

**AUSTRALIAN NATIONAL UNIVERSITY  
DEPARTMENT OF NUCLEAR PHYSICS  
14UD TANK OPENING REPORT NO 73**

**18 June - 29 June 1990**

**D.C. Weisser**

**R. Turkentine**

**Reasons for Tank Opening**

To install new designed spark protection electrodes for the chain idler wheels. Re-install chain in position number 1. The 14UD ran for 525 hours since last opening.

**Preamble**

Water managed to play a major role in our running, after the tank was last closed.

Its first appearance was when a water hose burst in the inflection magnet power supply on level 4. Naturally the water cascaded down the tower wetting everything in its path and filling the tank rims. After a mopping-up brigade went through the tower our main concern was with the analysing magnet. In case there was any moisture in the magnet, we ran the magnet with cooling water off at 100 amps 14.5 volts for 1 to 2 hours. As a precaution, all water hoses were changed in the inflection and analysing magnet supplies.

It was now the water made its own chore. One of the barbs on the water manifold in the analysing magnet supply broke. Fortunately this was on the ground floor so the water damage was minimal.

After the water repairs were done, air that got into the closed water circuit caused water to leak on to the chopper under the tank. We have become so proficient at cleaning up water spills now we were able to prevent any further damage occurring.

### **Tank Opening 19 June**

All spark protection electrodes for the chain idler wheels were removed from the 14UD. This was to allow their mounting flanges to be drilled and tapped to take the new designed electrodes.

Before the electrodes were removed from the 14UD, spark marks on them were noted and are as follows:

	<b>Casting</b>	<b>Position</b>
Small speck spark marks	22	F
	16	F
	19	F
	25	F
	16	F

There was a large spark mark on the face of electrode 25F.

### Chain Pick Offs

Our horse shoe shaped chain pick offs had a  $1\frac{7}{8}$  inch bore through them. We have replaced these with pick offs with a bore of  $2\frac{5}{16}$  inches, the same as the chain spark protection electrodes.

### Charging Volts

We took this tank opening as an opportunity to install two new aluminium boxes to house the charging volts surge resistors on the outside of the tank. The old housings did not allow human access in to it and the surge resistors could not be insulated well enough to stop breaking down to ground.

To install the boxes, the charging volt feed throughs were removed. It was then that we noticed the sharp edge on the inside edge of the bore, through the tank wall. This edge corresponds to dark marks on the nylon insulator. To remove the sharp edge we made a radiusing (?) tool that used the hole through the tank as a locator while we turned the tool by hand.

After assemble of the feed through the tank wall (?) the insulation was tested at 40 kV with no sign of breakdown.

### Post

Three new unused posts plus a reconditioned one were put into Unit 22. The new posts don't have screw blocks on the spark cups, so the reconditioned post is used to attach the stringers to.

Post numbers are           2345 position No 2  
                                  2342 position No 4  
                                  2344 position No 3

### Alignment

To try to find the reason for the beam entering the 14UD off centre, as seen by the tank slits, we decided to do an alignment through the 14UD.

The tube was vented from Level 5 and the tank cup, foil stripper and the bellows on top of the accelerator column were removed.

Because of a problem with our theodolite, we used the Taylor Hobson telescope mounted at level 4 and looked through the stripper canal to a target at the analysing magnet.

### Tank Slits

The errors found are as follows:

+X	.030 inches short of zero
-X	.013 inches over zero
+Y	.024 inches short of zero
-Y	.004 inches over zero

By disengaging the indicator potent with each slit, we were able to get all slits to zero when the meters showed .250.

### **Image Slits**

Found to be .060 inches low. This was aligned to zero after the quartz stop was installed.

### **Stop**

The suppressor in front of the stop cup relied on gravity to stay in the correct position. Unfortunately this was not good enough. The suppressor had rotated, cutting off about half the aperture the beam passes through.

A quartz Faraday cup now replaces the stop with a non-rotatable suppressor.

### **Super Buncher**

Was set left to right on line and .150 inches low, to allow for contraction when filled with liquid nitrogen.

### **Tank Cup**

Has been giving a few problems lately so we took its removal from the tube as an opportunity to make any improvements it may need.

Improvements needed were:

1. Reduce bearing face on thrust washer to lower the drag.
2. Return spring guide rod and tube required a lead on their common edges to stop them stepping over each other.

3. The spiral on the actuator allows for exactly 90° of rotation. The guide screw heads that run in the spiral had not been taken into account and so reduced the rotation by half the diameter of the head. The error becomes apparent when the cup is set exactly square to the beam path when in the “in” position. When the cup is taken out it is unable to fully clear the beam path. The problem was rectified by increasing the length of the actuator spiral.

### Resistors

We tested resistors in units 26 and 27 where the stringer has been removed at the 8-gap tube section. All resistors good drawing 6.7  $\mu$ A at 2 kV.

In unit 27 we noticed a tube spark gap had one of its hold down screws fail and the electrode had shorted out to the electrode above. This has been repaired.

The following are the values for the tangential resistors we tested across an 8-gap tube section in Unit 13:

	<b>1.5 Volts</b>	<b>5 kV</b>
1	720 $\mu$ A	9.4 $\mu$ A
2	500	9.5
3	669	9.5
4	501	
5	660	9.4
6	514	9.8
7	634	9.9
8.	630	9.8

## **Chains**

So as we can be sure about the new chain idler wheel spark electrode being satisfactory or not, Chains 2 and 3 were removed from the 14UD, inspected, all spark marks polished off and thoroughly cleaned.

Using a venturi pump we washed inside the chain pellets with warm water and RBS25 detergent. A further wash in alcohol removed any loose particles.

Chains 2 and 3 were installed into their respective positions in 14UD. A new 50 link length of chain was added to Chain No 1 which was removed during the last tank opening. After inspecting and cleaning, this chain was put into position No 1 in the 14UD.

## **New Spark Protection Electrodes**

Four chain idler wheels were installed using a centring jig locating on the chains. Large slightly domed washers were used on the flange hold down bolts. The holes, through the washers are off centre so the washer can cover the large irregular shaped holes in the flanges.

## **Leak Chasing**

All broken joints leak chased with the only leak showing up on the HE sublimator flange. New sublimators have been fitted to the pump and with re-torquing, the leak was fixed.

**Charging Tests**

After our standard cleaning procedure the charging test values are as follows:

<b>Kv</b>	<b>No 1</b>	<b>No 2</b>	<b>No 3</b>
0	0	0	0
2	8	9	8
4	14	16	14
6	21	22	19
7	24	26	22
8	27	28	25
9	Sparking		

Tank doors closed Friday 29 June 1990 at 14.30 hours

6/11/90