

## Superfund Sites: Super Effective or Super Fruitless?

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In the first half of the twentieth century, the pesticide dichlorodiphenyltrichloroethane, or DDT, was used for disease control. In the post-war years, companies such as Montrose Chemical began producing DDT at a high rate, primarily for agricultural use. Based in Palos Verdes, California, Montrose benefitted from high demand both regionally and nationally and rose to become the largest DDT manufacturer in the United States (Risebrough, 2016).

The DDT production process produces a high level of industrial waste. Montrose Chemical discharged this waste into the sewer system managed by the Los Angeles County Sanitation District (EPA, 2008). This sewer system contained an outflow at White Point, off the Palos Verdes shelf. White Point is home to a plethora of fish and other aquatic life, including a thriving White Croaker stock and a high amount of Kelp Bass (Love, et. Al, 1996). DDT contamination directly impacted the habitats and lifestyles of these fish.

A 2021 review by Moser et al. discusses how DDT increases tumor development in the liver, lung, and adrenal glands of animals. These are like the effects of DDT contamination on humans and significantly shorten life expectancy and reproductive yield. Given the aforementioned fish populations on the Palos Verdes shelf where DDT was discharged, it's no surprise that many studies have evaluated how the fish populations in this area have been impacted.

A 1987 Malins et al. study conducted for *Environmental Science and Technology* discusses high concentrations of toxic chemicals found in the Southern California White Croaker. This study evaluates a high correlation between proximity to the White Point sewer outfall and DDT concentration, with more DDT found in fish closer to the outfall. This study formed the basis for a slew of successive studies focusing on the White Croaker and the impacts of DDT. Almost forty years later, a 2022 Otim paper evaluates a set of conditions to evaluate whether the White Croaker experiences organism level stress because of DDT exposure. These conditions include length, mass by body part, and GSI “a measure of energetic investment in gonadal development.” The study found that at the organism level, “The decline [in White Croaker measurements] has accelerated since 1999 and appears to be related to the presence of DDTs and PCB in fish.” With an understanding of the contamination incident and the coinciding effects on local fish populations, we can now evaluate the effectiveness of the action taken by the EPA, particularly the designation of the area as a “Superfund Site.”

“Superfund” is the informal name given to the 1980 Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) (EPA, 2025). Broadly, this act gives the EPA the right to clean up contaminated sites and mandates that the contaminating party reimburse the EPA for the cleanup cost. The Montrose Chemical plant ceased operations in 1985 and was added to the Superfund National Priorities List in 1989.

To evaluate the effectiveness of the Superfund designation in rehabilitating damaged fish populations, we must first understand the actions taken by the EPA. According to the EPA's report on the history of the site, the very first action taken was covering the site with an asphalt cover in 1985 to reduce the levels of contaminants that would exit the site via storm runoff. This asphalt covering is checked monthly and was

expanded in the 1990s to include the entire site. Additional measures were taken in the decade following the designation as a Superfund site, including the removal of ~106 tons of contaminated sediment from sewers from 1996-1998 and the removal of DDT-contaminated soil from 30 residential properties from 1994-1999. Although these initial cleanup measures are effective in preventing further contamination, they fail to remove the DDT contamination from water systems and leave fish populations vulnerable. This lack of effective decontamination in the first decade is due in part to the focus on legal proceedings that culminated in Montrose paying a \$140 million settlement in 2001.

Despite the ineffectiveness of initial responses in cleaning the DDT-contaminated area, measures were eventually taken by the EPA to remove contamination. According to the aforementioned EPA overview of the actions taken at this site, a true groundwater treatment program became operational in February 2019 and removed 65,776 pounds of contaminants (EPA). This plan originated in 1999 and is projected to have complete effectiveness within fifty years of the start date; however, the implementation was largely delayed. Additional treatments using electrical resistance heating and soil vapor extraction in 2017 and 2020 have removed 26,000 pounds and 183,561 pounds of contaminated organic matter, respectively. In 2025 the third “Five Year Report” was prepared by the U.S. Army Corps of Engineers to analyze the effectiveness of cleanup measures taken by the EPA. Please refer to Figure 1 and see that Benzene and Chlorobenzene, two harmful byproducts of DDT, are decreasing, stable, or holding no trend at all tested sites except for one. This indicates that efforts to remove these contaminants have begun to see success over the past five years. Although this success has yet to materialize within the dominant regional fish populations such as the White Croaker, as is discussed in the aforementioned 2021 Otis assessment, it is a strong indication that these populations will begin to see a coinciding decrease in contaminants.

The fish populations in the areas surrounding the Montrose Chemical site were ineffectively supported in their recovery from the contamination incident. Measures to reduce contaminants and monitor these fish weren’t implemented until over 20 years after the original designation of the site as one of National Priority in 1989. Original recovery efforts were focused on reducing further contamination and protecting groundwater that impacts human populations. Additional efforts were focused on legal proceedings. These recovery efforts omitted the well-being of pivotal fish populations until true declines were recognized, and designation as a Superfund site was not an effective enough measure to protect these populations.

**Figure 1:** Summary of trends in contaminant concentrations in various sites across the Montrose Chemical Superfund Site. Image trimmed to focus on benzene and chlorobenzene, two byproducts of DDT.

Well ID	Location	Benzene 5 years	Benzene 10 years	Chlorobenzene 5 years	Chlorobenzene 10 years
MW 01	Water Table/MBFB			Decreasing	Decreasing
MW 06	Water Table/MBFB				
MW 09	Water Table/MBFB				
MW 11	Water Table/MBFB			No Trend	Decreasing
MW 13	Water Table/MBFB	No Trend	Decreasing	No Trend	Decreasing
MW 16	Water Table/MBFB				
MW 22	Water Table/MBFB				
MW 24	Water Table				
MW 29	Water Table/MBFB	Prob. Decreasing	Decreasing		
MW 30	Water Table/MBFB				
MWG004	Gage				
P-12	Water Table/MBFB				
P-26C	Gage				
16P-A					
BF-26	Merged MBFB/MBFC				
BF-36	Merged MBFB/MBFC				
BL-10C	Gage				
BL-11A	Water Table/MBFB				
G-09	Gage	No Trend	Decreasing	Prob. Decreasing	Decreasing
G-12	Gage				
G-19	Gage			No Trend	Decreasing
G-19A	Gage	No Trend	Stable		
G-21	Gage				
G-23	Gage	Stable	Stable		
G-24	Gage	Stable	No Trend		
G-25	Gage			Decreasing	Decreasing
G-26	Gage			Stable	Decreasing
G-27	Gage				
G-28	Gage				
G-30	Gage				
G-34	Gage				
LW-02	Lynnwood				
LW-03	Lynnwood				
LW-04	Lynnwood				
LW-05	Lynnwood				
SWL0004	Water Table/MBFB				
SWL0025	Gage				
SWL0042					
SWL0044	Water Table	No Trend	No Trend		
SWL0049					
SWL0050					
SWL0053	Merged MBFB/MBFC				
JMW-01					
LMW-13					
SWL0063	Gage	No Trend	Increasing		
Stable or No trend		7	4	4	0
Decreasing		1	3	3	7
Increasing		0	1	0	0

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