

MINUTES OF SPECIAL MEETING TO DISCUSS
NATIONAL RESEARCH COUNCIL OF CANADA
9:30 a.m., 18 June 1970 - B.C. Research Building, Vancouver
ASSOCIATE COMMITTEE ON GEOTECHNICAL RESEARCH

Attendance:

SNOW AND ICE SUBCOMMITTEE

Mr. P. A. Schaerer (Acting Chairman)	- National Research Council
Mr. G. P. Williams (Research Advisor, Snow & Ice Subcommittee)	- National Research Council
Mr. C. B. Geisler	- National Ski Patrol System
Dr. W. H. Mathews	- University of British Columbia
Dr. O. Slaymaker	- University of British Columbia
Dr. H. A. R. de Paiva	- University of Calgary
Mr. J. E. Merrett	- British Columbia Dept. of Mines & Petroleum Resources

PROCEEDINGS

Mr. Williams outlined briefly the role of the Snow and Ice Subcommittees and the Associate Committee on Geotechnical Research in encouraging SPECIAL MEETING TO DISCUSS AVALANCHE PROBLEMS sponsored several conferences, the latest being a conference held in Calgary on 23-24 October 1969, one day of which was devoted to avalanche problems. At this Conference, it was suggested that an Avalanche Information Centre be established in Western Canada. The Snow and Ice Subcommittee invited Mr. Schaerer to organize a meeting to discuss this suggestion. The purpose of this meeting would be to review present avalanche forecasting services in Western Canada, to define research problems and future needs, and make specific proposals for the establishment of an Avalanche Information Centre.

Mr. Schaerer reviewed the ideas on avalanche problems and research needs presented at the Calgary Conference on Snow and Ice (Appendix I). He reported briefly on a meeting with National Park representatives held in Calgary on 17 June (Appendix II). The three general subjects to which attention should be given are: (1) Technical information; (2) Education and Training; and (3) Research.

Mr. Geisler outlined the interest of the Canadian Ski Patrol in the establishment of an Avalanche Information Centre (Appendix III). He emphasized the need for manuals and information bulletins for the many ski resorts being developed.

The following summarizes the main points made during the general discussion:

OTTAWA
SEPTEMBER 1970

MINUTES OF SPECIAL MEETING TO DISCUSS
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Attendance:

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Mr. G.P. Williams (Research Advisor, Snow & Ice Subcommittee)	- National Research Council
Mr. C.B. Geisler	- National Ski Patrol System
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Mr. Williams outlined briefly the role of the Snow and Ice Subcommittee and the Associate Committee on Geotechnical Research in encouraging research in Canada. The Snow and Ice Subcommittee has sponsored several conferences, the latest being a conference held in Calgary on 23-24 October 1969, one day of which was devoted to avalanche problems. At this Conference, it was suggested that an Avalanche Information Centre be established in Western Canada. The Snow and Ice Subcommittee invited Mr. Schaerer to organize a meeting to discuss this suggestion. The purpose of this meeting would be to review present avalanche forecasting services in Western Canada, to define research problems and future needs, and make specific proposals for the establishment of an Avalanche Information Centre.

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Mr. Geisler outlined the interest of the Canadian Ski Patrol in the establishment of an Avalanche Information Centre (Appendix III). He emphasized the need for manuals and information bulletins for the many ski resorts being developed.

The following summarizes the main points made during the informal discussion:

(1) The information presented at the Calgary Conference and discussions at the meeting held on 17 June with National Parks representatives outlines clearly the growing need for avalanche forecasting and avalanche control information in Western Canada. It will be difficult, however, to obtain statistics which will define this need in monetary terms. The National Parks records would be a useful source for assessing the avalanche accidents that have occurred in the Parks. To assess accidents outside the Parks, it would be necessary to go through old newspaper reports. At some ski centres avalanche accidents are not always tabulated because of adverse publicity.

(2) There is now considerable information available in Western Canada through mining companies, such as the Granduc Mine and the National Parks and the work of the National Research Council at Rogers Pass. This information is most valuable for the planning of mines, roads, ski areas and buildings in avalanche terrain, as well as for avalanche hazard forecasting in the operational stage. There is a need for a central agency, such as the proposed Avalanche Information Centre to collect the information and make it available through publications.

It was suggested that a standard form be created for reporting avalanche occurrences. Co-operation from mines, ski areas, and road departments would have to be on a voluntary basis; there is no legislation by which reporting of avalanches could be enforced.

It would be necessary to classify the regions of Western Canada with respect to avalanche activity.

(3) Eventually, there could be a need for provincial legislation on safety in avalanche areas. This might include certification by avalanche experts from an Avalanche Information Centre before new ski resorts are approved. At present, the only safety regulations are those concerned with ski tows and mining operations.

(4) At the present time, universities in Western Canada are not concerned with avalanche research or training and do not have the facilities to become engaged in this type of work. An interdisciplinary education program could be organized, however, if a strong need were expressed. There might be difficulties finding enough individuals who would be willing to specialize in avalanche science at the University level, because opportunities for employment in this field are very limited.

It was felt that the work at the universities should be restricted to:

- (a) giving a few lectures to students with the purpose of making future managers of mines, forests, civil engineers, etc., aware of the problems;
- (b) undertaking specific research projects on avalanches and other alpine problems that would be suggested by the Avalanche Information Centre.

(5) Training of specialists in avalanche control could best be organized at the technical schools, e. g., the British Columbia Institute of Technology. Possible co-operation by the technical schools should be investigated. It was pointed out that technicians would have to have an interest in this type of work.

(6) At present, avalanches do not cause serious problems with forest operations in British Columbia. There is a need, however, to anticipate future problems and create a general awareness of potential avalanche problems and how these problems can be aggravated, particularly by forestry operations.

(7) It was generally agreed that an Avalanche Information Centre should be established. At the present time, the National Research Council would be the logical agency to administer it. The National Parks are in a position to co-operate but not run such a Centre. Interest at Universities and Provincial agencies is not sufficient for them to consider establishing such a Centre.

It was agreed that the Snow and Ice Subcommittee be asked to set up a Working Group to study the avalanche problem in depth. The first task would be to make specific proposals with respect to program, location, staff of an Avalanche Information Centre and to collect documentation necessary to make a strong representation for the need of such a Centre. The B. C. Mining Association will be asked to write a letter to Dr. Schneider, President of the National Research Council, stating the needs of the mining industry for information on avalanche forecasting and control.

The meeting adjourned at 12:15 p. m.

Avalanche Control Methods

1. Avoidance, location in safe areas.
2. Warning and temporary closures of hazardous areas.
3. Gunfire, hand-placed charges, helicopter bombing.
4. Structures: Retaining barriers
 Diversion structures
 Sheds
 Arresters
5. Reforestation.
6. Search and Rescue.

Problems in Avalanche Control

1. As outlined by W. E. Bottomley (National Parks) on 24 October 1969:
 - (a) Lack of trained personnel.
 - (b) Lack of communication between groups interested in avalanche control.
 - (c) Lack of information on the conditions of terrain and vegetation that cause avalanches.
 - (d) Development of weapons for the control by artillery.
 - (e) Development of the techniques and the scientific base of avalanche hazard forecasting.
 - (f) Standards of avalanche control and safety.
2. Duties of an Avalanche Information Centre, as outlined by C. B. Geisler on 24 October 1969:
 - (a) Consultation and hazard analysis service to any public or private organization, including ski resorts both existing and proposed.
 - (b) To conduct formal training programs for avalanche hazard evaluators and forecasters.
 - (c) To advise and to assist the Canadian Ski Instructors Alliance, the Association of Canadian Mountain Guides, and the Canadian Ski Patrol System to set standards and to train responsible members in snowcraft and avalanche work.

- (d) To carry out a publicity and education program with the aid of the National Film Board, the TV and radio stations, newspapers and magazines.
 - (e) To collect and analyze snow and weather information and to encourage the establishment of more observation stations. To issue weekly avalanche hazard evaluations or forecasts covering as many parts of the mountain region as possible.
 - (f) To conduct and encourage research into ways of simplifying avalanche hazard evaluation and forecasting.
3. As outlined by J. W. Nelson (B. C. Department of Highways) on 24 October 1969:
- (a) More snowsheds of a design which are economical in cost, easily erected, frost-free, well lit, and on good alignment.
 - (b) More sophisticated telemetering and further advances in studies of snow conditions resulting in unstable conditions.
 - (c) More accurate forecasting of avalanche activity in complex weather conditions.
 - (d) Better weaponry with pinpoint accuracy. In this regard I presume we will eventually abandon conventional weapons as we know them now.
 - (e) Flashing red lights and warning tones which can be activated at a Warning Control Centre to quickly advise the motorist of avalanche activity.
 - (f) Close control of logging activity and forest fire prevention in critical avalanche areas, as well as reforestation of denuded slopes.
4. Problems with respect to mines and roads as experienced by P. Schaerer:
- (a) Recognizing avalanche terrain and estimating the avalanche hazard to roads and structures in the planning stage.
 - (b) Lack of information on the physical properties of the moving snow (necessary for the design of control structures and assessment of possible damages).

- (c) Efficiency and economics of control measures, information required for cost-benefit analysis.
- (d) Methods of avalanche hazard evaluation in the operations stage that can be used by non-professional people; guidelines for instrumentation, observations, analysis.
- (e) Development of weapons and ammunition suitable and economical for avalanche control by gunfire.
- (f) Training of personnel responsible for the evaluation of the avalanche hazard for mining developments, roads, ski areas.
- (g) Education of personnel working and travelling in hazardous areas.

PS/mjp
June 15/70

MINUTES OF SPECIAL MEETING TO DISCUSS AVALANCHE PROBLEMS
WITH NATIONAL AND HISTORIC PARKS REPRESENTATIVES OF THE
DEPARTMENT OF INDIAN AFFAIRS AND NORTHERN DEVELOPMENT
2:00 p. m. , 17 June 1970 - National Parks Office, Calgary

Attendance:

Mr. P. A. Schaerer (Acting Chairman)	- National Research Council
Mr. G. P. Williams (Research Advisor, Snow & Ice Subcommittee)	- National Research Council
Mr. C. B. Geisler	- National Ski Patrol System
Mr. K. B. Mitchell	- National Parks
Mr. W. Bottomley	- National Parks
Mr. J. Sime	- National Parks
Mr. V. G. Schleiss	- National Parks
Mr. P. Fuhrmann	- National Parks
Mr. W. Pfisterer	- National Parks

Mr. Williams outlined briefly the function of the Snow and Ice Subcommittee and the Associate Committee on Geotechnical Research in encouraging research in Canada. The Snow and Ice Subcommittee asked Mr. Schaerer to organize a meeting of a few interested people to review the current information on avalanche hazard forecasting, define the problems that require research, estimate future needs, and make specific proposals for the establishment of an Avalanche Information Centre. The meeting in Calgary was organized so that National Parks representatives could make their views known before the meeting scheduled to be held in Vancouver on 18 June.

Mr. Schaerer reviewed the ideas on avalanche problems and research needs presented at the Calgary Conference on Snow and Ice on 24 October 1969 (Appendix I). The three general categories to which attention should be given are:

- (1) Technical information - for location of roads, structures, etc.
- (2) Education and Training.
- (3) Research - to improve the art of forecasting and control.

These general areas of interest were used as a basis for discussion.

The ensuing discussion was quite informal with many different views expressed. The following summarizes the main points made by various speakers:

(1) At present, avalanche activities in the National Parks are concerned with operational problems and there is no real opportunity for long-term research programs.

(2) There is a need for research on avalanche problems peculiar to Western Canada. In Canada we require a "mobile" control as there are few situations where expensive avalanche control structures are justified. For this reason, we cannot rely solely on European experience and methods.

(3) There is a need to produce Canadian manuals on avalanche forecasting and control methods. These are especially needed for operators at smaller skiing centres.

(4) The present system of training Park Wardens in avalanche control and forecasting is far from satisfactory. The program requires more continuity and opportunity for selected personnel to continue courses for more than one avalanche season.

(5) There is a need to define the various kinds of training and to set standards of qualification for avalanche hazard forecasters and for technical experts. Training programs should be available for personnel from industry.

(6) Rogers Pass is probably the logical place for training programs and for any proposed Avalanche Centre. Other sites should, however, be considered in the planning of a permanent Avalanche Information Centre.

(7) Some special type of training should be available at Universities, i. e., geomorphology, meteorology, and some aspects of snow science. At present none of the Western Canadian Universities has specialized courses in snow science. Training at the technical schools should also be considered.

(8) If an Avalanche Research Centre is established, it should be open to Universities to carry on special research problems, such as the use of explosives for avalanche control or investigating the use of snow fences at alpine sites for avalanche control.

(9) There is a need for avalanche experts to visit small ski centres that are being set up to advise on safety of slopes and the regular snow and weather observations that need to be taken. An Avalanche Centre would provide this service, gradually expanding it as the need arises.

(10) It was generally agreed that there is a need for an Avalanche Information Centre for avalanche training, to provide technical information as well as a basis for research. The National Parks Branch would probably be interested in co-operating with such a Centre and agree, in principle, on the need for one. As an operational group, however, primarily concerned with Parks operation, they probably would not be in a position to be responsible for it. It would have to be some kind of sharing program in co-operation with Universities, the National Research Council, and other agencies.



organisation de la patrouille canadienne de ski

canadian ski patrol system

June 17, 1970

RECOMMENDATIONS FOR AVALANCHE RESEARCH IN CANADA

In western Canada the avalanche hazards along the Trans-Canada Highway and in the developed recreational areas of the National Parks seem to be under adequate control.

This is not the case, however, for commercial developments outside of the parks, including oil drilling, mines, logging operations, and ski areas. Ski areas in particular tend to have avalanche problems because their very nature causes them to locate in possible avalanche terrain, and because they cater to large numbers of visitors. It has been established in Canada, the United States, and Europe that complete control over the enthusiastic skiing tourists is impossible, and that therefore it is essential to control avalanches in the vicinity of ski areas.

It appears that two general courses of action are open to Canada at this time. One, patterned after the approach of the United States Forest Service, would be to train a large number of government employees in avalanche control, and set up a government avalanche station at each ski area and industrial site. The other possibility would be to put avalanche control in the hands of the individual companies, but make sure that they have the knowledge and equipment to work with, and that they maintain the proper standard of alertness.

It is assumed that the second course of action could be implemented more quickly and at far less cost to the government. The following suggestions for avalanche research are aimed at preparing a simplified "packaged program" for avalanche control that small, local industries could afford. At the same time, it is recommended that participants in this program be required to make daily, weekly, or monthly reports to a central avalanche research station. Also, it is hoped that once such an avalanche control program is established, it will be backed by provincial or federal legislation to ensure that it is used wherever it is needed.

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SUGGESTIONS:

1. Publish a guide for the recognition of possible avalanche terrain, so that industries do not unknowingly locate on hazardous sites.
2. Reduce the cost of avalanche hazard evaluation and control by simplifying the type of instruments required and by making them readily available.
3. Reduce the amount of time necessary for daily observations and evaluations.
4. Reduce the number of factors to be considered in making an evaluation, or combine two or more factors into one reading.
5. Simplify the reading of instruments, especially automatic recording instruments, so that evaluations can be made without calculations and without re-plotting data.
6. Develop some rules of thumb for use by inexperienced evaluators. Rules may have to be tailor-made for different sub-climates.
7. Develop standard procedures for avalanche control with hand charges, helicopter bombing, and artillery.
8. Determine the most suitable artillery piece and ammunition for civilian use in avalanche control. Cost, safety, and effectiveness should be among the major criteria.
9. Investigate and recommend a simple procedure for legally authorizing the acquisition and use of such artillery, making guns and ammunition readily available through normal government channels if necessary.

The need for improvement along these lines exists now. It can be expected to increase as our population and industries expand. Western Canada has long since made the transition from frontier values to commercial values. We cannot treat recognizable environmental hazards in a frontier manner.



C. B. Geisler
C.S.P.S. Avalanche Training Officer