

Nettoyage des conduites sous pression

Introduction

The relative efficiency of a pipeline is dependent on two fundamental requirements: it must operate continuously, and the required throughput must be obtained with the least capital investment and the lowest operating costs. (Cordell and Vanzant) Here is where the cleaning process plays an important role as it allows the pipeline to operate without major interruptions while reducing operating costs that may rise when a problem is detected. In addition, it reduces pumping costs, chemical treatment costs, flushing requirement and cost involved, not to mention the dramatic increases of water deliveries. (Gray) However, this cleaning task is not the same for pipelines under pressure as for gravity pipelines. Service Intercommunal de Gestion, SIGE, that provides and distributes drinking water and firefighting water to the canton of Vaud and Geneva already counts with a procedure to clean gravity pipelines; nevertheless it also owns pipelines under pressure that require cleaning.



Figure 1 Image of deposits found in the flow meter (inlet) and pumps

Objective

The objective of this project is to evaluate the possibilities of cleaning these pipelines and to determine the best option according to its mechanical and economic feasibility as well as efficiency. Furthermore, the results of this study can be used in the construction of a new pipeline that will be placed under the surface of the Leman Lake to transfer sewage from Vevey and Montreux to Villeneuve.

Discussion

The three pipelines in which our study is focusing are EPUBAR 6004, 6005 and 6006. Figure 2 shows the remarked map to highlight the placement of the pipeline within the area of Noville while Table 1 shows the specifications of each line.

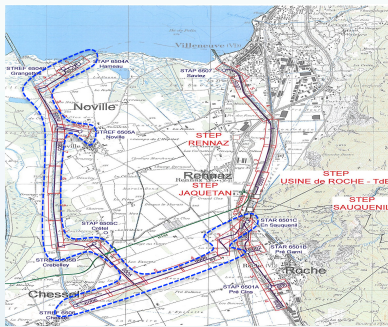


Figure 2 Map of the pipelines EPUBAR 6004, 6005, 6006. Specific pipeline marked in blue dashed line.

Table 1 Pipeline specifications.

Pipeline	Length	Diameter	Material	Inclination	Route
EPUBAR 6004	1621.40m	Φ110	Polyethylene	0%	From GRANGETTES to STREF 6504B
EPUBAR 6005(1)	2997.22m	Φ200	Polyethylene	0%	From NOVILLE-STREF 6505A to CREBELLEY-STREF 6505B
EPUBAR 6005(2)	947.4m	Φ200	Polyethylene	0%	From CREBELLEY-STREF 6505B
EPUBAR 6006(1)	2140.18m	Φ250	Polyethylene	0%	Up to EN SAUQUENIL-STREF 6501C



Figure 3 Several types of pigs (Pipeline Engineering)

The Table 2 presents the advantages and disadvantages of the cleaning solutions that have been detected by the research:

Table 2 Comparative analysis between different cleaning techniques

Possible solutions	Advantages	Disadvantages
Sewerage pipe cleaning nozzles	<ul style="list-style-type: none"> Known and tested technology Easily applicable Variety of cleaning nozzles Fair expected lifetime of benefit 	<ul style="list-style-type: none"> Not a feasible solution considering the length of the pipeline Requirement of stoppage of the water flow for a longer period of time than permitted Since the deposits are unknown, the efficiency of cleaning cannot be estimated Good structural condition of the pipeline is required Restriction in the pipeline sizes
Water pumping	<ul style="list-style-type: none"> No investment required in this case Not hazardous for the pipeline Applicable regardless the condition of the pipeline 	<ul style="list-style-type: none"> Dilution of the sludge which causes problems in further treatment of waste water Stir up of sediments Short expected benefit lifetime
Chemical product	<ul style="list-style-type: none"> Applies to all pipe sizes Can remove hard scales High expected benefit lifetime 	<ul style="list-style-type: none"> Toxicity of solvents High cost of disposing cleaning solutions and flushed water Prior tests to the pipeline are required as to determine the chemical solution, concentration, reaction time, etc.
Pipeline replacement	<ul style="list-style-type: none"> Higher efficiency of the new pipeline with respect to the current one 	<ul style="list-style-type: none"> High investment required Current pipeline has not ended its expected lifetime
Pigging	<ul style="list-style-type: none"> High efficiency Well known and widely applied technology High expected benefit lifetime No need to stop the flux of the current product Capacity of the current pumps is enough to launch a pig 	<ul style="list-style-type: none"> Restricted on bends, valves and space for the launcher Risk of getting the pig stuck in the pipeline Progressive pigging is required Inspection is realized only after cleaning Wrong pigging selection may damage the pipeline

What is a pig?

A pig can be described as a piston that is inserted and travels along a pipeline. Usually, the pig is propelled by the product in the pipeline since it uses an oversize fit to create a seal. There are over 350 types of pigs (Pigging Products & Services Association) with several designs and characteristics, depending on the pipeline needs and the product transferred through the pipeline. (Lotwin)

Conclusion

After considering all aspects and mostly the feasibility of each solution, pigging may provide the best results in cleaning. In order to select the appropriate pig type it is necessary to provide the supplier all necessary geometrical information of the pipeline. The drawings of this pipeline provide information about the location, material, diameter, length and year of construction. However, the dimensions of the bends and their including angles need to be accurately specified as to select a pig which will be able to traverse them. Since pigging inspection for the bends is not applicable without cleaning, segmental excavation of the pipeline is required as to provide all necessary information about the bends. Thus pigging supplier will be able to proceed to a further design of the suitable pig.

References

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