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FOR PARTICLE AND NUCLEAR PHYSICS

OPERATED AS A JOINT VENTURE

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UNDER A CONTRIBUTION FROM THE
NATIONAL RESEARCH COUNCIL OF CANADA

OCTOBER 2001

The contributions on individual experiments in this report are outlines intended to demonstrate the extent of scientific activity at TRIUMF during the past year. The outlines are not publications and often contain preliminary results not intended, or not yet ready, for publication. Material from these reports should not be reproduced or quoted without permission from the authors.

TECHNOLOGY TRANSFER DIVISION

INTRODUCTION

Technology Transfer is the TRIUMF division responsible for the commercial interactions for the laboratory. It is composed of a small group dedicated to ongoing technology transfer, plus the Applied Technology group that is responsible for the operations of the on-site commercial cyclotrons on behalf of MDS Nordion.

TECHNOLOGY TRANSFER

The mandate of the Division is the pursuit of all financially and technically viable opportunities for commercializing the technologies evolving from research at TRIUMF, in any appropriate manner that will enhance the Canadian economy.

The current Contribution Agreement between the National Research Council (NRC) and TRIUMF includes the requirements for TRIUMF to enhance its impact on the economies of western Canada. Specifically, there is an emphasis on providing benefits to small and medium-sized businesses in the western provinces, both through the TRIUMF purchasing practices, and through the transfer of technical knowledge and skills.

TRIUMF's strength lies in the unique aspects of the facilities, combined with the scientific excellence of the staff and the research conducted here. The Division has established a network of contacts with many commercialization offices and facilities throughout North America and the world, and constantly utilizes those contacts in its own activities. The division is also responsible for patent protection at TRIUMF, but it must be noted that although it can be important in identifying a novel technology, at this level of scientific discovery, merely patenting cannot be relied on as a long-term shield from competitive alternatives.

New technology such as that emanating from TRIUMF is, by definition, a high-risk venture. Although projects may appear to have promising potential, from experience it can be predicted that not all of them will actually fulfill expectations. The Division always takes a conservative approach in projecting current opportunities into future commercial activities.

APPLIED TECHNOLOGY GROUP

500 MeV Isotope Production Facility

During this year, the 500 MeV irradiation facility received 287.6 mAh. Four targets were irradiated and delivered to produce $^{82}Sr/^{82}Rb$ for MDS Nordion.

CP42 Facility

The total beam delivery for 2000 was 665 mAh. The weekly beam delivery graph is shown in Fig. 179, the quarterly time evolution of the beam delivery is shown in Fig. 180. The downtime and maintenance statistics are analyzed in Fig. 181 and compared with the TR30.

In September, the lower main magnet coil of the CP42 failed and had to be replaced. The repair, which required the whole cyclotron to be dismantled, caused a downtime of approximately two months.

Work is proceeding on the upgrade to the CP42 control system and the power supplies.

TR30 Facility

The total beam delivery for 2000 was 2905 mAh. The weekly beam delivery graph is shown in Fig. 182, the quarterly time evolution of the beam delivery is displayed in Fig. 180. Maintenance and downtime statistics are presented in Fig. 181 and compared to the CP42. 80% of the downtime was due to rf problems and conditioning as well as failures of the north and south solid target stations (1281 hours total).

ATG Development Projects

During 2000, ATG made extensive improvements to the design of the solid target units including further development of the dynamic braking system and the pneumatic transfer system.

The insertion of a dedicated tuning loop into the TR30 rf amplifier led to an increased stability of the system and helped reduce conditioning time. As part of the TR30 Reliability Upgrade Project, an additional quadrupole magnet was installed on the 1B beam line to reduce beam spills on the target station and to permit higher beam currents for radioisotope production.

RADIOISOTOPE PROCESSING (MDS NORDION)

During the year 2000, MDS Nordion shipped large quantities of short-lived medical isotopes produced using the TR30 and CP42 cyclotrons. The main radioisotopes produced and shipped were iodine-123 used in thyroid imaging and research, palladium-103 used in prostate brachytherapy and thallium-201 used in cardiac imaging.

The TRIUMF 500 MeV cyclotron was used to produce large-scale batches of strontium-82 whose daughter product, rubidium-82, is used in PET studies for imaging the heart blood flow. As well, work continued on the development of new isotopes and applications in cooperation with TRIUMF.

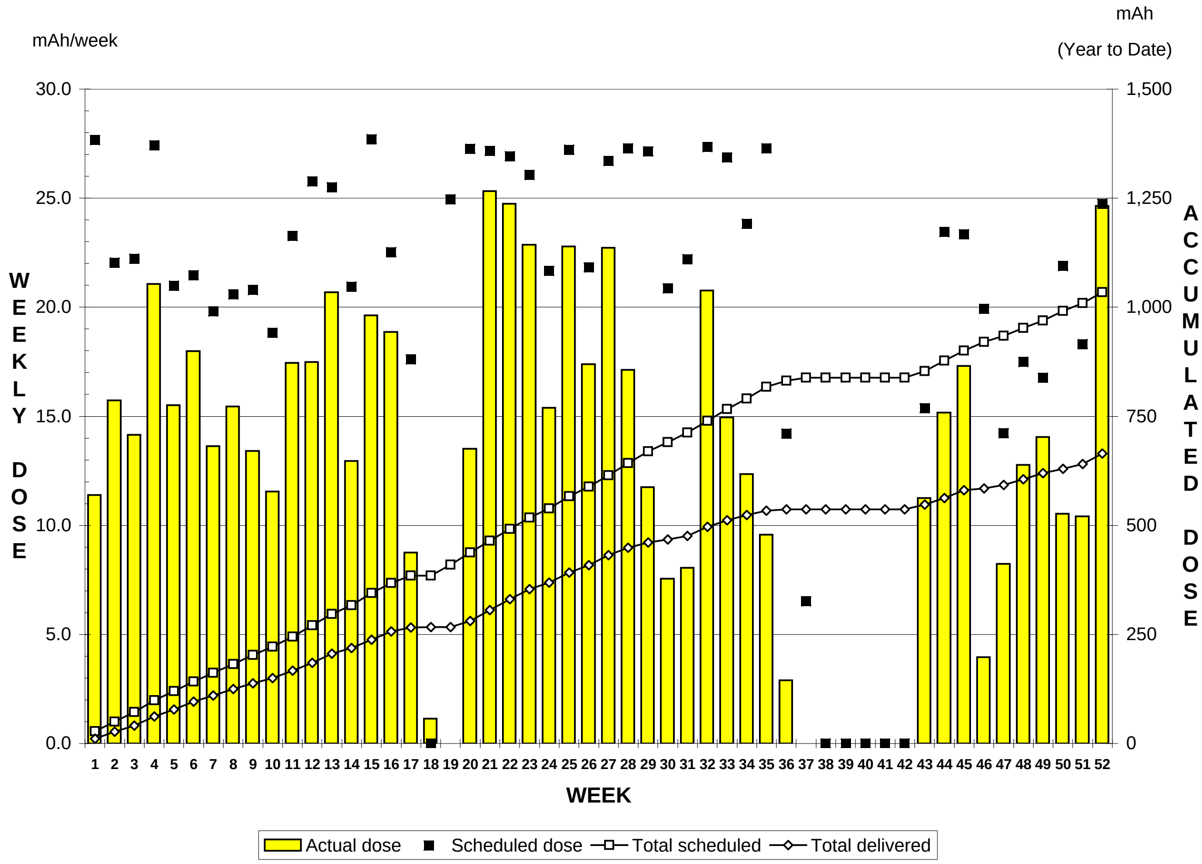
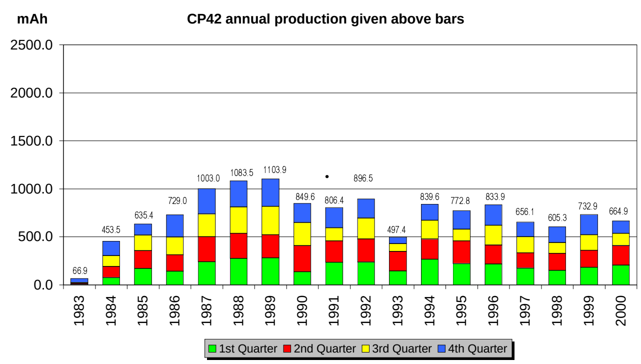


Fig. 179. Weekly beam delivery for the CP42.



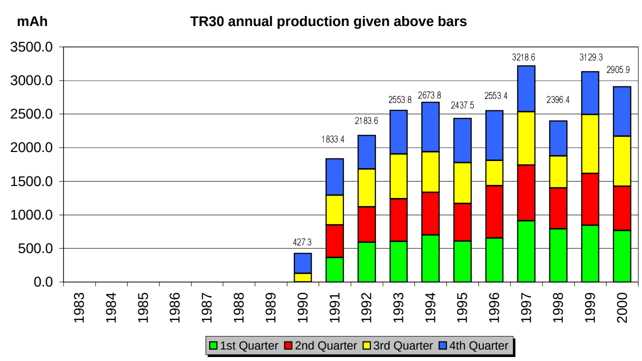
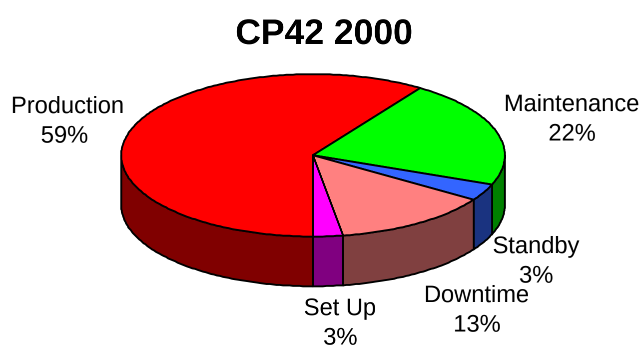


Fig. 180. Annual time evolution of the beam delivery for the CP42 (top) and the TR30 (bottom).



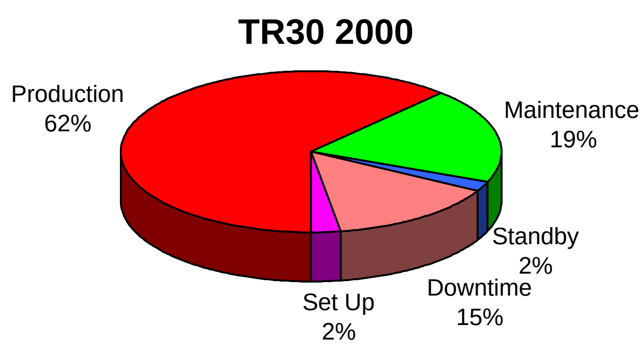


Fig. 181. Breakdown of downtime and maintenance for the CP42 (top) and the TR30 (bottom) during operational hours.

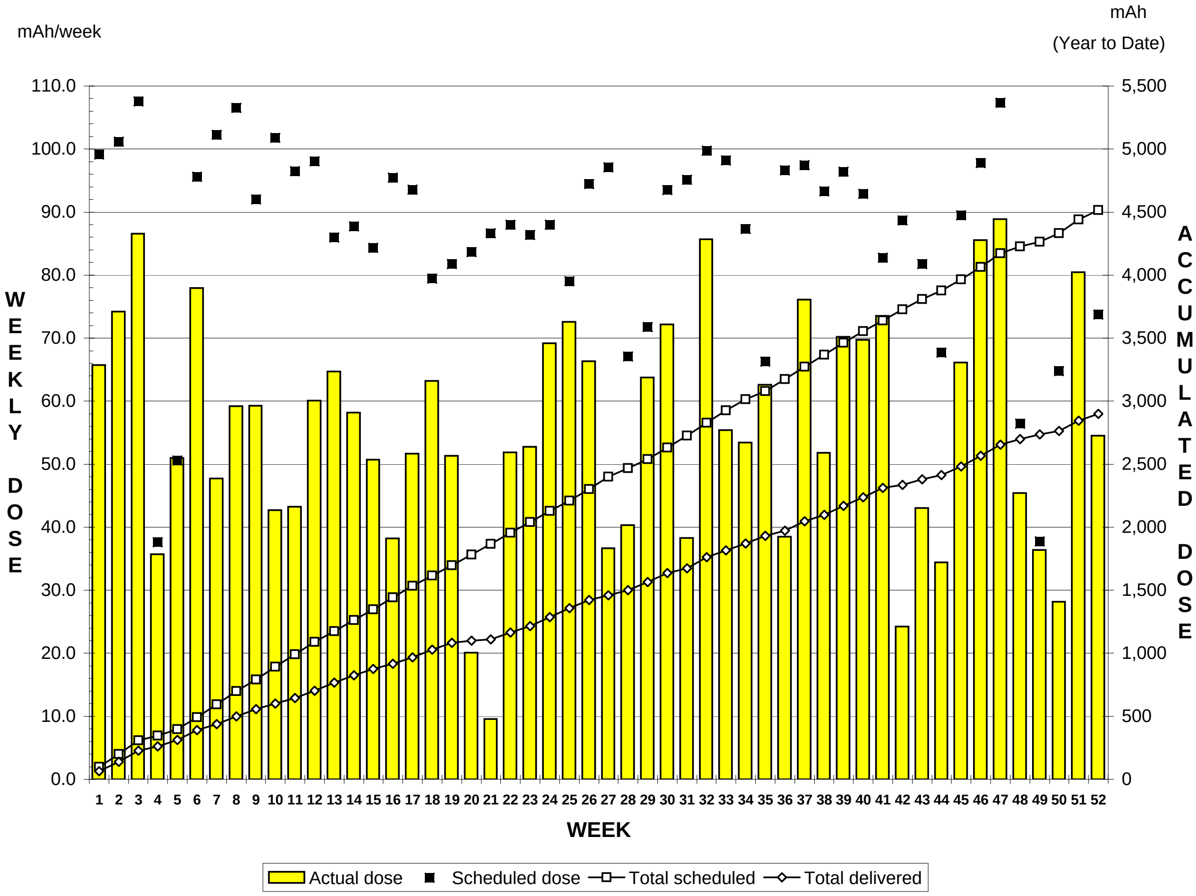


Fig. 182. Weekly beam delivery for the TR30.