AUSTRALIAN NATIONAL UNIVERSITY
DEPARTMENT OF NUCLEAR PHYSICS
14UD TANK OPENING REPORT NO.7

TAIS

APRIL 13th to 20th, 1977 (6 working days)

The tank was last closed on January 14th and the machine ran well for most of the 89 days between that date and this opening.

Excessive lost charge, which could only be explained by local trouble at the triode needles inside the tank, began to interfere with operating during the second week of April. In addition, the terminal lens could not be controlled and the stripper foils had been used about three times.

CONTROL CORONA NEEDLES:

Inspection of these needles revealed them to be only slightly dull. More significantly there was a brownish discolouration on the tank wall where the needles enter the tank. It was then observed that, for the tank gas pressure used up to this time, 80 p.s.i.a., the needles had to be withdrawn beyond the radius of the tank wall into the recess which houses the control corona unit. As, with use, the needles became more dull, an increasing fraction of the terminal corona current found its way to the tank wall near the needles instead of to the control needles themselves.

The tank wall was smoothed with emery paper and painted with aluminium paint; henceforth the tank pressure will be run closer to 100 p.s.i.a. to allow the control needles to protrude further into the tank, ensuring that they are the closest source of corona to the terminal.

TUBE AND COLUMN POINTS:

All the column points in Unit 14 were held to be worth replacing, though none were broken, or very badly worn. No other points in the machine were replaced. Four slightly worn points had been changed in U15 in January 1977 but, apart from these, no point has been changed in the fifteen months since every point was renewed.

CHAINS:

Oiling has been infrequent and has always been carried out as a protective measure for the chains rather than because of their electrical behaviour. No. 3 charging pulley rim was wet with oil, but the chain itself was only faintly moist; this was attributed to a dripping oiler. The other pulleys, and all three in the terminal, were normal. Chain 3 was shortened by one pellet. A contact spring on No.2 'up' d.c. idler had broken off, and was replaced. An 'up' idler in casting 17 was replaced for the same chain. All chains were strobed and chain slip, idler speeds and contact springs were checked.

STRIPPER:

The foils were changed and, once again, the A.N.U. stripper isolating valve operated well and no leaks were detected. A new mechanical foil counter was fitted in the terminal; it has three quarter inch figures and can be read very clearly by the terminal T.V. The gas stripping facility has not been re-introduced since the failure of the H.V.E.C. thermal leak recorded in Report No. 6.

SHAFT BEARINGS:

The last bearings still to contain Mobil 78 grease, the four in castings 7, 9, 10 and 11, were noisy and were replaced.

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TERMINAL LENS:

The failure mentioned earlier was because the power common lead had burnt through; this was local wiring, not pyrotenax.

PYROTENAX:

The first failure of this material, since it was first used instead of conventional wiring shielded by greenfield, occurred in the lead to the heater transformer in casting 14; the copper sheath at the point of failure had melted. It was found that a short circuit existed on the load which this lead supplied, probably causing the pyrotenax failure. The conversion to pyrotenax was continued and several more leads were changed. The supply for the terminal ion pump was moved to the ceiling of the terminal centre unit in order to shorten both input and output leads.

PNEUMATIC FUNCTION OPERATORS: (Report No. 5, page 4)

It was found that the solenoid valves had small leaks allowing the SF_6 with which they are operated to be lost into the atmosphere. All these solenoids have now been put inside the tank so that neither discharge nor leakage is lost. Wiri to this new installation from the tank wall feedthroughs was all carried out in pyrotenax.

MISCELLANEOUS:

One of the entrance slit motors, not used for years, was found to have failed electrically. Measurements were made for a removable, rigid ladder into the bottom of the tank to replace the tortuous and somewhat hazardous rope ladder used up until now.

TANK GAS:

In order to stocktake, our total stored supply of SF_6 was pumped into the tank, scavenging the storage vessel to exhaustion. We ended up with a tank pressure of 104 p.s.i.a. and give a very rough estimate of losses, for four transfers, of 500 ± 300 kg. Steps are under way to eliminate some small leaks in the gas handling system.

ION SOURCES:

The series of experiments and design changes to the ovens used on the lithex source, and its condensers, have led to the record of 61 operating days on one loading of approximately 34 grams (report No.5, page 2); the failure was due to blockage of the condenser at the input end of the canal and not exhaustion of lithium; in fact what appeared to be about 20% of the initial loading remained in the oven.

The General Ionex sputter source has been run into the machine for two one-week periods. Beam size at the analyzing slits appears to be a factor 2 or 3 wider than for the lithex source. An N.E.C. type sublimer pump has been fitted, together with a 2L/sec ion pump, on the head of the sputter source, resulting in a vacuum of about 1×10^{-7} at this point. Beams of ^{6}Li, ^{12}C, ^{16}O and ^{65}Cu have now been run from this source.

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May 6th, 1977.