Cranfield UNIVERSITY

IMPACT OF PHYSICAL CONDITIONING ON SMALL PARTICLES AND CONSEQUENCES FOR FLOCCULATION AND CORROSION

Ross Gregory, WRc plc, Frankland Road, Blagrove, Swindon SN5 8YF, UK
Tel: 01793-865000; Fax: 01793-865001; gregory@wrcplc.co.uk

ABSTRACT

Three investigations of the effect of physical conditioning (PC) on aqueous systems were carried out:

1. PC was applied by three devices individually and in combination to tap water dosed with ferric sulphate and the retention of the ferric hydroxide floc formed in a coiled pipe was measured. Retention of floc was affected not only by the individual PC device used but also by their combination.

2. Two iron coupon corrosion pipe rigs, each with a low and high velocity regime, were operated in parallel. The water to one flowed through an intrusive magnet PC device and the water to the other rig passed through a non-magnetic dummy unit. Coupons were removed from each velocity regime in each rig at regular intervals and their loss of weight by corrosion was measured. Coupon weight loss patterns was different between the two rigs and this was observed in the differences in the morphology of the corrosion product on coupons.

3. Short lengths of lead pipe had either low or high alkalinity water, with or without PC applied, passed through them whilst held in constant water temperature baths. The lead concentrations in the waters after passage through the pipes were measured. PC did not appear to affect lead concentration but SEMs indicated PC affected the morphology of the corrosion product within the pipes.

The results of all three tests are compatible with each other and support the principle that magnetic fields affect the behaviour of charged particles.

1. Introduction

Magnetic field treatment, physical conditioning (PC), is widely promoted for the control of scaling by hard waters and can be applied by a variety of devices, i.e. PC devices. The actual mechanisms and processes by which PC devices achieve their effects are unclear, although progress is being made (Baker & Judd 1996). The starting point is that magnetic fields affect charged species (Grimes 1988; Donaldson 1994).