

Portland Cement

Chemical and Environmental Justice Impacts in the Portland Cement Life Cycle

Many AEC professionals may not be aware that the building products they specify can have environmental justice impacts.

Product manufacturing often involves the use and release of toxic chemicals throughout the supply chain, impacting human and environmental health and contributing to environmental injustice.

As built environment practitioners seek to reduce the environmental justice harms caused by their material selections, understanding the role that portland cement plays can help raise awareness of potential impacts.

WHAT IS ENVIRONMENTAL JUSTICE?

The Environmental Justice Health Alliance for Chemical Policy Reform (EJHA) defines environmental justice (EJ) as a set of principles and a grassroots-led movement that “arose in response to the disproportionate exposure of communities of color and low-income communities to harmful pollution, toxic sites and facilities, and other health and environmental hazards.”¹

Read more about the
[Principles of Environmental Justice.](#)

This study explored the chemical and environmental justice impacts of portland cement manufactured in the United States.

You may be familiar with portland cement through its use in concrete, fiber cement siding, terrazzo flooring, plaster, grout, and mortar.² While mineral-based materials, such as portland cement, often have fewer hazards across their life cycle than synthetic materials, it is important to consider how they compare to alternatives and the potential to further reduce any health impacts.

Habitable assessed the chemical hazard and environmental justice impacts of portland cement according to five criteria:

- 1 avoid hazardous chemicals
- 2 prevent accidents
- 3 prevent pollution and waste
- 4 abide by environmental regulations
- 5 prevent disproportionate and cumulative impacts.

Habitable's analysis considered the 99 facilities identified as manufacturing portland cement in the United States.^{3,4} This research was conducted in 2024.

Learn more about Habitable's research process in our [Chemical and Environmental Justice Impacts Methodology](#).

Key Findings:

- Portland cement is derived primarily from mineral-based inputs. Some of the chemical inputs for portland cement production are hazardous, and portland cement manufacturing can release hazardous heavy metals.
- We identified two hazardous chemical incidents—such as fires, spills, and other nonroutine releases—related to portland cement manufacturing.
- Portland cement production facilities generate millions of pounds of related hazardous chemical waste, including releases to the air and water, each year.
- Facilities that make portland cement have a history of noncompliance with U.S. Environmental Protection Agency (EPA) regulations, with 18% of the facilities in significant violation for all of the previous 12 quarters.
- The combined communities surrounding portland cement manufacturing have a higher percentage of people of color and limited English-speaking households than the U.S. overall.

CRITERIA FOR CHEMICAL AND ENVIRONMENTAL JUSTICE IMPACTS	FINDINGS ON PORTLAND CEMENT
Avoid hazardous chemicals	<p>Inputs are primarily mineral based.</p> <p>About 40% of chemicals used as inputs for portland cement production (3 chemicals) are hazardous to human health.</p> <p>One chemical is highly reactive or flammable.</p> <p>One chemical is volatile.</p> <p>Releases of several heavy metal compounds are possible as a result of the process to make portland cement.</p> <p>Portland cement itself is not considered hazardous.</p>
Prevent accidents	<p>Limited chemical incidents related to portland cement manufacturing were identified.</p>
Prevent pollution and waste	<p>Facilities manufacturing portland cement in the United States report that they:</p> <ul style="list-style-type: none"> • generate almost 4.7 million pounds of hazardous portland cement-related chemical waste on average each year (combined); • release an average of 64,000 pounds of hazardous portland cement-related chemicals into the air and water each year (combined). <p>Some of this waste and these releases may be tied to other processes at these facilities.</p>
Abide by environmental regulations	<p>42% of portland cement facilities had significant violations of EPA regulations within the previous 12 quarters.</p> <p>18% of facilities had significant violations in every quarter.</p>
Prevent disproportionate and cumulative impacts	<p>Compared with the United States overall, the combined communities surrounding portland cement manufacturing facilities have a:</p> <ul style="list-style-type: none"> • higher percentage of people of color (47% near portland cement facilities versus 40% in the U.S. overall); • lower percentage of low-income households (27% versus 30%); • higher percentage of limited English-speaking households (6% versus 5%); • similar percentage of children as the nation overall (22%). <p>We further found cumulative impacts:</p> <ul style="list-style-type: none"> • Five different communities each face compounded health impacts from multiple portland cement facilities operating close to one another. • Some cities with portland manufacturing facilities contain no other industrial sites that release and/or manage hazardous chemicals; whereas, other cities contain many other industrial sites—up to 194 in one instance. • 11 cities that we researched contain more than 20 other industrial sites. • In 2022, each individual city experienced collective releases of hazardous chemicals ranging from <1 pound in one location to 4.5 million pounds in another.

Research Details

EPA reports violations quarterly. Compliance data for portland cement facilities is from July 2024.

TRI analysis was based on data through the 2022 reporting year. Average annual releases and waste represent the most recent five years for which data was available at the time of the research (2018–2022).

Habitable used EJScreen version 2.3, including U.S. Census Bureau American Community Survey data for 2018–2022.

Sources specific to portland cement are included to the right and in the accompanying spreadsheet. See Habitable's Chemical and Environmental Justice Impacts Methodology for other sources used in our analysis.

Sources

- 1 EJHA. What Is Environmental Justice?. Environmental Justice For All. <https://ej4all.org/about/environmental-justice> (accessed 2025-01-17).
- 2 Habitable. Pharos Common Products, 2025. <https://pharos.habitablefuture.org/common-products>.
- 3 Cemnet. Cement Plants located in United States. <https://www.cemnet.com/> (accessed 2024-05-31).
- 4 US EPA. Toxics Release Inventory (TRI) Basic Data Files. <https://www.epa.gov/toxics-release-inventory-tri-program/tri-basic-data-files-calendar-years-1987-present>.