A new company in the oil and gas drilling services arena has developed a process to take drilling muds that have been diluted with ground water. After concentrating the drilling mud with a settler the extra ground water is evaporated several times using vapor recompression as a major source of the heat for evaporation. The idea is to purify the ground water so that it is sufficiently pure to discharge into the ground. To this company’s surprise the “purified water” contains about 1% methanol which is too high to be discharged into the ground. The methanol is not a component of the drilling mud so it must be coming from the oil/gas well. The company wants to consider purifying the methanol using a distillation column. From their process there are two feed streams one is a vapor

And the other is mostly a liquid

With these two streams fed to a single distillation column, separate a distillate product that meets commercial requirements of purity 99.9% by weight that can be sold for $1.38/gallon (this is Nov. 1, 2011 price, but this price has been highly volatile over the last 3 years, see also attached web information about September 2009 price projections ($0.58/gal) and required purity and note that these prices are down significantly from 2008 where the price was as high as $2.38/gallon). You are to do a design of this
column, heat exchangers and pumps and optimize it. Then determine capital and operating costs as well as the standard measures of profitability given in Chapter 23, e.g. ROI, PBP and IRR.

It should be pointed out that to discharge process water into the ground it must contain <50 ppm MeOH. You may not be able to reach this purity in the bottoms of the distillation column if you do not there is always carbon bed adsorption or a water permeable membrane to clean this stream to the desired purity before discharge. You are not to design the carbon bed adsorption towers or the membrane process only the distillation tower and ancillary equipment. The distillation tower, reboiler and condenser should be sized and the cost of the tower, the reboiler and the condenser will constitute the capital costs for the project (and any utility plants). The operating costs can be determined from the utility costs for 50 psig steam and cooling water as well as the pumping costs for the reflux.
Methanol supply shifts will reduce prices long-term

New report outlines the future path of methanol supply and price

By David Hannon -- Purchasing, 9/17/2009 2:00:00 AM

With methanol demand expected to remain strong in China, new mega-methanol plants coming online in the Middle East will not only reduce production costs for methanol but also increase supply over the next five years, according to a recent report from SRI Consulting. All of which will lead to lower methanol prices in the long-term.

By locating the new mega-plants in Middle Eastern countries such as Iran, Oman, Egypt and Saudi Arabia close to natural gas and other energy supplies, production costs for methanol will decline while supply increases. This combination is expected to reduce methanol prices in the long-term, despite the fact that demand will continue at 7.8% through 2013.

The largest market for methanol is formaldehyde production, which gobbles up more than one-third of the global methanol supply. China is far and away the largest consuming market for methanol and, despite major increases in its methanol production, will remain a net importer through 2013. The Asian markets will consume more than half of the world's methanol each year.

In the near-term and closer to home, methanol prices are on the upswing after a long decline. According to Purchasing's pricing service, Purchasingdata.com, methanol prices slid consistently from their early 2008 level of $2.38/gallon to their June 2009 low of
50¢. They have ticked up for three straight months but are still less than half what they were a year ago.

Looking forward, ICIS.com reports that September North American methanol contract prices will rise due to spot prices recently eclipsing August contract levels. *Purchasing's* methanol price expectations index sits at 56.8¢ this month, indicating buyers expect prices to continue up in the short-term.

Confirming this trend is methanol supplier Methanex said in its recent earnings statement that, "Primarily as a result of strong demand in Asia, particularly in China, global methanol demand improved in the second quarter, which has supported a strengthening methanol price environment as we enter the third quarter. In July, our average non-discounted price is about $235/metric ton, up from our second quarter price of $211."

A Methanex joint venture called EMethanex is currently in the process of constructing a 1.26 million metric tons per year methanol facility on the Mediterranean Sea in Egypt.

According to [http://www.c-f-c.com/specgas_products/methanol.htm](http://www.c-f-c.com/specgas_products/methanol.htm), methanol must have a purity of 99.9% by weight to be sold on the market in bulk containers.

Pure methanol is an important material in chemical synthesis. Its derivatives are used in great quantities for building up a vast number of compounds, among them many important synthetic dyestuffs, resins, drugs, and perfumes. Large quantities are converted to dimethylaniline for dyestuffs and to formaldehyde for synthetic resins. It is also used in automotive antifreezes, in rocket fuels, and as a general solvent. Methanol is also a high-octane, clean-burning fuel that is a potentially important substitute for gasoline in automotive vehicles. The methanol derived from wood is used chiefly for rendering ethyl alcohol unfit to drink.

Methanol is a colourless liquid that boils at 64.96° C (148.93° F) and solidifies at -93.9° C (-137° F). It forms explosive mixtures with air and burns with a nonluminous flame. It is a violent poison; many cases of blindness or death have been caused by drinking mixtures containing it.