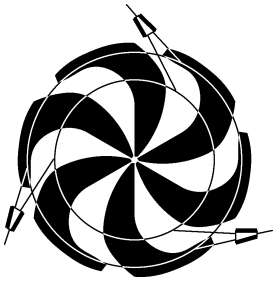
TRIUMF



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CANADA'S NATIONAL LABORATORY
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 2002

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 applied and commercial interactions between the laboratory and outside companies and institutions. It is composed of a small group dedicated to the transfer of TRIUMF generated technologies to the commercial and medical world, together with the Applied Technology group. This latter group is responsible for the operations of the on-site commercial cyclotrons that are owned by MDS Nordion, and produce medical isotopes for use in Canada and around the world.

TECHNOLOGY TRANSFER

Since its inception, the fundamental research at TRIUMF has generated innovative advances in science and technology that have been moved out into the economy to provide economic and social benefits for all Canadians. This has been achieved through the conventional approach of licensing to commercial companies as well as through donations to non-profit and medical institutions. In addition, technical knowledge has been transferred to numerous TRIUMF suppliers to assist in the provision of products to meet TRIUMF's unique requirements, which in turn has allowed those same companies to explore additional markets with their new skill sets. The experience of TRIUMF provides a real example of the benefits that can be obtained from fundamental research, even in the relatively short term.

The major commercial success in the application of TRIUMF's research has certainly been its association with MDS Nordion for the production of radioisotopes with far reaching medical applications. The relationship with TRIUMF has lasted for over 21 years and has allowed MDS Nordion to establish an enviable position in the world marketplace for cyclotron produced isotopes. The year 2001 saw a further milestone in the cooperative effort as MDS Nordion embarked on an ambitious $20 million expansion program for their facility at the TRIUMF site. The centrepiece of this expansion will be a new TR30 cyclotron, based on the original TRIUMF design, that is projected to be in operation by the end of 2002, producing an array of radioisotopes for medical applications.

APPLIED TECHNOLOGY GROUP

500 MeV Isotope Production Facility

During this year, the 500 MeV irradiation facility received 258 mA h. Ten targets were irradiated, six targets delivered to produce ^{82}Sr/^{82}Rb for MDS Nordion.

CP42 Facility

The total beam delivery for 2001 was 794 mA h. The weekly beam delivery graph is shown in Fig. 201 and the quarterly time evolution of the beam delivery is shown in Fig. 202. The downtime and maintenance statistics are analyzed in Fig. 203 and compared with the TR30.

Work is still proceeding on the CP42 control system upgrade and the multi output power supply.

TR30 Facility

The total beam delivery for 2001 was 2906 mA h. The weekly beam delivery graph is shown in Fig. 204 and the quarterly time evolution of the beam delivery is displayed in Fig. 202. The downtime and maintenance statistics are analyzed in Fig. 203 and compared with the CP42.

A major upgrade of the rf system was completed, which reduced the downtime of the machine considerably. Two new types of target station have been developed and tested successfully (1C, 1A prototype). ATG is planning to replace the two high current target stations for palladium production (1B, 2B) within the next year.

ATG Development Projects

ATG introduced new 3D design and thermal modelling software for enhanced engineering of cyclotron and target station components. Major improvements to the solid targets have been achieved.

ATG continues to be actively involved in the layout and technical planning for the MDS Nordion facility expansion project.

RADIOISOTOPE PROCESSING (MDS NORDION)

During the year 2001, MDS Nordion shipped large quantities of short-lived medical radioisotopes produced using the TR30 and CP42 cyclotrons. The main radioisotopes produced and shipped were iodine-123 used for thyroid imaging and research, palladium-103 used in prostate brachytherapy, and indium-111 used for monoclonal antibody imaging.

The MDS Board of Directors approved a facility expansion and acquisition of a new cyclotron to be completed by January, 2003 to meet the increasing demand for cyclotron radioisotopes.

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 blood flow.

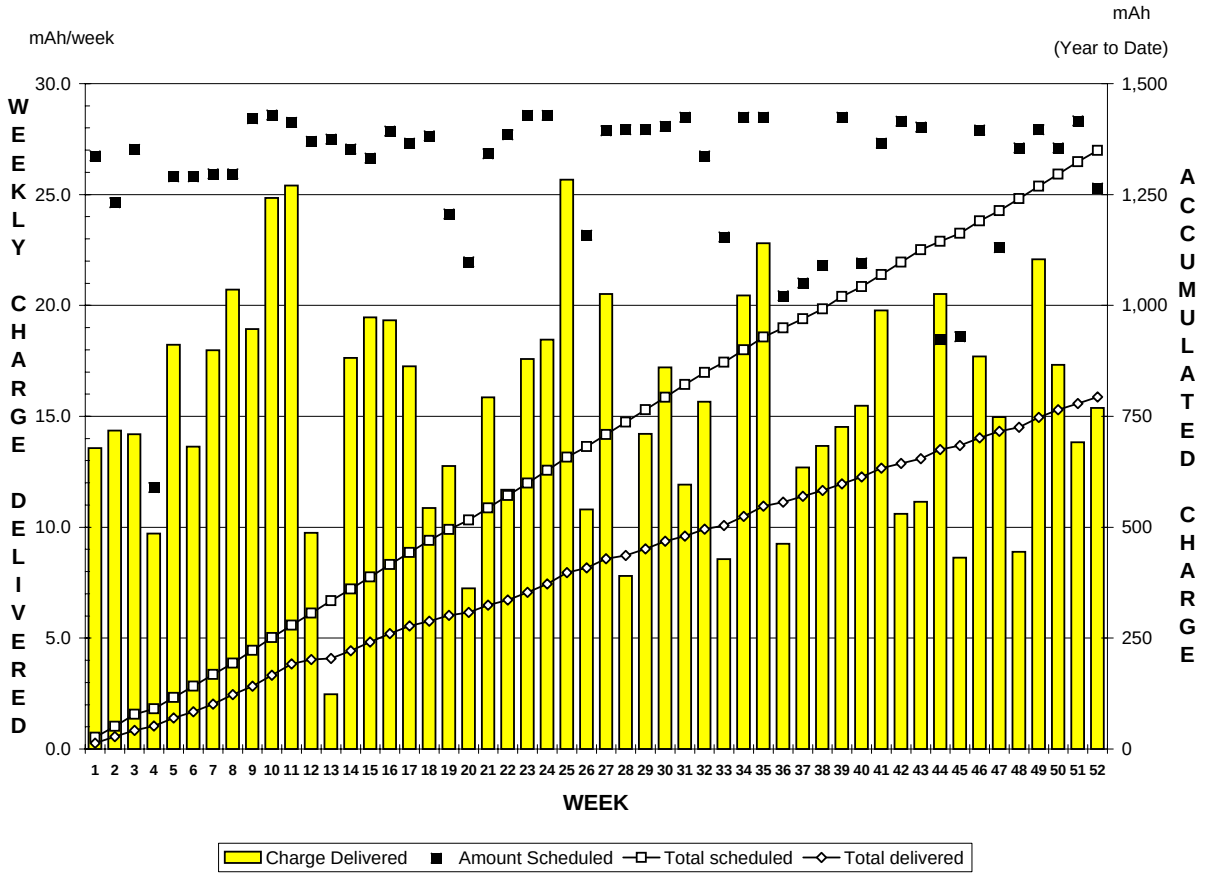

Fig. 201. Weekly beam delivery for the CP42.

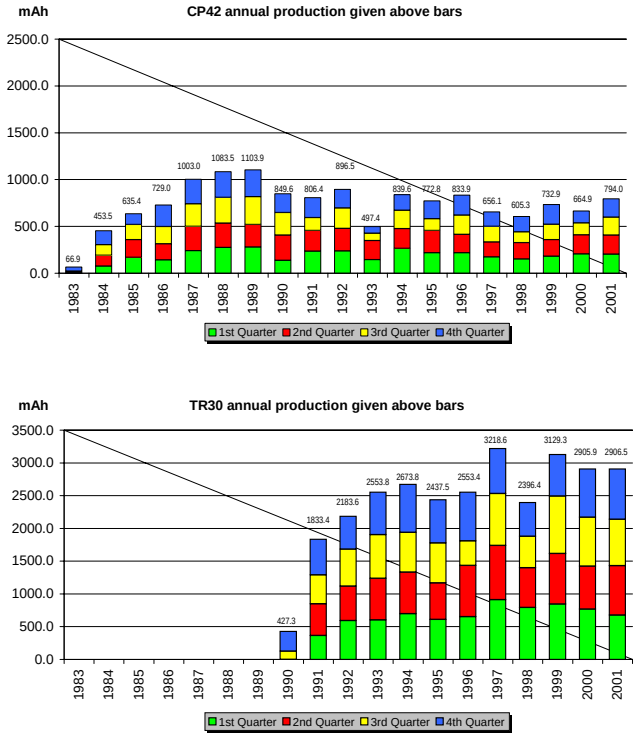

Fig. 202. Annual time evolution of the beam delivery for the CP42 (top) and the TR30 (bottom).

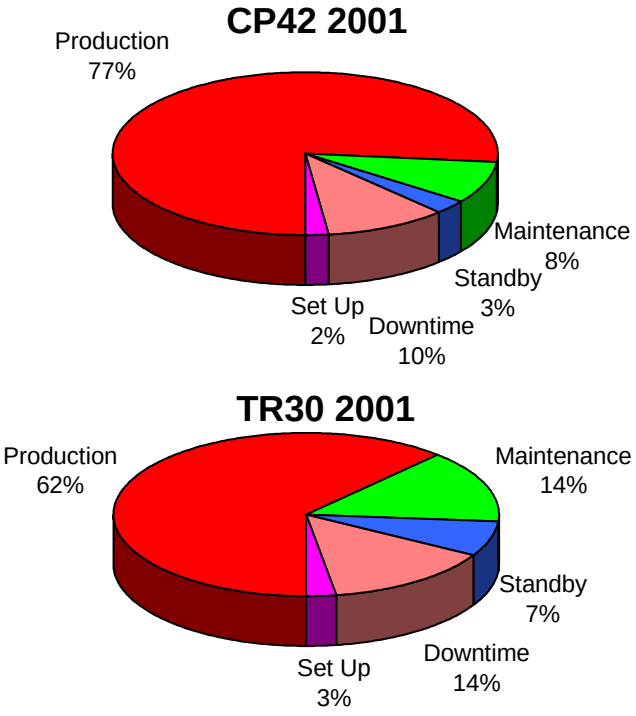

Fig. 203. Breakdown of downtime and maintenance for the CP42 (top) and the TR30 (bottom) during operational hours.

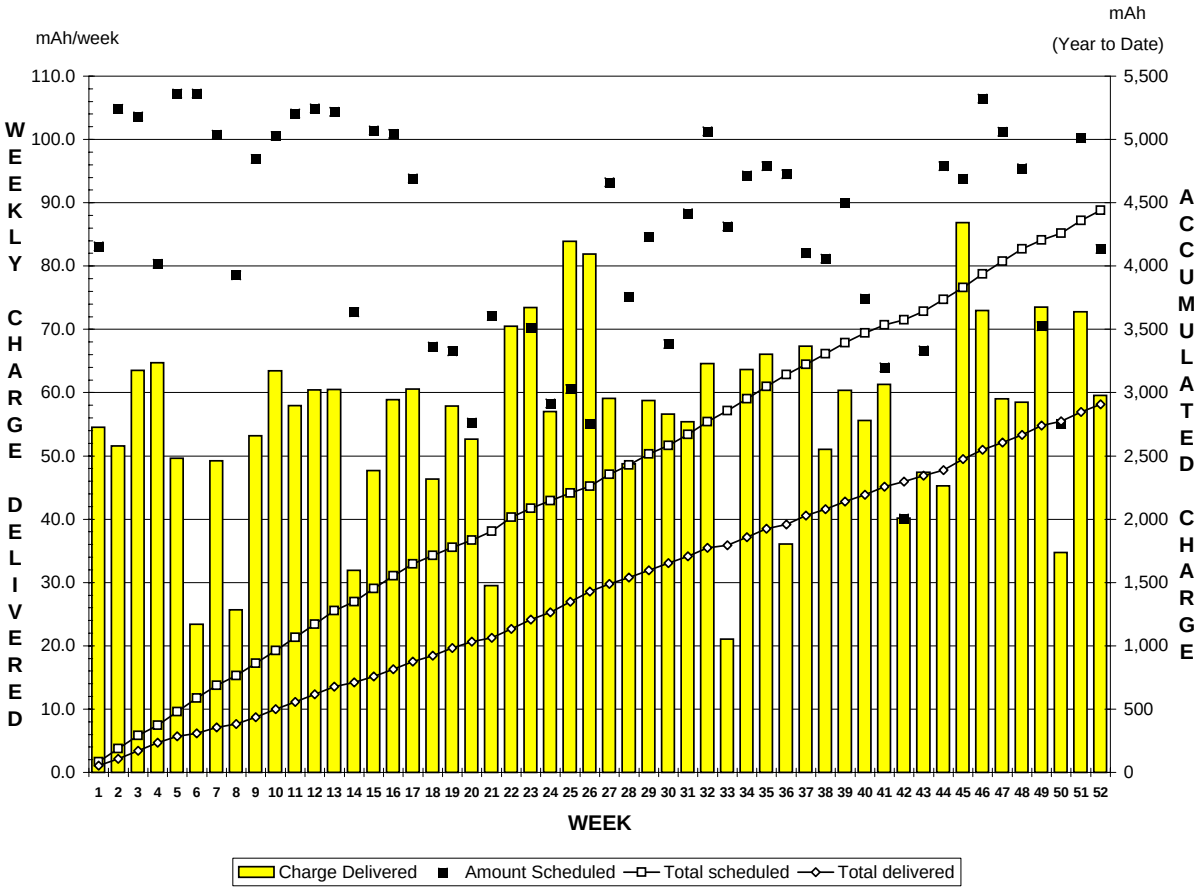

Fig. 204. Weekly beam delivery for the TR30.