

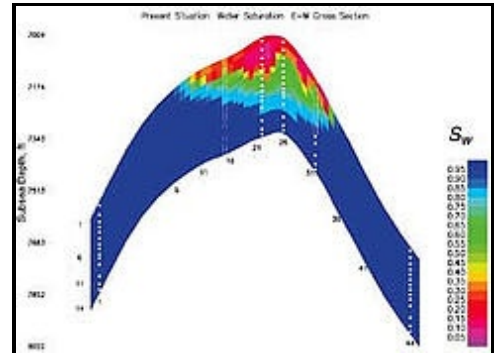


A picture of depletion

Posted by [Heading Out](#) on June 1, 2005 - 6:29am

Topic: [Alternative energy](#)

For most people there was some one thing that brought the reality of Peak Oil home to them. For me it was this picture, from a paper by Dogru, Hamoud and Barlow in JPT in February 2004. The reference, to the paper "Multiphase Pump Recovers More Oil in a Mature Carbonate Reservoir" can be found [here](#). It shows a vertical slice taken through the Abqaiq oilfield in Saudi Arabia, using an instrument that measures the relative fluid densities at different levels in the field.



Dogru, Hamoud & Barlow JPT 0204
Originally uploaded by [Heading Out](#).

The shape is that of the carbonate rock which is the oil reservoir, although the vertical scale has been exaggerated considerably to show the current contents of the field. By using different colors the authors have shown the different fluid densities, and these can simply be translated into four zones. Over time the field has been injected with water (the blue zone) and this has pushed up the oil (the green zone) into the wells. The red is the overlying gas cap. When the reservoir was untapped it was likely all red and green. After all these years of pumping you can see how little of the green - the oil - remains. The field is about 800 ft thick from top to bottom and about 1.5 miles below the surface. If there is a picture that speaks to depletion this to me, is it.

The models which King Hubbert, Colin Campbell, Jean Laherrerre and Kenneth Deffeyes have shown valid all show a significant drop in production as an oilfield comes to an end. This one is, very obviously, that close and one must therefore accept that it is one of those that the new field production of Abu Sa'fah and Qatif is offsetting.

However it is perhaps appropriate to make a gentle coughing sound and point out that there are segments of Ghawar in the north that are also more than 50% extracted, and these too must be considered in the production decline that is being offset.

It is not clear if the current reduced production at Abu Sa'fah and Qatif, reported to be 650,000 bd, rather than the [planned 800,000 bd](#), is due to production problems, or if is just that they have not yet completed drilling the planned number of wells.

A total of 151 wells, some for water injection, will be drilled in Qatif field, while another 29 wells will be drilled in Abu Saafah. Some 61 old wells at Abu Saafah will also be rehabilitated.

The wells at Abu Sa'fah will raise its production from 195,000 bd to 300,000 bd. (Doing the arithmetic this means that the new wells will average somewhere between 3,000 and 4,000 bd in

Going back to 1990 some 792 oilwells produced around 8.2 mbd, for just over 10,000 bd per well, by 1998, as quoted earlier, Saudi production was down to around [5,140 bd per well](#). They are now down to somewhere around 3,500 bd per well. Which may explain why their planned production is not quite there yet. Unfortunately it is likely that this downward trend will continue. And since the last development cost around \$1.2 billion one can understand how expensive it is going to be to actually increase overall production, when they get more drilling rigs.

UPDATED To include the reference to the paper (thanks Anonymous). And re-updated to reflect the papers new location (thanks Tim).



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