this kind of test will often serve as evidence that the corrosion has been caused at least in part by stray currents leaving the pipe. By using a recording instrument in connection with the earth ammeter, the characteristic variations of the current leaving a pipe can also be determined, and in this way the identity of the current can often be established.

From a study of the results of the survey it can be determined where current is leaving the piping. At a number of such points excavations should then be made and the exposed pipe examined with a test hammer for electrolytic corrosion. Where such corrosion and pitting are found at points where current is found leaving the pipe, it may be taken as evidence that the destruction was caused by electrolysis, because it has been conclusively proven that current cannot leave iron for surrounding soil without producing corresponding destruction of the iron.

Regarding the use and value of an electrolysis survey, it must be remembered that the object of the survey is to indicate the existence or non-existence of stray electric currents upon a piping system, and to determine where such currents flow on to the pipes and from the pipes. I have had occasion to examine a large number of electrolysis surveys and have found that many of these consist exclusively of voltmeter readings, and often these voltmeter readings are only made with reference to the rails. Such readings by themselves do not afford a measure of electrolytic danger.

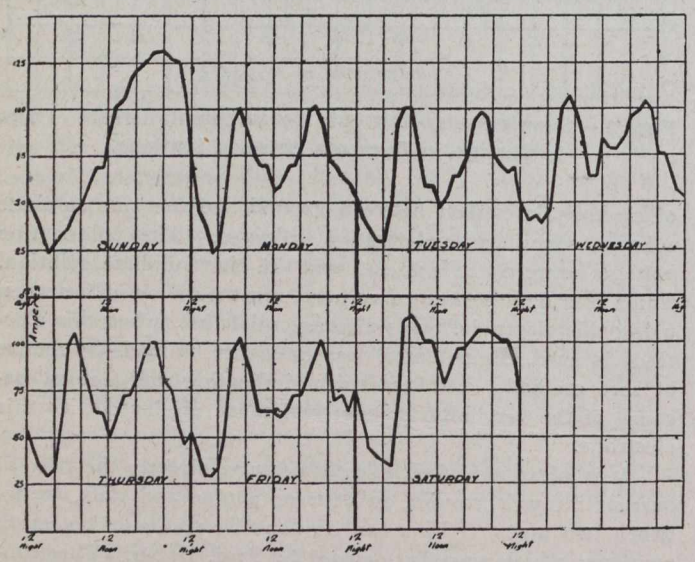

Fig. 9.—Stray Currents on Water Main Averaged from 24-Hour Record and Plotted for Week.

Potential measurements should be made to all underground structures. Measurements of current flow on pipes are also essential in an electrolysis survey because all current which flows on a pipe must leave it, and the amount of damage produced is proportional to the total current which leaves the pipe. I have seen some reports, on the other hand, where it is stated that the current on a given pipe is zero, but where the instruments and methods employed were not sufficiently sensitive to detect current as large as two or three amperes, and where, therefore, the conclusion of zero current is not warranted. From a complete and properly analyzed electrolysis survey, a great deal of good can generally be accomplished. It will not always be possible to remove all stray currents from the pipes, but measures will be indicated by which the conditions can be greatly improved, and points of greatest danger will be located. If then trouble does occur at a later time at these points, the electrolysis survey may be most valuable in affording proof of the destruction of the property from railway currents, and may be the means of compelling the railroad company not only to pay for the damage, but also to make improvements in its return system so as to avoid the recurrence of such damage. I know of a number of electric railroad companies who are regularly paying for damage caused by electrolysis to piping systems. The knowledge that a pipe-owning company is making electrolysis tests and is keeping watch on the situation, also has a strong moral effect on the electric railroads.

(To be continued).

HEMLOCK AND ITS USES.

The British Columbia Forest Service has data showing that western hemlock, which is being cut in increasing quantities on the coast, is a much more valuable timber than was heretofore thought. The sale is increasing throughout the province, some companies having placed it on the prairie market in successful competition with Douglas fir, on account of the lower freight rate and the relatively smaller danger of splitting in nailing. This latter reason makes it acceptable for joining and siding. At present the principal use of hemlock in British Columbia is in pulp manufacture, great areas in the north being cut over to supply this growing industry.

Authentic data are lacking with regard to the durability of western hemlock as compared with Douglas fir and other woods. The general impression is that Douglas fir is the more durable.

A few experiments made to determine the adaptability of western hemlock to treatment with liquid preservatives indicate that, as compared to Douglas fir, it offers about the same resistance to impregnation across the grain; but that it is easier to penetrate along the grain.

Hemlock is well suited for use in all but the heaviest construction work, as shown by results of tests which have been made, but up to the present time it has had a limited use in bridges and trestles. It has been used in some instances for caisson construction.

A considerable amount is cut into cross-ties. Many of the western railroads use Douglas fir, western larch, redwood and western hemlock exclusively for tie material. A large percentage of those ties are laid without preservative treatment. Occasionally it is cut into telephone or telegraph poles, but its use in this form has been very limited. It has the requisite strength for pole use and grows in such dimensions as to make it very suitable for this class of work. With a good treatment with some efficient preserving fluid it should give good service as a pole material.

Though practically all piling in the west is of Douglas fir, western hemlock is used to a limited extent, however, for this class of work and has apparently given satisfaction.

In house construction it is used a great deal as a framing material. For this class of work it serves as well as Douglas fir, and locally commands the same price.

When cut edge grain it makes good flooring material. It finishes smoothly on account of the uniform texture of the wood and it also wears evenly. It is not suitable for use in damp places on account of its tendency to warp under such conditions.

As a finish lumber it has the advantage of containing practically no pitch; it has a beautiful grain, works smoothly, takes stain readily, and when properly dried, will not shrink or swell materially under normal conditions. It presents a comparatively hard surface and consequently does not mar easily.