

Innovative alternative to conventional pipeline cleaning—Petrogal Matosinhos refinery

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For 20 years, Zyme-Flow® Technologies has offered the most complete decontamination solution for refining applications. In a single step, this process removes oil, gas, LEL, and benzene while also neutralizing hydrogen sulfide and pyrophoric iron sulfides. The chemistry can be applied as an aqueous solution in circulation or through a proprietary Vapour-Phase® steam cleaning process where the product is injected directly into the plant's steam source. Using Zyme-Flow® chemistry in conjunction with the Vapour-Phase® procedure offers the fastest method for rendering process equipment ready to open with a minimal mechanical footprint and vastly reduced amounts of generated waste that are compatible with waste water treatment facilities. Zyme-Flow® chemistries are environmentally responsible formulations utilized in refineries worldwide.

Case Study

In a recent application at Petrogal Matosinhos Refinery, the Zyme-Flow® Process was used to successfully decontaminate an uninsulated 2.1 Km 36" pipeline network associated with the transfer of crude oil at Matosinhos Refinery tank farm. This particular facility was located in an environmentally sensitive and residential area, so there was obvious concern for chemical releases and noise pollution. The pipeline had never been decontaminated in its 40+ year history, but inspection reports indicated the need for some spool replacements due to wall thinning. Industry standard is to use a liquid circulation chemical cleaning process followed by mechanical pigging. Using that methodology, the estimate for completion of this project was one (1) month. Due to critical time constraints posed by ship unloading schedule and the environmental concerns, the facility instead chose an innovative alternative approach using Zyme-Flow® chemistry in a Vapour-Phase® application in order to minimize wastewater for disposal. Prior to the implementation of the project, meetings were conducted between Zyme-Flow® Technologies and Petrogal plant personnel to discuss project planning, job scope definition and to develop a collaborative execution plan.

Zyme-Flow® Technologies estimated duration of this decontamination was three (3) day shifts exclusive of the preparative steps of draining the pipeline and conducting a water flush. Since the pipeline was drained but never water-flushed, significant oil volumes were expected and present when the decontamination commenced. Using a single injection point, Zyme-Flow® chemistry was introduced to the plant's 3" steam line using a single-stroke pneumatic pump. Piping laterals from the main pipeline to the storage tanks were blocked in before the tank, but did not have drain points. Skin temperatures of 226°F (107°C) at the end of the pipeline and on the lateral sections indicated adequate transfer of chemical throughout without the need for any supplemental steam injection. The Vapour-Phase® of Zyme-Flow® continued for five (5) hours, after which the small amount of condensate was collected using two (2) vacuum trucks. Upon opening, the pipeline was found to be completely free of oil, LEL, benzene, H₂S, and pyrophoric iron sulfides. The only foreign material present was a minor amount of iron oxide scale.

Advantages of the Zyme-Flow® Vapour-Phase® Process for Pipeline Decontamination

Relative to chemical cleaning approaches using liquid circulations and mechanical pigging, the Zyme-Flow® Vapour-Phase® Process offers the following advantages:

- Significant time and cost reduction
- Minimized mechanical footprint



- Elimination of noise pollution
- Minimized waste generation

Furthermore, large circulation pumps, frac tanks, and mix tanks are not required. Any oil emulsions quickly break upon quiescence with no further chemical treatment. The Zyme-Flow® Vapour-Phase® Process does not require pipe breaks that are normally associated with the use of pigs with 90° piping turns (eliminating concerns for possibility of chemical release).

The total job duration was three (3) days and the total cost of the project using Zyme-Flow® Process was a fraction of the original budget utilizing conventional liquid chemical cleaning/pigging practices.



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