Canadian Safeguards Support Program 2007–08 Annual Report

Canadian Nuclear Safety Commission
Commission canadienne de sûreté nucléaire

Canada

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Canadian Nuclear Safety Commission
280 Slater Street
P.O. Box 1046, Station B
Ottawa, Ontario K1P 5S9
CANADA

Tel.: 613-995-5894 or 1-800-668-5284 (in Canada only)
Facsimile: 613-995-5086
E-mail: info@cnsc-ccsn.gc.ca
Web site: nuclearsafety.gc.ca

Canadian Safeguards Support Program
2007–08 Annual Report

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EXECUTIVE SUMMARY

The Canadian Safeguards Support Program (CSSP), managed and funded by the Canadian Nuclear Safety Commission, helps the International Atomic Energy Agency (IAEA) to improve its safeguards regime. During the year, the program achieved its objectives by assisting the IAEA in many diversified areas.

A secure electronic mailbox developed and based on the Public Key Infrastructure was implemented in all Canadian multi-unit nuclear reactor facilities in Canada, as part of implementing IAEA State-level safeguards. The mailbox process is generic and could be utilized by the IAEA in other Member states.

The Autonomous Data Acquisition Module (ADAM) is a critical component for safeguards equipment used widely in CANDU reactor facilities and other facilities subject to IAEA safeguards. A new-generation ADAM is being developed to replace current ADAM modules that are becoming difficult to support due to component obsolescence. Significant progress has been made, and this will lead to a prototype to be evaluated by Summer 2008 with a view to implementing field trials by the end of the next fiscal year

In collaboration with the Swedish Nuclear Power Inspectorate (SKI, Sweden), development work on the Digital Čerenkov Viewing Device (DCVD) has resulted in a new UV zoom lens to replace the current 105- and 250-mm lenses, and to extend the capability and image quality of the DCVD.

CSSP consultants and staff have provided support for several training courses on topics that include CANDU reactor fundamentals, equipment, satellite imagery, and quality management. A computer-based training module on quality management systems has been produced and implemented for on-line training of the staff of the IAEA Department of Safeguards.

To support IAEA emphasis and reliance on information from all sources for its safeguards verification activities, the CSSP has developed an integrated information portal. This portal could become part of the Department of Safeguards' computing infrastructure to help the IAEA manage vast amount of diverse information

In collaboration with Health Canada, the CSSP has provided the IAEA with the latest version of Visual Interface for Text Analysis, (VITA) complete with user manual and software documentation. The ability to visualize the textual information has considerably simplified information collection and analysis by the IAEA Information Management Division of the IAEA's Department of Safeguards (SGIM). In collaboration with Defence Research and Development Canada and the Canada Centre for Remote Sensing, the CSSP has kept the IAEA abreast on emerging technology and advanced techniques for satellite imagery processing and analysis relevant for safeguards verification.

Table 1 of this report presents more information about the CSSP's outputs and outcomes for the 2007–08 fiscal year (FY).

INTRODUCTION

The Canadian Nuclear Safety Commission (CNSC) is mandated under the *Nuclear Safety and Control Act* to "regulate the use of nuclear energy and materials to protect the health, safety, security and environment and to respect Canada's international commitments on the peaceful use of nuclear energy[1]. One of the mechanisms used to pursue this mandate is the CSSP, which is managed by the Directorate of Security and Safeguards of the CNSC.

Established in 1977, the CSSP has a national and an international role to supplement the IAEA's resources for safeguards research and development, with the priority of providing assistance in improving safeguards implementation in Canada. The CSSP carries out this role by performing system studies, developing equipment and technology, and providing training and technical support. As the IAEA's and Canada's safeguards needs evolve, so does the support of the CSSP.

(Photo: Courtesy of IAEA and Dean Calma)

[1] CNSC, 2004-2005 Estimates, Part III – *Report on Plans and Priorities*.

MISSION

The CSSP's mission is to assist the CNSC in meeting its mandate by helping Canada to fulfill its international commitments on the peaceful use of atomic energy, and to enhance the effectiveness and efficiency of the IAEA's safeguards regime in Canada and abroad. To achieve this goal, the CSSP seeks to advance the development and improve the implementation of safeguards, both nationally and internationally, through delivering high-quality and timely services, products and advice.

OBJECTIVES

The specific objectives of the CSSP, as outlined in its five-year strategic plan, are as follows:

- To support the IAEA in developing safeguards approaches, under both traditional and integrated safeguards, to ensure that its safeguards system is effective and efficient;
- To develop new equipment, modify existing equipment and maintain or improve the reliability, cost-effectiveness and sustainability of equipment to meet emerging and existing needs of IAEA safeguards;
- To support the implementation of comprehensive, integrated information management systems at the IAEA that are required to facilitate the increased reliance on information-based safeguards approaches;
- To support the development of skill and knowledge required to undertake traditional and integrated safeguards approaches, through the design and delivery of high-quality training programs; and
- To ensure the continued reliability and credibility of IAEA conclusions through infrastructure (quality management) support of the IAEA transition to information- and knowledge-based safeguards approaches.

In achieving these objectives, priority is given to assisting the IAEA with implementing safeguards in Canada.

ACCOUNTABILITY AND RISK FRAMEWORK

Work performed by the CSSP is guided by its Accountability and Risk Framework, which takes the CSSP's mission, objectives, and outputs and links them into three activity streams that are shown in Figure 1.

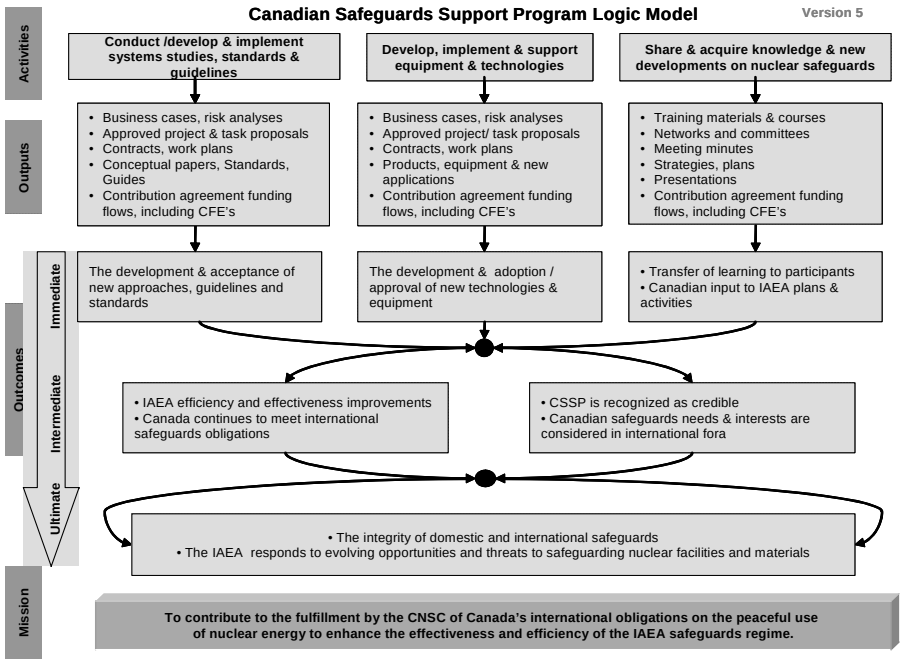


Figure 1: The CSSP's Logic Model

The first stream involves conceptual work designed to address specific safeguards issues, while continuing to advance the nuclear safeguards agenda.

The second stream of activities has a more tangible or physical product where new equipment and technologies are developed and supported.

The final stream of activities includes work performed by the CSSP in acquiring and sharing its knowledge through training, presentations, publications and networking. Outputs are generated to achieve immediate, intermediate and ultimate outcomes.

ORGANIZATION

In 2007–08, the CSSP was involved in a re-organization of the CNSC (see Figure 2). The Directorate of Security and Safeguards (DSS) was placed in a newly created Technical Support Branch (TSB). Reporting to the Vice-President of the TSB, the Director General of DSS allocates the necessary resources and confirms priorities so the CSSP can fulfill its mandate.

The Director of Technical Development and Services Division who also acts as the CSSP's coordinator, prepares and manages the program with the assistance of a team of three Safeguards Support Program Officers (see Figure 2). CSSP staff manages individual projects and liaises with the IAEA and International Safeguards Division (ISD), which also resides within the DSS to ensure project deliverables meet international and domestic needs.

An interdepartmental committee composed of senior staff working in safeguards and nuclear non-proliferation areas, from both the CNSC and the Department of Foreign Affairs and International Trade Canada (DFAIT), guides the CSSP on safeguards issues. The committee advises on the CSSP's priorities and ensures the work is consistent with Canadian policy on nuclear non-proliferation.

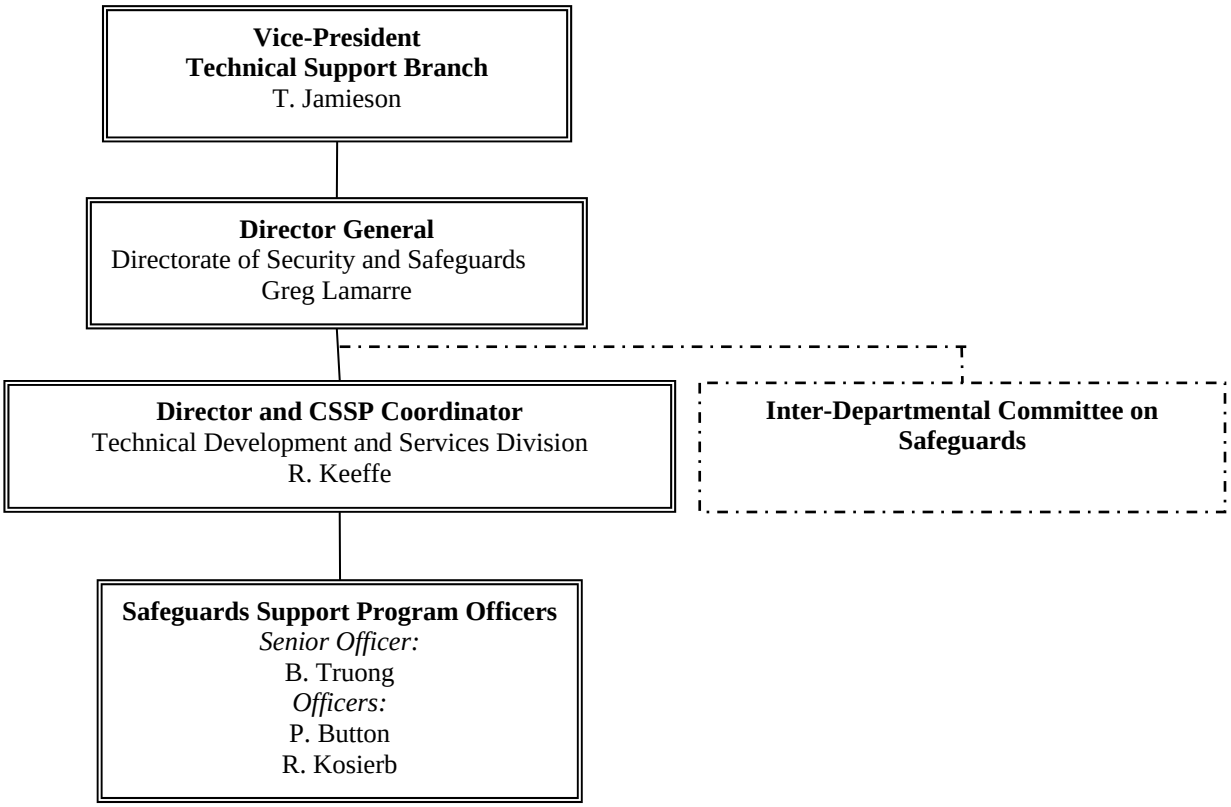


Figure 2: CSSP Organization Charts

STAKEHOLDERS

In fulfilling its mandate, the CSSP's ultimate beneficiary is the Canadian public. Figure 3 depicts the CSSP's stakeholders. Direct stakeholders include the IAEA, the CNSC, DFAIT and Canada's domestic nuclear community, including nuclear power generating facilities. The CSSP collaborates with other government organizations, such as the Defence Research and Development Canada (DRDC) establishments and the National Research Council, and the support programs of other Member states (MSSP) to the IAEA, to develop innovative equipment and technology. Canadian industry is contracted to undertake most CSSP tasks. The CSSP offers Canadian technology and skills where the IAEA needs assistance.

Figure 3: The CSSP's Stakeholders

OUTPUTS AND OUTCOMES

Table 1 provides a summary of the results and outcomes for 2007–08. The achievements of immediate and intermediate outcomes are provided where possible. The CSSP's work is focused on research and development, so it is normal that some outcomes were not achieved for specific outputs produced during the FY. For some outputs, the immediate or intermediate outcome has been acknowledged in the IAEA's 2007 Safeguards Implementation Report (SIR). A more detailed discussion of the CSSP-highlighted projects can be found in the section entitled Program Highlights.

Table 1: Outputs and Outcomes by Activity Stream

Activity	Outputs	Outcomes	
		Immediate	**Intermediate**
Conduct/develop and implement system studies, standards and guidelines	With the CSSP's assistance, the IAEA has completed an audit of the IAEA Public Key Infrastructure (PKI). Final approval is pending.	Full implementation of the IAEA's PKI is anticipated in 2008.	
Develop, implement and support new equipment and technologies	A joint IAEA/CSSP cost- sharing project installed core discharge monitor (CDM) cabling for the CANDU reactor at Bruce A, Unit 2.	The IAEA tested and accepted the cable installation. The CDM was installed, but remote monitoring was not yet operational.	Less effort for IAEA inspectors to determine the status of Bruce A,Unit 2.
	Development of mailbox system	Wider adoption in Canada. The CNSC safeguards mailbox is now in operation in ISD.	The mailbox system in conjunction with unannounced inspection is an essential part in the implementation of integrated safeguards in Canada.
	Stand-alone ADAM (VXI Irradiated Fuel Monitor [VIFM])	Used by the IAEA in non-Canadian locations to remotely monitor transfers of irradiated fuel, thus avoiding continuous presence of IAEA inspectors.	
	Laser-induced breakdown spectroscopy (LIBS) technology was successfully tested at the IAEA SAL (safeguards analytical laboratories) facility to identify the origin of U_3O_8 along with nuclear isotopes.	Results proved successful such that the project will be entering into the next phase of building a handheld LIBS instrument.	

Activity	Outputs	Outcomes	
		Immediate	**Intermediate**
	A commercial entity was identified to work on the Optically Stimulated Luminescence project. This company is now commencing the production of a portable instrument.		
	Testing at the Swedish CLAB facility proved quite successful for the DCVD in testing the new UV zoom lens and modifications.	The IAEA has accepted the DCVD zoom lens and proceeded with modifications of its two existing systems and the procurement of two additional updated units.	
	A geographical information system (GIS) and Web-based Integrated Information Portal (iIP) software was presented to IAEA in order to demonstrate the seamless integration of commercial and non-commercial programs.	The IAEA is in the process of comparing the iIP concept with other approaches before making the decision on course to take	
Acquire and share knowledge and new develop-ments on nuclear safeguards	Training for IAEA staff on the application of hyperspectral imagery analysis was provided in 2006–07, but not provided in 2007–08. However, training materials for the workshop were updated.	IAEA has adopted hyperspectral satellite image analysis for safeguards. (IAEA's SIR 2006)	The IAEA staff has become more proficient in their analysis of images, evident in their increased demand for and reliance on satellite imaging.
	The CCSP along with Swedish Safeguards Support Program (SWE SP) jointly sponsored a spent fuel verification for the IAEA in October 2007, which replaced the old ICVD (improved Čerenkov Viewing Device,	IAEA management, staff and participants associated with the course deemed the course quite successful and are anticipating the course to be conducted again in the next FY.	Trained inspectors effectively verify spent fuel with the ICVD and DCVD.

Activity	Outputs	Outcomes	
		Immediate	**Intermediate**
	DCVD, IRAT and SFAT courses.		
	VIFM training was provided to IAEA inspectors in September 2007.	The training was well received by the inspectors.	Inspectors have become more effective in the operation of the safeguards equipment.
	A computer based training module on a Quality Management System (QMS) for the IAEA Department of Safeguards was delivered.	The training module was installed on the IAEA Intranet and available for on-line training.	

EXPENDITURE

The CSSP commenced the 2007–08 year with a budget of C$1.585 million, the lowest of the last five years (see Figure 4). The budget reduction was due to transfers from the CSSP budget to different CNSC (i.e., non-safeguards) activities. The overall CSSP budget includes any transfer to the IAEA pursuant to the Contribution Agreement.

The purpose for the Contribution Agreement is for the CSSP to cover IAEA expenditures for the following items, requiring prior approval from the CSSP:

- Direct costs of salaries and benefits for Canadian Cost Free Experts (CFEs) employed for safeguards purposes at the IAEA;
- Direct costs of travel incurred by the IAEA for CSSP activities; and
- Direct costs of samples, standards, equipment, contractual services and other materials required and purchased by the IAEA for CSSP activities.

This past year, the CSSP transferred approximately C$200,000 under the Contribution Agreement. The funding was used mostly for safeguards equipment purchases by the IAEA. No CFE funding was required.

Of the countries supporting the IAEA, the CSSP is a medium-size program, with the US Support Program providing the largest contribution.

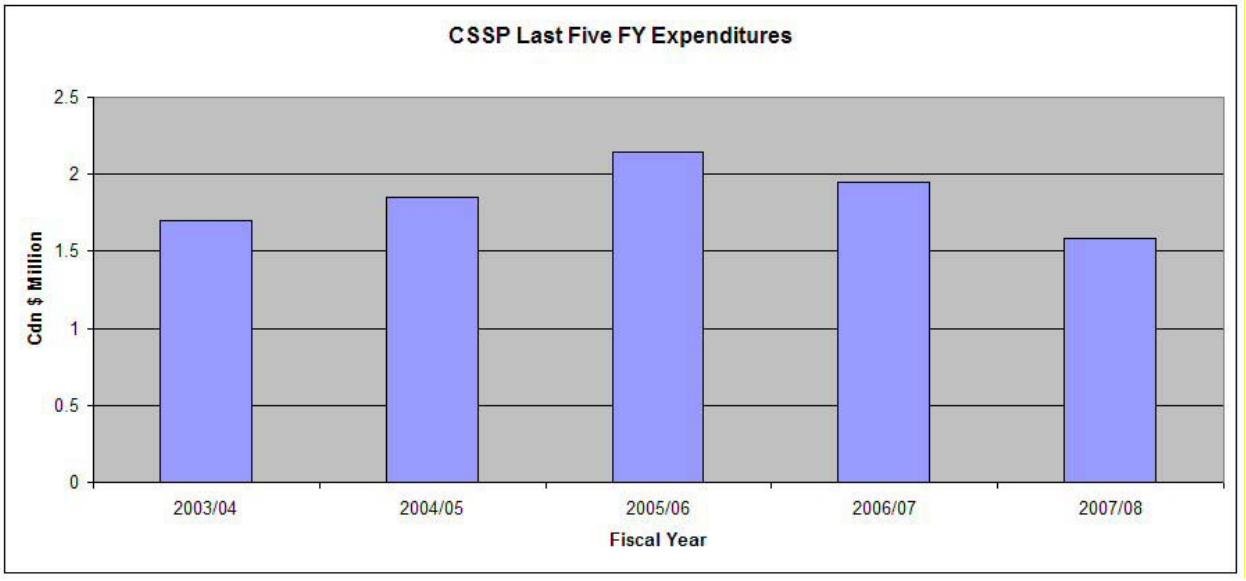


Figure 4 - CSSP Expenditures Over the Last Five Fiscal Years

Table 2 compares the CSSP's expenditures for the past two years. Overhead amount covers project-related expenditure (for example, travel) by CSSP staff. Salary is not included.

Table 2: Expenditure Distribution Comparison by CSSP Activity Stream

Fiscal Year / Activity	2006–07	2007–08
Overhead	$104.7k	$90.7k
System Studies	$62.1k	$40.0k
Equipment and Technologies	$1021.8k	$741.2k
Knowledge Sharing	$729.4k	$713.3k
Total	$1918.1k	$1585.2k

Figure 5 shows the breakdown of expenditures by activity stream for the 2007–08 FY.

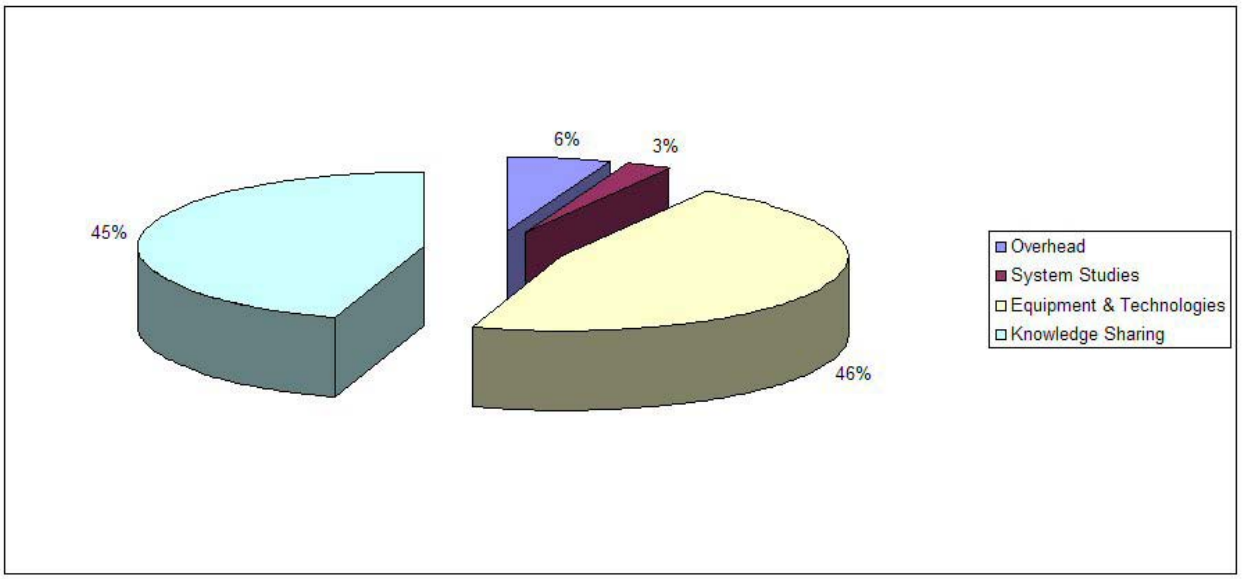


Figure 5: Fiscal Year Expenditures Categorized by CSSP Activity Stream

The expenditures can also be presented in different categories directly or indirectly related to benefiting the Canadian public.

Table 3: Expenditure Distribution Comparison by Contribution Stream[§]

Fiscal Year / Activity	2006–07	2007–08
Overhead	$104.7k	$90.7k
International	$360.6k	$532.4k
IAEA	$524.3k	$640.4k
Domestic	$928.7k	$321.8k
Total	$1,918.3k	$1585.3k

[§] Differences in the sums for Tables 2 and 3 are the result of round-off precision differences.

Note:

a) Domestic category: Safeguards expenditures conducted within Canada, which includes spending for VIFM support, remote monitoring, and all expenditures to support activities related to traditional safeguards and integrated safeguards in Canada;

b) International category: Expenditures contributing to safeguarding exported Canadian nuclear material and technologies by the IAEA. This category includes costs of development of software used in the unattended monitoring system at nuclear facilities outside Canada and expenditure for DCVD-related activities;

c) IAEA category: Funds for IAEA support on generic safeguards issues. satellite imagery, GIS and novel equipment technologies are within this category; and

d) Overhead: Project-related expenditures such as duty travel, participation at international working groups, and attendance of meetings and conferences by CSSP staff and other costs (for example, report publication and equipment purchase/maintenance).

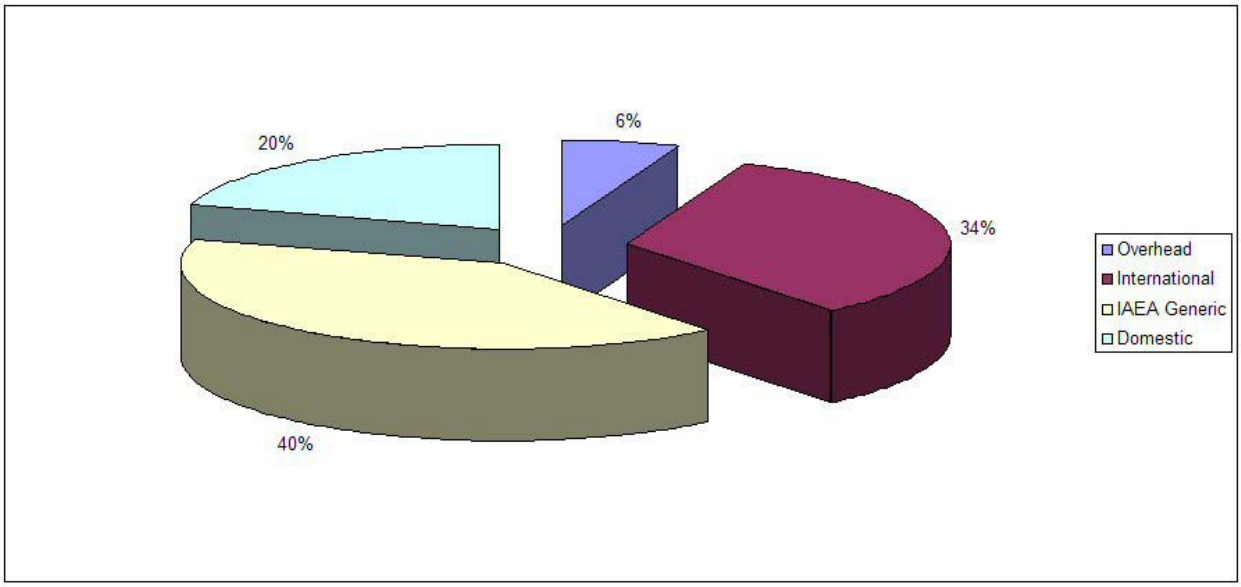


Figure 6: 2007–08 FY Expenditures Distribution by Canadian-Related Streams

FUND LEVERAGING

To leverage its limited funds, the CSSP establishes strategic partnerships with various organizations. This collaboration allows pooling of resources that include funding, data, information, and cutting edge technologies. During the reporting period, the CSSP cooperated with other MSSPs from Sweden, Finland, and Germany, UK and the USA, and with DRDC at Ottawa and Valcartier, Canada Centre for Remote Sensing (CCRS), Canadian Space Agency (CSA), the National Research Council and Health Canada in national projects. These collaborations optimized resource loading by avoiding duplication and resulted in well-coordinated efforts in support of the IAEA.

PROGRAM HIGHLIGHTS

SYSTEM STUDIES

Mail box and secure mail

CSSP assistance in implementing Public Key Infrastructure (PKI) at the IAEA is nearing completion. Through the Contribution Agreement, an independent review of procedures has been carried out by a consultant from Entrust. The IAEA now has the capability to generate and manage a PKI, but is awaiting a high-level audit before secure mail is made available to IAEA staff requiring it.

The CSSP has also provided guidance on implementation of the IAEA mailbox and its use by the operators. All Canadian multi-unit nuclear power facilities now submit information to the IAEA mailbox, and the remaining facilities are expected to do so soon. Submission of advance information data to an IAEA mailbox is a requirement under the integrated safeguards approach for Canada.

EQUIPMENT AND TECHNOLOGIES DEVELOPMENT

Next Generation ADAM

The autonomous data acquisition module (ADAM) is currently used widely in bundle counter and core discharge monitors at CANDU installations. In 2007, the CSSP started the development of a next generation ADAM (NGAM). Support is a challenge due to component obsolescence. Early in this reporting period, the CSSP became aware of new directions on unattended non-destructive analysis (NDA) instrumentation. The introduction of a new requirement, the universal NDA acquisition platform (UNAP) has led to a review of the NGAM requirements and a delay in its development cycle.

The UNAP aims to replace a variety of incompatible unattended radiation monitoring equipment with one type of equipment. It was argued that there would be considerable benefit to the IAEA, not only in support and in training, but also in facilitating the integration of large systems such as the one to be implemented at the Japan mixed-oxide plant.

The CSSP participated in discussions to refine UNAP requirements. Much of the UNAP functionality is either present in the NGAM or could be implemented; the major difference is in the number and type of input channels. The UNAP would require specialized channels, whereas the NGAM has a relatively simple input channel structure designed to work with the wiring in CANDU facilities. The CSSP believes that the UNAP device, as currently specified, would not be a cost-effective replacement for the ADAM. As a result of discussions with the IAEA, it was agreed that the NGAM should be developed. Many of the capabilities already included in the NGAM hardware could support the UNAP requirement. The CSSP may need to adjust its position once the UNAP requirements are finalized.

NGAM hardware design was completed by the end of the year and the circuit board design was sent for fabrication. Six pre-production NGAMs are scheduled for delivery to the IAEA later in 2008.

Digital Čerenkov Viewing Device (DCVD)

As reported last year, a UV zoom lens had just been constructed but required to be tested. The testing was completed this year, demonstrating its benefits. Both the lab and field trials showed that the lens provided far more flexibility for the DCVD user and maintained or exceeded the image quality of the 105- and 250-mm lenses.

Other hardware modifications were performed to accommodate this new lens by providing drive motors for tilting, focusing and zooming. All actions are now performed on the bridge side and are automated.

Work on the modeling continued with the Swedish Uppsala University providing a better source term in determining the amount of gamma rays being produced within an 8×8 light water reactor spent fuel assembly. This new calculation allowed the modeling to better predict the results obtained in field experiments.

This confirmation was demonstrated with the results obtained in April 2007 at the Swedish CLAB spent fuel storage facility. The work performed at CLAB had four objectives as follows, in order to:

- obtain data for the identifying partial defects within spent fuel assemblies;
- put the UV zoom lens in trial use;
- understand the DCVD's results in a quantitative manner; and
- obtain data for modeling verification.

Preliminary results from this work showed that the DCVD could statistically distinguish a single Zircaloy rod on the outer parameter. In addition, it could possibly identify a group of water rods and a group of missing rods under an obstruction. The results also indicated that the UV zoom lens improved the usability of the DCVD, contributed to better comprehension of the DCVD data, and resulted better agreement with the model prediction.

Work in the above areas is expected to continue during the next fiscal year.

Field Testing of the DVCD at Ringhals Nuclear Facility, Sweden
(Photo: Courtesy Rick Kosieb)

Novel Technologies

Work continued in this area advancing both the Optical Stimulated Luminescence (OSL) and LIBS projects.

OSL is a sensitive technology that can be used to detect radioactive materials. For the OSL project, effort was directed to the administrative arrangements for funding for building a hand-held prototype. Funding was approved late in the third quarter with the contract for the actual construction being established in the final quarter.

LIBS is a type of atomic emission spectroscopy using energetic laser pulses as the excitation source. As a result, matter (regardless of its physical state) can be analyzed. The LIBS project analysis was completed in March. The study discovered that LIBS, coupled with the Chemometrics software program, could identify compounds and not solely elements. Results were reported at the first North American Symposium on LIBS, which was held Oct 8–10, 2007. Additional testing was performed at the SAL in Siebersdorf, Austria in March 2008. This test examined material that is considered to be indicators and signatures of nuclear activity. Preliminary results appear promising. Due to the test occurring at the end of the reporting year, results will not be reported until the next year and published for the LIBS 2008 Conference in Berlin.

KNOWLEDGE SHARING

Satellite Imagery Technology and Analysis Methods

CSSP continued to provide the IAEA Department of Safeguards Satellite Imagery Analysis Unit with analysis methods using concrete examples. Several comprehensive case studies were carried

out and the results were presented at the Institute of Nuclear Material Management (INMM) and European Safeguards Research and Development Association (ESARDA) meetings (as shown later in Table 5 of this report). In addition to developing methodology for high-resolution optical imagery analysis, work has begun with high-resolution radar imagery. High-resolution radar sensors that provide imagery under day, night and all-weather conditions would extend SIAU monitoring capability, particularly in detecting potential clandestine activities. Analysis using multi-spectral and hyperspectral was also carried out to develop methodology for detecting substances using their spectral properties.

CSSP maintained collaboration with CCRS, DRDC-Ottawa and DRDC-Valcartier in the following areas: Interferometry analysis, radar processing techniques and infrared remote sensing, respectively. A project was carried out jointly with the CSA on the potential use of synthetic aperture radar (SAR) imagery for safeguards applications where the CSA funded most of the cash cost of the project and the CSSP provided contribution in cash and technical advice. The CSSP also participated in a joint collaboration with TerraSAR Canada, through Vantage Point International (VPI), to obtain initial high-resolution SAR imagery from the German all-weather TerraSAR-X satellite which was launched in June 2007. The CSSP had similar collaboration with MacDonald, Dettwiler Associates (MDA) in the development of methodology for polarimetric SAR imagery using airborne data and in the near future when RADARSAT-2 imagery is expected to be available in early 2008.

Satellite Image of Pickering Nuclear Generating Station
(Image: Courtesy of Google Earth)

Information Processing and Treatment

The CSSP provided support for IAEA activities involving safeguards information processing and treatment under the n-VISION project which encompasses several CSSP projects discussed below:

- *Collaborative software*: The CSSP provided the services of a Canadian consultant, who assisted and trained IAEA staff on the use of collaborative software (blogs, wikis, and Microsoft SharePoint). The benefits provided by collaborative software would help improve the efficiency and effectiveness within small units and larger divisions at the IAEA.

- *Visualized Interface for Text Analysis*: VITA version 7.5 was completed during the reporting period. The software along with the user manual was delivered to the IAEA. A meeting between the IAEA, the CSSP and Health Canada (CSSP collaborator) was held in Vienna to discuss potential improvement future plan for VITA development.

- *Information Portal*: The development of a CSSP GIS and Web-based integrated information portal using both commercial software and freeware available from the Web (the freeware was customized to suit the applications) was carried out during the reporting period. This work was to demonstrate the seamless integration of commercial and non-commercial software; the ability of the Portal to manage different databases, internal and external data servers; and to access various analysis tools for consequence analysis (for example, atmospheric dispersion) or visualization such as VITA.

The results of the above work were presented at the INMM Meeting in Tucson, AZ, USA as shown in Table 5 of this report.

Training

Training programs are designed to ensure equipment, software and techniques developed by the CSSP for the IAEA are properly installed, operated and maintained. The CSSP provides instructors, training material and hands-on instruction to IAEA safeguards staff through courses, field exercises and workshops.

Quality Management System Computer-Based Training
(Photo: Courtesy of Bob Truong)

During the past year, the CSSP provided training to SIAU imagery analysts on the processing and analysis of hyperspectral imagery. awareness training (two back-to-back courses) on the potential of satellite imagery for safeguards applications was given to IAEA inspectors, information collection and other staff. This course was jointly sponsored by the CSSP, SKI, the UK Support Program and the IAEA. CSSP staff and a consultant participated as instructors in the course which has been highly rated by the participants.

CSSP- sponsored-consultants continued to provide assistance in the review of SIAU equipment and hardware upgrade packages, and in the training of collaborative tools such as SharePoint to SGIM staff.

The CSSP also assisted in providing training on equipment it has developed: VIFM, CANDU course, ICVD and DCVD; and on advanced technologies.

CSSP consultant participated in the first VIFM course as instructor. The second VIFM course was postponed due to scheduling conflict. The CSSP also provided support for the revision of VIFM manuals.

Revision of the three modules (CANDU Reactor Fundamentals, Integrated Safeguards for CANDUs, and Underwater Cameras) for the CANDU course was in progress and will be delivered to the IAEA before the course which was postponed to end of August 2008.

An integrated course on spent fuel verification that combines the use of the CVD/DCVD, SFAT and IRAT was jointly given by CSSP consultants, SKI and IAEA staff to several inspectors (most of whom were from the IAEA and two from Euratom). The lectures portion was given in Vienna. Field exercises were conducted at Ringhals (Sweden). As in previous years, the service of CSSP consultants was highly appreciated by the IAEA.

CSSP supported the development of a computer-based training module for the Department of Safeguards' QMS. The module was available for self-learning via the Intranet.

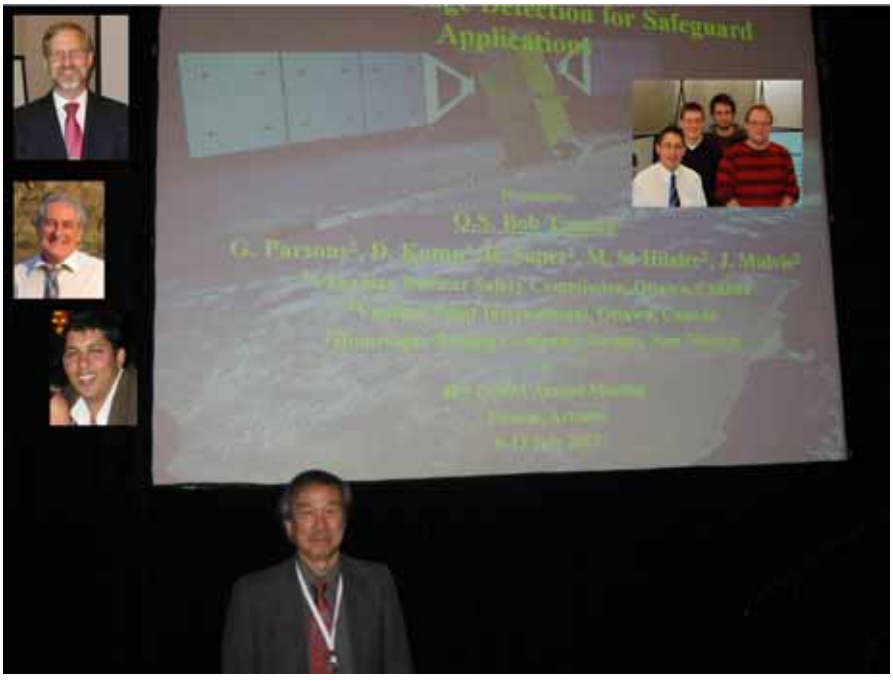
Table 4 provides a summary of CSSP-sponsored training activities discussed above.

DATE	COURSE	LOCATION	COLLABORATOR/ CONTRACTOR
May 2007	VIFM Training	Vienna, Austria	IAEA, CSSP, Eton Systems
May 2007	Satellite Imagery Awareness	Vienna, Austria	IAEA, SKI, CSSP, Borstad Associates, VPI
September 2007	CANDU Reactor Training	Vienna, Austria	IAEA, CSSP
November 2007	ICVD and DCVD Training	Vienna, Austria and Ringhals Nuclear Power Plant, Sweden	IAEA, SKI, CSSP, CSI)
March 2008	Computer-Based Quality Management for Focus Group – Deployment on IAEA Intranet	Vienna, Austria	IAEA, CSSP, Androcom, D.J. Films
As required	Database Software Training	Vienna, Austria	CSSP, Stantec
As required	Collaborative Software Training	Vienna, Austria	CSSP, Eton Systems

Table 4: CSSP-Sponsored Training Activities

CONFERENCES/PUBLICATIONS

The CSSP contributes to the CNSC mandate by obtaining and/or disseminating technical information at the following conferences and publications during this FY:



CSSP Presenters at INMM Tucson Annual Meeting
(Photo: Courtesy Bob Truong)

Table 5: CSSP 2007–08 Presentations and Conference Attendance

VENUE OR PUBLISHER	DATE	TITLE	PRESENTER/CO-AUTHORS
VITA Workshop, Vienna	February 2007	Delivery and demonstration of VITA 7.5 to IAEA staff	Bob Truong, Zachary Jacobson
ESARDA, 29th Annual Meeting, Aix-en-Provence, France	May 2007	CSSP Investigations Using SAR Imagery For Safeguards Applications	Bob Truong, Garrett Parsons, Ron Saper, John Mulvie
ESARDA, Aix-en-Provence, France	May 2007	Practical Training In Hyperspectral Satellite Image Analysis	Bob Truong, Leslie Brown, Gary Borstad
ESARDA, Aix-en-Provence, France	May 2007	Development of a Quality Management System (QMS) Training Package	Bob Truong, Ken Desson, David Martin
ESARDA, Aix-en-Provence, France	May 2007	Image Processing Techniques For Verification of Long-Cooled Spent Fuel and Partial Defect Detection Using the DCVD	Fredric Vinna, Dennis Chen, Andy Gerwing, Dennis Parcey, Rick Kosierb, Mats Larsson, Kåre Axel, Lars Hildingsson, Bo Lindberg,
ESARDA, Aix-en-Provence, France	May 2007	Safeguards Mailboxes and Unannounced Inspections	Peter Button, Bob Benjamin, Adam Dodd
INMM, 48th annual meeting, Tucson, AZ, USA	July 2007	Information Portal and Open-Source Tools for Nuclear Material Management	Bob Truong, Steve McArdle, Joe Yang, Pat Grover, Chris Piller
INMM, 48th annual meeting, Tucson, AZ, USA	July 2007	Collaborative Software Tools For Safeguards Applications	Bob Truong, Neil Herber
INMM, 48th annual meeting, Tucson, AZ, USA	July 2007	Knowledge Capture: A Practical Approach for JOb and Strategy-Related Information at the IAEA	Bob Truong, David Martin
INMM, 48th annual meeting, Tucson, AZ, USA	July 2007	Social Network Analysis for Nuclear Safeguards Applications	Zachary Jacobson, Bob Truong, Ben Houston, Neil Herber
INMM, 48thannual meeting, Tucson, AZ, USA	July 2007	Coherence Change Detection (CCD) for Safeguards Applications	Bob Truong, Ron Saper, Dan Krump, Garrett Parsons, Martin St-Hilaire, John Mulvie
INMM 2007, Tucson, AZ	July 2007	The Next Generation Autonomous Data	David Bot

VENUE OR PUBLISHER	DATE	TITLE	PRESENTER/CO-AUTHORS
		Acquisition Module for use in New and Retrofit iaea Safeguards Applications Involving Fixed and Portable Nuclear Detection	
Workshop on PolSAR	Aug 2007	Participate in workshop given by MDA and PCI	Bob Truong, Peter Button
IAEA NDA Workshop, Vienna	Sept 2007	Participation in workshop on the Universal NDA data acquisition platform	David Bot, R. Keeffe, P.Button
NASLIBS 2007 New Orleans, Louisiana	Oct , 2007	The CSSP's interest in LIBS technology	Rick Kosierb
NASLIBS 2007 New Orleans, Louisiana	Oct 8-10, 2007	Application of Soft Independent Modeling of Class Analogy to LIBS for Qualitative and Quantitative Analysis of Materials	François Doucet, Mohamad Sabsabi, Rick Kosierb
iIP Workshop	Nov 2007	CSSP Developed iIp as demonstrated to IAEA staff	Bob Truong, Steve McArdle
JAEA-IAEA workshop on advanced safeguards technology for the future nuclear fuel cycle Techno Community Square Ricotti, Tokaimura, Ibaraki, Japan	Nov 2007	CSSP Sponsored Projects on New/Novel Technologies: Update	Rick Kosierb

Celebration of IAEA Nobel Prize - Atoms for Peace at the 48th INMM Meeting in Tucson
(Photo: Courtesy Bob Truong)

Table 6: CSSP 2007/8 Publications

REPORTS	TITLE	AUTHOR	ISSUED
CSSP 2007-5	VIFM 6 Operators' Manual	Messner, Kovar, Button	August 17, 2007

ACRONYMS

ABBREVIATION	TERM
ADAM	Autonomous data acquisition module
CANDU	CANada Deuterium Uranium
CCRS	Canada Centre for Remote Sensing
C or CDN	Canadian
CDM	Core discharge monitor
CFE	Cost free expert
CLAB	Centralt mellanlager för använt kärnbränsle (Sweden's central interim storage facility for spent nuclear fuel)
CNSC	Canadian Nuclear Safety Commission
CSA	Canadian Space Agency
CSSP	Canadian Safeguards Support Program (CNSC)
CVD	Čerenkov Viewing Device
DCVD	Digital Čerenkov Viewing Device
DFAIT	Department of Foreign Affairs and International Trade Canada
DRDC	Defence Research and Development Canada
DSS	Directorate of Security and Safeguards
ESARDA	European Safeguards Research and Development Association
FY	Fiscal year
GIS	Geographical information system
IAEA	International Atomic Energy Agency
ICVD	Improved Čerenkov Viewing Device
iIP	Integrated information portal
INMM	Institute of Nuclear Material Management
ISD	International Safeguards Division (CNSC)
LIBS	Laser-induced breakdown spectroscopy
MDA	MacDonald, Dettwiler Associates
MSSP	Member state support program
NDA	Non-destructive analysis
NGAM	Next generation ADAM
OSL	Optically simulated luminescence
PKI	Public Key Infrastructure
PolSAR	Polarimetry Synthetic Aperture Radar
SAR	Synthetic aperture radar
SGIM	Division of Information Management (IAEA)
SGIT	Division of Safeguards Information Technology (IAEA)
SIAU	Satellite Imagery Analysis Unit (IAEA)
SIR	Safeguards Implementation Report
SKI	Statens Karnkraftinspekton (Swedish Nuclear Inspectorate)
SWE SP	Swedish Support Program (SKI)
UNAP	Universal NDA acquisition platform
UV	Ultraviolet
VIFM	VXI irradiated fuel monitor
VITA	Visual interface for text analysis
VPI	Vantage Point International
VXI	Vmbus eXtensions for Instrumentation

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