AUSTRALIAN NATIONAL UNIVERSITY
DEPARTMENT OF NUCLEAR PHYSICS
14UD TANK OPENING REPORT NO 63

D.C. Weisser **R. Turkentine**

This Report covers the period from 18 October 1988 to 31 January 1989, during which there were two tank openings ,at least.

Reason for the Tank Opening

October 17 to 19 - broken shorting rod in Unit 2.
Nov. 17 - another broken shorting rod.

Preamble

The 14UD was closed on 22 September 1988, but on 23rd it had to run with Unit 2 shorted because of sparking. On 19th October it was noticed that Chains 1 and 2 were slipping since their charging currents had decreased and the frequency of the charging traces decreased. This was actually due to a lack of oil rather than slipping.

Tank Opening 18 October 1988

The reason for the sparking in Unit 2 was that a a blank assembly had been installed on a tube gap 3-5 by mistake. This happened during the tube rotation exercise in the previous tank opening. The steel rod left in the 14UD was found to be in the correct position, although this confused the issue rather than made it clear. It was thought that the nylon stud broke before the spark damage. The shorting rod contact assembly in the top of unit 2 was loose. We don't know whether this contributed to the failure or not. It was generally dusty inside the accelerator, presumably from the sparking associated with Unit 2. The entire machine was wiped off. Chain No 2 was not shortened. The resistors were inspected. Readings of resistance in the machine seems to depend on hygroscopic grey dust. I removed a pair of resistor assemblies from gap 17. The grey power covered half the resistor. There were substantial spark marks on the electrodes as expected. The banana plug connecting the two resistors remained satisfactory. The doors were closed on 18 October 1988. The machine performed satisfactorily after the last tank opening and had been conditioned back up to 15.6 or 5.7 MV. During a carbon 14 run with many shorting rods in, yet another nylon rod broke. It now became clear that the rods were failing where a nylon stud join was not inside casting but between two castings. There it could be exposed to high electric field. This problem was probably exacerbated by kink in the electric field due to the stringer that went relatively near this joint in the shorting rod assembly. This problem had now become more

acute because with the rotation of the low energy tube the stringers come near the shorting rods whilst they used to be 180° away from the shorting rods.

On November 17, a 150mm length of nylon shorting rod disintegrated and spread throughout the lower end of the 14UD. There was no tank smell when the doors were opened. The column was essentially dust free. Chains were checked for length, the slipping problem in mind. All chains were judged to be of the correct length, but we removed one pellet from chain 1 as a precaution. The stripper foils were not changed.

Shorting Rods

On 18 October a loose shorting rod contact on casting no 2 was thought to have contributed to the nylon rod failure. Contact was removed and all mating surfaces cleaned with Carborundum paper and them put back together using new mesh washers between the blocks and the castings.

In the low energy end of the 14UD, we have an extra half unit between unit 6 and 7. Since the upgrade, it has been the practice when using shorting rods, to short out the units nearest the terminal. We now realise that we have been running with nylon rods from the tank wall to the mid section with the joins part in the live units. This is due to omitting the half nylon rod when we don't have to make up the correct length.

It is now our practice, when using the nylon rods, to ensure that the half rod is put into the half section. Doing this makes certain that all shorting rod joins are not exposed to live units. New O-rings and nylon sleeves have been fitted to the low energy shorting rod clamp. Previous to this tank opening, all studs in nylon rods had been replaced with new ones.

Resistors - 18 October

Resistors in Unit 14 were tested at 5 kV and the variation between the lowest and highest resistors was 7.5%. They were not removed. This variation is thought due to the hygroscopic breakdown products on the resistors and on the column ceramics due to the large number of corona point assemblies still in the accelerator. It is our hope that when all the corona point assemblies are replaced with resistors, the build up of material will cease. Unfortunately we don't have a satisfactory way of removing previously deposited hygroscopic breakdown product from the ceramics in the posts and will continue to suffer problems from this area.

Cleaning

17 November. All casting covers were removed from the low energy end of the machine and all the low energy units were opened. This was to allow

us to vacuum up all broken pieces of the nylon rod. Low energy tube sections were carefully blown down with dry nitrogen to remove any nylon fragments from spark gaps. The column was blown down and chamoised with water and RBS solution as in the previous tank openings.

Charging test

At the end of each Tank Opening, the usual chain charging tests were performed. With the chain stationary, the conductors withstood 9KV. Testing of the chains running resulted in 2 and 3 OK but #1 saturating at 15-16μA.