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 SUBJECT: Investigation of Effectiveness of HRT System for
 Venting Gas from Back of Fuel and Blanket Circulating Pumps
 TO: I. Spiewak
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In the HRT, gas which is trapped in the motor cavities of the fuel and blanket circulating pumps during filling operations and any gas which may migrate into the motor cavity during operation is to accumulate in enlarged chambers located in the pump purge lines immediately above the pumps.

It has been observed in the past that any gas present in the back of a pump tends to form a vortex above the center of the rotating shaft end. It would appear, therefore, that a vent in the center of the top plug of the pump would be most effective. However, because of the configuration of the seal weld cutter which is used to remove the top plug seal weld, a centrally located vent is impractical. In the HRT pumps, the vent is located 2 inches off the center line of the plug.

In order to determine the effectiveness of the off-center vent and the gas trap chambers, the Westinghouse 400A-2 pump was fitted with a Plexiglas top plug and a gas trap chamber fabricated from glass piping.

The loop and the pump were filled with water while allowing the air trapped in the pump to accumulate in the glass chamber. The loop was pressurized to bring the water-air interface to a level approximately 2 1/2 inches above the bottom of the chamber and purge flow of 5 gal/hr was introduced through the top of the chamber. When the pump was started, due to the internal pressure distribution of the pump and loop, the interface level dropped to within 1/4 inch of the bottom of the chamber. However, no gas was carried into the back of the pump with the purge flow.

Unmetered batches of gas were then introduced into the pump suction line of the loop. An appreciable quantity of the gas migrated up through the shaft seal and motor to the top of the motor cavity. A small, flat vortex did form over the center of the shaft but did not approach sufficient volume to block the auxiliary impeller suction inlet located in the top of the shaft. The remainder of the gas was effectively vented into the glass chamber.

From these tests, it was shown that gas in the circulating stream does migrate into the motor and bearing cavity of the pump. It was further demonstrated that the off-center vent and gas-accumulating chamber adequately vent the gas from the top of the pump and prevent gas binding of the auxiliary impeller.

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