

Next as to power: Twelve thousand five hundred barrels per hour at 750 pounds pump discharge pressure computes 3,767 water horsepower, and at 75 percent mechanical efficiency of the plunger type line pumps, and transmission—herringbone gears engine to pump—the engine horsepower becomes just 5,000 at each pumping station. Dividing the 5,000 horsepower into 3 units, and adding 1 unit for emergency, the total horsepower per station in Diesel engines becomes 6,250. For the entire line Henderson to Salem, of the 1,500 miles (I can scale it only at 1,750 miles—not 1,500), the average distance between stations including those on terrain practically level and on the mountainous sections, cannot be greater than approximately 34 miles, under usual pipe-line practice as to engineering details, and thus 44 stations would be required, forming a total of 220,000 horsepower in Diesel engines. But if the stations are closer together and the route is 1,750 miles as it scales on a Geographic Society map, then the engine power might easily mount to 400,000 horsepower.

But please remember that Diesel-engine power is even more critical than plate steel. Submarine engines are of the same type, built in the same plants as pipe-line engines; the engines for Diesel locomotives are of the same type, also built in the same manufacturing plants as pipe-line Diesels.

Then the great plunger-type pipe-line pumps required would necessarily be built in heavy machinery manufacturing plants—exactly where the vertical triple-expansion condensing steam-propulsion engines for our merchant ships are built, and the gear reductions for these great line pumps would be built in the same plants where reduction gears are made for use in the propulsion of warships powered with steam turbines through reduction gears to the screws.

And, after all, no such "big inch" pipe line has ever been built before; there will undoubtedly be some "bugs" in it, for this very large size of oil line can but be of the experimental type. For you know, of course, that most formulas relating to the design of pipe lines are empirical.

On the other hand, the Florida project—temporary pipe line and canal thereafter—has many merits. First, a series of lines to carry 300,000 barrels daily can be laid from St. Marks to the St. Johns River and oil can be started through without new steel and within 4 months from the time of starting, since the trenching will all be in soil with no rock at all, and the line pipe can be strung from a railroad which parallels the route.

A series of lines will carry "clean" and "dirty" oil-gasoline, compression-ignition engine fuel, crude and bunker fuel oil, for remember that east coast refineries have but 714,000 barrels' daily capacity, and an all-crude-oil movement does not match east coast requirements, while, of course, we cannot now move refineries from Texas to the east coast.

The Navy Department will receive its requirements of all oils at Norfolk—aviation and motor fuel, lubricants, compression-ignition engine fuel, bunker fuel—and delivery by barge of these various products is "right down the alley" of these coastal waterways. The distance from Texas refineries to Norfolk is far less than from Henderson to Bayonne and then down to Norfolk, and the barge route is all inland out of gunshot from salt water, while the route from Bayonne is outside and subject to naval attack from New York harbor southward.

Now as to barges: If the Governor of Florida had given you the exact location of the barges in the list which you testified had been sent to Interior Department, doubtless the next day none of them would have been at the same location, for tugboats have a habit of moving barges from one place to another. But I see no reason whatever for doubting the chief executive of Florida merely because he did not give you the exact location of each piece of this floating equipment. All floating equipment, down to the smallest launch, is registered in customhouses all over the country, and full sincerity on the part of the Interior Department would find it inquiring for itemization of all such floating equipment from these records, for the records contain dimensions, draft, tonnage, power, location, home port, and owner.

The Gulf Intracoastal Canal, running inland along the Texas, Louisiana, and Mississippi coast, intersects and connects with every coastal-refinery terminal with every pipe-line terminal delivering oil from the interior of Texas, New Mexico, Oklahoma, Arkansas, Louisiana—a network of lines, canals, and with terminals which exactly suited a movement by tankship, and which now exactly and precisely suits an equal movement by barge lines on a Gulf-Atlantic run. Such great facilities cannot be so easily set aside with trivia.