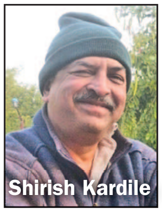
From the Board

What They Don't Teach You in Engineering School



Most water engineers in India are well acquainted with the clariflocculator, a unit with a concentric circular flocculation zone and an outer peripheral clarification zone. Coagulated water enters the unit in the center through the top ports of a hollow roller-compacted concrete shaft. The inlet to the shaft is below the bottom slab and connected by a buried understructure pipe from a flash mixer (rapid mix). The pivot of the rotating scraper bridge is fixed on top of the central shaft, and the other end of the bridge rests on the end carriage (a peripheral drive) on the outer circular clarifier wall. The slowly rotating bridge has hangers that support scraper blades. The sludge is moved toward the central pocket and drained off through a buried drain pipe.

About 25 years ago, a young civil designer received an urgent telegram, asking him to report to Karmala, a town in Solapur District, Maharashtra, because a new 5-mld water treatment plant was experiencing problems during commissioning. While visiting the site, he found the inlet units (cascade aerator, Parshall flume, and flash mixer) were flooded, and raw water was overflowing the walls. Only a small portion of the water was getting through to the clariflocculator and falling into a peripheral channel.

Anticipating blockage in the interconnecting buried pipe, the engineers at the site had tried their best to remove any obstacles. They'd pushed through a rod and wire rope and had also moved in a big air compressor to push air through the pipe. Only some polythene and gunnysacks (presumably empty cement bags) had been forced out. However, an obstruction remained, hampering flow.

To reconfirm, the design engineer opened his "approved" designs and drawings. Everything was set up per the book. The pipe diameter was 250 mm (9 in.), head loss (pressure drop) was within the limit, and construction elevations were correct. With the plant's inauguration event looming in two days, a few experienced engineers were consulted, but to no avail. Probing and prodding by the rods indicated the pipe was empty, but there was obviously a blockage at the end toward the central shaft.

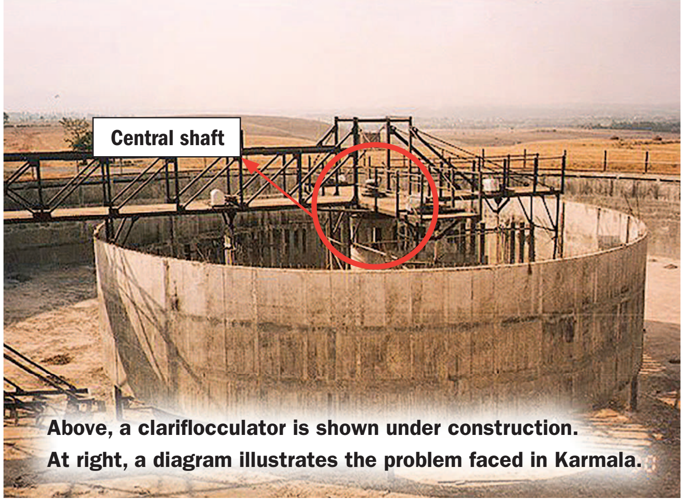
So, late one evening, the clarifier was drained, and the entire team gathered around the central shaft. Everyone concurred that a break should be made in the concrete for an opening at the bottom of the shaft, which measured 0.60 m (2 ft). Pointed chisels, sledge hammers, and tough men broke open a 46-cm square (1.5-ft) portion of 20-cm (8-in.) thick concrete. The sweating designer snatched a torch from a nearby man and peeped into the opening. After a minute or so, he raised his head, smiling.

"Eureka!" he cried. At the mouth of the pipe was an iron pan turned upside down and filled with hardened concrete. A thin guy with a crowbar was lowered into the shaft, which was about 1 m (3 ft) deep. The pan and the concrete debris were removed in about a half hour, and the hole in the shaft was plugged in two hours with fast-setting concrete.

Once the problem was solved, the contractor confided to the designer that the central shaft was manually filled with concrete, and leftover concrete was used to fill the shaft. A tired laborer must have accidentally dropped the concrete-filled pan into the shaft at the end of the day.

The experience taught the young designer an early lesson in what they don't teach you in engineering school!

—Shirish Kardile,
AWWAIndia Strategic Board Chair



Above, a clariflocculator is shown under construction. At right, a diagram illustrates the problem faced in Karmala.