Fact Sheet

Oilfield Water Discharges to Land

In California, oil wells extract far more water than oil. Typically, water and oil are comingled in underground oil-bearing geologic formations. The mixture is brought to the surface during production. The water that is brought to the surface is called “produced water.” Produced water is separated from the oil after it is brought to the surface. Then the produced water is either disposed of in injection wells, treated and discharged to surface impoundments or “ponds”, or is treated and reused. Reuse includes reuse in the oil fields for enhanced oil recovery operations, including steam flood or cyclic steam operations or waterflood operations. Sometimes, if the quality is suitable, the produced water can be reused to irrigate crops (more information on this practice can be found here).

How Much Produced Water is Generated in the Central Valley and Discharged to Ponds?

In 2017, approximately 131 million barrels of oil (a barrel is equivalent to 42 gallons) and 1.9 billion barrels of produced water were generated in the Central Valley. About 392 million barrels of produced water were discharged to land. Of this, approximately 95 million barrels were discharged to ponds and the rest was reused. Ponds allow the produced water to evaporate or, if the ponds are unlined, percolate back into the subsurface. Produced water is also sometimes used for dust control at oil field production facilities. The main goal of the Board’s Oil Field Discharges to Land program is to ensure that produced water will not negatively impact the quality of any surface or groundwater.

How Many Produced Water Ponds are there in the Central Valley?

Though the numbers fluctuate, there are about 333 oil field production facilities in the Central Valley, and there are about 1,092 ponds at these facilities. 539 of the ponds are active, which means that the ponds display evidence of discharge or are intended for discharge by the oil field operator. The remaining ponds are inactive. Generally, “inactive” means that the ponds are empty, have not been used in several years, and the operator has indicated that the ponds will not be used in the future.

What is the Quality of Produced Water?

The quality of the produced water varies greatly depending on the geologic formations from which it is derived. Most oil-bearing geologic formations are naturally high in salts, metals, and organic compounds. This is because many source rocks are composed of sediments that once were a part of the ocean floor. However, in some areas the oil has migrated from source rocks to areas that contain fresher water. In these cases, the produced water can be much better quality. This process is natural. For example, produced water generated in the oil fields north and northeast of Bakersfield is of good quality with respect to most constituents, including salts

(total dissolved solids concentrations less than 500 milligrams per liter), metals, and organic compounds. In many cases, this water is good enough to meet drinking water standards. In California, water that is reused as irrigation water generally comes from areas north and northeast of Bakersfield. On the other hand, produced water generated on the west side of the southern San Joaquin Valley is generally of poor quality, with high total dissolved solids (concentrations sometimes exceeding 10,000 milligrams per liter), sodium, chloride, and boron, and high concentrations of some naturally-occurring organics, such as benzene.

How is Oilfield Water Treated?

Produced water that is discharged to ponds is treated by the oil companies, primarily to remove hydrocarbon compounds (i.e., oil). The level of treatment varies by operator and oil field, but generally includes oil-water separation in tanks, and in some instances dissolved air flotation. Hydrocarbons are sent to be further refined and sold, while the produced water is sent to ponds for evaporation, percolation, and disposal.

How are Oilfield Water Discharges to Land Regulated?

Oilfield facilities in the southern San Joaquin Valley must comply with the *Water Quality Control Plan for the Tulare Lake Basin* (Basin Plan). Oilfield discharges to land are primarily regulated through permits called "waste discharge requirements" or "WDRs" that are typically issued to individual facilities. Newer WDRs include monitoring and reporting programs that require regular sampling of produced water and reporting on discharge volumes, additives, facility information, and repairs. These newer WDRs include three general orders issued in 2017 (Orders R5-2017-0034, R5-2017-0035, and R5-2017-0036). Where appropriate, Board staff are working to issue updated monitoring orders to facilities with older WDRs. In 2014/2015, the Board identified many facilities without WDRs, and issued Cleanup and Abatement Orders (CAOs) requiring that the operator running these facilities either close the facilities or bring them into compliance with State water quality requirements.

Currently, 122 facilities are regulated under WDRs and 60 are regulated under CAOs. Most of the remaining facilities are inactive and seeking closure. Staff are working with operators to get all ponds either regulated under WDRs or closed. Those operators who have not sought either WDRs or pond closure are subject to enforcement actions by the Central Valley Water Board. These enforcement actions can include cease and desist orders, CAOs that require cleanup and closure, and monetary penalties.

How Can I Stay Informed?

Visit the Central Valley Water Board's webpage for more information. You can also sign up to be on the State Water Board's Lyris email list here.

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