

## SALTON SEA

### ITS PROBLEMS AND COMPETING USES

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In Southern California we have an inland lake the primary purpose of which is to serve as a reservoir to receive and store drainage and seepage waters from the surrounding agricultural lands. But through the years corollary recreational uses developed in this attractive lake that is replenished from agricultural drainage waters and storm runoff; and now those recreational uses are being threatened by the same waters that are needed to replenish the lake. How did all this happen? To seek an answer to this, we'll have to first go back to prehistoric times and gradually work our way up to today.

The target area includes three major agricultural valleys, being the Coachella and Imperial Valleys in Southeastern California, and the Mexicali Valley in Mexico. These three valleys drain naturally into a sump area whose bottom elevation is approximately 278 feet below mean sea level. The lake which has formed in this sump, called the Salton Sea, has a present water surface elevation of 227 feet below mean sea level.

Before the turn of the century, the sump was dry. But it was not always dry in prehistoric times. Normally the Colorado River would flow into the Gulf of California (or Sea of Cortez as it is also called). But once every few hundred years, the Colorado River flows would become so great that the river would jump its banks, flow westward and fill the sump area to a height far greater than it is today. Subsequently, the river flow would subside, the Colorado River would revert to its usual course towards the Gulf of California, and the lake would gradually dry up.

Beginning in the 1850's a few people of vision realized that the geography and soil structure of this barren desert area could be made productive with an assured water supply. By taking barometric readings, a geologist who worked on a railroad survey party proved that the desert lay below sea level and could be irrigated by a gravity flow canal diverting from the Colorado River. Another individual succeeded in having legislation introduced into Congress to authorize development of Imperial Valley. The Civil War temporarily delayed further progress on the plan. However, in 1896, the California Development Company (private) was formed to reclaim Imperial Valley with Colorado River water, based on certain water filings that were assigned to the Company.

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The point of diversion from Colorado River was at Pilot Knob.

But the natural gravity flow to Imperial Valley was via an old river channel (Alamo River), in Mexico, which ran some 40 miles westward before re-entering California a few miles east of Calexico, and then flowed northward towards the Salton Sink. And so the implemented plan brought water to Imperial Valley for farming, with the drainage being to Salton Sink.

But the diversion works soon became silted up, and another intake was opened further downstream in Mexico. No control gate was built for this diversion, since it was considered to be only temporary, to be closed before the 1905 spring floods. However, just like it had done in past ages, in 1905, because of unanticipated winter floods, the Colorado River changed its course and poured its full flow down the Canal del Alamo into the Salton Sink, thus creating the present Salton Sea.

It took two years and a monumental effort to redirect the river into its usual channel. By this time, the private development company was bankrupt; and after more flooding in 1910, the Imperial Valley settlers decided to take matters into their own hands. In 1911, the Imperial Irrigation District, comprising over a half million acres, was formed by the settlers, and it acquired the rights and properties of the bankrupt California Development Company.

Now back to the Salton Sea, since after all that is the topic of this presentation. The importance of the Salton Sea as a drainage basin was well realized. In the 1920's, and as result of studies by the U.S.G.S., the Federal Government, by Executive Orders, withdrew from all forms of entry all public lands of the United States below the -220 foot elevation.

But the Federal Government, in general, owned only every other diagonal section under Salton Sea; and it remained to the Imperial Irrigation District to purchase all remaining private lands up to the -230 foot elevation. The District realized that the water level could eventually rise above -230, but that was all that it could afford at that time.

To answer the question of why Salton Sea was set aside as a reservoir to receive and store drainage waters from adjacent agricultural lands, one has only to recall what happened in ancient times when water was diverted for agriculture in the Tigris and Euphrates Valleys, with no provision being made to continually leach and drain the salts from the soil profile. The same would hold true in Imperial and Coachella Valleys were it not for the extensive networks of tile underdrains which are designed to leach the salts and transport them by gravity to a lower elevation, which is Salton Sea.

But as I mentioned at the outset, corollary recreational uses have developed in Salton Sea. During the 1950's the California Department of Fish and Game introduced several species of fish into Salton Sea, mostly from the Gulf of California. Of these, the sargo, croaker, tilapia, and particularly the corvina have thrived well, so that Salton Sea has become an extremely popular sports fishery. In addition, boating and water skiing are prevalent; an approximately 20,000-lot community called Salton

City was developed on the southwest shoreline, along with the communities of Desert Shores and Salton Sea Beach. On the northeast shoreline there are the communities of Bombay Beach and North Shore; and the State of California has developed a 13-mile long State Recreation area.

Obviously, these residential-recreational areas, with their supporting businesses, became a competing interest vis-a-vis the agricultural interests. What is the nature of these competing interests? Well, first, as mentioned about agriculture, it needs a reservoir to receive and store drainage waters in order to maintain adequate soil-salinity levels in the farmlands. On the other hand, the residential-recreational interests want a stabilized sea surface elevation, to protect their developments from both inundation and stranding. They also want a control on the salinity level, so that fish may continue to thrive; and they do not want any chemicals or other substances introduced into the sea water that would tend to taint the fish flesh or otherwise make the fish unpleasant or hazardous for human consumption.

The residential-recreational interests soon learned that there are additional interests with which they must compete. First of all there is "nature". Salton Sea is the drainage area for the gross Salton Sea basin, which includes also the Mexicali Valley in Mexico. During the years 1976-80, there were hurricane and other unprecedented rains in the gross basin. This created both a blessing and a disaster for the communities around Salton Sea. The blessing was that the rain water diluted the saline Salton Sea water; and the disaster was (and still is) that many shoreline developments became inundated.

Now that Arizona is taking its Colorado River water entitlement for the Central Arizona Project, and now that California most likely will be held strictly to its 4.4 MAFY, the aforementioned blessing and disaster will probably be reversed; that is: the shoreline will probably recede and the salt concentration in the Sea will probably increase. The salt concentration in Salton Sea is about 41,000 mg/l, which is 10 percent higher than ocean water. Some fisheries experts have predicted that at 40,000 mg/l salt concentration the fishery could be adversely impacted, and would definitely be adversely impacted at higher concentrations. It will take a little time to determine the accuracy of these predictions.

The Mexicali Valley in Mexico, and particularly the City of Mexicali is another threat to the residential-recreational interests in Salton Sea. In a 40-year period Mexicali has grown from a residential community of about 25,000 population to a major industrial city of about one million. Approximately half of Mexicali's sewage is discharged raw into New River which then flows some 61 miles northward emptying into Salton Sea. This sewage discharge more immediately impacts the bordering U.S. communities, such as Calexico and Seeley; but it is rather thoroughly oxidized by the time it reaches Salton Sea. However, Mexicali's sewage discharge does add nutrients to an already nutrient-choked sea.

But untreated sewage isn't the only waste that this highly industrialized city discharges to New River. There are hog farms, slaughterhouses, and dairy wastes. The city dump is located along a tributary, and drains to the river. Septic tank pumpings are discharged directly to New River.

Geothermal wastewaters are discharged to the river. And finally, carcinogenic and other toxic industrial wastes are discharged directly into the river. It is very questionable whether these heavy industrial toxics will break down before entering Salton Sea, although luckily it appears that some of these chemicals are absorbed into the heavy silt load that New River carries, and therefor probably some of these toxics rest in the sea's bottom muds.

As if I haven't mentioned enough problems that Salton Sea faces, recently appreciable concentrations of selenium were found in the sea water. Appreciable at least to the point where the State Department of Health Services has issued what they call an "advisory", that people should limit the quantity of fish that they eat from Salton Sea.

And so to summarize the status and problems concerning Salton Sea.

1. Salton Sea is located in a geologic sink, from which water evaporates, and in which salts accumulate.
2. The Federal Government has set aside all federal lands in Salton Sea up to elevation -220, creating a reservoir to receive and store drainage water from adjacent agricultural lands. The Imperial Irrigation District purchased all remaining lands under Salton Sea up to elevation -230, thus adding to the area set aside.
3. The Department of Fish and Game transplanted fish species from the Gulf of California. Four species thrived, resulting in an excellent sports fishery.
4. The TDS concentration of Salton Sea water is over 40,000 mg/l (about 10 percent higher than that of ocean water, and it will increase. Fisheries biologists consider that with much more increase the sports fishery could be threatened.
5. The water surface elevation of Salton Sea has been in a rising trend, and now stands at -227 feet. Further rise would adversely affect agricultural drainage and inundate shoreline developments. As California becomes held to its allotted amount of Colorado River water, so that increased conservation needs to be practiced, the water level could decline, which could leave some shoreline developments stranded. In fact, the State is already requiring IID to increase its water conservation programs.
6. The City of Mexicali, in Mexico, (population about one million) discharges untreated and partially treated sewage, toxic industrial wastes, slaughterhouse wastes, and almost every other conceivable type of waste to New River, which flows to Salton Sea.
7. Recently, selenium was found in Salton Sea waters in concentrations sufficient so that the State Department of Health Services issued an "advisory" against eating more than stated limited quantities of fish caught from the sea.

So, now that we have heard all of the problems concerning Salton Sea,

what, if anything, is being done about it?

There are a few plans afoot; but first it must be remembered that the primary purpose of Salton Sea is to serve as a reservoir to receive and store agricultural drainage waters from the irrigated valleys that surround the sea. Any proposals to stabilize Salton Sea's elevation or salinity, or to control pollutants discharged into the sea must first take into account this primary purpose of the sea.

#### In Regards to Stabilization of the Sea's Elevation:

A few years ago, the State Government, after conducting public hearings in Imperial Valley, specified an amount of agricultural water that must be conserved. The resultant reduction of flow towards Salton Sea may cause some lowering of the surface elevation, but it will also cause an increase in salinity.

#### In Regards to Controlling Salinity:

During the late sixties and early seventies a Federal-State Task Force developed a Feasibility Report, dated April 1974, on control of salinity in Salton Sea. The lowest cost alternative envisioned a 40-square mile diked impoundment near the southern end of the sea for final deposition and storage of salts. The project cost was estimated between 37 and 58 million dollars, with annual maintenance cost of \$251,000. It was envisioned that this project would be able to control the sea's salinity for 100 years.

The Feasibility Report was submitted to the Department of the Interior in 1974; but in competition with other water projects for the limited funds, the Secretary of the Interior gave the project a very low priority, which in effect shelved it.

Not much happened in the intervening decade to 1984. Unusual rains during that period kept the salinity from increasing at the expected rate. But with the State decision that Imperial Irrigation District must conserve a specified amount of water, the recreational interests again became concerned that the sea's salinity concentration may rise at an accelerated rate. Accordingly, California's Secretary for Resources recently established a "Salton Sea Task Force", whose principal assignment is to determine possible funding sources to finance an engineering project to stabilize both the sea's salinity and its shoreline elevation.

#### In Regards to Controlling Shoreline Elevation:

The Salton Sea Task Force, which I just mentioned, would have to consider this in any funded project. It will be difficult to control shoreline elevation, unless flows can be controlled from all sources, including Mexico and nature itself.

#### In Regards to Sewage and Other Wastes Discharged from Mexicali:

For over 40 years the Regional Board has been making representations to the United States Government, principally via the United States

Commissioner on the International Boundary and Water Commission to obtain adequate and permanent corrections to this major pollution and contamination problem. So far, these efforts have been to little or no avail. In 1980, a Minute was added to the Mexican-American Water Treaty setting minimal numerical and subjective limits on pollutants discharged from Mexico into New River. But Mexico has been in continual violation of these limits from the outset. In 1983, as result of a meeting between the two Presidents, the U.S.E.P.A. and its Mexican counterpart were given the role of "coordinators" (whatever that means) to seek adequate corrections to the discharge of pollutants from Mexico. So far, these two organizations have only been in the talking stage.

Around 1984 Congress appropriated \$600,000 to correct the pollution from Mexico, conditioned upon Mexico's appropriating a like amount. We understand that just recently Mexico appropriated its \$600,000. It is now to be determined just how these monies will be used to obtain corrections.

The State of California considers that correction of these discharges from Mexico is a duty and responsibility of the United States Government. Nevertheless, the State Government notes that regardless of the Federal duty and responsibility, the net effect is upon the residents of California. Therefor, a legislative bill was passed to provide funds to study possible corrective actions.

#### Senate Bill No. 1745

This bill was passed by the Legislature to appropriate \$500,000 to prepare a workplan for abating pollution levels in New River and Alamo River, as affected by sewage and toxic flows from Mexico. We understand that in signing the bill, the Governor reduced the amount to \$150,000.

#### Selenium

As mentioned earlier, selenium has been found in the flesh of fish from Salton Sea, in concentrations such that the State Department of Health Services found it necessary to issue an "advisory" that people should not consume more than a stated amount of these fish.

The first order of business is to determine the sources of selenium discharges toward Salton Sea. To this end, the State Water Resources Control Board and the Colorado River Basin Regional Board have developed a monitoring plan for testing in the various tributaries to Salton Sea. These tributaries include the New and Alamo Rivers, and the many irrigation drains. Any actions to be taken subsequently will need to await a determination of the selenium sources.

So there you have it; a sea that is beset with problems, but which at least continues to serve its primary purpose, which is as a reservoir to receive and store agricultural drainage from very important agricultural areas.

Thank you for this opportunity to participate on your organization's program. If you have any questions, I will try to answer them.