

ELECTRIC TRANSMISSION OF WATER POWERS.

[By CHAS. D. WALCOTT, Director U. S. Geological Survey.]

Recently there has been such a complete demonstration in California of the feasibility of transmitting electric energy at high voltage for great distances, that all important streams within 200 miles of Los Angeles or of San Francisco which are capable of developing substantial water power are being carefully studied.

The two factors producing power are the volume of water and the amount of fall, hence the U. S. Geological Survey, owing to its work in gaging streams and topographic mapping, is being called upon from many quarters in connection with these investigations. Frequently investments of many hundred thousand dollars are made or rejected on the basis of these records. The demand for accuracy in the determination of the low summer flow of the stream is particularly severe, and calls are made for a greater amount of detail, both as to the number of points of measurement and as to frequency, than it has been possible to obtain heretofore with the limited funds available for this work. A comprehensive knowledge of a stream can only be obtained after several years of careful study. Manifestly capital seeking investment will not wait to compile the records itself, especially in view of the fact that the result may prove unsatisfactory.

For power developments the low summer flow of the stream is that which is most urgently desired at first. These low volumes doubtless will be supplemented by stored water in the near future. During the past four summers meter measurements of the lowest September flow have been made of nearly all the trunk streams on the western slope of the Sierra Nevadas and Sierra Madres. These measurements are of especial value as these years have been of unusual drought.

The crest of the Sierra Nevadas ranges in elevation from 10,000 to 15,000 feet above sea level and is distant from 50 to 60 miles from the low San Joaquin Valley lands, the elevations of which are less than 500 feet. The streams issuing therefrom have very short steep gradients. Profiles of a large number of them, taken from the contour maps of the United States Geological Survey, are given in Water Supply and Irrigation Paper of the United States Geological Survey, No. 40.

The upper portion of the main streams and their tributaries naturally contain the steeper gradients,

and though usually showing a smaller volume of water they afford the greater power possibilities because of the higher available pressure heads. These streams are largely within the various National Forest Reserves. One of their interesting characteristics that has been learned, is that during the late summer months when the water is low, practically all of it comes from the highest portions of the drainage basins, say above elevation of 6,000 feet. In fact some rivers like the Kern, the Kings, and the San Joaquin, decrease in volume in the lower half of their mountain courses owing to losses by seepage and evaporation.

Arrangements have lately been made with the Forestry officials of the Interior Department for their Superintendents in the future to measure these streams at trail crossings, at high elevations, during their low summer stages, under the direction of J. B. Lippincott, the Resident Hydrographer of the Geological Survey. It is believed that this will add much to the knowledge of California streams in their upper courses. Heretofore they have not been accessible owing to their remoteness and the absence of any reliable observers.

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