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WATER SUPPLY ON THE ISLES OF SCILLY

I have been employed by the Council of the Isles of Scilly for the last twelve years as their Chief Technical Officer.

During most of that time there has been a problem with being able to supply a sufficient quantity of water to meet the demand.

St. Mary's is the largest of five inhabited islands with a population of 1500 people which rises to between four and five thousand in the peak Summer holiday months. The island is only three miles long by one mile wide and there is no space for large storage reservoirs and there are no rivers on the islands from where water could be abstracted. All the water comes from underground aquifers.

The Council is the only Local Authority in England that is also a Water Authority. The water on St. Mary's is obtained from three bore holes and three wells. Treatment is by pH correction and ultra violet light disinfection. About 60,000 gallons of water per day are supplied in the winter months which rises during Spring to a peak in August of about 130,000 gallons per day .

Prior to 1992, the islands experienced three years of drought conditions. Hose pipe bans were introduced each year and twice during that period we had to apply for a drought order. Publicity campaigns were undertaken each year to appeal to residents and visitors alike to conserve the supply. In February 1992, instead of the water in the wells rising as is normal at that time of the year, the levels started to fall. The Council resolved that immediate action was therefore necessary. There had been previous pressure from the Tourist Industry to provide a guaranteed supply of water even if this meant extra water charges.

The Council therefore looked at various options available:

1. Hiring of desalination plant

The Army were approached to hire a desalination plant because it was known that several were available having been used in the Gulf War. However the bureaucracy was difficult to overcome and the hire charges would have been uneconomically high.

2. Shipping in water

The local shipping company were contacted concerning shipping in water from the mainland. They were very helpful and produced detailed costings for this operation to be undertaken. However here again it was very costly and demanded a large labour element from our own workforce in order to provide the pumping and hoses necessary to transfer the water from the ship up to the nearest reservoir.

3. Purchase desalination plant

Estimates were obtained for the purchase of a desalination plant and when comparing with the previous two costs it was found that this option would be the best to resolve the short term problem and also to secure our water supply for the future.

Several firms in the United Kingdom were telephoned for details concerning the supply of a suitable plant. To our surprise not much interest was shown. It was apparent that they did not consider our enquiry to be a serious one. We finally located a Dutch firm who promised to deliver a plant in six weeks. They visited the island to inspect the situation and when their proposals were submitted it aroused media interest. Suddenly the United Kingdom firms woke up and realised that we were serious and other quotations came in, some promising delivery within five weeks.

A Consultant was employed to evaluate the quotations and Weir Westgarth were given the order to manufacture a reverse osmosis desalination plant capable of delivering 50,000 gallons of potable water per day. The order was placed in June 1992 and the plant was delivered within five weeks and was operational prior to the main tourist season in mid August. This was the first reverse osmosis desalination plant to be commissioned by a Water Authority in this country.

It is ironic that since the plant was switched on last year it appears to have been continuously raining ever since for which naturally I get all the blame!

The Reverse Osmosis Process

If, for example, sea water and fresh water are separated by a semi-permeable membrane then water molecules diffuse through the molecular structure of the membrane into the sea water until the solutions are of similar concentration. The (diluted) sea water, if in a sealed container, would then be under a pressure but if the salt water itself is put under a pressure in excess of this

then the direction of water diffusion can be reversed.

The complicated infrastructure needed to supply the plant was all carried out by the Council's Direct Labour Organisation while the plant was being manufactured. The RO plant was delivered in a standard type 20 foot container that one sees on lorries on the main roads. The manufacturers were restricted by the size of the unit and the weight that could be lifted by the crane on the ship.

Saline water is drawn from five bore holes that were drilled around the coast close to the plant. These bore holes act as a pre filter for oil, weed etc. and are not susceptible to storm damage as would be a direct sea inlet. Water is pumped up to a holding tank and thence is pumped into the plant. Pre treatment occurs by filtration through sand and cartridge filters. The water is then dosed with hypochlorite to kill any bacteria which otherwise would harm the membranes. The chlorine also would harm the membranes and so the water is then de-chlorinated. Flocculent is added to help the removal of suspended solids and finally a descalent is added to prevent scaling on the membranes.

After the pre treatment the water is pumped through high pressure pumps at 70 Bar pressure into the membranes which comprise spirally wound paper film in long tubes.

The concentrated brine is returned to the sea. 150,000 gallons of water is needed to be pumped through the plant to achieve the 50,000 gallons of potable water. The plant is divided into two separate trains each capable of producing 25,000 gallons per day. This enables us to run the plant at half capacity during the winter when demand is lower.

The RO plant is kept operational throughout the year. It provides two benefits. Firstly it provides an extra supply of water and secondly it solves our high nitrate content problem. By continuously blending with our existing well supply the nitrate content of the water can be brought down to comply with the EEC Drinking Water Directive. It is anyway recommended that desalinated water is not supplied neat into the public mains, as being devoid of any minerals it would upset the body's metabolism.

Since the plant was switched on last summer it has been operating continuously and has enabled us to abstract less water from our aquifers which has meant that all the wells had recovered to their normal levels by early Spring and we had no supply problems during last Summer. It is very pleasing to be able to enjoy dry sunny spells again without having to continuously worry about when the next rainfall is coming - not that we had many long dry spells

during the recent summer!

The total cost of the project was approximately £250,000, of which £48,000 was provided by a grant from the European Community's Regional Development Fund. The remaining amount had to be met by the water users on St. Mary's as the water supply has to be kept as a separate account. This meant that last year the water charges rose from £100 per annum to £133 per annum. Before the project was commenced a public meeting wad held in the Town Hall which was well attended. The public were informed of the options open to the Council and the decision that had been made. The great majority of the public have supported the Council in this venture even though it has meant extra water charges which still compare favourably with those experienced on the mainland.

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