

water over 200 feet deep. Will this gradually applied extra load produce a gradual depression? This might almost seem a crucial test, and it would seem as though a few well-placed and well-determined bench marks on projecting hills, or possibly triangulation tripods, in the area to be submerged would answer the question. And it is the hope of arousing interest and causing the necessary measurements to be made that has spurred me to write this note.

ALFRED C. LANE.

THE GEOGRAPHICAL DISTRIBUTION OF STUDENTS.

In the article on 'The Geographical Distribution of the Student Body at a number of Eastern and Western Universities and Eastern Colleges,' which appeared in the issue of SCIENCE for August 10, 1906, I neglected to call attention to the fact that the showing of a number of the state universities is somewhat misleading, for the reason that many students from outside the state in which the university is located endeavor to establish a state residence, in order to escape the tuition charged to outsiders. This is true particularly with reference to the University of California, on account of the isolation and the large size of the state. Families of students from outside often establish a temporary residence in Berkeley, and a similar state of affairs no doubt exists with reference to the University of Michigan and other state universities. At California not over one quarter of the students coming to the university from outside the state and from foreign countries are so registered.

RUDOLF TOMBO, JR.

Registrar.

SPECIAL ARTICLES.

THE PRESERVATION OF SURFACE CONDENSER TUBES IN PLANTS USING SALT OR CONTAMINATED WATER CIRCULATION.¹

The prevention of electrolytic corrosion of condenser parts where they are subject to contact with condensing water that contains elec-

¹Read at the Ithaca meeting of the American Association for the Advancement of Science, June 29, 1906, before Section D—Mechanical Science Engineering.

trolytic properties has been a serious problem with condenser engineers at sea as well as on land, where the condensing water contains salts in solution. This action is especially destructive where the cooling water is contaminated further with chemicals or with sewage.

In the great steam plants of New York city where the water bills extend into thousands of dollars per annum, in fact, are approximately one tenth of the fuel bills, this is an important condition bearing upon the cost of the hourly power unit, but the attempt to use surface condensers in the past for the purpose of saving this waste has not been accompanied with any degree of success. The highest economy demands such precautions as shall leave the hot-well water coming from the condensers in a proper condition for feeding the boilers.

The waste incident to the inability to save this water in stationary generating plants has caused the construction of surface condensing apparatus at such plants as that of the Brooklyn Edison Company at Bayridge, and of the Metropolitan Street Railway Company at 96th Street, New York City.

At the time the design of the Long Island City Power House of the Pennsylvania Railroad was undertaken, it became evident that true economy in the operation of a plant which would have under ordinary circumstances an annual water bill of about \$100,000, when the plant has been fully put into service, justified an attempt to save the water from the hot well for replenishing the boilers. This seemed to demand a thorough investigation of the matter of condenser protection where the circulation cooling water was an electrolyte as it was in this case.

The site where this plant was to be constructed was at Long Island City near the harbor front, and the plant was designed to contain, when fully constructed, fourteen 5,500 K.W. generating units. With such an equipment and with an ordinary loading, the amount of boiler feed water required per annum would cost in the neighborhood of \$100,000.

In the investigation of possible methods for