PART II: Meteorology and Hydrologic Engineering

INTRODUCTORY REMARKS

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The opening of the St. Lawrence Seaway means that the heavily industrialized coastline of the Great Lakes will experience an even greater concentration of economic wealth in the next few years. With the average water level for each lake being a key datum upon which coastal engineering designs and operations are based, a complete understanding and adequate warning of both short- and long-term deviations in these average levels must be at hand if loss of life and economic wealth are to be kept at a minimum. Several of the papers presented at one of the two sessions on Meteorology and Hydrologic Engineering reviewed the present state of our knowledge concerning natural fluctuations in water level within the Great Lakes basin. Inter-relations between precipitation, wind patterns, storm tracks, and lake levels were described in some detail, and indications were given as to where the state of present knowledge is inadequate.

The paper presented by Major Ira Hunt, and published in this Monograph, comprehensively describes the large-scale seiche action of Lake Erie. Through an unusually comprehensive statistical study by the Corps of Engineers concerning wind conditions both over and around the lake, Major Hunt has obtained a reliable stress coefficient for the set-up equation. This type correction, neglected by earlier workers who used misleading wind values from onshore, permits the wind set-up to be computed for specific points over the lake, and excellent correlations were obtained with the observed lake levels. However, the shallow, island-filled western end of Lake Erie creates a highly variable energy absorber, and Major Hunt notes that the present-day prediction accuracy of seiche-decay rates is still unsatisfactory.

The other session on Meteorology and Hydrologic Engineering comprised a series of papers on various aspects of precipitation as pertaining to engineering design and operational problems. This series of papers was particularly appropriate to a joint meeting of the American Meteorological Society and the American Society of Civil Engineers, since precipitation constitutes one of the more obvious phases of the hydrologic cycle falling within the common ground of meteorology and hydrology. Many aspects of design rest to a considerable degree upon analyses of precipitation data, particularly in the case of water control and utilization structures. Moreover, any improvement in the reliability of precipitation forecasts will provide direct benefits through more efficient operation of hydraulic structures.

Two of the papers presented at this session are included in the Monograph. Although both describe studies of precipitation over the State of Illinois, one concerns the probabilities of specified dry periods, while the other treats flood-producing storms. The drought studies reported by Mr. Changnon demonstrate the use of high-speed electronic computers to process tremendous quantities of climatological data in a minimum of time. It is interesting to note, also, that the storm studies reported by Messrs. Huff and Semonin utilize radar data for improved definition of storm pattern. There is every reason to expect that the more elaborate and dependable radar of the future will be invaluable for such purposes.

J. M. Biggs et al., *Topics in Engineering Meteorology*