Improved accident prevention through research

1987 ANNUAL REPORT

IRSST

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

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

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AUDITOR'S REPORT

To the members of
Institut de recherche en santé et
en sécurité du travail du Québec

We have examined the statements of revenue and expense and surplus of Institut de recherche en santé et en sécurité du travail du Québec for the year ended December 31, 1987 and the balance sheet as at that date. 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 results of the operations of the corporation for the year ended December 31, 1987 and its financial position at that date in accordance with generally accepted accounting principles applied on a basis consistent with that of the preceding year.

Samson Bélair

Chartered Accountants

Montreal, February 5, 1988

PRESIDENT'S MESSAGE

Having recognized the benefits of proper prevention management techniques and the critical importance of health and safety issues, numerous companies have significantly reduced the number of injuries and in some cases, have made their goal : TOTAL ELIMINATION OF WORK-RELATED ACCIDENTS.

While this goal is obviously desirable, it cannot be met without fully understanding risks in the workplace. The complexity of measures required to provide a healthy and safe work environment for all workers must also be considered, particularly at a time of high productivity and rapid technological change.

In fact the Occupational Health and Safety Institute (generally known as the "IRSST", its French language abbreviation for its name) carries out research whose specific objective is to determine the risks inherent in the work environment, to analyze their causes and consequences, and to propose the means of eliminating them at the source. An overall assessment of the past year's activities reveals the importance of prevention-related research. This year we have favoured wider dissemination of the results of our research since the best of solutions which remain generally unknown by the public will go unheeded.

Every effort must be made to prevent occupational injuries and illnesses. More than ever, research must be aimed at workers facing serious risks, identify the most serious accident-related problems, and provide concrete solutions in terms of health and safety.

The IRSST marked a turning point in 1986 by orienting its activities towards safety. In 1987, we committed ourselves more fully to this pursuit. The thought we have given to strategic objectives over the next five years reflects a conscious desire to better understand the preoccupations and needs of the working community.

The President,

Monique Jérôme Forget

DIRECTOR GENERAL'S REPORT

For the IRSST, 1987 marked an important phase in its orientation and in the consolidation of its activities. The problems and the expectations of the principal partners were more precisely defined. The means at our disposal were adapted, and our personnel adjusted their sights to meet these needs. A definite reorientation towards work safety and accident prevention has occurred.

Now that the problems have been identified, the Institute is able, on the one hand, to inform its outside research associates as well as in-house research groups of the research priorities of the workplace. The Institute is extending its research soliciting role to include the Safety Research and Development Contract Program. Furthermore, a more rational use of resources and personnel has clarified certain program objectives as well as the role and contribution of various units within the Institute.

Through improved dissemination of research results in 1987, the IRSST devoted much time and energy to increasing communications with its associates and promoting its role as research leader in the prevention of occupational illnesses and accidents.

NEW DIRECTIONS

Extensive work was carried out in 1987 to define and determine strategic objectives and research priorities for the coming years. Statistics from the Occupational Health and Safety Commission (better known under its French language abbreviation, "CSST"), research results, and meetings with those involved in occupational health and safety have permitted the IRSST to evaluate the main hazards in various industrial activity sectors and professions.

This analysis revealed the major occupational health and safety problems in the workplace and the priority research needed in order to solve them. The Institute can now orient its research towards the most serious accident-related problems and to the groups of workers most at risk.

Safety received increased attention in 1987 without occupational health being neglected. In-house and subsidized researchers now devote much of their energy to accident prevention and elimination.

5. COMMITMENTS

a) The company 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.

1988	$ 1,312,650
1989	1,312,650
1990	1,312,650
1991	843,600
	$ 4,781,550

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

	1988	1989	Total
Scholarships and grants			
Associate research groups	1,545,739	$ 953,687	$ 2,499,426
Subsidized research			
Research grants	456,417	187,617	644,034
Research contracts	220,430	115,454	335,884
Researcher training	184,000		184,000
	$ 2,046,586	$ 1,256,758	$ 3,663,344

6. EXPENDITURE BY ACTIVITY

	1987	1986
Management and co-ordination	$ 870,492	$ 831,408
Administrative services	1,510,498	1,373,449
Research	8,448,031	8,072,355
Laboratory services	3,459,031	3,068,836
Communications	553,104	625,661
	$ 14,841,156	$ 13,971,709

7. COMPARATIVE DATA

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

NOTES TO FINANCIAL STATEMENTS

year ended December 31, 1987

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 could contribute to achieving the objectives of the Act respecting occupational health and safety. More specifically, the corporation is responsible for identifying and eliminating risks to workers' health, safety and physical integrity at their source.

2. SIGNIFICANT ACCOUNTING POLICIES

i) INVENTORIES

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

ii) FIXED ASSETS

Acquisitions are charged against operations, and depreciation against the fixed asset surplus. 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

	1987	1986
CSST		
Laboratory services	**$ 474,962**	$ 180,048
Other	**40,795**	
Other organizations - external contracts	**14,850**	
Other	**34,057**	3,044
	$ 564,664	$ 183,092

4. FIXED ASSETS

	Cost	Accumulated Depreciation	Net value **1987**	Net value 1986
Office furniture and equipment				
Laboratories	$ 407,126	$ 288,147	**$ 118,979**	$ 147,792
Other departments	798,291	525,195	**273,096**	328,698
Laboratory and research equipment	4,491,361	3,580,022	**911,339**	1,102,920
Computer equipment	856,657	608,900	**247,757**	218,068
Leasehold improvements				
Laboratories	2,293,847	1,531,093	**762,754**	1,014,006
Other departments	1,050,866	705,320	**345,546**	456,223
	$ 9,898,148	$ 7,238,677	**$ 2,659,471**	$ 3,267,707

The acquisitions total $357,773 ($407,668 in 1986), and depreciation for the year total $964,209 ($1,044,535 in 1986).

Interaction between the CSST and the various associates (unions, employers, and the work force) has been increased. This ongoing dialogue enables the Institute to continue its pursuit of its key research goal: solving real problems in the workplace.

RATIONALIZATION OF ACTIVITIES

The strategic planning efforts of 1987 led the Institute to have external committees study its various programs in depth. Thus, the activities of the Research Support and Work Organization Program of the Administrative Services Division, as well as the services of the Laboratory Division have been evaluated, resulting in recommendations which in general have been retained and implemented. A reorganization of resources and personnel was carried out primarily to orient research efforts towards the priorities revealed by our studies.

This work also enabled us to inform our outside research associates of the new priorities. The Institute, no longer an organization that merely funds external research projects, is becoming one that solicits research along better defined lines. For example, the new R & D Contract Program on Occupational Safety finances research on subjects identified by the working community and which the Institute considers priorities.

Lastly, rationalization of our internal activities led to a detailed reexamination of each research project, and our service, analytical, and consulting activities. By so doing, the Institute has been able to ensure its financial stability without having to significantly reduce its research activities. This deserves to be mentioned because we have had to eliminate a certain number of positions and reduce research grants in order to meet new financial constraints. I would like to thank all IRSST personnel for their continuing and intensive collaboration, without which this high level of performance could not have been maintained.

DISSEMINATION AND USE OF RESEARCH RESULTS

In 1987, we improved the dissemination of our research results, thus promoting their use. In addition to making our research documents and reports available to a wide and diversified audience in the working community, the Institute has also attempted to reach specialized audiences. This new policy has enabled us to publish summaries of research publications and reports and get them out to a wider public.

Our objective is increased research visibility and improved availability of results among decision-makers and those responsible for health and safety prevention in the workplace.

The Institute has strengthened its already direct and continuous contact with companies and groups of workers as well as with the joint sector-based associations in order to better transfer these results. Our privileged relationship with the CSST should also be mentioned. This year it has taken the form of information exchanges, the use of statistics, and direct collaboration on research into the reintegration of the accident victim into the workplace.

THE IRSST : RESEARCH LEADER

The Institute has also continued its role as Quebec research leader in occupational health and safety. Since the creation of the Institute, its credibility in the research field has grown and is now widely established. As a result, the IRSST was called on in 1987 to act as an independent expert, or as guarantor of the scientific quality, accuracy, and research objectivity in several cases, Air Canada, Alcan, Bell Canada and the Montreal Urban Community Transport Commission (MUCTC).

The operation of the service laboratories has been reviewed according to the recommendations of the evaluation committee set up in 1987. Infrastructure and services are now better adapted for optimum use by both Institute researchers and outside clients. Furthermore, our excellent specialized services have been officially recognized by the American Industrial Hygiene Association, a distinction that has been conferred on only 10 Canadian laboratories from among the 250 labs in the association's 42 member countries.

By providing support to university and industry researchers, the Institute ensures effective channeling of funds and the establishment of an important network of high-caliber researchers and research teams in the key occupational health and safety sectors.

The sometimes international impact of the Institute's research and that of its associates convincingly demonstrates the increasing contribution of Quebec researchers. Through its research and involvement, the Institute promotes its visibility in the national and international network of major occupational health and safety research organizations. By maintaining operational links with our colleagues in the rest of Canada, in the United States, and in Europe, we avoid unnecessary duplication, benefit from work carried out by these institutes, and share our results.

All projects are submitted to peers committees recruited in universities and industrial research organizations. These committees ensure the scientific quality of research commissioned outside the IRSST as well as that of internally run projects. The IRSST's Scientific Advisory Board, made up of members from the scientific community and of worker and employer representatives, establishes the pertinence and priority level accorded to each project.

BALANCE SHEET

as at December 31	1987	1986
Current assets		
Cash and deposits	$ 348,387	$ 842,448
Accounts receivable (Note 3)	564,664	183,092
Inventories	65,568	79,394
Prepaid expenses	40,259	22,758
	1,018,878	1,127,692
Long term assets		
Fixed assets (Note 4)	2,659,471	3,267,707
	$ 3,678,349	$ 4,395,399
Current liabilities		
Trade accounts payable, deposit and accrued liabilities	$ 1,001,963	$ 1,120,419
Surplus	2,676,386	3,274,980
	$ 3,678,349	$ 4,395,399

Commitments (Note 5)

ON BEHALF OF THE BOARD

Director,

Director,

FINANCIAL REPORT

REVENUE AND EXPENSES

year ended December 31	1987	1986
Revenue		
Quebec Occupational Health and Safety Commission	$13,215,000	$11,869,000
Laboratory services	1,371,164	1,220,440
Interest	146,798	154,900
Outside contracts	65,801	
Other	52,035	20,061
	14,850,798	13,264,401
Appropriation from operating surplus		714,581
	14,850,798	13,978,982
Expenses*		
Remuneration	5,430,671	4,974,728
Professional services	291,487	447,056
Boards and comittees	86,231	58,000
Administrative and other	762,578	870,604
Advertising and publications	220,464	271,389
Conferences	80,404	77,812
Travel	91,087	77,271
In-house laboratory services	418,948	329,572
Services to customers	231,434	236,442
Building	2,350,726	1,861,456
Fixed assets	357,773	407,668
Research grants and contracts	4,519,353	4,359,711
	14,841,156	13,971,709
Excess of revenue over expenditure for the year transferred to surplus	$ 9,642	$ 7,273

*Details of expense by activity are contained in Note 6

SURPLUS

year ended December 31	1987	1986
Balance at beginning of year	$ 3,274,980	$ 5,338,055
Excess of revenue for the year	9,642	7,273
Fixed assets financed through operations	357,773	407,668
	3,642,395	5,752,996
Appropriation to revenue for the year		714,581
Cancellation of receivables from the Government of Québec relating to the preceding year		718,900
Depreciation of fixed assets	964,209	1,044,535
Net value of fixed assets sold	1,800	
	966,009	2,478,016
Balance at end of year	$ 2,676,386	$ 3,274,980
Represented by:		
Fixed assets surplus	$ 2,659,471	$ 3,267,707
Operating surplus	16,915	7,273
	$ 2,676,386	$ 3,274,980

OTHER IMPORTANT EVENTS IN 1987

The Institute's history was marked this year by the signing of the first collective agreement with the union representing our employees. This agreement has resulted in a clear definition of our employee relations and a certain number of committees being set up which should improve communication and collaboration between IRSST personnel and management.

There have been important changes within the Institute's Board of Directors, Scientific Advisory Board, and management. We would like to welcome Michel A. Caron, Guy Dufresne, Franco Fava, Michel Guillemette, Pierre Lortie, and Jean-Marc Turcotte as new employer representatives on the Board of Directors. They bring their extensive experience as managers of some of Quebec's most dynamic companies. We take this opportunity to thank Claude Garcia, Gilles Lavallée, Robert L'Heureux and Sarto Paquin, members whose mandate ended this year and whose advice has been of great benefit to the Institute over the last few years.

Some changes have also occurred within the Scientific Advisory Board, where André Raynauld, André Marsan and Carl Devost replaced Lionel Boulet, Gilles Leboeuf and Pierre Duguay. We would like to thank sincerely the members whose mandate has ended for their valued assistance, and to wish the new members a productive term of exchanges and contributions.

In management, F.-Pierre Dussault has become Secretary of the IRSST, adding this function to that of Director of Outside Research. Serge Bouchard has been named Director of the Research Support and Work Organization Program. He is responsible for the activities of this important human and social sciences research group, called on increasingly to collaborate with the Safety-Engineering and Safety-Ergonomics Programs.

Claude Demers, engineer, has been named Assistant Scientific Director. This addition has strengthened our scientific administration in its research planning and coordinating role at the Institute.

The reorganization of administrative services has been completed. As a result, Louise Lamarche coordinates financial services, and Ginette Gagnon, personnel services. Jean-Claude Dionne has been lent by the CSST to administer the office tower air quality project.

We wish to thank Jean-Louis Bertrand, Secretary of the Institute, who has become Director General of the Joint Sector-Based Association for Occupational Health and Safety, Social Affairs; and Alison D. McDonald, whose important Work and Pregnancy Program ended with the publication of numerous research reports.

DIRECTIONS FOR 1988

In 1987, the Institute was able to devote more time to safety and adapt its organization and activities to new needs. The Institute is now looking to 1988 and the future with optimism and determination.

In 1988, a new program planning will be developed to establish more firmly the choices implied by our strategic objectives. We shall continue research on priority safety related problems, now better identified, without neglecting those related to occupational illness and rehabilitation.

A number of measures have already been implemented and we intend to develop them further in 1988. We would like to mention the following in particular: project-based research management, calls for tenders and the awarding of contracts, particularly in the field of safety; and lastly, the creation of multidisciplinary task forces to deal with major problems common to several workplaces. For example, the first groups will be concerned with the problems of office tower air quality and backaches.

Improved communication with the working community and particularly with the occupational health and safety network remains the main preoccupation upon which a large part of our work in 1988 will be based. We shall carry out field studies and experiments on approaches and techniques that will enable us to communicate research results to potential users, namely companies and employer-worker groups. Insofar as possible, we will use evaluative studies to assess the impact of our research.

1988 will be a year of improved communication and cooperation with our clients, and greater visibility of our contribution to improving the quality of life and well-being of workers. These choices reflect an optimization of the practical results of collective efforts and the consequent pursuit of research excellence.

The Director General,

Louis Berlinguet

PRIORITY GROUP I
Building and public works
Chemical industry
Forestry and sawmills
Mines, quarries, and oil wells
Metal products manufacturing

PRIORITY GROUP II
Wood industry (except sawmills)
Rubber and plastic products industry
Transportation equipment manufacturing
Primary processing of metals
Manufacture of non-metallic mineral products

Solvents represent 50% of the requests for analysis; metals and ions - 12%; dusts - 16%; and toxicological analyses - 22%.

Calibration, maintenance, and repair of instruments for measuring gases, air samples, and physical parameters such as noise have ensured quality control of the field-workers' activities.

DISSEMINATION OF INFORMATION

The Communications Division has continued to serve the Institute's role of informing its varied clientele. During 1987, approximately 23,000 documents were therefore distributed either in response to specific requests, directly to a previously established list of associates and clients, or in the context of events bringing together those involved in occupational health and safety.

A total of 38 documents have been produced and published in the form of scientific brochures, technical guides and newsletters intended for the public at large. The magazine *L'IRSST* * has been published regularly three times a year and sent out to more than 4,000 subscribers, mainly in the working community.

An important document entitled *Secteurs et professions à risque* * (Hazardous Industries and Professions), summarizing knowledge on the main occupational health and safety problems in Quebec was published as part of Occupational Health and Safety Week in October, 1987.

In the three issues of *L'IRSST* *, the major articles dealt with *cooperation in research* (Spring 1987, vol. 4, no. 1), *occupational safety research* (Fall 1987, vol. 4, no. 2), and *accidents in the construction industry* (Winter 1987, vol. 4, no. 3). *Results of research on pregnancy* in the workplace were also published in the Fall 1987 issue.

* Published in French only

In 1987, the IRSST financed 8 associate research groups, four of which have been renewed for three year. Research budgets allocated to associate research groups amounted to $2,245,112 in 1987 .

SUBJECT	UNIVERSITY	AMOUNT ($)
Industrial toxicology	Montréal	183,923
Epidemiology of occupational disease	McGill	250,000
Biomedical Engineering	Polytechnique	308,535
Occupational lung disease	Sherbrooke	427,072
Work biology	UQAM	150,000
Social aspects of prevention	Montréal	495,582
Effects of work organization	Laval	150,000
Noise hazards and control	Montréal/Sherbrooke	280,000

An amount of $904,883 was devoted to subsidized research in 1987, with 10 research projects being completed during the year, and 16 continuing. Grants were awarded for 13 new projects requiring a total investment of more than $770,000 over the next three years. In 1987, these new projects totalled $379,696.

The researcher training program enabled 33 students to continue their graduate studies and their research projects in Quebec and in foreign universities. Scholarships of $388,670 were awarded in 1987-1988. Five summer grants of $3,500 were given to students to participate in occupational health and safety research.

SERVICES

The Institute's laboratories carry out environmental and toxicological analyses of contaminants; calibrate, maintain and repair measurement instruments; and manage collections of sampling equipment and measurement instruments available to field workers. These services are offered to the CSST inspection and prevention network.

The number of analyses carried out for the CSST network increased from 46,000 in 1986 to 52,000 in 1987. If the analyses carried out within projects are included, the number reaches 62,000. There is always a great variation in the types of analyses (225 types of analyses in 1987).

Toxicological analyses (blood and urine) increased from 11,000 in 1986, to nearly 12,000 in 1987.

More than 90% of the requests still come from participants within the Department of Health and Social Services' network (community health departments and local community service centres) which are responsible for setting up health programs for priority groups I and II recognized by the CSST.

HIGHLIGHTS

PRIORITIES

In 1986, the CSST reported more than 300,000 applications for benefits following occupational injuries, and a cost of more than one billion dollars to compensate and rehabilitate the injured persons. In order to better focus its research on injury and cost reduction, the Institute proceeded this year to analyze the CSST's injury statistics, the needs of its clients, and the results of research carried out to date. This analysis revealed high-risk economic activity sectors and groups, the most frequent and the most serious injuries, as well as certain health problems.

This systematic and documented study of occupational health and safety problems has allowed the Institute to pinpoint certain research areas already defined in its Scientific Policy adopted in 1984.

In early 1987, the IRSST Board of Directors began by officially adopting certain research priorities in safety, work-accident prevention, and elimination of health hazards. A list of priority research fields (see Table 1) was thus established, the fields retained being among those most likely to eliminate costly aspects of human suffering and compensation.

TABLE 1

1987 RESEARCH PRIORITIES

(Decision of the Board of Directors, February 1987)

1. ELIMINATION OF OCCUPATIONAL ACCIDENT RISKS

Fields of research:

- Material handling;
- Task, work station, and work area organization;
- Machines and tools capable of causing accidents;
- Impact of new technologies on worker safety;
- Collective or personal protective equipment.

2. ELIMINATION OF HEALTH HAZARDS

Fields of research:

- Elimination of noise;
- Improvement of ambient air by modifying processes or ventilation.

The Institute then systematically analyzed the accidents in order to determine strategic objectives and research priorities for the coming years. These strategic objectives will result in the formulation of a more precise list of priorities and by consistent planning of research activities.

RESEARCH

In 1987, the IRSST planned its research activities according to the priorities arising from analysis of the occupational health and safety situation in Quebec. Available funds as well as new research activities were concentrated on increased safety research and the introduction of new research related to compensation, rehabilitation, and evaluation.

Out of a total 88 internal and external research projects, 54% involved health questions; 30%, safety; and 16%, compensation, rehabilitation, and evaluative research. The cost distribution was 44% for health and 43% for safety.

Reorientation of research activities was mainly in internal research, subsidized research or research contracts, where the channeling of resources and research funds towards elimination of risks and hazards is evident. A comparison of the allocation of funds for subsidized research before and after 1987 (see Table 2) clearly indicates an increase in research to reduce and eliminate risks and hazards to which workers are exposed, and thus reflects the decisions made during 1987.

TABLE 2

EVOLUTION IN SUBSIDIZED EXTERNAL RESEARCH AS A PERCENTAGE OF THE TOTAL AMOUNT PAID AS GRANTS

RESEARCH OBJECTIVES ACCORDING TO THE IRSST MANDATE	Up to 1987 %	Commitments for the coming years %
■ Identification of risks and hazards	72	54
■ Reduction and elimination of risks and hazards	18	33
■ Compensation and rehabilitation	10	13
TOTAL	**100 %**	**100 %**

RESEARCH

The IRSST's research programs are under the management of the Director General, assisted by the Scientific Director. In 1987, there were 88 research projects carried out within the Institute and by outside researchers, 39 of which were completed during the year. The research projects are described in a brochure available in French upon request.

The distribution of internal and external research projects during the year indicates an almost equal allocation of funds to the safety and health sectors (see Table 3). Some of the funds were also assigned to research dealing with compensation, rehabilitation, and evaluation. The data enabling separation of the various research projects by sector are presented for information purposes only, since for certain projects the dividing line between health and safety, or identification and reduction of hazards, is difficult to establish.

TABLE 3

DISTRIBUTION OF INTERNAL AND EXTERNAL RESEARCH PROJECTS IN 1987

	Health	Safety	Compensation Rehabilitation	Evaluative research	TOTAL
Number of projects	48	26	7	7	**88**
% of number of projects	54%	30%	8%	8%	**100%**
Costs*	$ 1,049,342	$ 1,011,621	$ 281,896	$ 49,170	**$ 2,392,029**
% of costs	44%	42%	12%	2%	**100%**

	Identification of risks and hazards	Reduction elimination of risks and hazards	Compensation Rehabilitation	TOTAL
Number of projects	51	30	7	**88**
% of number of projects	57%	35%	8%	**100%**
Costs*	$ 1 331,615	$ 778,518	$ 281,896	**$ 2,392,029**
% of costs	55%	33%	12%	**100%**

* Project costs are given for information purposes only. For projects carried out in universities, the salaries of researchers and indirect costs which are not included in the grants given by the Institute must be added. For in-house projects, indirect costs must be added (rent, etc.). These numbers do not include the grants to associate research groups, nor scholarships to students.

FINANCING

In 1987, IRSST revenues were $14,850,798, which included a grant of $13,215,000. Graphs I and II show the exact distribution of IRSST revenues and expenditures for last year.

In 1987, the sustaining grant from the Quebec government, which had been $982,000 in 1986, was not renewed.

GRAPH I

REVENUES : $14,850,798 = 100%

GRAPH II

EXPENDITURES : $14,841,156 = 100%

CONSTRUCTION LINEMEN ARE PARTICULARLY SUSCEPTIBLE TO NINE TYPES OF WORK ACCIDENT SITUATION WHICH RESEARCH HAS REVEALED. RECOMMENDATIONS HAVE BEEN MADE FOR THEIR PREVENTION.

In-house research groups

Knowledge of certain major industrial activity sectors, notably the construction, forestry and wood industries, has increased. Significant developments have also occurred in research related to health and safety problems either affecting a large number of workers or having grave consequences, such as backache and lung diseases. The Institute's research groups have thus contributed to a better understanding of work environments as well as the sources of risk. Furthermore, they have developed means to eliminate these hazards, or equipment to protect against them when elimination at the source is not possible.

The construction industry, a major and very complex economic activity sector, received special attention. An exploratory study of accidents has led to the development of typical accident scenarios and to the identification of hazardous occupations and tasks. The results have been communicated to the workplaces concerned, particularly for certain occupations such as linemen and carpenters. Personal and collective protective equipment has also been laboratory or field tested against various risks, as in the case of blasting mats in blasting activities or guardrails on high-rise construction.

The most significant breakthrough was in paintshops in the transportation equipment manufacturing sector. Exposure to isocyanates in these shops is associated with a significant risk of occupational asthma. Work carried out as part of the HYGIENE AND TOXICOLOGY PROGRAM led to the development of very sensitive sampling methods for these contaminants and to the improvement of the work environment. This research will find numerous practical applications in a sector employing 7,000 workers in large industries as well as in small automobile paintshops. Using techniques for detecting and monitoring isocyanates in workshop air, researchers have found a solution to air contamination in this sector's industries. A specific collection filter has been developed and is the subject of a patent application. This device measures air contaminant captured, and as a consequence, the efficiency of ventilation. Lastly, mapping of isocyanate exposure in plants was carried out in order to improve work organization and reintegrate sensitized workers into the workplace.

BETTER SAMPLING OF ISOCYANATES WILL IN THE FUTURE RESULT IN A BETTER WORK ENVIRONMENT IN PAINT SHOPS.

THE NEW CONSTRUCTION GUARDRAIL IS A FLEXIBLE, EFFECTIVE SOLUTION TO THE PROBLEM OF ACCIDENTAL FALL.

A guardrail prototype for the construction industry was designed and validated on a concrete building construction site as part of the SAFETY ENGINEERING AND WORK ORGANIZATION PROGRAM. This safety equipment, which is both collective and personal, is very important on construction sites. It provides contractors and workers with a flexible and effective solution for improving construction site safety. Following tests on a prototype, a commercial model is now being developed. Patent applications have been submitted for this protective equipment.

The study of sulfur compounds related to the manufacture of paper pulp, carried out within the ANALYTICAL SUPPORT PROGRAM, allowed these contaminant emissions in plants to be determined and the emission sources and leaks in the processes to be precisely located. This work on compounds having a toxic effect primarily on the respiratory system involves 5% of some 31,000 workers in 60 Quebec pulp and paper plants. The results of research carried out in 7 plants have been communicated to the plants concerned in the form of a Sulfur Compound Evaluation Guide for locating leaks and determining worker exposure. Recommendations for corrective measures have also been included.

WORKER AND EMPLOYER REPRESENTATIVES ARE CONSULTED DURING THE CHECK-OUT OF THE ANTI-KICKBACK SYSTEM FOR EDGERS PERFECTED BY THE IRSST.

Anti-kickback devices for edgers and circular gang resaws used in sawmills have been developed as part of the SAFETY ENGINEERING PROGRAM. Models have been developed in the laboratory in collaboration with the Quebec Centre for Industrial Research (better known under its French language abbreviation, "CRIQ") in order to protect the more than 600 operators who are among the workers most exposed to serious accidents. An experimental anti-kickback system is now available for field testing on one machine in regular operation. Actual tests on this device suggest a probable reduction in the number of serious accidents caused by wood ejection.

ORGANIZATIONAL CHART
as of Decembre 31, 1987

* Work completed in June 1987

ADMINISTRATIVE REPORT

ORGANIZATIONAL STRUCTURE

Created in 1980, the Occupational Health and Safety Research Institute of Quebec (known under its French abbreviation, IRSST) has as its mandate to contribute through scientific research to the identification and elimination at source of occupational hazards, as well as to the rehabilitation of workers who fall victim to them.

To fulfill its mandate, the IRSST carries out research or has it carried out, provides participants in the prevention and compensation network with laboratory services and expertise necessary for their work, communicates to the working community the results of its research, and promotes the training of new researchers.

The structure of the Institute is based on research and services. Management of the Institute is headed by a DIRECTOR GENERAL, supported by a SCIENTIFIC DIRECTOR and a SECRETARY. The Institute's research functions are separated into three divisions:

- the IN-HOUSE RESEARCH DIVISION, consisting of three research programs: Safety-Ergonomics; Work Organization and Research Support, and Work and Pregnancy, which completed its work in June 1987;

- the EXTERNAL RESEARCH DIVISION, which administers associate research, subsidized research, and R & D contract programs, as well as researcher training;

- the LABORATORY DIVISION, which carries out analyses, and provides services and expertise in addition to carrying out Research & Development work in three programs: Hygiene and Toxicology, Analytical Support, and Safety-Engineering.

Research administration and support functions, as well as dissemination of research results, are provided by the ADMINISTRATIVE SERVICES DIVISION and the COMMUNICATIONS DIVISION respectively.

PERSONNEL

At the end of 1987, the Institute had 126 employees distributed as follows:
12 management personnel
55 professionals
33 technicians
26 technical or administrative support personnel
Ninety-six employees (76%), worked in research, service, consulting or expertise programs; the remaining thirty employees worked in support or management programs. In 1987, sixty employees, or 48% of personnel, participated in training programs in areas related to the Institute's activities

The Institute's employee union, affiliated with the *Syndicat canadien de la fonction publique* (SCFP), *local 2957*, signed their first collective agreement in 1987 which will terminate at the end of 1988.

MECHANICS WORK IN ONE OF THE FIVE TRADES MOST AFFECTED BY BACK PAIN.

Through the use of a statistical profile of back injuries, the RESEARCH SUPPORT AND WORK ORGANIZATION PROGRAM was able to identify five groups of workers mainly affected: material handlers, transport drivers, nursing personnel, construction workers and mechanics. Work on back injuries is particularly important since this problem results in an average of 1.5 million absentee days each year. The occupations that are most affected become priorities for risk reduction, achieved by dealing primarily with work methods, equipment, the work environment, as well as with worker training. Solutions are being developed for problems involving heavy equipment drivers in the forestry industry, bus drivers and hospital personnel.

The study on risk and accident prevention factors affecting linemen in the construction sector has also been completed as part of the RESEARCH SUPPORT AND WORK ORGANIZATION PROGRAM. This high-risk occupation carried out by 2,500 workers is ranked 7th on a scale of hazardous building occupations. Two reports have been communicated to the working community involved. The first presents nine typical accident scenarios, and the second, the preventive measures for each hazardous situation described. The employers, union representatives as well as representatives from the profession arrived at a consensus of all the recommended preventive measures. This acceptance of the results by the workers and employers should lead to changes in prevention programs in place.

A new system for analyzing whole-body vibrations, called "fourth power", has been developed by the SAFETY-ENGINEERING and ANALYTICAL SUPPORT PROGRAMS to measure more precisely the level of exposure to vibration. These levels are generally underestimated by present analytical methods and standards, when impulsive vibrations such as those generated by equipment such as skidders are considered. The study revealed in this latter case that the use of the current method (ISO 2631) could result in estimates that are 1 to 3 times lower for comfort indices, and 1 to 7 times lower for health indices.

A NEW ANALYSIS SYSTEM HAS BEEN PERFECTED FOR IMPULSIVE WHOLE-BODY VIBRATION, BASED ON FIELD MEASUREMENTS CARRIED OUT ON SKIDDERS.

THE MOST NUMEROUS AND SERIOUS CONSTRUCTION ACCIDENTS ARISE IN THE COURSE OF NON-SPECIALIZED CONSTRUCTION RELATED TASKS FOR WHICH NEITHER TRAINING NOR ANY PARTICULAR SAFETY MEASURES ARE PROVIDED.

Another research project by the RESEARCH SUPPORT AND WORK ORGANIZATION PROGRAM has established relationships between work organization factors and worker safety in the construction industry. This study reveals that the task involved and the type of construction site have a greater effect on accident risk than the occupation of the worker. Since there are 10,000 to 12,000 workers injured each year in this sector, the importance of such observations is clear. Nine typical accident scenarios have been recreated, showing the task performed, the movement at the time of the accident, and the occupations and the sites most affected. These scenarios make it possible to identify the work organization factors involved and the most appropriate safety measures. The results of this study will be used to inform and sensitize the some 82,600 workers involved.

The development of a procedure to study work stations in order to professionally rehabilitate injured workers has been completed. Carried out at the request of the CSST by researchers from our SAFETY-ERGONOMICS PROGRAM, this project resulted in the development of a procedure for evaluating and adapting working conditions, which takes into account functional disabilities of accident victims with permanent impairment. A set of forms for assessing work station adaptation has been developed for rehabilitation counsellors. This practical guide contains scales of functional restrictions, an ergonomic task-analysis grid, a condensed form for correcting and adapting the work station analyzed, a technical and human resource organizational diagram for the company, as well as an intervention protocol model. This procedure made use of outside expertise in the fields of medicine, occupational therapy, engineering, and ergonomics. Validation of these assessment forms and an impact study are expected in the coming year.

DOCTOR, ERGOTHERAPIST, ENGINEER, ERGONOMIST, COMBINED THEIR TALENTS TO DEVELOP A PROCEDURE TO EVALUATE AND ADAPT WORK CONDITIONS OF THE EMPLOYEE UNDERGOING REHABILITATION.

WORKERS REPRESENTATIVES

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

Gilles Martin
Representative - Occupational Health and Safety,
Fédération des travailleurs et des travailleuses du Québec

Charles Prévost
Union consultant to the training service,
Confédération des syndicats nationaux

Monique Simard
Senior Vice-President,
Confédération des syndicats nationaux

SCIENTIFIC MEMBERS

Clifford Nelson Baronet
Vice-President, Montreal operations,
Centre de recherche industrielle du Québec
(Quebec Industrial Research Centre)

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

Maurice Brossard
Vice-President, Biotechnology,
National Research Council of Canada

Yvon Gasse
Director, small-and medium-sized business Program,
Political Research Institute
Université Laval

André Marsan
Director, External Research Programs
Biotechnology Research Institute

André Raynauld
Professor of Economics,
Université de Montréal

SCIENTIFIC DIRECTOR

Jean-Yves Savoie

THOSE WHOSE MANDATE ENDED IN 1987

Lionel Boulet
Consultant ,
Groupe L.G.L.

Pierre Duguay
Labour Relations Director
Conseil du patronat du Québec
(Quebec Employers' Council)

Gilles Leboeuf
St Justine Hospital

THE SCIENTIFIC ADVISORY BOARD

The Scientific Advisory Board is a tripartite consultative group presided over by the Director General of the Institute and composed of 15 members. It includes six members of the scientific community named by the Board of Directors on the recommendation of the Director General, four employer representatives and four worker representatives chosen by the employer and union administrators respectively. The Scientific Director of the Institute participates as an invited guest.

The Scientific Advisory Board acts in a consultative capacity to the Director General, and through him, to the Board of Directors. The Scientific Advisory Board is called on by the Director General to make recommendations primarily on the IRSST's scientific policy, the orientation of research activities and laboratory services, and the policy for communicating information about research projects and results. It is called on to evaluate the pertinence, priority, and scientific quality of in-house and external research programs and projects.

The decisions of the Board on the scientific quality of research are generally based on analyses and recommendations of expert committees recruited in the scientific community.

MEMBERS OF THE SCIENTIFIC ADVISORY BOARD

(as of December 31, 1987)

CHAIRMAN
Louis Berlinguet
Director General

EMPLOYERS REPRESENTATIVES
Alexandre Beaulieu
President,
Alexandre Beaulieu inc.

René Bédard
President,
J.R. Bédard et associés,
Consultant for the Canadian Chemical Manufacturers' Association

Carl Devost
Director - Occupational Health and Safety Technical Services,
Conseil du patronat du Québec
(Quebec Employers' Council)

Michel Lesage
Medical Consultant - Occupational Health and Safety,
Lesage, Dumont et associés

CASES OF STILLBIRTH WERE NOTED AMONG THE CHILDREN OF WORKERS IN THE LEATHER INDUSTRY.

RESEARCH HAS NOT REVEALED ANY EVIDENCE OF RISK TO PREGNANT WOMEN USING VISUAL DISPLAY TERMINAL.

The WORK AND PREGNANCY PROGRAM completed its work in 1987. Based on a data bank containing more than 105,000 pregnancies, epidemiological research determined the extent to which work by pregnant women could affect fetal development, pregnancy outcome, or the mother's health. Some 56,000 women were interviewed concerning their recent and previous pregnancies. Research results revealed that work had little effect on the pregnant woman and the fetus. However, relationships were found between certain work-related risk factors and pregnancy outcome.

A relationship was observed between miscarriages and ergonomic factors in certain occupations that require the lifting of heavy weights and other significant physical effort. Certain occupations have a higher risk of miscarriage, such as those of saleslady, waitress, and nursing aide. Stillbirths were noted in the manufacturing (leather) and agricultural sectors. Cases of premature delivery were observed in women who work more than 40 hours per week. Congenital defects were observed in the offspring of workers having to use aromatic solvents, mainly toluene. Study results reveal no evidence of risk for pregnant women using visual display terminals (VDTs). The results of this research have been published in international scientific journals.

RESEARCHERS IN THE ACCOUSTICS RESEARCH GROUP LABORATORY OF THE *UNIVERSITÉ DE SHERBROOKE* WORK ON THE NOISE PATHWAYS AND NOISE REDUCTION AT THE SOURCE.

Outside research groups

Through its collaboration with associate research groups and grants to specific projects, the Institute continued in 1987 to devote a large portion of its budget to university research on key occupational health and safety problems. The IRSST's eight associate research groups received a total of $8.2 million in 1987, the major part of which went directly to occupational health and safety research. Of this total, $2.25 million came from the IRSST for organizational costs, $2.5 million came from the various universities, and $2.7 million came from other funding sources. In addition, direct IRSST funding of external research projects totaled $300,000.

Taken together, these groups represent approximately one hundred researchers. They now make up a specialized occupational health and safety network using scientific methodology to study problems experienced in the workplace. Their expertise is applied within the context of larger problems, particularly in the environment and public health fields.

The main contributions of associate research groups in 1987 were in the fields of lung diseases of industrial origin, as well as in various social aspects of occupational health and safety, both in accident prevention and work organization within companies. During the year, most of the research groups carried out their research directly in the workplace. They continued to publish their results in scientific journals and participated in international exchanges in their respective fields. Furthermore, several researchers-in-training have joined their groups. Some significant breakthroughs in research directly or indirectly subsidized by the IRSST deserve mention:

WORKERS REPRESENTATIVES

Christophe Auger
Confédération des syndicats nationaux

Andrée Bouchard
Secretary, confederal health and safety committee
Confédération des syndicats nationaux

Claude Gingras
Vice-President,
Centrale des syndicats démocratiques

Clément Godbout
Director,
Syndicat des métallos

Louis Laberge
President,
Fédération des travailleurs et des travailleuses du Québec

Jean Lavallée
General Manager and Financial Secretary,
Fraternité inter-provinciale des ouvriers en électricité
Vice-President,
Fédération des travailleurs et des travailleuses du Québec

Claude Morrisseau
Regional Director,
Syndicat canadien de la fonction publique

OBSERVER FOR MINISTER OF HEALTH AND SOCIAL SERVICES

Michel Pelletier*
Director - Public Health Protection and Prevention,
Ministère de la Santé et des Services sociaux
(Department of Health and Social Services)

DIRECTOR GENERAL

Louis Berlinguet*

SCIENTIFIC DIRECTOR

Jean-Yves Savoie*

THOSE WHOSE MANDATE ENDED IN 1987

Claude Garcia
Executive Vice-President - Operations,
Standard Life Assurance Company

Gilles Lavallée
Senior Consultant, Labour Relations,
Alcan Smelters and Chemicals Ltd

Robert L'Heureux
Director of compensation, job evaluation and organization,
Bell Canada

Sarto Paquin
Administrator

MEMBERS OF THE EXECUTIVE COMMITTEE

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

* In a consultative capacity only

BOARD OF DIRECTORS

The Board of Directors, a fifteen-member joint group, is made up of the President, seven employer representatives, and seven worker representatives. These members also make up the Board of Directors of the CSST. An observer chosen by the Minister of Health and Social Services, and the Director General of the Institute participate in a consultative capacity, with the Scientific Director as an invited guest. The Board of Directors determines the objectives, the development framework, and the financing of the Institute.

The Executive Committee is made up of the President of the Board of Directors and two of its members, named by the employer and union administrators respectively. The Director General of the Institute is an ex-officio member without voting rights.

MEMBERS OF THE BOARD

(as of December 31, 1987)

PRESIDENT

Monique Jérôme Forget
President-C.E.O.,
Occupational Health and Safety Commission of Quebec (CSST)

EMPLOYERS REPRESENTATIVES

Michel A. Caron
President and Chief Executive Officer,
Groupe Tremca Inc.

Ghislain Dufour
President,
Conseil du patronat du Québec
(Quebec Employers' Council)

Guy Dufresne
Senior Group Vice-President,
North American Pulp and Paper,
Consolidated-Bathurst Inc.

Franco Fava
Secretary,
Neilson Excavation Inc.

Michel Guillemette
Corporate Medical Director,
C.I.P. Inc.

Pierre Lortie
Chairman of the Board,
Chief Executive Officer and President,
Provigo Inc.

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

ONE RESEARCH STUDY CLEARLY DEMONSTRATED THAT THE FIBER OF SILICON CARBIDE IS ONE OF THE CAUSES OF LUNG DISEASES AFFECTING WORKERS IN THIS INDUSTRY.

The PATHOPHYSIOLOGY AND EARLY DETECTION OF PNEUMOCONIOSIS RESEARCH GROUP at the *Université de Sherbrooke* demonstrated the similarity in biological activity of silicon carbide fibers and asbestos fibers. These fibers, present in the dusts from silicon carbide plants, were identified for the first time as one of the agents responsible for lung diseases affecting workers in this industry. The results of this work may be used by an IRSST group in developing methods for detecting and determining the concentration of harmful emissions in the workplace.

The adaptation of biological monitoring techniques for benzene exposure using samples of expired air has been undertaken by the INDUSTRIAL TOXICOLOGY RESEARCH GROUP at the *Université de Montréal* in collaboration with a Montreal petroleum refinery. The fact that this method is a more sensitive and specific method than urine analysis for monitoring the degree of absorption in exposed workers is particularly significant in light of the possible reduction in permissible exposure limits. This new approach to biological monitoring does not use invasive methods such as blood or urine sampling.

The creation of the first Canadian experimental inhalation unit in a university environment by the INDUSTRIAL TOXICOLOGY RESEARCH GROUP at the *Université de Montréal* was made possible by the sharing of major resources of the IRSST, the *Université du Québec à Montréal*, and the *Université de Montréal*. These new facilities will result in a concentration of research activities in industrial toxicology and industrial hygiene. These specialized laboratories are capable of reproducing workplace environments and of testing contaminant-control measures.

THE EXPERIMENTAL INHALATION UNIT WILL IN THE FUTURE PERMIT TO REPRODUCE AMBIANT AIR ENVIRONMENTS ENCOUNTERED IN THE WORKPLACE AND TO TEST OUT PREVENTION METHODS IN THE LABORATORY.

The Sherbrooke section of the NOISE HAZARDS AND CONTROL RESEARCH GROUP, a team of researchers from the *Université de Montréal* and the *Université de Sherbrooke*, came to an agreement in 1987 with the Quebec Council for Health and Safety in the Primary Textile Industry to collaborate on a study of noise-related occupational accidents. This field research by the Acoustics Group at the *Université de Sherbrooke*, through productive interaction between the researchers and the working community, has resulted in the improved control of noise sources in plants. Collaboration with the textile industry has led to some fifty major interventions in various plants.

A COMPUTER BASED IMAGE GENERATING SYSTEM ENABLES TO CREATE A REPRESENTATION OF THE BACK'S ANATOMICAL STRUCTURES.

The BIOMEDICAL ENGINEERING RESEARCH GROUP from the *École Polytechnique de Montréal* has continued to improve the diagnostic tools for identifying the anatomical structures involved in backache. A computer based image generating system creates three-dimensional models of the back and precisely illustrates its various anatomical components in order to better understand normal and abnormal back function. This improved understanding of the back allows stress during mechanical operations to be evaluated, and effective means for preventing backache to be developed. The graphic results of the models can be used to as a basis for audiovisual documents used in training workers.

Studies carried out by McGill University's EPIDEMIOLOGY OF OCCUPATIONAL DISEASE RESEARCH GROUP had already established a causal relationship between exposure to tar volatiles and bladder cancer in aluminum smelter workers in cooperation with ALCAN. The direct results of these studies included the implementation of a medical supervision program, the promotion of the wearing of personal protective equipment, automation of the most hazardous tasks, and research to reduce exposure at the source. Because of these studies, Quebec aluminum-smelter workers requested that bladder cancer be included in the list of illnesses subject to compensation by the CSST. The research group's expertise was then used to develop scientific criteria to justify this inclusion. Various scenarios were submitted by the researchers to the CSST. The one eventually retained is based on a probability calculation which takes into account the risk related to exposure level, thus providing the affected worker with a "reasonable doubt". As a result of this expertise, British Columbia's aluminum smelter workers received the same rights to compensation.

NEW EQUIPMENT ENABLES ALCAN TO PROTECT WORKERS FROM EXPOSURE TO TAR VOLATILES.

THE TEST BENCH DEVELOPPED TO MEASURE THE PERFORMANCE OF PROTECTIVE LEGGINGS FOR CHAIN SAW USERS SET A NEW INDUSTRY NORM ADOPTED BY THE *BUREAU DE NORMALISATION DU QUÉBEC.*

Other practical applications of IRSST fields of expertise in 1987 were the design and evaluation of measurement equipment for noise, vibration, gaseous emissions and electrostatic fields. In addition, researchers participated in the design and testing of protective equipment, particularly for forestry workers. The test bench, developed last year to evaluate the performance of protective leggings for chain-saw users, was standardized by the *Bureau de normalisation du Québec* in 1987. The IRSST laboratories proceeded to evaluate equipment from Canadian,Quebec and foreign manufacturers. Following these tests, several manufacturers modified their products to improve their effectiveness.

Field observations and sampling have also been carried out to improve health and safety conditions, particularly in aluminum plants, steel works, and toxic waste treatment plants.

Lastly, the Institute has applied its increasing expertise in the development of techniques and equipment with the intention of producing its inventions commercially. Patents have been obtained or are pending on the air sampling technique in welding, and on a method for reconditioning batteries in measuring instruments which increases the autonomy of the instruments.

EXPERTISE

In 1987, the Institute made significant advancements in developing its expertise. Industries as well as union and employer associations benefited from the contribution of IRSST researchers and specialists to several projects. During the year, the analytical laboratories received official accreditation from the American Industrial Hygiene Association. The Institute is now one of some 10 accredited laboratories in Canada, this accreditation being an important guarantee of quality for its clients.

During the year, some fifteen analytical methods and four technical guides were published and distributed. The *Guide d'échantillonnage* (Sampling Guide) has also been revised and distributed to industrial hygienists working in the field. The laboratory newsletter, INFO-LABO, of which 500 copies are distributed to users of the Institute's laboratory services, covered the following subjects: vibration, plastic resins, retaining cables in construction, anemometers, silica, microbiologic agents, and electromagnetic fields. The Institute was also called on as an independent expert to validate measurement methods and to evaluate protective equipment in several workplaces. Important work was carried out, particularly in relation to air quality in office towers. The most important achievements in this area were the following:

EVALUATION OF AIR QUALITY AND VENTILATION IN OFFICE BUILDING HAS ALLOWED TO ISOLATE THE CAUSES OF THE MAJOR PROBLEMS AND SUGGEST CORRECTIVE MEASURES.

Ventilation and air quality in office towers were studied within the SAFETY-ENGINEERING and ANALYTICAL SUPPORT PROGRAMS; recommendations were drawn up for building owners and occupants concerning the implementation of corrective programs for ventilation systems in order to prevent air contamination problems and discomfort. The work carried out in several buildings resulted in the identification of the principal ventilation problems, the validation of measurement and evaluation techniques, as well as the development of methods for monitoring air quality inside buildings. Following these studies, recommendations applicable to all office buildings were made. Most involve the proper operation and maintenance of ventilation and humidity-control systems. Training of maintenance personnel for the buildings is also suggested. Extending the studies to a greater number of buildings would allow validation of the results already obtained, and eventually the establishment of an indoor air quality index as well as a standardized method for its determination.

There were concrete results in 1987 from research on worker exposure to welding fumes. The methods for evaluating this exposure were standardized through the development of a sampling device and the introduction of a sampling method allowing continuous air measurement in the respiratory zone of workers directly or indirectly exposed to fumes. A sampling and analytical guide for welding fumes has been produced by the researchers from the ANALYTICAL SUPPORT PROGRAM, providing standardization of the methods for evaluating risks to which welders are exposed. Hygienists and hygiene technicians now have a unique evaluation method, and to use it, a device patented and manufactured under licence by the Institute.

THE DOSE OF EXPOSURE TO ELECTROMAGNETIC FIELDS MAY NOW BE EVALUATED, THUS ALLOWING TO MEASURE THEIR EFFECT ON WORKERS.

The McGill University research group is also studying the effect of electromagnetic fields on electric-utility workers. By evaluating exposure to electromagnetic fields, the researchers demonstrated the feasibility of an epidemiological study on the relationship between exposure to these fields and cancer. This study will be carried out jointly with Hydro-Québec, Hydro Ontario, and *Électricité de France*. Since 1979, at least 18 studies of this nature have attempted to clarify this relationship, but problems in methodology, particularly with regard to exposure assessment, made interpretation difficult. The expertise developed by the group during this preliminary phase ensures that exposure measurement can now be carried out in a precise and reliable manner on a large scale. The most hazardous tasks, as well as the sources of exposure, both in the electrical industry and elsewhere, can now be identified and corrective measures planned.

The EPIDEMIOLOGY OF OCCUPATIONAL DISEASE RESEARCH GROUP has also studied the hypothesis that exposure to silica dust is a risk factor for development of lung cancer and possibly other cancers. The files of approximately 1300 silicosis victims compensated in Quebec since 1940 have been studied, and these workers' cases were followed from the date of compensation until 1987. The incidence of cancer and cancer-related deaths in these workers will be compared to those found in the male population in Quebec during the same period. This study will be used in conjunction with other similar studies to determine whether lung cancer in silicosis victims is an occupationally-induced disease. Since silica is a widely used substance whose production worldwide has shown no sign of declining in the last 10 to 15 years, this relationship is very important from a scientific, social and economic point of view.

INITIAL ASSESSMENT OF THE RIGHT TO REFUSE TO PERFORM WORK HAS DEMONSTRATED ITS EFFECTIVENESS IN CORRECTING DANGEROUS WORK CONDITIONS.

A preliminary report on the statutory right to refuse to perform work has been produced by the SOCIAL ASPECTS OF OCCUPATIONAL HEALTH AND SAFETY PREVENTION RESEARCH GROUP at the *Université de Montréal*. This report gives a general description of the exercise of this right and its impact in the workplace. It further indicates that this right is effective in improving dangerous working conditions and is used by a minority of workers who are almost exclusively unionized in a limited number of companies. The researchers conclude that a better understanding of this right should result in increased use.

In 1987, the same group at the *Université de Montréal* completed a study on the setting up and operation of joint occupational health and safety committees in companies. The research results reveal a predominance of institutionalized committees with relations oriented towards dialogue rather than towards conflict between worker and employer representatives. The study report was circulated to employer and union associations, to local community service centres, and to the CSST. This contributed to a better understanding of the role and operation of committees, a preferred means by which the working community may take responsibility for prevention.

CONSTRAINTS RELATED TO WORK ORGANIZED IN THE FORM OF LARGE DATA ENTRY POOLS GIVE RISE TO OVERUSE OF MEDICATION BY WORKERS.

The results of an investigation on the state of health of data entry clerks have been published by the EFFECTS OF WORK ORGANIZATION ON OCCUPATIONAL HEALTH AND SAFETY RESEARCH GROUP at the *Université Laval*. The study revealed a higher incidence of mental health problems as well as an overconsumption of medication in these workers. The organizational stresses acting in large work pools (pressure to produce, job monotony and anxiety) were identified, suggesting that there would be increased productivity in small semi-autonomous groups.

The GROUP FOR ACTION-ORIENTED RESEARCH ON BIOLOGY AND WORK of *Université du Québec à Montréal* has developed tests for the identification of signs and symptoms of early neurophysiologic changes in workers with prolonged exposure to organic solvents in several work environments, particularly those plants manufacturing paints, explosives, and printing inks. In all cases, the studies were followed by recommendations for changes in work practices: isolating containers, handling in hoods, or rotating personnel. In certain cases, a ventilation and recovery system for solvents was installed.

A NEW PROTECTIVE FACE SHIELD HAS BEEN DEVELOPPED FOR FOREST WORKERS : LIGHT, ANTI-FOGGING, ABRASIVE RESISTANT, FULL VISIBILITY FOR THE WORKER.

THE EFFECTIVENESS OF HAND REHABILITATION, MAY BE MEASURED BY A NEW DEVICE WHICH ALLOWS AUTONOMY FOR THE USERS.

Through research grants, several new projects related to safety were begun during the year. Among the subjects dealt with by researchers in various Quebec universities were safety problems in the mining, fishing and forestry industries; the extensive indirect costs caused by work accidents, the effect of work accident risk on Quebec workers' salaries, and North American trends in compensation for occupational stress-related problems.

In 1987, the IRSST began collaborating with applied research groups. Through grants or contracts, joint research, was undertaken with CRIQ, the *Institut de recherches cliniques de Montréal* and the Centre for Technological Development at the *École Polytechnique*. Because of this new R & D Contract Program on Occupational Safety, the Institute developed an administrative and decision-making infrastructure enabling it to contract out research relating to specific accident-elimination needs.

The OVIFO design company received the mandate to design and develop a face shield for workers in the forestry industry based on material evaluation and design criteria developed by the IRSST.

A project to design and develop an anti-kickback system to reduce accidents related to edgers in the woodworking industry has been carried out in collaboration with CRIQ at the request of the Association of Furniture Manufacturers of Quebec.

IRSST has also financed the development and prevalidation of a computerized device to promote and control effective hand rehabilitation. The purpose of this device, called REMUSK, is to strengthen the hands of workers suffering from a reduction in functional capacity.