DPST--83-624

DE91 007204

Received by PSTI

FEB 08 1991

DPST-83-624

TECHNICAL DIVISION
SAVANNAH RIVER LABORATORY

CC: W. R. Stevens, III, 773-A
D. G. Kilpatrick, 676-1G
D. C. Witt, 676-1G
H. D. Martin, 704-G
M. D. Boersma, 676-1G
L. F. Landon, 704-G
C. T. Randall, 676-G
J. L. Kessler, 676-G
H. L. Hull, 704-G

June 27, 1983

M E M O R A N D U M

TO: J. F. ORTALDO, 773-A

FROM: F. M. HECKENDORN, 704-G

DESIGN REQUIREMENT FOR DUAL AIR SUPPLIES
TO MELTER BORESCOPE

Introduction and Summary

The long term survivability and usefulness of the melter surface viewing borescopes would be greatly increased if a method of remote lense cleaning was available. The two units to be installed on the DWPF melter will incorporate air cooling and lense purging into their design. At present a single air supply line would serve both needs.

Separating the two air services will allow the introduction of water or steam into the purge service. Tests on the prototype borescope at ETF have shown this to be an extremely effective way of cleaning the lense of occasional deposits or splatter. It is recommended that this change be incorporated into the DWPF design. There is no change in the number of jumpers required.

MASTER

Discussion

The melter surface is viewed through a borescope and TV combination analogous to a wide angle telescope with remote display. The portion that penetrates the melter is ceramic cloth insulated and air cooled. The cooling air discharges outside of the melter.

A second air supply discharges into the melter through a small hole through which the surface is viewed. This keeps the lense clean under most circumstances.

The source of lense fouling is two fold. A gradual long term build-up can occur if any of the salt vapors in the melter vapor space reach the cold lense surface and condense. The second mechanism is from violent surface action ejecting material towards the borescope.

The current optimization of lense purging has eliminated virtually all of the deposits and all impacts except for an occasional lucky shot. It is recognized that fouling will still occur at a low frequency. It is also a known experimental fact that effectively all lense deposits are very water soluble.

It would probably be possible to overcome all lense fouling with increased air purge. However, this is an undesirable solution since it would add greatly to the burden on the off-gas system.

An alternate solution was tried on the LSFM at ETF utilizing separate cooling and purge air supplies. Water was introduced into the purge air line and allowed to blow through the borescope. The resultant water vapor/steam that hit the lense removed all material in a few seconds. Only approximately 100 ml of water was required to remove a direct hit of splatter that had occurred several days before, on the first test. Subsequent tests were equally successful.

It is anticipated that either water or steam could be used since it is steam anyway when it reaches the lense. It passes through the hottest portion of the borescope.

The current DWPF borescope design utilizes a common air line to both the cooling and purge services. The cooling air also goes through the camera electronics for cooling. The above lense cooling method will require separating these services. The current layout provides adequate spare air lines for this separation without effective jumper utilization.

FMH:tkS

END

DATE FILMED

02 / 22 / 91