METROPOLITAN
WATER
DISTRICT
NUMBER 3 • 1985

Focus ON WATER

The sleeping giant must stir

By Carl Boronkay, General Manager, Metropolitan Water District. This article first appeared in the *Los Angeles Times*.

Metropolitan faces a question, the answer to which is critical to each of the 13 million people living on our coastal plain. Shall we invest time and money in securing an assured supply of water? If not, can we accept the alternative, which is to risk shortages during dry periods through the next decade and to live with shortages thereafter?

The answer seems obvious, but it isn't. The mere handful of consumers who oppose water development are the people we hear from most frequently. We have suffered three defeats of water legislation in the past few years. Neither the Legislature nor the governor seems inclined this year to pursue a bill that would move us closer to completion of the State Water Project—a system of reservoirs, pumping plants and 400 miles of aqueduct that provides about one-fourth of the water consumed in Southern California.

And next year is an election year. Water development is an unpopular election issue. Whatever a politician's stand, he or she will likely anger half the state—or so the current wisdom goes.

On a recent local news program, several adults were asked where they thought their

water came from. Not one had any idea. That is unfortunate, because once there is an understanding of the systems that carry water to Southern California from hundreds of miles away, there is usually an appreciation for the cost and intricacies of our water supply.

One of those systems, the Colorado River Aqueduct, will be halved, in terms of assured supplies of water, next year. We are negotiating to increase the availability of Colorado River water on a long-term basis—this will not be an assured supply.

Another system, the Los Angeles Aqueduct, supplies water for the City of Los Angeles only. There is temporary peace in the courtrooms, but water rights in the Owens Valley and Mono Basin have been and will be contested time and again.

With the remaining system, the State Water Project, we can almost meet our year 2000 needs if rainfall is normal. Two or three consecutive years of very low rainfall would mean turn-of-the century project shortages equal to the water required by more than two million people.

What is being done to avert the economic and social upheaval that would result from water shortages?

We are negotiating with conservation leaders in the Imperial Valley to fund their projects in exchange for access to the water saved.

We are storing current surpluses in groundwater basins for later use.

We are exploring the banking of currently unneeded water in reservoirs on the Colorado.

We are encouraging residential and industrial conservation.

We are expanding our internal system to take full advantage of all state project water currently available.

We are helping to fund local reclamation projects such as desalting brackish groundwater and cleaning up wastewater. These supplies can be used in limited cases to offset the need for "new" water.

We are doing everything possible to take advantage of any future surpluses on the Colorado River.

The state is negotiating for access to unused water in the federal Central Valley Project and for additional water from the Sacramento-San Joaquin Delta without the need for new construction. We would have access to some of that water.

Water-development critics point to this list of projects as proof that adequate water exists and that no further projects need be built.

With the exception of water from the Imperial Irrigation District (where negotiations are in progress), not one of those listed projects represents a long-term assured supply of water. For that, the State Water Project must be completed, either by widening, deepening and strengthening the channels through the delta or by going around it with a new channel. Also needed are additional reservoirs to store huge winter flows that currently waste to the sea.

For those improvements to occur, several things must happen:

Consumers must take seriously the threat of long-term drought.

Southern California water agencies must settle their differences and approach water development in a united fashion.

People who are concerned about adequate water supplies have to accept their obligation to make themselves heard.

If legislation authorizing a big project in the delta is not possible, then we need to begin now with a series of smaller projects, to be built in increments, in order to stay one step ahead of demand.

All Californians must come to realize that current operations in the delta are inefficient and destructive, and that any of the reasonable plans for completion of the State Water Project would also protect the delta region.

It is true that there is no water-shortage problem today. It is just as true that there will be a problem in the near future—a problem that cannot be solved overnight.

Water projects sometimes take decades to complete. Meanwhile, the population served by Metropolitan Water District is growing while our assured supplies of water are being reduced.

The only source of additional water to carry Southern California into the 21st century is water from a completed State Water Project.

If Southern California is the sleeping giant that it is characterized to be, the time has come to wake up.

A bit of luck brings water rates down

At a time when inflation is so common it's taken for granted, any rate reduction earns itself a place in the believe-it-or-not department.

Several changes have developed in Metropolitan's financial picture leading the board of directors to reduce wholesale rates by $5 per acre-foot for the 1985-86 fiscal year. This move scales down the district's projected revenues by about $7 million. An acre-foot is about the annual amount used by two families of five.

The chief "bit of luck" is that although the district had expected to share in a multi-million-dollar program for refilling State Water Project reservoirs, it now appears that the Department of Water Resources, which operates the state project—including several hydroelectric plants—has sold more than enough surplus electricity to compensate for costs of refilling the reservoirs. In fact, Met probably will receive a good-sized power credit.

Also, water sales during the winter rainy season have been higher than anticipated.

Of course, no luck lasts forever, and Met's staff expects a moderate rate hike could be necessary in 1986-87. There is hope, of course, that this year's dollar surpluses and power credits expected in 1985-86 will offset that increase.

Water from the Colorado River Aqueduct is sent into Whitewater River, then on to the spreading basins.

Banking on it

If a bird in the hand is worth two in the bush, thousands of acre-feet of Colorado River water available now should not be ignored.

So Metropolitan has worked out an exchange agreement with Coachella Valley and Desert water agencies to store surplus water in their underground water basin beneath Palm Springs.

Water from Metropolitan's Colorado River Aqueduct is released down the Whitewater River, then diverted into huge hollows in the desert sand from which it seeps into the groundwater basin where it will be stored until needed during a dry period.

The program—the first of its kind in California and a major step in long-range plans to better manage Southern California's existing water resources—was developed jointly by Metropolitan, Desert and Coachella. Met provides about half the water consumed in the six-county area from Ventura to Riverside to San Diego. Desert and Coachella provide residential and agricultural water service from Palm Springs to the Salton Sea.

Over the next two to three years, 350,000 acre-feet of water or more will be stored in the groundwater basin. Ultimately, as much as 600,000 acre-feet—more water than the city of Los Angeles uses in a year—could be banked there. During a drought, this will augment Southern California's water supply.

"All three water agencies," says Metropolitan's general manager Carl Boronkay, "are capitalizing on surplus water now available

from the Colorado River and on low-cost power from Hoover Dam to pump that water. In the future, extra water may not be available and the electricity to run the pumps will be considerably more expensive."

Like Metropolitan, Desert and Coachella participate in the State Water Project, the huge system of dams, reservoirs and aqueducts that delivers water from Northern California to agencies in the central and southern parts of the state.

Because neither Desert nor Coachella has built the expensive pipelines to connect to the state system, they have, since the early 1970s, traded their state project allotment to Met in exchange for an equal amount of Met's Colorado River water.

This new program expands the bucket-for-bucket trade into wholesale storage. During a drought year, Coachella and Desert will forego the water Metropolitan would normally deliver to them, pumping instead from their groundwater basins.

So the coastal Southland gains a little drought insurance, while desert water users benefit from a more secure water supply and the decreased pumping costs that result from higher groundwater levels.

Desert and Coachella water users also will have the added benefit of a proposed small-hydroelectric power plant that will generate electricity—enough to meet the needs of about 500 households—with the water released from the Colorado River Aqueduct into the Whitewater River.

To handle the large amounts of water to be percolated underground during the next several years, 10 new spreading basins—the largest almost 1.5 miles long—have been scraped in the earth near the Whitewater River. In all, 19 basins covering 704 acres are ready to capture the billions of gallons the water agencies have begun spilling into the desert sand.

"This marks a significant step toward better managing existing water supplies," says Boronkay. Other programs Metropolitan is considering, with an eye on that same goal, include a similar groundwater storage project in the Chino basin near Pomona and agricultural irrigation water conservation in Imperial County.

No selenium problem in Southland's water

Recent news accounts have alarmingly suggested that deliveries from the State Water Project into Southern California may be contaminated with selenium from the Kesterson Wildlife Refuge near Los Banos.

Kesterson is seriously endangered by build-ups of this naturally occurring element that has been washed out of soil in the west San Joaquin Valley by irrigation water. In February, the California Water Resources Control Board ordered the U.S. Bureau of Reclamation to either shut down Kesterson, which it operates, or find a way to eliminate selenium contamination. In mid-March, the Bureau announced it was closing Kesterson and cutting off irrigation water to 42,000 acres of San Joaquin farmland.

Reports that dangerous selenium levels have found their way into the Southland's drinking water are incorrect. Tests of state project water find selenium well below the limits set by state and federal regulatory agencies. Indeed there is no indication that any selenium-contaminated water is flowing out of Kesterson.

The Environmental Protection Agency and the State Department of Health Services set the maximum permissable level of selenium in drinking water at 10 parts per billion (ppb) parts of water. In water samples collected as recently as January 14, Metropolitan found selenium levels of less than two ppb in state project water supplies, and levels of four to six ppb in water from the Colorado River.

From 1980 through 1984, Metropolitan's testing revealed selenium levels of up to two ppb in state project supplies, and up to four ppb in Colorado River supplies.

In *all* cases, Metropolitan's water has been well below the 10 ppb maximum set by the governmental agencies.

The California Department of Water Resources, which operates the State Water Project, and the U.S. Geological Survey also have tested state project water. The Department of Water Resources has run 21 tests of water samples taken from various points in the Sacramento-San Joaquin Delta. In only one of those tests, taken at the point where the San Joaquin River enters the delta, were selenium levels even detectable with a reading of one ppb. The U.S. Geological Survey, in tests of water drawn from 20 locations in the San Joaquin from 1979 through 1982, found selenium levels of no more than one ppb.

quick and to the point

Information, please

If you want to know more about such matters as why and where reclaimed water is used, Metropolitan's small-hydro-electric generation program, water conservation, chloramines' use as a disinfectant, how Met is organized and operated, or where the water used in Southern California comes from, brochures are available from Met's Public Information Office, Post Office Box 54153, Los Angeles, CA 90054, telephone 213/250-6485. More than two dozen publications are in stock.

A tiny fish could stymie irrigation

Though it is miniature in stature, nobody is under-estimating the power of the tiny desert pupfish to cause huge problems for Imperial and Coachella Valley irrigation districts when the guppy-like fish is declared an endangered species—expected to occur soon—by the U.S. Fish and Wildlife Service.

Routine drain maintenance destroys many pupfish and will be prohibited unless the operation is declared exempt by a federal agency. Because both irrigation districts are under the aegis of the Bureau of Reclamation, a federal agency, they hope to be allowed to continue their maintenance schedule.

Water war truce

A 93-year battle, colored in the early years by dynamite attacks and shotguns and in later years by lawsuits, ended in a truce recently when Los Angeles and Inyo County agreed to a settlement on water from the Owens Valley.

Effective through February 1989, the agreement assures Los Angeles, which now annually exports about 108,000 acre-feet of underground water from the Owens Valley, a minimum of 106,000 acre-feet in a wet year and nearly twice that during a dry year. In return, Los Angeles will finance 18 Owens Valley environmental projects.

This pact is a revision of a similar agreement reached a year ago.

Doing something about the weather

California growers may soon be able to take a more scientific approach to deciding when and how much to irrigate. All that's needed is the Legislature's approval of a Department of Water Resources plan to provide up-to-the-hour weather and irrigation information, via computer, to farmers and the public.

Research begun in early 1982 by the California Irrigation Management Information System (CIMIS) should be complete in July, at which time the weather station network becomes the property of the Department of Water Resources.

Interior gets a new secretary

Donald Hodel, the nation's newly appointed 45th Secretary of the Interior, says President Reagan asked him to continue working toward such goals as increasing water supplies and improving the federal government's relationship with state and local governments.

Among other water-related matters, the interior secretary determines use of the Colorado River—one of Metropolitan's two water sources.

At his confirmation hearing before the Senate Committee on Energy and Natural Resources, Hodel said, "It is imperative that we as a nation revitalize the magnificent water development programs launched early in our history... The federal-state partnership in water development has helped create abundant year-round water, electric and food supplies, and reduced flooding... We should be able to improve our program to meet America's current and impending water needs while recognizing federal budgetary realities."

A native of Oregon, Hodel has headed the Department of Energy for about two years.

New treatment plant in the home stretch

Construction has reached the halfway point for the $140-million Los Angeles Aqueduct Filtration Plant, being built by the Los Angeles Department of Water and Power to help it continue to meet the strict water-quality standards established by the federal Safe Drinking Water Act of 1974. Scheduled for completion by late 1986, the innovative plant is designed to solve, among other things, the occasional cloudiness in Los Angeles' water.

Streamlining waste management

Gov. George Deukmejian's proposal to set up a California Department of Waste Management, which would coordinate the state's efforts to manage the handling, disposal and cleanup of toxic wastes, is slated to go to the Legislature in April. If neither the Assembly nor the Senate disapproves it, this will automatically become effective in June.

The new department, with divisions of Toxic Substances Control, Solid Waste Management, and New Technology, would come under the aegis of the state's Health and Welfare Agency.

Among the chief concerns in toxic waste management is water quality.

Reminiscences: Bringing the Colorado River home

Excerpted with permission from *Engineering & Science*

To bring water rushing to Southern California in 1939, not only was an aqueduct built, a science was refined.

A means of achieving the most efficient pumping possible for the Colorado River Aqueduct was prodded and shaped from research to reality by a team of engineers from Metropolitan and California Institute of Technology. To accomplish their goals, a new laboratory was born at Caltech.

Metropolitan, according to a letter from then general manager and chief engineer F.E. Weymouth, stood to gain much from special research proposed at Caltech: The aqueduct called for a long term investment of more than $33 million; each percent gained in pumping efficiency would mean savings of about $49,000 per year – in 1939 dollars – in power costs.

At Caltech, Theodore Von Karman, a widely respected professor, had become interested in developing a hydraulics program. He made the case for Caltech's involvement: "...I believe a laboratory of this kind will have a unique position in this country and almost in the whole world.

"Considering the recent development of aeronautics as a science and as a technical art, the great achievements are due to the fact that the technical development was connected simultaneously with the development of the scientific fluid mechanics and the aeronautical engineers departed from the methods used in natural science and applied mathematics. The same development is starting now in hydraulic engineering..."

Jim Daily began working in Caltech's hydraulic machinery laboratory, better known as the "pump lab," as a graduate student in 1935. He later served 18 years on the faculty at Massachusetts Institute of Technology, then joined the University of Michigan, where he retired as a professor of fluid mechanics and hydraulic engineering. He now lives in Pasadena.

by James W. Daily

The Hydraulic Machinery Laboratory at Caltech had its genesis with some graduate student thesis projects in the early 1930s under Robert Knapp, assistant professor of mechanical engineering. Knapp had spent some time in Europe visiting hydraulic facilities. He returned with the sharp conviction that there was a need in this country for more definitive research into the hydraulics of centrifugal pumps, that it should be done in a laboratory independent of all manufacturers, and that it should be done at Caltech.

The time was ripe for many reasons. Southern California needed water and there was a project underway to build a great aqueduct from the Colorado River to Los Angeles and adjacent cities. It was to be 300 miles long and a series of five pumping plants were necessary to lift the water some 1600 feet over the mountains. The pumps were to be among the largest and most powerful anywhere in the world. The fledgling Metropolitan Water District of Southern California (MWD) had designed the project and was busy initiating construction.

Caltech needed MWD's support to a sophisticated laboratory effort aimed, of course, at the problems that might arise with the exceptional pumps required for the new aqueduct.

Knapp's vision in the whole project, including the laboratory plan and most of its details, led to an accurate and efficient data collection system, the forerunner of systems now used worldwide.

Among those who took a deep interest in the pump lab's development was Aladar Hollander, known affectionately as A.H. He had been a student at the Technische Hochschule in Budapest and after World War II he became a professor of mechanical engineering at Caltech. In the 1930s, however, he was chief engineer for the Byron Jackson Co. Pump Division and in one sense a bystander. But he was well known for his expertise and his sage advice and his support of the project was invaluable.

Others involved included Frank Wattendorf, who had early been in charge of the pump lab; Ralph Watson, who took over lab leadership in 1935; and George Wislicenus, a young pump designer who as a graduate student in the early 1930s carried out the various tests that helped persuade MWD to support the more sophisticated program.

In the beginning, pump lab experiments looked into a variety of phenomena as well as the basic behavior of centrifugal pumps. The result was to tighten up final specifications beyond the prevailing wisdom of the day.

By December 1935 four pump manufacturers had submitted bidders' models for testing. At this stage, the small active lab staff included some on temporary duty from MWD: A.W. (Bill) Atwood, Paul Winn and Harold Levinton. Near the project's finish Arthur Ippen, who was soon to receive his doctorate, joined the team to contribute valve specifications.

When the project ended, the summer of 1936, MWD personnel returned to their Los Angeles office. Ippen eventually went to MIT where he became head of the Hydrodynamics Laboratory. He died in 1974. Watson became associate dean of engineering at Syracuse University. Wislicenus, after teaching at Johns Hopkins, became head of the Naval Ordinance Research Laboratory and the Aeronautics Department at Pennsylvania State University.

MWD passed title to its interest in the pump lab to Caltech.

The tests had resulted in large overall savings and avoidance of future problems, including excess vibration and materials damage. The investigations affected the overall cost of the pumping plants as well as the cost of the pumps themselves. Field tests of three prototype units proceeded smoothly in 1939.

Atwood remembers the field tests: "The tests on the model pumps probed that a single-stage centrifugal pump would meet the requirements and an efficiency of 88 percent or better could be achieved. Therefore the final specifications for the prototype units required a guarantee of 88 percent efficiency and provided a bonus for each percent achieved above that. Failure to meet the guarantee required the manufacturer to modify or replace the pump.

"Paul Winn and I, having spent several years as MWD representatives at the Caltech pump lab, were both deeply involved in the final field tests. The tests at Intake and Gene were witnessed by A.H. Hollander. He would look over our shoulders at the readings as we recorded them and retire to a corner of the pump house and work his little slide rule. We would glance over, and if he was smiling, all was going well, but if he was frowning we would check our instruments. After the run was over, Paul and I would return to the conference room and with the calculator apply the various corrections and grind out the results. However, from Hollander's smiles, we already knew they would be good.

"The final results showed an excellent 90.0 percent for the five pumps tested. That evening A.H. treated the entire test crew to a case of special German wine he had brought along in anticipation of such excellent results."

Progress notes

Edmonston Pumping Plant — On-line for the Department of Water Resources are three new pumping units providing increased reliability and another step toward Metropolitan's ability to take advantage of the entire flow from the State Water Project.

Arlington Basin Desalter Project — In a joint reclamation venture with the Santa Ana Watershed Project Authority, brackish groundwater will be removed from the Arlington Groundwater Basin, treated and fed into Lake Mathews, near Riverside. This will create a void in the basin, encouraging better quality water to enter and improve the basin's overall water quality.

Devil Canyon bypass study — In an effort to assure reliability of the east branch of the California Aqueduct, which brings water from the north, a preliminary report has been completed outlining ways to bypass the Devil Canyon power plant. Currently, a power plant shutdown would cut off water flow in the aqueduct.

Alamo Power Plant — A direct power feed-back into project operations will result when this station, located on the east branch of the California Aqueduct, west of Palmdale, goes on-line in January 1986.

South Laguna and Las Virgenes Reclamation Projects — These will provide their districts with treated sewage for irrigation use.

Pamo Reservoir — Several advantages related to power generation and increased yield from the State Water Project are among the benefits offered by this project now on the drawing boards in San Diego County. Storage downstream of the Red Mountain power plant would allow a constant rate of flow through the plant resulting in cheaper power. Construction of the reservoir, given the nod by voters last November, also offers storage of winter flows for summer delivery.

Chino and San Fernando Valley groundwater storage programs — These two plans call for Met to deliver surface water, to be stored in groundwater basins in years of excess supply, for later use during dry years.

Montezuma Slough Control Structure — Currently in the design stages, this will regulate water quality in Suisun Marsh, adjacent to the Sacramento-San Joaquin Delta, through the use of radial gates that will contain fresh water in the marsh and prevent excessive seawater intrusion.

Editor and writer/Penny Lawbaugh
Designer/Mario Chavez

Focus ON WATER

Metropolitan Water District
Box 54153
Los Angeles, California 90054

Address correction requested

92373 LEAGUE0161
LEAGUE OF WOMEN VOTERS
OF REDLANDS
1313 E COLTON AVE
REDLANDS CA 92373

Bulk Rate
U.S. Postage
PAID
Los Angeles, Calif.
Permit No. 11979