IRSST

ANNUAL REPORT

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Serving the Working Community Through Research

IRSST
Institut de recherche
en santé et en sécurité
du travail du Québec

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In this report, "IRSST" refers to the Institut de recherche en santé et en sécurité du travail du Québec (Québec Occupational Health and Safety Research Institute). "CSST" refers to the Commission de la santé et de la sécurité du travail du Québec (Québec Occupational Health and Safety Commission).

Union and employer groups at a major construction site have collaborated in the implementation of recommendations formulated by IRSST researchers concerning protection against falls from heights.

Heigh-steel workers are protected against falls by lateral safety cables attached to posts connected to the girders.

Photo Mario Bélisle

IRSST
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du travail du Québec

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AUDITORS' REPORT

To the members of
The Occupational Health and
Safety Research Institute

We have examined the balance sheet of The Occupational Health and Safety Research Institute as at December 31, 1988 and the statements of revenues and expenses and balance of funds for the year then ended. Our examination was made in accordance with generally accepted auditing standards, and accordingly included such tests and other procedures as we considered necessary in the circumstances.

In our opinion, these financial statements present fairly the financial position of the Corporation as at December 31, 1988 and the results of its operations for the year then ended in accordance with generally accepted accounting principles applied on a basis consistent with that of the preceding year.

Samson Bélair

Chartered Accountants

Montréal, February 22, 1989

PRESIDENT'S MESSAGE

Having firmly committed itself in 1986 to safety-related research, the IRSST began an in-depth examination of its medium- and long- term strategic planning last year. Although the Institute, in fulfilling its research mandate, focuses on problems capable of resolution in the short term, its role does not end there. Pro-active research must also be undertaken, even if the resulting benefits will not be apparent for some years. The initial results of this effort appear very encouraging:

- The IRSST, in collaboration with its labour and management partners and the CSST, has defined its research priorities in fields related to health and safety hazards in the evolving workplace. This process ensures that the Institute remains responsive to the concrete needs of the working community.
- This year the Institute introduced a new standing program designed to evaluate the tangible results of its activities in the workplace. By so doing, it will be able to better identify the various factors which determine its effectiveness in reducing occupational injury.
- The Institute has progressed from the role of end-user of research performed by its collaborators in the scientific community to that of contractor. In this context, the Associate Research Group program has been reevaluated to better serve the Institute's interests.
- Functional ties with the CSST have been strengthened this year, particularly in areas of common concern such as back problems, air quality in office buildings, and the more effective use of CSST statistical data in research.
- Concrete application of research results in a number of sectors has resulted in the elimination of health hazards at the source (isocyanates) and a reduction in the number of accidents (shingle saws).

It is against this backdrop that the Institute's research activities - increasingly recognized by the working community - occur. The best sign of the Institute's increased effectiveness, and the most encouraging, is the number of requests for sponsorship and consultation received from the working community, which now regards the Institute as a full-fledged partner and indispensable ally in the struggle for improved occupational health and safety.

President,

Monique Jérôme Forget

DIRECTOR GENERAL'S REPORT

In 1988 the Institute made a concerted effort to develop closer ties with its clients and thereby improve its response to their needs.

The two motivating factors underlying this effort were the necessity to ensure that the Institute's activities conform to the requirements expressed by the working community, and the need to furnish research results in a readily usable form to those most concerned. Input from our partners therefore assumed a central role in our efforts to establish research priorities, furnish scientific research of the highest calibre in response to specific requests, and improve the modes of communication and application of our research results.

The ultimate goal of our efforts has always been, and remains, the maximization of the return on investment in the Institute's research activities, through a reduction of the hazards which workers face and the injuries which they suffer.

We believe that the integration of valid preventive strategies into occupational health and safety practice depends on the use of research results to facilitate the decision-making processes at the planning stage or upon the introduction of new technology. This fundamental vision is articulated in a brief submitted last October by the Institute at the government of Québec-sponsored "Sommet sur la technologie", entitled "La recherche en santé et en sécurité: productive pour les milieux de travail et l'ensemble de l'économie".

PRIORITY RESEARCH TOPICS

In 1988, the Institute further defined its strategic planning and research priorities. The resulting objectives were submitted to its labour and management partners, the Commission de la santé et de la sécurité du travail (CSST), and by the Board of Directors. The Institute's future planning will accordingly reflect these research priorities.

The topics approved emphasize research aimed at the elimination of accidents and occupational illness, without however neglecting the identification of risk factors and the rehabilitation of workers. Specific priority research topics in these fields include the development and validation of material handling methods, the organisation of tasks, workstations, and work areas, hazardous materials and tools, the introduction of new technology, the development and validation of personal and collective protective equipment, the reduction of noise and vibration, and ventilation and air quality. In addition, the Institute will be performing evaluative research and analyzing socio-economic trends and indicators affecting occupational health and safety.

Three working groups were created in 1988 to coordinate evaluative research, research on back problems and research on indoor air quality in office buildings.

4. FIXED ASSETS

	Cost	Accumulated Depreciation	Net Value 1988	Net Value 1987
Office furniture and equipment				
Laboratories	409 648 $	312 447 $	**97 201 $**	118 979 $
Other departments	823 564	585 564	**238 000**	273 096
Laboratory and research equipment	4 747 412	3 924 956	**822 456**	911 339
Computer equipment	983 880	721 394	**262 486**	247 757
Leasehold improvements				
Laboratories	2 296 626	1 739 686	**556 940**	762 754
Other departments	1 094 528	811 371	**283 157**	345 546
	10 355 658 $	8 095 418 $	**2 260 240 $**	2 659 471 $

The acquisitions total 457 510 $ (357 773 $ in 1987) and depreciation for the year totals 856 741 $ (964 209 $ in 1987).

5. COMMITMENTS

a) The Corporation is committed under the terms of a non-cancellable commercial lease. Operating expenses and taxes are added to the following basic commitments of this lease.

1989	1 312 650
1990	1 312 650
1991	843 600
	3 468 900 $

b) At year-end the commitments are as follows:

Scholarships and grants	1989	1990	Total
Associate research groups	717 602 $	378 901 $	1 096 503 $
Subsidized research			
Research grants	250 469	174 904	425 373
Research contracts	266 323	100 000	366 323
Research scholarships	182 000		182 000
	1 416 394 $	653 805 $	2 070 199 $

6. EXPENDITURES BY ACTIVITY - OPERATIONS FUND

Research activities	1988	1987
Management and co-ordination	**991 524 $**	870 492 $
Administrative services	**1 355 025**	1 510 498
Research	**9 666 706**	9 872 529
Communications	**644 101**	553 104
	12 657 356	12 806 623
Laboratory services to the network members	**2 133 630**	2 034 533
	14 790 986 $	14 841 156 $

7. COMPARATIVE DATA

For comparative purposes with the current year, certain data from the preceding year have been reclassified.

NOTES TO FINANCIAL STATEMENTS

year ended December 31, 1988

1. STATUS AND NATURE OF ACTIVITIES

The corporation, incorporated under Part III of the Québec Companies Act, assumes the responsibility for developing, co-ordinating and carrying out research activities which contribute in achieving the objectives of the Act Respecting Occupational Health and Safety. More specifically, the corporation is responsible for identifiying and eliminating risks to workers' health, safety and physical integrity at their source.

2. SIGNIFICANT ACCOUNTING POLICIES

Operation fund

Are part of the operation fund on one hand the research activities for which the corporation receives an annual grant from the CSST and on the other hand the laboratory services to the network members which are billed to the CSST on a monthly basis. The current operating expenses related to these activities are charged to this fund.

Restricted fund

The restricted fund includes the external contracts activities as well as the J. H. Honoré Sauvé's fund. The direct expenses related to these activities are charged to this fund.

Inventories

Supplies are valued at the lower of cost and replacement value. Cost is determined substantially according to the first in, first out method.

Fixed assets

Acquisitions are charged against operations, and depreciation against the balance of fund.

Depreciation of furniture and equipment is computed under the declining balance method at the following rates:

Office furniture and equipment	20 %
Laboratory and research equipment	30 %
Computer equipment	30 %

Amortization of leasehold improvements is computed according to the straight-line method over the term of the lease (until 1991).

3. ACCOUNTS RECEIVABLE

	1988	1987
CSST		
Laboratory services	**369 796 $**	474 962 $
Others	**654**	40 795
Advance to the WDU Congress	**175 174**	54 447
Other	**27 017**	48 907
	572 641 $	619 111 $

Great emphasis was placed this year on our collaboration with the CSST, both in establishing our research priorities and in coordinating joint action on high-priority issues. Revision of the data collection system used to collect statistical data for both research and administrative purposes was a particularly evident example of this coordination.

SCIENTIFIC EXCELLENCE AND RECOGNITION

Evaluation of the scientific quality of the Institute's activities remains one of our principal concerns. The Scientific Director has accordingly extended the quality control process previously used for external research, involving peer review of research protocols and project reports, to internal research activities.

By establishing criteria of scientific excellence the Institute furthers its credibility in the eyes of its clients and its counterparts, both in Canada and internationally. The increased recognition of the Institute's in-house and university-affiliated researchers is clearly demonstrated by the increase in the number of research proposals received from the working community in 1988.

The past year also saw the founding of an international association of occupational health and safety research institutes by the Institute and fifteen of its counterparts. This association was created to promote the exchange of scientific information and the realisation of joint projects by association members with common interests. The Institute is the only Canadian representative. With the National Institute for Occupational Safety and Health (NIOSH) of the United States, it comprises the association's North American contingent.

A cooperative agreement on research in the field of machine safety was entered into with NIOSH in 1988. This agreement puts the expertise of American researchers, particularly in the fields of metal presses and robotics, at our disposal while offering them the benefit of our experience with a variety of woodworking equipment, most notably shingle and edging saws used in the sawmill and woodworking sectors, respectively. The Institute also concluded a number of other collaborative agreements with governmental institutions, private agencies, and other research institutes.

APPLICATION OF RESULTS

The Institute considers its responsibility to deliver research results in a form which the working community can readily put to use as important as its obligation to ensure that the planning and execution of its projects correspond to these partners' needs.

The concerted effort made by the Institute to clearly communicate its results is reflected in the number of publications it produced and in the ready accessibility of research results. Results are available in the form of either two-page summaries or concise reports of approximately ten pages, with detailed results available as separate appendices. This multiplicity of formats allows all interested parties, regardless of available time or the nature of their inquiries, to access research results.

In addition to increasing the accessibility of our research results, we have sought to ensure that these results are applied by our clients. To this end, the evaluative research working group created this year has a mandate to evaluate the extent to which Institute research is applied, the strategies used to apply it, and the concrete effects of its application in the workplace. Four projects have been evaluated to date.

With the results of these evaluations in hand, the Institute expects to collaborate with the CSST in optimising the use of research results by its clients. This process will lead to enhanced collaboration between the Institute and its partners during the execution of research as well as in the implementation of proposed solutions.

RESEARCH PROGRAMS AND PROGRAM MANAGEMENT

Continuing the rationalization process undertaken in 1987, the Institute completed implementing an external contract program in safety-related research in 1988, and extended it to research in other priority areas. At the request of our Boards, the Associate Research Group program was modified and will now fund groups of clearly-defined research projects rather than provide general infrastructure funding. These new policies will allow the Institute to make optimal use of its external scientific resources as it strives to fulfil its objectives.

In keeping with this trend, the Institute has also improved a number of its operational policies and procedures. Most noteworthy of these are the policy concerning Institute research and consultation contracts, and the patent policy necessitated by the increasing number of projects with practical applications.

BALANCE SHEET
as of December 31

	1988	1987
OPERATIONS FUND		
CURRENT ASSETS		
Cash	**629 551 $**	342 820 $
Accounts receivable (note 3)	**572 641**	619 111
Inventories	**65 572**	65 568
Prepaid expenses	**49 271**	40 259
	1 317 035	1 067 758
LONG-TERM ASSETS Fixed assets (note 4)	**2 260 240**	2 659 471
	3 577 275 $	3 727 229 $
CURRENT LIABILITIES		
Accounts payable and accrued liabilities	**644 545 $**	1 050 843 $
Due to restricted fund	**84 189**	
	728 734	1 050 843
BALANCE OF FUND	**2 848 541**	2 676 386
	3 577 275 $	3 727 229 $
RESTRICTED FUND		
CURRENT ASSETS		
Deposit	**5 928 $**	5 567 $
Accounts receivable	**68 527**	
Due from operation fund	**84 189**	
	158 644 $	5 567 $
BALANCE OF FUND	**158 644 $**	5 567 $

Commitments (note 5)

ON BEHALF OF THE BOARD

Adrien Ouellet Director

Louis Laberge Director

	BALANCE OF FUNDS year ended December 31	
	1988	1987
OPERATIONS FUND		
Balance at beginning of year	**2 676 386 $**	3 274 980$
Excess of revenues for the year	**571 386**	9 642
Fixed assets financed through operations	**457 510**	357 773
	3 705 282	3642395
Depreciation of fixed assets	**856 741**	964 209
Net value of fixed assets sold		1 800
	856 741	966 009
Balance at end of year	**2 848 541 $**	2 676 386 $
Represented by:		
Fixed assets surplus	**2 260 240 $**	2 659 471 $
Operating surplus	**588 301**	16 915
	2 848 541 $	2 676 386 $
RESTRICTED FUND		
Balance at beginning of year	**5 567 $**	5 217 $
Excess of revenues for the year	**153 077**	350
Balance at end of year	**158 644 $**	5 567 $

In the administrative sector, a working group on in-house computer-related issues has been created and a master plan in this area drafted. These developments will facilitate access to research data for both administrative and research purposes, and will foster the integration of computer technology into research activities.

In the field of industrial relations, the Institute, in conformity with the procedures described in its collective agreement, conferred the status of researcher on seven members of its professional staff in 1988. Furthermore, the Institute and the union representing its employees agreed to extend the collective agreement for a period of one year, to December 31, 1989.

BOARD OF DIRECTORS, SCIENTIFIC ADVISORY BOARD AND ADMINISTRATIVE PERSONNEL

Two members of the Board of Directors - Pierre Lortie and Christophe Auger - left the Board in 1988, as did the observer for the ministère de la Santé et des Services sociaux, Dr. Michel Pelletier. Dr. Pelletier's replacement is Dr. Marc Dionne.

Yvon Gasse completed his term on the Scientific Board. We deeply regret the passing of René Bédard, whose place has been taken by Richard Lapointe.

Claude Demers left the position of Assistant Scientific Director to work in the private sector. Donat Savoie replaces him and will also provide management support for the internal research groups. Mr. Savoie, on loan to the Institute for three years, comes to us from the Canadian public service, where he was Director of Circumpolar and Scientific Affairs in the Department of Northern Affairs.

Jean-Marc Lalancette, Director of the Safety-Ergonomics Program relinquished his position to return to research activities in the private sector. His interim replacement is Serge Bouchard, also Director of the Work Organisation Program.

Responsibility for the evaluative research working group has been given to Jean-Charles Guindon, on loan from the CSST.

Finally, we would like to mention the arrival of Prof. Ilkka Kuorinka, on loan to the Institute from the Finnish Institute for Occupational Health, in Helsinki. Dr. Kuorinka is currently president of the International Association for Ergonomics.

DIRECTIONS FOR 1989

The past year was marked by the strengthening of our ties with our clients, the improved dissemination of the results of our activities, and the establishment of major research priorities.

The coming year will see the Institute follow up on these achievements, in order to ensure that our research activities lead to concrete improvements in the quality of working life and the welfare of workers.

Our prime objective will be the coordination and optimisation of the planning and execution of Institute and university research in priority areas. Such collaboration will help assure the scientific excellence of our work, and will be especially useful in validating the credibility of our results in the workplace.

These policies are no more than Québec society has a right to expect from a research institute whose mandate is the improvement of occupational health and safety.

Director General,

Louis Berlinguet

REVENUES AND EXPENSES
RESTRICTED FUND
year ended December 31

	1988	1987
REVENUES		
Outside contracts	354 422 $	$
Interest	361	350
	354 783	350
EXPENSES		
Remuneration		
Salaries	151 627	
Fringe benefits	20 969	
	172 596	
Postage	150	
Travel	3 324	
Analysis	4 301	
Sub-contracts	21 335	
	201 706	
EXCESS OF REVENUES OVER EXPENSES FOR THE YEAR transferred to balance of fund	153 077 $	350 $

FINANCIAL REPORT

	REVENUES AND EXPENSES OPERATIONS FUND year ended December 31	
	1988	1987
REVENUES		
Québec Occupational Health and Safety Commission	**13 399 617 $**	13 215 000 $
Laboratory services (CSST)	**1 488 430**	1 371 164
Interest	**268 648**	146 798
Other	**205 677**	117 836
	15 362 372	14 850 798
EXPENSES*		
Remuneration	**5 519 344**	5 430 671
Professional services	**279 560**	291 487
Boards and committees	**79 085**	86 231
Administrative and other	**759 160**	762 578
Advertising and publications	**223 898**	220 464
Conferences	**88 241**	80 404
Travel	**135 714**	91 097
Laboratory operation	**455 213**	418 948
Network sampling material	**270 822**	231 434
Building	**2 266 900**	2 350 726
Fixed assets	**457 510**	357 773
Research grants and contracts	**4 255 539**	4 519 353
	14 790 986	14 841 156
EXCESS OF REVENUES OVER EXPENSES FOR THE YEAR transferred to balance of fund	**571 386 $**	9 642 $

* Details of expenses by activity (Note 6)

HIGHLIGHTS

In 1988, the Institute defined the research topics on which it intends to concentrate in the coming years.

Priority will be given to research in the following six areas:

◆ **Identification of safety hazards**: identification and characterisation of accident risk factors and scenarios.

◆ **Elimination of safety hazards**: materials handling; task, workstation and work area organisation; hazardous machines and tools; the introduction of new technology; personal protective equipment; vibration.

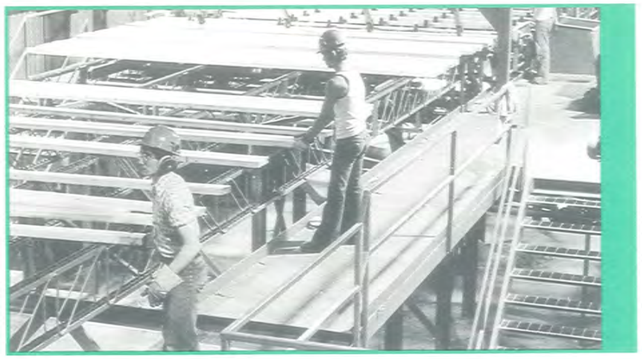
◆ **Identification of health hazards**: identification and monitoring of physical, biological, and chemical contaminants.

◆ **Elimination of health hazards**: noise reduction; development of general and local exhaust ventilation systems; modification of industrial processes and protective equipment in order to reduce exposure to toxic products; research on air quality in office buildings.

◆ **Rehabilitation**: diagnostic and therapeutic research; therapy evaluation; development of measurement techniques; improvement of functional residual capacity; ergonomic demands of workstations.

◆ **Evaluative research**: evaluation of the social, legal, or economic aspects of occupational health and safety, and of the impact of new technologies on occupational safety; characterisation of key socio-economic trends and indicators affecting occupational health and safety.

The following section describes the Institute's research and consulting activities in 1988 within the above-mentioned areas.



The description of the circumstances leading to sawmill accidents allows companies to effect specific preventive measures.

RESEARCH ACTIVITIES

IDENTIFICATION OF SAFETY HAZARDS

◆ In response to a request from the Association des manufacturiers de bois de sciage du Québec (Québec Association of Lumber Producers), the WORK ORGANISATION PROGRAM collaborated with the SAFETY ENGINEERING PROGRAM in a study of work organisation in sawmills and of sawmill accidents.

A detailed model of accident scenarios was developed, based on the analysis of some 1,241 accident reports from nine sawmills between 1986 and 1987. This research established the correlation of the various phases of production and typical work situations with the risk of specific injuries. Furthermore, chainsaws, edging saws, and shredders were identified as the most hazardous equipment.

The main recommendations of this study concern the improvement of the conveyor and wood sorting systems, and of waste disposal procedures.

These recommendations will be transmitted to the major sawmills, to their health and safety committees, and to the employer and union associations in this sector, and will allow the companies to implement the necessary corrective measures themselves.

ELIMINATION OF SAFETY HAZARDS

◆ Lock-out procedures on sawmill equipment were the major concern voiced by the Association des manufacturiers de bois de sciage du Québec in their request mentioned in the previous section. This is understandable, since the unexpected start-up of inadequately locked-out equipment is a well-known cause of sawmill accidents. Accordingly, the issue of equipment lock-out procedures was examined by the SAFETY ENGINEERING PROGRAM in 1988.

◆ INSTRUMENTATION

Quality control of the prevention network's activities are assured through the Laboratory Division's calibration, maintenance and repair services for instrumentation used for the sampling and the measurement of gas concentrations and physical parameters such as noise.

The LABORATORY DIVISION has also begun to offer its services to clients other than the CSST. Thus, employer and union groups, companies, and various other agencies used its services in 1988.

COMMUNICATION

In 1988, the COMMUNICATIONS DIVISION distributed some 34,000 documents either in response to specific requests or in the context of specific events related to occupational health and safety. A total of 29 scientific reports, technical guides and newsletters were published this year, besides the 22 research profiles contained in the Institute's news magazine *L'IRSST*, sent to almost 5,000 subscribers mostly drawn from the working community.

The major issues covered in the three issues of L'IRSST were indoor air quality in office buildings (spring 1988), vibration in the workplace (fall, 1988), and sawmill accidents (winter 1988).

Finally, volume I of an inventory of the Institute's research activities since its creation (*"Répertoires des recherches"*) was published as part of Occupational Health and Safety Week, in October 1988.

Disbursements for each of the eight groups in the Associate Research Group Program were as follows:

GROUP	UNIVERSITY	AMOUNT funded in 1988*
Industrial toxicology	Montréal	$450,000
Epidemiology of Occupational Injury	McGill	$496,326
Occupational Lung Disease	Sherbrooke	$184,952
Biomedical Engineering	École Polytechnique	$184,952
Biological Approach to the Work Environment	UQAM	$185,328
Effects of Workplace Organisation on Occupational Health and Safety	Laval	$112,000
Social Aspects of Occupational Health and Safety Prevention	Montréal	$115,000
Noise Hazards and Control	Montréal / Sherbrooke	$280,000

* Not including amounts paid through the Contract and Subsidized Research Program in 1988

Through its Researcher Training Program, the Institute awarded bursaries to one post-doctoral fellow, 12 doctoral students, and 10 master's students, working in fields judged to be of high priority. Over seven years, a total of 193 students have received funding of this kind for their master's, doctoral or post-doctoral training in fields related to occupational health and safety.

SERVICES

◆ ANALYSIS

In 1988, the Institute's Laboratory Division analyzed some 56,000 environmental and toxicological samples for the CSST's prevention network, an increase from the 52,000 analyzed in 1987. Adding the analyses performed for research projects, a total of 71,000 analyses were performed.

As always, the analyses performed for the CSST cover a wide spectrum of substances, with 225 different analytes being analyzed this year. Over 90% of the requests for analysis come from Départments de Santé Communautaire (DSCs, Community Health Departments) and Centres Locaux de Services Communautaires (CLSCs, Local Community Services Centres) and are related to the development of health protection programs for companies in CSST-defined priority industrial sectors I and II.

Half the analyses were of solvents, with metals and ions accounting for 12% of the total, dusts for 16%, and toxicological analyses for 22%.

Institute engineers observed conditions in eight sawmills, studied the design of various machines, and reviewed the scientific literature concerning lock-out procedures. One of the major recommendations which arose concerned the implementation, in collaboration with the workers, of complete and explicit shut-down and lock-out procedures in all sawmills.

These procedures should cut off all sources of power to the machines and should be applicable during unblocking operations as well as during maintenance and repair operations. The researchers also recommend installing emergency shut-down equipment on the machines themselves, providing personal locks to the employees, and training employees in safety procedures. In common with their colleagues of the WORK ORGANISATION PROGRAM, the SAFETY ENGINEERING PROGRAM team recommended a more detailed study of the systems used to convey wood and to contain wastes.

A clearly structured intervention strategy was undertaken in collaboration with unions and employers in order to ensure concrete application of the SAFETY ENGINEERING PROGRAM'S research. The Institute's participation in this activity ensures that research results will be transmitted to both parties in a useful form.

◆ The study of the ergonomics of the bus driver workstation was also completed in 1988. This study was performed by ERGEV Inc. in association with the Institute at the request of the Société de transport de la Communauté urbaine de Montréal (Montréal Urban Community Transport Corporation) and the Bus Drivers' Fraternity.

In the third phase of this study, a report of which was submitted in the course of 1988, field trials were performed on a seat selected during a previous phase of the project, and on an inclinable steering wheel, both designed to reduce back fatigue in bus drivers. Twenty drivers tested this equipment under normal working conditions for a period of eight weeks, and recorded the effect it had on their posture.

The new model of eye protection currently being evaluated resolves forestry workers' complaints about the comfort and effectiveness of previous models.

The equipment was found to have adequately fulfilled task requirements and ergonomic criteria. The report also contains recommended measures for the reduction of postural strain in bus drivers.

◆ In 1988 the SAFETY ENGINEERING PROGRAM, in collaboration with OVIFO Design, completed the design of a protective visor and protective glasses for forestry workers, and produced prototypes of this equipment.

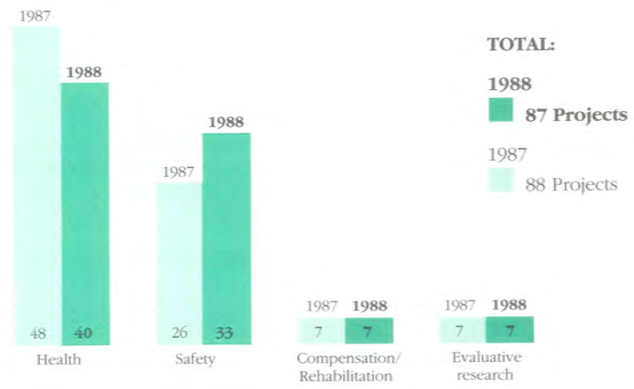
Both models are retractable, can be modified to accommodate a helmet, and have been designed to reduce fogging and glare. Preliminary trials indicate that the equipment is acceptable to forestry workers and provides adequate protection.

A patent application has been filed and discussions are under way with a manufacturer regarding the marketing of the equipment. The potential Canadian market for this protective equipment is comprised of approximately 65,000 forestry workers.

RESEARCH

The Institute's research programs are administered by the Director General who is assisted in this task by the Scientific Director and by the Directors of the other scientific programs. In 1988, 87 internal, contract, or subsidized research and consultation projects were carried out, 24 of which were completed during the year. As a result of the significant developments or the external contract program in safety research, the Institute was able to further concentrate on priority problems identified by the working community. Of the 54 contract or subsidized projects, 10 were performed in collaboration with the Institute's internal research groups. A list of all projects active in 1988 appears in a supplementary report available in French.

TABLE 1 - DISTRIBUTION OF RESEARCH PROJECTS IN 1987 AND 1988



Funding of the Institute's eight Associate Research Groups continued in 1988. This program, dating back to the Institute's beginnings, has resulted in the formation of university research groups investigating topics judged relevant and of high priority by unions and employers, and by the scientific community. The evolution of these occupational health and safety priorities in 1988 led to a modification of the funding arrangements between the Institute and the Associate Research Groups, such that funding is now on a project rather than thematic basis. This new policy was applied in determining funding for the following four research groups whose contracts with the Institute expired in 1988:

- the Associate Research Group on the Effects of Work Organisation on Occupational Health and Safety, at the Université Laval
- the Associate Research Group on Social Aspects of Occupational Health and Safety Prevention, at the Université de Montréal
- the Associate Research Group on Biomedical Engineering, at the École Polytechnique de Montréal
- the Associate Research Group on the Epidemiology of Occupational Injury, at McGill University.

FUNDING

Revenue for the IRSST in 1988 was $15,717,155, including a grant of $3,399,617. The distribution of revenues and expenditures for 1988 is illustrated in Figures I and II.

FIGURE I
Revenue: $15,717,155

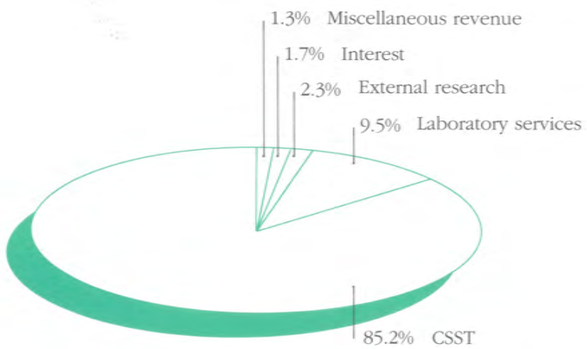
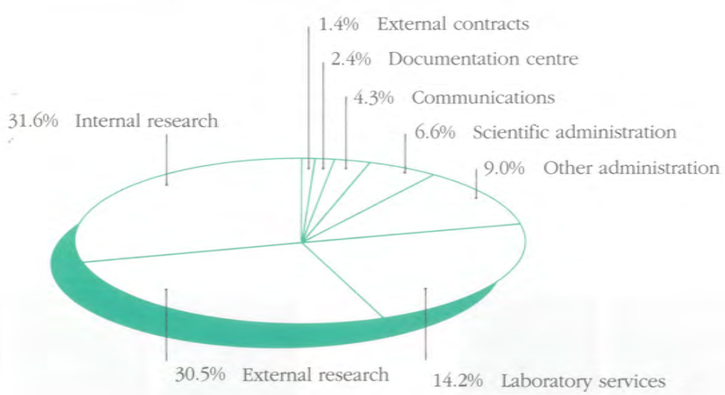


FIGURE II
Expenditures: $14,992,692



Better planning in the choice of equipment can reduce the number of dangerous situations to which carpenters and joiners are exposed.

◆ Research by the SAFETY-ERGONOMICS PROGRAM on safety and work at heights during conventional formworking operations was completed this year.

The use of inappropriate materials and equipment in the constrained space available during formworking operations performed while working at heights may cause a loss of balance, which may in turn lead to falls or collisions. This project therefore examined the criteria applied in choosing equipment and materials for the construction of work surfaces during these operations. Task-based criteria were developed for choosing material and equipment, and recommendations concerning the planning and preparation of work and the design of equipment were presented.

It appears possible to choose appropriate work surface equipment and materials on the basis of construction plans or blueprints and a knowledge of the height of the formwork, the working height, the length of the walls, the number of workers, and the space limitations. Redesign of support scaffolds, service scaffolds, and ladders could render them safer, as they are currently poorly adapted to the exigencies of real working conditions. Finally, given the unpredictable conditions prevailing on construction sites, on-site consultation between workers, foremen, and safety representatives should be standard operating procedure before undertaking a new task.

The identification of anti-vibration seats will allow skidder owners to apply economical solutions.

◆ Significant research in the field of occupational exposure to vibration was performed by researchers in the SAFETY ENGINEERING and ANALYTICAL PROGRAMS. A particularly noteworthy research project resulted in the development of a field measurement technique for exposure to segmental vibration. This technique, published as an industrial hygiene protocol, allows the most appropriate instrumentation and analytical approach to be selected for each of the major classes of vibrating tools.

A complementary project involving the development of a test bed for the measurement of vibration generated by grinders is under way in the laboratory. The use of this evaluation technique to identify grinders generating the least vibration will contribute to the reduction of occupational exposure to vibration.

Finally, the research project concerning anti-vibration seats in skidders has been completed. Five models of seats were evaluated in the laboratory and at logging camps, and the Institute is now in a position to advise the owners of skidders of the seat models which provide the most effective attenuation of vibration. Using this information, the owners will be able effect inexpensive corrective measures.

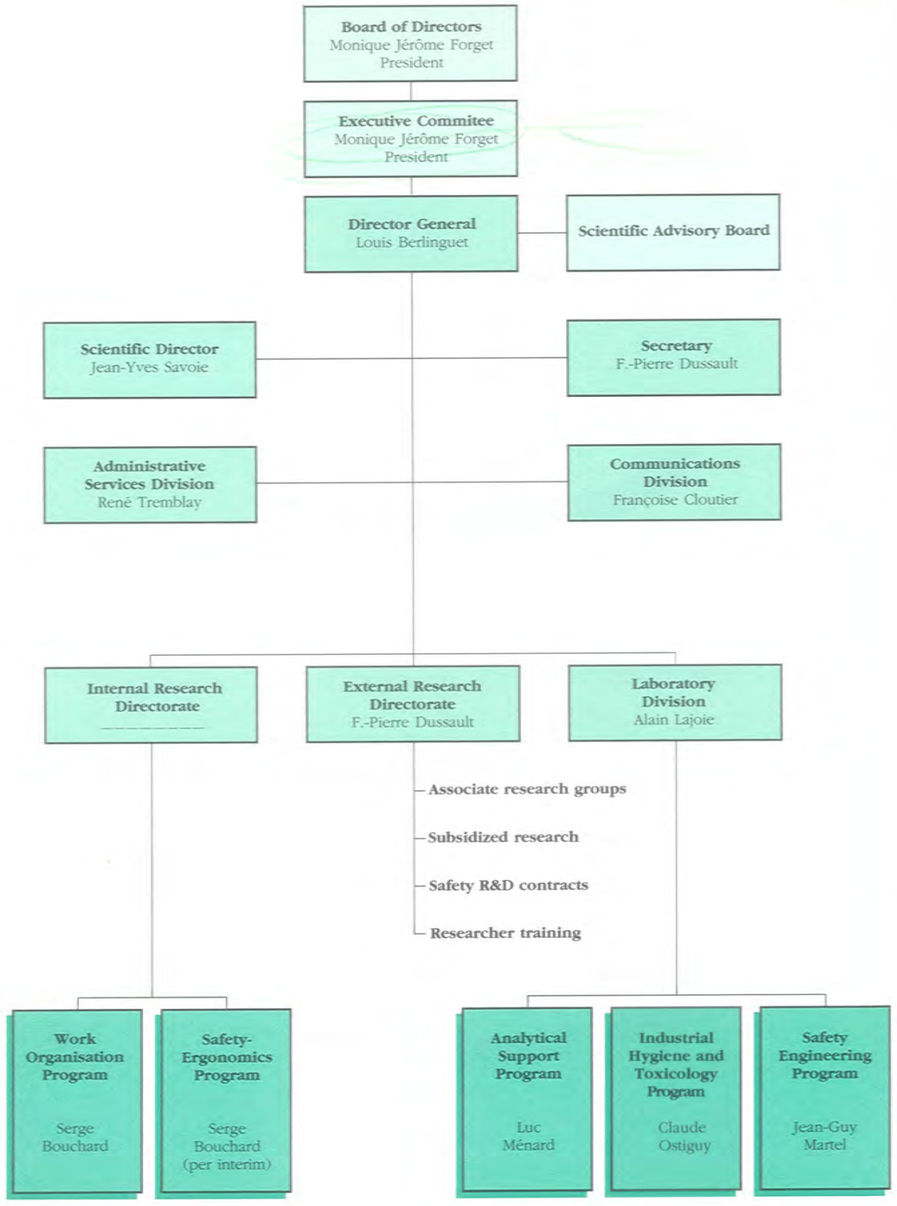
IDENTIFICATION OF HEALTH HAZARDS

◆ Work by the Institute's LABORATORY DIVISION and the Université Laval on the detailed analysis of respirable dust to which foundry workers are exposed continued in 1988. A new method developed by the research group was used to analyze respirable dust samples taken at key location in five foundries.

This method allows the qualitative and quantitative determination of the chemical and granulometric characteristics of the dust as a function of the type of foundry (e.g. cast iron, copper, aluminum) and process. These results will help the sector to reduce worker exposure to toxic agents responsible for lung disease.

ORGANIZATIONAL CHART

as of December, 31, 1988



ADMINISTRATIVE REPORT

ORGANISATIONAL STRUCTURE

The Institut de recherche en santé et en sécurité du travail du Québec (IRSST: Occupational Health and Safety Research Institute) was created in 1980. Its mandate is to contribute through scientific research to the identification and elimination at the source of occupational hazards, and to the rehabilitation of workers injured by these hazards.

The Institute fulfils its mandate by performing, contracting, and funding research, by supplying of laboratory services, and through the application of its expertise. Its communicates the knowledge gleaned from its research activities to the working community and contributes to the training of new researchers.

The Institute is headed by the DIRECTOR GENERAL who is supported by the SCIENTIFIC DIRECTOR and the SECRETARIAT. Research activities are administered by three directorates:

- The INTERNAL RESEARCH DIRECTORATE, responsible for the Safety-Ergonomics and Work Organisation Programs;
- The EXTERNAL RESEARCH DIRECTORATE, responsible for the Associate Research Group, Contract and Subsidized Research, and Researcher Training Programs;
- The LABORATORY DIVISION, which performs environmental and toxicological analyses, provides expertise and services, and performs research through the Industrial Hygiene and Toxicology, Analytical Support, and Safety Engineering Programs.

The ADMINISTRATIVE SERVICES DIVISION is responsible for administrative and support functions, while the Communications Division is responsible for the dissemination of research results to the Institute's clients.

PERSONNEL

The distribution of the Institute's 126 employees at the end of 1988 was as follows:

11 management personnel
56 professionals
33 technicians
26 technical and administrative support staff

Training or refresher courses were taken by 62 employees (49% of personnel).

The union representing the Institute's employees, the Canadian Union of Public Employees (CUPE) local 2957, agreed to prolong the collective agreement with the Institute until the end of 1989.

New bronchial challenge tests reduce the risk to subjects of violent reaction.

◆ The Institute completed its joint project with the Hôpital du Sacré-Coeur de Montréal involving the development and validation of a bronchial challenge test. Occupational asthma is the most common occupational lung disease, and may be caused by some 200 substances, of which the most common are isocyanates, flour, and red cedar dust. Exposure to one third of these substances is in the form of dusts or powders, and the definitive diagnosis of the condition requires the exposure of the subject to the suspected causal agent. Conventional tests have the disadvantage of furnishing no information on the quantity and granulometric properties of the dust, and of potentially provoking a violent reaction in the subject.

In response to these problems the ANALYTICAL SUPPORT PROGRAM developed an exposure system which generates dust aerosols of known concentration. This methodology was evaluated in tests conducted on 21 subjects suspected of suffering from occupational asthma. Fifteen subjects exhibited immediate and delayed reactions, while six subjects reacted to neither this test method nor to conventional testing methodology. The data from the fifteen subjects who demonstrated a positive reaction was used to generate a dose-response curve.

The specific granulometric data furnished and the reduced risk of violent reactions in subjects constitute significant advantages of this method over conventional test procedures.

◆ Researchers at the Université de Montréal, in collaboration with the INDUSTRIAL HYGIENE AND TOXICOLOGY PROGRAM, developed a high pressure liquid chromatography (HPLC) analytical method for a specific urinary metabolite of ethylene oxide. The absence of an identifiable, specific, metabolite had to this point precluded the measurement of the absorption of ethylene oxide in occupational settings.

A gas chromatography-mass spectrometry analytical method with improved sensitivity and specificity has also been developed. Validation of the method by the analysis of metabolite levels in exposed workers will be performed in 1989. The use of the validated technique will result in better estimates of received dose, and the formulation of effective control and personal protective strategies.

Noise-related problems may be predicted at the planning stage of factories or work areas through the use of computerised simulations of sound fields similar to those generated by machines in industrial settings.

◆ A research group at the Hôpital du Sacré-Coeur de Montréal submitted their report this year on disturbances of sleep and vigilance among workers with a history of rotating shiftwork experience (day-evening-night).

An insomnia index was developed based on the results of a questionnaire completed by almost 500 nurses and auxiliary nurses who had worked rotating shifts. Women who had worked nights for more than four years exhibited higher indices of insomnia.

In the second phase of the study, 15 subjects participated in a laboratory study of their sleep characteristics, vigilance and circadian rhythms. The sleep profiles of subjects suffering from extreme insomnia were characterized by insufficient recovery periods, and numerous awakenings. These subjects also exhibited reduced vigilance, particularly in weakly-stimulating environments.

In general, the research demonstrates the potentially persistent effect of night work on sleep and vigilance, in which the length and concentration of night work is a significant determinant.

ELIMINATION OF HEALTH HAZARDS

◆ Predictive acoustics remains a priority research area for the Université de Sherbrooke's Acoustics Group, member of the ASSOCIATE RESEARCH GROUP ON NOISE HAZARDS AND CONTROL.

Through laboratory simulations of sound fields similar to those created by industrial machines, this technique allows potential problems associated with noise exposure to be predicted at the planning stage of the plant or work area. It may also be used to establish, in the laboratory, the necessary corrective measures for an existing industrial setting, and to evaluate the effectiveness of corrective measures.

WORKER REPRESENTATIVES

Robert Bouchard
Director, Occupational Health and Safety Services
Fédération des travailleurs et des travailleuses du Québec (FTQ)

Gilles Martin
Representative, Occupational Health and Safety
Fédération des travailleurs et des travailleuses du Québec (FTQ)

Charles Prévost
Union consultant, Training Service
Confédération des syndicats nationaux (CSN)

Monique Simard
Executive Vice President
Confédération des syndicats nationaux (CSN)

SCIENTIFIC AND TECHNICAL MEMBERS

Clifford Nelson Baronet
Executive Vice President, Research and Development,
Technical Services
Centre de recherche industrielle du Québec
(Québec Industrial Research Centre)

Madeleine Blanchet
President
Conseil des affaires sociales de la famille
(Family and Social Affairs Council)

Maurice Brossard
Vice President, Biotechnology
National Research Council of Canada

André Marsan
Director of the External Research Program
Biotechnology Research Institute

André Raynaud
Professsor of Economics
Université de Montréal

DEPARTURES DURING 1988

Yvon Gasse
Directeur du programme PME
Institut de recherches politiques
Faculty of Administration
Université Laval

René Bédard
President
J. René Bédard et associés
Consultant to the Canadian Chemical Manufacturer's Association
(deceased)

SCIENTIFIC ADVISORY BOARD

The Scientific Advisory Board is a tripartite body presided over by the Director General of the Institute and composed of 15 members distributed as follows: six members of the scientific community named by the Board of Directors on the recommendation of the Scientific Director; four employer and four worker representatives, named by employer and union administrators, respectively; the Scientific Director sitting as a non-voting member.

The Scientific Advisory Board acts in a consultative capacity vis-à-vis the Director General. At his request, the Board advises on issues such as the Institute's scientific policy, the orientation of research activities and laboratory services, and the communication of research reports and results.

The Board is also called upon to evaluate the relevance, priority and scientific quality of in-house and external research programs and projects. Evaluation of the scientific quality of research projects is generally based on the analysis and recommendations of expert committees recruited from the scientific community.

MEMBERS OF THE SCIENTIFIC ADVISORY BOARD

(as of December 31, 1988)

PRESIDENT
Louis Berlinguet
Director General

SCIENTIFIC DIRECTOR
Jean-Yves Savoie *

OBSERVER
Lise Langlois *
Vice-President of
Planning and Programming
Commission de la santé et de la sécurité du travail du Québec

EMPLOYER REPRESENTATIVES

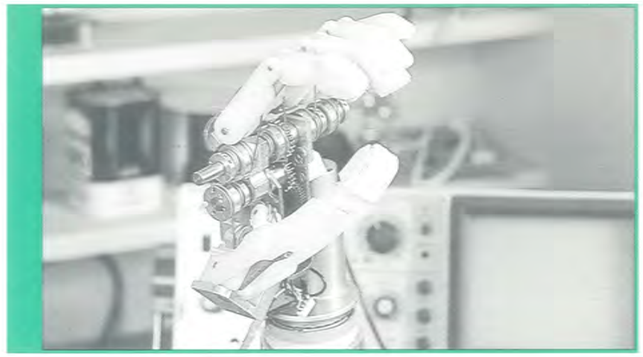
Alexandre Beaulieu
President
Alexandre Beaulieu Inc.

Carl Devost
Director of Occupational Health and Safety Technical Services
Conseil du patronat du Québec

Michel Lesage
Consulting physician, Occupational Health and Safety
Corporate Medical Director
Dominion Textile Inc.

Richard Lapointe
Toxicologist
Société d'électrolyse et de chimie Alcan
(Alcan Smelters and Chemicals Ltd.)

* non-voting member



The more natural morphology of the new hand prosthesis will facilitate the reintegration of hand amputees into the workforce.

This group also produced a software package in 1988 capable of determining the exact noise level at any given point in a work area. The software was developed and validated on scale models and in industrial settings. It is capable of simultaneously emitting 10,000 sound waves in all directions and following their trajectory as they reflect off the walls of the work area or objects located in the area.

A new, generalised, method of calculating the total acoustic response of work areas was also developed.

REHABILITATION

◆ In 1988, researchers at the Institut de réadaptation de Montréal (Rehabilitation Institute of Montréal) continued their work on the development and validation of a new type of hand prosthesis intended to improve the reintegration of hand amputees into the workforce.

The prosthesis, offering three types of grip, greater flexibility, and a more natural morphology than other available models, was designed using computer simulation. The design phase has been completed and a three-month validation study, in which hand amputees familiar with alternative models of prosthesis will evaluate the new model and complete a questionnaire, is currently in progress. The manipulation of various objects using the prosthesis will also be the subject of an ergonomic analysis.

EVALUATIVE RESEARCH

◆ A statistical profile of injuries leading to permanent disability was completed this year by a team of the WORK ORGANISATION PROGRAM. This study constitutes the second phase of a larger project involving the analysis of CSST data. The first phase was marked by the publication last year of a similar study on back injuries. The study's database was drawn from the approximately 10,000 accidents resulting in permanent disability in 1981.

Although injuries resulting in permanent disability account for only 3% of all occupational accidents, they represent 50% of all compensation paid by the CSST. The cost and length of compensation for permanent disability are higher in workers aged 35 years and older. The risk of suffering a permanently disabling accident is higher among workers employed in the agriculture, construction, mining, forestry, sawmill, and transportation sectors.

The average compensation for permanent disability in 1981 was approximately $25,000, with a range of $13,000 to $490,000, depending on the nature and severity of the injury. Back injuries result in the longest (14 to 15 months) and most costly compensation.

◆ Researchers at the Université de Montréal completed their project on the effect of accident risk on pay scales in Québec. Research focused on the extent to which labour market forces result in the payment of hazard bonuses, and the extent to which these forces constitute an incentive to undertake preventive measures and accident reduction.

The results indicate that the risk of accidents among blue collar workers and manual workers is explicitly acknowledged and compensated for by compensatory bonuses which the researchers estimate at 2.5% of the total salaries budget. The value of the bonus does however vary as a function of the incidence and severity of the accidents. This finding clearly demonstrates that the financial impact of dangerous occupations extends beyond the compensation paid by the CSST and affects the structure of the labour market.

Future research is planned on interprovincial comparisons, the analysis of the economic factors involved in the determination of occupational risk, and the benefits of investing in preventive measures.

WORKER REPRESENTATIVES

Andrée Bouchard
Secretary
Confederal Health and Safety Committee
Confédération des syndicats nationaux
(Confederation of National Trade Unions, CNTU)

Claude Gingras
Vice President
Centrale des syndicats démocratiques
(Congress of Democratic Unions)

Clément Godbout
Director
United Steelworkers of America

Louis Laberge
President
Fédération des travailleurs et des travailleuses du Québec
(Québec Federation of Labour, QFL)

Jean Lavallée
Director General and Financial Secretary
Fraternité inter-provinciale des ouvriers en électricité
(Interprovincial Brotherhood of Electrical Workers)
Vice President
Fédération des travailleurs et des travailleuses du Québec (QFL)

Claude Morrisseau
Regional Director
Canadian Union of Public Employees

DEPARTURES DURING 1988

Pierre Lortie
President and Chief Executive Officer, Provigo Inc.

Christophe Auger
Confédération des syndicats nationaux (CNTU)

Michel Pelletier
Observer, ministère de la Santé et des Services sociaux du Québec

DIRECTOR GENERAL
Louis Berlinguet*

SCIENTIFIC DIRECTOR
Jean-Yves Savoie*

OBSERVER
Marc Dionne*
Director of Public Health (per interim)
Ministère de la Santé et des Services sociaux du Québec
Minister of Health and Social Services

EXECUTIVE COMMITTEE

Monique Jérôme Forget,
President
Ghislain Dufour
Louis Laberge
Louis Berlinguet*

* non-voting member

BOARD OF DIRECTORS

The Board of Directors, composed of a president, seven employer representatives and seven worker representatives, is responsible for determining the Institute's long-term objectives, development plan, and funding. Board members also sit as the Board of Directors of the Commission de la santé et de la sécurité du travail du Québec (CSST).

MEMBERS OF THE BOARD

(as of December 31, 1988)

CHAIRMAN

Monique Jérôme Forget
President and Director General
Commission de la santé et de la sécurité du travail du Québec

EMPLOYER REPRESENTATIVES

Michel A. Caron
President and Director General
Groupe Tremca Inc.

Ghislain Dufour
President
Conseil du patronat du Québec
(Québec Employer's Council)

Guy Dufresne
Executive Vice President
North American Pulp
and Paper Group
Consolidated Bathurst Inc.

Franco Fava
Secretary
Neilson Excavation Inc.

Michel Guillemette
Director of Medical Services
Canadian Pacific Forest Products
Ltd.

Jean-Marc Turcotte
President and Chief Executive
Officer
Tioxide Canada Inc.

The principal causes of indoor air quality problems in office buildings are defective humidification systems and inadequate fresh air.

◆ The ASSOCIATE RESEARCH GROUP ON THE SOCIAL ASPECTS OF OCCUPATIONAL HEALTH AND SAFETY PREVENTION, affiliated with the Université de Montréal, published a report of its study on the effective management of occupational safety.

The project examined the differences in performance, as measured by accident rates, among manufacturers in the same sector, characterised the different strategies used to manage occupational safety, and identified organisational models most likely to produce decreases in the frequency and severity of accidents.

The results indicate that the companies with the lowest accident rates had the following characteristics in common: a focus on preventive measures rather than on the administrative aspects of managing occupational accidents; decentralised implementation of preventive measures; involvement of the workers and of all organisational levels in prevention activities; support for the health and safety committees in all respects; and a common view of safety and work shared by both the foremen and the health and safety representatives.

CONSULTATION

Apart from its regular research programs, the Institute also furnishes expertise in response to individual requests from the working community.

IDENTIFICATION OF HEALTH HAZARDS

◆ The SAFETY ENGINEERING and ANALYTICAL SUPPORT PROGRAMS performed an extensive series of investigations of the role of chemical and microbiological contaminants, ventilation on indoor air quality and comfort in fifteen office buildings last year.

The results of these studies indicate that the major problems are related to the ventilation systems. Humidity and fresh air control systems are often defective or incorrectly calibrated and the distribution of fresh air is often uneven.

The drive to reduce energy costs often results in an insufficient amount of fresh air being added to every ventilation cycle, and minimal fresh air standards - varying between 2.5-10 litres/person/second, depending on the institution - are therefore not respected. The concentration of chemical contaminants is low, although higher concentrations may be generated from isolated unventilated sources such as photocopying or mimeographing machines.

ELIMINATION OF HEALTH HAZARDS

◆ In response to a request by the Association paritaire pour la Santé et la Sécurité du travail, Secteur Affaires Sociales (Joint Occupational Health and Safety Association, Social Affairs Sector), the ANALYTICAL SUPPORT PROGRAM identified and quantified microbiological contamination in hospitals.

Samples taken from two hospitals established the existence, in the ventilation system and in the work areas, of microorganisms capable of affecting workers and patients. The conditions which these organisms may cause include lethargy and chronic weakness.

Taking this as their starting point, the researchers developed a ventilation system decontamination project for all hospitals. The project entails the identification of the sources of contamination, thorough decontamination of the ventilation systems, and verification of the effectiveness of the decontamination. This will be followed by the distribution to all Québec hospitals of a guide describing the conditions likely to lead to contamination, the necessary corrective measures, and the frequency with which ventilation systems should undergo maintenance.

The IRSST laboratories have studied the feasibility and cost of shielding visual display units.

◆ This year also saw the ANALYTICAL SUPPORT PROGRAM review the scientific literature concerning the possible health effects of electromagnetic radiation emitted by visual display units (VDUs). The feasibility and cost of passive VDU shielding was established in a series of laboratory measurements of the electric and magnetic fields, and future studies will precisely quantify the effectiveness of the recommended shielding techniques.

It should be noted that the motivation for this research is purely preventive, there existing no clear evidence of the harmful effects of work with VDUs.

◆ The LABORATORY DIVISION provided support services for two ad hoc committees of the Board of Directors of the CSST dealing with workers exposed to silica, asbestos, and man-made mineral fibres. The asbestos-related work involved the comparison of the fibre-counting method currently used to NIOSH method 7400, in order to provide a basis for the choice of a new method. The precision of the two methods was compared by a group of 12 counters drawn from various companies, government departments, unions, and employer groups, using samples prepared in the laboratory. The accuracy with which the methods measured concentration was determined during workplace sampling.

◆ Finally, the LABORATORY DIVISION participated in a number of national and international programs related to quality control and trials of personal protective equipment. Particularly noteworthy was the participation in nine international industrial hygiene and toxicology programs and in several committees - including those of the American National Standards Institute (ANSI), the American Society for Testing Materials (ASTM), and the International Standardisation Organisation (ISO) - concerned with standardising the evaluation of personal protective equipment.