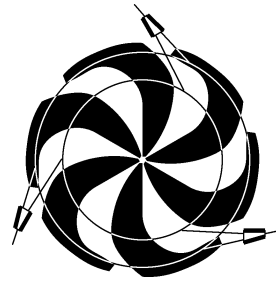


# TRIUMF



## ANNUAL REPORT SCIENTIFIC ACTIVITIES 2002

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**CANADA'S NATIONAL LABORATORY  
FOR PARTICLE AND NUCLEAR PHYSICS**

OPERATED AS A JOINT VENTURE

MEMBERS:

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

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THE UNIVERSITY OF REGINA  
THE UNIVERSITY OF TORONTO

UNDER A CONTRIBUTION FROM THE  
NATIONAL RESEARCH COUNCIL OF CANADA

DECEMBER 2003

*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.*

## ADMINISTRATION DIVISION

### INTRODUCTION

The Administration Division is made up of Human Resources and Administration, Accounting and Materials Control, Administrative Computing, and Safety. The manager of each group reports to the Director. A summary of Division activities is included in this report.

### HUMAN RESOURCES AND ADMINISTRATION

All employees are reviewed for performance on an annual basis. The period covered for Performance Planning and Review coincides with the calendar year. The Hiring and Promotion Guidelines for Professional and Supervisory staff were revised and approved by the TRIUMF Board of Management for implementation.

In 2002 TRIUMF cancelled its agreement with the University of British Columbia for the supply of clerical and support staff. While this meant that ten new positions were created at TRIUMF, this had no effect on the salary budget since TRIUMF reimbursed the university for all salary and benefits costs.

TRIUMF has a very strong student program and hires on average some 35 summer students per year in addition to the university co-op student programs that it supports throughout the year.

The insurance program was renewed with an approximate 25% increase in premium from the previous year as a result of market conditions. Third party liability coverage remains at \$50 M. All buildings operated by TRIUMF are owned by the University of British Columbia and insurance coverage for these buildings and contents is provided by the Canadian Universities Reciprocal Insurance Exchange (CURIE).

TRIUMF awarded a contract for the installation of a security card access system in December. This photo security card will be required to access the main office building and the area behind the security fence. It is expected the system will be operational early in 2003 and all employees and long term visitors will be required to wear a photo ID card. All short-term visitors will be required to wear a Visitor badge. TRIUMF Management has decided not to install a system that would have included the installation of motion detectors with cameras behind the security fence. Security guard coverage continues between 6:00 pm and 6:00 am on working days with twenty-four hour coverage on weekends and statutory holidays. All vehicles accessing the site behind the security fence are required to have a permit.

Construction of the ISAC-II building is nearing

completion with beneficial occupancy expected in March, 2003.

There are currently five full member and six associate member universities in the Joint Venture. Each full member university has two voting members on the Board of Management. Two additional voting members are appointed by the Board from the private sector. The associate members each retain one non-voting member on the Board. In 2002 the TRIUMF Board of Management instituted a Technology Transfer Subcommittee of the Board to review technology transfer activities and TRIUMF's IP policies.

TRIUMF has an Operating Committee (OPCOM) that is made up of representatives from the full member universities along with representatives from the TRIUMF users community and staff. In 2002 the "Terms of Reference" were revised so that communication between the universities and TRIUMF can be enhanced.

TRIUMF must now comply with Federal Treasury Board requirements under a Results-based Management and Accountability Framework. The purpose of this framework is to establish a mechanism to help the National Research Council and TRIUMF: i) collect performance information related to this initiative; ii) track delivery of commitments and reporting; iii) describe how the success of TRIUMF will be evaluated over time; and iv) provide direction for on-going and future planning. This report was submitted in late summer and accepted by the Treasury Board.

### ENVIRONMENTAL HEALTH AND SAFETY

#### Licensing

A second hearing into the application by TRIUMF for a new operating licence was held on February 28, 2002 at the Canadian Nuclear Safety Commission (CNSC) headquarters in Ottawa. A delegation spearheaded by Dr. J.W. McDonald and Dr. A. Shotter made a presentation successfully defending TRIUMF's application and a new licence was issued at the beginning of May. A new licence was required because of the change in the regulatory environment when the former Atomic Energy Control Board (AECB) was replaced by the CNSC.

The new licence carried two conditions: that TRIUMF develop a Quality Assurance Program acceptable to the CNSC and that TRIUMF prepare a "Preliminary Decommissioning Plan".

The first condition was addressed by the members of the QA Task Force who produced a "Quality Manual" and eight "Standard Operating Procedures" that, for the most part, defined how quality was already being achieved at TRIUMF. However, there were a num-

ber of aspects of the present, rather informal system, that require improvement, especially documentation and ongoing assessment. The CNSC staff comments on the proposed QA Program were received by the end of the year and we are making a number of minor revisions to be re-submitted by mid February, 2003.

The preparation of a “Preliminary Decommissioning Plan” (PDP) was contracted out to a consulting firm that specializes in such work. Together with TRIUMF staff, a program of measurement was carried out during the spring in order to define the magnitude of any eventual decommissioning. The TRIUMF site was divided into a number of “work packages” for the purpose of determining costs and manpower. The PDP was close enough to completion by the end of the year that TRIUMF staff could start its review of the document prior to submission to the CNSC.

### Training

The Radiation Safety Course was offered a total of four times in 2002 (January, May, July and September) with 49 trainees attending. There was a 100% pass rate with an average of 90% on the final exam. The two most senior Radiation Surveyors (Lynne LeMessurier and Peter Biglowe) took over the instructional duties of the Contamination/Decontamination module. These two people have brought more practical on-the-job radiation protection experience to the course.

The development of the formal accelerator operator training program continued during this year. The four operations groups, 500 MeV OPS, ATG, ISAC and TR13, under the guidance of the training coordinator, Phil Jones, applied the systematic approach to training (SAT) in developing their programs. Each developed a task list that was analyzed in order to determine which tasks required formal training. In phase two of the SAT design, documents were created from the task lists. These documents were then used in developing the lessons and job performance measures required for each of the training programs.

### Occupational Health and Safety

The fire alarm system, sprinkler systems and fire extinguishers were all inspected and verified during 2002. Representing both management and workers, the members of the TRIUMF Accident Prevention Committee (TAPC) through their regular program of inspections continue to assist OH&S by doing an excellent job raising safety awareness on the site.

The project management for both the new MDS Nordion TR30-2 and the ISAC-II building gave TRIUMF full co-operation in terms of personnel safety during construction. The TRIUMF Housekeeping Committee formed last year has made a noticeable improvement in the overall appearance of the TRIUMF site.

A clean and orderly work environment has reduced injuries and accidents while promoting worker’s pride in the workplace.

### Personnel Dosimetry

The collective dose for TRIUMF personnel for the year 2002 was 420.6 mSv as measured by the direct reading dosimeter service. Table XLVIII shows the breakdown of the collective dose by various work groups.

Table XLVIII. Collective dose for TRIUMF personnel by group.

Group	Dose (mSv)	Fraction of Total (%)	Median (mSv)
Applied Technology	123.1	29.3	4.5
500 MeV Operations	41.4	9.8	1.9
Safety Group	34.4	8.2	1.0
Life Sciences	33.8	8.0	1.8
Remote Handling	27.1	6.4	2.0
Vacuum Group	23.2	5.5	3.7
Tech Support	18.1	4.3	0.5
RF Group	14.9	3.5	1.8
Plant Group	14.5	3.4	0.5
Beam Lines/Probes	12.1	2.9	2.4
ISAC Operations	7.9	1.9	0.1
ISIS	3.0	0.7	0.3
Outside Contractors	2.9	0.7	0.4
Others	72.1	17.1	—
<b>Total</b>	<b>420.6</b>	<b>100.0</b>	<b>0.6</b>

### Interlocks and Monitoring

Further improvements were made to the 500 MeV facility radiation safety system. A number of radiation monitors that had been identified as “critical” were upgraded so as to make them less prone to tampering by enclosing them in locked cabinets and rerouting the cabling in conduit. An analysis of the two radiation safety systems for common failure modes indicated that additional reliability could be achieved by completely separating the trip circuitry used by the two systems to shut down the 500 MeV cyclotron. A conceptual design to achieve this was developed. A number of tests were performed in order to determine the magnitude of the proton beam loss and the resulting radiation fields outside shielding when the settings on the two dipoles in beam line 2A were varied. It was established that no setting of these dipoles could result in a radiation dose above the regulatory limit.

The ISAC Radiation Monitoring System was extended to cover the growing network of ion beam lines delivering beam to a number of new experimental stations. A number of improvements were also made to the system’s display functions.

The interlocks for the ISAC east target station were installed. A new exclusion area was created on top of the ISAC target shielding to control access during conditioning of one target station while the other is being bombarded. Because the two target stations share the same cooling water circuit, access to this area cannot be allowed for such a configuration due to expected high radiation fields from the cooling water.

## **ADMINISTRATION COMPUTING AND COMMUNICATIONS**

### **Management Information Systems**

Many of the developments in MIS in 2002 were made possible by the increased use of Web and email technologies:

- **Electronic information distribution:** The volume of paper produced by the Business Office was reduced dramatically by the implementation of a system that allowed management reports to be “printed” as PDF files instead of paper. Users were given the option of having monthly reports emailed, resulting in a reduction of over 30% in the amount of paper distributed. Additionally, almost all large reports produced in the accounting department were stored on CD-ROM instead of being printed, reducing the in-house printing requirements by over 90%.
- **Electronic notification:** An automated system was implemented so that requisitioners could receive immediate email notification whenever purchase-orders were placed, or when requisitioned goods were received at TRIUMF.
- **More information available via the Web:** New Web applications were developed so that division heads, account holders, and their alternates could view up-to-the-minute account status in the “Personalized Portal” on the Administration Web site.
- **Interactive use of the Web:** For the first time, account holders were able to use forms on the Web to place requests for summer/coop students. Entries in these forms were stored in a database, to allow the Student Coordinator and Human Resources to manage the requests efficiently using a Web interface.
- **Improvements to existing Web applications:** Many of the existing Web applications were improved; for example, the Stores Catalogue application was updated to include both thumbnail and full-size photographs of many items.

### **Word Processing Systems**

The project to migrate all word processing clients to a standardized Windows 2000 based platform was

completed near the start of 2002. Aside from an increase in the number of client systems, no major changes were made to the word processing environment.

### **Telephones**

The site telephone system saw only incremental changes in 2002. No modifications were made to the central systems themselves, though some preparation was done to accommodate the upcoming ISAC-II expansion. Most of this preparatory work involved planning and laying cables to, and within, the new building.

Major reductions in dial-in usage were observed, allowing the number of dial-in lines to be cut to 10 from 18.

A new system was put in place to simplify running long-distance teleconferences. This system allows callers to join a TRIUMF teleconference by dialling a toll-free number. Usage of this system increased throughout the year.

## **OUTREACH ACTIVITIES**

In 2002 TRIUMF began developing a new Science Education Outreach Program which aims to bring the excitement of subatomic physics research in Canada to as broad a public audience as possible. At the outset, the Outreach Program will focus its attention on introducing high school science teachers to the TRIUMF research experience. The teachers will in turn share their knowledge with their students and encourage talented young students to consider careers in science. TRIUMF has been actively pursuing external sources of funding for these initiatives, which presently are not accounted for in its present five-year plan. At time of writing, a substantial contribution of matching funds has been secured from the private Vancouver Foundation, and further funding is being sought.

### **High School Teacher Internships**

A key component of the new Outreach initiative is a program to bring high school science teachers to TRIUMF for brief “internships”. Teachers will join and participate fully on a running experiment at TRIUMF for 3-5 days. In the end, the teachers will work with the Outreach office in producing resource materials for their classrooms and the general public, based on their internship experience. This model was tested in August with two teachers from Penticton, who were very enthusiastic about the program and highly recommended it to their science teacher colleagues in an article written for their monthly journal. The near-term goal will be to accommodate roughly 6 such internships each year with teachers across the province, aiming for the longer term perhaps double that number with teachers from across Canada.

## Professional Development Day

On October 25, TRIUMF, together with the BC Association of Physics Teachers, hosted a professional development day for high school science teachers. Eighty-five high school teachers attended, most of them from the Vancouver area, but a few from as far away as Prince George and Vancouver Island. The attendees were offered a variety of lectures and hands-on demonstrations on topics such as the standard model of particle physics, medical imaging techniques, synthesis of radioactive  $^{13}\text{N}$  with the TR-13 cyclotron, measurement of penetration of different types of radiations,  $\gamma$ -ray spectroscopy, and charged particle beam optics. The organizers judged the day to be an unqualified success, and a follow-up event is planned for 2003.

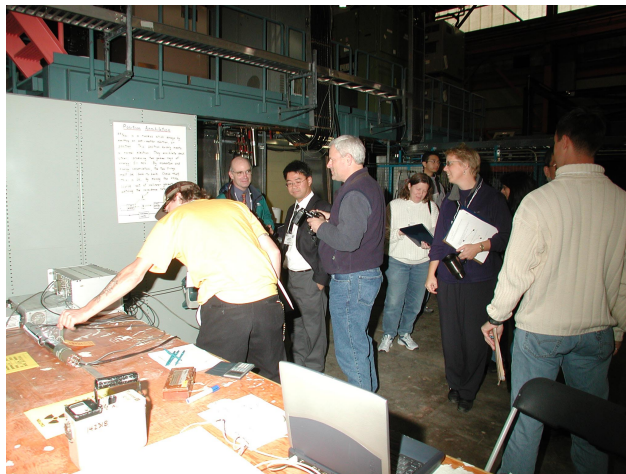


Fig. 257. Attendees at TRIUMF-hosted professional development day.