

PRODUCED WATER PONDS

Disposal of Oil and Gas Wastewater in Unlined Pits Endangers Groundwater in San Joaquin Valley

BACKGROUND

Since the late 1900s, California law has allowed the oil and gas industry to dispose of wastewater extracted during oil and gas development—known as produced water—in unlined ponds. Over time, produced water percolates below ground into local and regional groundwater resources.

California is one of the last states in the country to allow the disposal of produced water into unlined ponds. This factsheet summarizes the findings of a peer-reviewed study by the energy science and policy research institute PSE Healthy Energy.

OVERVIEW

99% of California's produced water ponds are located in the Tulare Basin within the San Joaquin Valley.

In the Tulare Basin, there are at least 1,850 active, inactive, and closed ponds used exclusively for produced water disposal. At least 85% of these ponds are unlined and 31% are still active.

Over a 50-year period, the disposal of over 16 billion barrels of wastewater into unlined ponds has introduced salts, carcinogens, and other toxins into regional aquifers.

METHODS

- Determined the number, status, and locations of unlined produced water ponds in the Tulare Basin.
- Summarized available information on the composition of produced water discharged into unlined produced water ponds.
- Estimated total dissolved solids (TDS) levels in groundwater underlying unlined produced water pond locations.
- Summarized locations where impacts to groundwater resources has been documented in the Tulare Basin.

KEY TERMS

Produced water

Wastewater associated with oil and gas development. In California, 3.2 billion barrels of produced water were extracted in 2017.

Total dissolved solids (TDS)

Inorganic salts found in water.



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FINDINGS

Inadequate Legal Protection. California law provides less stringent protection for groundwater from produced water ponds than for other oil and gas industry practices, such as produced water injected underground during hydraulic fracturing, enhanced oil recovery, and other forms of underground injection.

Legacy Impact. The historic disposal of produced water in unlined ponds has raised the salinity of nearby groundwater resources and introduced salts, carcinogens, and other toxins into the region's aquifers that can serve domestic, municipal, and agricultural purposes.

Continued Risk. Monitoring data at active produced water pond facilities shows that produced water often contains salts and other chemicals at levels that exceed the limits established by local water agencies.

Geographic Spread. Data from produced water pond facilities with monitoring wells indicates that the impact to groundwater in some cases extends more than 4 km from facilities, with groundwater plumes migrating in the direction of agricultural wells.

Stronger Monitoring Needed. Groundwater monitoring at unlined produced water pond facilities is sparse. Where monitoring has occurred, impact to groundwater has been observed and has proven too expensive to actively remediate.

RECOMMENDATIONS

The authors recommend that California increase legal protections from unlined produced water ponds for groundwater. Currently, the law does not explicitly protect groundwater containing total dissolved solid levels over 3,000 mg/L.

The authors suggest increasing protections to include groundwater with total dissolved solid levels up to 10,000 mg/L. This would limit the use of unlined ponds overlying groundwater resources that are not prohibitively expensive to desalinate and decontaminate.

Where contamination to groundwater resources has already occurred, increased monitoring is necessary to understand and track potential risks for regional agricultural and domestic water resources.

ABOUT PSE HEALTHY ENERGY

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