REPORT ON SNOW SURVEYORS TRAINING CONFERENCE AT ALTA, UTAH

by
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Snow surveys are the key to seasonal water supply forecasts. Any errors made in the collection of these basic data usually cannot be corrected by manipulation of a slide rule or calculator. Through statistical methods a forecast can be made that is inherently accurate, but this forecast is only as good as the basic data used. Therefore, it rests upon the shoulders of the field snow surveyors to bring back factual field data that justify the expense of their trips.

The Soil Conservation Service sponsors west-wide Snow Survey Training Conferences. At these training sessions field snow surveyors of the Service and cooperator personnel are trained in the many jobs of snow surveying and winter survival. Three of these training sessions have been held: Ketchum, Idaho, in 1951, McCall, Idaho, in 1954 and Alta, Utah, in 1956. The next one is planned for Jackson, Wyoming, in 1958.

I would now like to give you the highlights of the Alta training session. Three types of participants attended: Trainee, observer and instructor. The trainees were required to participate in all phases of the session, both field and classwork, and at the conclusion were presented with certificates signifying successful completion of all phases of snow surveying presented. Observers were cordially invited to attend all sessions, but attendance at strenuous field sessions was not required. While the field sessions were being conducted the observers were usually with the oversnow machines. See Figure 1. The instructors were selected for their knowledge and experience in their particular field. One hundred seven men attended the conference. See Figure 2.

The program committee spent many an hour working up the program and making all arrangements. Greg Pearson, as chairman, handled all reservations and most of the local arrangements, while Morlan Nelson was busy with the television crews and writers of NBC.

On Monday, January 23, the training conference was called to order by Mr. J. A. Libby who made the opening remarks and introductions. Objectives of the conference were set out by R. A. Work as follows:

> "Objectives of this training conference are four-fold: First to better inform you of the goals of snow surveys and economic purposes served by various types of runoff forecasts developed from snow surveys.
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> "Second, to provide training in the field work of snow surveying, whereby the measurements you men secure in the future will be of highest quality and of maximum value.
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> "Third, to increase the production rate and efficiency of field snow survey work that will reduce unit cost. It will increase measureably the degree of safety attendant to each snow surveyor.
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> "Fourth, to underscore the importance of teamwork. Snow surveying is a team activity. It calls for supreme coordination, sincere fellowship and man-to-man loyalty."

Carl Brown, Director of the Planning Division, Soil Conservation Service, described the Service's policy in water management activities. The definition of Public Law 566 given by Mr. Brown is as follows: "Public Law 566 authorizes technical and financial aid to local organizations in planning and carrying out works of improvement for (1) flood prevention, including both structural and land treatment measures, and (2) the agricultural phases of the conservation, development, use and disposal of water." Public Law 566 authorizes but part of the Department's water management activities. Mr. Brown enumerated many other phases, but I believe that this one is most important to the national economy.

John H. Wetzel, Chief of the Soil Conservation Service Watershed Planning Branch, spoke on "Balancing Water and Soil Management in Soil Conservation Districts." He pointed out that soil conservation districts in the past have been primarily concerned with prevention of soil erosion and the conservation of soil moisture. Recently soil conservation districts have begun to look into their water supply and are making their cropping plans around the prospective water supply. It is the districts' responsibility to work closely with flood control, drainage, and diking districts.

Mr. F. C. Koziol, Supervisor of the Wasatch National Forest, welcomed the group to the Wasatch National Forest. Morlan Nelson then reviewed the "Principles of Personal and Group Conduct in Mountain Travel" (general and as applied to the Alta area). This talk was followed by a lecture on the "Theory and Practice of Snow Surveying" by Mr. W. T. "Jack" Frost. After Jack finished his lecture George Peak and the writer demonstrated the practices of snow surveying. The demonstration was observed by the group through the windows of the lecture room. First the wrong way to do the job was shown, and then the right way, while Jack kept the group informed of the many points we were bringing out.

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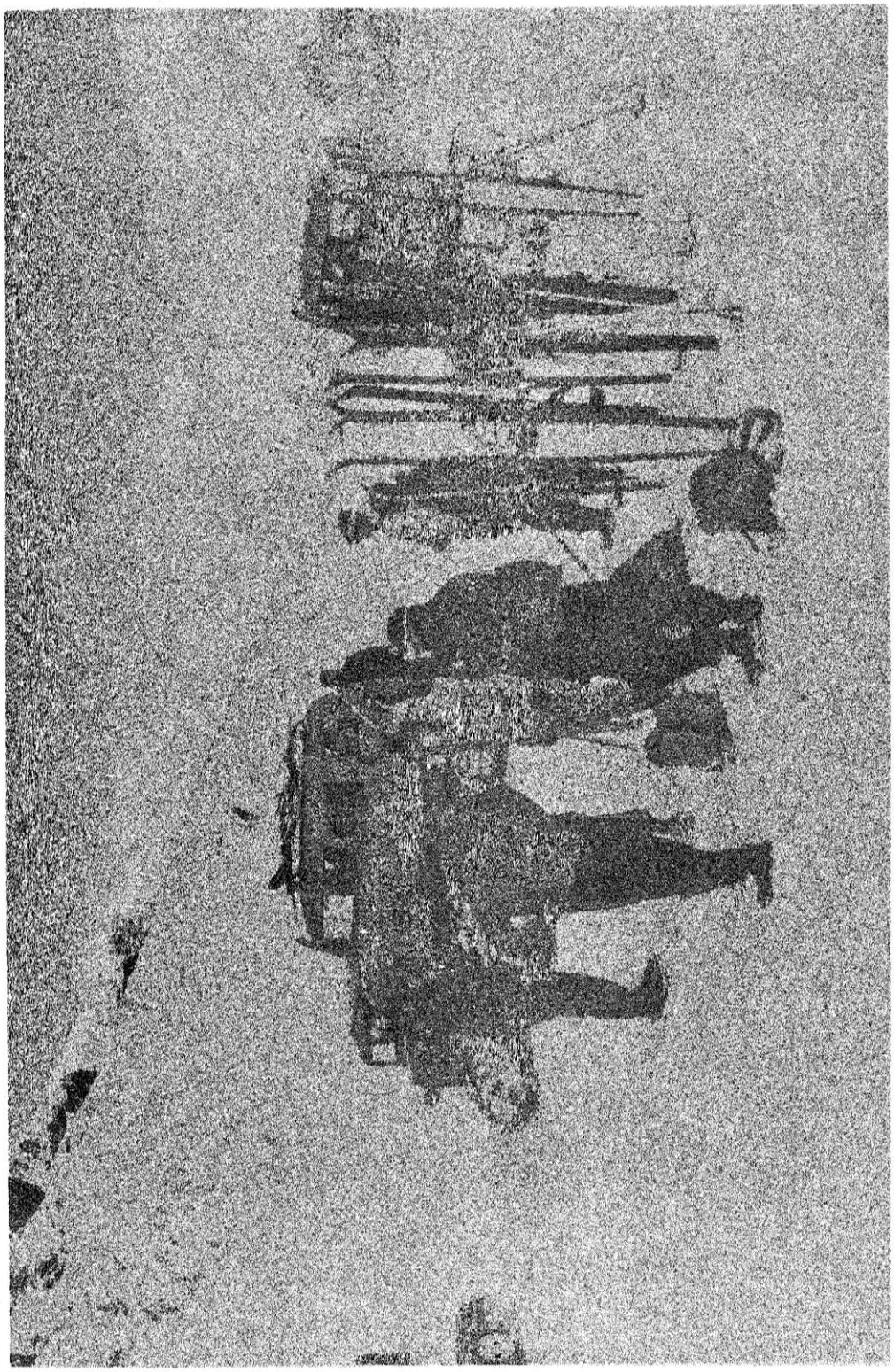

Fig. 1 - Machine Instruction Class, Alta, Utah.

Fig. 2 - Students and Faculty, Snow Surveyor Training Conference, Alta, Utah.

Mr. A. R. Codd gave a lecture on the protection and maintenance of snow sampling equipment in which he gave recommendations for the care, repair, and waxing of the tubes and scales. The wax Mr. Codd recommended is the old standby, paraffin.

The evening sessions were, I believe, most enjoyable. These sessions were attended by nearly everyone at Alta. The lectures usually consisted of slides or films. M. M. Atwater gave a slide lecture on avalanche characteristics and then showed the film "Avalanche Rescue." The film "Avalanches to Order" was scheduled, but instead the film "Snow Ranger" by Sverre Engen was shown. Mr. Engen also had another film called "Champs at Play" which showed many Olympic and National Ski Champions skiing at Alta and various other resorts. Both of these films were produced by Mr. Engen and were excellent in all ways. Dee Molenaar gave a slide talk entitled "An Attempt on K-2 by the Third American Karakoram Expedition." Mr. Francis Millner and Mr. John Clinch, Representatives of the Snowy Mountain Hydroelectric Authority of Australia, presented two films produced by their company entitled "Harvesting the Snow" and "Conservation of Soil in the Snowy."

Routine snow survey work made up the bulk of the remaining indoor sessions except the outstanding sessions presented by G. M. Hawkins, Civilian Instructor on Survival, U. S. Air Force. Mr. Hawkins presented in a very clear fashion "Survival," "Search and Rescue" and "Safety and Treatment of Casualities." He also presented an army training film on survival. A lecture on the "Physics of Snow Cover" by E. R. LaChapelle, U. S. Forest Service Snow Ranger at Alta, and a paper entitled "Fifty Years of Snow Surveying" by George D. Clyde were also presented.

All in all the conference was very successful and the training received by the men will show up in the continued safety record of snow surveys and accurate results of the field work.

SNOW HYDROLOGY SUMMARY REPORT

by

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The Corps of Engineers, U. S. Army, has long recognized the need for basic knowledge in the field of snow hydrology to insure adequate and economical design of major water control projects, for efficient operation of dams and maximum utilization of reservoir storage, and for meeting its responsibilities in connection with flood emergencies. Twelve years ago the Corps embarked on a cooperative research program with the Weather Bureau and other Federal agencies in order to meet the stated objectives. Most of you here today are fairly well acquainted with the scope of this program, so I will not dwell on that now. I would like to take this opportunity, however, to call your attention to the summary report, entitled "Snow Hydrology", to be completed in the next few months, which summarizes the investigations and is written with the view of being a reference work on theoretical and applied snow hydrology. In order to acquaint you with the material contained in the report, I would like to present a brief resume of the report, chapter by chapter.

Chapter 1, "Introduction," lists the purpose and scope of the report, includes a statement of the problem, and reviews briefly the activities of the Cooperative Snow Investigations.

Chapter 2, "Snow Laboratory Data," provides information on the field observational program of the Cooperative Snow Investigations and includes detailed descriptions of the three laboratory areas, methods of observation of hydrometeorologic elements, a general description of quality of data, brief descriptions of regular and special observations, and information on the publication of basic data.

Chapter 3, "Precipitation and the Accumulation of Snow," discusses the interrelationship between precipitation and snowfall; meteorological and terrain features affecting precipitation; the problem of measurement of precipitation, snowfall, and snow accumulation; factors affecting the accuracy of point precipitation and snow accumulation measurements; and methods of determining basin precipitation and snow accumulation from point measurements.

Chapter 4, "The Water Balance in Areas of Snow Accumulation," discusses the factors affecting the water balance, including rainfall, snowfall, snow accumulation, interception, snowmelt, soil moisture recharge, transpiration, ground water storage, and runoff. It includes a presentation of monthly values of each component of the water balance for the period of record for each snow laboratory.

Chapter 5, "Melting of the Snowpack," is a complete theoretical discussion of the physical processes of heat transfer to the snowpack; it shows how these processes are affected by conditions of the atmosphere and the environment, and includes mathematical expressions for elating snowmelt to meteorologic variables.

Chapter 6, "Snowmelt Indexes," presents methods of application of the principles of snowmelt presented in chapter 5 to basin areas, through use of thermal budget indexes. Reliability of indexes of snowmelt for each of the

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