

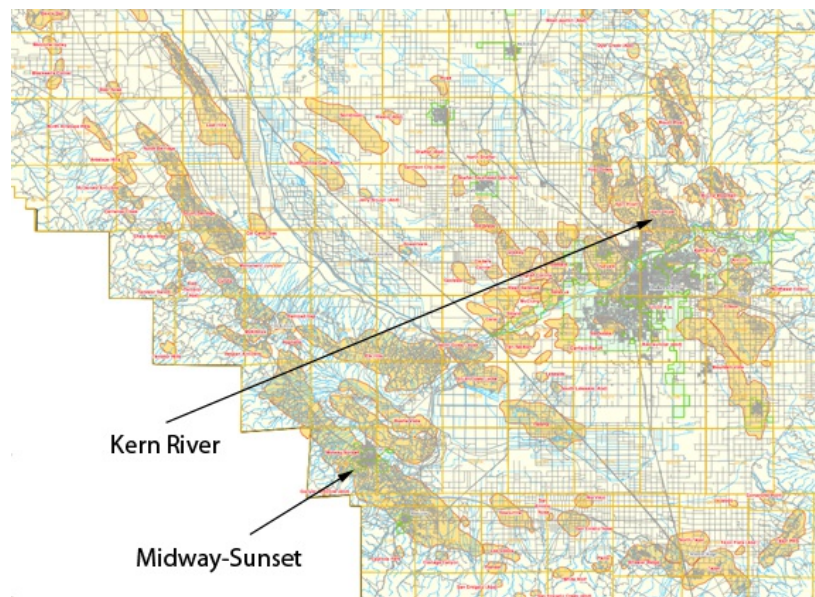


## Tech Talk - The Heavier Oils of California's Kern Valley

Posted by [Heading Out](#) on June 26, 2011 - 9:50am

The Kern River field was [first found](#) by a wood cutter and his son, who began digging with a 3-inch auger after being asked to drill a well below a seep on the Kern River shore on the Means property. They found oil at a depth of 13 ft. They then dug out a larger hole, using a pick and shovel to create a larger access from higher up the river bank down to that oil level, and then drilled down an additional 30 ft. after having fixed the auger to the end of a section of connected pipes. (This was done by manually turning the auger). The well then started flowing, filling the excavation at [around three bd](#). That oil was then taken and used as boiler fuel to power a more conventional drill that, nineteen days later, reached another producing horizon at a depth of 256 ft. and became the first commercial well in the field. By 1904, the field was producing 17.5 million bbl/a year, at which it peaked.

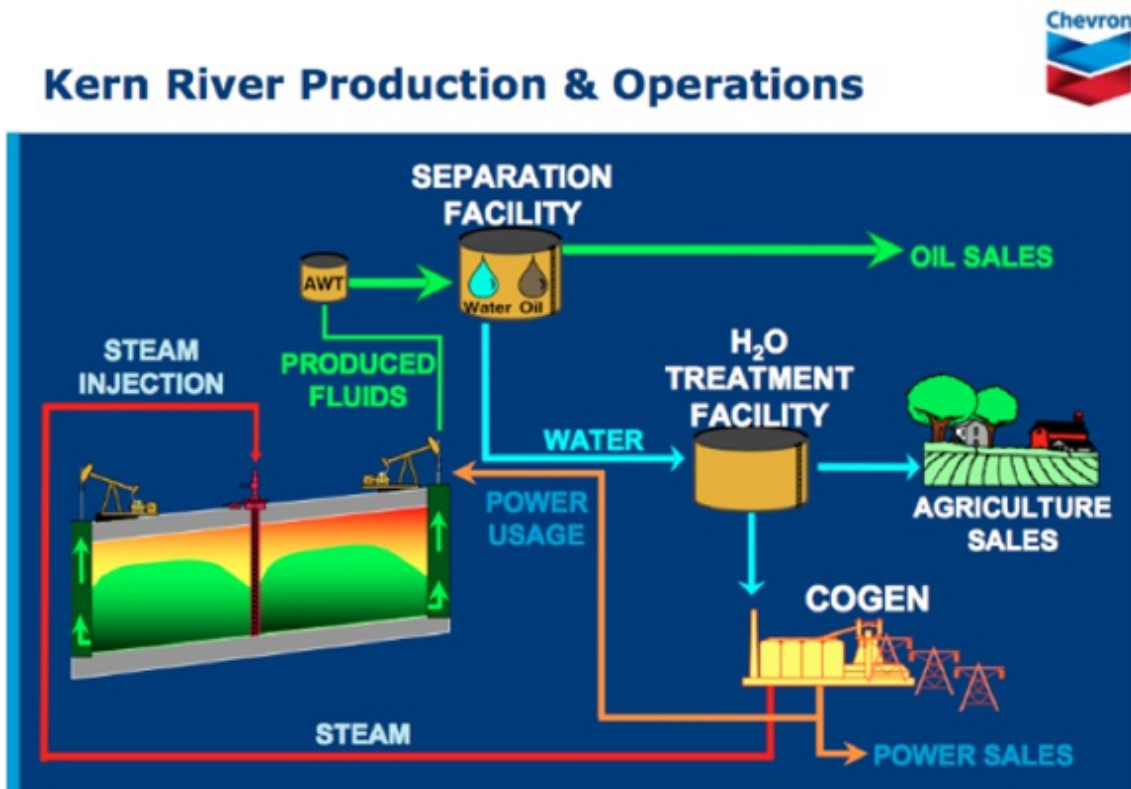
It is important to distinguish the different fields in the region, since there are many fields around Bakersfield, each having different histories and projections for the future. The Kern River field, for example, has produced roughly 2 billion barrels of oil since that first well, with about [476 million barrels estimated as being still available](#).



*Oil Fields in the Kern Valley around Bakersfield, CA with the Kern River field (the first) and the Midway- Sunset (the largest) further identified. ([CA Conservation](#))*

The Kern Valley rapidly became the largest oil-producing region in the state, particularly since the arrival of the railroad in 1902 made it possible to develop the adjacent Midway-Sunset field, which remains the [largest oilfield in the State](#). As a result, by 1904 California was producing more oil than Texas. Times have changed a bit since then, and while the Midway-Sunset claims to remain the largest oil producing field within the lower 48 states (note that this doesn't include the offshore Gulf), the largest operator in the field now only produces some [29,000 bd](#).

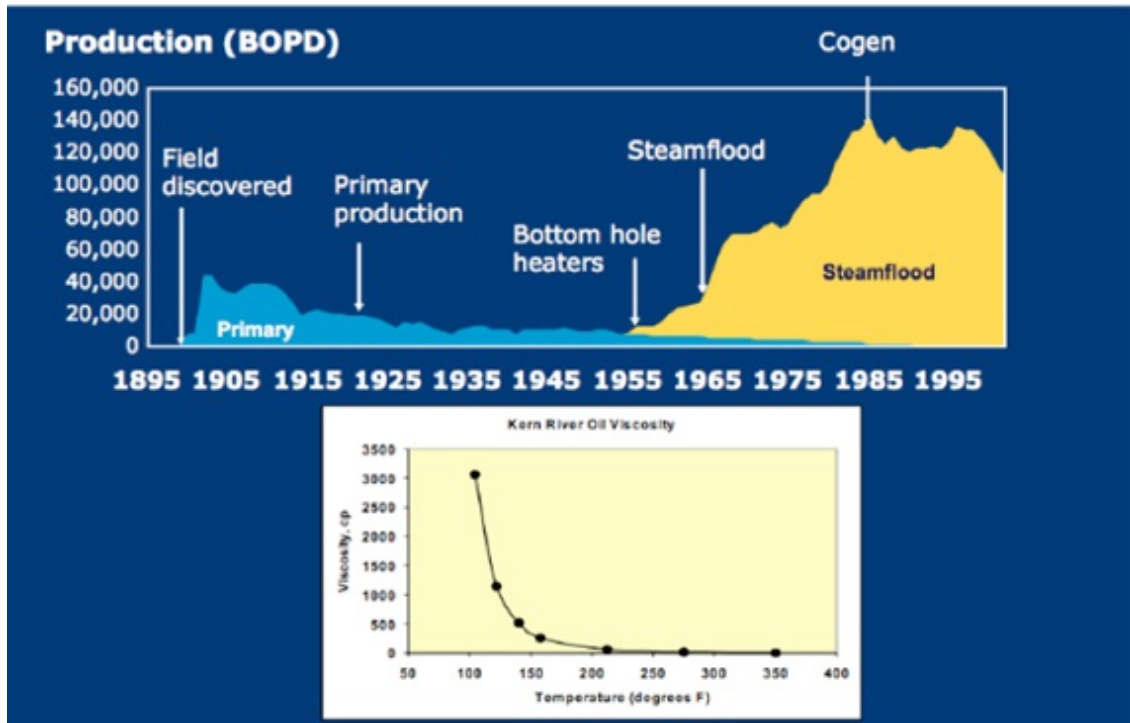
Gail Tverberg visited the production facilities at the Kern River field back in [February 2009](#) and gave a more detailed description of the field and the work Chevron is doing than I plan to cover today. (There is no point in trying to compete with her excellent report, though the reference to the video of the tour is [now here](#), and the API picture record of her visit seems to have vanished.) The oil in the field is heavy, and so steam has been injected through one set of wells, in an increasingly refined operation, to heat the oil in place so that it will flow more easily to other collection wells, where it can be pumped to the surface.



*Kern River production process (from Chevron via [Gail Tverberg](#))*

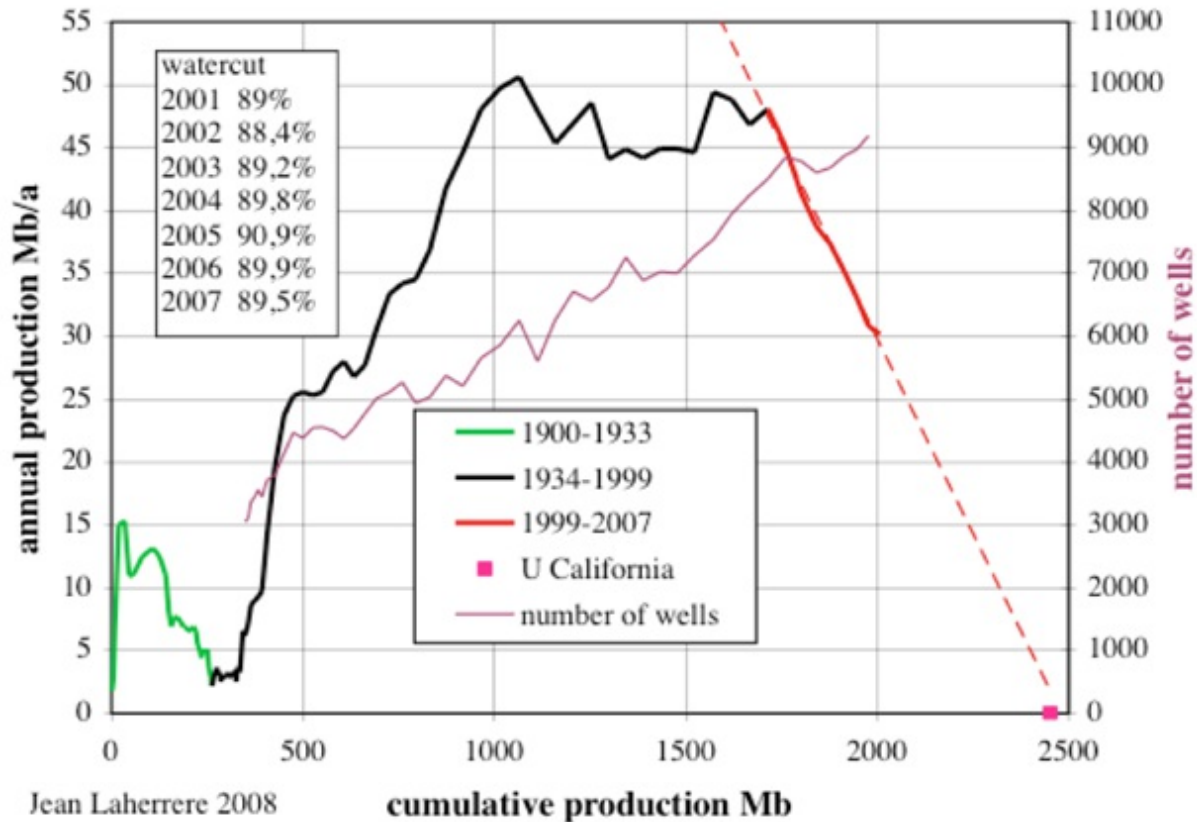
The impact of the steam flood on production was dramatic, and has become the main method of production since it was introduced.

## Steamflood Performance Kern River



*Impact of steam flood on oilfield performance (Chevron via [Gail Tverberg](#))*

Gail also then posted a comment by Jean Laherrère on his estimate of future production from the field, showing its future decline, even with an increased number of wells, to a [final estimate of production](#) for the field.

**Kern River (1899 13°API) oil decline 1900-2007**

*Cumulative oil production estimate ([Jean Laherrere](#))*

My own visit to Bakersfield looked at a different way of producing the oil. The Bureau of Mines (as called then) brought large borehole mining equipment to Bakersfield and used pressurized jets of water to [mine the oil and sand](#) from around a well in the McKittrick field at a depth of 350 ft, bringing the mix to the surface, where the oil was removed, and the sand then re-injected back into the cavity. (This process was also successfully applied in mining small pods of uranium ore in Wyoming). The method has the advantage of getting all the oil from the formation section that was mined, with relatively little environmental impact, but the closure of the Bureau shut down this program. (Though I retain slides of the operation).

Some of the sand is even closer to the surface, as the initial well showed, so that strip mining of the region to produce the oil in the same way as in Alberta may be economic for the upper layers of some of the fields, were it not from the emissions that would come from the exposed oil and have a negative impact on local air quality.

The continued search for more efficient methods to extract a greater proportion of the remaining oil continue through the present. Methods have been proposed where the steam is generated using solar power to heat the steam. A small pilot plant was opened at the beginning of this year to [demonstrate the feasibility](#) of the technique, though as yet on too small a scale to produce a significant amount of oil. Higher temperature steam has been generated at other power plants using the same technological concept and so there may be a path forward for this development.

In the same way, there are some experiments to use the [injection of oxygen and steam](#) as a way of increasing production. The process is claimed to be able to work below the 2,000 ft limitation of conventional steam flooding to a depth of perhaps 3,500 ft. The claim is also that the costs are down at \$4/bbl capital cost and \$15/bbl operating cost to achieve this enhanced recovery. The process sounds a little too good to be true in the simple form in which it has been presented to

date, but it illustrates the possible potential for improving absolute recovery levels above those presently available.

Unfortunately, the research budgets for finding enhanced ways of producing fossil fuels are not seen as having the critical importance that they may well have. The greater emphasis on advancing renewable forms of energy, and Washington power struggles have meant that energy research is [not the hot topic](#) it once was and the interest in developing new techniques to obtain more oil from existing fields is often subsumed by the desire in companies to grow reserves, even if only by purchase instead of discovery or development.

The debate over energy supply and the environmental impact of different sources of power continues to make it difficult to find satisfactory ways to supply California with the energy that its population needs. With the confines within which the oil and gas industry currently work in the state, it is hard to see any future gains in production over the levels of today, and the greater likelihood of declining production.



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