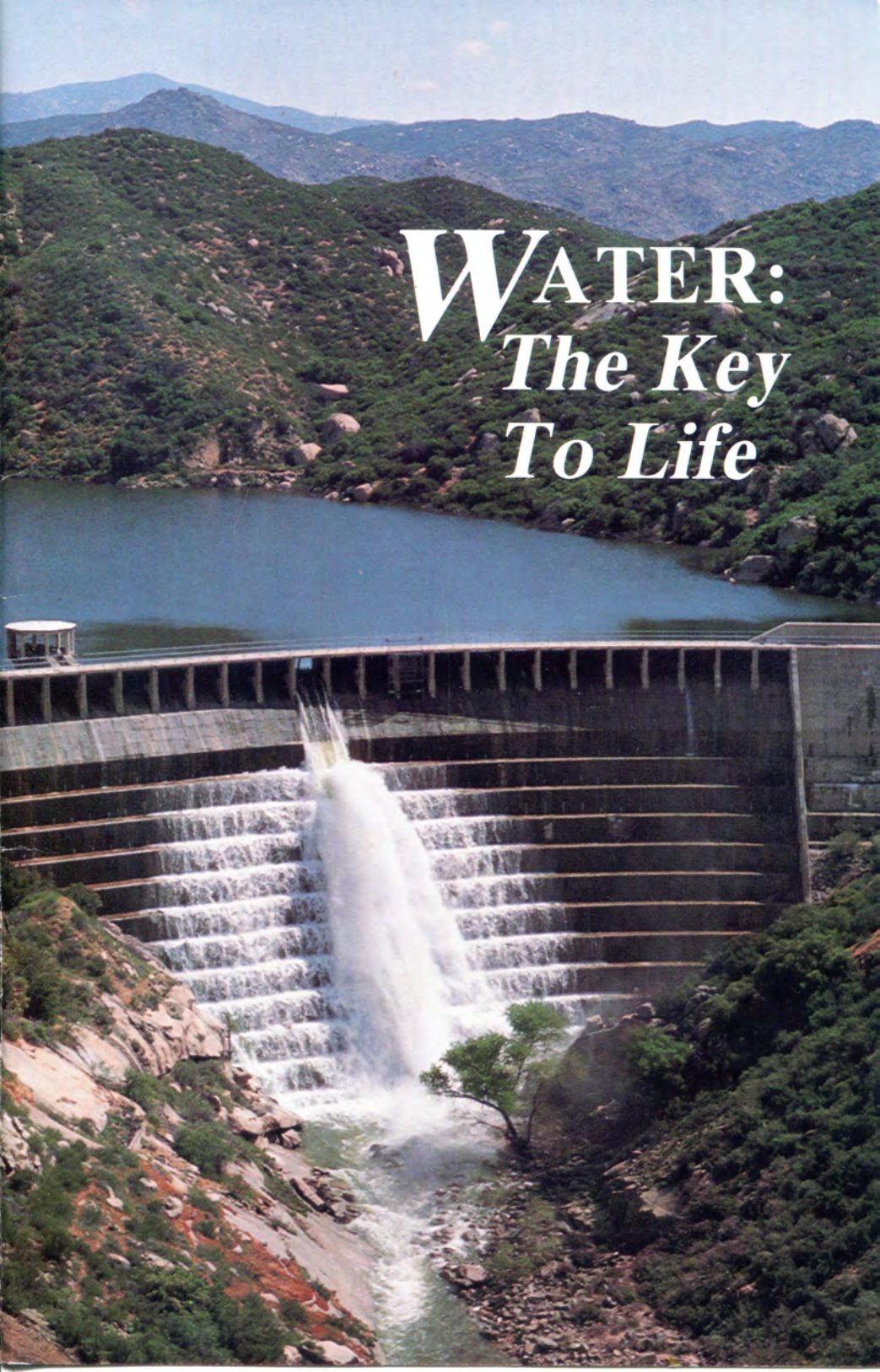

WATER:
The Key
To Life

MAKING THE DESERT BLOOM

San Diego is a city in bloom. From the Otay Mountains to the rolling hills of North County, the city is a palette of color. Hillsides are ablaze with yellow and orange gazanias, private yards are adorned with pastel bedding plants, and even the freeways are lined with magenta ice plant and overhanging eucalyptus.

Upon first glance, one would never know that San Diego has grown up on top of a desert. San Diego's beauty is indeed man-made. Water is the key to the city's beauty — and to its survival.

Located in a semi-arid environment, San Diego's annual rainfall averages less than ten inches, or one-tenth that of some parts of Northern California. Prolonged rain storms are rare, and there are no permanent streams, natural lakes, or groundwater sources in the area. Local rivers — the Cottonwood-Otay in the south, the San Diego in the central part of the city, and the San Dieguito to the north of the city — provide barely enough water to support a population of 50,000 persons.

As a result, San Diego has become increasingly dependent upon imported water which travels hundreds of miles before reaching its final thirsty destination.

Today, the city — through the San Diego County Water Authority — imports as much as 200 to 300 million gallons of water daily from the Colorado River and from rivers in the northern part of the state.

San Diego maintains nine man-made reservoirs to collect run-off from seasonal rains and to store imported water.

While these lakes are world-famous for their excellent fishing opportunities, their primary purpose is to provide a supply of water to the city's three water treatment plants.

El Capitan, San Vicente, Sutherland and Murray reservoirs feed the Alvarado Treatment Plant with a combination of local and imported water. The Alvarado Plant has a design capacity to treat 120 million gallons of water daily, and it serves the central and eastern parts of the city.

Water from Morena, Otay and Barrett reservoirs flows into the Otay Treatment Plant where 15 million gallons of local water are treated daily to serve the South Bay area. By 1989, the plant's capacity will be expanded to 40 million gallons per day.

Finally, the Miramar Reservoir serves as a holding facility for imported water from the County Water Authority Aqueduct. It provides water from the Colorado River and from Northern California to the Miramar Water Treatment Plant where up to 140 million gallons are treated daily for delivery to the northern section of the city.

HOW PURE IS SAN DIEGO'S WATER?

There really is no pure water, except perhaps, that found in clouds. Even rainwater, however, becomes affected by gases and dust as it falls through the atmosphere.

Because San Diego's untreated water comes primarily from distant surface rivers and from rainfall runoff, it is higher in mineral content than some underground water supplies. But many of these minerals are good for you even though they may impart a slight characteristic taste in the water.

The process used at San Diego's three water treatment plants in many ways copies nature itself. Impurities are carefully removed through complete treatment, leaving San Diego with an excellent quality of drinking water which meets or exceeds all state and federal drinking water standards.

COAGULATION AND SETTLING

In nature, particles of sand, silt and organic material settle to the bottom of a river bed or a lake, leaving clean, clear water near the surface.

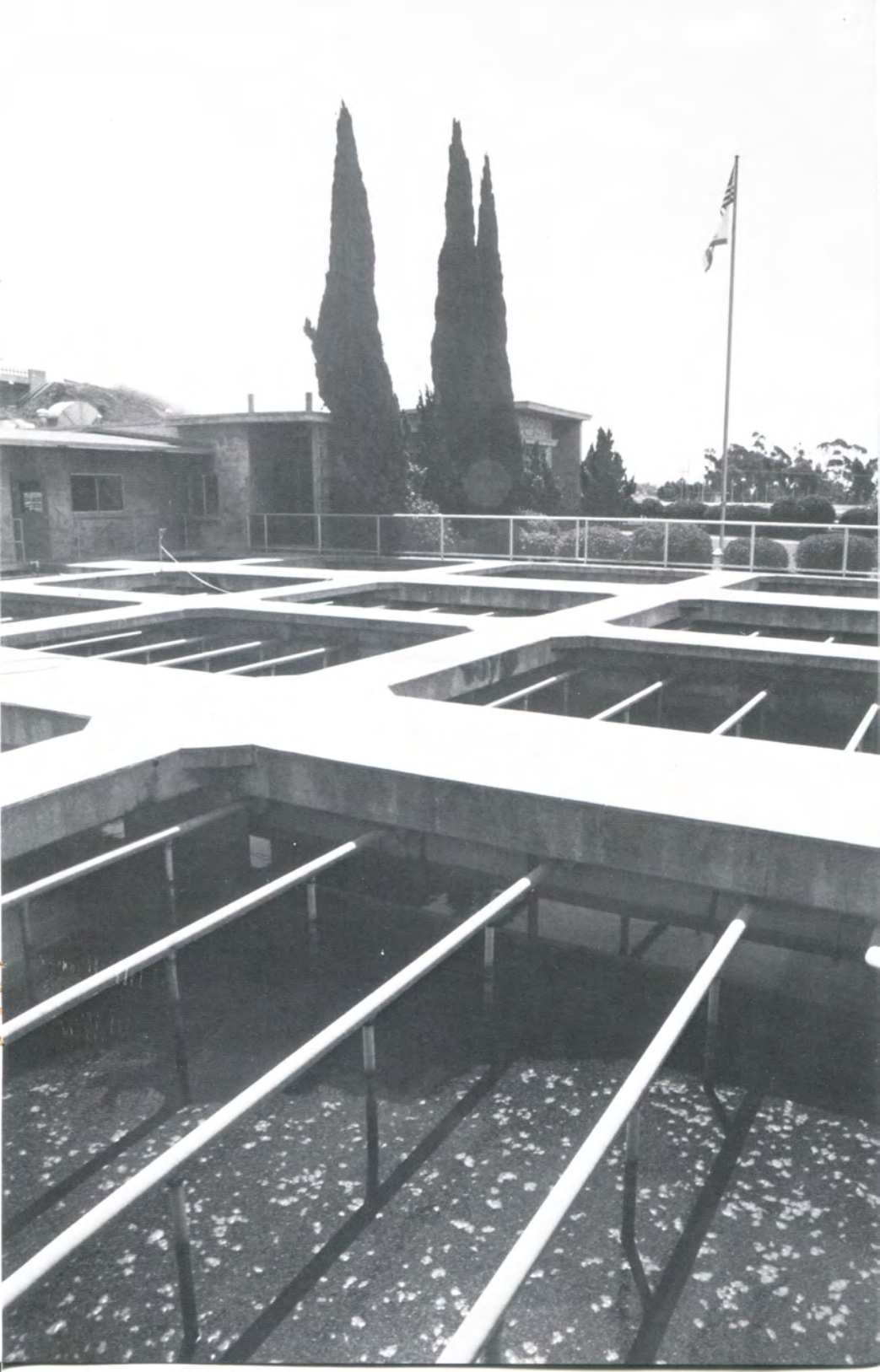
At San Diego's water treatment plants, ferric chloride is added to the water to cause small particles of dirt, sand and plant material to coagulate, or floc at a rapid rate. The coagulant is added to the incoming water, and as the particles stick together, they drop to the bottom of a settling basin and are removed.

FILTRATION

In nature, sand and gravel act as filters which trap small particles in the water as they pass slowly through soil.

At San Diego's treatment plants, water leaving the settling basins is passed through filter beds consisting of a 14- to 20-inch layer of anthracite coal above 10 to 20 inches of sand. This filtration process removes any remaining suspended particles.

After a period ranging from a few hours to two days, the filter bed is backwashed to remove the accumulation of trapped particles of algae, silt and clay. As the filters are cleaned, the backwash water is recycled naturally by sending it back to the untreated water reservoir.




500 ml
300
400

DISINFECTION

In nature, extremely short ultraviolet rays in the sunlight act as excellent disinfectants for surface water. But as little as a one-inch barrier of water can halt ultraviolet penetrations.

Disinfection of raw water is essential to control diseases such as cholera, typhoid fever and dysentery.

At San Diego's treatment plants, water is disinfected of bacteria by using chloramine —a substance formed when a small amount of ammonia is mixed with chlorinated water.

The process of cleansing drinking water with chloramines is not new. Denver has been using chloramines for more than 70 years; St. Louis, 50 years; and Boston, 40 years.

San Diego converted its disinfection process from chlorine to chloramines in 1981 in an for the regulation of trihalomethanes *(THM's).* Trihalomethanes are substances which are formed when free chlorine combines with organic particles in the water.

Federal regulations limit the presence of THM's to 100 parts per billion in drinking water, or about one drop per 132 gallons. San Diego's drinking water contains about 50 or less parts per billion THM, or about half the allowable limit.

MAKING SURE THE WATER IS SAFE

From the time San Diego's water enters the water treatment plant to the time it enters your home, it is tested and retested to make sure it is as clean and as healthy as possible.

It is tested more than 110,000 times each year at more than 100 points throughout the system — at the lakes, during the purification process, in the pipelines as it flows to your home, and at the tap.

The water is checked for harmful bacteria, for dozens of chemical elements, and for the presence of toxic substances.

WATER FINGERPRINTS

In addition to performing bacteriological tests, chemists routinely monitor other characteristics of water — fingerprints so to speak — which distinguish one water supply from another.

Turbidity — Turbidity is commonly thought of as water clarity. Undissolved, suspended matter such as clay, silt, organic particulates, plankton and other microscopic organisms can cause water to appear cloudy. State drinking water standards limit turbidity to 0.5 turbidity units. San Diego's drinking water contains from one-fourth to one-half the allowable limit.

Total Dissolved Solids — This refers to the mineral content of the water and is closely tied to the untreated water source. Surface water, such as that from rivers, collects minerals as it passes over rocks and through soil. Because San Diego depends on surface water, its supply has some minerals and total dissolved solids.

Hardness — Hardness is an indicator of scale formation caused by the presence of calcium and magnesium in the water. Hard water causes scale in pipes, boilers and cooling towers and reduces the sudsing action of some soaps.

San Diego's water is quite hard and would require extensive and expensive treatment to soften. Softened water is not necessarily desirable because of its high sodium content which may be harmful to your health.

PH — This measures alkalinity versus acidity in water. Controlling pH is important in avoiding corrosion in distribution lines. San Diego's water is adjusted to a slightly alkaline level of 8.2 on the pH scale.

Taste and Odor — Seasonal temperature changes in local water reservoirs can cause algae growth which may create an earthy-musty taste and odor in the drinking water. Although tastes and odors are not harmful, they are carefully monitored, controlled and eliminated through the treatment process.

San Diego's Water Quality
Comparison to the Drinking Water Standards
(based on 1985 yearly averages)

Primary Standards

Constituent	Standard	San Diego Water
Inorganics		
Arsenic mg/l	0.05	‹0.004
Barium mg/l	1.0	‹0.047
Cadmium mg/l	0.01	‹0.003
Chromium mg/l	0.05	‹0.01
Lead mg/l	0.05	‹0.03
Mercury mg/l	0.002	‹0.0002
Selenium mg/l	0.01	‹0.003
Silver mg/l	0.05	‹0.003
Nitrate mg/l	45.0	1.25
Fluoride mg/l	1.6	0.27
Organics		
Endrin ug/l	0.2	‹0.07
Lindane ug/l	4.0	‹0.01
Methoxychlor ug/l	100.0	‹0.58
Toxaphene ug/l	5.0	‹0.13
2,4-D ug/l	100.0	‹0.25
2,4,5-TP ug/l	10.0	‹0.025
THMs ug/l	100.0	45.0
Turbidity (NTU)	0.5	0.20

mg/l = milligrams per liter = parts per million
ug/l = micrograms per liter = parts per billion

Secondary Standards

Constituent	Guideline	San Diego Water
Calcium mg/l	no guidelines	55
Chloride mg/l	250	71
Color (units)	15	< 2
Copper mg/l	1	0.012
Langelier Index	positive	+0.43
Foam Agents mg/l	0.5	0.03
Iron mg/l	0.3	0.02
Manganese mg/l	0.05	0.01
Odor (TON)	3	< 1
pH (units)	6. 5-8.5	8.2
Sodium mg/l	no guidelines	68
Sulfate mg/l	250	125
TDS mg/l	500*	445
Zinc mg/l	5	0.012

* 500 recommended
1000 maximum average

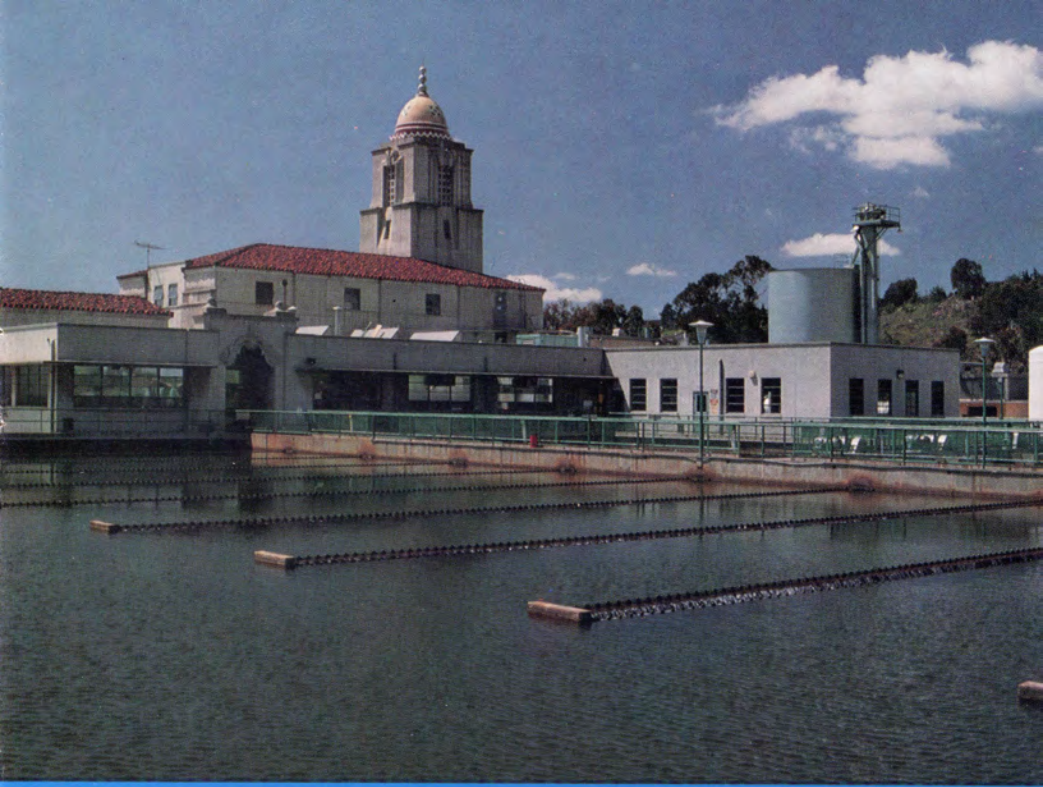
DRINK UP, SAN DIEGO!

San Diego's Water Utilities Department is committed to providing good, clean, healthy and affordable drinking water to its customers.

Everyday we deliver more than 200 million gallons of water to the community through thousands of miles of pipeline. We deliver the water straight to your home for about one-eighth of a penny per gallon. Where else can you get such a bargain?

San Diego's beauty, growth and prosperity depend upon its water supply. Through hard work, dedication and long-range planning, the Water Utilities Department will continue to provide quality water to its customers for years to come.

CREDITS
Department of Water Utilities
Armand V. Campillo, Director
Will Sniffin, Deputy Director, Water Production
Yvonne Rehg, Writer
Don Jones, Photographer
Carol Chaffin Limbach, Graphics
Doris Reynolds, Typesetting
4/86 10K



San Diego Water Utilities Department
202 C Street
San Diego, CA 92101