

# A Legacy of Pollution

## Why Full Remediation of the Phillips 66 Oil Refinery in Carson, CA is Essential for Health

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**Health in Partnership (HIP):** HIP transforms the field of public health to center equity and build collective power with social justice movements.

**Asian Pacific Environmental Network (APEN):** For over three decades, APEN has been building the power of Asian immigrant and refugee communities on the frontlines of fighting big polluters.

*Cover photo: Residents living in refinery communities often live within feet of polluting sites, separated only by a fence line. (Photo by Anastasia Yulo)*

# Introduction and Key Findings

In 2024, one of the biggest corporate polluters, Phillips 66,\* announced that it would be closing its Wilmington and Carson, CA oil refineries by the end of 2025, after over 100 years of operation.<sup>2</sup> Now that the sites are closed, the Los Angeles Regional Water Quality Control Board is the primary authority overseeing site remediation, which is the cleanup of contaminated properties.<sup>2,3</sup>

**This brief focuses primarily on the Carson Phillips 66 site and the community of Carson.** We explore existing research about the community health impacts of living near a refinery, how Carson is overburdened by pollution, and why aggressive and proactive remediation is necessary for health after a refinery closes.

## **Our key findings are:**

- Oil refineries emit toxic chemicals that impact the health of adults and children living up to 20 km (12.4 miles) away, with people living within 5 km (3.1 miles) experiencing the strongest impacts.<sup>4</sup> Oil refineries also contribute to climate change, which has widespread health and economic impacts.
- Over 80,000 Carson residents live within 5 km of the Carson Phillips 66 site. Nearly all are BIPOC and a third are Asian. The entire city of Carson is within 10 km of the site.
- Phillips 66 is only one piece of the story. Multiple other refineries and thousands of oil wells are located near Carson. Available data shows that Carson residents are overburdened by pollution, especially from toxic releases, fine particulate matter, hazardous waste, and cleanup sites. Rates of cardiovascular disease and asthma are high compared to other areas of the state. It's important for *all* sources of pollution to be addressed, including through full cleanup of the Carson Phillips 66 site.
- When a refinery closes, the health concerns don't automatically go away. Currently, there is no standard requirement around refinery site remediation or who pays for it even though toxic pollutants can linger in communities long after refineries close. In October 2025, an Environmental Investigations and Cleanup report from the California State Water Resources

\* According to The University of Massachusetts Amherst Political Economy Research Institute (PERI), whose most recent Combined Toxic 100/Greenhouse 100 Polluters Indexes lists Phillips 66 as 46 out of 100 large corporations based on chronic human health risk from all their U.S. polluting facilities in 2022 — the latest data available.<sup>1</sup>

Control Board noted the presence of some chemicals (described in full text) at levels above regulatory screening levels at the Carson Phillips 66 site, indicating a potential impact on water quality and human health.<sup>5</sup>

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**The Los Angeles Regional Water Quality Control Board has the opportunity to be a national leader by developing a remediation plan that is community-driven, complete, holds Phillips 66 financially accountable, and ensures that the site is transformed into something beneficial for the community.**

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As this brief shows, Carson residents face a legacy of pollution from multiple refineries and oil wells. Improving the community's health requires that each and every source of pollution is remediated. The Phillips 66 closure is an incredible step in the right direction, but will only translate to healthier communities if the Los Angeles Regional Water Quality Control Board uses this moment to push for levels of clean up that were previously unavailable while the refinery was in operation.

**The Board has the opportunity to be a national leader by developing a remediation plan that is community-driven, complete, holds Phillips 66 financially accountable, and ensures that the site is transformed into something beneficial for the community.** Doing so will set a precedent of what remediation should look like not only in California, but nationwide.

# Oil Refineries and Carson's Health

This section describes how oil refineries impact community health generally and explores Carson-specific data that shows the community is overburdened by pollution.

## How Oil Refining Impacts Community Health

### OIL REFINERIES EMIT DOZENS OF TOXIC POLLUTANTS

**Refineries are among the most toxic industries nationwide.** According to an essay from the Union of Concerned Scientists that summarizes existing research, oil refining processes, storage leaks, and accidental releases emit dozens of air, water, and soil pollutants.<sup>6</sup> The essay summarizes a few of the most harmful toxins, including:<sup>6</sup>

- *Benzene*, which is highly carcinogenic and causes neurological, reproductive, developmental, and immunological damage.
- *PM 2.5*, which are tiny, invisible, deadly particles that can get deep into the brain and lungs, and are linked to cancer and increased risks of infant mortality, asthma in children, and death from cardiovascular disease. PM 2.5 emissions have been found as far as 31.1 miles downwind of a refinery.
- *Nitrogen and sulfur oxide*, which are linked to reduced lung function, cardiovascular disease, low birthweights, increased asthma attacks, and even acid rain.
- *Ground level ozone*, also known as smog, is associated with cancer, heart disease, reproductive concerns, and more. Ground level ozone can travel far from where it's formed.
- *Heavy metals such as selenium*, which can lead to neurological, heart, respiratory, and kidney problems when taken in high amounts.

### COMMUNITIES WITHIN 5 KM OF A REFINERY EXPERIENCE THE HIGHEST HEALTH RISKS, THOUGH IMPACTS HAVE BEEN FOUND EVEN 20 KM AWAY

A 2026 journal article offers a comprehensive review of studies published since 1977 that look at the health impacts of living near petroleum and biofuel refineries.<sup>4</sup> Drawing from nearly

50 years of research, the authors conclude that **“the health burden of refinery emissions is disproportionately borne by nearby communities.”**<sup>4</sup> Their key conclusions are:<sup>4</sup>

- Living near a refinery is associated with a range of acute and chronic health effects among both adults and children, including:
  - ◊ Cancer, particularly leukemia, pancreatic, buccal, larynx, stomach, kidney, lung, breast, lymphatic, hematologic, and prostate cancers
  - ◊ Cardiorespiratory disease, particularly asthma, bronchitis, heart disease, stroke
  - ◊ Respiratory impairment
  - ◊ Overall mortality
  - ◊ Excess healthcare utilization
  - ◊ Biomarkers of systemic inflammation, immunodeficiency, liver, and kidney dysfunction
- Adults and children living within 5 km (3.1 miles) of a refinery have the most adverse health effects, while risks remain elevated as far as 10 km (6.2 miles) away. Some evidence even suggests adverse health impacts as far as 20 km (12.4 miles) away.

## **OIL REFINERIES’ ROLE IN CLIMATE CHANGE, AND FOSSIL FUEL MISINFORMATION**

Beyond the pollutants they emit, oil refineries play a key role in climate change more broadly. Oil refining is the third-largest stationary source of global greenhouse gas emissions, and oil refineries contribute overall to the primary cause of climate change, which is the production and burning of fossil fuels.<sup>7,8</sup>

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A 2024 federal investigation from the House Committee on Oversight and Accountability and Senate Budget Committee found that the fossil fuel industry has known about the relationship between greenhouse gases and climate change for at least 60 years, yet many Big Oil companies worked to deny climate science, spread disinformation, and undermine public understanding.<sup>9</sup>

Despite their efforts, research on the link between oil refining, pollution, climate change, and their impacts on community health remains strong.



*The Phillips 66 refinery in Carson has been operating for over 100 years. Carson residents are pushing for a remediation plan that benefits communities rather than continues the legacy of harm. (Photo by K Sanchez)*

## **CLIMATE CHANGE LEADS TO ECONOMIC COSTS, WHICH AFFECT US ALL**

A 2025 study published by The Center for Law, Energy, & the Environment at UC Berkeley summarizes prior research on the economic costs of climate change in California and across the US.<sup>10</sup> They describe how climate change increases costs in the following ways:

- Rising electricity and home insurance costs, personal expenses in the wake of disasters, and food supply chain disruptions that increase the cost of food all contribute to rising household expenses.
- Climate events such as wildfires or drought may impact the availability of work, leading to lost wages.
- Businesses face costs from supply chain disruptions, direct damage to products, and insurance losses.
- The public sector must pay to repair infrastructure damaged in extreme climate events, on top of shouldering the ongoing cost of building new, climate-resilient infrastructure.
- Exposures like heat, pollution and wildfire smoke contribute to healthcare costs from ER and medical visits, all while climate-driven events affect the quality and availability of healthcare.

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**The average American who is born in 2024 can expect to pay \$500,000 in climate costs in their lifetime.<sup>12</sup>**

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The authors feature key data points found by previous research, including:<sup>10</sup>

- Climate-driven extreme events cost \$2.9 trillion nationwide between 1980 and 2025; 11.4% of those costs were incurred in California.<sup>11</sup>
- The average American who is born in 2024 can expect to pay \$500,000 in climate costs in their lifetime.<sup>12</sup>
- In Southern California, the cost of wildfire smoke comes out to nearly \$85 per person, per day of exposure.<sup>13</sup>
- Extreme heat resulted in \$1 billion of additional healthcare costs from 2016 to 2020, nationwide.<sup>14</sup>

## Pollution and Health in the City of Carson

### **TENS OF THOUSANDS OF CARSON ADULTS AND CHILDREN LIVE WITHIN A 5 KM RADIUS OF PHILLIPS 66\***

According to our estimations, over 80,000 Carson residents live within 5 km of the Carson Phillips 66. This includes nearly 20,000 children and teens – 3,500 of whom are under 5 years old. This population is nearly all (96%) BIPOC, including 28% Asian, reflecting systemic environmental racism that concentrates environmental hazards near communities of color.<sup>15</sup>

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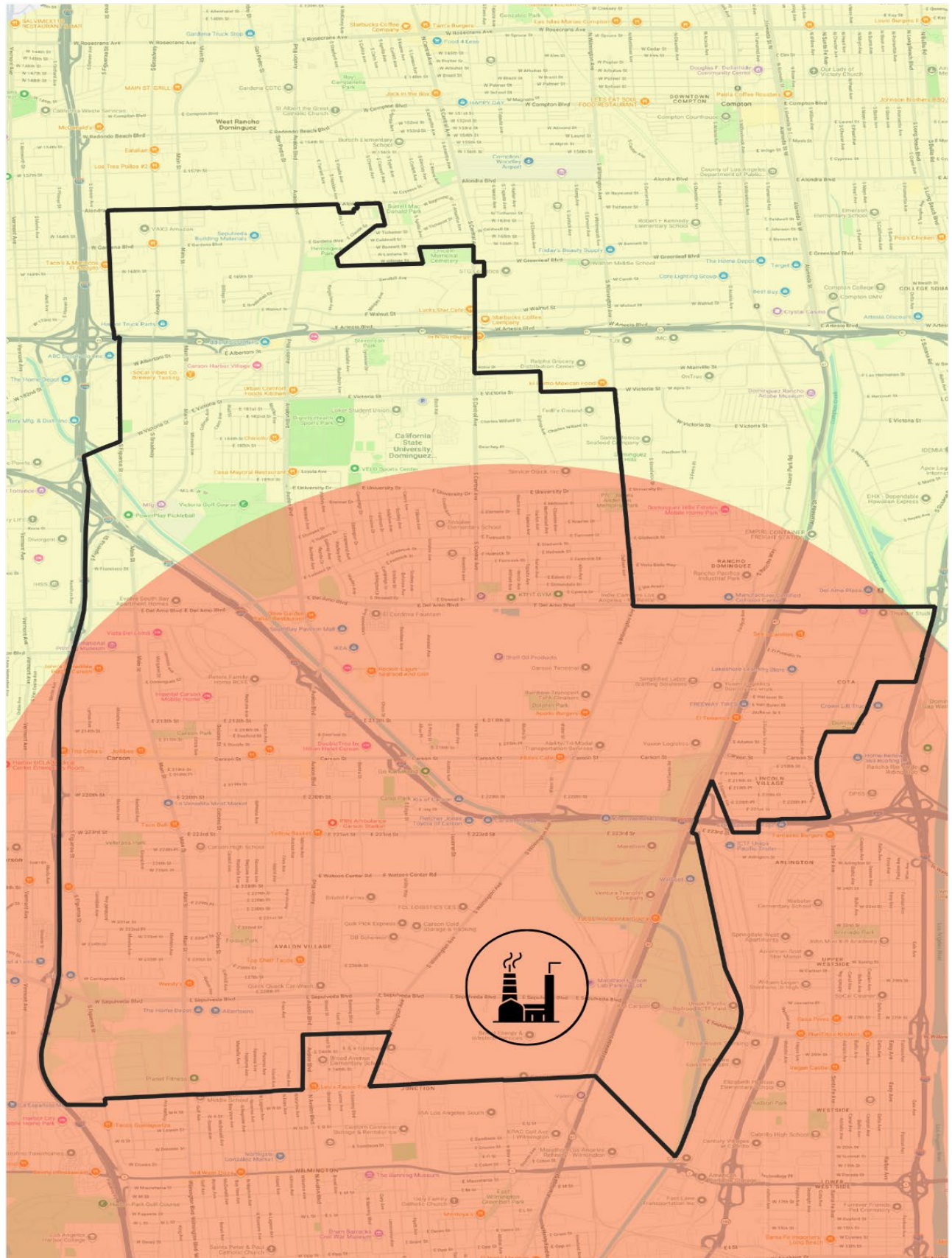
### **CARSON IS OVERBURDENED BY POLLUTION, INCLUDING PM 2.5 AND TOXIC RELEASES**

In addition to soil and groundwater contamination that remains at the Phillips 66 site, which will be described below, Carson residents continue to be exposed to toxic pollutants from multiple other refineries operating in the neighboring areas of Torrance, Wilmington, and El Segundo.<sup>16,17</sup> There are also thousands of oil wells across Carson and neighboring areas, which affect surrounding air.<sup>18,19</sup>

According to CalEnviroScreen 5.0 data, the average Carson census tract has an overall pollution percentile of 80.8\*\* relative to the rest of the state. Some census tracts in the city have percentiles above 99, meaning that they are more burdened by pollution than nearly all of California.

\* See Appendix A for our methodology used in this section.

\*\* CalEnviroScreen is a mapping tool from the State of California Office of Environmental Health Hazard Assessment. To visualize which California communities are the most affected by and vulnerable to pollution, CalEnviroScreen uses environmental, health, and socioeconomic information to produce scores for every census tract in the state. They then use percentiles so users can compare different census tracts to each other. A percentile is defined as the percentage of values that are under the specified value. For example, a pollution percentile of 80.8 means that 80.8% of census tracts in California have less pollution. Because CalEnviroScreen data offers percentiles only for census tracts and cannot be aggregated to the city level, we report the average percentile in Carson in this section. Please see Appendix B for all Carson CalEnviroScreen 5.0 data, including the lowest, average, and highest percentiles in the city. Note that as of the time of writing, CalEnviroScreen 5.0 is considered a draft that is open for public comment.



*This map shows what areas of Carson are within a 5 km (orange area) and 10 km (yellow area) radius of the Carson Phillips 66 site. This map was created through QGIS.*

### **Some of the main pollutants in the city are linked, in part, to refinery operations:**

- Toxic releases, which are concentrations of chemicals released from large facilities. CalEnviroScreen 5.0 includes the Phillips 66 Carson site as one toxic release facility.
  - ◊ Average percentile in Carson: 98.2
- PM 2.5 concentrations, which is one of the main pollutants emitted from refineries.
  - ◊ Average percentile in Carson: 93.4
- Hazardous waste, which is the combined burden of hazardous waste generators and permitted treatment, storage, and disposal facilities. CalEnviroScreen 5.0 includes the Phillips 66 Carson site as a hazardous waste site.
  - ◊ Average percentile in Carson: 76.9

Additionally, recent research from PSE Healthy Energy, UC Berkeley, and UCLA estimates that 29.5 premature deaths in 2021 are attributable to one year of exposure to PM 2.5 from the Phillips 66 Carson site.<sup>20</sup>

Other research found that a 2021 hydrogen sulfide exposure event in Carson led to respiratory and nervous system impacts, including a 38% increase in emergency visits for asthma and 25% increase for migraines and headaches within one month.<sup>21</sup>

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According to CalEnviroScreen 5.0, Carson residents are overburdened by cardiovascular disease (average percentile = 70.6) and asthma (average percentile = 69.5) – both of which are outcomes that health research links to living near refineries. Improving the community's health requires that each and every source of pollution is closed and remediated.

## **FEDERAL GRAND JURY INDICTMENT AND EPA INVESTIGATION OF CARSON PHILLIPS 66**

Following a March 2019 fire at the Carson site, an EPA investigation conducted between April 15 and 18, 2019 found that the company was not complying with the Clean Air Act requirements to ensure accidental releases of hazardous substances do not threaten surrounding communities.<sup>22</sup> As of April 2026, the EPA's website states that Phillips 66 has resolved some of the alleged noncompliance, and the EPA and the Department of Justice are currently in negotiations with Phillips 66 to reach a settlement agreement to address noncompliance at the Carson site.<sup>22</sup>

In 2024, a federal grand jury returned an indictment charging Phillips 66 with violating the Clean Water Act by dumping industrial wastewater from the Carson site into county sewers twice between November 2020 and February 2021, and failing to report the violations.<sup>23</sup> In early 2026, Phillips 66 entered into a deferred prosecution agreement and paid an \$8 million fine as well as \$28,572 in restitution to the LA County Sanitation Districts.<sup>24,25</sup>

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# Importance of Site Remediation

Since Carson is overburdened by pollution, each and every source of pollution must be addressed to keep residents safe. The Phillips 66 refinery closure is a historic step toward reducing the total pollution burden that residents face, but it isn't enough. **Improving Carson residents' health requires a full remediation of the toxic waste left in the refinery's wake.** Setting precedent through the cleanup of Phillips 66 will have broad impacts across the region, since the state's oil industry is in decline and more refineries will likely close in the near future.<sup>26</sup>

## Remediation Lacks Clear Requirements and Strong Precedent

**There is practically no standard process or requirement around refinery remediation and who pays.<sup>2</sup>**

There are also few models available for a cleanup done well. Remediation of the Philadelphia Eagle Solutions (PES) refinery, which closed in 2019, is often cited, but is "likely a poor model for appropriate approaches given significant concerns with its adequacy to protect the surrounding community."<sup>2(p21)</sup>

Indeed, a 2023 analysis found that the soil and water around PES were heavily contaminated with chemicals including benzene, lead, toluene, and benzo(a)pyrene.<sup>27</sup> At the time of the analysis, some contaminants had migrated, potentially impacting a drinking water aquifer.<sup>27</sup>

PES is hardly the only example. Many decommissioned refineries have been designated Superfund Sites — contaminated sites containing hazardous waste that poses risks to human health. A search for "refinery" in the EPA's Superfund Site Database yields 15 results, showing that there is much precedent for the fact that refineries create contamination.<sup>28</sup>

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## The CA State Water Board Indicates that Contaminants Are Present at Carson Phillips 66

According to one of the regulatory profiles for Phillips 66 on the California State Water Resources Control Board's GeoTracker database, **there have been releases of "contaminants of concern" into the underlying soil and groundwater at the Carson Phillips 66 site.**<sup>29</sup>

The Fall 2025 Semiannual Groundwater Monitoring Report — which is most recently available at the time of writing — notes the presence of chemicals in groundwater from sampled wells at the Carson Phillips 66 site, including:<sup>30</sup>

- *Light nonaqueous phase liquids (LNAPLs)*, which include petroleum, oil, or gasoline fuel and were found to be in a layer as thick as 7.16 feet.
- *Benzene*, with maximum concentrations from different wells reading at 14,000, 12,000, and 11,000 µg/L. By comparison, the public health goal of benzene concentration in groundwater is 0.15 µg/L.<sup>31</sup>
- *Lead*, with concentrations from different groundwater samples ranging from 4.9 to 60 µg/L. By comparison, the public health goal of lead concentration in groundwater is 0.2 µg/L.<sup>32</sup>
- *Arsenic*, with concentrations from different groundwater samples ranging from 13 µg/L to 160 µg/L. By comparison, the public health goal of arsenic concentration in groundwater is 0.004 µg/L.<sup>33</sup>
- *Diisopropyl ether (DIPE), tert-butyl alcohol (TBA), and methyl tert-butyl ether (MTBE)*, all of which are highly flammable colorless liquids.<sup>34</sup>

In an October 2025 fact sheet about the Carson Phillips 66 site, the California State Water Resources Control Board wrote:<sup>5</sup>

**"The presence of LNAPL in the subsurface, or the detection of TPH [total petroleum hydrocarbons] and/or VOCs [volatile organic compounds] in soil or soil vapor above regulatory screening levels, indicates a potential impact on water quality and, consequently, human health."**

**The demolition of the Carson Phillips 66 site will also produce hazardous waste**, including over 12,000 cubic yards of asbestos-containing materials and contaminated soil, according to a 2026 notice from the City of Carson, Community & Economic Development Department.<sup>35</sup>

## Precedent for Polluters Paying

**It's essential that Phillips 66 pay for the cost of remediating the soil and groundwater at both their refinery sites.** Ensuring that those who create pollution bear the costs of managing it is a widely accepted principle known as “polluter pays.”<sup>36</sup>

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The polluter pays principle has decades of precedent. It was first introduced in the 1970s and was reaffirmed in 1992 through the Rio Declaration on Environment and Development, which was adopted by more than 175 nations.<sup>37</sup> More recently, states including New York and Vermont have enacted Climate Superfund Bills into law, shifting the cost of climate adaptation away from taxpayers and toward the companies most responsible for greenhouse gas emissions in the first place.<sup>38,39</sup>

There is precedent at the local level as well. In 2024, Chevron agreed to pay the city of Richmond, CA — where it operates a refinery — \$550 million over 10 years as a way to support the community's needs.<sup>40</sup>

# The Los Angeles Water Board Can Be a National Leader

Improving health in Carson requires that every and all sources of pollution are fully remediated. The closure of Phillips 66 presents an amazing opportunity to reduce the amount of pollution present in the city. **But actualizing this opportunity is not an inevitability; it depends on how accountable we become to the frontline communities that face the most impact as we move towards a future that prioritizes the health of communities over oil industry profits.**

In one future, community taxpayers pay for a hasty cleanup that fails to fully remediate chemicals of concern, all while the empty site is developed into new polluting or harmful industries. In another, the Los Angeles Regional Water Quality Control Board develops a comprehensive plan that is community-driven, centers the expertise and leadership of community members on the frontlines, holds Phillips 66 financially accountable, and ensures that the site is transformed into something beneficial for the community.

**The Los Angeles Water Board has the opportunity to be a national leader and set a strong precedent for what a healthy refinery decommissioning looks like.**



*On August 21, 2025, APEN held a town hall in Carson to discuss a community-centered vision for the Phillips 66 refinery closure. Over 100 people attended, including Carson residents, APEN members, Carson City officials, refinery workers, and state representatives. (Photo by Anastasia Yulo)*

# Appendices

## Appendix A

We used the mapping software QGIS to identify the census tracts that fall within 5 and 10 km of each refinery. We counted census tracts that had any level of overlap with these radiuses, even if part of the census tract falls outside the radius. We then calculated the total population, age distribution, and race/ethnicity distribution of those census tracts using data from the 2024 American Community Survey 5-Year Estimates.

## Appendix B

Because CalEnviroScreen 5.0 offers percentiles only for census tracts and cannot be aggregated to the city level, this table contains the range of percentiles across Carson census tracts, as well as their average.

Category	Indicator	Lowest Percentile in Carson	Average Percentile in Carson	Highest Percentile in Carson
Overall	Draft CES 5.0 Percentile (overall Cal Enviro-Screen percentile)	59.92	80.52	99.26
Pollution	Pollution burden (overall pollution burden)	49.42	80.76	99.23
	Toxic releases (concentrations of chemical releases from large facilities)	97.25	98.18	99.28
	PM 2.5 (PM 2.5 concentrations)	85.93	93.39	98.78
	Hazardous waste (combined burden of hazardous waste generators and permitted treatment, storage, and disposal facilities)	51.34	76.88	98.39
	Traffic (average amount of traffic)	42.41	70.01	94.71
	Groundwater threats (impact of nearby groundwater threat sites)	9.55	73.01	98.23
	Cleanup sites (number and types of environmental cleanup sites)	20.04	68.47	99.23

Category	Indicator	Lowest Percentile in Carson	Average Percentile in Carson	Highest Percentile in Carson
	Child's lead (how likely children are to be exposed to lead specifically from housing)	21.52	62.35	94.07
	Diesel PM (how much diesel PM is emitted into the air near where people live)	18.76	59.47	85.21
	Solid waste (combined burden of solid waste sites and facilities, like landfills and recycling centers)	0	47.93	99.88
	Small air toxic sites (combined presence of small air toxic sites that emit air contaminants, like gas stations)	11.84	51.56	98
	Impaired waters (extent of water quality impairments in lakes, streams, rivers, and coastal waters)	0	44.5	89.51
	Ozone (average daily maximum ozone concentrations in summer months - "ozone is a gas and the main ingredient of smog at ground level")	31.78	33.84	38.69
	Pesticides (average use of selected hazardous pesticides in agricultural areas)	0	21.22	68.84
	Drinking water (drinking water quality)	4	10.88	28.06
Populational characteristics	Populational characteristics (overall score based on health and community conditions that can increase vulnerability to pollution)	54.67	69.95	92.67
	Diabetes (prevalence of diabetes among adults)	63.24	83.88	98.57
	Low birth weight (percentage of infants born with low birth weight)	14.83	71.36	99.93
	Cardiovascular disease (ER visit rate for heart attacks)	66.13	70.55	91.2
	Asthma (ER visit rate for asthma)	57.42	69.54	92.54
	Unemployment (percentage of people 16+ who are unemployed)	27.32	61.15	90.25
	Education (percentage of adults 25+ with less than a high school education)	4.75	58.6	93.47
	Linguistic isolation (percentage of households where no one over the age 14 speaks English well)	0	50.89	90.37
	Poverty (percentage of people living below twice the federal poverty level)	10.36	48.99	77.27
	Housing burden (percentage of households that are low income and spend more than half their income on housing)	2.86	36.21	89.91

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