Outward opening draft tube door.

The annual inspection of one of the large vertical axis propeller units in an 8-unit powerplant had just been completed, and the engineers were about to leave the plant for lunch. The maintenance crew was told to close the unit and water up, ready for an afternoon startup. Two men were sent down to close the outward-opening cast steel draft tube door. The draft tube liner was also cast steel and had a very loose hinge supporting the door. In order to align the 48 bolt holes in the door flange with the matching holes in the liner, there were four tapered brass "alignment" bolts, one in each corner. The two men just had time to insert and secure the alignment bolts before leaving for lunch.

After a quick lunch, the plant operator was in the basement and happened to glance up the dimly lit passage to the draft tube door, noticing that it was closed. He then proceeded to the draft tube deck and instructed the gantry operator to lift the draft tube gates. A few minutes after starting to lift the gate, the draft tube door burst open, flooding the plant to tailwater level, just above the steel spiral casing. Fortunately, the maintenance crew was still at lunch and nobody was in the plant basement. To compound the flooding problem, all sump motors were below tailwater level. Eventually, the plant was dewatered using a DC-submersible pump powered by car batteries connected in series.

Lessons Learned.

There are several -1) a more rigorous check-off procedure is required prior to watering up -2) always specify inward-opening draft tube doors, they are inherently safer and -3) either use submersible sump pump motors below tailwater, or alternatively a long shaft to an above-tailwater motor. An added safety measure would be an independent power cable and control to the motors, accessible in an emergency when station service power is lost.