LOWER MISSISSIPPI HYDRO POTENTIAL

by
Sultan Alam

Hydroelectric Potential Along the Lower Mississippi River

Along the Lower Mississippi River, the Old River Control Complex (ORC) area (see figure) has probably the best potential for generating hydroelectricity for the following reasons:

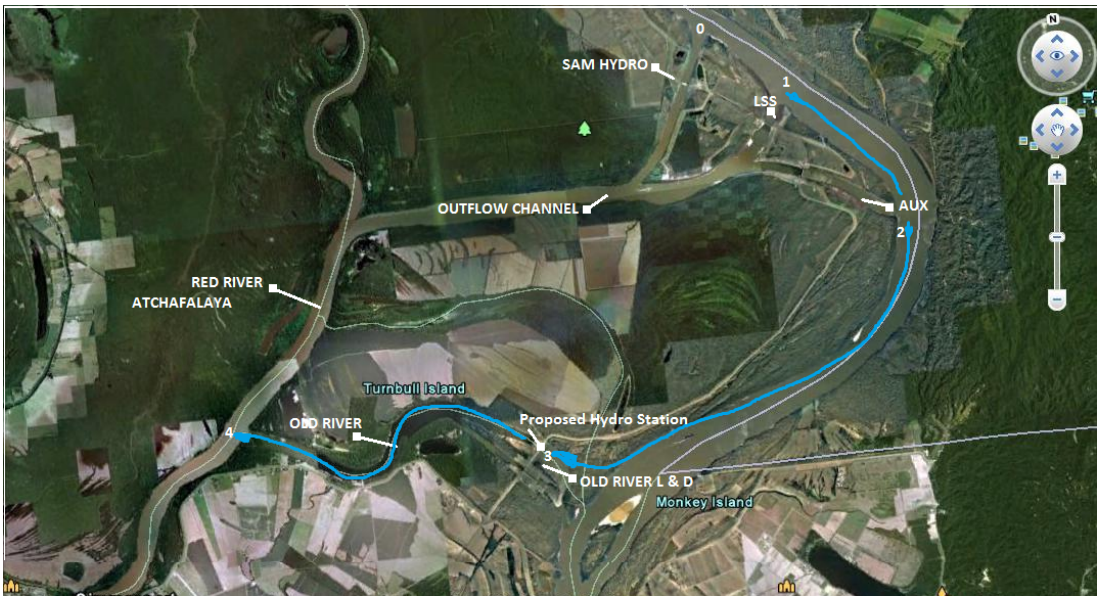
- Systematic diversion of a percentage of Mississippi River discharge to the Red-Atchafalaya Rivers system through existing U.S. Army Corps of Engineers (USACE) flow diversion structures.
- Significant abrupt head differentials between the Mississippi River and the Red-Atchafalaya Rivers system.
- Satisfactory power generation at the Sidney A. Murray Hydroelectric Station (SAM) over the last 20 years confirms that in spite of all the complexity the hydrological condition; the available discharge and corresponding head differential at the ORC is reliable and conducive to power generation.

By agreement, the Sidney A. Murray Hydroelectric Station is not allowed to use 100% of the diverted flow at the ORC. So every year depending on the Mississippi River discharge the Low Sill Structure and the Auxiliary Structure are passing a certain percent of the diverted discharge.

If the flow that is being currently diverted through the Low Sill Structure and the Auxiliary Structure was diverted through a hypothetical hydroelectric installation at the Old River Lock and Dam, it would be producing a significant amount of energy annually. Based on daily available discharge and the corresponding head differential, the annual energy output may be in the range of 300,000MWH to 600,000MWH. However, this would mean that USACE would have to shut down their two existing flow diversion structures (excepting when the percentage of Mississippi River discharge diverted to the Red-Atchafalaya Rivers system would exceed the capacity of the hydroelectric plants).

The consequences of having a Hydroelectric Station at Old River Lock and Dam would be the following:

- The potential head at the existing hydro station would increase (the headwater level will go up and the tail water level will go down), thus it will produce more energy with the same discharge.
- The sediment diversion through the new hydroelectric station would be less than that currently passing through the Auxiliary Structure. Thus, more sediment would go down the Mississippi River and in the long run may have a positive impact on delta restoration efforts.
- The outflow from the power plant would impact the navigation conditions in the portion of the Old River Lock connecting to the Red-Atchafalaya River due to the flow velocity and some sediment transport.



Mississippi River in the Old River Control Complex area with various existing flow diversion structures: (0) The Sidney A. Murray Hydroelectric Station, (1) The Low Sill Structure, (2) The Auxiliary Structure and (3) The Proposed Hydro Station at The Navigation Lock and Dam connecting Old River to the Red - Atchafalaya River.

Conclusions and Comments

The Sydney A. Murray Hydroelectric Power Station has proved that hydro power generation is possible in Louisiana and off the Lower Mississippi River. As this plant is not using the totality of the diverted flow, it is possible to use the available discharge to produce more energy annually in the range of 300,000MWH to 600,000MWH. This would require some changes in the existing operating practices and the possibilities should be investigated.

The 30-70 split of the flow under all Mississippi River discharge conditions was decided at a time when the possibility of hydro power generation was not anticipated. With the 20 years experience at Sydney A. Murray Hydro Station it seems logical that this flow diversion rule should be reassessed to see if some modifications would enhance the potential of hydroelectric power generation in this area of Louisiana. Diverting more discharge to the Atchafalaya during the high flows of the Mississippi River might be feasible. A slight modification of this rule might allow Louisiana to get some more clean and renewable energy, which should be investigated further.