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Channel Image Improving

By Lee Pilgrim, Editor, Texas Water Resources
AUTHORITIES SAY HOUSTON
SHIP CHANNEL NOW CLEANER
----------Corpus Christi Caller, May 1975

TARPON HITTING IN HOUSTON SHIP CHANNEL
----------Houston Chronicle, November 1975

SPECIES OF MARINE LIFE SAID
INCREASING IN CHANNEL
----------Galveston Daily News, June 1976

Such newspaper headlines are indications that the Houston Ship Channel, so long a foul smelling dumping hole for industrial plants and refineries, municipal sewage, and ship and barge refuse, is steadily becoming cleaner.

The Texas Water Quality Board long before the enactment of the Water Pollution Control Act of 1972 (P.L. 92-500) set out to clean up the polluted Ship Channel. Recently the Texas Water Resources editor talked with three members of the TWQB who are directly involved in the efforts to change the modifiers--acrid, filthy, trashy, dead, stinking, septic, unsightly, and toxic--that have often gone before the words Houston Ship Channel. Agreed that progress is being made to reduce the pollution in the vital commercial waterway, the TWQB representatives discussed what is being done and how, historical background, future expectations, and some of the problems. Participating were John Latchford, director of Field Operations; Joe Beal, chief of Engineering Analysis and Modeling Section, and Steve Warshaw, biologist in the Surveillance Section.

Q. Would you describe and locate the Houston Ship Channel?
A. Usually when we talk of the Houston Ship Channel we refer to the landlocked portion, the 25 miles of Channel from the Turning Basin in Houston to Morgan's Point on

Galveston Bay. Dredged for deep water vessels, it is 45 feet deep at the Turning Basin and 14 feet from there to Allen's Landing. Water comes into the channel from nine major tributaries, like Buffalo Bayou. The San Jacinto River feeds the lower portion of the channel.

Intended as a transportation system for boat traffic, it became a convenient point for industry to get rid of wastes. It had a tremendous waste going into it but retained reasonably good quality when it went into Galveston Bay. One important factor was the location of the San Jacinto River adding fairly good quality water and diluting the wastes. But time and population and the complexity of that chemical complex caught up with us.

Q. When did pollution clean-up start?
A. Back in the early '30s, Texas adopted a standard requiring secondary treatment for municipal wastes. In 1962 the Texas Water Pollution Control Board was created. It set out to require a permit of every discharger. Then the Texas Water Quality Board, created in 1967, upgraded permits and wrote new ones to require better levels of treatment. The major thrust was getting everybody under a permit.

By 1970 we were still trying to get industry familiar with the Texas Water Quality Act and with the importance of treating wastes. There were two industrial plants with secondary treatment in 1967; by 1972 there were only two that didn't have it. So most of the channel industries had good secondary treatment before the passage of P.L. 92-500. Texas was ahead of most states in this effort. Industry has got a bad name out of this thing. In recent years they have been very progressive under both P. L.92-500 and the Texas law previously. The Texas law tracks the federal law fairly well.

Q. Is there a problem with non-compliance?
A. Today all major dischargers are either 1) meeting their permit, 2) under enforcement order to meet the permit, or 3) in litigation. Violators are subject to fines. The fine under Texas law is $1,000 a day maximum; whereas the federal law fine is $25,000. However, we have been able to obtain penalties as large as they have on various cases. Of course, we have to look at fines realistically. The threat of a fine doesn't really make industries build a treatment plant, because they could just write a check out to the state of Texas and come out better financially than by building the treatment plant. For example, capital outlay for one plant on the Channel was $3 to $4 million plus annual operating costs of around $800,000.

The biggest polluter on the Channel today is the City of Houston. When we first surveyed the Channel discharges back in 1968, industry contributed about 60 percent of the total load and municipalities contributed the rest. Now it has just about reversed. Houston has spent lots of money to try to get right, but it's hard to catch up. Theoretically it has to provide for 500,000 gallons per day of additional sewage capacity each month to accommodate the constant influx of people. The Northside Sewage Plant added 25 MGD (million gallons a day) sewage capacity; but before it was completed, they needed another 25 MGD to catch up. You just don't go out and build a 25 MGD treatment plant

in a month. Besides the rapid population growth, Houston has experienced delays in equipment delivery and some budget problems.

Our enforcement program also includes a system which grants district supervisors authority to issue citations to minor violators. It is very effective.

Q. What is the basis for lawsuits and hearings we read about?
A. There are some lawsuits current. There are individuals who believe that the permit limitations set by EPA are too strict or unreasonable. They are suing EPA to try to get the standards changed. Also there are adjudicatory hearings in which a company goes before a commission of experts to be heard when the standards seem unrealistic for the individual company's particular situation. Most of these are a one parameter type thing--like a particular metal in their waste. They feel the limit is set too low for them to attain. This is done before the permit is agreed to, since they would be subject to a lawsuit if they didn't meet the level of treatment prescribed in a permit. Sometimes one company will adjudicate in behalf of others in the same industry with the same problem.

Q. How are standards set?
A. What we call standards are stream standards the Channel must meet. The state's waters are divided into segments for which standards are set depending on the intended use of the water in the segment. The Channel's intended use is to serve as an industrial transportation facility. However, to protect Galveston Bay from all the wastes carried in the Channel, the water in the segment nearest the Bay is additionally classified as "deemed desirable for noncontact recreation and propagation of fish and wildlife." Parameters evaluated for that designation include dissolved oxygen, pH, fecal coliform bacteria, and temperature. We go through a public hearing process to establish standards in all classified waters.

The dissolved oxygen standard reflects the intent to protect Galveston Bay from Channel wastes, establishing a minimum of 1.5 parts per million (ppm) in the Turning Basin, 2.0 ppm in the middle segment, and 4.0 ppm in the lowest segment, near the Bay. The bacterial standard is also more stringent in the lowest segment. Standards for pH (which measures how acidic or basic the water is) and temperature, on the other hand, are uniform for the whole Channel.

Q. How are standards set for individual dischargers?
A. In 1974 a waste load allocation was developed by mathematical means. It specifies the amount of contaminants the Channel could receive and still meet the oxygen standard. It was incorporated in a document, the waste load evaluation, which is used by our permit writers and EPA to develop each permit. An attempt is made to require similar levels of treatment for dischargers with similar wastes. If a plant's load exceeds its allocation, it builds an improved treatment system. When necessary a compliance schedule is established for a discharger, so that he has increasingly restrictive standards to meet as he adds to his waste treatment process.

Q. How many dischargers are there?
A. About 400. Besides the City of Houston with 38 individual permits, there are about 375 industries and water districts and between 25 and 40 municipalities.

Q. How is the system monitored?
A. There are two kinds of monitoring programs going on. One examines the waste that comes from the plant. We measure what comes from the pipes of each discharger to get as close as we can to their final discharge after they have done all the treating they are going to do.

Three types of contaminants have been looked at most carefully. One is biological oxygen demand (BOD), the material that causes removal of oxygen from the water. Second is bacteriological quality of the water. It is mainly influenced by municipal treatment plants since these are the bacteria that work on the waste in the plant. No problem, unless the waste washes through before it is treated properly. The Northside Treatment Plant in Houston, for instance, receives more waste than it is designed to treat and this material gets into the Channel. The third area, metals in the water, has received less attention than the others. TWQB has a standard for discharges of metals into the Channel but not for the water itself.

Also there is a self-reporting system whereby each contributor monitors his discharge and sends us the results. We have identified the point of discharge in the permit, and we set the volume that they can discharge --the amount of water they can dump out and the type or level of waste material. If our sample indicates they are in violation of the parameters set in their permit, we can take legal action. Initially we notify them of the finding, which sometimes indicates a breakdown in the treatment system.

The other program measures the quality of the Channel itself. We are interested in the basic parameters that indicate the quality of water. For i nstance, how much oxygen is in it. Samples are taken on a monthly basis at seven stations in the Channel. These include water samples near the surface and bottom, and other measurements at several depths in between. Adjacent bayous and bays are also monitored regularly.

Q. How does Gulf Coast Waste Disposal Authority fit in?
A. It's a government agency established to provide treatment for the three-county area near Galveston Bay. We can file suit against them if they violate their permit, just as we do industry. But it is doing a real good job. GCWDA has a 55 MGD complex industrial waste treatment plant, highly sophisticated. Wastes from several industries in the area--Champion Paper, for example --are transported by pipeline to GCWDA's Washburn Tunnel Plant for treatment. Industries that use the service can forget the waste treatment headache and let GCWDA worry about it. But it costs them.

Q. Is anything else involved in cleaning up the Channel?
A. Two other things. Due to past waste discharges a "reservoir" of contaminants has accumulated on the bottom of the Channel. In the upper Channel this occurs in the form of black, oily, smelly sludge deposits. These deposits tend to recontaminate the overlying

water, so stable improvement in water quality necessarily involves an improvement in the quality of these deposits. This is accomplished to a considerable extent during maintenance dredging, which occurs every two years or so. In cooperation with the Corps of Engineers, we regulate the disposal of the dredged material on leveed land disposal sites.

The other area is stormwater runoff. Not much information is available on the magnitude of this source of contaminants which include organic debris, precipitates from automobile and smokestack emissions, and other materials. We have conducted one study indicating that runoff from a moderate rain contributed less than 10% of the oxygen demand loaded to the Channel in wastewater discharges on that day. So this may or may not be a significant factor. We are continuing to study it.

Q. What problems do you have?
A. It was difficult for us to mesh our state program with the federal program. Our Water Quality Act has not been amended to coincide with P.L. 92-500. Dischargers now have dual permits--a state and federal document that say essentially the same thing. It's a burden on them and on us.

Further problem is that dischargers have a bottleneck in resource availability--money and equipment and getting things on line. Nationwide upgrading of water quality has put a burden on producers of pipes, pumps, and other equipment so that delivery is slow.

Q. Do you have specific goals?
A. The same as EPA because we are trying to meet the P.L. 92-500 requirements. The treatment levels that we had set for the Channel plants are more stringent than normally is required for 1977 because of the nature of the receiving water. But it is physically impossible for some plants which receive permits in 1976 to be at the treatment level required in the allocation by 1977. We have notified EPA that we are going to require reasonable implementation.

The TWQB spokesmen are realistic: They don't view the Channel, as the EPA does, a future "swimmable fishable stream." They also are optimistic: They consider the few footdraggers to be victims of circumstances who are moving as quickly as possible toward compliance. And they acknowledge the fact that even though progress has been made, there must be constant effort to upgrade and maintain water quality in the Houston Ship Channel.
If a fish doesn't like the water, he can usually leave when the tide changes. Benthic organisms can't," explained the young man holding a bottle of small bottom-dwelling animals, called benthos or benthic organisms.

The remark by **Bert H. Bates,** chief of the Texas Water Quality Board biological laboratory in Deer Park, indicates the importance of benthos in measuring the progress of pollution clean-up in the Houston Ship Channel. Although larger marine species are headline grabbers, the presence of benthos and plankton-- minute organisms that move with the water current-- is vitally significant.

The bottle containing the tiny animals is part of a collection of species that have been found by the TWQB Channel monitoring team during the four years that Bates has been there. He also keeps a photo file of each new phytoplankton organism encountered.

His team of four biologists monitors the Channel from the Turning Basin to Morgan's Point, about 25 miles. Organisms collected include plankton, benthos, and nekton. Nekton are organisms capable of swimming, such as fish or shrimp. The lab team samples seven stations on the channel once a month and the six side bays once a quarter. The time-consuming activity involves taking both surface and bottom samples. Profiles of each station are run to determine the levels of dissolved oxygen, pH, temperature, and conductivity at 5 depths--1, 10, 20, 30 and 40 feet.

Although Bates admits "we could have many more than seven stations and still not have enough," he is proud of the strides that have been made since the early days when there were only two stations with surface sampling only. He says the ideal way would be to sample every day with every change in tide--in fact several times during the tidal change--because the Channel is constantly changing.

"Trends develop. When we monitor a body of water like this biologically, chemically, and physically, we determine trends in areas of primary concern," he said.

The Channel has three different systems, each a habitat for different organisms' upstream where there is freshwater inflow, midzone, and the lower area which is somewhat marine. Monitoring stations are set up to consider the different systems. Factors that affect monitoring results are wind, temperature, amount of freshwater inflow, tidal exchange, and ship traffic--to name a few.

"As the numbers and diversity of organisms increase, water quality generally increases," Bates said. "Years ago, 1971-72, we found little or no plankton from the Turning Basin to the San Jacinto River. More and more they are showing up in greater and greater numbers."

Bates also reported that freshwater organisms are showing up in the lower portion of the channel. Migration from upstream takes the organisms through the portion of the Channel having the lowest level of dissolved oxygen. It can be concluded, therefore, that conditions have improved or the organisms would not have made it to the lower reaches.

The increase of fish during the past year has been reported at the TWQB monitoring station located 11 miles upstream from Morgan's Point. At the next upstream station, 8 miles farther on, fewer nekton are reported.

Croaker is the species found in the largest numbers in the nekton screens. Crab is next. Others include bass, bluegill, butterfish, catfish, drum, flounder, menhaden, sand trout, and sheepshead.

"One would assume by this increase in numbers and the diversity of organisms that the water quality is getting better. It is a safe assumption. It is real monitoring. They are there," Bates stated.