ENGINEERING AND SCIENCE
Monthly

Vol. VII, No. 8-9 August-September, 1944

The Engineer and Postwar Planning

By HARRY K. FARRAR

THE action in Washington recently in forming the Committee on Postwar Research is an important indication of the extent to which engineers and scientists are being enlisted in postwar planning and of one type of planning which is now being undertaken. This committee, with Charles E. Wilson as chairman and men who have been active in the Office of Scientific Research and Development as its other members, is reported to have as its objective the preparation of the United States to defend itself in any future war.

Although engineers naturally prefer that the results of their efforts be used for good, they cannot assure that their products will not be used for evil. Before the present war many people expressed the hope that with advances in transportation and communication the peoples of the world would learn to know and understand each other and as a result there would be no more wars. The evidence now indicates that better transportation and communication have resulted in extending wars farther and farther until warfare now involves practically all of the world and its consequences are not confined to the battlefield as they were years ago but now death and destruction reach people and establishments throughout the warring nations.

This characteristic of present warfare will be greatly intensified in the next war. This is reflected in another type of postwar planning which has for its purpose the protection of power generation and power users from disaster foreshadowed by that visited by British bombers upon the Eder and Moehne dams in Germany. Airplanes undoubtedly will become capable of carrying loads of explosives which can seriously break such dams as Boulder, Grand Coulee, Bonneville, and Shasta. This probability is discussed in the June 22 issue of "Public Utilities Fortnightly," by J. E. Bullard, who recommends that utilities maintain a reasonable proportion of capacity in steam plants and that they urge industries to locate on the upstream side of large dams to avoid destruction by flood which would result from wartime attack on the dams.

Destructive use of his products is not the fault of the engineer, for the devices used so catastrophically in war are the results of his efforts to make peacetime life more pleasant. In wartime the engineer works harder further to perfect these same machines for the protection of his nation. In turn, what he achieves under the extreme urgency of war is, in the ensuing period of peace, adapted to satisfying peacetime wants. We can now confidently foresee that such adaptation to peaceful wants is again about to begin. When sufficient time following the war

Harry K. Farrar

has elapsed, peacetime living will profit from the accelerated development. In this way, those who survive the war will receive a profit from it in the form of greater satisfaction of their wants. Whether this is a net profit is very doubtful indeed.

Engineers would rather see technical progress made more slowly if war is the only means to accelerate it. However, those who remember the effort following World War I to secure peace through making an effective League of Nations and World Court and later saw these agencies fail as the world drifted toward war, probably feel that wars will recur and that the world will continue to get accelerated scientific development from time to time. The story of this nation just prior to the present war shows that there can be no successful isolation. We had

(Continued on Page 16)

or vane, which is immersed in the fluid tested; hence the vibrations of the reed are transmitted to the vane. The reed and vane assembly is supported within the cell by ribbon or torsion type bearings located just below the reed member of the assembly. The free or upper end of the reed carries a magnetic coil over a permanent magnet, thus inducing a current which is registered on the indicator dial and which varies with the amplitude of the period of vibration of the reed. With this arrangement it is apparent that increasing resistance to vibration in the vane will increase the amplitude of vibration in the reed (assuming constant voltage and frequency of the exciter current) and thus generate more current from the magnetic field, which is registered by the indicator. Resistance to vibration in the vane is provided by the inertia resulting from the density of the fluid in which the vane is immersed. Theoretically, and apparently in practice, viscosity of the fluid is a negligible factor because the period of vibration of the vane is too small to exert any appreciable shear.

THE FUTURE OF MUD ENGINEERING

Development of other instruments like the gravimeter has been held up for the duration, but their usefulness has manifold possibilities in the future. Mud preparation and its chemical control are comparatively new and offer a fertile field for future improvement. Not only are varied fluids needed for specific applications but new treatments may be found. A great deal of fundamental work is necessary, as demonstrated by the comparatively little known about the common clays and the mechanics of treatments of their water suspensions.

As time goes on, and as drilling goes deeper past the present record, which is 600 feet short of three miles, mud treatment and control will be more and more helpful. Drilling must continue at an accelerated pace, for although more fields are found, they are smaller in reserves. Thus since the targets are smaller the firing must be greater and more accurate.

The Engineer and Postwar Planning

(Continued from Page 3)

neutrality legislation and we were determined not to be provoked into war, but the isolationists would not foresee that the decision was not ultimately in our control. Actually even they were unwilling to accept the conditions Japan and Germany would have imposed upon us. They should have abandoned their isolationism after Pearl Harbor—and many did. Yet it appears that there are still enough of them left to make both major political parties afraid to take an unequivocal stand in favor of joint force to oppose aggression. The pattern of thought on postwar planning is not now significantly different from that following World War I. It does not appear, therefore, that the present war will be the last.

Reluctant though one may be to accept the implication of such action, it seems wise in our postwar planning to recognize that seriously destructive wars occur about once per generation and that as time goes on they become more extensive and more destructive. The action in starting now to prepare for World War III seems realistic and sensible. The disheartening effect of planning in the midst of one war for the one to follow in about 30 years is somewhat relieved by the knowledge that most postwar planning is for peace.

The engineer is amused by some of the imaginative predictions that some advertisers are making. He knows that extravagant claims cannot be fulfilled, that unfair advantage is being taken of the fact that non-technical people have recently heard more than usual about the usefulness of science. But the engineer knows also that the war has given tremendous acceleration to many developments such as jet and rocket propulsion, the combustion gas turbine, welding processes, electrical communication, electronic heating, X-ray inspection, plastics, and to almost every other scientific process and product.

Although winning the war is still the primary purpose of engineers, they know that the first day of peace will see most of them return to projects abandoned a few years ago and to planning new peacetime projects not believed necessary or economical before the war. Their efforts will be demanded by civilians almost as urgently as they are now needed by war and it will be difficult to explain to potential buyers why their postponed wants cannot be fulfilled immediately. Conversion of war production was remarkably rapid and complete but, very fortunately and in spite of the misguided isolationists, it started long before we were actually at war. Because it started so early many people do not realize how long the process of conversion actually required nor do they realize that the conversion was planned years before it was started.

Reconversion to peacetime production probably will not proceed as rapidly as did conversion to war goods production since reconversion will not be of such vital importance to survival and its costs will have to be borne to a larger extent by private capital. Because it will proceed more slowly, it should start earlier. The indefiniteness of V-Day makes it difficult to know just when reconversion should start but it is probable that those who have not already at least started to plan reconversion will find postwar competition extremely hard to meet.

The importance of starting reconversion as early as possible is attested by the recent agreement of the War Production Board, the War and Navy Departments, and of the War Manpower Commission to permit the manufacture of civilian goods hitherto prohibited or restricted in the plants of companies which have labor and machinery not needed in the war effort.

Sediment Transportation

(Continued from Page 12)

field measurements is still missing for large streams with fine bed material.

Often conditions are too complicated for analytical treatment. Irregular shaped cross sections or profiles, confluence of streams or temporary deposition of bed material are some of the complicating factors. In these cases the direct analytical method may be supported by model studies which can give quantitative results for transportation problems if they are based on the rules given by the laws of transportation (6). Model studies of such sediment problems have been performed using either sediment of the same or of different specific gravity in model and prototype.

The analytic determination of the transporting power of different stream sections gives the engineer a tool to predict the future development of streams with a movable bed. *Figs. 5a and 5b* show the canyons into which two small streams developed when their transporting power exceeded the available sediment supply. Thousands of acres of the most valuable valley lands are made unusable for agricultural purposes by similar developments. Hundreds of thousands of dollars are spent every year to prevent and repair damages to our communication systems due to channel cutting. But just