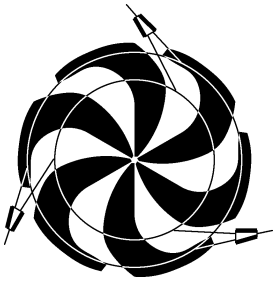
TRIUMF



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CANADA'S NATIONAL LABORATORY
FOR PARTICLE AND NUCLEAR PHYSICS

OPERATED AS A JOINT VENTURE

MEMBERS:

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SIMON FRASER UNIVERSITY
THE UNIVERSITY OF VICTORIA
THE UNIVERSITY OF BRITISH COLUMBIA

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THE UNIVERSITY OF TORONTO

UNDER A CONTRIBUTION FROM THE
NATIONAL RESEARCH COUNCIL OF CANADA

JULY 2000

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 of the laboratory. It is comprised 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 requirement 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. The NRC has commissioned both Western Economic Diversification (WED) and the Industrial Research Assistance Program (IRAP) to provide assistance in this effort.

As the arm of TRIUMF responsible for this activity, the objectives of the Division are:

i) to transfer TRIUMF technical knowledge and skills to the Canadian economy, in particular the western Canadian economy; and
ii) to generate income for TRIUMF, for further research and development.

The crucial first step to commercializing new or innovative technologies from a research laboratory is to generate disclosures of such innovations. To this end, 28 potentially commercial disclosures have been documented this past year, and 3 of those have been funded by TRIUMF for further development.

In keeping with the focus on western Canadian small to medium-sized businesses, TRIUMF has, with the help of WED, organized 5 industry supplier shows in the western provinces this past year. The purpose of these shows was to acquaint industry representatives with TRIUMF's activities, to present procurement opportunities, and to establish contacts.

Our contract administrator is also ensuring that there is a conscious effort made to attract bids from as many eligible western Canadian companies as is reasonably possible. To date, the results of this effort have shown a steadily increasing success.

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 fulfil 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 83 mAh. Irradiations were only performed in the fourth quarter of 1999. Two targets were irradiated to produce $^{82}Sr/^{82}Rb$ for MDS Nordion.

CP42 Facility

The total beam delivery for 1999 was 0.73 Ah. The weekly beam delivery graph is shown in Fig. 175, the quarterly time evolution of the beam delivery is shown in Fig. 176. The downtime and maintenance statistics are analyzed in Fig. 177 and compared with the TR30.

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

TR30 Facility

The total beam delivery for 1999 was 3.1 Ah. The weekly beam delivery graph is shown in Fig. 178, the quarterly time evolution of the beam delivery is displayed in Fig. 176. Maintenance and downtime statistics are presented in Fig. 177 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 (948 hours total).

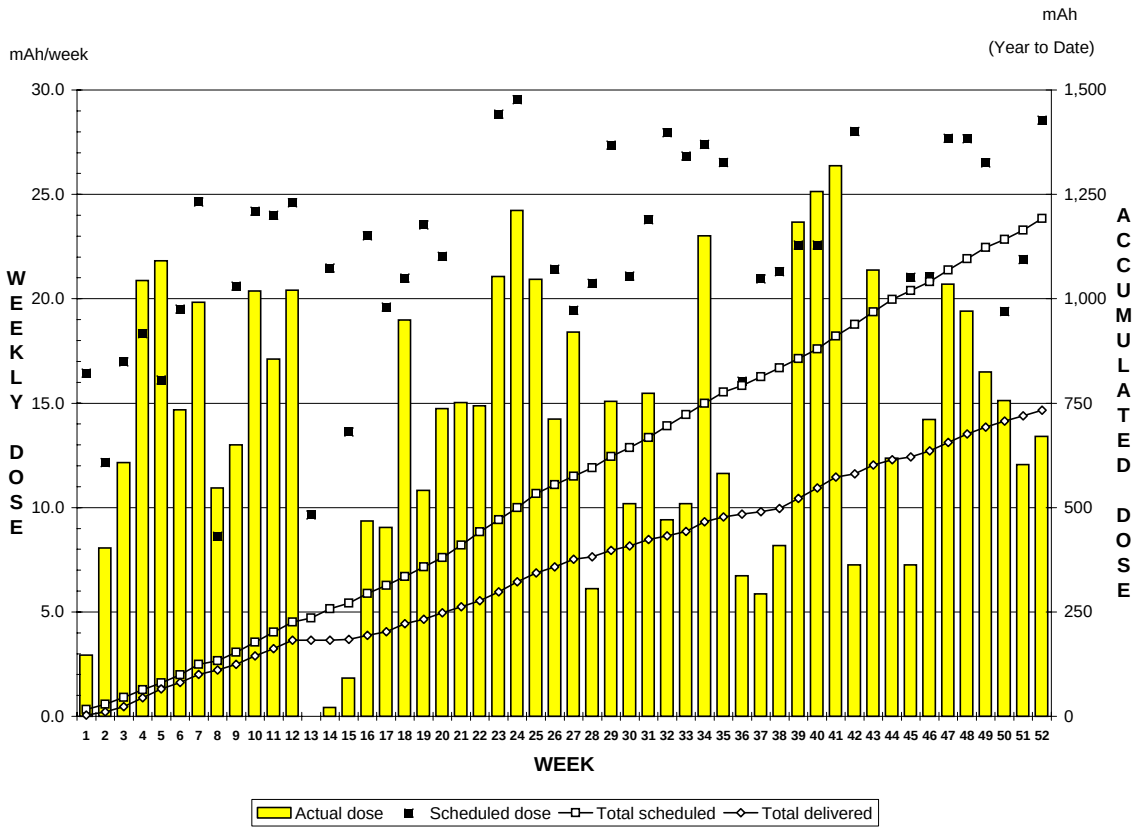

Fig. 175. Weekly beam delivery for the CP42.

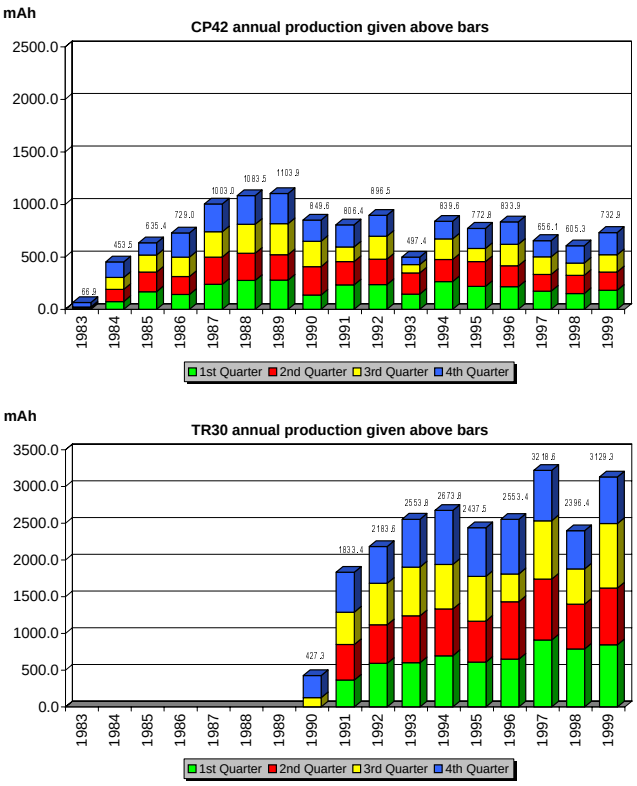

Fig. 176. Quarterly time evolution of the beam delivery for the CP42 (top) and TR30 (bottom).

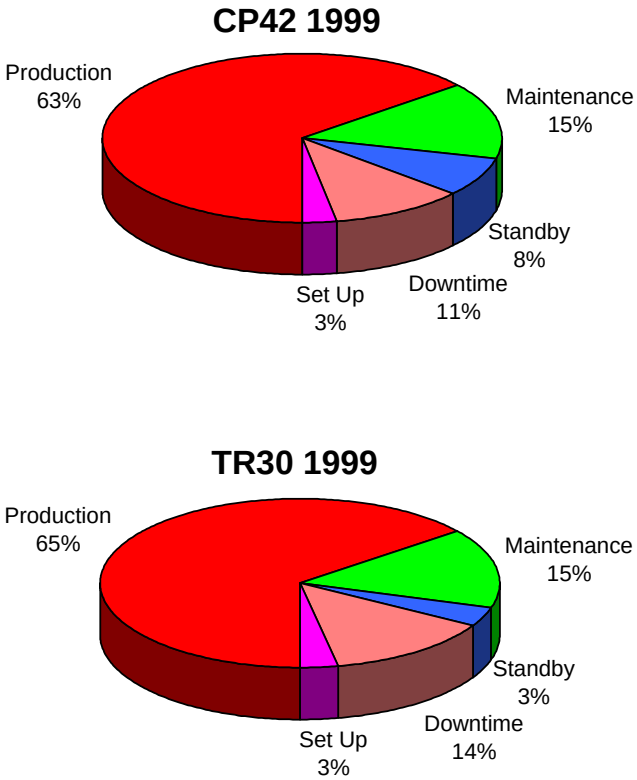

Fig. 177. Breakdown of downtime and maintenance for the CP42 (top) and TR30 (bottom) during operational hours.

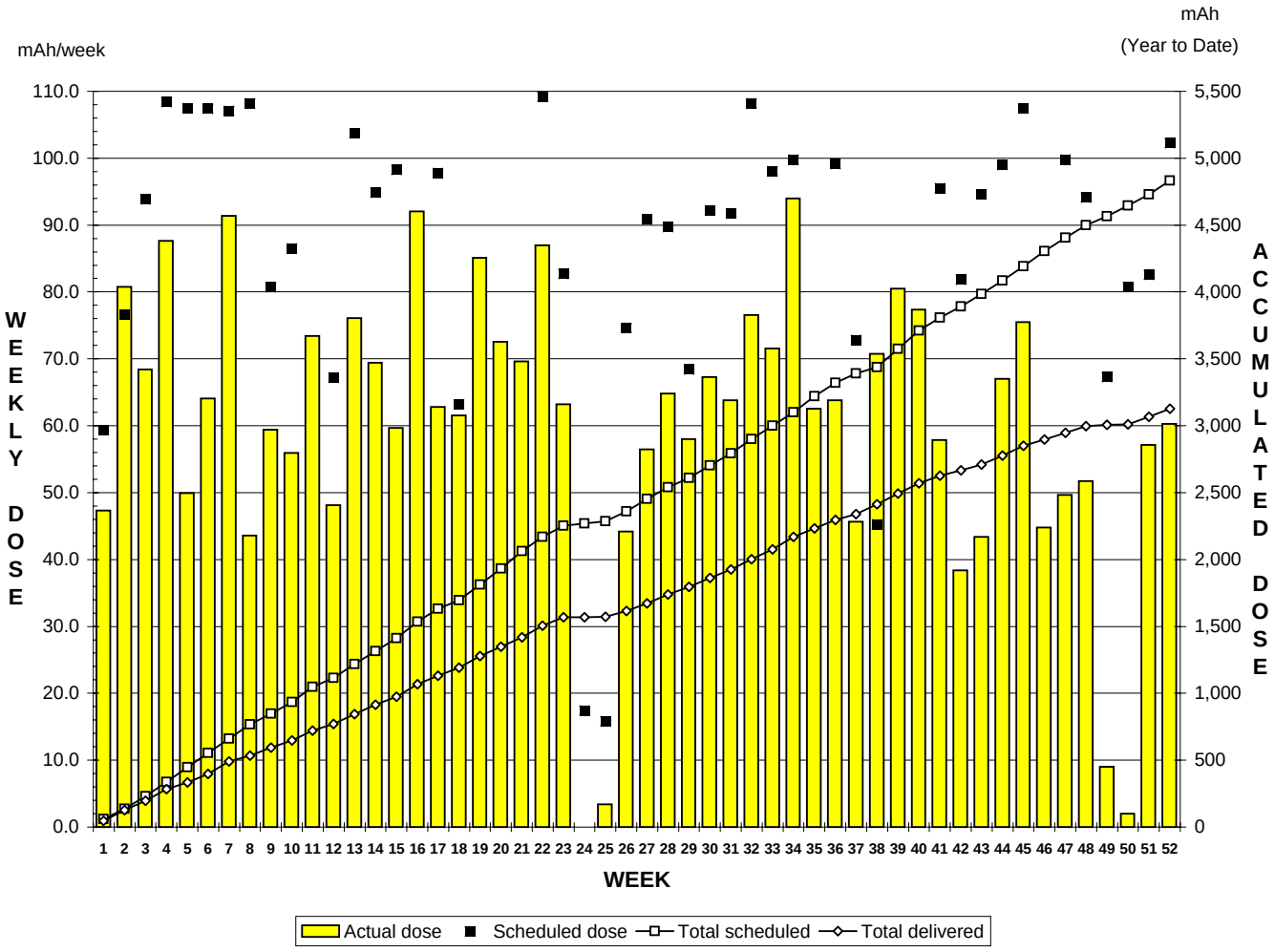

Fig. 178. Weekly beam delivery for the TR30.

ATG Research Projects

During 1999, ATG members were actively involved with organizing the Third International Conference on Isotopes held in downtown Vancouver in September. 3ICI attracted several hundred international scientists and engineers from research and commercial institutions. ATG staff presented oral and poster papers.

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. A new solid target station which permits the irradiation of solid targets at different incident angles has been designed and will be tested. This project employed two co-op students, resulting in useful technical reports. Modifications to the rf system of the TR30 and an upgrade of the 1B and 2B beam lines with an additional quadrupole magnet have been planned in detail and will commence in 2000.

RADIOISOTOPE PROCESSING (MDS NORDION)

During 1999, MDS Nordion shipped large quantities of short-lived medical isotopes produced using the TR30 and CP42 cyclotrons. The main contributors to sales were iodine-123 and thallium-201, used around the world for nuclear medicine studies. A new product, palladium-103, was successfully introduced to the market. Palladium-103 is used in the manufacture of sources for prostate cancer treatment.

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

A TRIUMF-led project to upgrade Nordion's CP42 cyclotron continued throughout the year. The TR30 remains the most powerful isotope production cyclotron in the world.