Intro to horn water spray

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Effect of horn water was expected to cancel in Far/Near for MINOS, and be far less than the hadron production uncertainty, so no significant work was put into it by NuMI beam group. However, this could be not insignificant for other experiments.

Will give introduction to horn spray – geometry, flow rate

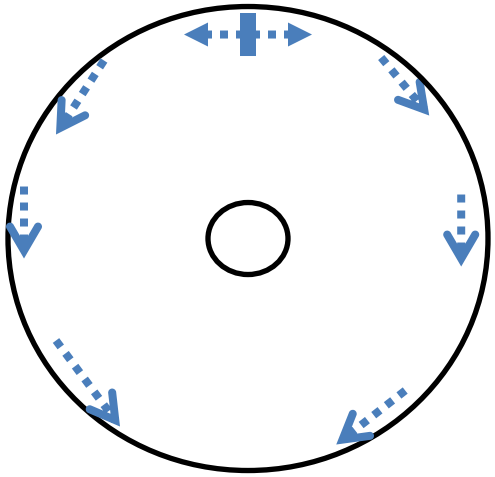
The docdb entry includes the following documents:

- Engineering note documenting an attempt to measure water film thickness (LBNE-doc 7555 by Cory Crowley).
- A (not very good) video of spray on horn 2 neck, taken through one of the lower 120 deg ports, where one can see the water dripping off the bottom of the neck.

We have a water-spray test stand where one could do further measurements

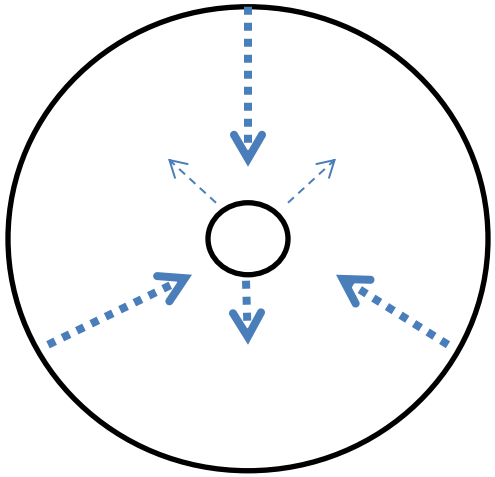
Measurements on a real horn are also possible, but more difficult

Outer conductor

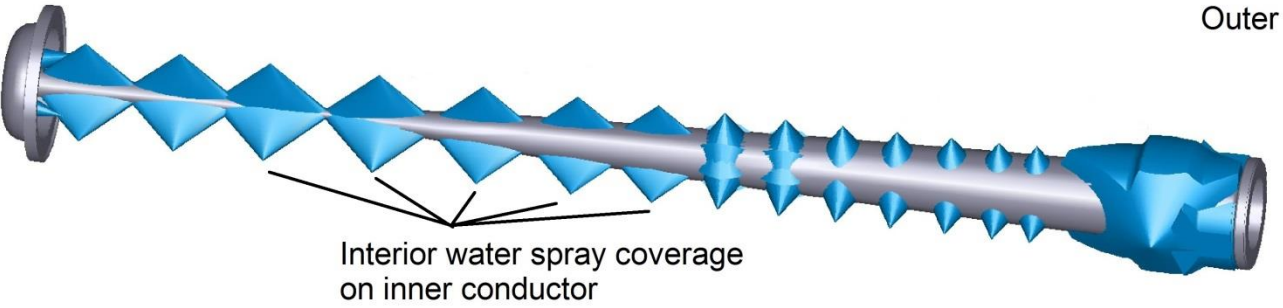


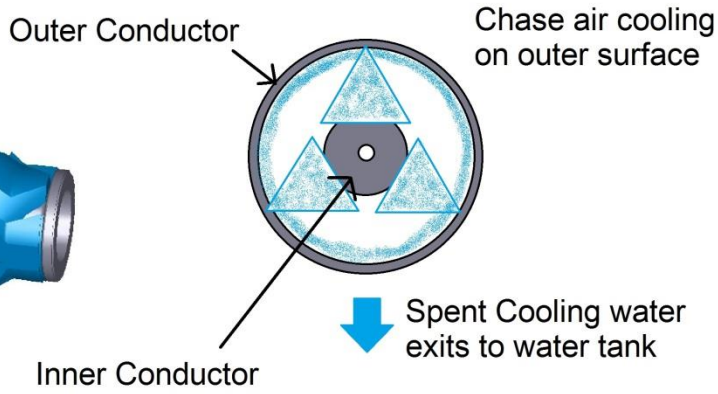
Spray from top nozzles,
water clings, flows to bottom of horn,
should have no effect on neutrino production

Inner conductor

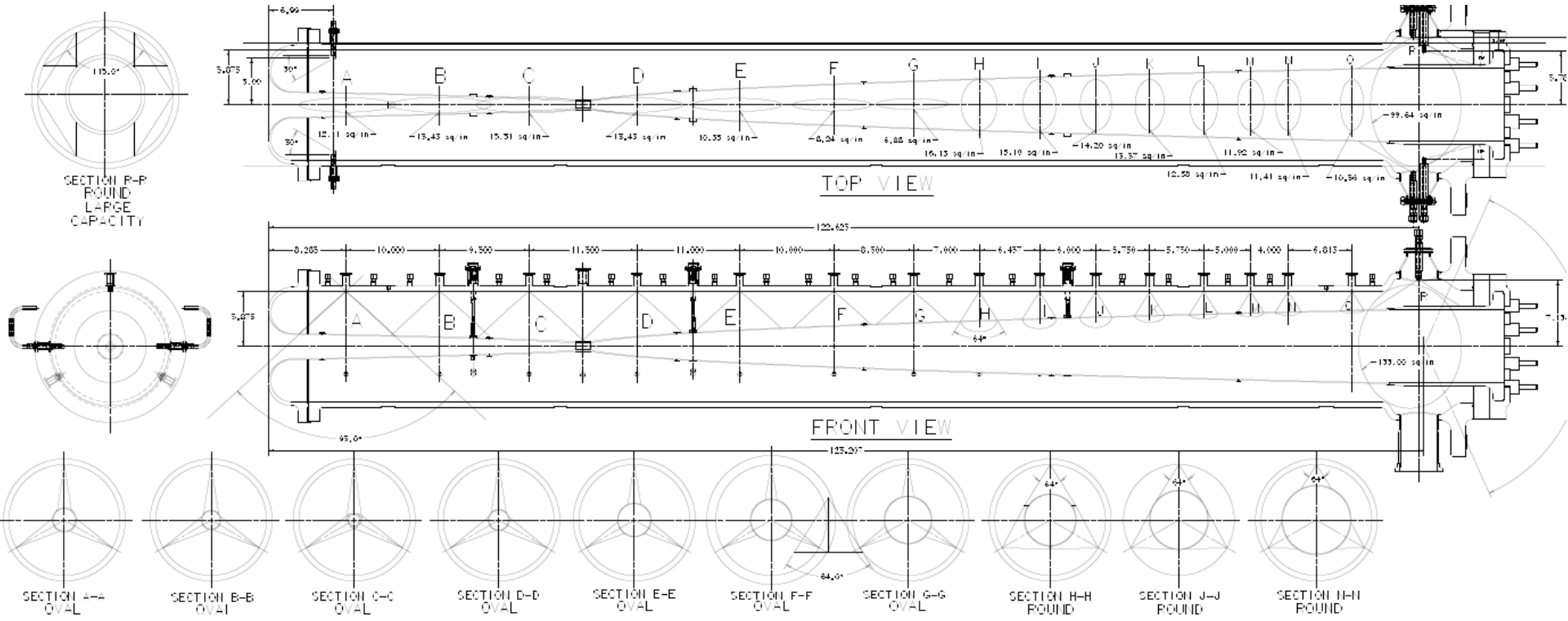


Spray from 3 directions,
some bounces off,
some forms film, drips off bottom of IC
Film of 1 mm could be ~ 3% neutrino loss





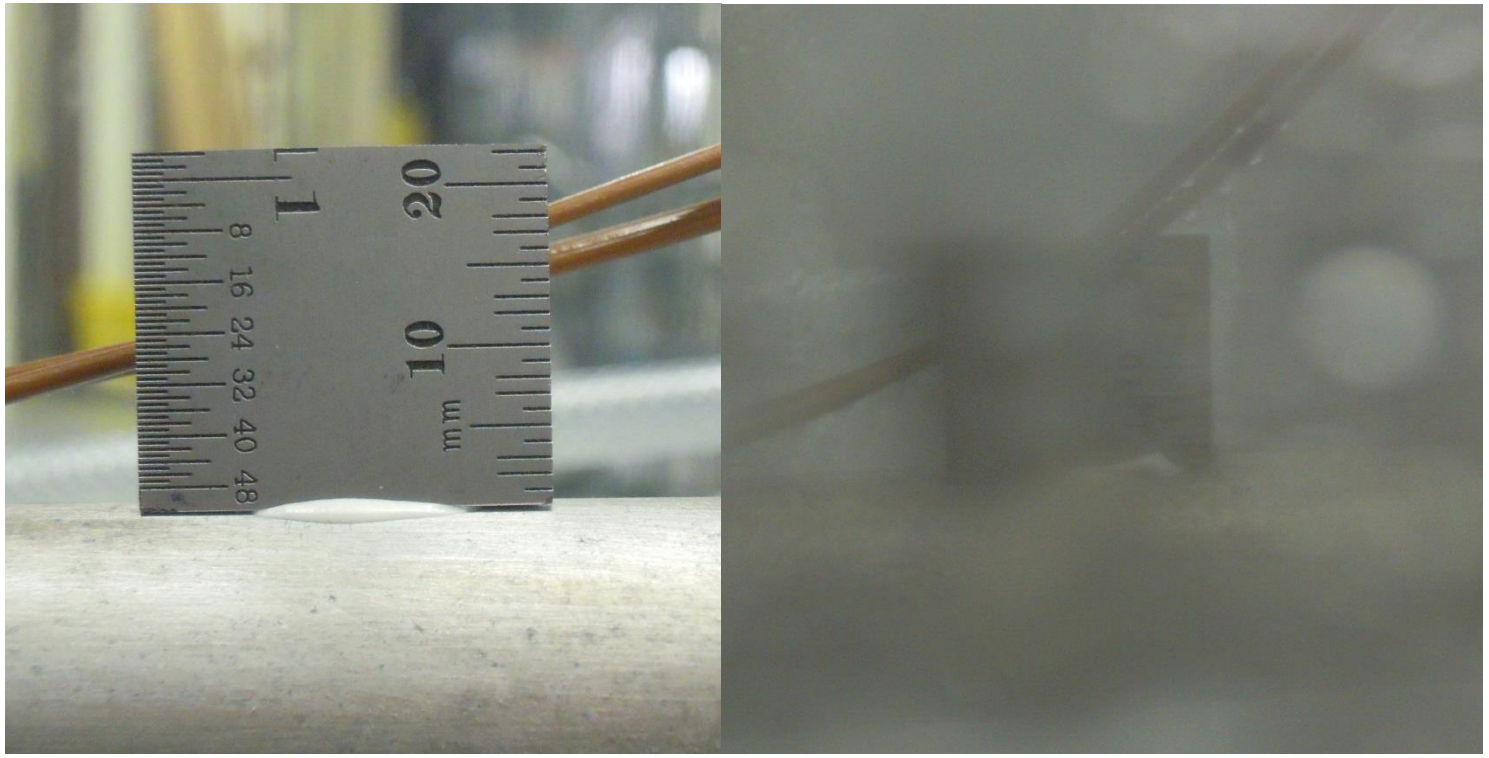
Horn 1 spray pattern



From drawing 437891-A1, ANU horn 1 IC spray pattern

Horn 1 flow: 23 gpm for IC, ~ 7m/s velocity from nozzles

From LBNE-doc 7555



"At no point could a visible film be identified other than on the edges of the water film test. These observations show that the water film thickness is confirmed to be no more than approximately 1mm, and most likely is less than that"