

## ***scale removed from an effluent water pipe in a refinery***

**Company:** Q<sup>A</sup>, Rotterdam Netherlands



### **About the customer:**

The Q<sup>A</sup> refinery is located in Europoort the port of Rotterdam, which is the biggest port in the world. Q<sup>A</sup> is the brand name of Kuwait Oil International doing world wide operations outside Kuwait. The crude used for refining is coming from Kuwait, the refinery produces mainly fuel and lubricants, as well as raw material for the petrochemical industries.

### **Effluent water:**

In refineries water is used for a lot of process. Mainly the water is used for heating or cooling the [crude oil](#) or hydro carbons. As always there can be found in effluent water all kind of water from different sources, such as blow down from the [steam boilers](#), or the [cooling towers](#), wash water and even traces of hydro carbons. Hence the effluent water is always going through a row of cleaning and purification processes in order to ensure the high environmental requirements of Q<sup>A</sup>. The quality of the water which is finally given to the public sewage system is regularly sampled and controlled by the authorities of the Europoort.



### The Problem:

In the effluent water in this early stage after the refinery itself a lot of impurities can be found. There are trace of oil, but as well a lot of [calcium carbonate](#), which is forming the scale seen in the pictures. This calcium and other salts coming mainly from the blow down or bleed off water. As in a [cooling water](#) the water is evaporated in order to have a cooling effect what is left is water with a high concentration of TDS.

As can be clearly seen at the picture above, the pipe connecting two process units, a lot of scale has been formed over time. This fact has limited the flow of the water which caused problems upstream. First the engineers checked the [pump](#), which is the most obvious cause of the limited flow, but even after cleaning the pump no improvement could be found. When checking the pipe itself, the picture above has been made.

### The Solution:

The pipeline is only a few hundred meters long, but it was anyhow decided to install on Merus Ring at the beginning of the line and a second one direct after the pump. This was done to be sure to have the same good effect after the pump, which might emit electrical fields. The installation was outdoor, so the rings had to be protected against the environment, like rain etc. Therefore the rings were wrapped in plastic foil. In this case there have been no chemicals added to avoid the scaling. As adding chemicals in the effluent water is not very helpful, especially because it is not known, what kind of stuff will be carried in the pipe line. So the only change to before are the 2 Merus Rings.



#### The Monitoring:

As the effluent water has not a constant flow, there is no direct monitoring possible. So the only way to get sound proof has been to open the pipe and check visual. The pictures taken are all made at the same position and angle, in order to get the best possible comparison.

The first picture done before the installation, which is on top left of this page, shows app.  $8\text{ mm}$  of scale evenly covering the entire pipe. The second picture in the middle on the right side, has been taken exact 1 month after the installation. There it could be already seen a big improvement. The scale in the pipe has only a thickness of  $2\text{ mm}$ . As well the scale has not the same thickness on each position in the pipe this is due to fact the flow is higher on certain parts in the pipe, therefore there is more mechanical force to remove the scale solved or softened by Merus. The last picture was done after 12 month. As can be seen there is even less scale and certain parts of the pipe are entirely free of scale. Anyhow the speed of removing the scale has gotten less, compared to the first 1 month. This again is due to the lesser flow in the pipe.

The pipe has won app.  $4\text{ mm}$  inner diameter due to the scale removal. The amount of water is the same, ergo the velocity of the water gets less and we have less friction in the pipe.

How long it will take until the pipe is total clean again can not be predicted. As a lot of factors have to be taken into account. It made take another year or even more until finally the pipe is clean. But this is not so important, as long it is assured the trend of scaling has turned, and there will be no problem in future due to a clogged pipe.