AUSTRALIAN NATIONAL UNIVERSITY

DEPARTMENT OF NUCLEAR PHYSICS

14UD TANK OPENING REPORT NO.21

June 24th to August 8th, 1980.

(45 days open; 33 working days)

In addition, two half-day "re-entries".

REFERENCES: Earlier Tank Opening Reports are referred to by the notation 12/4 etc, meaning Report No.12, page 4.

REASON FOR THE TANK OPENING:

The opening was scheduled in order to change the terminal spinnings and carry out major work on the vacuum system while the tube was at air.

PREAMBLE

The 14UD was last closed on April 24th and during the 53 operating days since then the machine worked fairly satisfactorily, though the upper shaft and Chain 2 were out of action. We had accepted for 10 months that virtually no sublimers in the machine were of any use (18/2) and it is noteworthy that, for the period since the last opening, the L.E. vacuum remained in the mid 10^{-8} region.

Eerie stability was not experienced at all since the last closure and this gave rise to almost as much conjecture as regret. There were one or two periods when stability was poor, though acceptable. Rods were put in as a diagnostic, but this led to further confusion.

Generally the machine had been well-behaved and was conditioned to 14.35 MV and the machine was used without trouble at 13.9 MV with occasions up to 14.1 MV. Computer parameter logging started during June. The first efforts at a summary are enclosed.

Chain 3 began to misbehave and was often found to have significant negative self-charge. Oiling was at first promptly effective and later very slow to produce results. Regular fluctuations in charging current for Chain 3 arose, which were at about the frequency of wobble which can occur in the stiff direction of the chains.

THE TANK OPENING

Exploratory tour:

When the doors were first opened the smell inside the tank was particularly acrid, but after a night's ventilation with our filtered air system (11/7) the atmosphere in the tank was not unpleasant.

The chains were checked first; they were very dry and thickly tacky. There was plenty of oil in the reservoirs and the dispenser worked properly, establishing that the chain problems had not been due to lack of oil.

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The lowest terminal spinning was opened for the first time in 7 months. All looked quite well, apart from a higher than usual accumulation of fragments of rubbish. Two contacts were missing from d.c. idlers and that there were not more after such a time surprised us somewhat.

The tube and column corona point assemblies appeared to be in serviceable condition, though the needles were not nearly as sharp as they were in their first flush of youth three years ago when every assembly in the machine was changed (9/3). The stabilizing idlers were in good condition for all chains. The two authors differed somewhat in appraisal of the amount of dust on the column which was somewhere between "no worse than usual" and "there's dust everywhere; can't you see it?"

Nothing in the superficial inspection explained the absence of eerie stability since the previous tank opening, or the occasions when stability was poor. The chains had been thickly tacky before at openings prior to which stability had been excellent. Chain 3 was turned by hand and exhibited nothing to explain its erratic behaviour.

General plan:

It was decided to change the terminal spinnings as first job, mainly in order to close the tube as soon as possible. In addition all 96 of the control wires which enter the tank through the lid would have to be removed and so it was an opportunity to renew and reorganize the wiring in its entirety; this work could only proceed when the lid was back on.

The chance to make a variety of changes led to the democratic suggestion that a few pet hates could probably be eased, or got rid of altogether. One of the authors immediately clamoured that the beam profile monitor at the top of the column was never used, was disliked and distrusted by the few who knew it was there, and harboured dust; therefore it ought to be taken out. The suggestion was vetoed by the other author for what appeared to be aesthetic reasons but, as a consolation, he agreed to the redesign of the terminal foil counter box. This may not seem a proportionate concession but the box in questio consisted of a number of loose, irregularly shaped sides, brackets, spacers and shims, the majority of which always fell down into the column on the rare occasions when replacing a light bulb was risked.

And so to work!

Immediately after the inspection in the tank the tube was let up to air and dismantling of both L.E. and H.E. vacuum systems begun. At the same time all the wiring and greenfield tubing at the top of the column was taken out to the accompaniment of the merry ring of 7 pound hammers on the tank just outside where a youthful team was removing the 56 large, thickly-painted nuts and bolts from the lid.

The wiring was stripped, everything removed from inside the lid and the three terminal spinnings raised to the top of the column by the end of the first day, and there was a feeling that things were going briskly. In the previous few weeks, a working deck for ease of access to the beam pipe, steerers, cables etc. had been assembled eight feet above the tank top, together with a small gantry to lift the spinnings. The lid was left in position until all welding, drilling and grinding associated with the platform was completed.

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During the second day the column was stayed by four one-inch square steel tubes which were clamped at the terminal end on the steel posts and at the other end on bars which were bolted to the four flanges which normally take the corona triode stabilizing system, the generating voltmeter and two unused ports. Since the platform had to operate above these supports, they were put in through the bottom tank door, tied under the platform and raised to position where they were located and clamped firmly. Precautions were then undertaken to ensure that no-one could absentmindedly try to drive the platform down past the terminal.

At 10 a.m. on the third day the lid was slid off; then the cross-members which hold the top of the column were removed. With the three spinnings as close to the top as possible, the column rocked significantly when pushed. The first spinning was raised by the platform until about 18 inches of it were above the column, then straps of car seatbelt webbing, which had been made for the purpose, were looped round the spinning at four places and hooked onto a steel cross suspended on a block and tackle. The spinnings were easily lifted out of the tank but raising them by the platform was a touchy procedure because the column swayed readily. The rings frequently caught on the inside rims of the spinnings, giving quite a thump to the ring supports.

The new spinnings had been left in their wrapping until the time to install them when it was discovered that the new lower spinning did not have the four angled lugs which align the bottom of the one above. Also it was clear that the swivelling location plates on the column would not fit in the new spinnings because of the difference in contour. Accordingly the plates were removed and machined while the location lugs were being fitted. These holdups meant that the new spinnings were not installed the same day the old ones were removed; this was something of a pity because it would have been a record for the southern hemisphere.

In the morning of the fourth day after the doors were opened the new spinnings were put in, the column top cross members put back and the temporary struts at the terminal removed. The spinnings were placed in operating position at the terminal and modifications and adjustments were made to the various spinning locators and supports, all of which had had to be removed in order to get the narrow diameter of the lower spinnings past. One of the "hates" scheduled for attention was the tightness of the centre spinning supports which always caused great difficulty in deploying them. They were machined to a much better fit and the entire terminal suspension system worked easily and was adjusted more precisely than we have made the effort to do before. The new spinnings are almost a quarter of an inch smaller in the inside ring clearance diameter than the old ones, and this requires greater care in transporting them along the column. Though there have been one or two skirmishes at making new jacks, on which the spinnings are moved by the platform, the project was never completed. We were still using the original ones which are tedious to adjust and which time and abuse have bent and loosened. A new design was suddenly envisaged by the more ingenious author and drawn up quickly on the back of an old envelope. A set of new jacks was made and came into active service in time for the final closure of the terminal.

After they had been admired the new spinnings were soon forgotten and we were back with the status quo and platform time was allocated according to the priorities of the wide range of jobs which were now being begun.

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VACUUM.

Inside the tank:

Having accepted that all the sublimers were useless (18/2), we planned to examine the insides of the pump bodies before deciding to remove them for chemical cleaning. In all probability the simple method of collecting the loose flakes with a vacuum cleaner, then dislodging the scale with a wire brush, would be all that was necessary. When the menorah of sublimers was withdrawn from the first terminal pump the sublimer pellets looked in remarkably good condition and there was no flake or scale whatsoever in the body of the pump. It was precisely the same in the other terminal pump and we began to wonder if something had gone wrong and the sublimers had not been operating at all. However, the tests described in Report 18/2 were carried out patiently and carefully (in the absence overseas of one of the authors) and 30 - 40 amps were measured on all the sublimers.

We attacked the inside surfaces vigorously with a wire brush and a lively display of characteristic titanium sparking made it clear that there was a good coating on the body, even though none could be made to flake off. A closer inspection of the pellets revealed that, though they were not wrecked or distorted, many were uniformly depleted. The unjustified defamation of the sublimers was excused by attributing their condition to a combination of reasons which are all kind to sublimers, if not diagnosticians. To begin with the tube has remained at high vacuum for two years and there have been no bursts of gas on hot pellets; sublimers in the tank are never required to pump down from backing pressures as external ones are; the pumps are always rested when the shafts are off and are rarely "whomped" (run for an hour at 40 amps to gain extra pumping). When the L.E. midsection sublimer pump was opened it had the same appearance as the two in the terminal.

Before the shutdown two menorahs of 12 sublimers each had been assembled on new flanges with new feedthroughs, and leaktested; these were put in the terminal pumps. New sublimer changeover switches supporting their actuators, were fitted in redesigned stainless steel housings. These also enclosed the 12 feedthroughs, enabling connections to be made from the switches to the feedthroughs in short lengths of copper braid. The 40 amp connections from the sublimer transformers to the changeover switches were made in pyrotenax.

A new 10 litre/sec ion pump was put in the terminal and a used and bench-tested one in the L.E. midsection. The terminal pump shorted out immediately. The sublimers in the midsection pump were renewed. A dry joint was found in the wiring for the midsection ion pump unit and this may well have been the cause of historic intermittent failures.

The Weisser valve, which isolates both ends of the accelerator tube from the terminal stripper, was removed, its seat renewed and an improved adjustment device was designed and fitted.

A 300 litre/sec ion pump was connected to the tube at the top of the column and fed via a high-voltage feedthrough by a power supply outside the tank.

In parallel with the vacuum work inside the tank, the L.E. and H.E. vacuum systems were completely dismantled. The sublimer pumps were reconditioned and new 20 litre/sec ion pumps installed. An ANU ball valve, similar to the one installed at the L.E. (11/5) was put in at the H.E. end. In order to insert the ball valve without moving the H.E. Quadrupole, the H.E. faraday cup was incorporated into a new vacuum manifold for the H.E. pump. As a diagnostic device, and

also for protection, a thermocouple gauge head was fitted above the H.E. ball valve and will be tied into the protection circuits.

The seats of both the L.E. and H.E. pump isolation valves were replaced. New, higher capacity magnetic steerers, and their associated beam pipes, were installed below the H.E. quadrupole.

A foil stripper assembly was put in below the object slits of the energy-analyzing magnet. There will be more about this later in the report.

The H.E. beam profile monitor was found to have its wire burnt off by the beam. How far back in the past this happened is not known. To the chagrin of those of a given allegiance none of the four beam profile monitors lying around the laboratory could be made to park their wires reliably out of the beam and the H.E. unit was put back without a wire. Its vacuum housing was replaced because of a weld leak caused by rust repaired with glyptal.

The tube could not be closed until the alignment had been carried out, and this, in turn, had to wait for the various bits of plumbing to be completed; thus a few unavoidable delays occurred. At the H.E. end the ball valve was thought to be closed and the vacuum system was roughed for leak testing. Sadly we report that we pumped on the accelerator tube until an aluminium foil cover over the stripper flange sucked in and popped. The minor consequence of this error resulted in wrecking a number of H.E. stripper foils because this stripper unit had not been taken out. The more serious result was that our rigid policy of minimizing turbulence in the tube by gentle roughing to maintain the conditioned state was, at a blow, thwarted. Subsequent to this fiasco an interminable series of vacuum problems plagued the new H.E. ball valve; they included a ruptured bellows, twice misplaced gaskets and two separate weld leaks, totalling 5 removals and replacements of the valve. Although 79 separate flanged joints were disturbed on the accelerator during this tank opening all the vacuum problems occurred within 20 inches of the H.E. ball valve. We began to feel that the good start with the lid and the spinnings was slipping a bit, along with our fortitude.

At about this stage the older author was suddenly afflicted by a great number of large, itchy lumps, necessitating urgent medical attention. An allergy was diagnosed and, after a number of tests, confirmed and isolated. The author was informed that nothing could be done because, unfortunately, little was known by the medical profession about allergies to beam profile monitors, apart from the desirability of removing the cause.

Eventually the tube was closed and pumped after having been open for 28 days.

ALIGNMENT.

A new Wild theodolite was used to establish a vertical datum to which to align the 14UD. The theodolite was set up in a reproducible position under the analyzing magnet over the point used previously. The entire accelerator, including the analyzing magnet, could be moved with respect to this datum.

The 14UD tank was moved so that targets top and bottom coincided with the vertical line. To achieve this the top of the tank was moved by about 0.2 inches and the bottom by about 0.04 inches. Then, with the tank aligned, it was found that the stripper and L.E. tube entrance were on axis and did not have to be moved at all.

An alignment station was established on top of the tank and set to the new vertical axis. This station can accommodate both the Taylor Hobson telescope and the new theodolite. A secondary vertical line was established with the theodolite to bring the inflection magnet in the source room on axis. All four alignment pedestals in the source room were adjusted to be in the same plane and for their intersecting lines of sight to go through the vertical datum of the machine.

All beam optical components throughout the laboratory, from the ion sources to the beam dumps, were realigned.

COLUMN:

Wiring:

The rewiring marathon was begun by fitting new connection boxes at the feedthroughs under the tank lid. Control wires to the entrance slits used pyrotenax and the control rod motors used two 25-core cables in separate copper tubes. We found, on disassembling the conax 8-wire feedthroughs, that nearly all the original wires had suffered to some extent from spark damage and a few of them were in very bad condition. In all cases the breakdown had occurred in line with the machined edge of a steel insert used to apply mechanical pressure to the teflon gland. Having tested nylon inserts for strength and distortion we eventually put these in instead of the steel ones so that the distance from the wires to local ground was more than twice as long and there was no sharp metal edge. Because most of the wires would have to be replaced it was decided to make them long enough to go directly to the barrier strips and avoid crimped-on extensions. This meant a lot of teflon covered wire, so a telex, framed in both flattering and pleading terms, was sent to N.E.C. requesting immediate shipment. Always our friends in time of trouble N.E.C. contacted the manufacturers who rushed us, by the next plane, a reel of the wrong wire. A less flattering telex was sent to N.E.C. who promptly sent us every inch of the correct wire they had in stock It transpired that, without telling N.E.C., the manufacturers had changed the design and the wire. The original wire was thickly insulated with teflon; the replacement wire was thinly insulated with varnish. The thin insulation would be unsuitable for the control voltages at the feedthroughs, let alone the high transients which did so much damage to the original wire.

Points:

The points continue to survive. Their condition was commented on (17/3; 18/3) and has not worsened noticeably, though tube and column currents fall off at higher voltages than they used to and make control more difficult without shorting rods. The ANU points in Unit 2 (19/2) are in good condition and none of their needles have fallen out or broken.

Chains:

All the stabilizing idlers which had not been converted were replaced with ANU versions (14/2; 19/2). No stabilizing idlers had failed.

As reported (20/5) a noisy bearing in the charging pulley of Chain 2 caused us to isolate the chain at the time of the last button-up; the bearings were replaced. While this was being done it was noticed that a pivot pin in the pantograph device which sets the aspect of the Chain 2 inductors was very badly worn, and it was replaced.

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The chains were cleaned with alcohol in the usual way and then oiled by hand. The nylon rims of all the chain pulleys were examined and there was no evidence of the crazing damage which occurred four years ago (2/1); this effect is looked for at all tank openings and has never recurred since adequate oiling was instituted.

Shafts:

Bearing failure in the upper shaft motor was detected at the end of the last shutdown (20/5) and the shaft isolated until this shutdown. The upper shaft motor is extremely difficult to remove because it stands partly in the lid recess and only two workers can get close enough to lift it down. A removable hydraulic jib, or davit, was made and fitted into position. It will enable the motor to be raised, swung, and then lowered to the platform quite easily; nevertheless, while the tank lid was still off, the upper shaft motor was changed for a reconditioned one and the jib was taken out until the next time the motor has to be changed.

All bearings were listened to and 6 pairs were changed in the lower shaft; none in the upper shaft needed attention.

L.E. components:

All components between the tank lid and the L.E. tube were removed for alignment. The entrance slits were set when the general alignment took place. The slit notation, +X, -X, +Y, -Y always caused confusion because no-one was ever really certain of the reference from which direction was implied (no-one down under knew which way was up); the ambiguity was completely resolved by re-identifying the slits red, green, white and yellow, and they are painted so inside the tank. The colours now relate to direction toward and away from the ion sources.

The beam profile monitor inside the tank was retained because it was mechanically operational and filled up the space in the vacuum plumbing.

The tank cup manifold was replaced by one containing a port for the newly installed 300 litre/sec ion pump.

MISCELLANEOUS.

Cables:

The insulation of the high voltage charging and suppression cables often breaks down because of tank sparks and, in an attempt to ease the situation, they were run in copper tube for almost their full length. The original perspex safety covers round the tank feedthroughs were replaced by aluminium ones into which the copper tube terminates. (These cables failed with almost the first spark.)

Metering leads:

Tube and column corona metering leads, hitherto in bare wire stood off the column by sticky panduits, were re-run with supports made of N.E.C. type 3 corona assembly discs which are contoured to present a rounded edge to the casting. They are attached by perspex sheets and double sided adhesive foam. We believe the rounded edge will allow sparking to ground without damaging the insulator. This idea was blatantly stolen from N.E.C. via O.R.N.L.

8/...

Power failure, and a moral:

Without warning a switching catastrophe by the electricity authority blacked out the entire campus for nearly an hour. One of the authors, the usual one, was plunged into utter darkness on the platform near the terminal so that, according to the other author, he could see no evil either. The ventilation fan stopped and there was dead silence. In these circumstances a sense of orientation is completely lost and, since the platform is always littered with a variety of heavy and sharp things to trip over and fall onto, the best thing is to get on all fours and clear somewhere to sit safely before yelling the place down. We do, of course, have a torch about which there is a strict rule that it never leaves the platform under any circumstances, but it had been borrowed.

The 14UD tower has no emergency lights other than in the stairwell. The other author had to find a torch before being able to see to connect the crank handle and wind the platform down by hand. We shall have emergency lighting fitted near the platform winch and also on the platform itself.

Cleaning: (More mines!)

Though we pay considerable attention to cleaning the column at every tank opening it was felt that the 14UD was not as clean as it had been after the Great Cleanup nearly three years ago (9/2). This was when the rubber-covered heater leads were removed because fragments of charred rubber were all over the column; every casting cover was taken off and the recesses in the castings were cleaned laboriously, this exercise leading to the original discovery of sandmines. Once again every casting cover was taken out of the machine and an intensive cleaning session begun. One or two sandmines were ferreted out of castings which are rarely opened, but we presume were searched in the past; they were about a c.c. each in volume and nothing like the splendid nuggets found in our heyday. The ceilings and floors of units in the H.E. column were cleaned with solvent where oil had spattered from the chains. Final cleaning was, of course, by blowing every nook and cranny on the tube, posts and castings with nitrogen, and then tac-ragging all smooth surfaces.

The clean-up revealed several loose tie-rods ('stringers') which connect intermediate heater plates to rings a third above and below each casting. To find these failures on each side of the terminal explained adequately the lack of eerie stability we had suffered. In addition.three shorting rod contact assemblies were loose and, in one case, the screw hole in the casting had been arced away, explaining the unstable voltage when shorting rods were used. Six old-style non coilbound shorting rod contacts were replaced by coilbound versions.

Final tests:

The chains ran well mechanically and the charging tests were copy-book, at least they became so when the charging and suppression supplies were connected to the right inductors.

Button-up:

The tank doors were closed at 4 p.m. on a Friday after seven weeks. An informal conference was held and all who had contributed such cheerful effort, much of it intensive and frustrating, were asked to attend and join in the general appraisal. While the discussion was going on the tank was roughed down to about 4 p.s.i.a. and then let up to atmospheric again in order to observe changes in the tube vacuum; all was well and the roughing continued overnight.

Next day the tank was gassed up to about 10 p.s.i.a. and tests were made for SF_6 leaks. Two were found: a bad one on the pipe thread of one of the 8-wire feedthroughs (but not on the gland), and a significant one at the O-ring of the nipple which seals the accelerator tube to the tank lid. The one on the feedthrough was fixed by reducing tank pressure to atmospheric, easing off the threaded pipe and thoroughly cleaning it, applying threadseal compound and tightening again.

The leak at the tube nipple could only be attended to inside the tank and, in view of the relatively low leak rate, it was decided to trade off some SF_6 against the value of obtaining a rough idea how the machine would work after so much disturbance of its vital parts, including that great imponderable - a complete re-alignment. Consequently the tank was not pumped to fix the leak but gassed up instead for voltage and beam tests.

While the tank was being gassed up the source, which had been dismantled for the source room alignment, was put together again and aligned with the newly established targets. The source was running, and about to be used, when the nitrogen disaster struck within minutes of the sourceroom chiller failure. The liquid nitrogen man had arbitrarily decided not to fill the tank at the last delivery time and we not only ran out of liquid nitrogen but also the gas pressure above the liquid in the tank which operates all the pneumatic valves on the accelerator and in the target area. The source pressure went bad because the chiller failed and the valves failed to close in response to the protection signals; there was no sudden, dramatic failure, just a slow, inexorable drift to bad vacuum that no-one could do anything about in time except close hand valves and relieve emotion by voicing simple expressions. The accelerator tube went to about 30 mm and by that time a cylinder of nitrogen was connected to the line and the business of pumping down begun. The long-planned emergency bottle to take over automatically in the event of such an extremely improbable contingency has been put off from time to time because there has never been a liquid nitrogen failure; perhaps it has moved a little closer.

Later the same day all was well again and the machine was taken to 10.23 MV before conditioning symptoms appeared. This was better than expected in view of the unfortunate way the tube had been treated. An oxygen beam was put through to determine if anything was grossly wrong. Transmission through the machine itself was fine but transmission round the energy analyzing magnet was poor and maximized only with excessive steering correction. (More details will be given later.) The situation was held to be satisfactory enough to pump out and fix the SF_6 leak.

FIRST RE-ENTRY

We were able to lower the nipple from the tank lid without disturbing the tube vacuum because there was sufficient flexibility on a bellows each side of the nipple. The O-ring was taken out and established as being clearly too thin for the groove; this was very strange since the nipple, with a new O-ring, was put back by the two authors themselves, checking each step because of the importance of the seal! A length of thicker O-ring material was cut, put round the tube and joined with IS495. A few things were checked and then the tank was closed again.

Next morning the machine was gassed up and, not long after voltage conditioning was started, Chain 3 broke, and once more a pump-out was begun. There are no data on terminal volts for this period.

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SECOND RE-ENTRY.

The chain break was not caused by nylon link failure, as in the past, but by the screw of one of the removable links coming out. It should be remembered that all chains had been cleaned a day or so before, and then oiled by hand; this means that all links were handled several times and no projecting screws detected. Also, because of Chain 3 instability mentioned earlier, this chain and its related components were examined carefully.

The chain was taken out but the new one we have in reserve was not put in, in other words we buttoned up with only two chains. This chain failure takes its place in the Rogues Gallery of reasons for chain breakage. We did not follow the advice of N.E.C. and loctite all removable link screws because of the difficulty we experienced in undoing them; we believed they were in too tightly to need loctite. Clearly N.E.C. was right and in penance we undid and loctited the screws of every removable link in the other two chains - after one of the three horses had gone. The chain that failed had clocked a little over 5,000 hours but we are not inclined to count this as a chain life because we do not equate a loose screw with a failed nylon link. Our other two chains have done 7,600 and 11,000 hours. Our best past record is 12,450 hours. Now that the SF_6 breakdown product problem is under control, lifetimes greater than this are expected.

MACHINE PERFORMANCE AFTER 2ND RE-ENTRY.

The 3rd button-up was on a Friday and the machine was gassed up during the weekend. On the following Monday conditioning was begun and the first evidence occurred at 10.77 MV. After 16½ hours, divided over two days, this threshold level lifted to 13.34 MV and the experimental program commenced.

Experimenters used the machine at voltages up to 13.3 MV in single and double stripping mode. Near 13.3 MV double stripping ^{58}Ni (220 MeV), occasional sparks still occurred. At the beginning of this run, while the experimenters were battling with target problems, some shorting rod diagnostics were carried out. The onset voltage for conditioning subsections of from 6 to 8 units displayed conditioning thresholds ranging from 1.07 MV/unit for the top of the L.E. and H.E. sections, to 1.02 MV/unit for the bottom of the H.E. section. When all rods were removed the machine, as a whole, conditioned from 13.3 MV to 13.75 MV in an hour.

The machine then ran non-stop for 8 days and nights to conclude an experiment for a visitor from Birmingham who was so satisfied with his run that there were invitations to champagne at 9.30 a.m. when it ended. This was encouraging, but there were other problems.

Energy analyzing magnet:

Ever since the magnet was carefully aligned geometrically, even the second time, there have been transmission problems associated with it. These have been characterized by the need for a large steering component parallel to the field of the 90° magnet, when beam was sent down various beam lines. Introduction of a horizontal steering element just after the energy analyzing slits has corrected the problem so that transmission to the target has returned to near 100%.

The problem which requires this steering correction is open to speculation; the competing theories are:

1) In spite of heated assertion to the contrary the 90° magnet is mechanically twisted about a vertical axis.

2) Because of the asymmetry in the distribution of current through the coils in the magnet (15/2) a net steering effect in the fringe region is present.

Since the problem is easily solved the true cause will not be pursued at present.

The 3rd, (external) stripper:

In order to bend a beam, the rigidity of which would have been beyond the capability of the present analyzing magnet, the new foil stripper was installed before the magnet. Unfortunately this stripper produces beams with essentially identical magnetic rigidities which differ in energy because of different charge state histories. There is no doubt that we installed it in the wrong place. One staff member said that there was egg on his face, but enough left over to go all round the laboratory.

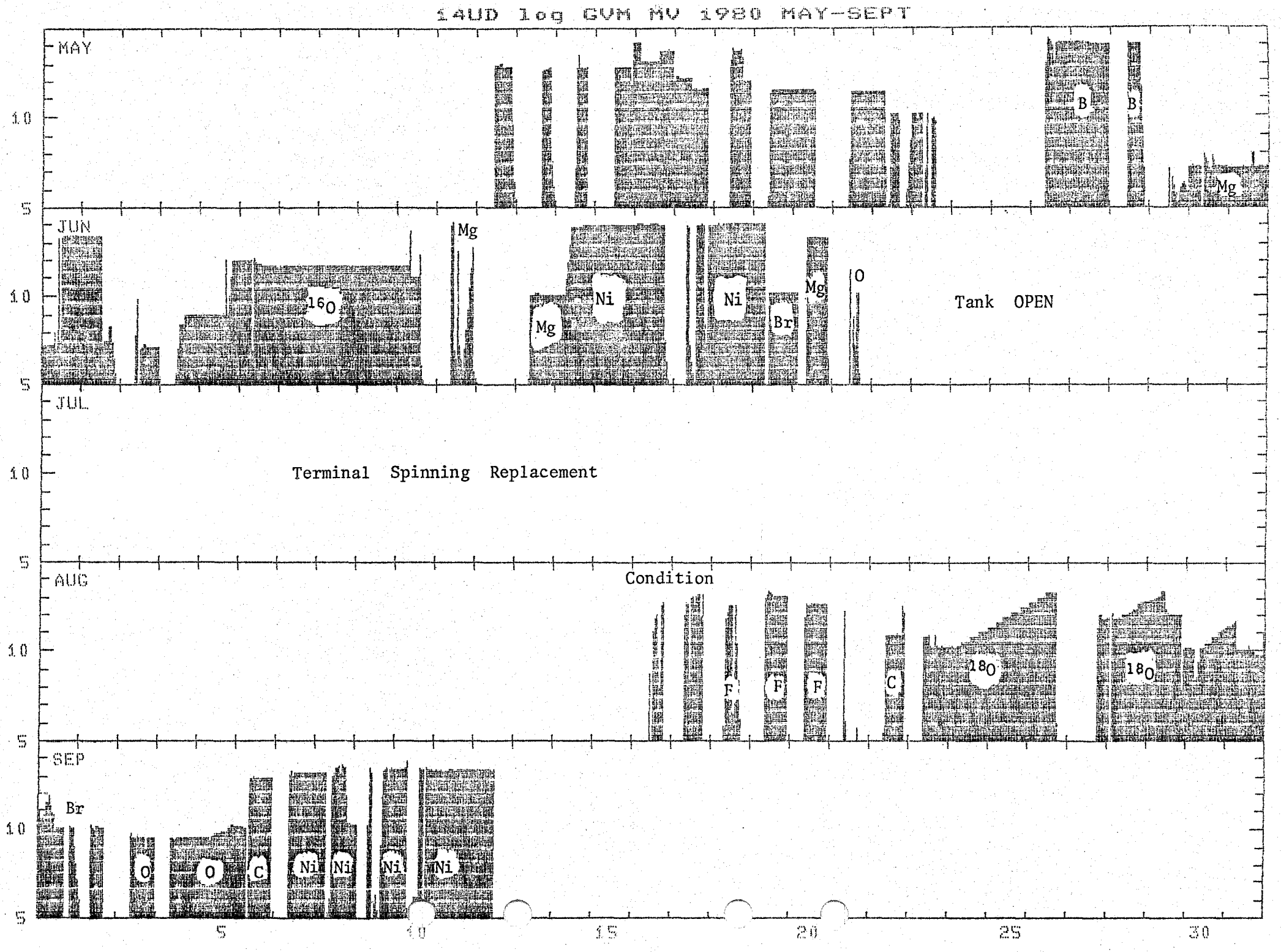
ION SOURCES:

We reported (20/6) that, shortly after replacing the molybdenum suppressor electrode in the sputter source with a titanium one, the characteristic erosion appeared to be reduced. Since then the electrode has been removed and sandblasted on several occasions when the source has been open and the titanium version appears convincingly more resistant to erosion than the molybdenum one.

D.C. Weisser

T.A. Brinkley

September 16th, 1980.


14UD log GVM MV 1980 MAY-SEPT
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14UD SCHEDULE 23/5/80 - 7/8/80.

MONTH	DATE	DAY	GROUP	LINE	
		MON			
		TUES			
		WED			
		THURS			
MAY	23	FRI	OPHEL, LEIGH	5	^{16}O, ^{24}Mg
	24	SAT			
	25	SUN			
	26	MON	OPHEL, SHUTE et al.	5	^{7}Li, ^{10}B.
	27	TUES			
	28	WED			
	29	THURS			
	30	FRI	SOOPER-DOOPER	6	100 MeV
	31	SAT			^{26}Mg
JUNE	1	SUN			
	2	MON			
	3	TUES	BAXTER	6	17 MeV
	4	WED			proton
	5	THURS			
	6	FRI	DRACOULIS, FAHLANDER	1	^{16}O
	7	SAT			100 MeV
	8	SUN			
	9	MON			
	10	TUES	NURZYNSKI ET AL	5	^{24}Mg
	11	WED			120 MeV
	12	THURS			
	13	FRI	SIE/MELBOURNE	2	^{58}Ni
	14	SAT			220 MeV
	15	SUN			
QE II	16	MON			
	17	TUES			
	18	WED			
	19	THURS	HAY, TREACY, PENDER Br	7	~~Cu 100 MeV~~
	20	FRI	GALSTER, HINDE, LEIGH	6	^{28}Si
	21	SAT			100 keV
	22	SUN	HAY, TREACY, PENDER	7	Cu 100 MeV
	23	MON	TANK OPENING		
	24	TUES	until ~~7/8/80~~.		
		WXX			
		XXXXXS			
JULY	25	FRI			
	26	SAT			
	27	SUN			

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14UD SCHEDULE - 17 April - 25 May, 1980

MONTH	DATE	DAY	GROUP	LINE	
APR.	14	MON			
	15	TUES			
	16	WED			
	17	THURS	LEIGH, HINDE, OPHEL, GALSTER	5,6	^{16}O
	18	FRI			^{24}Mg
	19	SAT			
	20	SUN			
	21	MON	Change cones in Source		
	22	TUES	TANK OPEN		
	23	WED			REPORT
	24	THURS	Change foils		NO: 20
	25	FRI	ANZAC DAY		
	26	SAT			
	27	SUN			
	28	MON	HINDE, ET AL.	6	^{28}Si
	29	TUES			180 MeV
	30	WED			
MAY	1	THURS	HEBBARD ET AL.	5	60 MeV
	2	FRI			^{16}O
	3	SAT			
	4	SUN			
	5	MON	LEIGH, HINDE, GALSTER, OPHEL	6	^{19}F
	6	TUES			100 MeV
	7	WED			
	8	THURS	SIE, ET AL.	1 or 2	^{16}O
	9	FRI			100 MeV
	10	SAT			$^{32}S, ^{34}S$
	11	SUN	HAY et. al.	7	Cu 100 Mev
	12	MON	S.D.		
	13	TUES	SPEAR ET AL.	6	^{26}Mg
	14	WED			100 MeV
	15	THURS			
	16	FRI			
	17	SAT			
	18	SUN	DRACOULIS - POLETTI	1 and 2	^{16}O ^{18}O
	19	MON			Be
	20	TUES			Li
	21	WED			
	22	THURS	HAY ET AL.	7	Cu 100 Mev
	23	FRI	NURZYNSKI ET AL.	5	^{24}Mg
	24	SAT			100 MeV
	25	SUN			