

AUSTRALIAN NATIONAL UNIVERSITY

DEPARTMENT OF NUCLEAR PHYSICS

14 UD TANK OPENING REPORT # 86

24th TO 25th AUGUST 1999

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REASON FOR TANK OPENING

To investigate why the terminal turbo pumps would not turn on.

To find why the machine had recently begun sparking.

PUMP OUT 23-8-99

Pump out tank, open doors and start ventilation system.

SUMMARY OF WORK

24-8-99

The platform was deployed and the initial cruise down the column found the LE end of the machine clean. It was noted that there were only six spark marks, one on the terminal and five more between the terminal and Unit 20. In Unit 20 fragments of plastic signaled that there was a major problem in the chain idler system and particulates, most probably the cause of sparking, were found distributed throughout the HE end of the machine.

The HV gap test found no other problems.

And so to work

The terminal was opened and the RF box covers were removed.

The fault in the turbo pump system was not simply a lead left unplugged as had been hoped, but was found to be a broken solder joint on the turbo 24volt relay circuit. The temperature sensor, that was replaced at this time also, already had one broken wire joint so both were fixed and operation tested out OK.

The damaged idler in Unit 19, chain 3 was removed and all chains were checked for idler wheel damage. It was soon noticed that most of the thirteen yellow coloured wheels, that were fitted last opening, were damaged to varying degrees, the completely failed one in Unit 19 being the worst and two were found to be unmarked.

25-8-99

The fitting and adjustment of the remaining idlers was completed and the operation of terminal equipment was tested. The terminal was closed and the remaining casting covers were fitted.

The chain motors, inductors and wiring in the bottom of the machine were cleaned and checked.

Charging tests were completed and then the column was wiped down. The usual HV gap test was done and the metering checked.

The machine was closed and air evacuated in preparation for gas up tomorrow morning.

TURBO PUMPS

During tank opening #85 the RF shielded boxes, in the terminal, were opened to allow fitting of the new foil-changer control board. After the opening the terminal turbo pumps would not turn on.

The terminal was opened and the covers were taken off the RF boxes. It had been thought, wrongly as it turned out, that the turbo pump power lead had been left off. After all the power leads were checked and no other obviously simple fault was found then the expert was called in. David Kelly, assisted on the platform by Alistair Muirhead, found that one of the wires that provide 24v to the turbo pump relays was broken from its spark protection feed through terminal on the side of the GP3 box. The soldered connection, of the low standard our software guy is capable of, must have been inadvertently dislodged during the wiring of the new foil-changer board.

It is normal operating procedure to check the operation of terminal equipment prior to closing the terminal. The new foil-changer was operated after its installation and again prior to closing the terminal. So much care was spent on the new equipment that testing of the turbo pumps was overlooked. The tank crew is determined that all equipment will be checked in future.

CHAIN IDLERS

The damaged idler in Unit 19, chain 3 was removed and then a complete inspection of all idlers was done. The condition of the thirteen yellow coloured wheels, fitted during the last opening, varied between two extremes. The completely failed one in Unit 19 was by far the worst and two of the remaining twelve were not even pitted. The old brown coloured wheels, still a majority of the population (pop 72), did not appear to be any more worn than when last inspected approximately eight weeks ago.

Spares wheels had not yet been ordered, but, many old brown coloured wheels, probably accumulated over twenty years of hoarding anything of the remotest interest and including some

that were removed last opening, were still available. These were sorted through time and again in an effort to find wheels with the softest tyres that, hopefully, would last until new ones arrive.

The yellowish coloured wheels may have been on hand since 1985 and, whilst they had never been used, could hardly be thought of as new. The tyre material appears to have hardened over time and probably is just too brittle. Whilst there are one or two examples of similar damage to brown wheels, down through the years, for the most part they appear to remain resilient and some are still quite soft.

Whilst the many different tyre materials used over the years would most likely have different service lives, environmental effects such as exposure to air and oil may also have an influence on service life. We speculate that the brittle tyres shatter under electrical field stress at the chain contact.

Since the idlers in the 14UD are at least fifteen years old, shelf units included, one could argue that buying a fresh new set makes good sense. Thirty six new idlers have been ordered and more will be ordered in the not to distant future.

RF BOX SPARK PROTECTION

The RF box mounting pads, that were spark damaged last opening (TOR85) and were modified at that time, had not sustained any damage what so ever even though the machine had been sparking quite a lot over the final two weeks. The modified pads, incorporating spark gaps, were only in service for eight weeks but this result was a positive one.

INITIAL PERFORMANCE

The machine has been sparking much more than usual. This is probably due to particulates that remain after cleaning up the fragmented idler. Some would be due to normal conditioning.

There had been twenty four sparks noted in the log by Tuesday 31-8-99 and range from 11Mv to 14Mv.