14UD TANK OPENING REPORT NO.6.

Two openings: January 4th to January 7th, 1977.
January 12th to January 14th, 1977.

When the tank was last closed, on November 26th, 1976, the high energy pressure did not improve beyond about 1×10^{-7} and it was assumed that, although leakchasing had been careful and repeated, an undetected leak still existed in the tank. Because the machine was behaving well, and meeting the schedule, it was decided not to open up until after Christmas. However, a few days before the holiday, the vacuum was only being held by heavy sublimer currents and, in addition, serious instabilities in the generating voltmeter were traced to the unit itself, inside the tank. These facts called for a change of plan and, on Christmas Eve, the SF_6 was pumped down to just above atmospheric at which tank pressure the vacuum stabilized; the machine was left in this condition for the Christmas holiday period.

GENERATING VOLTMETER:

When the unit was taken to pieces for examination the stator plates were seen to be slightly loose, though probably not sufficiently to give rise to fluctuations. The motor was obviously running at a much lower speed than its nominal 3,000 rpm. It was strobed, and checked with a tachometer, and found to be only 830 rpm; this was attributed to winding damage. A new motor was bought but the closest obtainable was larger than the original and could only be fitted when extra length in the housing was gained by changing the BNC feedthrough for a microdot. Modifications were made to the motor mount to improve cooling by increasing gas circulation wherever possible round the motor.

The rotor shaft of the GVM was only grounded through its bearings and this suggested that the rotor might charge up and discharge through the bearings. A grounded carbon brush was fitted to touch and earth the shaft directly. This might contribute a damping effect on vibrations on the rotor shaft.

After eventual tank button-up the GVM worked perfectly and, although monitored for several days, exhibited no speed fluctuations at all.

VACUUM:

Leak chasing led to the discovery of a small leak on the disused ionizer feedthrough on the lower terminal pump; the leak was closed with torrseal. The midsection region has been under suspicion for some time and was meticulously tested for leaks. There were indications of a leak on a tube heater feedthrough immediately above the midsection and this was torrsealed also. The tube in units above and below the midsection was bagged and Tube 3, in Unit 6, exhibited a leak which was traced to the 10th ceramic; this leak was sealed with glyptal.

The doors were closed and, when the tank was roughed, no change was seen in tube pressure. However, on gassing up, the tube pressure began to rise after a threshold of 30 psi, though this increase was held by the lower terminal pump when it was turned on.

The following day there was a tank spark at 12.3 MV; a number of devices tripped and tube pressure rose to about 200 millimetres. Having confirmed that the leak was somewhere in the tank we again opened up. The gas stripper bottle, which had been checked at 450 psi a day or so earlier, was empty.

It was soon clear that the HVEC thermal leak, fitted in place of the NEC valve in September, 1975, was leaking in the gas flow direction (i.e. not through its walls). The thermal leak had not been operated and the failure was attributed, in

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some way, to the severe tank spark, though we took into account that there might have been a defect which was correlated with the threshold of 30 psi tank pressure at which the tube vacuum began to suffer. The new stripper volume isolation valve, (Report No. 5, page 3) was useful as a diagnostic measure. With the valve closed the tube pumped down satisfactorily and the stripper gas input flange was replaced by a blanking flange, eliminating the gas option entirely. Since gas stripping has never been used for experiments, loss of the facility caused no concern.

When pressure tested the thermal leak showed onset bubbling at the output end for only 25 psi on its input; at 200 psi on the input there were several bubbles per second at the output. A throughput of this order, connected to a bottle at 450 psi, explained not only the massive leak but also its continuation, because of the volume of the bottle over the period during which we were determining the location and magnitude of the leak. The thermal leak was disassembled and found to be in good order, excepting that the adjustment screw inside was looser than expected.

FOILS:

Because the stripper volume was at air all used foils were replaced. The stripper volume was roughed by a vacsorb and then opened to the tube which, by this time, was again under good vacuum. This was the second routine use of the new tube shut-off valve.

CORONA POINTS:

Points in positions 10, 11 and 12 on Tube 1 in Unit 15 were in poor condition and were replaced. Prior to this only one point had been changed in the entire machine for almost exactly a year, at which time every point was changed. These recent failures are attributed to improper setting of the terminal lens.

SHAFT BEARINGS:

Bearings were changed in L.E. castings 8, 9 and 13; also every H.E. bearing was changed excepting the single bearing in Unit 28. Two bearing cages were disintegrating.

These changes mean that now only bearings in 7, 10, 11 and 12 still have Mobil 78 grease, (Report No. 3, page 1 and Report No. 5, page 3).

MISCELLANEOUS:

Such matters as idlers, inductors, oilers etc. were checked and Chain 2 was cleaned because of a buildup of thick oil marks where the pulley rims make contact. Chain 3 will need to be shortened at the next opening.

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January 21st, 1977.

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