 800 microns."

and oxygen is present.[202] Coal dust can ignite as a suspended dust bed in air, or as a precipitated dust layer, with the igniting energy that can be provided by a spark or even human static discharge.[203] BNSF has acknowledged that coal dust causes fires in places where it accumulates.[204]

The health and safety impact report commissioned by TLS, coal infrastructure project sponsors, recognizes that significant combustion risk from coal dust is present: "…the emissions should be controlled properly to eliminate that potential, as well as to avoid posing a significant explosion/fire hazard for workers or port infrastructure or a nuisance to the public."[205]

TLS repeatedly stated that it is their intention to create a fully enclosed storage facility for coal at the terminal.[206] The storage facility is alternately described as having a fabric covering over metal supports, or being a dome-like structure. However, there is evidence that the specific type of Utah coal destined for export from this terminal has a history of spontaneous combustion when stored in enclosed areas and may have to be stored outside.[207]

The risk of fire exists anywhere significant amounts of coal are in use or storage.[208] There is a non-negligible risk of explosion and/or fire in coal storage facilities to be built at the terminal. As such both workers at the terminal and people living in or visiting adjacent communities will be at risk of suffering injuries and possible death from coal explosions and exposure to post-explosion coal combustion emissions, which are considered toxic and are listed on the Prop 65 list of chemicals known to cause cancer or reproductive toxicity in humans.[209] Long-lasting fires are possible in enclosed, even underground coal storage

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[202] English, Paul, PhD, MPH. Testimony submitted September 14, 2015. "RE: Public Health Impacts of Coal Exports at the Former Oakland Army Base."
[203] Sipila, J. (2013). "Emerging risk issues in underground storage of bituminous coal." Aalto University 166/2013.
[204] BNSF (2011). "BNSF- Customers - What I Can Ship - Coal - Coal Dust FAQs, Mar 2, 2011." Screenshot sent by Dr. Muntu Davis, MD, MPH to Zoe Chafe, 10 February 2016.
[205] HDR report "Oakland Bulk and Oversized Terminal Air Quality and Human Health and Safety Assessment of Potential Coal Dust Emissions" (Sept 2015) p6
[206] Letter from Jerry Bridges, President and CEO of TLS, to Honorable Mayor (of Oakland) Libby Schaaf, July 15, 2015. 304 p1-5.
[207] Utah coal from the SUFCO mine was used in a Department of Energy/National Energy Technology Laboratory demonstration project in Nevada in the early 2000s. The coal was stored in a 16,400 ton capacity dome, until it caught on fire and had to be moved outside. "Some problems were encountered with spontaneous combustion of coal in the dome…The solution was to store the coal outside." Department of Energy (2002). "Piñon Pine IGCC Power Project: A DOE Assessment, DOE/NETL-2003/1183." https://www.netl.doe.gov/File%20Library/Research/Coal/major%20demonstrations/cctdp/Round4/PinonPineR2.pdf. Cited in No Coal in Oakland testimony, September 18, 2015.
[208] Department of Energy (1993). "The Fire Below: Spontaneous Combustion in Coal," Environmental Safety & Health Bulletin, Issue EH-93-4, May 1993.
[209] California Environmental Protection Agency (CalEPA) Office of Environmental Health Hazard Assessment (OEHHA) (2013). "Chemical Listed Effective August 7, 2013 as Known to the State of California to Cause

facilities in industrialized settings. In 2008 in Finland a smoldering fire lasted 4 months in an underground storage facility.[210]

Careful design of coal processing, handling, and storage facilities is not enough. Even if safety protocols are followed, coal and coal dust are very combustible and can pose substantial risk and substantial damage from fires and explosions, but also health threats from coal combustion emissions.[211] Several scientific studies have found that many (perhaps even the majority of) explosions in coal processing and storage facilities occur as a result of "human error" and "technical failure/malfunction of component or equipment" in areas such as silos and hoppers.[212]

When coal is burned, it creates fine particulate matter and polycyclic aromatic hydrocarbons (PAHs) and often results in the release of mercury and lead into the environment. "Emissions from combustion of coal" was added to the California EPA Office of Environmental Health Hazard Assessment (OEHHA) list of chemicals known to the State to cause cancer for purposes of Proposition 65.[213] Other toxic air pollutants emitted when coal burns include metals such as chromium and arsenic, which can cause a range of dangerous health problems in adults, from cancer to respiratory illnesses."[214]

If coal were to burn at the terminal or while being transported, unexpectedly, it would not have any of the pollution reduction technologies that must be used in coal-fired powerplants or other coal burning facilities. The emissions would be uncontrollable for the duration of the fire, emitting products of incomplete combustion.

During the relatively short time that the Port of Los Angeles had a coal and petcoke terminal, there were several serious incidents that threatened health and safety of those working at the terminal as well as communities in the area. A piece of equipment used to transfer coal and petroleum coke (shiploader) caught fire twice in six months (in September 2000 and February 2001). Part of the equipment malfunctioned, causing temperatures high enough to ignite coal and petcoke particles that had entered the

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Cancer: Emissions from Combustion of Coal." http://oehha.ca.gov/proposition-65/crnr/chemical-listed-effective-august-7-2013-known-state-california-cause-cancer.

[210] Sipila (2013). "Emerging Risk Issues in Underground Storage of Bituminous Coal," Aalto University. And: Sipila (2013). "Emerging risk of autoignition and fire in underground coal storage" Journal of Risk Research http://www.tandfonline.com/doi/full/10.1080/13669877.2012.729525.

[211] Sipila (2013). "Emerging Risk Issues in Underground Storage of Bituminous Coal," Aalto University.

[212] Fabiano (2014). "Coal dust emissions: From environmental control to risk minimization by underground transport. An applicative case-study," Process Safety and Environmental Protection.

[213] California Environmental Protection Agency (CalEPA) Office of Environmental Health Hazard Assessment (OEHHA) (2013). "Chemical Listed Effective August 7, 2013 as Known to the State of California to Cause Cancer: Emissions from Combustion of Coal." http://oehha.ca.gov/proposition-65/crnr/chemical-listed-effective-august-7-2013-known-state-california-cause-cancer

[214] Environmental Protection Agency (EPA) (2016). "Final consideration of cost in the appropriate and necessary finding for the mercury and air toxics standards for power plants." https://www.epa.gov/sites/production/files/2016-05/documents/20160414_mats_ff_fr_fs.pdf

bearings. This caused a chain reaction that caused the fire to spread to other parts of the equipment.[215]

Federal agencies are calling for stricter standards on combustible dust, indicating that current standards do not adequately protect workers in the US and that failure to create a comprehensive combustible dust standard could cost lives.[216] The US Chemical Safety Board, an independent federal agency that investigates chemical accidents to protect workers, the public, and the environment, calls the need for a "general industry standard for combustible dust" the "Most Wanted Safety Improvement."[217]

## 5.2 Explosion

Coal is explosive when in dust or powder form. It does not take much coal dust to cause an explosion, and in fact, the dust may be hardly visible but still sufficient to cause an explosion. "If footprints are visible in coal dust on the floor or the coal dust is seen on the walls of a plant, then there is enough coal dust at that particular location to propagate an explosion."[218]

Coal dust explosions create incredibly damaging forces. "The speed and duration of the moving air in an explosion is capable of dispersing additional coal dust from the floor, walls, overhead beams, and equipment," which can then feed a secondary fire and/or explosion. In most coal dust explosions, the air speed has been found to exceed 200 miles per hour.[219]

Recent coal dust explosion tragedies include:

- Oak Creek, Wisconsin, 2009: Six workers were injured when coal dust, collected off of arriving coal trains, exploded in a silo that was used to catch the dust.[220]
- South Dakota, 2011: Two firefighters were killed when there was a fire in a coal storage area. Firefighters brought it under control at first, but it flared up again. Two firefighters then climbed onto the roof and directed a water hose stream through a hatch. An explosion killed both of them. The explosion may have involved combustible dust, flammable gases, steam, or a combination of these factors.[221]

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[215] Exponent (no date). "Coke and Coal Shiploader Fire: Los Angeles Port." http://www.exponent.com/experience/coke-and-coal-shiploader-fire-los-angeles-port/

[216] Moure-Eraso, R. (2014). "The Danger of Combustible Dust," New York Times, Aug 22, 2014. Quote from editorial: "Dust explosions are readily preventable with engineering controls, ventilation, training and other measures. The voluntary, industry-supported national fire codes have urged these measures for decades, and they now must be codified and enforced through federal regulations." "Inaction could cost lives."

[217] Chemical Safety Board, [no date]. "Most Wanted Safety Improvement: OSHA Combustible Dust Standard," http://www.csb.gov/recommendations/mostwanted/combustibledust/ viewed 12 May 2016.

[218] Stephan, C. [no date]. "Coal dust explosion hazards." Mine Safety and Health Administration.

[219] Stephan, C. [no date]. "Coal dust explosion hazards." Mine Safety and Health Administration.

[220] Kertscher (2009). "We Energies coal dust silo explosion injures 6 workers," http://www.jsonline.com/news/milwaukee/38864087.html

[221] Occupational Safety and Health Administration (OSHA) (2013). "Firefighting Precautions at Facilities with Combustible Dust," https://www.osha.gov/Publications/OSHA_3644.pdf

- Green Bay, Wisconsin, 1991: Dust in a facility was ignited by a minor explosion, or puff, which triggered a massive explosion, blowing out the outer building walls and roof. There had also been previous fires at the facility, which uses bituminous coal..[222]
- Dearborn, Michigan, 1999: Six people were killed and dozens more sustained serious injuries when an initial explosion caused disturbed coal dust to also explode inside a facility.[223] This explosion caused $1 billion in property losses.[224]

There are other explosion risks associated with coal, beyond coal dust accumulation. Coal stockpiles emit methane, and handling and storage of coal is expected to generate carbon monoxide due to spontaneous combustion.[225]

Project sponsors submitted documents stating that the commodity will be stored outdoor (contradicting much of the information provided, which states that commodity would be stored in fully enclosed facilities) and appears to imply that natural dispersion will be relied upon to dissipate any gases released.[226]

## 5.3 Derailment

Coal dust is known to cause train derailments by weakening and destabilizing train tracks.[227] Coal dust contributes to rail problems because it accumulates in ballast, the material placed under railroad tracks to provide drainage and structural support to the tracks, reducing the effectiveness of the ballast.[228] (See Figure 17.) Accumulation of coal

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[222] Hossfeld and Hatt, (2005). "PRB Coal degradation causes and cures," http://www.coalcombustion.com/pdf/PresentationsPDFs/PRBCoalDegradation.pdf

[223] Occupational Safety and Health Administration [no date]. "Potential for Natural Gas and Coal Dust Explosions in Electrical Power Generating Facilities," Technical Information Bulletin. https://www.osha.gov/dts/tib/tib_data/tib20001106a.pdf. See also: Chemical and Hazard Investigation Board (2006). "Investigation Report: Combustible Dust Hazard Study." REPORT NO. 2006-H-1. http://www.csb.gov/assets/1/19/dust_final_report_website_11-17-06.pdf.

[224] Bresland, J. (2010). Written Testimony Before the U.S. House of Representatives Committee on Education and Labor Subcommittee on Workforce Protections Hearing on "Examining the Tragic Explosion at the Kleen Energy Power Plant in Middletown, Connecticut" June 28, 2010. U.S. Chemical Safety Board http://www.csb.gov/assets/1/19/FINAL_Bresland_Written_Testimony_Kleen_Energy.pdf

[225] 309, "TLS Preliminary Operating Plan," for example, p167: "The toxic and explosive gases that may be generated during storage are carbon monoxide from COMMODITY, due to spontaneous combustion, and methane."

[226] "COMMODITY storage is outdoors and any gases released outdoors will be dispersed." TLS Preliminary Operating Plan, p167.

[227] Coal dust is considered a "persistent ballast foulant" by the Surface Transportation Board. Fouling refers to the condition of railroad ballast when voids in this unbound aggregate layer are filled with relatively finer materials or fouling agents, such as coal dust. Coal dust, in particular, is a concerning ballast foulant because it traps moisture (See Huang, H. et al. (2009). "Laboratory Characterization of Fouled Railroad Ballast Behavior," Transportation Research Record: Journal of the Transportation Research Board, No. 2117, Transportation Research Board of the National Academies http://trrjournalonline.trb.org/doi/pdf/10.3141/2117-12)

[228] "The blockage of the drainage pathways by the fouling agents slows and reduces the ballast's drainage capabilities. When this happens, water can remain on the ballast particle surfaces and can even accumulate

dust leads to train derailments, of both coal trains and other trains using the affected tracks.

Scientists testing materials that accumulate around railroad tracks found that coal dust was "by far the worst fouling agent for its impact on track substructure and roadbed, and it caused the most drastic decreases in shear strength, especially at high fouling levels."[229] Surface Transportation Board, the federal government entity, highlighted that coal dust is not necessarily visible prior to a track failure.[230] Buildup of coal dust has in the past resulted in track damage so severe that railroad segments have had to be rebuilt, disrupting the delivery of goods.[231]

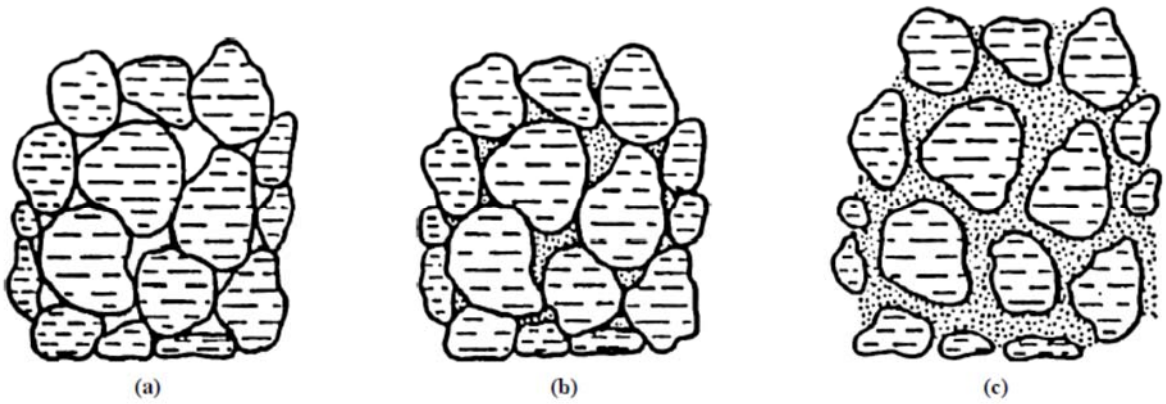


***Figure 17: Representation of how coal dust can destabilize train tracks by filling in spaces between the ballast. In this figure, (a) represents "clean ballast"; (b) represents 'partially fouled ballast"; and (c) represents "heavily fouled ballast".[232]***

within the ballast section. These conditions weaken the ballast's load carrying capacity, the water essentially acting as a lubricant between the ballast particles. Additionally, the fouling agents themselves can act as a lubricant on the ballast particle surfaces. Where large portions of ballast are fouled, the track then can become susceptible to movement when a train travels over the tracks."

[229] Huang, H. et al. (2009). "Laboratory Characterization of Fouled Railroad Ballast Behavior," Transportation Research Record: Journal of the Transportation Research Board. http://trrjournalonline.trb.org/doi/pdf/10.3141/2117-12.

[230] Surface Transportation Board (2011). Surface Transportation Board Decision Docket No. FD 35305. ARKANSAS ELECTRIC COOPERATIVE CORPORATION—PETITION FOR DECLARATORY ORDER March 3, 2011. http://www.stb.dot.gov/decisions/readingroom.nsf/WebDecisionID/40436. Note also: "[C]oal dust's high volume relative to its weight and high moisture-absorbing capacity make it a unique problem."

[231] Department of Energy, Infrastructure Security and Energy Restoration, Office of Electricity Delivery and Energy Reliability (2007). "Deliveries of Coal from the Powder River Basin: Events and Trends 2005-2007," October 2007, https://www.oe.netl.doe.gov/docs/Final-Coal-Study_101507.pdf. "During the first two phases of the track rebuilding effort, coal shipments were reduced to about 85 percent of normal capacity. Since UP does not have alternate tracks to move PRB coal to markets, the railroad was forced to declare Force Majeure on contracted deliveries of PRB coal."

[232] Huang, H. et al. (2009). "Laboratory Characterization of Fouled Railroad Ballast Behavior," Transportation Research Record: Journal of the Transportation Research Board, No. 2117, Transportation Research Board of the National Academieshttp://trrjournalonline.trb.org/doi/pdf/10.3141/2117-12

The overall former Army Base redevelopment project includes the placement of additional and upgraded rail lines to facilitate the import and export of goods from the Port of Oakland. Given the impacts of coal dust on rail tracks, it would not be in the best interest of the City or the Port to allow any on-going buildup of coal dust on said tracks.[233]

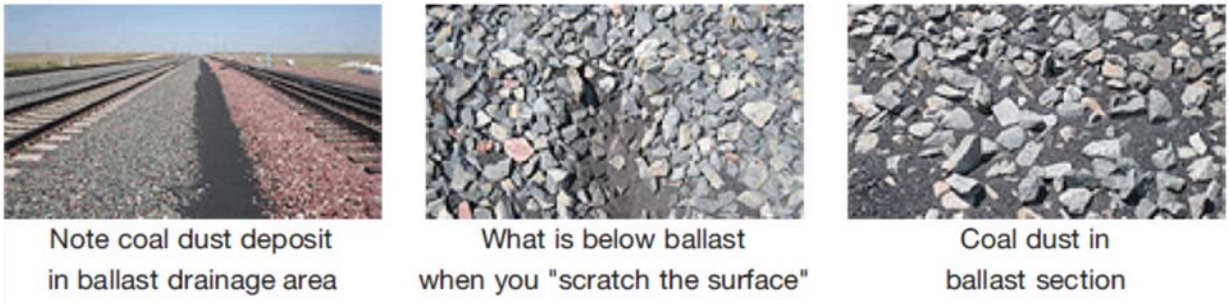


***Figure 18: Pictures posted on BNSF website showing effect of coal dust on train ballast. Note that the coal dust is not always visible at the surface of the ballast, as it accumulates between the aggregate (rocks).***

The possibility of a coal train derailment in or near Oakland that would potentially affect residents, workers, visitors, and anyone who happens to be in the vicinity of the railyard or terminal when the derailment were to happen is not negligible.234 Despite efforts by rail companies to prevent derailments, coal train derailments still happen with frequency in the United States. There were at least 6 coal train derailments in 2015, and 9 derailments in 2014, that were significant enough to warrant mass media coverage.[235]

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[233] See for example Attachment 7 to the LDDA, which describes potential rail improvements.

[234] "The history of the shipment of hazardous products shows that accidents are likely to occur over an extended period of time. If/when an accident occurs in this congested area, it could have severe consequences." Karp, Larry, PhD. Professor of Agricultural and Resource Economics, UC Berkeley, Written Testimony submitted October 2, 2015. "Proposal to ship coal through Oakland."

[235] See, for example: WCJB TV-20 (2014). "Train Derailment Spills 500 Tons Of Coal In Dunnellon," WCJB TV-20. http://www.wcjb.com/local-news/2014/01/train-derailment-spills-500-tons-coal-dunnellon; Associated Press (2014). "BNSF train derails near Worden; 13 cars off tracks," Associated Press. http://www.greatfallstribune.com/story/news/local/2014/07/11/bnsf-train-derails-near-worden-cars-tracks/12543891/
World-Herald News Service (2014). "Coal train derails, spills contents in York County," World-Herald News Service. http://www.omaha.com/news/nebraska/coal-train-derails-spills-contents-in-york-county/article_e4ec09ae-5842-11e4-a31e-001a4bcf6878.html; Eyewitness News (2014). "Train Derailment Causes Environmental Concerns," Eyewitness News. http://www.pahomepage.com/news/train-derailment-causes-environmental-concerns; US92/KTIV (2014). "Train derailment in Nebraska leaves 22 cars off tracks," US92/KTIV. http://www.ktiv.com/story/27710928/2014/12/26/train-derailment-in-nebraska-leaves-22-cars-off-tracks; KETV (2014). "Cass County Sheriff: BNSF train derails in Louisville," KETV. http://www.ketv.com/news/train-derails-in-louisville/31331178; Associated Press (2015). "BNSF train derails in Weld County," Associated Press. http://www.coloradoan.com/story/news/2015/03/22/bnsf-train-derails-in-weld-county/25187775/
Jordan, Greg (2014). "Railroad crossing reopened after coal car derailment," Bluefield Daily Telegraph. http://www.wsaz.com/home/headlines/BREAKING-NEWS--Train-Derailment-Reported-in-Kanawha-173284391.html; Knapp, Aaron (2015). "Clearing debris from train derailment expected to take until late February," Journal Times. http://journaltimes.com/news/local/clearing-debris-from-train-derailment-expected-to-take-untillate/article_c428c050-874f-11e3-b3ae-0019bb2963f4.html; Moody, Sean and Jerrika Insco (2014). "Train carrying coal derails in downtown Paris," WKYT.

## 5.4 Concerns for emergency responders

City workers (emergency responders) will be at high risk when responding to coal fires or explosions in large part due to the hidden dangers associated with coal and coal dust fires, which requiring special training and experience to put them out.

Coal is considered a "Class A" material, which means that is known to heat up when wetted. Emergency responders are advised not to use water as a preventive measure on such fuels.[236]

One of the main concerns with deep-seated fires is that emergency responder actions could generate a dust cloud that leads to an explosion.[237] Coal fires can be followed by explosions, if the firefighting response stirs up existing dust at the facility. This complication has resulted in the deaths of emergency responders in the past.[238] This aspect of coal and coal dust necessitates special training among those that would be responsible for responding to emergencies at the proposed project site.

Recognizing the danger, Los Angeles City Fire Department decided in 2000 to cancel its 18-week training programs in their harbor after a preliminary report indicated that exposure to petroleum coke dust in the harbor might increase the risk of cancer for trainees and staff.[239]

The preliminary operating plan submitted by TLS attempts to minimize or ignore the dire worker safety and public safety consequences associated with emergency response at a terminal designed to handle commodities prone to spontaneous combustion.[240] The

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http://www.wkyt.com/home/headlines/Train-derailment-shuts-down-East-Main-Street-in-Paris-285795031.html; Rector, Kevin (2014). "CSX train carrying about 8,000 tons of coal derails in Bowie," Baltimore Sun. http://www.baltimoresun.com/news/maryland/bs-md-csx-derailment-20140501-story.html; Uebelherr, Jan (2015). "Coal train derails in Caledonia; track may have cracked in cold," Journal Sentinel. http://www.jsonline.com/news/wisconsin/coal-train-derails-in-caledonia-forcing-road-closure-b99187285z1-241075621.html; Whitten, Jeff (2015) "Train hits Road Grader, causes derailment in Des Moines County," KWQC. http://kwqc.com/2015/11/09/train-derailment-in-des-moines-county/; Wilson, Mark D. (2015). "140-car train loaded with coal derails on South Side," San Antonio Express-News. http://www.mysanantonio.com/news/local/article/Train-loaded-with-coal-derails-on-South-Side-6675477.php; Zemba, Liz (2015). "8 train cars hauling coal derail in Brownsville," Trib Total Media. http://triblive.com/news/adminpage/9332546-74/reported-brownsville-cars

[236] Occupational Safety and Health Administration (OSHA) (2013), Firefighting Precautions at Facilities with Combustible Dust, https://www.osha.gov/Publications/OSHA_3644.pdf

[237] Occupational Safety and Health Administration (OSHA) (2013). "Firefighting Precautions at Facilities with Combustible Dust," https://www.osha.gov/Publications/OSHA_3644.pdf

[238] Occupational Safety and Health Administration (OSHA) (2013). "Firefighting Precautions at Facilities with Combustible Dust," https://www.osha.gov/Publications/OSHA_3644.pdf

[239] Weikel, D. (2000). "Debate Rises Over Coke Dust at Ports," LA Times. http://articles.latimes.com/2000/jan/07/local/me-51790

[240] "TLS Preliminary Operating Plan," for example, p169: "This facility will have the ability to detect if spontaneous combustion has ignited the stored COMMODITY."

operating plan includes passages such as "In the event that a fire breaks out the person who notices the fire will have to make a judgment call regarding whether they can put the fire out with an extinguisher close by or if they must seek help,"[241] which seem to minimize the substantial danger posed by presence of combustible or explosive dust at the terminal and ignore the need for tailored emergency responses designed to prevent secondary explosions. Moreover, the "Safety and Health" section of the Operations Manual draft, while mentioning the need for gas detection and "hot commodity" detection, makes no mention of dust or the potential for dust explosion.[242]

## 6. DUST MITIGATION PROPOSALS

The project proponents suggest that there will be efforts to minimize coal dust by covering facilities and using water sprays. Given the volume of coal that would be processed through the terminal, and the amount of movement of coal necessary at and within the terminal, it is unlikely that any combination of mitigation efforts or interventions will succeed in completely and safely containing coal dust associated with the rail transport, unloading, handling, stockpiling, and transloading of the coal in question. For example, even a design created solely with dust mitigation in mind would face the challenges of balancing total enclosure with the ever-present risk of combustion and explosion, given that coal is highly volatile, friable, and prone to self-heating when exposed to oxygen.[243] There are also concerns that, due to the highly combustible and explosive nature of coal dust, dust mitigation measures may actually increase health and safety risks to workers, especially in enclosed spaces.

No matter the mitigation measure, it is clear that not all coal dust will be contained when transported through Oakland. Even if covered cars were designed, manufactured, and fully tested for safety before being used in Oakland, coal dust would continue to leak from the bottom-dump hoppers or through other ventilation portals.[244] Ventilation would be

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[241] "TLS Preliminary Operating Plan," for example, p290 "SAFETY PROCEDURE NO. TLS-03 HAZARD COMMUNICATION PROCEDURE".

[242] "TLS Preliminary Operating Plan," p166-173.

[243] Carras, J. and Young, B. (1994). "Self-heating of coal and related materials: Models, application and test methods." Progress in Energy and Combustion Science. "Self-heating can be defined as the phenomenon of a temperature rise in a material under ambient conditions, where the heating results from some chemical and/or physical process occurring within the material. The temperature rise may increase sufficiently that combustion or an explosion follows… The self-heating of coal stockpiles can create problems for coal producers as practices may have to be adopted to minimize self-heating in stored coal. Similarly self-heating can be a problem for transportation of coal over large distances, particularly as it may affect the safety of vessels...In recent years the exploitation of low-rank, low-sulphur coals in western U.S.A. also raises issues concerned with self-heating during drying, storage and transport."

[244] BNSF has testified that, on average, each bottom loading rail car transporting coal loses an average of 45 lbs of coal per car per 400 mile trip. "Unit trains" usually have at least 100 cars per train, so it is reasonable to assume that 450 lbs of coal could be lost by each train over 400 miles. Conservatively assuming a uniform distribution of coal and coal dust lost from the bottom of the train over the course of the journey, this would indicate that more than one pound of coal and coal dust could be deposited along tracks in Oakland from each

necessary because completely enclosing coal increases the retention of heat released during self-heating and also increases the accompanying risk of combustion or explosion.[245]

## 6.1 Covered rail cars

Project sponsors claim that coal dust will be fully contained within covered rail cars.[246] Although covered rail cars do exist, there is no evidence that covered rail cars that may be appropriate for coal transport and contain coal dust are available or in use in the United States. Project sponsors further asserted that proposed covered coal cars have been approved by the US Department of Transportation and the US Federal Railroad Administration.[247] Yet, there is no evidence that covered rail cars that contain dust have been tested, manufactured, or approved for use in the United States.[248]

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train that enters the terminal. It is possible that more coal would be lost toward the end of the train's journey, as fine dust settles over the course of transport and the trains will be jostled when uncoupled in the terminal railyard. The fugitive coal and coal dust is subject to reentrainment from wind gusts. See Rail Energy Transportation Advisory Committee (2009). "Minutes," September 10, 2009, http://www.scribd.com/doc/129350651/Surface-TransMinutes-9-10-09-1. Cited by Fox, Phyllis, PHD, PE. Testimony submitted September 21, 2015. "Environmental, Health, and Safety Impacts of the Proposed Oakland Bulk and Oversized Terminal."

[245] Carras, J. and Young, B. (1994). "Self-heating of coal and related materials: Models, application and test methods." Progress in Energy and Combustion Science.

[246] See, for example, 8 September 2015 letter from Jerry Bridges to Mayor Libby Schaaf; see also HDR: Basis of Design, Oakland Bulk and Oversized Terminal, California Capital Investment Group, Preliminary Engineering, Port of Oakland, Oakland, CA, July 16, 2015. In TLS Basis of Design Doc 964 p14. The report states that the cars would be bottom hopper (bottom dumping), rapid discharge style cars, with removable, fiberglass covers; see also "Any coal that may be shipped through Oakland Global will not emit coal dust." TLS Media Advisory, May 22, 2016, "Oakland Community and Civic Leaders Voice Concern Over Oakland City Council Delays and Loss of Existing Skilled Jobs at Former Oakland Army Base Development." http://www.businesswire.com/news/home/20160522005047/en/MEDIA-ADVISORY-Oakland-Community-Civic-Leaders-Voice

[247] See for example CCIG Response to Follow up Questions p47 "The Department of Transportation (DOT), has determined that the "Ecofab Railcar Cover System" meets the criteria for a closed transport vehicle, as specified in Title 49 CFR 173.403(c). The U.S. Federal Railroad Administration (FRA) has indicated to "EcoFab" that their cover design is compliant with North American Safety Appliance Regulations."

[248] See, for example, email from Doug Bock of EcoFab to Lora Jo Foo on 27 May 2016. "Ecofab has at no time sought or received FRA approval for the cover we have presented to TLS." See also email from Harold (Tom) Blankenship of Federal Railroad Administration to Lora Jo Foo on May 27 2016: "FRA does not get involved with any fugitive coal dust emission tests as far as I know… FRA does NOT approve covers EXCEPT when requested to provide guidance for a particular design as it relates to the safety appliance arrangement contained in the proposal. Once reviewed, the FRA may issue a letter that the proposed design may or may not comply with current safety appliance regulations contained in AAR S-2044 and Title 49 Code of Federal Regulations (CFR) Part 231... FRA does not "approve" any cover design in the marketplace. We do regulate and enforce safety appliance appurtenances when covers may place workers at a safety risk." Mr. Blankenship is the subject matter expert who provides guidance to car and locomotive builders on the interpretation, application and enforcement of Title 49 Code of Federal Regulations Part § 215 Railroad Freight Car Safety Standards.

There is no evidence to contradict the notion that any use of covered rail cars to transport coal through Oakland, and to store coal in Oakland before offloading or transloading at the proposed terminal should be considered experimental and will come with accompanying uncertainty regarding the efficacy of their containment of coal dust.

The use of covered cars would increase risk of fire, since the coal is prone to spontaneous combustion and, when enclosed, heat from the coal cannot dissipate effectively.[249] Project sponsors, in repeatedly guaranteeing the use of covered cars to transport coal into and through Oakland, appear not to have addressed the safety concerns associated with enclosing coal for transport and during the offloading time when unit trains will be split onto ladder tracks in Oakland.

## 6.2 Surfactants and other open-car mitigation techniques

While assuring that covered cars will be used to mitigate coal dust, the project sponsors simultaneously state that surfactants may be used to reduce coal dust release from rail cars traveling through Oakland and sitting at the terminal, as well as load profiling and load packing.[250] Surfactants have not been shown to completely mitigate coal dust emitted from open coal rail cars, either while moving or stationary; CCIG acknowledges this.[251] There is no evidence that surfactants are currently required to be applied to rail cars transporting coal from Utah.[252]

Even mandated use of surfactants does not guarantee any discernable suppression of coal dust. Clouds of dust are seen emanating from some coal-carrying trains where dust

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[249] Multnomah County Health Department (2013). "The Human Health Effects of Rail Transport of Coal Through Multnomah County, Oregon: A Health Analysis and Recommendations for Further Action." February 2013. Davis, Muntu, PhD, MPH. Alameda County Public Health Department, Director and County Health Officer. Letter to Zoe Chafe, 9 February 2016. "Re: Clarification of 10/6/15 responses to the City Administrator's follow-up questions about the proposed Oakland Bulk and Oversized Terminal project and review of HDR Engineering Report." See also Trimming, T. (2013). "Derailing Powder River Basin Coal Exports: Legal Mechanisms to Regulate Fugitive Coal Dust From Rail Transportation," Golden Gate University Environmental Law Journal, Vol. 6, Issue 2, Article 7.

[250] CCIG Response to Follow up Questions: "Any potentially material release of fugitive dust from rail cars is adequately mitigated via the use of standard industry best management practices including the application of surfactants and specific stacking and layering of coal."

[251] CCIG Response to Follow up Questions: "As discussed in the HDR Report, studies show that the use of profiling and topping agents in open rail cars reduces coal dust emissions by more than 85%."

[252] Union Pacific does not require the use of surfactants on coal shipped by rail from Utah, according to a newspaper report from April 2016. A spokesperson for the railroad company said that coal is shipped in open cars, but that Utah coal is considered by the company to be less dusty than coal from Wyoming, which is why surfactant is not required. This raises the question of whether coal arriving in Oakland via Union Pacific would have any dust mitigation measures applied, as well as whether the developers would be permitted to consider using any dust mitigation measures when shipping via Union Pacific. "A spokesman for Union Pacific said it ships coal in uncovered or open cars. Wyoming coal is sprayed with a topping agent to reduce dust. Coal from Utah is not as dusty and is not sprayed, UP officials said." Bizjack, T. (2016). "California, clean fuel leader, weighs oil, coal trains," Sacramento Bee, April 3.

mitigation techniques should have been used, most likely in the form of surfactants.[253] These "superdusters" represented about 5% of observed trains in a peer-reviewed study published in 2015 and produced documented concentrations of $PM_{2.5}$ from 53-232 ug/m3.[254] BNSF acknowledges that, even if application of surfactants is required, there can be "significant variation in the quality and consistency of the physical application of topical treatments at the mines."[255]

If 20 trains were to arrive in Oakland each day, and similar rates of superdusters were observed, residents in adjacent communities and visitors to adjacent parks would be exposed to the effects of at least one superduster train each day for the 362 days per year the terminal project sponsors expect that it will operate. The effects of elevated $PM_{2.5}$ from superdusters on the health of vulnerable populations and sensitive receptors within adjacent communities is of serious concern. This $PM_{2.5}$ would be in addition to the baseline air pollution experienced by people in nearby communities.

There are also concerns that not all chemicals used in surfactants have been disclosed, therefore potential health threats and safety risks from handling treated coal, exposure to fugitive dust from treated coal, and environmental accumulation and leaching of treated coal are not known.[256]

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[253] Communication with Prof. Dan Jaffe. See also www.atmos.washington.edu/jaffegroup/modules/APOLLO/Jaffe_trains_August2015_final_presentation.pdf and Jaffe, D. et al. (2015). "Diesel particulate matter and coal dust from trains in the Columbia River Gorge, Washington State, USA," Atmospheric Pollution Research, 946-952. http://www.sciencedirect.com/science/article/pii/S1309104215000057

[254] Jaffe, D. et al. (2015). "Diesel particulate matter and coal dust from trains in the Columbia River Gorge, Washington State, USA," Atmospheric Pollution Research, 946-952. http://www.sciencedirect.com/science/article/pii/S1309104215000057. CCIG noted in submitted comments that the monitor used in the Jaffe study was not calibrated for coal dust (p52). Both the authors and the peer-reviewers were aware of this fact, which does not invalidate the findings. The monitor measures mass of particles, after screening for size, not composition. There is a ~20% difference in mass scattering efficiency, according to Prof. Jaffe, first author of the study. Dr. Jaffe is the author of 139 peer-reviewed publications on topics in atmospheric science and chemistry.

[255] Sustainable Systems Research, LLC. "Technical Memorandum Air Quality, Climate Change, and Environmental Justice Issues from Oakland Trade and Global Logistics Center," submitted September 18, 2015. In personal communication, Prof. Jaffe (UW-Bothell) also surmised that inconsistent application of surfactant could be a cause of superdusters.

[256] "Most of the research on dust suppressants has been conducted by industry and has focused on the effectiveness (or performance) of dust suppressants, that is, the ability to abate dust. Little information is available on the potential environmental and health impacts of these compounds. Potential environmental impacts include: surface and groundwater quality deterioration; soil contamination; toxicity to soil and water biota; toxicity to humans during and after application; air pollution from volatile dust suppressant components; accumulation in soils; changes in hydrologic characteristics of the soils; and impacts on native flora and fauna populations." Environmental Protection Agency (EPA) (2002). "Potential Environmental Impacts of Dust Suppressants: "Avoiding Another Times Beach"," Expert Panel Summary, May 30-31, 2002, Las Vegas. Cited in No Coal in Oakland testimony, September 18, 2015.

# 7. TRANSPACIFIC POLLUTION FROM EAST ASIA TO BAY AREA

Project sponsors indicate in their submissions that much of the <9 million metric tons of coal to be handled at this terminal each year is likely to be exported to countries in Asia. Scientific evidence now irrefutably shows that a portion of the air pollution experienced by Californians originates in Asia, including from combustion of fossil fuels such as coal. The National Academy of Sciences, in a review of relevant literature concluded that "Air pollution is no longer a local issue."[257] As shown in the figure below, a wide range of air pollutants that are of concern because of their impacts on human health are reaching the Western United States. If and when the coal that is exported through this terminal is burned in Asia, some portion of the emissions from the burning of that coal will come back to impact human health in the Bay Area.

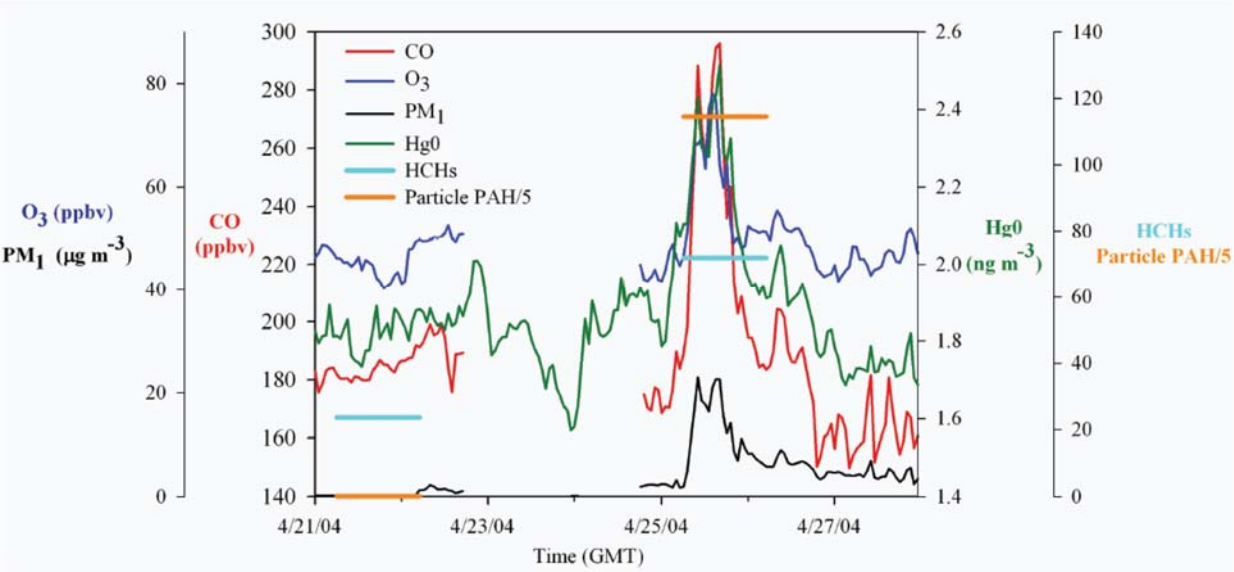


***Figure 19: This figure shows elevated levels of health-damaging pollutants such as fine particulate matter, ozone, and mercury in an air plume from Asia, measured at a study site in Oregon in April 2004.[258] Studies such as these have determined that air pollution does travel from Asia to the West Coast of the United States, usually over 1-2 weeks.***

[257] "Air pollution, once thought of as purely a local issue, now is recognized as a complex problem that is also subject to regional, hemispheric, and even global influences. Although domestic sources are the primary contributors to most of our nation's air quality problems, the United States is both a source and a receptor for pollutants transported great distances. Pollutants not only flow across our borders with Canada and Mexico but also travel between North America and Asia, Africa, and Europe. These pollutants contribute to public health threats, degraded visibility, agricultural and native vegetation injury, decreased domestic and wild animal viability, infrastructure materials damage, poorer water quality, degraded aquatic ecosystems, and climate change." National Academy of Sciences (2010). Global Sources of Local Pollution: An Assessment of Long-Range Transport of Key Air Pollutants to and from the United States, p12.

[258] National Academy of Sciences (2010). Global Sources of Local Pollution: An Assessment of Long-Range Transport of Key Air Pollutants to and from the United States, p36.

## 7.1 $PM_{2.5}$

The Bay Area region is currently in non-attainment status for $PM_{2.5}$, implicating that $PM_{2.5}$ concentrations in the Bay Area, and especially in West Oakland, are above the level deemed safe by the US EPA. $PM_{2.5}$ is a pollutant with serious health implications (see Section 3.2). Some of the $PM_{2.5}$ in the Bay Area comes from Asia via atmospheric transport.[259] Plumes of particulate matter pollution from Asia primarily affect the Western United States.[260]

Analyzing airborne lead isotopes, UC Berkeley researchers found evidence of an ongoing, "background" contribution of trans-Pacific pollution to Bay Area air pollution, and indications that about 29% of air pollution sampled originated from Asia.[261] In addition to direct impacts of coal transportation in West Oakland, air quality could be further degraded through these indirect effects through trans-Pacific migration.

There is evidence that "aged" $PM_{2.5}$, such as that which arrives in California after transport from its overseas source, is especially health damaging. Some of these particles form in the air and are known as secondary $PM_{2.5}$. Secondary particles can dissolve in lung fluids, depositing dissolved chemicals. Many of these secondary particles have an ultrafine core, which means that they facilitate the deposition of ultrafine particles deep in the lung.[262]

Researchers have estimated that 1,100 annual premature deaths in North America result from exposure to human-caused outdoor air pollution ($PM_{2.5}$) that originates in other countries. They point out that these premature deaths counteract health improvements resulting from policies that have reduced other types of air pollution in the US.[263] And as air quality standards tighten in California and across the US, emissions from Asia may well account for an increasing percentage of the total air pollution in the Bay Area, and that fraction will not be controlled by domestic air pollution regulations.[264]

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[259] "Some instances of elevated nondust PM have also been reported at West Coast sites and attributed to sulfur and other Asian industrial emissions." National Academy of Sciences (2010). Global Sources of Local Pollution: An Assessment of Long-Range Transport of Key Air Pollutants to and from the United States, p80.
[260] National Academy of Sciences (2010). Global Sources of Local Pollution: An Assessment of Long-Range Transport of Key Air Pollutants to and from the United States, p79.
[261] Ewing, S. et al. (2010). "Pb Isotopes as an Indicator of the Asian Contribution to Particulate Air Pollution in Urban California," Environmental Science & Technology.
[262] Turpen, B. (2014). "Characterizing exposures to atmospheric carcinogens," in *Air Pollution and Cancer,* International Agency for Research on Cancer (IARC). http://www.iarc.fr/en/publications/books/sp161/index.php. "When secondary particles comprising concentrated aqueous solutions deposit in the lung, they dissolve into the lung surfactant, delivering dissolved chemicals. These (largely) secondary accumulation-mode particles sometimes contain an ultrafine primary core, facilitating the deposition of ultrafine solid particles. Hygroscopic (secondary) particles can also transport water-soluble vapor (e.g. hydrogen peroxide, organic peroxides) into the lower lung."
[263] National Academy of Sciences (2010). Global Sources of Local Pollution: An Assessment of Long-Range Transport of Key Air Pollutants to and from the United States. p87. "It is worth noting that this number of premature mortalities in North America is comparable to the reduction in premature mortalities expected to result from tightening the U.S. 8-hr O3 standard from 84 ppbv to 75 ppbv."
[264] National Academy of Sciences (2010). Global Sources of Local Pollution: An Assessment of Long-Range Transport of Key Air Pollutants to and from the United States. p87.

## 7.2 Ozone

Ground-level Ozone, a contributor to smog, is an air pollutant of major concern to human health.[265] Ozone is created when pollutants such as carbon monoxide (CO), NOx, and volatile organic compounds (VOC)—all pollutants formed when coal is burned—interact in the atmosphere, especially in warm temperatures and sunlight.

Excessive ground-level ozone in the air can have a serious deleterious effect on human health.[266] It can cause breathing problems, trigger asthma, reduce lung function and cause lung diseases.[267] Children can have higher exposures to ozone than adults.[268] Short-term exposure to high ambient ozone levels leads to significant premature mortality, and the risk of mortality is not limited to those already at a high risk of death.[269] Acute exposure to elevated ozone is associated with increased hospital admissions for pneumonia, chronic obstructive pulmonary disease, asthma, allergic rhinitis and other respiratory diseases, and with premature mortality.[270] Ozone increases risk of incident asthma in addition to exacerbating existing cases.[271] The risk to children of experiencing ozone-related asthma

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[265] Here, ozone refers to a type of outdoor air pollution close to the ground that is detrimental to human health. It does not refer to the (beneficial) ozone layer, which is in the stratosphere, 12-19 miles above Earth. Unhealthy levels of ozone (above the ozone air quality standard) were associated with an estimated 800 premature deaths, 4500 hospital and emergency department admissions, 900,000 school absences, and > 1 million minor restricted-activity days (per year averaged over the three years studied) in the US in the early 2000s. National Academy of Sciences (2010). Global Sources of Local Pollution: An Assessment of Long-Range Transport of Key Air Pollutants to and from the United States. p. 35.

[266] For example, a study of UC Berkeley students found that exposure to ozone exposure over time negative affected lung function: "[Researchers] collected residential address histories for freshman at the University of California at Berkeley and matched them to monitors near their homes. Cumulative ozone exposure was associated with a significant decrement in forced expiratory volume in 1 second." Schwarz, J. (2004). "Air Pollution and Children's Health," Pediatrics. This article has been cited 250 times. http://pediatrics.aappublications.org/content/113/Supplement_3/1037.long.

[267] World Health Organization (WHO) (2014). Fact Sheet Number 313 "Ambient (outdoor) air quality and health," March 2014. http://www.who.int/mediacentre/factsheets/fs313/en/ "There are recent conclusive associations between daily mortality and lower ozone concentrations. Ozone at ground level – not to be confused with the ozone layer in the upper atmosphere – is one of the major constituents of photochemical smog. It is formed by the reaction with sunlight (photochemical reaction) of pollutants such as nitrogen oxides (NOx) from vehicle and industry emissions and volatile organic compounds (VOCs) emitted by vehicles, solvents and industry. As a result, the highest levels of ozone pollution occur during periods of sunny weather."

[268] "Ozone is a highly reactive gas, producing oxidative damage in the lung…Children tend to be outdoors in the afternoon and in the summer, which results in much higher exposure for children than adults, who are protected by their indoor environment." Schwarz, J. (2004). "Air Pollution and Children's Health," Pediatrics. http://pediatrics.aappublications.org/content/113/Supplement_3/1037.long.

[269] National Academy of Sciences (2010). Global Sources of Local Pollution: An Assessment of Long-Range Transport of Key Air Pollutants to and from the United States. p.17.

[270] National Academy of Sciences (2010). Global Sources of Local Pollution: An Assessment of Long-Range Transport of Key Air Pollutants to and from the United States. p.71.

[271] McConnell, R. et al. (2002). "Asthma in exercising children exposed to ozone: a cohort study." Lancet. http://www.ncbi.nlm.nih.gov/pubmed/11844508. Study has been cited more than 600 times.

exacerbations is greatest among those with severe asthma. That risk exists even when ambient ozone levels fall within the limits set by the EPA to protect public health.[272]

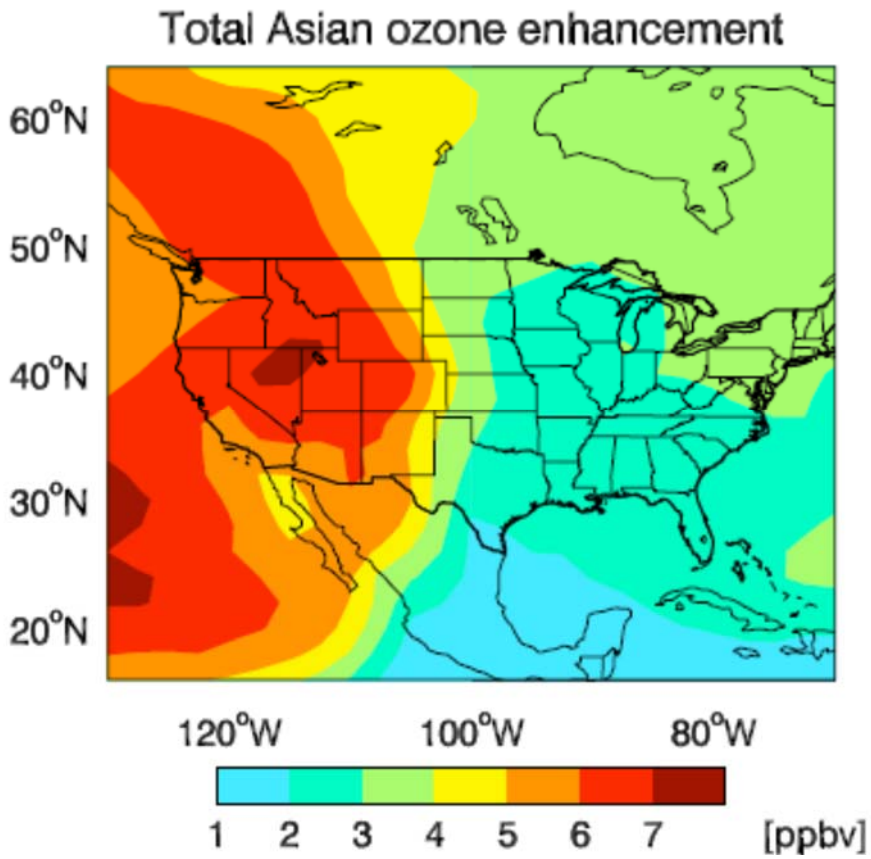


***Figure 20: Modeled US surface ozone attributable to Asian anthropogenic emissions during study period in 2006.[273]***

Measured ozone levels in the Bay Area are above the standards set by the US EPA and the California EPA to protect human health.[274] Ozone in the Bay Area is worsened by pollution coming from distant sources, including coal-burning in China.[275] In the absence of Asian

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[272] Lockwood, A. et al. (2009). "Coal's assault on human health." Physicians for Social Responsibility. http://www.psr.org/assets/pdfs/psr-coal-fullreport.pdf

[273] Zhang, L. et al. (2008). "Transpacific transport of ozone pollution and the effect of recent Asian emission increases on air quality in North America: an integrated analysis using satellite, aircraft, ozonesonde, and surface observations," Atmospheric Chemistry and Physics. "Figure 15: Mean simulated US surface ozone enhancements from Asian anthropogenic emissions during the INTEX-B time period (17 April–15 May 2006)." This paper has been cited 194 times.

[274] See BAAQMD (2016). "Air Quality Standards and Attainment Status," http://www.baaqmd.gov/research-and-data/air-quality-standards-and-attainment-status, accessed 22 Jun 2016. The Bay Area is out of attainment for all ozone standards: the 8 hour (averaging time) California standard (0.070 ppm), the 1 hour California standard (0.09 ppm), and the 8 hour federal standard (0.070 ppm).

[275] A fifteen scientist committee convened by the National Academies of Sciences found clear evidence that "distant pollution does contribute to increased concentrations of O3 over populated regions and that such increases may have detrimental impacts on human health, agriculture, and natural ecosystems…One study estimates that the number of premature cardiopulmonary deaths that could be avoided per year in North

anthropogenic emissions, 53% of ozone exceedances (8 hour averaging time) of 75 ppb in the model would not have occurred in the southwestern USA.[276] A recent study found that transpacific emissions from Asian countries contribute 8–15 ppb ozone on days when observed daily maximum 8 hour averaged ozone exceeds 60 ppb.

East Asia's level of ozone-related emissions is expected to increase rapidly over the next few decades and will likely raise the surface ozone baseline in the United States by a few ppb (the metric used to measure ozone).[277]

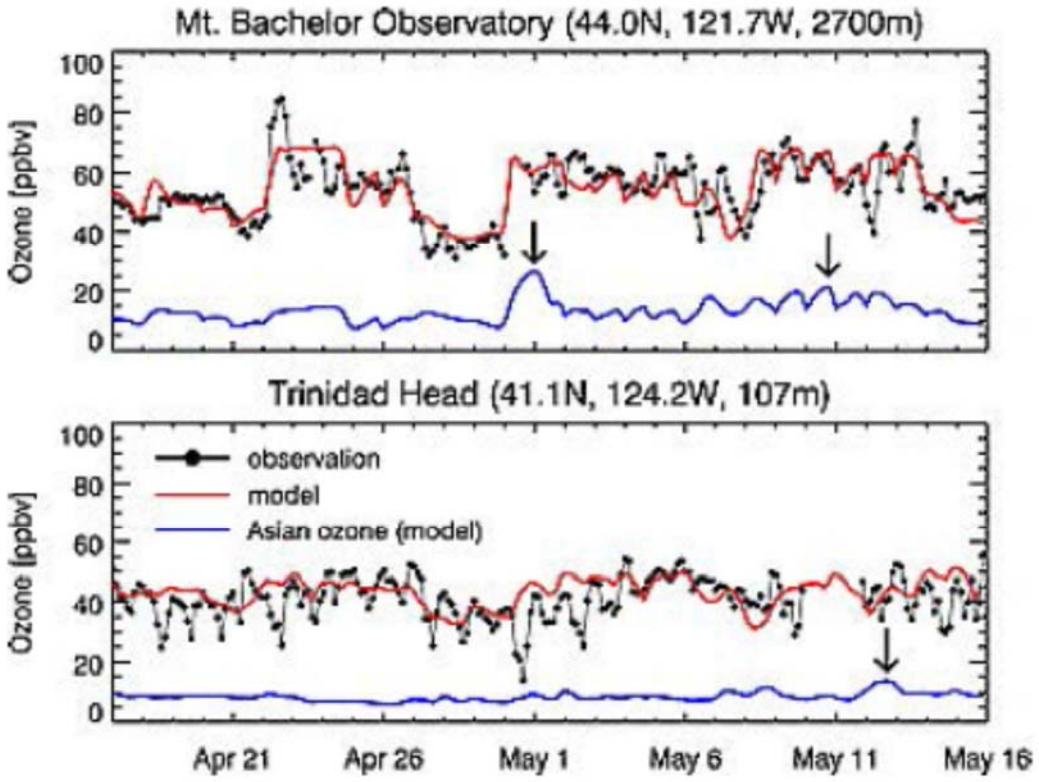


***Figure 21: The blue line shows the influence of Asian emissions on ozone levels at a Northern California site (in Point Reyes, see lower panel) over a study period in 2006.[278]***

America due to a 20 percent emission reduction in other major Northern Hemisphere industrial regions is in the hundreds." National Academy of Sciences (2010). Global Sources of Local Pollution: An Assessment of Long-Range Transport of Key Air Pollutants to and from the United States.

[276] Lin, M. et al. (2012) "Transport of Asian ozone pollution into surface air over the western United States in spring," Journ Geophys Research.

[277] National Academy of Sciences (2010). Global Sources of Local Pollution: An Assessment of Long-Range Transport of Key Air Pollutants to and from the United States, p61.

[278] Zhang, L. et al. (2009). "Intercontinental source attribution of ozone pollution at western U.S. sites using an adjoint method." Geophysical Research Letters. Referenced in testimony by Laura Wisland.

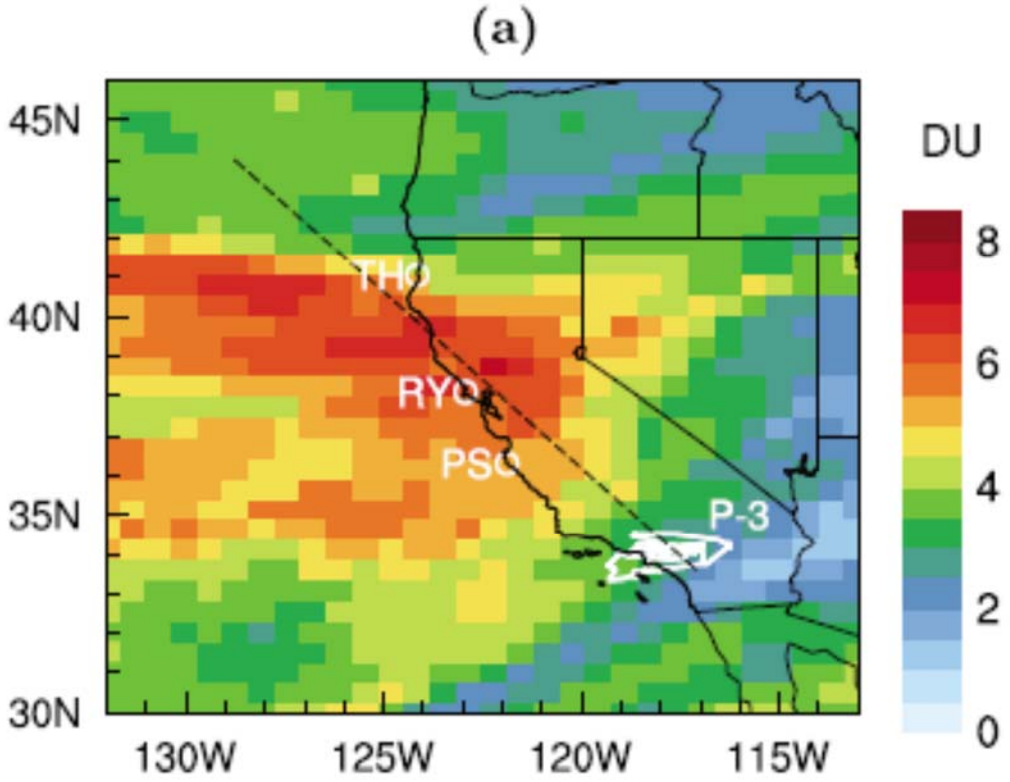


***Figure 22: Scientific study of the transport of Asian pollutants to California on May 8, 2010.[279]***

If ozone continues to be transported to California as a result of coal burning in other countries, it will contribute to future Bay Area ozone air quality standard violations and, more importantly, will impact the health of Bay Area residents.[280] In addition, climate change will likely exacerbate the problem of high ozone levels in the Bay Area. Ozone is produced more efficiently in the atmosphere when temperatures are higher. That is why ozone is of most concern during the summer in the Bay Area. Polluted U.S. sites show a strong correlation of high-ozone episodes with elevated temperature.[281]

[279] Model Asian enhancements to the tropospheric column O3 in dobson unit. The dashed black line denotes the location of the ozone vertical cross-section shown in Figure 7b. The white line indicates the NOAA WP-3D flight path.

[280] National Academy of Sciences (2010). Global Sources of Local Pollution: An Assessment of Long-Range Transport of Key Air Pollutants to and from the United States p5.

[281] The effect of higher temperature on ozone levels is "driven in part by chemistry, biogenic VOC emissions, and the association of high temperatures with stagnation events that trap pollution" National Academy of Sciences (2010) Global Sources of Local Pollution: An Assessment of Long-Range Transport of Key Air Pollutants to and from the United States p74.

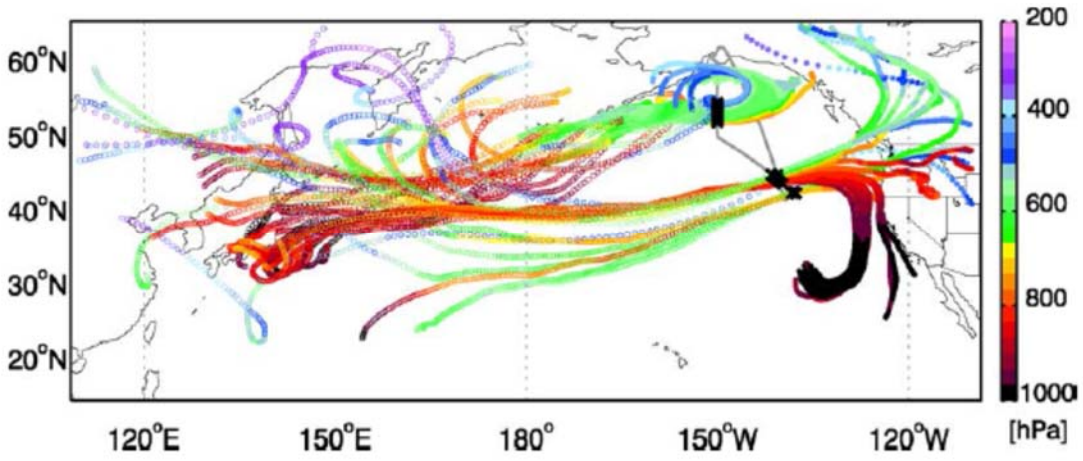


***Figure 23: Model showing trajectory of carbon monoxide (a precursor to ozone pollution) from Asia to California.[282]***

## 7.3 Heavy metals and toxics

When coal is burned, toxic metals such as mercury are released into the air. Mercury is a neurotoxin that can cause hand tremors, increases in memory disturbance, and other adverse health impacts.[283] Because mercury creates such a public health hazard, the US EPA has taken steps to drastically reduce mercury pollution from coal burning within the United States.[284] However, the amount of mercury released annually in Asia is >400 times that which is released annually in California, and half of the Asian release occurs in China.[285]

Oakland residents and others in the Bay Area are at risk from mercury pollution traced to coal burning in Asia.[286] There is documented evidence that mercury released in Asia is

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[282] Zhang, L. et al. (2009). "Intercontinental source attribution of ozone pollution at western U.S. sites using an adjoint method." Geophysical Research Letters. Referenced in testimony by Laura Wisland. "Kinematic 7-day backward (open circles) and 3-day forward (solid circles) trajectories for the enhanced CO layers of Asian pollution (CO>125 ppbv and 2–7 km) observed in the INTEX-B DC-8 flight on May 9."

[283] National Academy of Sciences (2010) Global Sources of Local Pollution: An Assessment of Long-Range Transport of Key Air Pollutants to and from the United States, p17.

[284] Environmental Protection Agency (EPA) (2016) "Supplemental Finding that it is Appropriate and Necessary to Regulate Hazardous Air Pollutants from Coal- and Oil-Fired Electric Utility Steam Generating Units" https://www3.epa.gov/mats/pdfs/20160414_mats_ff_fr.pdf

[285] Jaffe, D. et al. (2005). "Export of atmospheric mercury from Asia," Atmospheric Environment. This article has been cited 292 times.

[286] Global emissions of mercury have increased from $1400*10^6$ g per year in 2000 to $2000*10^6$ g per year in 2008, primarily driven by coal combustion in East Asia. Weiss-Penzias et al. (2016) "Trends in mercury wet deposition and mercury air concentrations across the U.S. and Canada," Science of the Total Environment. http://www.sciencedirect.com/science/article/pii/S0048969716300614. Fossil fuel-fired power plants are the largest source of mercury emissions to the air. Once mercury from the air reaches water, microorganisms can change it into methylmercury, a highly toxic form that builds up in fish. People are primarily exposed to mercury by eating contaminated fish. https://www3.epa.gov/mats/health.html#impacts

found on the West Coast.[287] A scientific panel convened by the National Academy of Sciences found that "intercontinental transport" of mercury is "an important process that clearly affects U.S. exposures."[288] Mercury is transported globally in the atmosphere, and because it can stay in the atmosphere for 6-12 months, it can travel long distances, from China to California, for example.[289]

Mercury that enters the San Francisco Bay Area is converted to the neurotoxin methylmercury.[290] Methylmercury is now found in fog along the coast of California.[291] It eventually accumulates in ecosystems and wildlife and endangers human health. [292] Methylmercury exposure is a particular concern for women of childbearing age, unborn babies, and young children. Studies have linked high levels of methylmercury to damage to the developing nervous system.[293] Mercury exposure can impair children's ability to think and learn.[294]

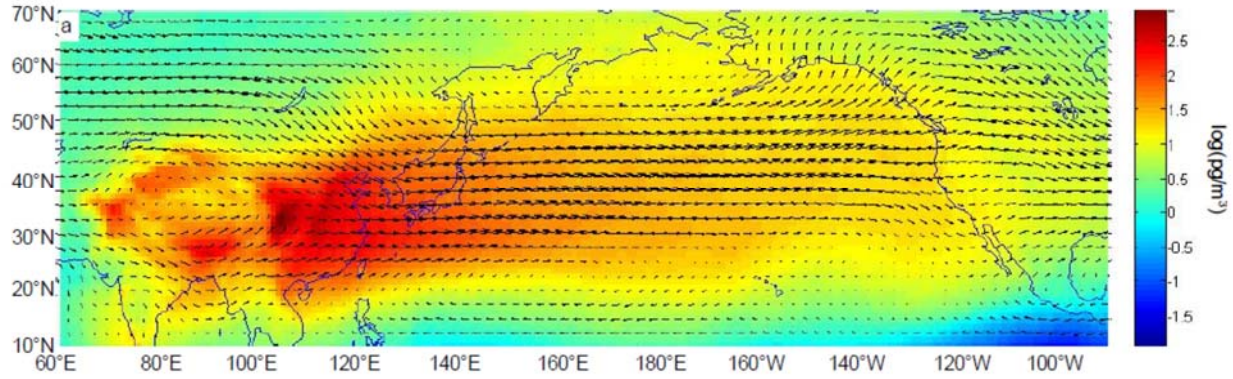


***Figure 24: Annual mean total BaP concentration (pgm−3) over the northern Pacific Ocean in 2004: horizontal distribution of total BaP concentration at 3 km above ground.[295]***

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[287] Jaffe, D. et al. (2005). "Export of atmospheric mercury from Asia," Atmospheric Environment. This article has been cited 292 times.

[288] National Academy of Sciences, 2010, Global Sources of Local Pollution: An Assessment of Long-Range Transport of Key Air Pollutants to and from the United States, p7.

[289] http://www.sciencedirect.com/science/article/pii/S0048969716300614 (Weiss-Penzias 2016)

[290] "Methylmercury [CH3Hg] is the most toxic form [of mercury]…Environments that are known to favor the production of methylmercury include…coastal wetlands, particularly along the Gulf of Mexico, Atlantic Ocean, and San Francisco Bay." USGS Mercury in the Environment Fact Sheet 146-00 (October 2000). https://www2.usgs.gov/themes/factsheet/146-00/

[291] http://www.nsf.gov/discoveries/disc_summ.jsp?cntn_id=136056&org=NSF

[292] Zhang 2016 http://www.pnas.org/content/113/3/526.full.pdf

[293] "A recent study has estimated that between 316,588 and 637,233 US children each year suffer loss of IQ resulting from methylmercury toxicity, costing the United States $8.7 billion (in 2000 dollars; range, $2.2-43.8 billion) in lost economic productivity." "The role of air pollution in asthma and other pediatric morbidities." Trasande and Thurston, 2005, Allergy and Clinical Immunology. http://www.jacionline.org/article/S0091-6749(05)00306-4/fulltext#sec4.7 This article has been cited 158 times.

[294] https://www3.epa.gov/mats/health.html#impacts and EPA (2016). "Final consideration of cost in the appropriate and necessary finding for the mercury and air toxics standards for power plants." https://www.epa.gov/sites/production/files/2016-05/documents/20160414_mats_ff_fr_fs.pdf

[295] Zhang, Y. et al. (2011). "Transpacific transport of benzo[a]pyrene emitted from Asia," Atmos. Chem. Phys., 11, 11993–12006. www.atmos-chem-phys.net/11/11993/2011/.

PAHs, such as benzo(a)pyrene, are other health-harming chemicals that are released when coal is burned. Benzo(a)pyrene is a PAH found in coal tar that is known to be carcinogenic. The International Agency for Research on Cancer specifically mentions that benzo(a)pyrene can be ingested via vegetables grown in areas with surface contamination from atmospheric PAH fall-out.[296] PAHs and other semi-volatile compounds are transported across the Pacific Ocean in about a week under certain meteorological conditions.[297] East Asian emissions of PAHs contributed 97 % of the modeled average benzo(a)pyrene concentrations over North America, including significant contributions in California.[298] (See Figure 24.)

## 8. BURNING COAL: GLOBAL AND BAY AREA EFFECTS

The magnitude of greenhouse gas emissions expected to result from the burning of coal proposed to be exported through Oakland cannot be downplayed, especially in light of Oakland's and California's efforts to reduce contributions to climate change (under the City's 2012 Energy and Climate Action Plan and the State's AB 32 The Global Warming Solutions Act). These emissions are relevant to the health and safety of people living, working and visiting Oakland because it is now understood that climate change will have a wide range of effects on Oakland, as soon as this century. (See Section 8.2.) Local and state efforts to mitigate greenhouse gases and other climate relevant emissions, thus reducing future health and safety harms from climate change, will be counteracted by the emissions that will result when large quantities of coal exported through Oakland are eventually burned.

The project sponsors indicate that the terminal will have the capacity to handle up to 9 MMTPA of commodity. If coal were the only commodity to be handled at the terminal, and virtually all of the coal were to be eventually burned in power plants overseas, this burning would generate approximately 23 $MMTCO_2e$ per year.[299] This is more than 8 times all of the

[296] IARC (2012). "Chemical Agents and Related Occupations," Monograph 100F. http://monographs.iarc.fr/ENG/Monographs/vol100F/.
[297] Zhang, Y. et al. (2011). "Transpacific transport of benzo[a]pyrene emitted from Asia," Atmos. Chem. Phys., 11, 11993–12006. www.atmos-chem-phys.net/11/11993/2011/.
[298] Zhang, Y. et al. (2011). "Transpacific transport of benzo[a]pyrene emitted from Asia," Atmos. Chem. Phys., 11, 11993–12006. www.atmos-chem-phys.net/11/11993/2011/.
[299] Emission factors for coal were provided by the California Air Resources Board (ARB): Non-Power Plant: 2.347 $MTCO_2e$/short ton, Power Plant: 2.341 $MTCO_2e$/short ton. These emission factors are referenced in the Mandatory GHG Reporting Regulation, which incorporates U.S.EPA Part 98 emission factors by reference. See http://www.arb.ca.gov/cc/reporting/ghg-rep/regulation/subpart_c_rule_part98.pdf, Tables C-1 and C-2. These emissions factors represent a conservative estimate of emissions from end us of coal, given that burn conditions in power plants are highly controlled and can optimize complete combustion. Actual emissions of air pollutants are likely to be greater. Amount of coal expected: The HDR report submitted by project sponsors indicates a total design capacity of 9 MMTPA. This figure does not include emissions associated with the mining of the coal, the transport of the coal to Oakland, the terminal activities, or the transport of the coal from Oakland to its end use destination.

greenhouse gases emitted in the City of Oakland in 2013, the last year for which data are available.[300]

Climate Change has been called the biggest global health threat of the 21st century.[301] Climate change produces a wide range of mild to devastating effects on human health.[302] In general the most vulnerable people will be most severely affected.[303] The EPA states that, "Our most vulnerable citizens, including children, older adults, people with heart or lung disease and people living in poverty are most at risk to the health impacts of climate change."[304] The World Health Organization estimated global warming to be responsible for 166,000 deaths in 2000, from malaria, malnutrition, diarrhea, and drowning.[305] (This is just a small subset of the causes of ill-health and death associated with climate change.)

With 19 miles of shoreline, Oakland's residents are vulnerable to sea level rise, volatile weather patterns, warming oceans, and rising tides; these conditions put the city—particularly near our shoreline—among those most threatened by impacts from climate change, and create yet another source of environmental stress for vulnerable residents.[306]

## 8.1 California and Oakland GHG reduction plans

To conservatively estimate the greenhouse gas emissions associated with the eventual use of the coal, for the purposes of understanding Oakland's potential role in handling a climate-relevant commodity, it is assumed that almost all of the coal will be burned for fuel overseas.[307]

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[300] City of Oakland "core" emissions (those emitted strictly within city limits, not counting upstream or lifecycle emissions) from City of Oakland 2016 Greenhouse Gas Emissions Inventory Report (2013 Data Year), March 2016. See page 7: "In 2013, core emissions equaled 2,768,150 metric tons of carbon dioxide equivalent (MT $CO_2e$)."

[301] Costello, A. et al. (2009). "Managing the health effects of climate change," The Lancet. This article has been cited >1100 times. See also testimony by Paul English, 14 September 2015.

[302] Intergovernmental Panel on Climate Change (2014). "Chapter 11: Human health: impacts, adaptation, and co-benefits," Climate Change 2014: Impacts, Adaptation, and Vulnerability. Working Group II, Fifth Assessment Report.

[303] "The impacts of climate change are already being felt in California and will disproportionately impact the state's most vulnerable populations." https://www.gov.ca.gov/news.php?id=19047 July 21, 2015 "Governor Brown to World's Mayors: It's Up to Us to Make it Happen." Remarks at the Vatican.

[304] https://www.epa.gov/cleanpowerplan/fact-sheet-clean-power-plan-benefits-cleaner-more-efficient-power-sector

[305] http://www.psr.org/assets/pdfs/psr-coal-fullreport.pdf

[306] City of Oakland (2016). 2013 Greenhouse Gas Emissions Inventory Report. http://www2.oaklandnet.com/oakca1/groups/pwa/documents/report/oak059097.pdf

[307] Emission factors for coal provided by California Air Resources Board from Mandatory GHG Reporting Regulation, which incorporates U.S.EPA Part 98 emission factors by reference. See http://www.arb.ca.gov/cc/reporting/ghg-rep/regulation/subpart_c_rule_part98.pdf, Tables C-1 and C-2. The coal emission factor is based on bituminous coal. Emissions estimates reported here assume that all coal is combusted in power plants. This is a conservative assumption, as non-industrial uses of coal would result in higher emission factors of most pollutants, due to non-optimized burn conditions.

### 8.1.a California greenhouse gas reductions

Over just 10 years of full operation (at 9 MMTPA coal), combustion of coal exported through this terminal would likely result in the release of at least 232 $MMTCO_2e$.[308] This is equivalent to approximately half of California's entire annual carbon budget at current levels.[309] It is also equivalent to all of the greenhouse gas emissions that will need to occur in California between 2020 and 2025 to ensure that California transitions from the 2020 Target (set in The Global Warming Solutions Act of 2006, AB 32)[310] to the 2030 Goal established in Executive Order B-30-15.[311]

If coal were to be exported throughout the 66 year life of this project (as leased), combustion of the 5-9 MMTPA exported through this terminal would likely result in at least 851 $MMTCO_2e$ and as much as 1531 $MMTCO_2e$. California's emission target for 2050, a year which will fall in the middle of the lease cycle, is less than 100 $MMTCO_2e$.[312] This means that emissions from burning coal exported over the length of the lease, as understood from documents submitted by project sponsors, would be equivalent to approximately one decade (and possibly 15 years) of California's entire carbon budget at 2050 Target levels.

[308] The lease period is 66 years.

[309] California's emissions were 441.5 $mmtCO_2e$ in 2014, the most recent year for which data were available. California's 2020 Target is 431 $mmtCO_2e$.

[310] Note that AB32 is part of California's Health and Safety code (Section 38500): Global warming poses a serious threat to the economic well-being, public health, natural resources, and the environment of California. The potential adverse impacts of global warming include the exacerbation of air quality problems, a reduction in the quality and supply of water to the state from the Sierra snowpack, a rise in sea levels resulting in the displacement of thousands of coastal businesses and residences, damage to marine ecosystems and the natural environment, and an increase in the incidences of infectious diseases, asthma, and other human health-related problems.

[311] Assuming that California achieves the 2020 Target (431 $MMTCO_2e$) and progresses on a linear trajectory toward the 2030 Goal (260 $MMTCO_2e$ or 40% below 1990 levels), progressive annual reductions of 17 $MMTCO_2e$ will be required. The cumulative reductions from 2020-2025 would be 256 $MMTCO_2e$ in this scenario. "This new target is consistent with the path necessary to reach the scientifically established levels needed to limit global warming below 2 degrees Celsius (°C) – the warming threshold at which scientists agree that there will likely be major climate disruptions – and aligns California's GHG reduction targets with those of leading international governments." State of California 2030 Target Scoping Plan Concept Paper June 17, 2016. http://www.arb.ca.gov/cc/scopingplan/document/2030_sp_concept_paper2016.pdf

[312] The 2050 Target is 80% below 1990 levels. State of California 2030 Target Scoping Plan Concept Paper June 17, 2016. http://www.arb.ca.gov/cc/scopingplan/document/2030_sp_concept_paper2016.pdf.

### 8.1.b Comparison to Oakland greenhouse gas reductions

In 2009, the Oakland City Council adopted GHG reduction goals of 36 percent fewer emissions by 2020 and 83 percent fewer emissions by 2050.[313] Oakland's Energy and Climate Action Plan notes that, "Achieving a 36% reduction in GHG emissions will require unprecedented leadership by the City and all members of the Oakland community."[314] However, with even 5 MMTPA of coal handled through the proposed terminal, burning of the commodity shipped through Oakland would result in annual GHG emissions in excess of 4 times all of those currently emitted in Oakland.[315] (See Figure 25.) The emissions that would result from burning a single year's worth of exported coal (5 million metric tons of coal, a conservative scenario), would be 179 times the amount by which Oakland must reduce its emissions each year to meet its 2020 greenhouse gas emissions target.[316]

According to Oakland's Energy and Climate Action Plan, meeting its ambitious emission goals will require the following effort: a 20% reduction in vehicle miles traveled annually as residents, workers and visitors meet daily needs through transit, walking, and bicycling; 24 million gallons of gasoline and diesel saved annually on local roads due to less driving and more fuel efficient vehicles; 32% reduction in annual electricity consumption through conservation and energy efficiency in homes and businesses; 14% reduction in annual natural gas consumption through retrofits to Oakland's homes and commercial buildings and aggressive conservation; 62 million kWh and 2.7 million therms of renewable energy production annually from local solar panels and other renewable energy technologies; 375,000 tons of waste diverted annually away from local landfills through waste reduction, reuse, recycling, and composting.[317] These emission reduction efforts, which are motivated in large part by the goal of protecting Oaklanders' long-term health and safety in light of climate change and sea level rise, would be counteracted and substantially reversed by the emissions associated with burning coal exported through Oakland.

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[313] City of Oakland (2016) Greenhouse Gas Emissions Inventory Report (2013 Data Year). See testimony by Laura Wisland, Union of Concerned Scientists. In July 2009, the Oakland City Council approved a preliminary planning GHG emissions reduction target for the year 2020 at 36% below 2005 levels, on a path toward reducing GHG emissions by more than 80% below 2005 levels by 2050 (83%). (See City of Oakland 2016 Greenhouse Gas Emissions Inventory Report (2013 Data Year), March 2016.) This planning target was developed based on recent publications of the Intergovernmental Panel on Climate Change (IPCC), widely recognized as the world's leading body of climate scientists. According to a recent IPCC report, achieving this level of GHG reductions throughout the industrial world will help to produce a level of climate stabilization that would avoid the worst future climate impact scenarios. Additional background on this GHG reduction target is provided in the ECAP Appendix. Oakland has an opportunity to demonstrate leadership by striving to achieve this level of GHG emissions reductions, reinforcing our commitment to local climate action.

[314] See testimony from Laura Wisland, Union of Concerned Scientists. See also City of Oakland (2012). Energy and Climate Action Plan.

[315] Latest data for Oakland emissions are from 2013. See City of Oakland (2016) Greenhouse Gas Emissions Inventory Report (2013 Data Year). The comparison is with City of Oakland's core emissions. Since emissions from coal burning as calculated here do not include upstream emissions (such as those associated with mining or transport), it is most appropriate to compare them with Oakland's core emissions.

[316] Assumes a linear reduction in Oakland core emissions between 2005 and 2020, necessitating approximately 71,800 $mtCO_2e$ reduction per year during that time period. Burning 5 million metric tons of coal in a power plant releases about 12.9 million $mtCO_2e$.

[317] 1751 p101, Oakland ECAP

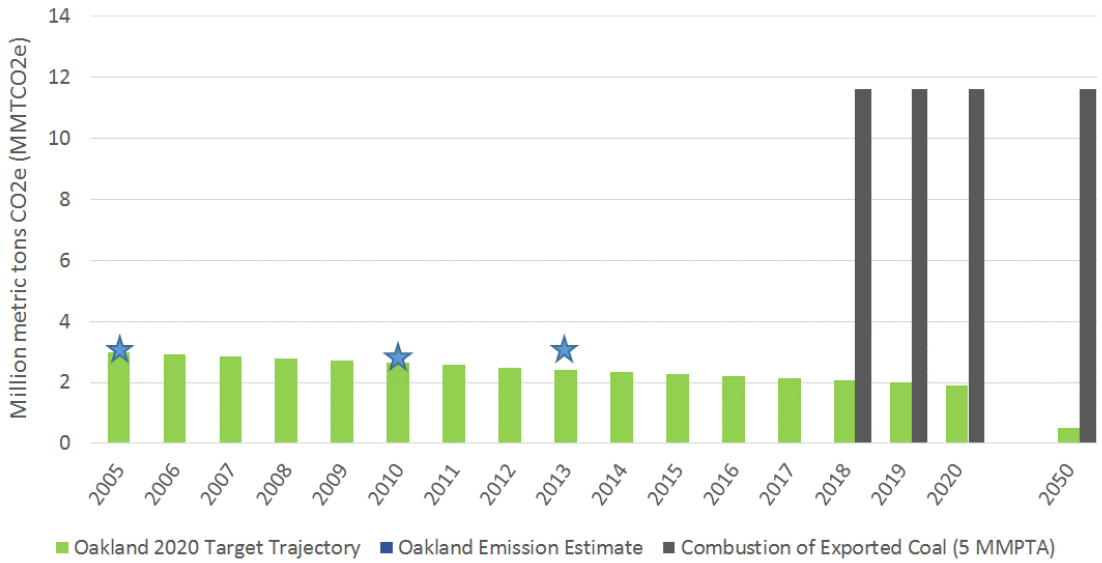


***Figure 25: Comparison of greenhouse gas emissions from Oakland and proposed coal exports (5 MMTPA), 2005-2050. The green bars show the trajectory needed to meet the City of Oakland's Energy and Climate Action Plan's goal of reducing "core" city emissions to 36% below 2005 in 2020, which was adopted in 2012, assuming linear emission reductions. The 2050 bar shows Oakland's target of 83% below 2005 levels in 2050. The blue stars represent Oakland core emissions estimates for 2005, 2010, and 2013, as determined by the City of Oakland. The gray bars show the emissions expected to result from coal shipped through the proposed Oakland terminal, at the conservative rate of 5 MMTPA. This figure assumes that the coal is eventually burned in power plants.[318]***

Oakland's efforts to reduce its emissions, both directly and indirectly, are mentioned in proposed terminal planning documents. The 2013 Standard Conditions of Approval and Mitigation Monitoring and Reporting Program (SCA/MMRP), as revised by the City Council, includes the requirement of a GHG reduction plan, which must answer to this question (emphasis added):

> *"Would the project generate greenhouse gas emissions, <u>either directly or indirectly</u>, that may have a significant impact on the environment?"*[319]

The goal of the required GHG reduction plan, as specified, is to "increase energy efficiency and reduce GHG emissions by at least 20 percent, with a goal of 36 percent below the project's "adjusted" baseline GHG emissions to <u>help achieve the City's goal of reducing GHG</u>

[318] In 2009, the Oakland City Council adopted GHG reduction goals of 36 percent fewer emissions by 2020 and 83 percent fewer emissions by 2050. This figure assumes a linear reduction in Oakland core emissions between 2005 and 2020, necessitating approximately 71,800 $mtCO_2e$ reduction per year during that time period. Burning 5 million metric tons of coal in a power plant releases about 12.9 million $mtCO_2e$. Targets and 2010 and 2013 emission inventory estimates are derived from City of Oakland Emission Inventory, March 2016.

[319] Standard Conditions of Approval and Mitigation Monitoring and Reporting Program, Revised by City Council 16 July 2013. See p. 27.
http://www2.oaklandnet.com/oakca1/groups/ceda/documents/report/oak042281.pdf

emissions." The SCA/MMRP specifies that project sponsors must submit the GHG Reduction Plan for City review and approval.[320] Project sponsor TLS clearly expressed the need to conform to the SCA/MMRP in design, construction, and operation of the terminal.[321]

Emissions from end use of the coal exported through the proposed terminal are an indirect source of greenhouse gas emissions from the project that would have a significant impact on the environment. To be consistent with the intent and requirements of the City's Energy and Climate Action Plan and the SCA/MMRP, the project should both reduce its operational baseline as directed and avoid causing significant impact on the environment through net indirect greenhouse gas emissions resulting from the project; the latter taking into account the range of commodities available for export. Export of coal through the proposed terminal will make it practically impossible to fulfill the indirect GHG reduction requirement.

### 8.1.c International greenhouse gas reductions

The OECD and other international organizations have made clear that coal combustion will need to be reduced in order to meet local, state, national, and international climate change mitigation goals. Even the most advanced (and costly) coal-fired power plants are not going to be consistent with the mitigation efforts required to keep climate change below 2°C of warming above pre-industrial levels (a goal commonly cited by the world community) unless they can capture and store the $CO_2$ they produce.[322]

Efforts to lower heat-trapping greenhouse gas emissions in Oakland and California, and lower coal use throughout the United States through the Obama Administration's Clean Power Plan, will be negated to the extent that the coal we avoid using in this country is exported to be used elsewhere, followed by the impacts of global warming to our communities.[323]

California Governor Jerry Brown has stated that, "It doesn't make sense to be shutting down coal plants and then export it [coal] for somebody else to burn it in a more dirty way.

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[320] Standard Conditions of Approval and Mitigation Monitoring and Reporting Program, Revised by City Council 16 July 2013. See p. 27.
http://www2.oaklandnet.com/oakca1/groups/ceda/documents/report/oak042281.pdf

[321] "In addition to the normal California regulatory regime of existing federal, state, and local regulations, the Terminal Logistics Solution (TLS) project must be designed, constructed, and operated within and in conformance to the Oakland Army Base Redevelopment program Standard Conditions of Approval /Mitigation Monitoring and Reporting Program (SCA/MMRP) requirements." TLS Basis of Design Introduction.

[322] "Between now and 2050, if no further mitigation measures are undertaken, coal generation is projected to emit more than 500 $GtCO_2$. That is around half the remaining carbon budget consistent with staying under 2°C." http://www.oecd.org/environment/climate-what-has-changed-what-has-not-and-what-we-can-do-about-it.htm, OECD 2015. For reference to the 2°C goal, please see for example UNFCCC (2015). "Adoption of the Paris Agreement," Conference of the Parties, 21st Session, Paris, 30 Nov-11 Dec 2015. http://unfccc.int/resource/docs/2015/cop21/eng/l09r01.pdf.

[323] Several written testimony letters submitted by the public addressed this point.

But what we need is a national plan to reduce all fossil fuels. Certainly, coal would be at the top."[324] Governor Brown has also specified that "over 90 percent" of coal "can never be taken out of the ground."[325]

UC Berkeley Professor Maximilian Auffhammer wrote, "As we are working towards a global climate architecture, leakage of carbon from regulated areas [such as California] is a major concern as it partially offsets the effectiveness of such legislation...Using this terminal to ship coal to Asia simply provides a valve to leak coal to its biggest consumer and offset US federal and California legislation."[326]

## 8.2 Health effects of climate change in Bay Area

This section details the expected effects of climate change on Oakland and surrounding areas.

The health and safety of Bay Area residents, and specifically those in Alameda County, is expected to be affected by climate change over the next few decades. Climate change threatens Oakland specifically, with impacts that are felt as both discrete shocks (coastal floods, increased wildfire risks) and continual or periodic stress (rising seas and droughts). As the climate warms, droughts, extreme heat days, large rainstorms and other abnormal weather patterns are expected to occur more frequently and intensely.[327]

Oakland's poorer residents, the elderly, and children may be disproportionately vulnerable to these increasing threats.[328] (See Figure 26.) Mortality in Alameda County may increase 17.4% for every 10 degree (F) change in mean daily temperature, with an excess mortality risk of 9.2% for people over 65.[329] Mortality from cardiovascular conditions on extremely hot days is estimated to be up to 28 percent higher than normal.[330] The elderly, infants and

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[324] Yardley (2015). How Utah quietly made plans to ship coal through California. LA Times. Dec 11 2015.
[325] On July 21, 2015, Governor Jerry Brown made the following remarks at the Vatican: "One-third of the oil that we know exists as reserves can never be taken out of the ground. Fifty percent of the gas can never be used and over 90 percent of the coal. Now, that is a revolution. That is going to take a call to arms." https://www.gov.ca.gov/news.php?id=19047 "Governor Brown to World's Mayors: It's Up to Us to Make it Happen." The press release about his remarks noted: "Earlier this year, Governor Brown issued an executive order to reduce greenhouse gas emissions in California 40 percent below 1990 levels by 2030 - the most ambitious target in North America and consistent with California's existing commitment to reduce emissions 80 percent under 1990 levels by 2050. The Under 2 MOU builds on other international climate change pacts with leaders from Mexico, China, North America, Japan, Israel and Peru."
[326] Written testimony provided by Dr. Maximilian Auffhammer, on September 21, 2015. Dr. Auffhammer is a Professor of Environmental Economics and Associate Dean of Social Sciences, UC Berkeley, and was a Lead Author of the Intergovernmental Panel on Climate Change Fifth Assessment Report.
[327] City of Oakland 2016-2021 Local Hazard Mitigation Plan. May 13, 2016. : www.oaklandnet.com/lhmp
[328] City of Oakland 2016-2021 Local Hazard Mitigation Plan. May 13, 2016. : www.oaklandnet.com/lhmp
[329] Ostro, B. et al. (2011). "Quantifying the health impacts of future changes in temperature in California," Environmental Research.
[330] California Climate Change Center (2012). "Our Changing Climate: Vulnerability & Adaptation to the Increasing Risks from Climate Change in California," http://www.energy.ca.gov/2012publications/CEC-500-2012-007/CEC-500-2012-007.pdf.

African Americans are at higher risk for hospitalization for stroke, diabetes, acute kidney failure, dehydration and pneumonia. Preterm delivery is more likely for all pregnant women. (See Section 4.2.b for more on health effects in vulnerable populations.)

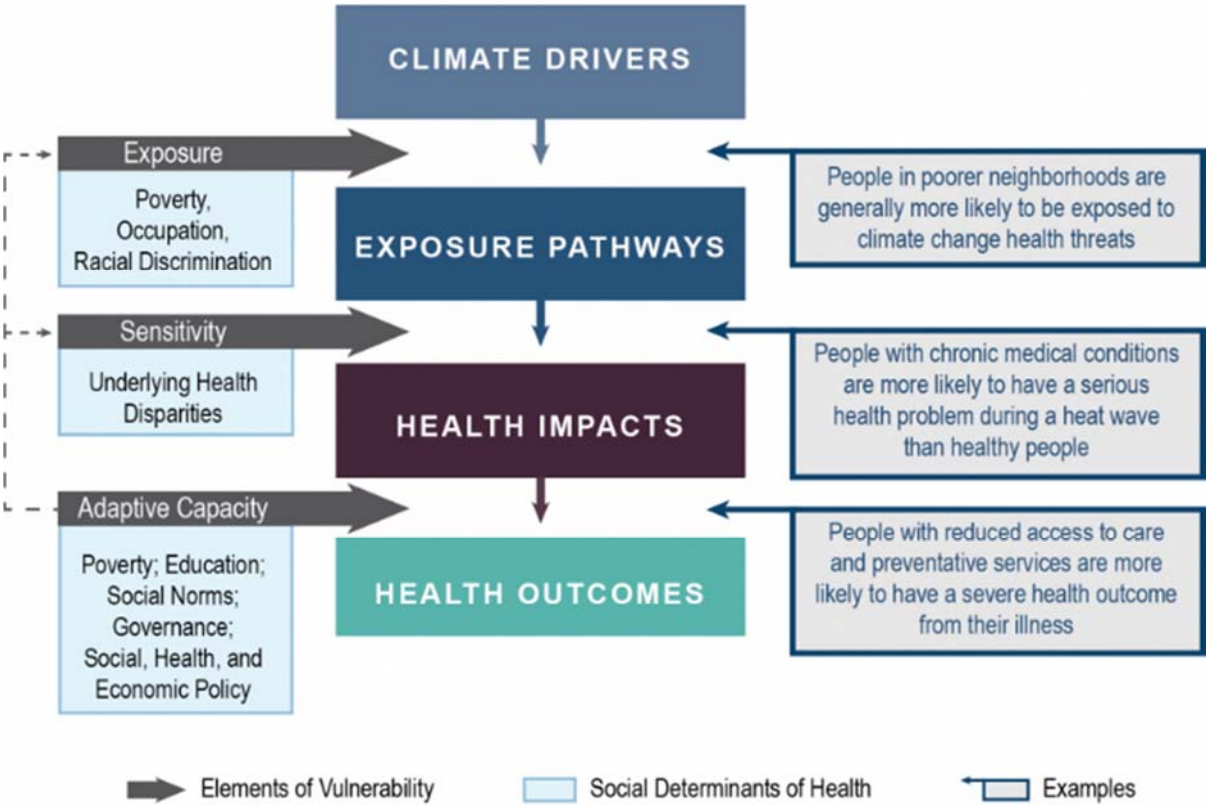


***Figure 26: Intersection of social determinants of health and vulnerability[331]***

## 8.2.a Higher temperatures

Average temperatures in Alameda County are expected to rise between 3.3 and 5.6 degrees Fahrenheit in the next half century.[332] Alameda County is likely to experience the highest percent change in risk estimate per 10˚C increase in apparent temperature (17%), nearly twice as much of an increase per 10˚C than the state-wide average (9%), according to a study of future temperature projections in California.[333]

Extreme heat can have public health impacts, particularly to the elderly and children under five: premature death; cardiovascular stress and failure; and illnesses such as heat stroke,

[331] Gamble, J.L., (2016) Ch. 9: Populations of Concern. The Impacts of Climate Change on Human Health in the United States: A Scientific Assessment. U.S. Global Change Research Program, Washington, DC, 247–286. http://dx.doi.org/10.7930/J0Q81B0T

[332] Laura Wisland, Union of Concerned Scientists, citing California Energy Commission (2015), CalAdapt, http://cal-adapt.org/tools/factsheet/.

[333] Ostro, B. et al. (2011). Quantifying the health impacts of future changes in temperature in California. Environmental Research 111 1258–1264.

heat exhaustion and kidney stones.[334] Mortality linked to extreme heat may double or triple during an extreme heat event.[335] Workers who must labor outside are at particular risk for health impacts from higher temperatures.[336]

The number of extreme heat days in the state is expected to rise 21-24 per year.[337] Historically, there have been four extreme heat days in any given year, statewide. Climate models predict increases in both the intensity and duration of heat waves in California and an increase in ozone pollution. The health effects of higher temperatures and higher ozone concentrations in California have been well documented and will result in increases in mortality, hospitalization and emergency room visits in Oakland.[338]

### 8.2.b Air pollution

It is likely that climate change will worsen $PM_{2.5}$ pollution as well, especially in areas where medium and high social vulnerability exist.[339] By around 2050, 949,000 Alameda County residents are expected to live in areas with high $PM_{2.5}$ and 747,000 of these residents (79%) will be in areas classified as having medium or high social vulnerability.[340]

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[334] City of Oakland (2016). 2016-2021 Local Hazard Mitigation Plan. May 13, 2016. : www.oaklandnet.com/lhmp

[335] California Climate Change Center (2009), "Estimating the Mortality of the July 2006 California Heat Wave," California Energy Commission CEC-500-2009-036-F.

[336] It is with "high confidence" that the Intergovernmental Panel on Climate Change expects "consequences for health of lost work capacity and reduced labor productivity in vulnerable populations" if climate change continues at projected in the scenarios evaluated. Intergovernmental Panel on Climate Change (2014). "Chapter 11: Human health: impacts, adaptation, and co-benefits," Climate Change 2014: Impacts, Adaptation, and Vulnerability. Working Group II, Fifth Assessment Report.

[337] Laura Wisland, Union of Concerned Scientists, citing California Energy Commission (2015), CalAdapt, http://cal-adapt.org/tools/factsheet/. The State of California defines an extreme heat day as a day during the months of April through October, where the maximum temperature exceeds 81 degrees Fahrenheit (in Oakland).

[338] Ostro, Bart, PhD. Testimony submitted September 16, 2015 and October 1, 2015. Former Chief of the Air Pollution Epidemiology Section, California Environmental Protection Agency.

[339] Cooley, H. (2013). "Social Vulnerability to Climate Change in California," Pacific Institute report prepared for California Energy Commission. p 57. "By 2050, an estimated 14 million residents lived in census tracts with $PM_{2.5}$ levels projected to be above the California standard in 2050, which is categorized as high exposure (Table 15). About half of those with high exposure also lived in areas with high social vulnerability." Potential causes of increased $PM_{2.5}$ include higher temperatures, more wildfires, and more biogenic emissions of $PM_{2.5}$ precursors (such as VOCs).

[340] Cooley, H. (2013). "Social Vulnerability to Climate Change in California," Pacific Institute report prepared for California Energy Commission. p 60.

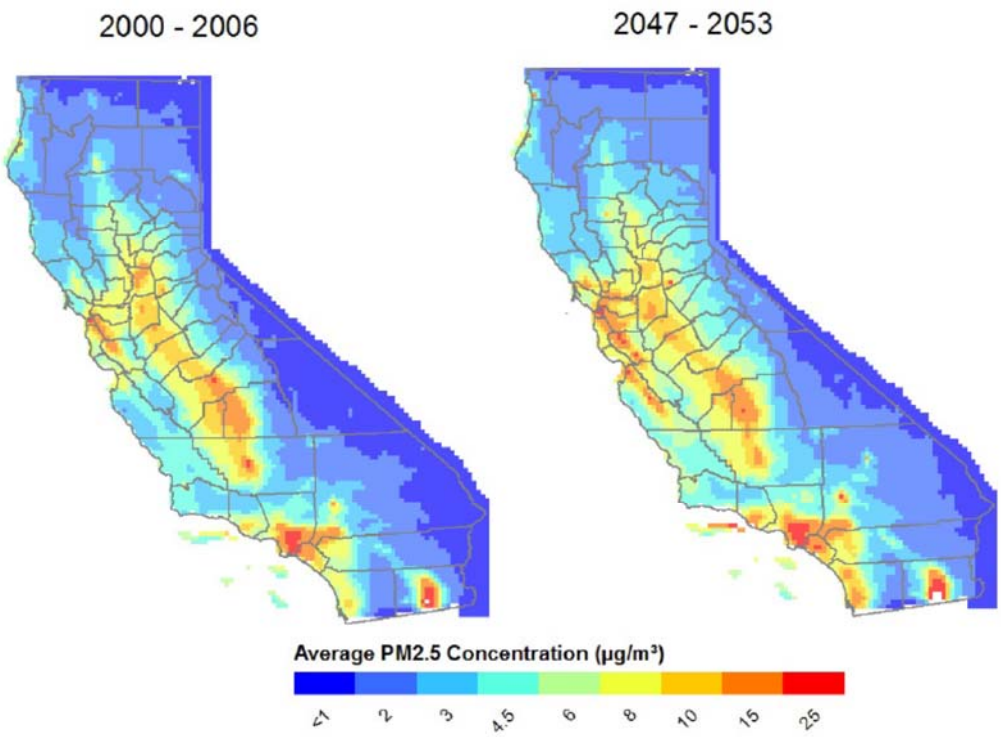


***Figure 27: Average $PM_{2.5}$ concentration under present (7 year average 2000-2006) and projected future conditions (2047-2053).[341]***

### 8.2.c Drought and wildfire

The City's Local Hazard Mitigation Plan notes that California's future climate of frequent drought and higher heat leaves Oakland at extreme risk for wildfire, akin to the 1991 Oakland-Berkeley fire, which killed 25 people, injured 150 people, destroyed more than 3,000 homes and resulted in $9 billion of losses. The hazard mitigation plan notes that "[g]iven the current drought conditions of the last few years, the probability of another wildfire is extremely high. As such, the Oakland hills area remains vulnerable to another catastrophic event."[342]

Global warming has already measurably worsened the ongoing California drought.[343] While scientists largely agree that natural weather variations have caused a lack of rain, rising temperatures are making things worse by driving moisture from plants and soil into the

[341] Projections are based on the NCAR B06.44 Business as Usual Emissions Scenario. Source: Cooley, H. (2013). "Social Vulnerability to Climate Change in California,", Pacific Institute report prepared for California Energy Commission p57.
[342] City of Oakland (2016). 2016-2021 Local Hazard Mitigation Plan. May 13, 2016. www.oaklandnet.com/lhmp
[343] Williams, A. et al. (2015). "Contribution of anthropogenic warming to California drought during 2012–2014," Geophysical Research Letters. http://onlinelibrary.wiley.com/doi/10.1002/2015GL064924/full

air. One study estimates that increased temperatures have driven up water demands by as much as twenty-five percent.[344]

### 8.2.d Infectious diseases

Climate change may affect the geographic range and incidence of several environmental infectious diseases, including West Nile encephalitis, Lyme disease, coccidioidomycosis ("valley fever"), dengue fever, and human hantavirus cardiopulmonary syndrome.[345] West Nile virus activity often appears to be greatest during La Niña conditions of drought and hot summer temperatures, both of which are similar to the conditions likely to be induced by climate change in California.[346] Modeled results also indicate that future climate conditions will also support increased plague activity in the Central and North Coast counties.[347]

## 8.3 Sea level rise in Oakland

Sea level rise is caused by rising temperatures and melting ice and is exacerbated by the release of heat-trapping greenhouse gases and short-lived climate pollutants. When the coal that is proposed to be exported through OBOT is eventually burned, it will contribute to the global temperature increase and sea level rise.

The Oakland Army Base site is considered "most at risk" from sea level rise.[348] Several existing fire stations are also at risk of future flooding, according to the Bay Conservation and Development Commission.[349]

Predictions are that global climate change will increase the sea level rise of San Francisco Bay, and that the frequency and extent of short term, temporary coastal flooding will

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[344] Williams, A. et al. (2015). "Contribution of anthropogenic warming to California drought during 2012–2014," Geophysical Research Letters. http://onlinelibrary.wiley.com/doi/10.1002/2015GL064924/full

[345] English, P. (2011). "Environmental Health Indicators of Climate Change for the United States: Findings from the State Environmental Health Indicator Collaborative," Environmental Health Perspectives. http://ehp.niehs.nih.gov/0900708/

[346] California Department of Public Health, (no date)."Vector-borne disease and climate change," California Environmental Health Tracking Program. http://cehtp.org/faq/climate_change/vectorborne_disease_and_climate_change.

[347] Holt, A.C. et al. (2009) "Spatial analysis of plague in California: niche modeling predictions of the current distribution and potential response to climate change." International Journal of Health Geographics, doi:10.1186/1476-072X-8-38.

[348] City of Oakland (2016). 2016-2021 Local Hazard Mitigation Plan. May 13, 2016. www.oaklandnet.com/lhmp "Oakland is projected to experience 36-66 inches of sea level rise by the year 2100, which, without action, could substantially impact coastal areas: low lying coastal residences, the Port, the former Oakland Army Base, the Oakland Alameda County Coliseum complex, Oakland International Airport, and I-880 are most at risk."

[349] "Fire Station #22 serves the airport and has special equipment for aviation disasters; stations #27 and #29 serve the neighboring communities. The fire stations are vulnerable to future flooding because the buildings are at grade and firefighters rely on vulnerable roads to perform their emergency response function." BCDC (2015), "Oakland/Alameda Resilience Study Phase 1 Report: Vulnerability and Risk Assessment Findings, November 2015 Draft", pgs -20-31. Cited in Local Hazard Mitigation Plan.

increase. Eventually, permanent daily tidal inundation will be reached.[350] Storms are expected to increase in intensity, as well. With Oakland's older stormwater drainage system, processing the water from the predicted higher tides and larger storms could lead to significant increases in both coastal and urban flooding and flood damage.

Sea level is already rising as a result of human activities. In a recent report on sea level rise and its impact on coastal flooding in the San Francisco Bay Area, Climate Central found that human-caused global sea level rise has caused the number of flood days in San Francisco to increase by 118% over the past 30 years. Sea level has risen at least 4 inches since 1950, and 3.5 inches can be linked to human-caused global sea level rise.[351] Between 1950-2014, 329 flood days (69%) were attributable to anthropogenic global sea level rise in San Francisco.[352] Over the past 10 years alone, 81 flood days (82% of all flood days in that period) were attributable to anthropogenic sea level rise in San Francisco.[353]

Our Coast, Our Future is an initiative that assists Californians in better understanding the potential effects of future sea level rise on existing infrastructure. The two figures below represent conservative (expected day-to-day conditions) and likely but less frequent (upper end of projected sea level rise, combined with 100 year storm event) scenarios for 2070-2080.

[350] City of Oakland (2016). 2016-2021 Local Hazard Mitigation Plan. May 13, 2016. www.oaklandnet.com/lhmp

[351] Strauss, B. et al. (2016). "Unnatural Coastal Floods: Sea level rise and the human fingerprint on U.S. floods since 1950," Climate Central Research Report. http://sealevel.climatecentral.org/uploads/research/Unnatural-Coastal-Floods-2016.pdf

[352] "Very likely" range is from 200-420 flood days, or 42-89% of total. Strauss, B. et al. (2016). "Unnatural Coastal Floods: Sea level rise and the human fingerprint on U.S. floods since 1950," Climate Central Research Report. http://sealevel.climatecentral.org/uploads/research/Unnatural-Coastal-Floods-2016.pdf

[353] "Very likely" range is from 62-92 flood days, or 64-93% of total. Strauss, B. et al. (2016). "Unnatural Coastal Floods: Sea level rise and the human fingerprint on U.S. floods since 1950," Climate Central Research Report. http://sealevel.climatecentral.org/uploads/research/Unnatural-Coastal-Floods-2016.pdf

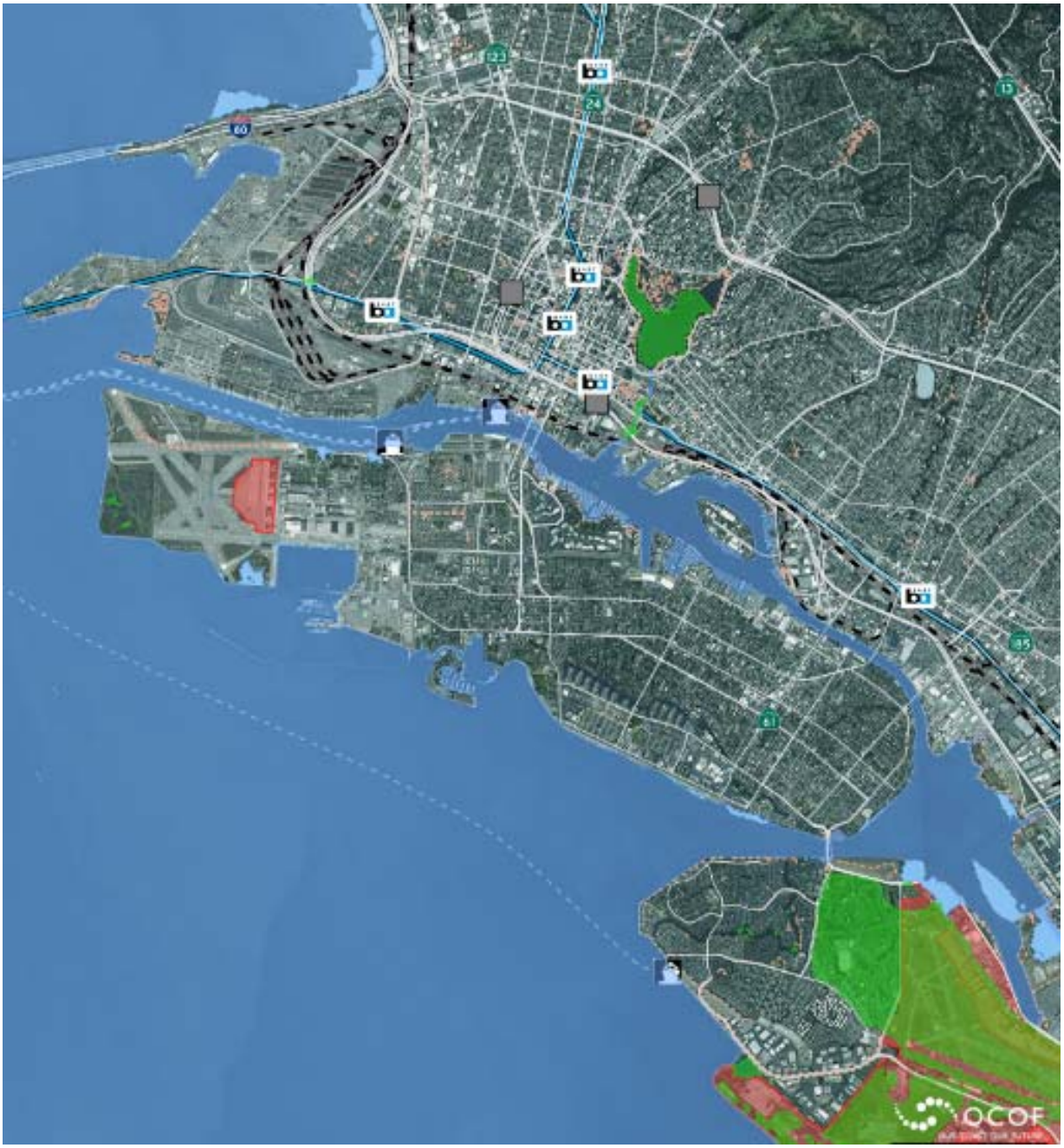

***Figure 28: Flood prone areas in Oakland projected when 50 cm of sea level rise occurs, under everyday conditions with no storm impact or King Tide event. This amount of sea level rise (50 cm or 1.6 feet) is projected for 2070-2080 (within the lease duration of OBOT) by nearly all reports and scenarios.[354] Note the low-lying flood prone areas (shown in green) and the flood hazard areas (shown in blue) in the project site, the Oakland airport and around Lake Merritt. Airports are shown in red.***

[354] Our Coast Our Future, "Comparing Sea Level Rise Predictions." http://data.prbo.org/cadc/tools/sealevelrise/compare/ Viewed 19 May 2016.

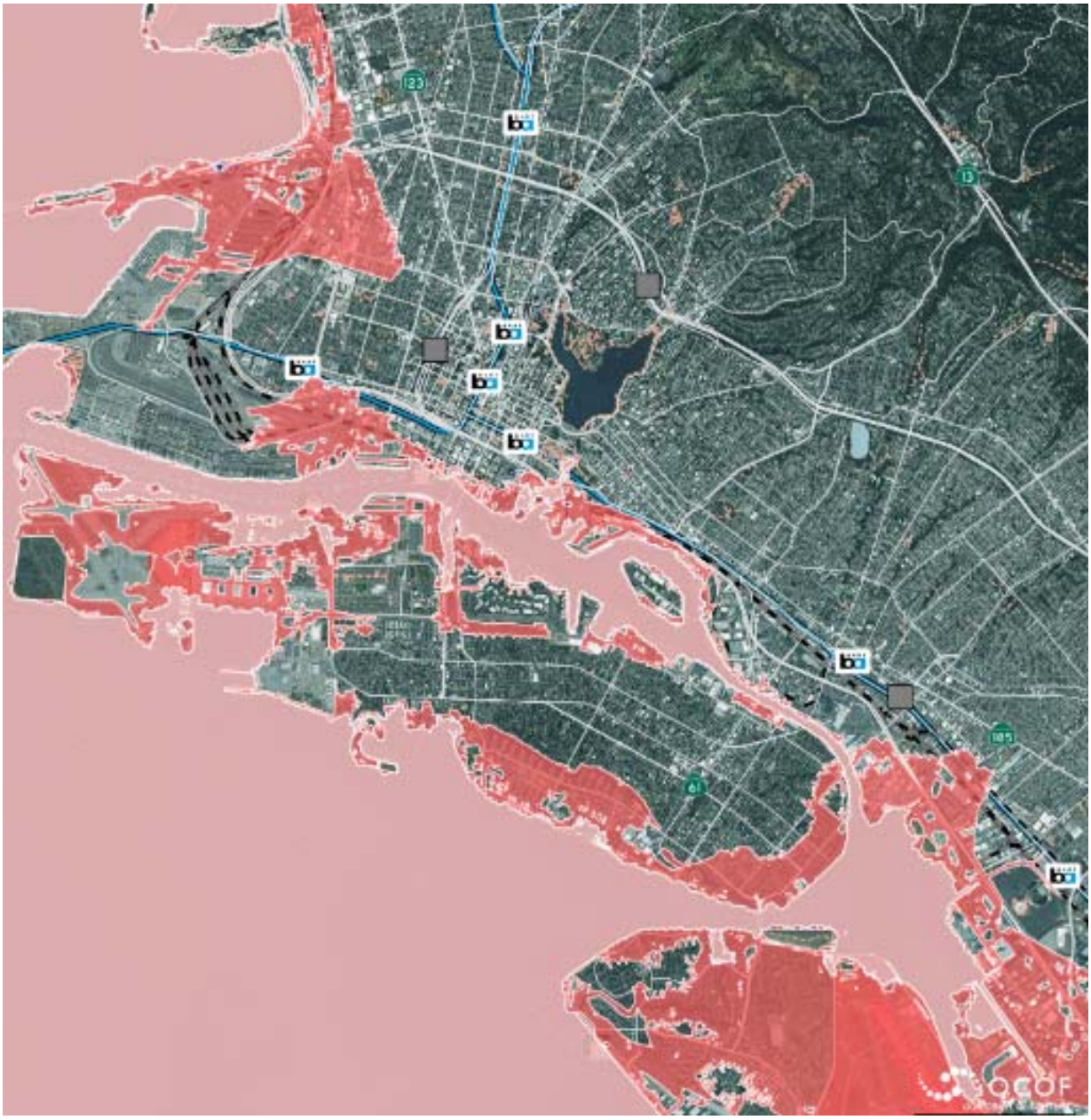

***Figure 29: Projected inundation in Oakland associated with 75 cm of sea level rise, taking into account waves expected during 100 year storm events. Many sea level projections for 2070-2080 (within the lease duration of OBOT) estimate approximately 75cm of sea level rise in the Bay Area. Light pink shading indicates extent of minimum inundation expected; dark pink shading indicates extent of maximum inundation expected. Airports are shown in red.[355]***

The Adapting to Rising Tides project has found that approximately 6,000 Oakland residents would be at risk in a 16-inch sea level rise scenario, and 15,000 residents would be at risk with 55-inch sea level rise, which is expected to occur by the year 2100. The replacement

[355] Our Coast Our Future, "Comparing Sea Level Rise Predictions." http://data.prbo.org/cadc/tools/sealevelrise/compare/ Viewed 19 May 2016.

costs of property in the Adapting to Rising Tides project area in Oakland are estimated at $22 to $38 billion.[356] City facilities at risk with a 16 inch SLR scenario are two fire stations, five health care facilities, two homeless shelters and three schools, among other city facilities.[357]

This is an example of a positive feedback loop which will lead to the exacerbation of safety and infrastructure impacts: the Oakland Army Base site (and its visitors, workers, and adjacent communities) is at short-term and long-term risk from sea level rise, and the project itself (if coal were to be shipped through it) would contribute to additional sea level rise, worsening the problem over time.

## 9. Conclusion

The transloading, handling, storage and shipping of coal in and through Oakland is likely to have serious and on-going health effects and safety risks for residents, workers and others who live, work and/or visit portions of Oakland and adjacent communities.

## Acknowledgements

This report was peer-reviewed by Prof. Rachel Morello-Frosch, PhD, MPH.

[356] City of Oakland (2016). 2016-2021 Local Hazard Mitigation Plan.: www.oaklandnet.com/lhmp
[357] City of Oakland (2016). 2016-2021 Local Hazard Mitigation Plan.: www.oaklandnet.com/lhmp

# APPENDICES

# A1. Acronyms and Abbreviations

| | |
|---|---|
| AB32 | Global Warming Solutions Act of 2006 (California Assembly Bill 32) |
| ACPHD | Alameda County Public Health Department |
| BAAQMD | Bay Area Air Quality Management District |
| BTU | British thermal unit, a measure of energy content |
| CalEPA | California Environmental Protection Agency |
| CARB | California Air Resources Board |
| CCIG | California Capital & Investment Group |
| COPD | Chronic obstructive pulmonary disease |
| CWP | Coal workers' pneumoconiosis |
| EBMUD | East Bay Municipal Utility District |
| EBRPD | East Bay Regional Park District |
| ECAP | Energy and Climate Action Plan (Oakland) |
| EPA | Environmental Protection Agency |
| HDR | HDR Engineering Firm |
| IARC | International Agency for Research on Cancer (WHO Agency) |
| LDDA | Lease Disposition and Development Agreement |
| MEC | Minimum explosive concentration |
| MMTPA | Million metric tons per annum |
| $MMTCO_2e$ | Million metric tons of carbon dioxide equivalent |
| MSHA | Mine Safety and Health Administration (Department of Labor) |
| NAAQS | National ambient air quality standards |
| NIOSH | National Institute for Occupational Safety and Health |
| NMRD | Non-malignant respiratory disease |
| NOx | NO and $NO_2$ (gases) |
| OBOT | Oakland Bulk and Oversized Terminal |
| OECD | Organisation for Economic Cooperation and Development |
| OEHHA | Office of Environmental Health Hazard Assessment (CalEPA) |
| OSHA | Occupational Safety and Health Administration (Department of Labor) |
| PAH | Polycyclic aromatic hydrocarbon |
| PEL | Permissible exposure level |
| $PM_{2.5}$ | Fine particulate matter (having aerodynamic diameter < 2.5 µm) |
| PMF | Progressive massive fibrosis |
| PVC | Polyvinyl chloride |
| REL | Reference exposure level |
| TLS | Terminal Logistics Solutions |
| VOC | Volatile organic compound |
| WHO | World Health Organization |

# A2. TYPES OF COAL

Coals are characterized in grades or ranks, including the following (which are ordered from least to most carbon content per unit mass): lignite, subbituminous, bituminous, and anthracite. Coal grades are determined by level of maturity, which is the product of a combination of geological processes, including time, pressure, and heat. Coal types vary by carbon content, energy density, moisture content, and sulfur content. Thermal or "steam" coal is used to create steam, often for electricity generation. Metallurgic coal is used for making iron or steel. Coal is also used for industrial purposes. In some countries, notably in East Asia, coal is burned in households for cooking and heating.

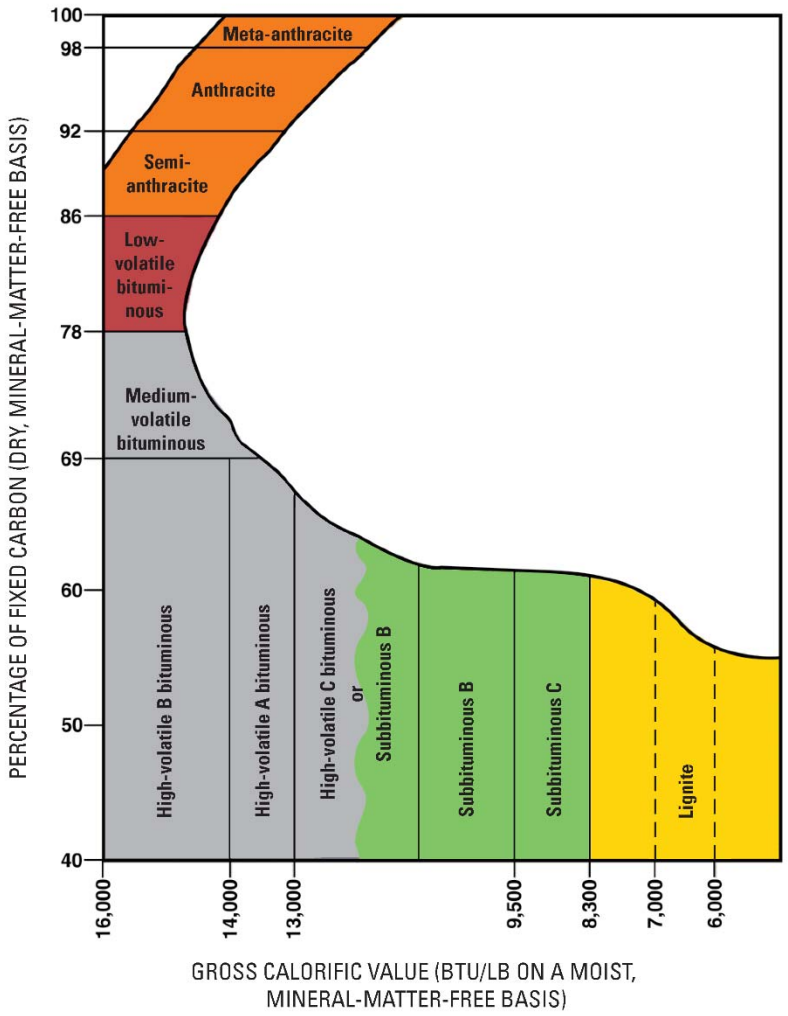


***Figure 19: Types of coal, ranked by energy per mass and percentage of fixed carbon. Source: United States Geological Survey. Utah coals likely to be exported through the terminal range from 11,000-12,000 BTU/lb.***

## A3. PRECAUTIONARY PRINCIPLE

Coal and coal dust affect human health in myriad ways. Some of the effects of coal and coal dust exposure on human health are well-documented; others have not been widely studied. Because of this, policymakers should consider invoking the precautionary principle to guide decision-making around coal and coal dust.

The precautionary principle is based on the following tenet: "Where threats of serious or irreversible harm to people or nature exist, anticipatory action will be taken to prevent damages to human and environmental health, even when full scientific certainty about cause and effect is not available, with the intent of safeguarding the quality of life for current and future generations."[358]

There is a test of two aspects that can be used to determine whether the precautionary principle should be applied: (1) when we suspect our actions may pose a threat to human or ecological health and (2) when scientific uncertainty might otherwise keep us from taking action to prevent harm. If both of the statements are true for a given situation, the precautionary principle approach is appropriate.[359]

Key components of the precautionary principle include the following[360]:

- Taking anticipatory action to prevent harm in the face of scientific uncertainty.
- Exploring alternatives, including the alternative of "no action."
- Considering the full cost of environmental and health impacts over time
- Increasing public participation in decision-making
- Shifting responsibility for providing evidence to proponents of an activity

In 1997, the International Agency for Research on Cancer (IARC) stated in its report on coal dust that it "cannot be classified as to its carcinogenicity to humans" and that there was at the time "inadequate evidence in humans for the carcinogenicity of coal dust."[361] This meant that, at the time, "The available studies are of insufficient quality, consistency or statistical power to permit a conclusion regarding the presence or absence of a causal association, or no data on cancer in humans are available." However, as detailed in the previous sections, evidence that has emerged since that time has strengthened the suspicion that coal dust is very harmful to humans. Section 3 includes information on the

[358] http://www.watoxics.org/files/seattle-pp-whitepaper
[359] http://nsglc.olemiss.edu/Precautionary%20Principle.pdf
[360] http://www.watoxics.org/files/seattle-pp-whitepaper
[361] http://monographs.iarc.fr/ENG/Monographs/vol68/mono68-12.pdf

recent determination, based on new scientific evidence, that particulate outdoor air pollution is carcinogenic.[362]

There is evidence that the precautionary principle should be employed (which would dictate mitigating all exposure) due to the substances that make up coal dust and are on the OEHHA list,[363] especially because exposure to more than one carcinogen, in combination, can have deleterious effects.

In addition, the lack of public information regarding the chemicals included in the surfactants sometimes used on coal transported in rail cars also seems to require application of the precautionary principle. Many of the toppers used on open cars are proprietary and therefore their chemical composition is not disclosed; and in some cases, their Material Safety Data Sheets (MSDS) do not provide sufficient information on human or environmental health impacts.[364] The precautionary principle seems appropriate to apply here, with the goal of protecting the health and safety of Oakland residents, workers, and visitors, as is the responsibility of the City. [365]

[362] In 2013, 24 experts from 11 countries meeting at the International Agency for Research on Cancer (IARC) "unanimously classified outdoor air pollution and particulate matter from outdoor air pollution as carcinogenic to humans (IARC Group 1), based on sufficient evidence of carcinogenicity in humans and experimental animals and strong mechanistic evidence." Loomis, D. et al. (2013). "The carcinogenicity of outdoor air pollution," Lancet.

[363] California Environmental Protection Agency (CalEPA) Office of Environmental Health Hazard Assessment (OEHHA) (2016). State of California Environmental Protection Agency Office of Environmental Health Hazard Assessment Safe Drinking Water and Toxic Enforcement Act of 1986: Chemicals Known to the State to Cause Cancer or Reproductive Toxicity. May 20, 2016. http://oehha.ca.gov/media/downloads/proposition-65//p65single05202016.pdf. See also International Agency for Research on Cancer (2015). "Outdoor Air Pollution," Monograph 109, p42. http://monographs.iarc.fr/ENG/Monographs/vol109/index.php

[364] 2322 p273, sahu

[365] This conclusion was also reached by the Union of Concerned Scientists: "Given the evidence that coal dust and other hazards related to coal transport could jeopardize public health and safety, and the uncertainty surrounding the extent of such hazards or what measures could safely avoid or mitigate the impacts .of coal transport, the most prudent and responsible course is to not allow Oakland residents to be exposed to such risks in the first place." (Adrienne Alvord, UCS, 1751 p83).

# A4. RESOLUTIONS

The following entities have passed resolutions opposing the transport, handling, storage, and/or transloading of coal at or to the proposed terminal:

A4.1. Oakland Unified School District

A4.2. East Bay Mayors

A4.3. East Bay Regional Park District

A4.4. Emeryville

A4.5. Berkeley

A4.6. City of Richmond

A4.7 City of El Cerrito

Please see the attachments at the end of the report.

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**RESOLUTION**
**OF THE**
**BOARD OF EDUCATION**
**OF THE**
**OAKLAND UNIFIED SCHOOL DISTRICT**

**Resolution No. 1516-0195**

**OPPOSING CONSTRUCTION OF A COAL DEPOT IN THE CITY OF OAKLAND, CA; SUPPORTING STATE LEGISLATION AND FEDERAL REGULATIONS DESIGNED TO PROTECT THE CHILDREN AND RESIDENTS OF OAKLAND, CA AGAINST THE HAZARDS AND RELATED ACTIVITIES SUCH A FACILITY POSES TO THE COMMUNITY**

**WHEREAS,** new technologies have resulted in the development of unprecedented amounts of both domestic and foreign oil, natural gas, and other petroleum products and derivatives, which will significantly increase the volume of petroleum products moving by rail; and

**WHEREAS,** the last few years have seen a dramatic rise in transport of crude by rail nationwide—the volume of crude by rail shipments in Northern California increased by 50 percent in 2013 alone—accompanied by a similar rise in accidents, nearly 100 in 2013; and

**WHEREAS,** the increase in crude by rail transportation has resulted in several recent derailments, spills, and fires which have resulted in the loss of human life and billions of dollars of damages, which illustrates the potential catastrophic impacts that could occur in our community from the transport of petroleum by rail; and

**WHEREAS,** a Federal Surface Transportation Board proceeding regarding the transportation of coal by rail found that coal dust can destabilize rail tracks and can contribute to train derailments; and

**WHEREAS,** the U.S. Department of Transportation has concluded that the increase in crude by rail transport poses an imminent hazard warranting emergency measures to abate the serious risks to communities and the environment and the National Transportation Safety Board recently made recommendations to avoid urban areas when transporting crude; and

**WHEREAS,** previous rail car derailment explosions in North America show emergency responders do not have sufficient equipment and supplies to adequately respond to a catastrophic explosion due to a rail car derailment; and

**WHEREAS,** the rail lines that will carry this petroleum run by Oakland's parks, businesses, and schools, and along our waterfront, creeks, and other natural areas; and

**WHEREAS,** coal and pet coke are commonly transported via open-top rail cars and where a large volume of these materials escape during transit, contaminating the surrounding area with coal dust, thereby increasing the risk of derailments; and

**WHEREAS,** coal and petroleum coke contain toxic heavy metals—including mercury, arsenic, and lead—and exposure to these toxic heavy metals in high concentrations is linked to cancer and birth defects in humans and can be harmful to fish and wildlife; and

**WHEREAS,** new coal and pet coke export terminals and crude by rail operations are expected to result in a massive increase in train traffic in California, causing concerns about blocked roads inhibiting the travel of emergency vehicles, pedestrians, and other vehicle traffic; and

**WHEREAS,** increased rail traffic in California will lead to an increase in diesel emissions in communities along rail lines; and

**WHEREAS,** Utah Senate Bill 246, contributes $53 million dollars for the development of a coal depot and transportation of approximately 9 million tons annually of Utah coal to west Oakland for export to China and other countries;

**WHEREAS**, the California Transportation Commission is disbursing grant money given to the City of Oakland and/or its Port via Proposition 1B, in part, to fund the west Oakland depot to which Utah coal will be transported for international export;

**WHEREAS,** the Board of Education of the Oakland Unified School District is deeply concerned about the threat to the lives, safety, and health of its students and staff due to potential spills, and fires from the transport of petroleum by rail to and construction of a coal facility, with attendant environmental hazards, located within the boundaries of the District;

**WHEREAS**, State Senator Loni Hancock has introduced in the California State Senate SB 1277 which declares that the transportation of coal through west Oakland will present a clear danger to the health and safety of Oakland residents as well as the workers that will handle the coal and prohibits the shipment of coal through an Oakland facility that has been paid for, in part, with California funds; SB 1278 which requires an environmental impact review from any public agency that has authority to approve any portion of a project relating to the shipment of coal through Oakland; SB 1279 which prohibits the use of California public funds to build or operate any port that exports coal from California and applies to any port located near a disadvantaged community; and SB 1280 which requires port facilities that ship bulk commodities and receives California funds to prohibit coal shipments or fully mitigate the green-house gas emissions associated with the combustion of the coal,

**NOW, THEREFORE, BE IT RESOLVED,** that the Board of Education of the Oakland Unified School District opposes Utah Senate Bill 246 and supports enactment of California Senate Bills 1277, 1278, 1279 and 1280, and urges the U. S. Department of Transportation (DOT) to adopt regulations increasing federal tank care design and operation regulations for petroleum shipments and phase out of older-model tank cars which do not have stringent standards, which should be issued to protect the health, safety and welfare of the District's children and the residents of the City of Oakland;

**BE IT FURTHER RESOLVED,** that the Board of Education calls upon the Board of Port Commissioners of the City of Oakland and the City Council of the City of Oakland to halt the development of the depot mentioned herein or any similar facility, in the interest of maximally protecting and preserving the health and welfare of the children and residents of the City of Oakland.

**PASSED AND ADOPTED** by the Board of Education of the Oakland Unified School District, this 23rd day of March, 2016, by the following vote:

| | |
|---|---|
| **AYES:** | Jody London, Aimee Eng, Jumoke Hinton Hodge, Roseann Torres, Vice President Nina Senn and President James Harris |
| **NAYS:** | None |
| **ABSENT:** | None |
| **ABSTAINED:** | Shanthi Gonzales |

## CERTIFICATION

We, James Harris and Antwan Wilson, President and Secretary of the Board of Education of the Oakland Unified School District, respectively, do hereby certify that the foregoing Resolution was duly approved and adopted by the Board of said District at its Special Meeting No. 1 held on the 23rd day of March, 2016, in the City of Oakland, CA, with a copy of the Resolution being on file in the Office of the Board of Education of said District.

File ID Number: 16-0638
Introduction Date: 3-23-16
Enactment Number: 16-0465
Enactment Date: 3-23-16
By:

James Harris
President

Antwan Wilson
Secretary

JH:ER:st

PETER MAASS
Mayor of Albany

TOM BATES
Mayor of Berkeley

GREG LYMAN
Mayor of El Cerrito

DIANNE MARTINEZ
Mayor of Emeryville

TOM BUTT
Mayor of Richmond

April 14, 2016

Dear Mayor Schaaf and Members of the Oakland City Council:

We urgently request that you do everything you can to ensure that coal is not allowed to be shipped from the marine terminal under development at the former Oakland Army Base. Coal was not considered in the environmental review of the project when it was approved, and if you don't stop what would be the largest coal terminal on the West Coast of the United States, the health and safety impacts could be severe, not just for Oakland but also for our communities and for the world.

Here is what some of the world's leading organizations say about coal:

- The American Lung Association considers coal dust a source of particulate matter that is dangerous to breathe.
- The World Health Organization cites coal dust, along with silica and asbestos, as responsible for most occupational lung diseases due to airborne particulate.
- The United States Environmental Protection Agency cites numerous scientific studies that link particulate matter with significant health problems, including premature death in people with lung or heart disease, nonfatal heart attacks, irregular heartbeat, aggravated asthma, decreased lung function, and increased respiratory symptoms such as irritation of the airways, coughing, or difficulty in breathing.
- There are no proven topping agents that have demonstrated effectiveness at reducing coal dust over long trips.

Neighborhoods near the port, already suffering the health burdens of toxic pollution from other port activities, would be exposed to coal dust and increased emissions from increased coal train traffic. Our communities also would be impacted. A main rail line likely to be used by coal shipments passes through our cities. Our communities would be exposed not only to coal dust and increased diesel emissions but also to increased risk of collisions and derailments from coal trains. Coal also is the leading source of greenhouse gas emissions among fossil fuels, thus harming our environment no matter where it's burned, and the hydrocarbons and toxic metals dispersed into the atmosphere by coal burning in Asia travel across the Pacific to the West Coast and add to the problems of increased sea level rise, drought and forest wild fires that climate change brings to our state.

We sincerely urge you – for the sake of all of us and the planet – to take action to reject the coal plan and protect the health and safety of our communities.

Sincerely,

Peter Maass | Tom Bates | Greg Lyman | Dianne Martinez | Tom Butt

ADDITIONAL MAYORS OPPOSED TO THE SHIPMENT OF COAL EXPORTS THROUGH OAKLAND

Mayor David Haubert

Mayor Bill Harrison

Mayor Barbara Halliday

Mayor John Marchand

Mayor Pauline Cutter

Mayor Carol Dutra-Vernaci

East Bay Regional Park District

2950 PERALTA OAKS COURT P.O. BOX 5381 OAKLAND CALIFORNIA 94605-0381 T: 1-888-EBPARKS F: 510-569-4319 TRS RELAY: 711 WWW.EBPARKS.ORG

October 5, 2015

Mayor Libby Schaaf
1 Frank H. Ogawa Plaza
3rd Floor
Oakland, CA 94612

Oakland City Councilmembers
1 Frank H. Ogawa Plaza
3rd Floor
Oakland, CA 94612

Dear Mayor Schaaf and City Councilmembers,

I am the elected Director to the East Bay Regional Park District (District) Board representing most of Oakland. As you know, the District along with eight other public agencies, is planning the future Gateway Park on former Oakland Army Base land which the federal government is committed to convey to the District by a public benefit conveyance.

Major entry to the bike/ped trail of the new Bay Bridge will be from Gateway Park. Of course, part of our mission as a park district is to encourage the public to engage in vigorous outdoor exercise; biking and hiking on trails is part of that task. Our next door neighbor will be the bulk terminal now proposed for off-loading coal onto ships which will undoubtedly release plenty of coal dust. The risk to our park users is obvious. The grade from the park to the bridge will be uphill thereby exerting bikers, joggers and walkers who will probably inhale coal dust in the process.

The mile long trains transporting the coal are likely to block Burma Road and other arteries leading to the park, thereby isolating the park from the rest of the city. This is not only inconvenient, but could be dangerous in the event of an emergency, trapping sick or injured people in the park for long periods of time.

For these and other reasons, please prohibit coal transportation through the city.

East Bay Regional Park District

2950 PERALTA OAKS COURT P.O. BOX 5381 OAKLAND CALIFORNIA 94605-0381 T: 1-888-EBPARKS F: 510-569-4319 TRS RELAY: 711 WWW.EBPARKS.ORG

Yours truly,
/s/ Director John Sutter
Director, EBRPD

cc. Robert Doyle
Bob Nisbet
Erich Pfuehler
Oakland City Councilmembers

- Dan Kalb, Council District 1
- Abel Guillen, Council District 2
- Lynette Gibson McElhaney, Council District 3
- Annie Campbell Washington, Council District 4
- Noel Gallo, Council District 5
- Desley Brooks, Council District 6
- Larry Reid, Council District 7
- Rebecca Kaplan, Vice Mayor

EAST BAY REGIONAL PARK DISTRICT

RESOLUTION NO.: 2015 -11 - 316

November 3, 2015

RESOLUTION TO OPPOSE EXPORT OF COAL THROUGH
THE NEW OAKLAND GLOBAL TRADE AND LOGISTICS CENTER

WHEREAS, the mission of the East Bay Regional Park District includes a commitment to incorporate an environmental ethic to guide all that we do; and

WHEREAS, the District is an active, committed leader in the international Healthy Parks Healthy People movement; and

WHEREAS, the new eastern span of the Oakland-San Francisco Bay Bridge features the very popular Alexander Zuckermann bicycle / pedestrian path along its southern edge which is now a destination of regional significance; and

WHEREAS, the pathway will connect to a segment of the Bay Trail on a spit of U.S. Army property located at the east end of the bridge, which is planned to be transferred to the East Bay Regional Park District for the development of Gateway Park; and

WHEREAS, the possibility of daily release of coal dust directly adjacent to a park is counter to the District's mission to provide healthful recreation and include an environmental ethic in the District's activity; and

WHEREAS, coal dust presents clear health risks to communities, as tests show that coal dust contains substances known to impact human health including arsenic, lead, chromium, nickel, selenium and other toxic heavy metals; and

WHEREAS, coal burning leads to as many as 13,000 premature deaths every year and more than $100 billion in annual health costs.

NOW, THEREFORE, BE IT RESOLVED the Board of Directors of the East Bay Regional Park District hereby express opposition to the export of coal through Oakland and specifically the Oakland Global Trade and Logistics Center at the former Oakland Army Base; and

BE IT FURTHER RESOLVED, the General Manager is hereby authorized and directed, on behalf of the District and in its name, to execute and deliver such documents, and to do such acts as may be deemed necessary or appropriate to accomplish the intentions of this resolution.

Moved by Director Sutter, and seconded by Director Wieskamp, and adopted this 3rd day of November, 2015, by the following vote:

| | |
|---|---|
| FOR: | Beverly Lane, Doug Siden, John Sutter, Ayn Wieskamp, Dennis Waespi. |
| AGAINST: | None. |
| ABSTAIN: | None. |
| ABSENT: | Diane Burgis, Whitney Dotson |

Board President

**CERTIFICATION**

I, Yolande Barial Knight, Clerk of the Board of Directors of the East Bay Regional Park District, do hereby certify that the above and foregoing is a full, true and correct copy of Resolution No. 20511-316 adopted by the Board of Directors at a regular meeting held on November 3, 2015

**RESOLUTION NO. _____**

**RESOLUTION OF THE CITY COUNCIL OF THE CITY OF EMERYVILLE OPPOSING THE MINING, EXPORT AND BURNING OF COAL, AND THE TRANSPORTATION OF COAL AND PETROLEUM COKE ("PETCOKE") ALONG CALIFORNIA WATERWAYS, THROUGH DENSELY POPULATED AREAS, INCLUDING THE CITY OF EMERYVILLE**

---

**WHEREAS,** Emeryville has roads and rail lines capable of transporting large quantities of petcoke and coal materials; and

**WHEREAS,** the California Assembly passed, and Governor Brown signed, Joint Assembly Resolution No. 35 in September 2012 urging the President and Congress to restrict the export of coal for electricity generation to any nation that fails to adopt regulations on greenhouse gas emissions or hazardous air emissions as restrictive as those adopted by the U.S.; and

**WHEREAS,** in Washington and Oregon, 27 cities passed similar resolutions opposing coal transport and export, and hundreds of other public officials – including Governors Kitzhaber and Inslee, state and federal agencies, tribes, health entities, religious leaders and other community leaders, have recognized the harms of coal by making statements of concern about coal transport and export. The State of Washington Department of Ecology, through its SEPA process, is requiring a comprehensive cumulative impacts analysis of proposed coal export facilities and rail transport from mine to port to plant spanning the Powder River Basin to Asia for the proposed Longview and Bellingham coal export facilities; and

**WHEREAS,** coal and petcoke are commonly transported via open-top rail cars and there is evidence that a large volume of those materials escape during transit. The Port of Oakland memo dated February 19, 2014, "Environmental Issues Associated With Handling Export Coal," estimates that even if a surfactant is applied, 6 tons of coal dust are still released by a 125-car train over the course of a 400-mile trip, or 12-18 tons over the course of a 800-1,200 mile trip. According to at least one report from the BNSF Railway, each coal car in a 125-car coal train loses, on average, 500 pounds of coal per car in transit, for a total of up to 60,000 lbs lost per train on an average trip. Uncovered rail cars could contaminate cities, towns, farmland, forestland, streams, and rivers across California with coal dust and chunks of coal; and

**WHEREAS,** a federal Surface Transportations Board proceeding on coal by rail transportation found that coal dust is a "pernicious ballast foulant" that can destabilize rail tracks and contribute to train derailments. Between July 2012-2013 at least 40 coal trains in the U.S. derailed, causing four victims to lose their lives, large amounts of coal to spill, major delay to other rail users, and significant costs to repair the damage; and

**WHEREAS,** the transportation of coal in open rail cars and accumulation of coal on or near rail lines has been known to create public safety hazards, including train derailments, explosions and fires; and

**WHEREAS,** new coal and petcoke export terminals are expected to result in an increase in train traffic in California, causing concerns about blocked roads, causing great inconvenience, increasing costs to business and commerce, inhibiting the travel of emergency vehicles, pedestrians, access to waterways near the rail lines for fishing and other recreational use, and other vehicle traffic, and potentially catastrophic train derailments; and

**WHEREAS,** increased rail traffic in California from coal can lead to an increase in diesel emissions in communities along rail lines, and exposure to particulate matter from diesel engines has been linked to impaired pulmonary development in adolescents; increased cardiopulmonary mortality; measurable pulmonary inflammation; increased severity and frequency of asthma attacks, emergency room visits, and hospital admissions in children; increased rates of heart attacks and strokes in adults; increased risk of cancer; and increased asthma and lung disease in children; and

**WHEREAS,** coal contains toxic heavy metals – including mercury, arsenic, and lead – and exposure to these toxic heavy metals in high concentrations is linked to cancer and birth defects; and

**WHEREAS,** petroleum coke contains Polycyclic Aromatic Hydrocarbons (PAHs) and heavy metals – including arsenic, copper, mercury, nickel, and zinc – at levels that are harmful to fish and wildlife as well as humans; and

**WHEREAS,** trains delivering coal traveling through the Bay Area will follow routes adjacent to the San Francisco Bay, Estuary, and its tributaries, and routes adjacent to the Sacramento River and Sacramento-San Joaquin Delta, Richmond Riviera, and Santa Fe Channel posing a serious threat to these ecosystems, and to California's agricultural irrigation and drinking water supplies; and

**WHEREAS,** hauling coal into California involves traversing some of the most challenging mountain passes in the nation, areas with earthquake faults and numerous unsafe old steel and timber bridges over major waterways, increasing the probability of serious accidents; and

**WHEREAS,** trains and/or trucks delivering coal and petcoke pass through densely populated neighborhoods and the potential of a catastrophic accident involving the transportation of coal and petcoke products, such as a coal train derailment, is a real danger; and

**WHEREAS,** the cumulative impacts of combined coal/petcoke train and truck traffic through, in addition to the cumulative upstream and downstream greenhouse gas impacts of these fossil fuels, must be analyzed;

**NOW, THEREFORE, BE IT RESOLVED,** that the Emeryville City Council opposes the mining, transport, burning, and export of coal in general; and

**BE IT FURTHER RESOLVED,** that the Emeryville City Council opposes the use of existing rail lines and roadways to transport coal and petcoke along California waterways, through densely populated areas, and through the City of Emeryville; and

**BE IT FURTHER RESOLVED** that the City Council shall direct staff to:

- Carefully evaluate CEQA documents and any draft permit approvals, such as air permits or zoning changes, for transport of coal and petcoke, for potential adverse impacts on public health, safety and the environment, and submit comments addressing any such adverse impacts, as well as any omissions or discrepancies;

- Include in all CEQA comments a request for a region-wide cumulative impacts analysis to fully account for the direct, indirect and cumulative impacts associated with multiple proposals for coal and petcoke transport and export in California communities;

- Submit a letter to Governor Jerry Brown requesting a cumulative impacts analysis similar to the Washington Department of Ecology for coal mining, transport and burning;

- Oppose coal and petroleum coke transport through the City of Emeryville and support increased state and federal regulations regarding coal and petroleum coke transport through the City of Emeryville by working with local stakeholders and other groups, including considering filing amicus briefs in support of public entities and environmental organizations that file lawsuits;

- Address impacts to public health, safety, property, air quality, and surface and groundwater caused by the transportation of coal and petcoke through Emeryville by actively enforcing and/or encouraging aggressive enforcement of all applicable local state and federal laws and regulations and engaging in state and federal regulatory processes;

- Alert and communicate with other cities along the transportation route, and support their opposition to coal and petcoke transport, as well as efforts for stronger regulation;

- Work through the California League of Cities, California League of Counties, and other relevant organizations to articulate opposition to coal and petcoke transport, as well as support for stronger regulations;

- Alert State legislative representatives and lobbyists in Sacramento and enlist

their help;

- Lobby federal Senators and Representatives for help at the federal level.

**ADOPTED,** by the City Council of the City of Emeryville at its regular meeting held Tuesday, June 16, 2015.

**MAYOR**

**ATTEST:**

**APPROVED AS TO FORM:**

**CITY CLERK**

**CITY ATTORNEY**

RESOLUTION NO. 67,280–N.S.

OPPOSE SHIPMENT OF COAL THROUGH THE MARINE TERMINAL UNDER DEVELOPMENT AT THE FORMER OAKLAND ARMY BASE

WHEREAS, coal-producing counties in Utah and the developers of the large marine terminal under development at the former Oakland Army Base have proposed to ship large volumes of coal – estimated at up to 5 million tons per year -- through the terminal, which is called the Oakland Bulk and Oversized Terminal and also the Oakland Break Bulk Terminal; and

WHEREAS, the coal would be transported to the terminal along one or both of the two Class I rail lines serving the Port, including one that runs through West Berkeley; and

WHEREAS, any coal trains traveling through West Berkeley to the terminal would increase the risk of health-damaging coal dust and diesel emissions as well as collisions and train derailments in Berkeley, and coal trains on any rail line to the Oakland terminal would pose the same dangers to other populated areas along the routes, especially neighborhoods of West Oakland, which are already burdened by pollution and other adverse impacts from Port of Oakland operations; and

WHEREAS, coal burning is the largest source of greenhouse gas (GHG) emissions among all the fossil fuels; and

WHEREAS, substantial increases in GHG emissions are responsible for a significant increase in global warming; and

WHEREAS, among the threats facing humankind, global warming may pose the greatest danger of long-term catastrophe, including: starvation caused by shortage of food; sea-level rise leading to flooding of major cities, coastal regions and island nations; massive flight of refugees; extinction of many species; and drastic shifts in weather, including increased floods, more droughts and devastating storms; and

WHEREAS, coal burning stands in direct conflict with the City of Berkeley's Climate Action Plan, with the State of California's climate action goals and policies, and with President Obama's policy to curb reliance on coal; and

WHEREAS, coal burning is a chief source of air pollution, including hydrocarbons and mercury and other toxic heavy metals, creating 50 to 400 more pollutants than natural gas, and contributes to many deaths and long-term damage to health; and

WHEREAS, the primary destination of the coal that would be shipped from the Oakland marine terminal would likely be Asia, chiefly China; and

WHEREAS, a large toll of deaths and disease linked to air pollution in China has been documented in scientific studies, including a widely cited study by the Berkeley Earth

research group, published in *PLoS ONE* in August 2015, which estimated that air pollution (particulate matter) contributes to an estimated 1.6 million deaths in China annually; and

WHEREAS, the site of the new marine terminal is owned by the City of Oakland, whose City Council went on record in 2014 opposing the transport of coal and other hazardous fossils fuels through Oakland; and

WHEREAS, the plan to ship coal from the terminal was not disclosed in 2012 when the City of Oakland granted approvals for the marine terminal and when the California Transportation Commission allocated $242 million of state Proposition 1B Trade Corridor Improvement Funds (TCIF) for the marine terminal and associated infrastructure at the former Oakland Army Base; and

WHEREAS, the chief representative for the developers, Phil Tagami, CEO of CCIG (California Capital & Investment Group), had said coal would not be shipped at the terminal, stating in the project's December 2013 newsletter, "CCIG is publicly on record as having no interest or involvement in the pursuit of coal-related operations at the former Oakland Army Base," according to a July 6, 2015, KQED report; and

WHEREAS, a lawsuit filed Oct. 2, 2015, in Alameda County Superior Court by the Sierra Club, Communities for a Better Environment, San Francisco Baykeeper and the Asian Pacific Environmental Network says the many damaging impacts of shipping coal were not addressed in the project's Environmental Impact Report and asks the court to order the City of Oakland to block pending approvals of the terminal, conduct an environmental review in compliance with the California Environmental Quality Act (CEQA) and not grant any further approvals until CEQA requirements are met; and

WHEREAS, the Sierra Club, Earthjustice, West Oakland Environmental Indicators Project, San Francisco Baykeeper and Communities for a Better Environment have requested in a Sept. 24, 2015, letter to the California Transportation Commission that the Commission block disbursement of state Proposition 1B Trade Corridor Improvement Funds (TCIF) allocations that would support the export of coal or other fossil fuels at the marine terminal; and

WHEREAS, the coal terminal directly conflicts with the requirements and main goals of Proposition 1B Trade Corridor Improvement Funds (TCIF), including "reducing emissions of diesel particulate and other pollutant emissions" and supporting "continuous improvement in infrastructure and environmental mitigation;" and

WHEREAS, the proposed Oakland coal station is opposed by a wide range of local political leaders, environmental organizations and community groups, as well as by the key union that handles port cargo, the International Longshore and Warehouse Union's Northern California District Council and Locals 10 and 34.

NOW THEREFORE, BE IT RESOLVED by the Council of the City of Berkeley that it opposes the shipment of coal through the Oakland Bulk and Oversized Terminal under

development at the former Oakland Army Base, and resolves to transmit copies of this resolution to the following:

- Gov. Jerry Brown
- Oakland City Council
- Oakland Mayor Libby Schaaf
- State Senator Loni Hancock
- Assemblymember Tony Thurmond
- Alameda County Transportation Commission
- Bay Area Air Quality Management District
- California Transportation Commission

The foregoing Resolution was adopted by the Berkeley City Council on November 17, 2015 by the following vote:

Ayes: Anderson, Arreguin, Capitelli, Droste, Maio, Moore, Wengraf, Worthington and Bates.

Noes: None.

Absent: None.

Tom Bates, Mayor

Attest: Mark Numainville, City Clerk

**RESOLUTION NO. 48-15**

**A RESOLUTION BY THE CITY COUNCIL OF THE CITY OF RICHMOND OPPOSING THE MINING, EXPORT AND BURNING OF COAL, AND THE TRANSPORTATION OF COAL AND PETROLEUM COKE ("PETCOKE") ALONG CALIFORNIA WATERWAYS, AND THROUGH DENSELY POPULATED AREAS INCLUDING THE CITY OF RICHMOND**

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**WHEREAS** Richmond has roads, rail lines and marine shipping terminals capable of transporting large quantities of petcoke and coal materials; and

**WHEREAS** the California Assembly passed, and Governor Brown signed, Joint Assembly Resolution No. 35 in September 2012 urging the President and Congress to restrict the export of coal for electricity generation to any nation that fails to adopt regulations on greenhouse gas emissions or hazardous air emissions as restrictive as those adopted by the U.S.; and

**WHEREAS** in Washington and Oregon, 27 cities passed similar resolutions opposing coal transport and export, and hundreds of other public officials – including Governors Kitzhaber and Inslee, state and federal agencies, tribes, health entities, religious leaders and other community leaders, have recognized the harms of coal by making statements of concern about coal transport and export. The State of Washington Department of Ecology, through its SEPA process, is requiring a comprehensive cumulative impacts analysis of proposed coal export facilities and rail transport from mine to port to plant spanning the Powder River Basin to Asia for the proposed Longview and Bellingham coal export facilities; and

**WHEREAS** coal and petcoke are commonly transported via open-top rail cars and there is evidence that a large volume of those materials escape during transit. The Port of Oakland memo dated February 19, 2014, "Environmental Issues Associated With Handling Export Coal," estimates that even if a surfactant is applied, 6 tons of coal dust are still released by a 125-car train over the course of a 400-mile trip, or 12-18 tons over the course of a 800-1,200 mile trip. According to at least one report from the BNSF Railway, each coal car in a 125-car coal train loses, on average, 500 pounds of coal per car in transit, for a total of up to 60,000 lbs lost per train on an average trip. Uncovered rail cars could contaminate cities, towns, farmland, forestland, streams, and rivers across California with coal dust and chunks of coal; and

**WHEREAS** a federal Surface Transportations Board proceeding on coal by rail transportation found that coal dust is a "pernicious ballast foulant" that can destabilize rail tracks and contribute to train derailments. Between July 2012-2013 at least 40 coal trains in the U.S. derailed, causing four victims to lose their lives, large amounts of coal to spill, major delay to other rail users, and significant costs to repair the damage; and

**WHEREAS** , the transportation of coal in open rail cars and accumulation of coal on or near rail lines has been known to create public safety hazards, including train derailments, explosions and fires; and

**WHEREAS** new coal and petcoke export terminals are expected to result in an increase in train traffic in California, causing concerns about blocked roads, causing great inconvenience, increasing costs to business and commerce, inhibiting the travel of emergency vehicles, pedestrians, access to waterways near the rail lines for fishing and other recreational use, and other vehicle traffic, and potentially catastrophic train derailments; and

**WHEREAS** increased rail traffic in California from coal can lead to an increase in diesel emissions in communities along rail lines, and exposure to particulate matter from diesel engines has been linked to impaired pulmonary development in adolescents; increased cardiopulmonary mortality; measurable pulmonary inflammation; increased severity and frequency of asthma attacks, emergency room visits, and hospital admissions in children; increased rates of heart attacks and strokes in adults; increased risk of cancer; and increased asthma and lung disease in children; and

**WHEREAS** coal contains toxic heavy metals – including mercury, arsenic, and lead – and exposure to these toxic heavy metals in high concentrations is linked to cancer and birth defects; and

**WHEREAS** petroleum coke contains Polycyclic Aromatic Hydrocarbons (PAHs) and heavy metals – including arsenic, copper, mercury, nickel, and zinc – at levels that are harmful to fish and wildlife as well as humans; and

**WHEREAS** trains delivering coal traveling through the Bay Area will follow routes adjacent to the San Francisco Bay, Estuary, and its tributaries, and routes adjacent to the Sacramento River and Sacramento-San Joaquin Delta, Richmond Riviera, and Santa Fe Channel posing a serious threat to these ecosystems, and to California's agricultural irrigation and drinking water supplies; and

**WHEREAS** hauling coal into California involves traversing some of the most challenging mountain passes in the nation, areas with earthquake faults and numerous unsafe old steel and timber bridges over major waterways, increasing the probability of serious accidents; and

**WHEREAS** trains and/or trucks delivering coal and petcoke pass through densely populated neighborhoods in Richmond, North Richmond and neighboring communities, and the potential of a catastrophic accident involving the transportation of coal and petcoke products, such as a coal train derailment, is a real danger; and

**WHEREAS** the cumulative impacts of combined coal/petcoke train and truck traffic through Richmond and other parts of California, in addition to the cumulative upstream and downstream greenhouse gas impacts of these fossil fuels, must be analyzed.

**NOW, THEREFORE, BE IT RESOLVED** that the Richmond City Council opposes the mining, transport, burning, and export of coal in general; and

**BE IT FURTHER RESOLVED** that the Richmond City Council opposes the use of existing rail lines and roadways to transport coal and petcoke along California waterways, through densely populated areas, and through the City of Richmond; and

**BE IT FURTHER RESOLVED** that it is the policy of the City of Richmond to not allow city property, including city-owned properties managed by the Port of Richmond, to be used for the storage or export of coal or petcoke; and

**BE IT FURTHER RESOLVED** that the City Council shall direct staff to:

- Carefully evaluate CEQA documents and any draft permit approvals, such as air permits or zoning changes, for transport of coal and petcoke, for potential adverse impacts on public health, safety and the environment, and submit comments addressing any such adverse impacts, as well as any omissions or discrepancies;

- Include in all CEQA comments a request for a region-wide cumulative impacts analysis to fully account for the direct, indirect and cumulative impacts associated with multiple proposals for coal and petcoke transport and export in California communities;

- Submit a letter to Governor Jerry Brown requesting a cumulative impacts analysis similar to the Washington Department of Ecology for coal mining, transport and burning;

- Oppose coal and petroleum coke transport through the City of Richmond and support increased state and federal regulations regarding coal and petroleum coke transport through the City of Richmond by working with local stakeholders and other groups, including considering filing amicus briefs in support of public entities and environmental organizations that file lawsuits;

- Address impacts to public health, safety, property, air quality, and surface and groundwater caused by the transportation of coal and petcoke through Richmond by

actively enforcing and/or encouraging aggressive enforcement of all applicable local state and federal laws and regulations and engaging in state and federal regulatory processes;

- Alert and communicate with other cities along the transportation route, and support their opposition to coal and petcoke transport, as well as efforts for stronger regulation;

- Work through the California League of Cities, California League of Counties, and other relevant organizations to articulate opposition to coal and petcoke transport, as well as support for stronger regulations;

- Alert State legislative representatives and lobbyists in Sacramento and enlist their help;

- Lobby federal Senators and Representatives for help at the federal level

- Submit a letter to rail carriers involved in transport of coal and petroleum coke in Richmond requesting:

    - railroads involved in coal and/or petroleum coke proposals make public any plans for new or expanded rail facilities or significant rail traffic volume increases and that the railroad provide representatives to meet periodically with local citizen groups and local government officials from Richmond to seek mutually acceptable ways to address local concerns;

    - railroads immediately contact the Railroad Operations and Safety Branch of the California Public Utilities Commission to ensure the timely implementation of adequate and updated plans for investigation, inspection, infrastructure improvement, or any other mechanism available to the California Public Utilities Commission to improve and maintain safe operating practices and transport of materials by rail;

    - rail carriers conduct environmental monitoring in the City of Richmond, including but not limited to groundwater and air monitoring, and submit environmental monitoring and testing information to local government entities on an annual basis for 10 years or until the City of Richmond determines that there is no significant environmental impact from activities conducted by the railroad;

    - railroads take proactive measures to prevent rail accidents, offset congestion, and reduce community impacts by drafting road improvement plans for grading, widening, or otherwise providing crossings at intersections that would be impacted by rail traffic increases, and to pay in full for these upgrades;

**BE IT FURTHER RESOLVED** that the City Council will direct staff to expedite CEQA analysis and approve permits for projects designed solely to reduce harmful emissions or required to comply with environmental laws, including consideration of a negative declaration for proposed covered storage of fossil fuels.

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**I CERTIFY** that the foregoing resolution was adopted at a regular meeting of the City Council on May 19, 2015, by the following vote:

| | |
|---|---|
| AYES: | Councilmembers Beckles, Martinez, McLaughlin, Pimplé, Vice Mayor Myrick, and Mayor Butt. |
| NOES: | Councilmember Bates. |
| ABSTENTIONS: | None. |
| ABSENT: | None. |

PAMELA CHRISTIAN
CLERK OF THE CITY OF RICHMOND
(SEAL)

Approved:

TOM BUTT
Mayor

Approved as to form:

BRUCE GOODMILLER
City Attorney

State of California }
County of Contra Costa : ss.
City of Richmond }

I certify that the foregoing is a true copy of **Resolution No. 48-15**, finally passed and adopted by the City Council of the City of Richmond at a regular meeting held on May 19, 2015.

**Agenda Item No. 5(D)**

RESOLUTION NO. 2016–XX

RESOLUTION OF THE CITY COUNCIL OF THE CITY OF EL CERRITO OPPOSING SHIPMENT OF COAL THROUGH THE MARINE TERMINAL UNDER DEVELOPMENT AT THE FORMER OAKLAND ARMY BASE

WHEREAS, coal-producing counties in Utah and the developers of the large marine terminal under development at the former Oakland Army Base have proposed to ship large volumes of coal - estimated at up to 5 million tons per year - through the terminal, which is called the Oakland Bulk and Oversized Terminal and also the Oakland Break Bulk Terminal; and

WHEREAS, the coal would be transported to the terminal along one or both of the two Class I rail lines serving the Port, including one that runs through West Contra Costa County; and

WHEREOAS, any coal trains traveling through West Contra Costa County to the terminal would increase the risk of health-damaging coal dust and diesel emissions as well as collisions and train derailments in West Contra Costa County, and coal trains on any rail line to the Oakland terminal would pose the same dangers to other populated areas along the routes, especially neighborhoods of West Oakland, Richmond and neighboring communities, which are already burdened by pollution and other adverse impacts from Port of Oakland operations; and

WHEREAS, coal burning is the largest source of greenhouse gas (GHG) emissions among all the fossil fuels; and

WHEREAS, substantial increases in GHG emissions are responsible for a significant increase in global warming; and

WHEREAS, among the threats facing humankind, global warming may pose the greatest danger of long-term catastrophe, including: starvation caused by shortage of food; sea-level rise leading to flooding of major cities, coastal regions and island nations; massive flight of refugees; extinction of many species; and drastic shifts in weather, including increased floods, more droughts and devastating storms; and

WHEREAS, coal burning stands in direct conflict with the City of El Cerrito's Climate Action Plan, with the State of California's climate action goals and policies, and with President Obama's policy to curb reliance on coal; and

WHEREAS, coal burning is a chief source of air pollution, including hydrocarbons and mercury and other toxic heavy metals, creating 50 to 400 more pollutants than natural gas, and contributes to many deaths and long-term damage to health; and

WHEREAS, the primary destination of the coal that would be shipped from the Oakland marine terminal would likely be Asia, chiefly China; and

WHEREAS, a large toll of deaths and disease linked to air pollution in China has been documented in scientific studies, including a widely cited study by the Berkeley Earth research group, published in PLoS ONE in August 2015, which estimated that air pollution (particulate matter) contributes to an estimated 1.6 million deaths in China annually; and

WHEREAS, the site of the new marine terminal is owned by the City of Oakland, whose City Council went on record in 2014 opposing the transport of coal and other hazardous fossil fuels through Oakland; and

WHEREAS, the plan to ship coal from the terminal was not disclosed in 2012 when the City of Oakland granted approvals for the marine terminal and when the California Transportation Commission allocated $242 million of state Proposition 1B Trade Corridor Improvement Funds (TCIF) for the marine terminal and associated infrastructure at the former Oakland Army Base; and

WHEREAS, the chief representative for the developers, Phil Tagami, CEO of CCIG (California Capital & Investment Group), had said coal would not be shipped at the terminal, stating in the project's December 2013 newsletter, "CCIG is publicly on record as having no interest or involvement in the pursuit of coal-related operations at the former Oakland Army Base," according to a July 6, 2015, KQED report; and

WHEREAS, a lawsuit filed Oct. 2, 2015, in Alameda County Superior Court by the Sierra Club, Communities for a Better Environment, San Francisco Baykeeper and the Asian Pacific Environmental Network says the many damaging impacts of shipping coal were not addressed in the project's Environmental Impact Report and asks the court to order the City of Oakland to block pending approvals of the terminal, conduct an environmental review in compliance with the California Environmental Quality Act (CEQA) and not grant any further approvals until CEQA requirements are met; and

WHEREAS, the Sierra Club, Earthjustice, West Oakland Environmental Indicators Project, San Francisco Baykeeper and Communities for a Better Environment have requested in a Sept. 24, 2015, letter to the California Transportation Commission that the Commission block disbursement of state Proposition 1B Trade Corridor Improvement Funds (TCIF) allocations that would support the export of coal or other fossil fuels at the marine terminal; and

WHEREAS, the coal terminal directly conflicts with the requirements and main goals of Proposition 1B Trade Corridor Improvement Funds (TCIF), including "reducing emissions of diesel particulate and other pollutant emissions" and supporting "continuous improvement in infrastructure and environmental mitigation"; and

WHEREAS, the proposed Oakland coal station is opposed by a wide range of local political leaders, environmental organizations and community groups, as well as by the key union that handles port cargo, the International Longshore and Warehouse Union's Northern California District Council and Locals 10 and 34.

NOW THEREFORE, BE IT RESOLVED that the City Council of the City of El Cerrito opposes the shipment of coal through the Oakland Bulk and Oversized Terminal under

development at the former Oakland Army Base, and resolves to transmit copies of this resolution to the following:

- Gov. Jerry Brown
- Oakland City Council
- Oakland Mayor Libby Schaaf
- State Senator Loni Hancock
- Assemblymember Tony Thurmond
- Alameda County Transportation Commission
- Bay Area Air Quality Management District
- California Transportation Commission

I CERTIFY that at a regular meeting on March 15, 2016, the El Cerrito City Council passed this resolution by the following vote:

| | |
|---|---|
| AYES: | COUNCILMEMBERS |
| NOES: | COUNCILMEMBERS |
| ABSTAIN: | COUNCILMEMBERS |
| ABSENT: | COUNCILMEMBERS |

IN WITNESS of this action, I sign this document and affix the corporate seal of the City of El Cerrito on March ____, 2016.

_____
Cheryl Morse, City Clerk

APPROVED:

_____
Gregory B. Lyman, Mayor