5-1-1925

City Club of Portland Bulletin vol. 05, no. 32 (1925-5-1)

City Club of Portland (Portland, Or.)
FRIDAY, MAY 1
Hotel Benson 12:10

ANNUAL MEETING
Election of Officers

SPEAKER
J. CHRISTY WILSON
of Tabriz, Persia

SUBJECT
“Present Day Conditions in Persia”

SPECIAL MUSIC
MRS. GENEVIEVE C. DUNDORE . . . Sporano
LINDSLEY ROSS . . . . . . Accompanist

The Upper Columbia River as a Waterway

The report of the Port Development and Public Utilities section of the City Club on Upper Columbia river development is presented in this issue of the Bulletin. The report has been approved by the Board of Governors and will be presented to the Club for adoption on Friday, May 1st. Members of the committee are: Francis H. Murphy, L. A. Andrus, committee chairman, and L. K. Hodges, section chairman. The report follows:

To the Board of Governors:

Your committee appointed to make a study of “The Upper Columbia River as a Waterway” herewith submits its report.

Because of its length we have (1) summarized the conditions which must be considered in solving this problem; (2) we have given you our conclusions as to the principles which should govern development and improvement of this river system; (3) we have recommended that the City Club take action along certain lines; and (4) we have then presented the detailed information on which we have based our conclusions and recommendations.

We have received valuable assistance from Mr. F. C. Schubert, Corps of Engineers, War Department; from Mr. James Polhemus, Chief Engineer of the Port of Portland, who made available to us Mr. H. R. Rands’ splendid report, and from Mr. J. P. Newell.

FRANCIS H. MURPHY
L. A. ANDRUS, Chairman
L. K. HODGES, Chairman of Section

I.—THE PROBLEM

Portland lies practically at the mouth of one of the great river systems of the world. The upper Columbia and its chief tributary, the Snake, drain 252,000 square miles of sparsely populated agricultural land, a territory in which there is only one large city above Portland and that located on neither stream, in which there is practically no manufacturing, except the pine lumber industry, and in which the extractive industries are of minor importance.

These rivers carry large volumes of water, their flood seasons coming in the early summer as a result of snow melting on the mountains which bound their drainage areas. Both rivers have relatively steep slopes, their courses com-
The Upper Columbia River
Continued from page 1
prising a series of pools separated by rapids or falls. For a large part of their length, they run at the bottom of deep canyons or gorges with the agricultural lands at considerable heights above and oftentimes well back from their banks. Much of the territory traversed is semi-arid and with insufficient rainfall to provide for annual crops without irrigation.

Railroads parallel the Columbia between Portland and Pasco and the Snake to Lewiston, while branches from these lines run out into the farming, mining and timber country. Several streams flow into these rivers, some of which are ideally adapted to power development.

For many years a considerable volume of water borne traffic was handled on the Columbia and Snake rivers, and the Federal Government has spent almost $10,000,000 in channel improvements and on structures to make possible the passage of the worst obstructions with the intention of fostering this traffic. In spite of the expenditures, river traffic above Portland has disappeared except for special instances over limited stretches. This condition is primarily due to the fact that slack water navigation ends about 50 miles above Portland and beyond this point the boat operator encounters such swift currents and shallow water that barge navigation is out of the question and steamers have all they can do to traverse the rivers.

The undeveloped arid lands bordering these streams lie at such elevations and distances and the contour of the valleys is such that gravity canals for delivering water from these rivers are not ordinarily feasible and most of these irrigation projects can be watered only by means of pumping plants. Fortunately, the flood period of both streams coincides with the period of maximum demand for irrigation as well as with the time when the secondary, or flood water, power of any power plant is the greatest. Between Priest Rapids on the Columbia, Riparia on the Snake and The Dalles on the Columbia, there are over one-half million acres of arid land within pumping distance of these rivers.

In the Columbia River basin and in the territory immediately to the East, there are great stores of raw materials, now largely undeveloped. Some of these require large quantities of cheap power to reduce them to usable form, and all will find markets more easily if they can be carried to the consumer at low transportation costs.
On rivers of the size of the Columbia and the Snake, improvement works for navigation or power developments involve very heavy expenditures of capital, but inasmuch as the most expensive structure for either project, the dam, is common to both, it is apparent that such improvements can be built most economically when built concurrently. Canalization and power development are thus brought into being together, thereby providing a transportation artery on which may be carried the products from the expenditure of the power.

Power developments on these rivers result in the generation of blocks of power of such size as to be unwieldy and unless there be a demand for a considerable proportion of the possible primary power of any project at the inception of the development, the carrying charges during the early years will make the project commercially impracticable.

It has been estimated that the cost of canalization of the Columbia to Priest Rapids and of partial canalization of the Snake to Lewiston, with power plants at each dam, would be $175,000,000. There could be generated almost 1,000,000 primary horsepower at these power plants. It is useless to urge the expenditure of any such sum within a limited period, either by the Federal Government or by private enterprise. There is no existing demand for such a vast quantity of power and there is no possibility of diverting to the river enough tonnage to justify such an investment. Waterway improvement and power development on these rivers are essentially business enterprises, should be treated as such and should be undertaken as and when the demand for the commodities produced is sufficient to enable each unit of the combined projects to pay its way.

These rivers are both classed as navigable and as such are under the control of the War Department and the Federal Power Commission. No river improvement works can be constructed without the approval of the Chief of Engineers of the War Department and no power developments may be undertaken without securing a license from the Federal Power Commission.

II.—CONCLUSIONS

From the foregoing statement of conditions and a study of the detailed information given hereafter, the following conclusions are drawn:

1. That complete canalization of the Columbia River to Priest Rapids and partial canalization of the Snake River to Lewiston must be accomplished before these rivers can become factors in the transportation system of the Columbia River Basin; that power development on these rivers will aid materially in promoting the growth of the contiguous territory, thereby increasing the production of and demand for commodities which may be transported on these rivers; that improvement of the river and development of power can be accomplished most economically when built concurrently; and that, therefore, plans for one improvement should take into consideration and make provision for the other.

2. That no further development below Priest Rapids be undertaken until there has been worked out a comprehensive plan for the improvement of these rivers. This plan should show in considerable detail the location, type and size of works for power development and for securing slack water navigating conditions; the location of river ports; the terminal facilities required at these ports and the roads which must be built or improved to give suitable access to them. That such a plan include or be supplemented by a survey of markets and of raw material resources of the Northwest which may furnish the basis of industries using large quantities of power and producing large tonnage of bulk freight.

3. That a demand for a considerable part of the primary power generated at each improvement project must be in existence before the project is begun by private capital. That this condition can be brought about by locating some industry requiring large quantities of power at or near each dam-site concurrently with the building of the dam or by developing a market within practical transmission distance of the dam-site.

4. That the improvement for navigation of the Columbia above Portland should progress from one end toward the other; and that the interests of all will be best served by starting this improvement at Cascade Rapids.

5. That federal state or municipal ownership and operation of the power plants at the various dams is most undesirable, and that these developments should be carried out by private capital under licenses from the Federal Power Commission, the Federal Government paying the cost of those structures useful as aids to navigation.

6. That rates and standards of service for transportation on these rivers should be brought under the control and supervision of the Interstate Commerce Commission, and that, upon proper showing, certificates of necessity and con-
venience should be issued to any qualified applicant, if, by so doing, service in the Columbia Basin can be benefitted.

7. That the water of these rivers can be used for three purposes—navigation, power development and irrigation—and that the allocations for each should be so co-ordinated that no one will suffer by reason of the water diverted for the others. That by the provision of adequate storage facilities, the great quantity of water required for the Columbia Basin Irrigation Project can be taken from the Columbia and its tributaries without diminishing the flow necessary and desirable for navigation and power development and may prove beneficial through the return of seepage water to the river during the low water period in this stream. The fact must not be overlooked that the Columbia and Snake flow through three states and that the Columbia passes through Canada. Each state has its rights to these waters and Canada has, through a treaty with the Federal Government, the right to free navigation over the Columbia to its mouth. Any diversion or construction, therefore, which would impair the adequacy of the Columbia as a transportation artery would doubtless meet with opposition from Canada.

III.—RECOMMENDATIONS

You committee believes that the most useful function the City Club can perform at this time is to disseminate accurate information as to conditions as they exist with respect to navigation and power development on these rivers, to urge the preparation and adoption of a comprehensive plan for such improvements based on the principles laid down in our conclusions, and to support all efforts toward the fulfillment of part or all of this plan, when such efforts are substantially in accord with the conditions we have stated above.

We recommend that the City Club discriminate most carefully in lending its endorsement to proposals for developments on these rivers, making sure that they are in substantial conformity with the general plan and principles and that they will stand the test of close business analysis whenever power development shall be involved. The published statements concerning the plans for the Priest Rapids project, for which federal license has recently been issued, conform with the principles laid down in this report and provide an excellent illustration of the type of development which should be encouraged on the river below.

We believe that the City Club will do a useful service by lending support to any qualified central organization investigating the raw material resources of the Columbia River Basin and the markets for the products to be manufactured from these materials.

Because of the magnitude of any single development it is reasonable to assume that considerable time will elapse before the work preliminary to construction will start, and we urge the Club to use this interval in conducting an educational campaign which will acquaint the public with the problems involved.

IV.—CONDITIONS EXISTING ON COLUMBIA AND SNAKE RIVERS

Existing conditions will be detailed only to the extent necessary to make clear the reasons for the conclusions drawn. The facts will be presented in the following order:

The present condition of the rivers.
Federal improvement projects.
Commerce since opening of Dalles-Celilo canal.
Tonnage originating in territory tributary to Columbia and Snake rivers.
Factors limiting river commerce under present conditions.
Proposed canalization of Columbia and Snake and concomitant development of electric energy.
Digest of Federal Water Power Act.

Present River Conditions Outlined

Portland to Columbia River.—Willamette River is dredged to a minimum depth of 35 feet.
Mouth of Willamette to Bonneville.—(About 42 miles.) A tidal reach, with but little fall and current except during the summer freshet season. Minimum depth 12 feet.
Bonneville To Head of Cascade Rapids.—(4.33 miles.) The river gorge where the Cascade mountain chain is penetrated, has a total fall of 34.6 feet at low water and strong currents at all stages of the river. There is now a minimum depth at low water of seven feet and a channel width of 250 feet.
The Head of Cascade Rapids To the Foot of Three Mile Rapids.—(4.33 miles.) The river gorge where the Cascade mountain chain is penetrated, has a total fall of 34.6 feet at low water and strong currents at all stages of the river. There is now a minimum depth at low water of seven feet and a channel width of 250 feet.
The Foot of Three Mile Rapids To Lower Entrance of Dalles-Celilo Canal.—(4235 miles.) A rather quiet pool with a total fall of 4.01 feet with no very strong currents at any stage of the river.
The Lower Entrance of Dalles-Celilo Canal.—Channel conditions are fairly good at low stages of river but at medium and high stages, on account of the narrow rock gorge through which the river flows, there are swift currents, boils and eddies which make navigation difficult for even high powered steamers, and preclude barge navigation through
this reach without further improvement of the river.

Celilo Canal—8½ miles long, having a channel width of 65 feet at the bottom, a channel depth of 8 feet, and five locks with a minimum channel width of 45 feet, and an available depth of seven feet on the sills. Each lock has an available length of 265 feet for the maximum width.

Celilo To the Snake River.—(123 miles.) In this section of the river there is a fall of 186 feet at low water. There are 19 rapids with falls of from 2 to 17 feet, each. Homily, Umatilla and Devils Bend Rapids now offer the greatest obstacles to navigation in this section. The controlling depth is four feet at low water, with channel widths of 100 feet through all rapids except Homily, where the channel is only 70 feet wide. Channel widths in the pools between rapids are from 400 to 1500 feet.

Mouth of Snake To Foot of Priest Rapids.—(78 miles.) This stretch has a controlling depth of three feet, at low water, with only slight current.

Priest Rapids.—The river has a fall of 68 feet, at low water in a distance of 92½ feet. There are seven rapids in this stretch with short pools between.

Priest Rapids To Cabinet Rapids.—In this stretch of 42 miles, the controlling depth is not less than three feet, at extreme low water, and operating conditions are otherwise favorable.

Cabinet Rapids To Head of Rock Island Rapids.—At Cabinet Rapids there is a fall of 10 feet, in 8000 feet. Above is a pool six miles long with only minor falls, then Rock Island Rapids with a fall of 12½ feet, in 8000 feet. Both of these rapids are un navigable at low water but can be passed by high powered boats at stages of 10-12 feet, above low water.

Rock Island Rapids To Wenatchee.—Navigation in this stretch is difficult at low water because of small rapids and boulders. The controlling depth at low water not less than three feet.

Mouth of the Snake To Riparia.—(67 miles.) The river bed is in solid rock, has a fall of 201 feet, or 3.03 feet per mile, and includes 18.26 miles of rapids and 48.44 miles of reaches. The low water discharge is about 14,000 second feet. At high water there are no obstructions to navigation except the swift current. The controlling depth at extreme low water is 30 inches.

Snake River, Riparia To Lewiston.—(73 miles.) The river bed has a gravel bottom and the obstructions are principally gravel bars. There are 25 such shoals with a maximum current velocity of nine miles per hour. The total fall in this section is 199.6 feet, an average of 2.67 feet per mile. The pools aggregate 58.55 miles and the rapids 14.7 miles. The controlling depth at extreme low water is four feet, and navigation can be carried on throughout the year except when the river is closed by ice.

Snake River, Lewiston To Johnsons Bar.—(100 miles.) The river to Dodg (17 miles), is similar to that between Lewiston and Riparia. Above to Wild Goose Rapids (15 miles) are some steep rapids and swift currents. Above Wild Goose Rapids the river runs through a deep canyon with numerous rapids and narrow channels. At present, navigation is confined to gasoline launches which can operate only when there is a stage of three to four feet, on the Lewiston gorge. Pittsburg landing is 74 miles above Lewiston.

Federal Government Improves Columbia River

The Federal Government has improved the tidal reach from Vancouver to Bonneville by removing snags and boulders, placing buoys and range lights and otherwise making the channels safer for navigation.

Between Bonneville and the foot of Cascade Rapids, the channel has been cleared of obstructions to a minimum depth of seven feet, and width of 250 feet. In 1914 the government completed the Cascades Canal around the upper Cascades Rapids. The rapids are passed by means of one lock having two chambers in flight and a canal with an over-all length of 3000 feet, and a clear width of 90 feet. Before this lock and canal were built, the head of navigation was at Bonneville, and freight was carried around the rapids on wagons or on a short portage railroad on the Washington side of the river.

The pool from the Cascades Canal to The Dalles required no improvement and no work has been done by the government in this stretch.

The government's improvement project of 1904 provided for open river improvement from the foot of Three Mile Rapids to the foot of The Dalles (or Five Mile) Rapids and a continuous canal on the Oregon shore from the foot of The Dalles Rapids to the head of Celilo Falls. This project is 99% complete. The canal was opened to navigation May 5th, 1915. It is 83½ miles long, has five locks and overcomes a total fall of 81 feet, at extreme low water. This stretch of the river was un navigable at all stages. All freight for points above The Dalles was transferred around these rapids in wagons up to 1905, when the Oregon Portage Railroad was
opened to traffic. With a channel 10 feet deep at low water and 250 feet wide through Three Mile Rapids and with The Dalles-Celilo canal, a heretofore unnavigable section of the river is opened up for river boats at all stages. The current through Three Mile Rapids is too strong to permit barge navigation upstream.

Beginning in 1872 and continuing to date, the federal government has been making appropriations for improvement of the Columbia river from Celilo to the mouth of the Snake. The existing project provided for removing obstructing boulders and ledges and raking the gravel shoals in order to provide safe navigation in such channels as exist. The section is 124 miles long. This project is 96% complete and has resulted in producing a controlling depth of four feet at adopted low water over all shoals and minimum channel widths of 100 feet, except at Homly Rapids where the width is 70 feet. The remaining work under the project consists of straightening the most dangerous channels through the rapids.

Between the mouth of the Snake and Wenatchee, no improvement work has been done by the federal government.

Large Expenditures Involved

Total expenditures by the government on new improvement work, not including maintenance, through June 30th, 1923 have been as follows:

<table>
<thead>
<tr>
<th>Project</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cascades Canal</td>
<td>$3,903,780.30</td>
</tr>
<tr>
<td>Dalles-Celilo Canal</td>
<td>4,719,154.62</td>
</tr>
<tr>
<td>Columbia River above Celilo Falls to mouth of Snake River</td>
<td>507,510.90</td>
</tr>
<tr>
<td>Appropriation by State of Washington and expended by federal Government</td>
<td>25,000.00</td>
</tr>
<tr>
<td>Total</td>
<td>$9,155,445.82</td>
</tr>
</tbody>
</table>

Federal improvement of the Snake river has been carried on under Acts of Congress of 1902, providing for the sections from Riparia to Lewiston and Lewiston to Pittsburg Landing, and of 1910 providing for the section from the mouth to Riparia. The existing project “provides for general open-river improvements by blasting rock-reefs, dredging and raking gravel bars, and the construction of some contraction works, with a view to securing a depth of five feet in the existing channels from the mouth to Riparia, and thence of the same depth and 60 feet wide to Lewiston. No increase of depth above Lewiston is contemplated.” (An. Rept. Ch. of Engrs. 1923, p. 1735.)

This project was 72% complete at the end of June, 1923. The controlling depth on the shoals between the mouth and Riparia is two feet at one point at adopted low water, (minus 0.3 feet on the Lewiston Gauge) between Riparia and Lewiston, two and one-half feet at one point, and above Lewiston to Pittsburg Landing about two feet. Channels below Lewiston vary from 240 to 700 feet wide in the pools and from 60 to 150 feet wide through the rapids. Above Lewiston the channels are from 50 to 100 feet wide. Navigation is limited to stages of three feet on the Lewiston gauge from the mouth to Riparia. From Riparia to a point 12 miles above Lewiston, navigation is practically continuous. It is doubtful if the five foot channel depth contemplated by this project can be obtained at all points by open-river methods of improvement.

Through June 30th, 1923, the federal government expenditures on new work under all projects for the Snake River had amounted to $291,661 and in addition there had been spent on new work $85,000 contributed by the State of Washington, a total of $376,661.

Commerce Developed On Columbia and Snake Rivers

Before the completion of the Oregon Railroad and Navigation Company's railroad, the Columbia river offered the only economical trade route between Portland and the country east of the Cascade mountains. Goods were shipped by boat to Bonneville, transferred around the Cascade rapids on wagons and later on a portage railroad on the Washington side of the river, loaded again on boats to be delivered at The Dalles. If destined for points further east, another portage around Celilo Falls was necessary, then another boat delivered to up-river points on the Columbia or Snake. In those days, rates were high, service slow and uncertain, and interruptions because of floods or ice rather frequent. All boats were combination freight and passenger carriers, and while efficient for the purpose for which built, suffered from the handicaps imposed in trying to cater to two services.

With the coming of the railroad, the boat lines were confronted with competition offering lower rates, practically continuous service, and conveyances suited to the load to be carried.

The boat lines met this competition by cuts in rates to a point where shippers of certain commodities found it to their advantage to use water transport, and the construction of the Cascades canal and the Oregon Portage railroad so expedited the service that a considerable tonnage continued to move on the river. To remove the last obstacle to continuous naviga-
tion from Portland to the upper Columbia and the Snake, the federal government undertook the construction of The Dalles-Celilo Canal on a right-of-way provided by the state of Oregon, improved the channel through all other rapids so that navigation would be safe and practicable at all ordinary stages of the river between Portland and Priest Rapids on the Columbia and to Lewiston on the Snake.

Continuous Water Route Provided

The opening of The Dalles-Celilo canal on May 5th, 1915, permitted through navigation between Portland, Priest Rapids and Lewiston, without transhipment of cargo. Boat lines were in a better position to compete with the railroads, so far as operating conditions were concerned, than ever before. The following statistics show the tonnage passing through the Cascades and The Dalles-Celilo canals:

<table>
<thead>
<tr>
<th>Year and Down</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1913</td>
<td>No Com. No boats operating above The Dalles.</td>
</tr>
<tr>
<td>1914</td>
<td>3494</td>
</tr>
<tr>
<td>1915</td>
<td>4,277   Dalles-Celilo canal opened May 5th, 1915.</td>
</tr>
<tr>
<td>1916</td>
<td>443,094</td>
</tr>
<tr>
<td>1917</td>
<td>37,280</td>
</tr>
<tr>
<td>1918</td>
<td>40,135  Operation of boat lines suspended above The Dalles October 31st, 1917.</td>
</tr>
<tr>
<td>1919</td>
<td>25,733  No boat service above The Dalles.</td>
</tr>
<tr>
<td>1920</td>
<td>18,459  No regular service above The Dalles.</td>
</tr>
<tr>
<td>1921</td>
<td>10,557  One boat making round trip every two days, Portland-The Dalles.</td>
</tr>
<tr>
<td>1922</td>
<td>5,424   One boat on run, round trip every day when in service. No commerce through the canal from January 12th to May 1st and from May 9th to September 1st, 1921, on account of suspension of all boat service to points above the canal. The canal was also closed by ice from December 19th to December 31st, 1921, inclusive.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Year and Down</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1913</td>
<td>No boat operating above The Dalles.</td>
</tr>
<tr>
<td>1914</td>
<td>No boat operating above The Dalles.</td>
</tr>
<tr>
<td>1915</td>
<td>8,394   May 5th to December 25th. To Lewiston and way points.</td>
</tr>
</tbody>
</table>

Large Tonnage Originates In Territory of Columbia and Snake Rivers

Probably the most thorough and painstaking survey of the tonnage originating in the counties of Washington, Oregon and Idaho bordering on the Columbia and Snake rivers was made by H. A. Rands, Consulting Engineer, of Portland, for the Port of Portland Commission. The report is entitled "Upper Columbia and Snake River Traffic Survey" and was undertaken for the purpose of studying and outlining natural Trade Drainage Districts of the country contiguous to the Columbia and Snake rivers."

Mr. Rands spent four months in the spring of 1918 in a personal examination of the territory. Statistics of grain production which follow are taken almost exclusively from this report.

Mr. Rands, for his purpose, divided the territory into seven divisions:
1. Between Portland and Warrendale, 56 miles.
2. Warrendale to the foot of Three Mile Rapids, below the entrance to The Dalles-Celilo Canal, 50 miles.
3. Foot of Three Mile Rapids to the mouth of the Snake, 135 miles.
4. Along the Columbia from the mouth of the Snake to Priest Rapids, 78 miles.
5. Along the Snake from its mouth to Lewiston, 139 miles.
6. Lewiston to Johnson's Bar, 100 miles.
7. Along the Clearwater river, Lewiston to Kamiah, 68 miles.

Practically no grain or other crops are produced throughout the first division and navigating conditions are now so favorable that the only hope of increasing water borne traffic from this division lies in expansion of the industries in Vancouver, Camas and Washougal.

Mr. Rands arrives at the tonnage of the Second Division by deducting the tonnage
passing The Dalles-Celilo Canal from that passing the Cascades Canal. For 1917, this tonnage was 32,289. This figure does not, of course, represent the total tonnage of agricultural or manufactured products originating in the division. It is actual river traffic for 1917 and has since dwindled to an insignificant figure.

Washington State Grain Reports credit Lyle with warehouse receipts of 832 tons of grain in 1917. This is produced in territory tributary to towns on the river in the Third Division and will be included there.

The tonnage produced in the Third Division territory is predominantly wheat. Some wool comes to the river on the railroads, but the bulk of it is shipped from the towns toward the ends of the branch lines. At Umatilla there is an irrigated district of considerable proportions but most of the products are consumed near by. Mr. Rands summarizes the tonnage of this Division as follows:

<table>
<thead>
<tr>
<th>Tons</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grain moved by steamer per year</td>
</tr>
<tr>
<td>Grain moved by R. R. from river points</td>
</tr>
<tr>
<td>Grain moved by R. R. from interior points</td>
</tr>
<tr>
<td>Total grain</td>
</tr>
</tbody>
</table>

It should be remembered that Mr. Rand's report was made when boats were operating regularly above The Dalles-Celilo Canal.

The Fourth Division includes most of Benton and Franklin counties, Washington. The Rands report shows the following tonnage originating in this territory:

<table>
<thead>
<tr>
<th>Tons</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grain moved by rail from river points</td>
</tr>
<tr>
<td>Grain moved by rail from interior points</td>
</tr>
<tr>
<td>Total grain</td>
</tr>
</tbody>
</table>

Considerable tonnage originates on the irrigated lands in these counties, but the great bulk is used locally or moved to the east by rail. Mr. Rands states that it is doubtful if much of the grain now marketed from inland rail points can be diverted to the river because of distance in the case of Franklin county and because most of the grain growing districts of Benton county are close to the Northern Pacific railroad.

The Fifth Division includes the great wheat growing counties of Washington along the Snake river from the mouth to Riparia, while from Riparia to Lewiston there is one railroad, the O.-W. R. & N. Co., on the north bank, only. The wheat raised on the lands south of the river between Riparia and Lewiston is brought to the river and ferried over to the railroad on steamers owned and operated by the railroad company, the cost of this service being absorbed in the rate from shipping point.

Mr. Rands estimates the grain tonnage of this Division to be:

<table>
<thead>
<tr>
<th>Tons</th>
</tr>
</thead>
<tbody>
<tr>
<td>Through grain tonnage now moved by river</td>
</tr>
<tr>
<td>Grain tonnage hauled to railroad points on river</td>
</tr>
<tr>
<td>Grain tonnage hauled to railroad points in interior</td>
</tr>
<tr>
<td>Total grain</td>
</tr>
</tbody>
</table>

A small additional tonnage of canned fruit and grain products originates at Lewiston and the irrigated districts around that city produce a considerable quantity of fruit. It seems unlikely that much of these products would move toward Portland in competition with similar products grown at down-river points.

Maps prepared by Mr. Rands show that the territories embraced in his sixth and seventh divisions, so far as grain-producing sections are concerned, are much the same. These divisions include Latah, Clearwater, Nez Perce, Lewis and Idaho Counties, in Idaho, and Asotin County in Washington, and in these counties there is produced, according to a report of the Lewiston Commercial Club, wheat, barley and oats aggregating 287,700 tons. Grain delivered to Asotin is transferred to its tracks in Lewiston by the O.-W. R. & N. Company, without charge, while flour milled at Asotin is delivered to Lewiston by truck. Practically all of the grain raised in the Idaho counties is shipped out by rail through Lewiston. Some grain from Latah county is taken out through Moscow to the north. The mills of the Lewiston Milling Company have a capacity sufficient to use practically one-half of the wheat crop of these counties, or about 70,000 tons. The flour has uniformly been shipped out by rail, but the feed by-products were shipped out by water in considerable quantities when boats were operating.

Mr. Rands states that the Clearwater is not what may be considered a navigable stream. "Shoals, bars, divided currents and rapids characterize its channel from the mouth." Such being the case, all tonnage developing along its course must be delivered to Lewiston before it can become potential river freight.

From the foregoing, it is apparent that the territories of the Third and Fifth Divisions produce the bulk of the tonnage truly tributary
to the river. The sum of the annual tonnage of these divisions is:

<table>
<thead>
<tr>
<th>Tons</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Grain moved by steamer (up to 1918)</td>
<td>2,000</td>
</tr>
<tr>
<td>Grain moved by rail from river points</td>
<td>85,920</td>
</tr>
<tr>
<td>Grain moved by rail from interior points</td>
<td>882,432</td>
</tr>
<tr>
<td>Total grain</td>
<td>960,352</td>
</tr>
</tbody>
</table>

Mr. Rands states: "The average grain tonnage of all Eastern Washington, Wasco, Sherman, Gilliam, Morrow and Umatilla counties, in Oregon, and Latah, Nez Percé, Lewis, Idaho and Clearwater counties in Idaho, amounts to 1,930,000 tons. As near as can be determined, this tonnage finds primary market about as follows:

<table>
<thead>
<tr>
<th>Tons</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>At Union Pacific and Spokane, Portland and Seattle points</td>
<td>670,000</td>
</tr>
<tr>
<td>At competitive points</td>
<td>230,000</td>
</tr>
<tr>
<td>At Northern Pacific, Great Northern and Chicago, Milwaukee and St. Paul points</td>
<td>1,030,000</td>
</tr>
<tr>
<td>Total grain</td>
<td>1,930,000</td>
</tr>
</tbody>
</table>

The Engineers of the U.S. War Department estimate the wool and miscellaneous outgoing tonnage at not less than 50,000 tons, much of which moves by rail to the east.

Efforts were made to ascertain the tonnage to and from various river points which might be diverted to boat lines. Answers to the questionnaire submitted were without statistical value.

The above figures represent careful estimates of tonnage now produced annually in territory more or less tributary to the Columbia and Snake rivers. A concise statement of tonnage which might be developed in territory directly tributary to these rivers may well be added.

Along the Snake in Asotin county, Washington, there are immense deposits of lime rock, notably one just above the mouth of the Grande Ronde, 25 miles above Lewiston. There are large deposits of marble in the same district.

Coal of an inferior grade is found 15 to 20 miles up the Grande Ronde above its mouth. In spite of its poor quality, it might be found useful in a country where any fuel is scarce and high-priced.

There are many copper-silver mining claims on the Snake near the mouth of the Imnaha river 50 miles above Lewiston.

The greatest tonnage developed would come from lands, now barren, supplied with water by pumps operated with power from hydro-electric plants at dams on the Columbia and Snake rivers, the dams serving the double purpose of producing slack water in the rivers and effective heads on the water wheels.

Irrigation Projects Are Considered

The following list of feasible irrigation projects along the Columbia and Snake rivers is taken from a bulletin of the State Engineer of Oregon:

<table>
<thead>
<tr>
<th>Average Irrigible Pumping</th>
<th>Area</th>
<th>Lift</th>
</tr>
</thead>
<tbody>
<tr>
<td>Horse Heaven Slope</td>
<td>61,000</td>
<td>300 ft.</td>
</tr>
<tr>
<td>Berrian Slope of Columbia</td>
<td>4,300</td>
<td>367 ft.</td>
</tr>
<tr>
<td>Castle-Arlington Slope</td>
<td>150,000</td>
<td>380 ft.</td>
</tr>
<tr>
<td>Three Rivers Slope</td>
<td>42,000</td>
<td>343 ft.</td>
</tr>
<tr>
<td>Pasco</td>
<td>80,000</td>
<td>265 ft.</td>
</tr>
<tr>
<td>Benton</td>
<td>109,000</td>
<td>225 ft.</td>
</tr>
<tr>
<td>Priest Rapids</td>
<td>112,000</td>
<td>310 ft.</td>
</tr>
<tr>
<td>Total</td>
<td>558,300</td>
<td></td>
</tr>
</tbody>
</table>

If this area could be made relatively as productive as the existing Umatilla project, it would produce annually over 2,000,000 tons of crops.

This estimate of tonnage takes no account of the merchandise moving to inland points from Portland. The amount of this east bound tonnage has never been accurately summarized, but it is manifestly of considerable extent and it is plain that boat lines must share in its movement. The reasons why part of this merchandise tonnage must go by water will be discussed later.

River Commerce Limited Under Present Conditions

It has never been conclusively demonstrated that water transportation on such rivers as the Columbia and Snake and through a territory with the agricultural and industrial development and population density which now obtains along these rivers, can compete successfully with rail or highway transportation. Before a fair trial can be made of the economy of water transportation in this district, many things must be done. The most important will be discussed here.

Above Bonneville on the Columbia, efficient operation of single boats is impossible because of the excessive currents encountered at all stages of the river. The use of fleets of barges is entirely impracticable. Any boat operating over this stretch of the river must be provided with enough power to surmount the many rapids, power far in excess of that required to operate through the pools. It may be contended that towboats would go upstream with the barges light, which is probably true, in large measure,
but even so no rowboat which it would be economical to use could take its complement of barges through such rapids as those below Cascade Locks or Three Mile Rapids below The Dalles-Celilo Canal. Additional boats, used purely as helpers, would have to be provided at such points.

Between Portland and Celilo boats and barges drawing six to seven feet of water can be operated at all stages of the river. Above Celilo there are considerable periods each year when a four foot draft is the maximum. As a result, the boats operating below Celilo cannot carry a full load above that point and a boat operator must take his choice between shallow draft craft for the whole journey or shallow and deep draft boats for the two divisions of the river with transhipment of cargo at Celilo.

While the rapids from Priest Rapids to Wenatchee can be navigated at high stages of the river, the currents are so strong and the channels so narrow that it is only feasible for single boats of high power to make the trip.

Conditions are unfavorable on the Snake between its mouth and Riparia due to shallow water and swift currents on the ledges. Above Riparia, there is more depth but there are many bars where strong currents exist.

The swift currents of the Columbia and Snake rivers are due to the high rate of fall of these streams. Between the foot of Priest Rapids and Celilo, a distance of 190 miles, the fall of the Columbia averages 1.36 feet per mile, this fall being concentrated largely in some 20 rapids, while the Snake falls almost 3 feet per mile from Lewiston to its mouth. As a comparison, it is stated by Mr. Rands that in the 380 miles below Pittsburg, the Ohio river falls 231 feet, while in the 380 miles from Lewiston to Vancouver, the Snake and Columbia fall 605 feet after allowing for the fall overcome by the Cascade Locks and the Dalles-Celilo Canal. In spite of this relatively small fall on the Ohio, the Federal Government has deemed it necessary to canalize that river so as to minimize what current existed and provide a uniform minimum depth of water throughout.

Boating Season Interrupted

The boating season on the Columbia is subject to two interruptions annually. Ice in the river may cause a suspension of navigation of from one to six weeks at any time between December 15th, and February 15th. In about two out of three years, the spring flood reaches such a stage that the Cascade Locks and the Dalles-Celilo Canal must be closed to navigation for from two to six weeks. This usually occurs in June.

On the Snake, navigation is somewhat hazardous when the river is below three feet on the Lewiston gage. Mr. Rands finds that a stage of three feet or over may be expected for only 137 days per annum, on an average, this period running from March 5th to July 20th. It is obvious that this period is not included in the crop moving season.

Even if channel and current conditions were favorable, successful boat operation would be well nigh impossible without adequate terminal facilities. Mr. Rands' comments on this phase of the problem are pertinent. "On the Columbia it may almost be said that no port facilities exist. Not only is there danger (to shipments) from loss by theft, and damage by storm, but there is a great inconvenience by reason of driving and turning teams in difficult places. When a farmer ships or receives anything by rail, he backs his wagon against a platform at the same approximate level as his wagon bed and rolls his load off on as the case may be. The same conveniences must be afforded at river points before steamers can hope to obtain any great amount of tonnage on the Columbia or elsewhere. The constructing of these terminals is something the operating companies cannot pay for. The traffic will not stand it, and, for that matter, wherever river traffic has assumed any considerable proportions the terminals have been provided by the public, and used by the operating companies free of charge. The same rule must apply to the Columbia and Snake rivers, and until the communities, port districts or counties, take up this matter of providing terminals the water borne traffic on these rivers above The Dalles, in the future as in the past will remain next to negligible in amount."

Landing Facilities Poor

In his report, Mr. Rands lists 50 points as being natural ports for river shipments. Of these, four had dock facilities for the care of river freight, and 12 had warehouses on the banks above beach landings. At the other 40 points no terminals existed in 1918, and at no place was there railroad connection.

Inasmuch as practically all of the grain producing areas are at some distance from the rivers, good roads to the terminals are a necessity if grain is to be diverted from the inland rail points. Mr. Rands found road conditions on the approaches to the terminals unfit for heavy traffic in the majority of cases, and the beach landings difficult of access.

Under present conditions of channel and landings, the sternwheel river boats in use on the
Columbia and Snake rivers are suitable and efficient. They are combination freight and passenger boats, however, a type not suitable for economical operation where carrying and pulling capacity is the measure of usefulness. They cannot be loaded nor unloaded economically nor quickly and are totally unsuited for the handling of bulk freight. If slack water conditions existed, these boats might be used to fair advantage for towboats, as are similar boats on the Ohio, but it is probable that the screw driven tunnel type towboats, like those now operated by the War Department on the Mississippi, would prove more efficient in towing service. All of the barges now in use on the river, carry their loads on deck. None is suitable for carrying bulk grain in the hold.

Highways Present Competition

With the completion of the highways on the north and south banks of the Columbia, the boat lines have been deprived of the transportation of the vehicles, live-stock and automobiles heretofore carried in considerable numbers between Portland and the Dalles and a way has been provided for the entrance of another competitor for the traffic in package freight and passengers. Auto busses now operate on frequent schedules between Portland and Pendleton in Oregon and as far east as Camas and Washougal in Washington. Auto trucks carry package freight as far east as Arlington, Oregon. The charges include store-door delivery and the service is regular and speedy.

The growing practice of shipping grain in bulk has added another complication to the problem of river transportation. Such shipments require special loading and unloading facilities, and boats designed for the economical and safe handling of such cargo. Another angle of this phase of the problem arises from the increase in the number of farmers' co-operative grain warehouses and elevators. As far back as 1915, 33% of the grain shipments in Washington originated at farmer's warehouses. None of these is so located that boats may be loaded directly and if this grain is to be diverted from the warehouses, the boat freight rate must be made exceeding attractive.

The general location of the grain producing sections of the river countries has a great influence on the tonnage which may be expected to move by water. Mr. Rands' statistics show that in 1917 less than 10% of the crop was loaded on cars and boats at river points. If the farmer is to use water transport, there must be a saving which will compensate him for greater delivery expense.

The foregoing discussion does not undertake to mention all the factors which have caused the practical elimination of commerce on the upper Columbia and Snake rivers, with the exception of the ferry service on the Snake. Only the most obvious are enumerated, although there are many contributing factors.

Remedies for Existing Difficulties Proposed

Practically nothing can be done to promote river traffic until operating conditions are improved. The plan which appeals to most students of this phase of the problem is canalization of the Columbia and Snake. The improvement for navigation to be coupled with development of electrical energy at each dam.

If each major obstacle to navigation be considered separately, some idea of the magnitude and feasibility of such a plan can be gained.

The first such obstacle (going upstream) is due to the rapids from Bonneville to the Cascade Locks. It is at this point that the river has cut its way through the Cascade Range and the gorge is narrow and has unusually steep banks. Two methods have been considered for making it possible for towboats and their tows to pass this point.

(1) A high dam below Bonneville which would drown out all the rapids—including the Cascades Rapids and the Cascade Canal—and would furnish a forty-foot head for power development.

(2) A new Cascade Canal on the Washington shore extending from slack water below Bonneville to the pool above the Cascade Rapids.

Because of the narrow channel through which the river flows, the first plan would not effect a beneficial reduction in the currents above Bonneville at river stages above 10 feet, all the lowlands between Bonneville and Celilo would be flooded, and there would be necessary extensive relocation of the railroads on both banks. There is also some uncertainty as to the character of the foundations for the dam. There could be developed, however, some 200,000 continuous horse power and 220,000 secondary horse power eight months in the year. The cost of such a project has been estimated at approximately $45,000,000.

Canalization Suggested

A lateral canal along the Washington shore would provide satisfactory navigating conditions, would flood no bottom land nor damage any railroad grades and would leave the river channel free for power development when its need became apparent. Its cost has been estimated at about thirty million dollars.

In comparing these two plans, it should be noted that the high dam will give slack water...
through to The Dalles-Celilo Canal through seven months of the year and will make available a vast quantity of power. During five months of the year, that is, from March to August, navigating conditions will be unsatisfactory for barge navigation. The lateral canal will provide good navigating conditions at all times, but will have no effect on the Three Mile Rapids above The Dalles and will develop no power. The dam, power house and equipment will cost 50% more than the canal.

The difficulties at Three Mile Rapids are due to the extremely narrow channel through which the river flows. This channel is scarcely 300 feet wide at low water and little more at higher stages. No satisfactory navigating conditions through this short stretch of the river can be obtained by means other than canalization unless the dam proposed for Bonneville be built high enough to drown out this rapid at all stages of the river during which navigation is possible elsewhere. No estimate of the cost of such canalization work seems to have been made.

Two plans have been proposed for the improvement of the Columbia between Celilo and the mouth of the Snake. Our plan contemplates the construction of five dams with an average lift of 38 feet, thereby completely canalizing the river, and making possible the development of approximately 900,000 primary horse power, all at an estimated cost of approximately $100,000,000. The second plan would use eight low dams, eliminate 107 feet of the 200 feet fall of the river, make possible the development of 760,000 primary horse power and would cost approximately $120,000,000. Under this plan one dam would be placed at the mouth of the Snake, thereby providing slack water to the foot of Five Mile Rapids on that stream, this point being the upper limit of the pool formed by the fifth dam of the first plan.

Two plans for the improvement of the Snake have been prepared. The first plan calls for five dams giving a total lift of 180 feet, and a possible power development of 1,200,000 primary horse power. The cost was estimated to be approximately $40,000,000. The second plan calls for the construction of eight dams with a total lift of 180 feet, a possible power development of 1,620,000 primary horse power and an estimated cost of approximately $50,000,000. Neither of these plans completely canalizes the river, but in each the dams have been so located that those stretches of the river between the upper limits of the pools and the dams next above would offer minimum difficulties to barge navigation.

Develop Power Sites

The engineers of the War Department made an estimate in 1911 of the cost of improving the Columbia between the mouth of the Snake and Wenatchee. The plan recommended by the District Engineer, called for a power dam at Priest Rapids of sufficient height to drown out the rapids, a similar project at Rock Island Rapids, improvement of the channel at Cabinet Rapids and at intermediate points above and below these rapids, all at a total estimated cost of $7,025,000. Even with these improvements, it is not contemplated that barges would be used in transporting freight. Based on present construction costs, it is not probable that these improvements could be made for less than $15,000,000.

The foregoing estimates indicate that the minimum cost of the structures and equipment necessary to provide practically slack water from Portland to Lewiston, good navigating conditions for single boats from the mouth of the Snake to Wenatchee and make possible the development of 1,300,000 primary horse power would be about $175,000,000.

This sum would be expended on one canal and seven dams on the Columbia and five dams on the Snake. The construction of the canal would open the river to barge navigation to The Dalles, the lower end of the grain producing region. Above that point, no one dam would give material relief; even to reach Umatilla with barges, three dams would be necessary. The one direct advantage which would accrue from piecemeal construction of these upper river improvement works would come from the development of irrigated areas along the banks and the location of industries using large quantities of power at the various dam sites, thereby increasing the tonnage tributary to the river.

The tonnage of grain loaded on cars and boats at river points in 1917 was given as 8,000 tons in Mr. Rands’ report. If all of this could be diverted to the rivers, it would furnish only a small part of the traffic which could be handled on these streams when canalized. To increase this tonnage, three steps must be taken: (1) There must be adequate river terminals; (2) Good roads to the terminals must be built from the grain-producing regions; (3) Through rail and water rates must be obtained from those districts so distant from the river that truck haulage is not economical.

River Freight Terminals Needed

Mr. F. C. Schubert of the Corps of Engineers, War Department, has designed two types of small warehouses and landing stages for river
ports. Under present conditions they can be built for about $3,000 and $4,000 each, and one or the other will serve probably 45 of the 56 port districts outlined by Mr. Rands. The terminals at the other 11 ports would probably cost, on an average, about $20,000 each. Practically none of the suggested port districts would find such expenditures burdensome, and the plans contemplate structures adequate for the traffic which may be expected to pass over them. No allowance in the above figures is made for acquiring sites nor rights-of-way for approaches, nor for dredging operations where channel conditions require it, as at Hood River. It should also be understood that all such improvements must be built with public funds and that it is doubtful if the direct revenue from wharfage charges will pay fixed and operating costs.

Good roads from the grain districts are compliments of improved terminals. One loses its maximum usefulness without the other. No estimate seems to have been made of the mileage necessary to give each of the 56 port districts a good approach to its terminal. It seems reasonable to assume that not less than 250 miles of road will have to be rebuilt and built. All of this work will be paid for with funds obtained from the public.

When regular and adequate boat service is in operation on the Columbia and Snake rivers, it should be possible to force a division of rates with the railroads on grain shipped from inland points. This procedure is provided for in the Panama Canal Act of 1912. If such rates be put into effect; there would be opened up to the boat lines the immense wheat tonnage of the Walla Walla and Inland Empire or Palouse districts of Washington, the wheat country east of Lewiston, Idaho, and that of eastern Oregon. Should such rates be secured, physical connection between the river terminals and the railroads must be effected. It is probable that at no point west of Umatilla can sufficient saving be made by such joint rates, to justify the transhipment expense.

Upstream traffic on the Columbia and Snake will be confined to commodities demanded by the population of the contiguous territory. Lumber and possible fuel to the mid-Columbia territory are the bulky commodities most in demand. Food stuffs and less-than-carload quantities of general merchandise complete the list. If boat operation on these rivers is to be profitable a considerable volume of such traffic must be developed and to do this the demands of a population greater than that now existing at river towns must be served. It has there-
The same principle will hold on the river, where the sequence of events will be the same. Spasmodic attempts, however, to establish river transportation will not be a sufficient basis for private or public investment in such enterprises. In some way, river transportation must be made a dependable and permanent service before corporations or co-operative associations will forsake their present locations or add to their investments by the construction of new warehouses and elevators.

V.—FEDERAL WATER POWER ACT

This act was approved June 10th, 1920. It establishes the Federal Power Commission composed of the Secretaries of War, Interior and Agriculture. It may be summarized as follows:

The Commission is authorized and empowered—

(a) To make investigations concerning the utilization of water resources of any region and the location, capacity, development, costs and relation to market of power sites.

(b) To co-operate with the executive departments and other agencies of State or National Governments in such investigations.

(c) To make public from time to time the information secured.

(d) To issue licenses for the purpose of constructing works for the improvement of navigation and the development of power on any of the navigable waters of the United States, subject to approval of the Chief of Engineers and the Secretary of War, or upon any of the public lands or reservations of the United States.

(e) To issue preliminary permits for the purpose of enabling applicants for a license to secure data.

(f) To prescribe rules and regulations for accounting and records.

Preliminary permits may run not over three years. They serve primarily to establish priority, are not transferable and may be canceled upon failure of permittees to comply with conditions. Licenses run not over 50 years, may be altered or surrendered upon mutual agreement between licensee and Commission. May be transferred only with approval of Commission and transferee, and shall be subject to all conditions of original license.

An applicant for license must submit his plans of proposed development.

All licenses shall contain following conditions:

(a) The project shall be best adapted to a comprehensive scheme of improvement and utilization for purposes of navigation, of water-power development and of other beneficial public uses and may be modified to these ends.

(b) Licensee shall pay to the United States reasonable annual charges for administration of the Act; for use of its property and expropriation of excessive profits. State or municipal project licenses for power development or improvement of navigation, to be operated not for profit, shall be issued free.

If a dam be constructed across a navigable river, "the Commission may, in so far as it deems the same reasonably necessary to promote the present and future needs of navigation and consistent with a reasonable investment cost to the licensee, include in the license any one or more of the following conditions:

(a) That such licensee shall . . . construct . . . without expense to the United States . . . a lock or locks . . . in accordance with plans of the Chief of Engineers and Secretary of War . . ."

(b) That in case such structures are not made a part of the original construction, the licensee shall convey to the United States, upon demand, right of way through its dams and permit such control of pools as may be required to complete such navigation facilities.

(c) The licensee shall furnish free of cost to the United States power for operating locks."

If navigation structures will increase the cost of power development above a reasonable cost, the Commission may submit recommendations to the Congress concerning participation of the United States in the cost of construction of such navigation structures, the license for the power development, however, being conditioned on the licensee bearing the cost of such navigation structures should the United States not participate.

Work under a license must be begun within 2 years from date thereof and prosecuted with due diligence until sufficient capacity has been put into use to satisfy the then demand for power. Additional units must be added as the Commission may direct. The Commission has the power to extend the time for beginning construction for not more than 2 additional years and for completion of the first unit of the development when not incompatible with the public interest. Failure to begin construction is sufficient cause for termination of the license, and the Attorney General may bring suit for the revocation of the license and sale of the works constructed, if the project be not completed within the time prescribed in the license or as extended by the Commission.

At the expiration of a license, the United States shall have the right to take over from the licensee, its property covered in whole or in part
by the license or which depends for its usefulness upon the continuance of the license, together with any aids to navigation, upon paying therefor the net investment of the licensee in the property taken. The amount of the licensee’s net investment shall be determined by agreement between the Commission and the licensee or by a suit in equity before the United States District Court.

Upon the expiration of a license, if the United States does not take over the project of the licensee, a new license may be issued to the then licensee or to a new licensee. If the license be issued to new parties, they must assume the obligations to the original license which would have been required of the United States had it taken over the project. In the event that a new license is not issued at once, the Commission may issue annual licenses until a new license is issued.

The United States reserves the right to take possession of the properties of the licensee in time of war, paying the licensee a reasonable compensation therefor, as fixed by the Commission.

The Secretary of War shall have the power to establish rules and regulations governing the maintenance and operation of aids to navigation, including the pools above the structures of the projects, and may require the licensee to maintain lights and signals for the safety of boat operators.

All licensees selling power for public service must abide by the regulations for service and charges to customers prescribed by the proper authority in the state where the power is sold. If there is no regulatory body in any state where power is sold by a licensee, the Commission has regulatory power until such time as the state sets up its own regulatory body.

When power is sold in interstate commerce, the rates charged must be reasonable and nondiscriminatory. If the states interested cannot agree on rates and services or on the securities to be issued by the licensee, the Commission has the power to regulate and control these matters, and these powers shall be administered in accordance with the procedure and practice in fixing and regulating rates, charges and practices of railroad companies.

The right of eminent domain is conferred on a licensee so that he may acquire sites and lands for a project which is, in the judgment of the Commission, desirable or justified in the public interest for the purpose of improving or developing waterways for the benefit of interstate commerce.

Permits, rights-of-way or authority granted prior to this act are not affected by it, but the Commission may grant licenses under this act upon application of holders of such rights.

When applications for licenses to build projects upon public lands are filed, these lands shall be withdrawn from entry until the Commission has issued the license or denied the application. Willful violations of the provisions of this act or the conditions of the licenses issued hereunder, or of orders of the Secretary of War or Secretary of Commerce, when proven, shall subject the violator to fine.

After due process of law, licenses may be revoked for violation of their terms and the property of the licensee sold. Buyers at such sales shall assume the obligations and privileges of the licensee.

No provision of this act shall affect the rights of the States relating to control, appropriation, use, or distribution of water used in irrigation or for municipal or other uses.

VI.—COLUMBIA RIVER BOARD REPORT TO THE FEDERAL POWER COMMISSION

In 1921, the Federal Power Commission decided to make a study of the proper development of the Columbia River between Flathead Lake, in Montana, and the mouth of the Snake River in Washington. Accordingly, they appointed a Columbia River Board consisting of J. B. Cavanaugh, Colonel, Corps of Engineers, Chairman; D. C. Henny, Consulting Engineer, U. S. Reclamation Service; Fred F. Henshaw, District Engineer, U. S. Geological Survey; C. S. Heidel, State Engineer, Montana; W. G. Swendsen, Commissioner, Department of Reclamation, Idaho; Marvin Chase, Supervisor of Hydraulics, State of Washington. This Board of Engineers was appointed to make a general study of the Upper Columbia river with a view to outlining a scheme of development best suited to the needs of power, irrigation and navigation on the Columbia, in order that the action of the Federal Power Commission in passing upon permits and licenses for power development might be in accordance with some well-defined policy.

The introduction to this report states that, "The investigation and report are required to cover the following principal points:"

(a) A general resume of power, irrigation, and other possible uses to which the water may be devoted.

(b) A program of development that will harmonize the interrelated uses in such manner as to secure the greatest benefit from them all.

(c) A policy to be followed by the United
States and the States of Montana, Idaho, and Washington in using, reserving, or disposing of public lands, waters, reservoirs, and power sites."

In a conclusion, the report states, "The conclusions arrived at embody a general scheme of development considered by the board as best suited to the needs of power, irrigation, and navigation on the Columbia."

A detailed statement follows of the conclusions reached after a nine months' study of this district.

The board then recommends: "If a policy of action in harmony with the conclusions stated be adopted as a basis for action on power applications, it is believed that the general public interest will be served to the fullest extent; that all feasible irrigation development dependent on the waters of the upper Columbia River will be safeguarded; that irrigation and water power development will be co-ordinated; and that interference with river navigation by dams can, if necessary, be converted into decided improvement by the construction of locks, and that interference with lake navigation can be corrected by dredging.

Mr. O. C. Merrill, Executive Secretary of the Federal Power Commission, in submitting this report to the Commission, states as follows:

"I submit to you herewith report of the Columbia River board containing a study of and recommendations upon a general plan of development of the Columbia river, between Flathead Lake in Montana and the mouth of the Snake river in Washington.

"By the provisions of the Federal water power act the commission is authorized and empowered to make investigations and to collect and record data concerning the utilization of the water resources of any region to be developed, the water-power industry, and its relation to other industries and to interstate or foreign commerce, to co-operate with the executive departments and other agencies of State or National Governments in such investigations, and to make public from time to time the information secured. The act further provides that all licenses issued thereunder shall be on the condition that the project adopted, including the maps, plans, and specifications, shall be such as in the judgment of the commission will be best adapted to a comprehensive scheme of improvement and utilization for the purpose of navigation, of water-power development, and of other beneficial public uses; and, if necessary, in order to secure such scheme the commission shall have the authority to require the modification of any project and of the plans and specifications of the project works before approval.

"While the commission is not given authority to grant rights of way for irrigation uses only, or to authorize the erection in navigable waters of structures solely for navigation use, it is apparent from the provisions of the statute that it has the authority and the duty to give consideration to both of these uses insofar as they affect power development within its jurisdiction. If there are possible or projected navigation or irrigation developments which will affect possible or projected power developments on any stream, it is the duty of the commission to investigate these uses and their effects, and if upon such investigation it finds that a certain scheme of composite development is best adapted to the utilization of the stream for all purposes, it is competent for the commission to issue permits or licenses for power developments in conformity with such findings; in fact, not otherwise can the power projects which it approves meet the requirements of the law that they shall be such as in the judgment of the commission will be best adapted to a comprehensive scheme of improvement and utilization.

"The board was instructed to make a study of the Columbia river from Flathead Lake to the mouth of the Snake river; to report on the character and extent of present and prospective uses of the river for navigation, irrigation, and power, with a discussion of the relative merits of each and of their relation to each other; and to outline a program of development that would harmonize the conflicting uses in such manner as to secure, in the long run, the greatest combined benefit from all. The river along a part of its course passes through the Dominion of Canada. There is also a treaty with Great Britain relating to navigation on the river. The board was, therefore, instructed to give consideration to these matters in its report.

"It would seem that the foregoing states very clearly both the attitude of the commission and the power which it has in regard to studying and acting upon the various possible uses of the waters of any given stream. It would appear that there need be no apprehension on the part of anyone about the question of whether any of the three important uses to which the waters of such a stream as the Columbia can be applied will not be given full and fair consideration, in any future development.

The conclusions and recommendations of your committee on the development of the upper Columbia river as a waterway are given on pages three.