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Production of process water by reverse osmosis for automotive paint applications

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Introduction

Reverse osmosis is the most extended technology in seawater and brackish water desalination. This technology is used in many applications, one of them the manufacture of automotive paints. In this work, two years of operation of a brackish water reverse osmosis (BWRO) desalination plant are analyzed. The raw water intake was a groundwater well.

In this case, the BWRO desalination plant had to produce a quite high water quality due to its purpose. The main objective is the water quality over the efficiency of the desalination plant.

Material and Methods

The desalination plant had a sand and cartridge filters with antiscalant dosing as pre-treatment. The RO system had two stages with 40 pressure vessels (PV) in the first stage and 20 in the second stage with 6 BWRO elements per PV.

An important amount of operating data were collected during 17,000 operating hours in order to evaluate the performance of this BWRO desalination plant working under these specific conditions.

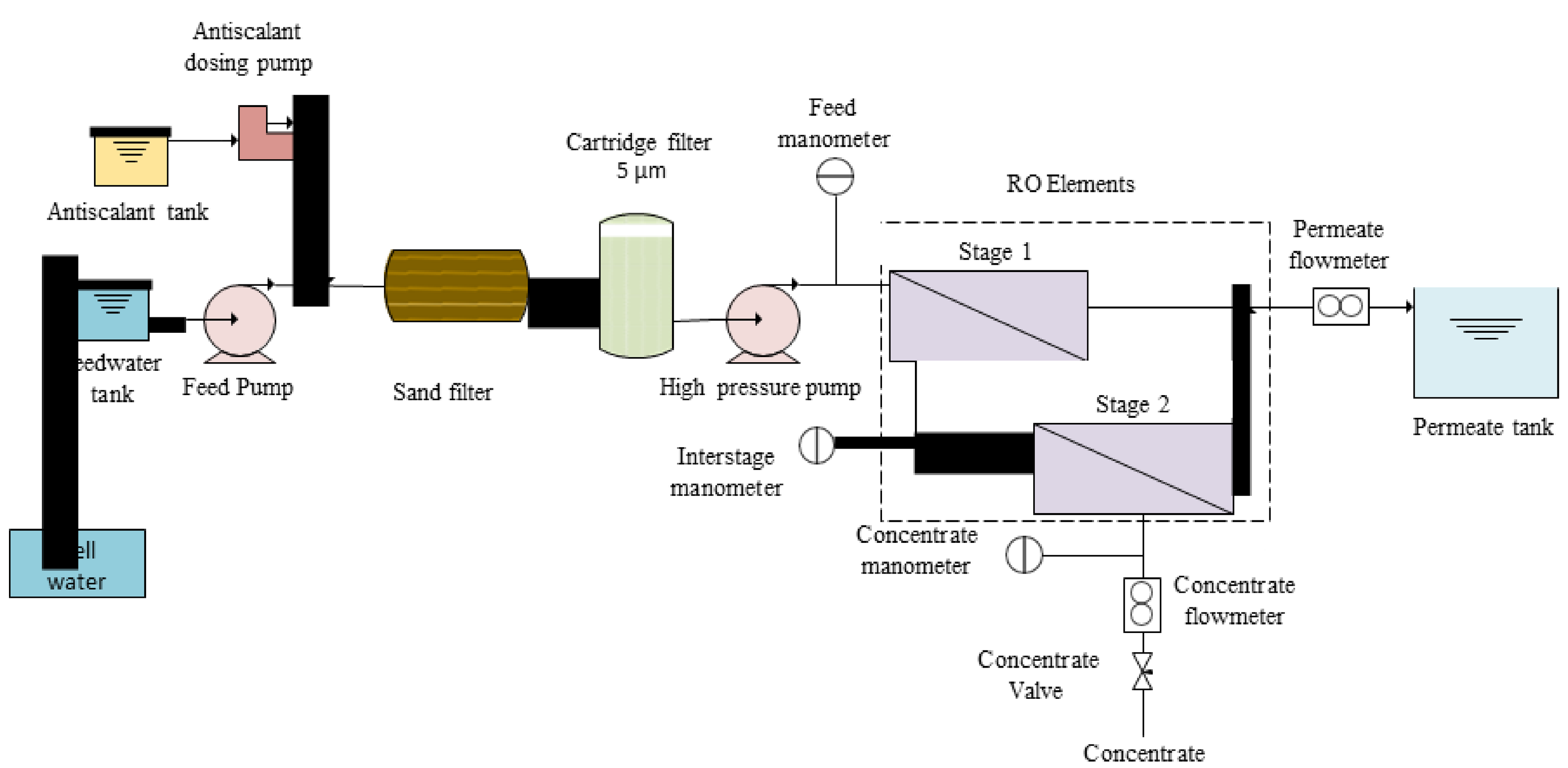

Figure 1. BWRO desalination plant

Results

The feedwater conductivity was between 680 and 2,100 µS/cm, the pH in the feed between 6,05 and 7,55. The feed pressure increase from 11 to 28 bars due to membrane fouling along the operating period. The RO system had a recovery around 75% with a production of 7,200 m³/d approximately. The rest of results are shown in Figs 2-12.

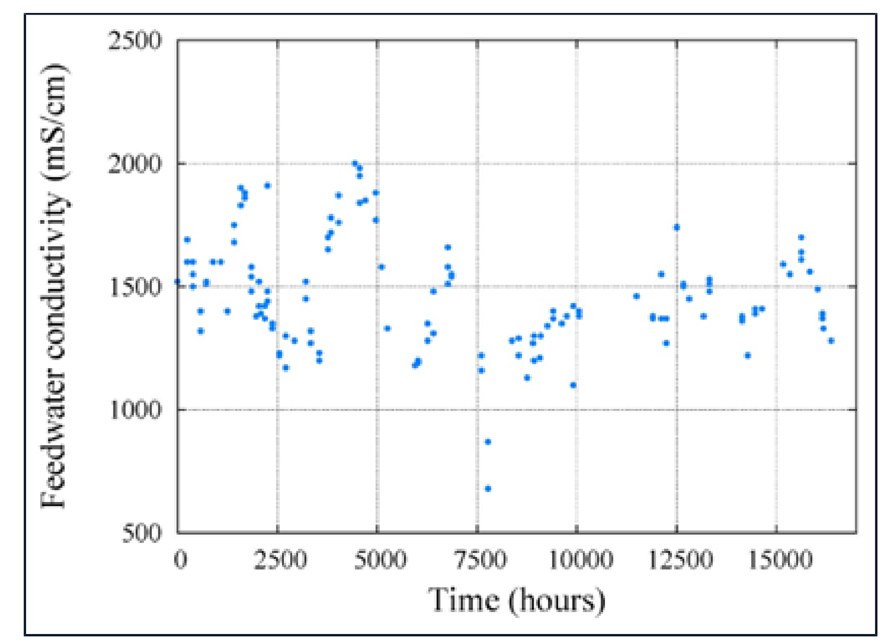

Figure 2. Feedwater conductivity

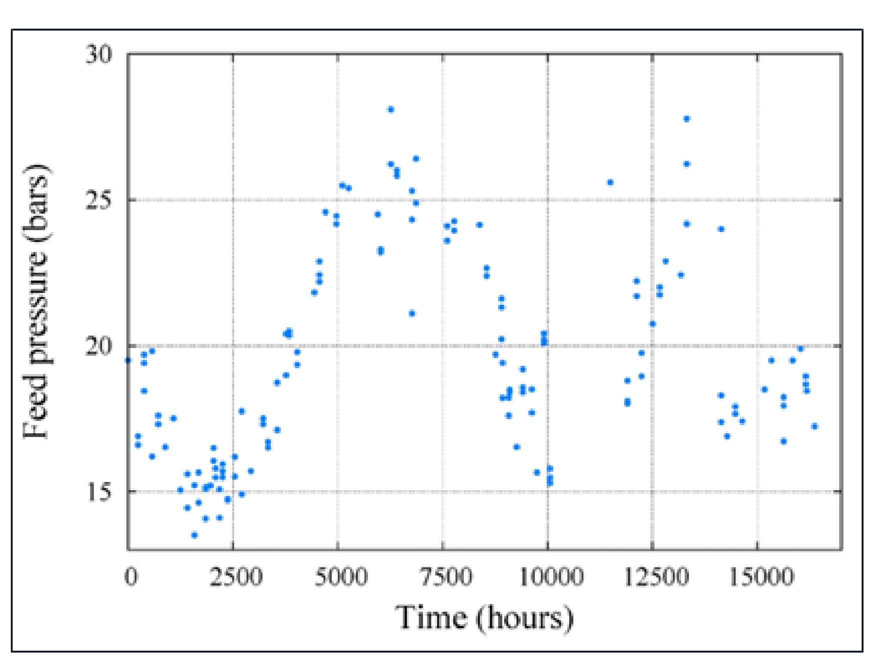

Figure 3. Feed pressure in line 1

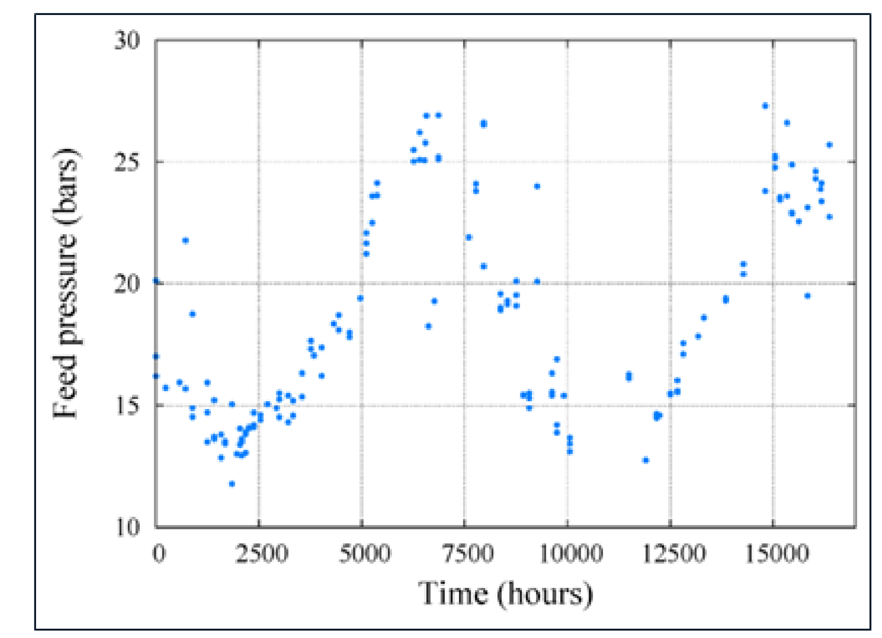

Figure 4. Feed pressure in line 2

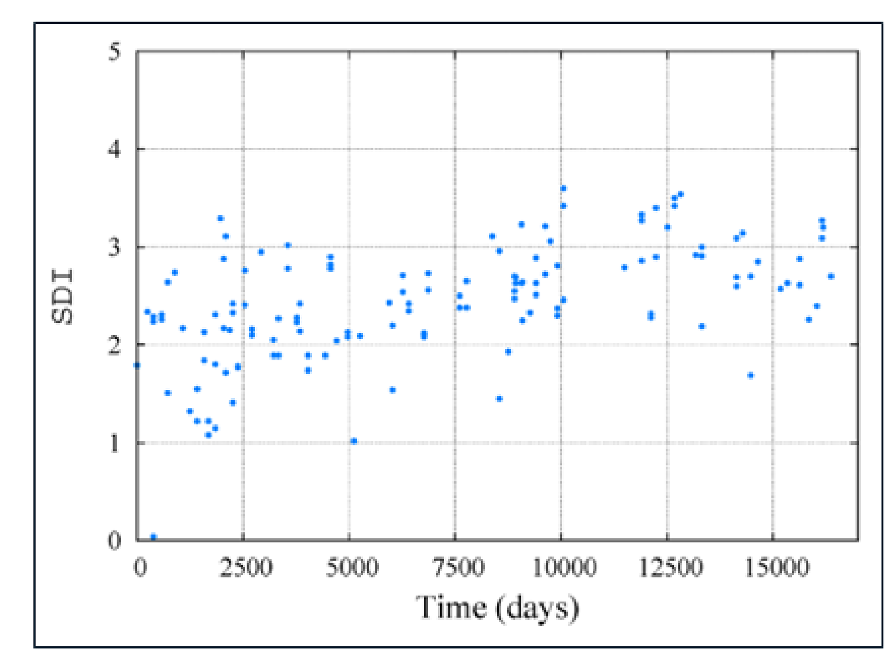

Figure 5 SDI in line 1

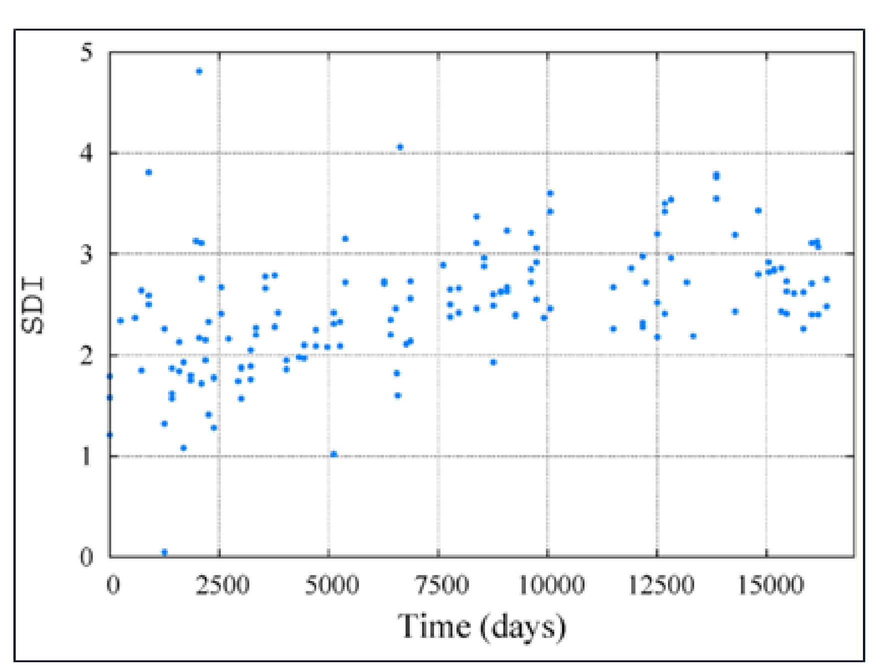

Figure 6. SDI in line 2

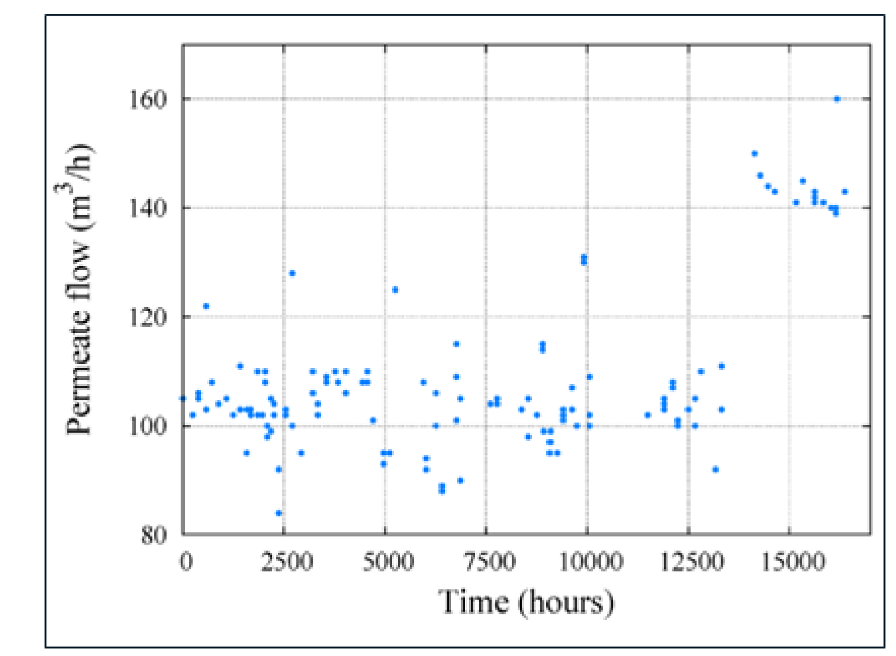

Figure 7. Permeate flow in line 1 stage 1

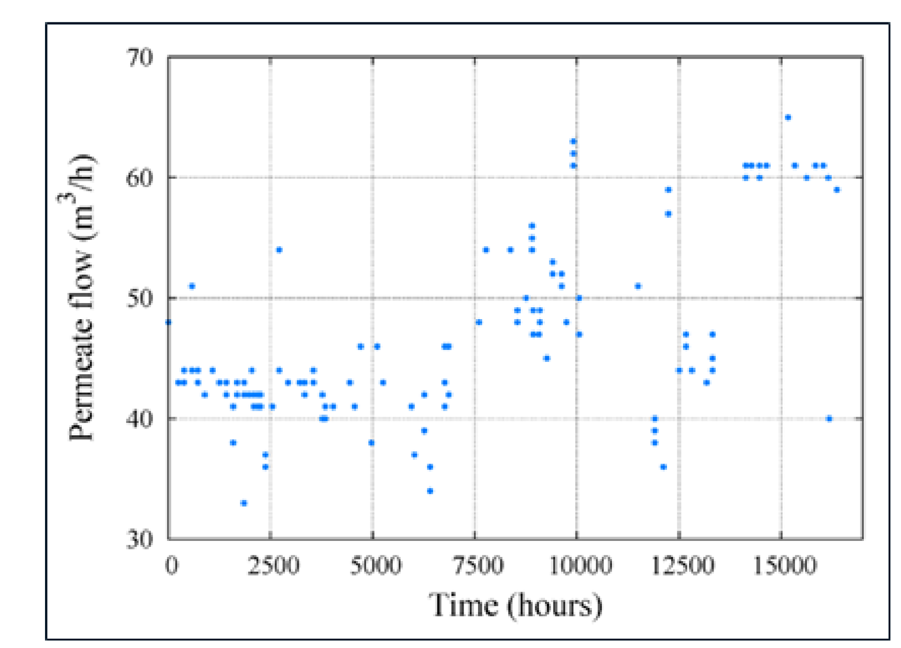

Figure 8. Permeate flow in line 1 stage 2

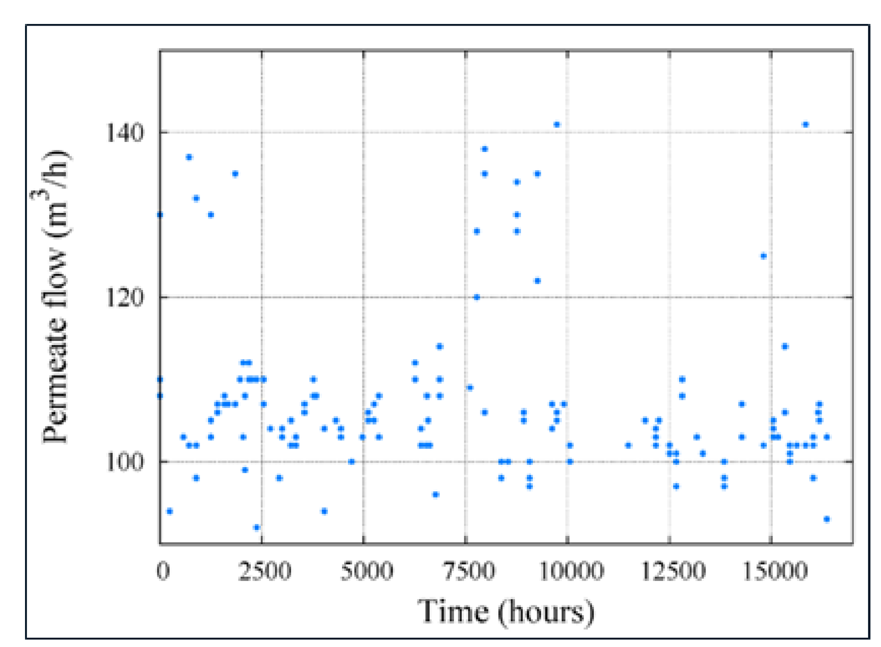

Figure 9. Permeate flow in line 2 stage 1

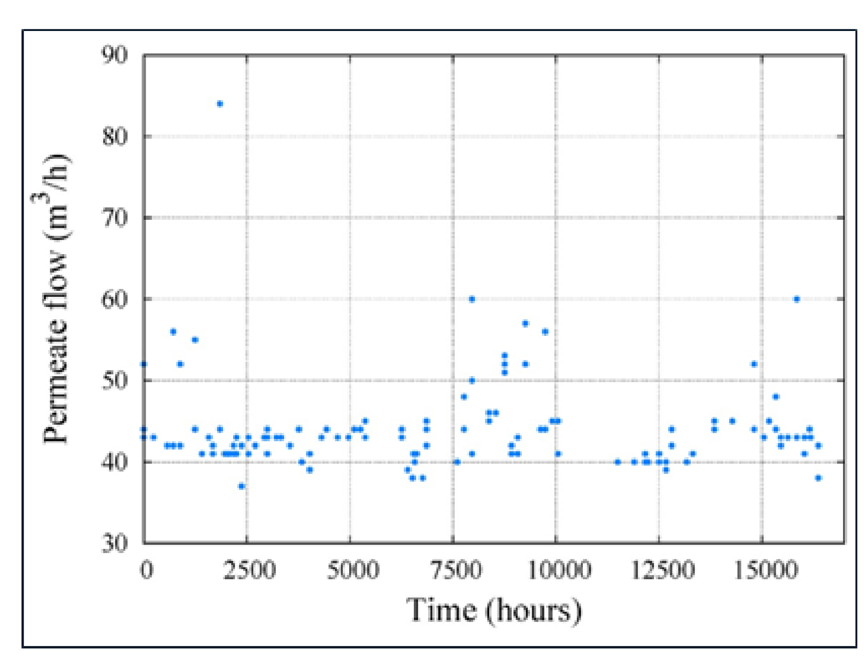

Figure 10. Permeate flow in line 2 stage 2

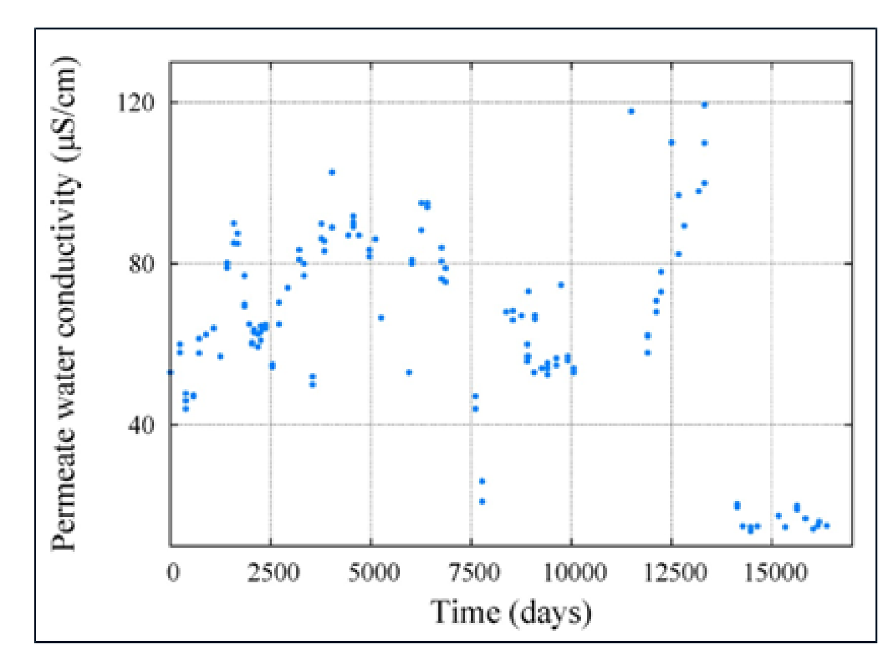

Figure 11. Permeate conductivity in line 1

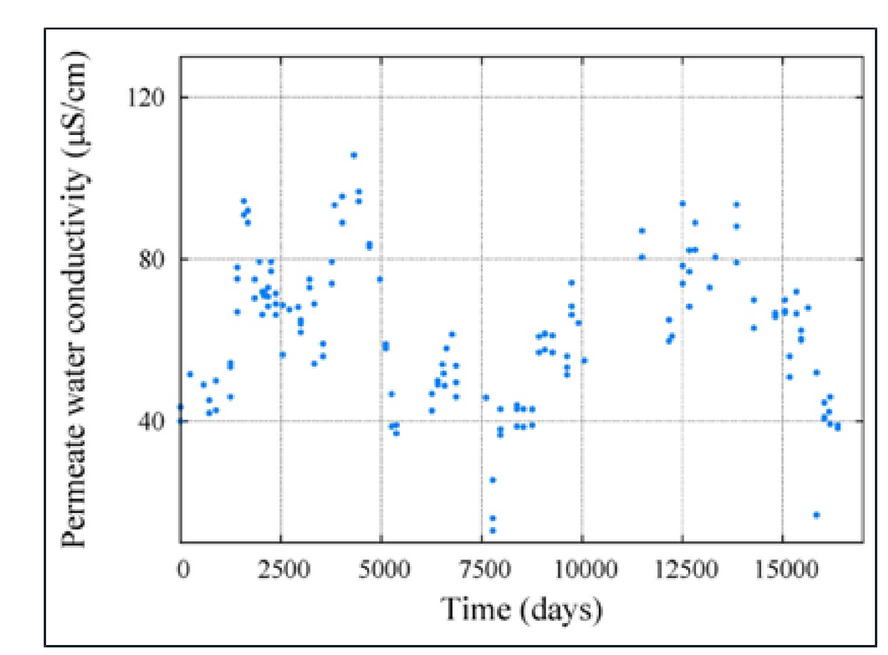

Figure 12. Permeate conductivity in line 2