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Brine discharge from the Javea desalination plant

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Abstract

The Javea desalination plant on the Mediterranean coast of Spain, currently has a production capacity of 28,000 m^3/d of desalinated water and in the coming years that capacity will rise to 42,000 m^3/d. From a technical point of view, the design of the plant is conventional, however the method of brine discharge has been specifically adapted for this plant, with the aim of minimising environmental impact. The Javea plant perfectly illustrates how reverse osmosis technology is compatible with the natural environment. This paper explains the technical elements of the plant, analyses the various options that were considered for brine discharge and concludes with what became the final, innovative and environmentally friendly solution.

Keywords: Reverse osmosis; Brine discharge

1. Introduction

The Javea Reverse Osmosis Sea Water Desalination Plant is located in the province of Alicante on the Mediterranean coast (Fig. 1). The town itself is situated in a cove between the promontory of San Antonio to the north and the promontory of San Martin to the south.

The final part of the river Gorgos lies in this cove and it is on the right hand side of this river, at 2 km from the river mouth, that the desalination plant has been constructed (Fig. 2).

Similar to the method used at the Bahia de Palma desalination plant the brine dispersal for this plant was originally planned to take place on the Gorgos river bed where it meets the sea. The strong hydro-dynamic forces at

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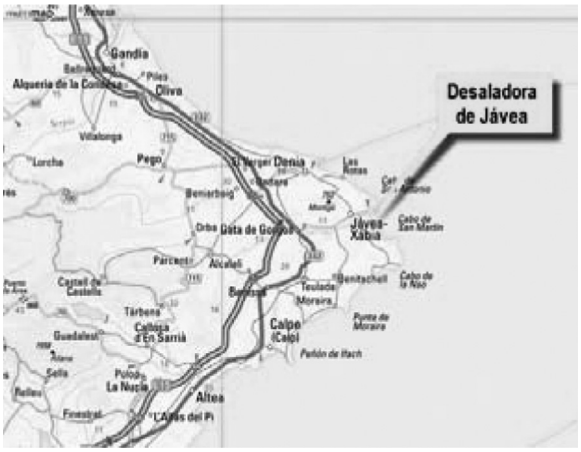

Fig. 1. Location of the desalination plant.

the river mouth would assure the swift dispersal of the waste brine into the sea, with the strong spring and summer winds coming from Levante in the east in addition to the effects of the pebble coastline.

During the construction phase, Pridesa commissioned research by the University of Alicante into the environmental effects of the aforementioned brine dispersal. The presence of fields of healthy sea grass at a very short distance (80 m) from the mouth of the river Gorgos led this study to conclude that the brine should be released in the Fontana Channel, having already been diluted with sea water at an approximate ratio of 1:4.

2. Description of the plant

Work carried out on the desalination plant can be divided into 4 sections:

- Sea water intake wells
- The desalination plant
- System for dilution of the waste brine product
- Discharge of the diluted brine product.

The locations of these various elements can be seen in Fig. 3.

The sea water is taken in through deep coastal wells which are situated all along the central reservation of Avenida Augusta which runs parallel to the coastline. 10 wells were drilled, each with a depth of 201 m to take advantage of the connections between the sea of the lower aquifer and its high level of permeability.

In each of the 10 wells, a submersible pump has been installed with a capacity of 375 m^3/h. Only 7 out of the 10 wells are working wells, with the other 3 in reserve, ready for the future enlargement of the plant. The intake pumps are divided into two blocks. Each block is made up of five pumps and discharges into a pipe of 600 m in diameter, made out of fibre-

Fig. 2. Aerial view of the desalination plant.

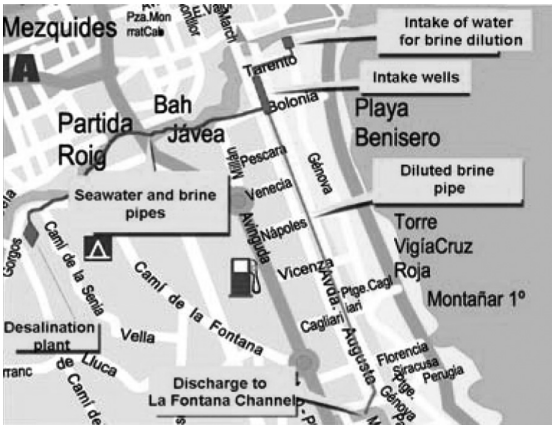

Fig. 3. Locations of the various elements.