



Figure 3.24 A photo showing even baffles around the bends.

The effects of chemically modified glass surfaces on size, morphology and number of crystals formed in crystallisation of four proteins (lysozyme, thaumatin, catalase and ferritin) were clearly demonstrated,²⁰⁹ and the effects of surface chemistry and morphology of polymeric substrates on nucleation behaviour showed a reduction in nucleation induction time for the crystallisation of aspirin.²¹⁰ The impact of materials of construction on nucleation were also reported.^{153,211} The exchange of the tubes was the ‘game changing’ solution for this case and encrustation free operations were accomplished thereafter. A few of days later, the truth was unveiled. A surface defect was clearly visible when this piece of tube was broken up. Since it was initially located at the nucleation zone, the rough edges of the damaged surface would have made it easy for nuclei or crystals to stick on, or for some minute crystal residual of previous runs to be retained and to act as seeds. Once this piece of tube had been moved further downstream, the nucleation process was fully completed, and crystals grew in size; the effect of crystals hanging on the rough surface was minimized. Well, this is just an unexpected case.

3.5.4.5 Case 5 – Due to Recycle

In a chemical company in Europe, a NiTech DN15 crystalliser was used for a cooling crystallisation of an inorganic compound. The solution was fed into DN15 at 60 °C, through two temperature zones (60 to 40 and 40 to 20 °C) and the exit stream from the DN15 was directed back to the feed tank. No seeds were used; spontaneous nucleation was the means of generating nucleation. The start of the cloudiness of the solution was observed and varied from 47