gather from the small and large barges. But we have got to build barges, and I think we should build them intelligently.

I have assumed an 11,000-barrel barge. Somebody may say 10,000 or 9,000. That is not essential. The dimensions of that barge will be 195 feet by 35 by 11 molded depth. That is not a departure from standard practice, and is indicated as probably the best standard barge.

Mr. HALL. Is that the average barge?

Mr. BUCKMAN. No; I do not think you could tell what the average barge is. We have a heterogenous mixture of barges of all kinds and descriptions. But the Research Department of the Maritime Commission and the Office of Defense Transportation recommend those sizes for barges which we are to build, if they are to be built economically to carry this traffic.

The CHAIRMAN. Can you tell us what type of barge is borne by the Federal Barge Line on the Mississippi?

Mr. BUCKMAN. They are very largely of that type. These figures correspond closely with the Federal Barge Line's equipment.

Now, the amount of steel in one of those barges is taken as 250 tons. It is assumed that they will go in tows of 3. That is to say, there will be 1 towboat for every 3 barges. If that assumption is carried out, then the amount of steel in the barge will be the steel actually in the barge plus the proportionate steel, one-third, that is in the tug. The steel in the standard steel tug, Diesel powered to 600 horsepower, with proper equipment to tow these barges at a speed of 5 miles an hour on the average—that is, they will go faster when they are empty, and they will go slower when they are full, but an average speed—is 160 tons. That, then, gives you the steel represented by each barge in itself and its proportion in the tug as 303.3 tons per barge.

So if you are talking about all-steel barges that we are going to construct, and which will be of the best design—leaving aside for the moment the necessities of the situation and whether or not you can get the steel—that is the kind of barge that should be built, and you will multiply your number of barges by 303.3 and you will get the number of tons of steel it is going to take.

As I stated before, the average speed of those barges, empty, and loaded, is taken as 5 miles.

Now, in order to give the pipe line the benefit of the doubt, and to take it at high efficiency—the smaller the pipe line, the lower the efficiency, of course, in energy consumed and in weight of steel—the pipe line is taken as a 24-inch line. You can take it at anything you want, but you have to have something to figure with. And the capacity of that pipe line for heavy oil is 250,000 barrels a day. The weight of a pipe line is a question of determination, largely governed by the pressures which will have to obtain, and that depends upon the number of pumping stations and the hydrostatic head, which again depends on the terrain. But the lightest pipe line which I think could possibly be used for serviceable work would be one which would, on the average—it would be heavier here and lighter there, but on the average, on a long line—carry a safe working pressure of something around 500 pounds. The working pressure would be heavier at some places, and you would have to have heavier pipe, and lighter at others, and you would have to use lighter pipe. The average weight of that pipe is 250 tons per mile, and practice indicates that you should add at least