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14UD TANK OPENING REPORT No. 54

1st to 8th August 1986  
(8 days open, 6 working days.)

REFERENCES: Earlier Tank Opening Reports are referred to by the notation (38/4) etc, meaning Report No. 38, page 4. A glossary of terms and abbreviations is given at the end of the report.

REASON FOR TANK OPENING

Entry became unavoidable because of an inductor wiring breakdown problem. We took the opportunity to change all the tube and column corona needles.

PREAMBLE

The 14UD was last closed on 12th June. Immediately after gassing up it was conditioned to 13.36 MV; there was no lost charge and xrays were at the normal level. The machine went into use at 13.5 MV and ran non-stop at this voltage for a week; an assortment of lower voltages then followed. After this, because a step in the startup instructions was not expressed in unequivocal black and white, an experimenter with a very precise mind blew up at least four power supplies on the ion source. This put the accelerator off the air while repairs were carried out to the source, a few vacuum systems and two emotionally unsettled authors.

To show that it bore no ill feeling, the source then ran for 17 days and nights non-stop on a variety of beams; even then it was only turned off to prepare for a 5 day run that we wanted to avoid interrupting.

On 23rd July we again observed 25 microamps of lost charge and recorded in the logbook that there were probably again bdp deposits on the tank wall. At about the same time we began to experience problems with the charging system which we attributed to the charging voltage feed wires in the bottom of the tank. These wires are attached to the inductors, therefore they move with the charging motors as the chains stretch and can come close enough to the support structure to break down. To some extent we controlled the the problem by running without Chain 3 and we decided to schedule a tank opening. Performance was normal for less than 16 kV charging voltage with all chains running. The 14UD continued operating at about 13.5 MV until 31st July, when we shut down and took out the gas.

OPERATIONAL TIME.

During the 50 days since the last closure, the 14UD operated for 887 hours. This was 77% of elapsed time, excluding the days for gas transfer (42/2).

available and were installed throughout. The set removed had operated for 15,100 hours since September 1983.

When the new needle assemblies were all put in and set by the special N.E.C. alignment device (40/5; 41/7), all the tube gaps in Unit 15 were tested from the platform by varying the voltage of the resistance tester to give a current of 50 microamps for each gap. The uniformity of gradient of the new points was found to be just about as bad as for three year old points, that is to say there was a maximum fluctuation of about 10%.

#### Shafts.

Bearings were renewed in castings 9 and 10 and it was contended that the remainder would survive until the next scheduled opening. They were put in in May 1984 and, since then, the upper shaft has clocked 10,254 hours, the lower 12,082 hours.

#### STRIPPERS

The terminal foils were renewed and a new piston and springs put in the actuator. The counter drive was altered so that "Foil forward" increases the number.

#### CHARGING SYSTEM:

##### Chains:

There were no link inspections. Chain 2 was shortened by 2 pellets. The negative and positive distribution wires in the bottom of the tank were treated to a long-intended new arrangement which the older author has nagged about for years. Unfortunately, it was done in his absence and the machine slammed shut before he got a chance to grumble at it.

##### Idlers:

All stabilizing idlers were said to be in as good condition as could be determined by listening to them.

#### Miscellaneous

The G.V.M. was fitted with a commutator as the foundation of a system being designed by Doug Stewart to sense the terminal going negative and switch off the chains before any more reverse sparking can take place, bringing about further damage to the ceramics in the column posts, (48/1, 49/1).

Glossary of terms and abbreviations:

The order in which an accelerated particle passes positions in the machine is used to number them, thus Unit 1 is the first unit and units 14 and 15 are each side of the terminal, Unit 28 is the last. Tube electrode 19/2/7 is Unit 19, tube section 2 and electrode 7.

BDP or bdp, breakdown products.

Conductivity cell - the breakdown product detector described 37/10

Vivalyme - assumed to be soda lime,  $\text{CaO} + \text{NaOH}$

Operational time: We subtract tank opening time from elapsed time and quote the percentage of the remainder that the machine has volts on terminal; thus downtime, or failure to use the 14UD, count against us. Sometimes when the source is down the column is voltage conditioned, leading to an overestimate. Comparison of the plots shows that the difference is small.

The reports, including final copy, are produced on a computer which has no superscript capability or symbols. Powers of 10 and mathematical expressions are given in Fortran; nuclei and units are written in full, e.g. 'boron eleven', 'millivolts' etc.

Finally, to avoid confusion, David Weisser and the older author often eat lunch together.

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14UD 100 JUNE 1986

