

DAM REPORT

STATEMENTS OF AUTHORITIES ON DAM CONSTRUCTION REVEALS SATISFACTORY CONDITION; SAVAGE SCORED ON REPORT

Colonel Ed Fletcher, One of Builders of Structure In Sweeping Denial of Charges Made By H. N. Savage; Safety Confirmed

A sweeping denial of all charges regarding Lake Hodges dam in a statement issued by Engineer H. N. Savage to the city council was made by Colonel Ed Fletcher, one of the builders of the dam. Col. Fletcher's statement follows:

"The statement of H. N. Savage that Lake Hodges dam is unsafe is ridiculous.

"Savage has a personal prejudice against all multiple arch dams, as evidenced by his statements in San Diego papers several years ago.

"The plans of Lake Hodges dam were first approved by our engineer, then approved by the chief engineer of the Santa Fe railroad and finally approved by the state engineer of California, as well as all state authorities.

"Lake Hodges dam was built under personal supervision of the state engineer, W. S. McClure, and a bronze tablet accepting the dam in the name of the state of California can be seen at the dam today.

"The multiple arch type of dam is a new principle with higher factors of safety.

"Savage has never built a multiple arch dam. He pins his faith to gravity arch principle. The St Francis dam was a gravity arch.

"Savage built Otay dam, a gravity arch, at a cost of \$11,000,000; Barrett dam, a gravity arch, at a cost of \$1,750,000. We built Lake Hodges dam at a cost of less than \$400,000. It has stood the test.

"The greatest discharge of water, officially measured, in San Diego county passed Lake Hodges dam two years ago; more than 80,000 second feet, or one-third the flood discharge of the Colorado river.

"If Savage and the city of San Diego wants to throw away \$150,000 and reinforce the buttresses this can be done, but it is wholly unnecessary.

"Rudolph W. Van Norden of San Francisco, considered the greatest authority in the country on multiple arch dams, stated in writing, after a personal inspection that Lake Hodges dam is not in a dangerous condition is stable and cannot be questioned.

"It is unfortunate, but most engineers of the old school who have had their life experience in gravity dams are naturally suspicious of any new principle. The multiple arch type is beyond the experimental stage.

"More than 20 of these dams have been built on the Pacific coast the last ten years, three of them higher by 20 to 40 feet than the Lake Hodges dam."

Assures of Safety

In referring to the report of Savage, Leroy A. Wright attorney for the Santa Fe Irrigation company, said he would assure his clients that everything would be done to remove any flood danger.

Edward Hyatt, Jr., state engineer who said that he was at the hearing at the request of the Santa Fe Irrigation company, said that the state had passed on the validity of the Hodges bond issue and therefore had some interest in the welfare of the irrigation company. Since the project was taken over by the city however, the re-

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SAVAGE URGES NEW AND SAFE DAM AT HODGES

Site Higher Up In Basin Than Present Structure Favored TO DOUBLE SUPPLY Project Would Give City 15,000,000 Gallons Of Water Daily

By MAGNER WHITE

A new and safe dam at Hodges! One consisting of entirely new construction at a site a little higher up in the basin than the present structure; or one to be made by rebuilding the present dangerously unsafe dam.

And, in connection with the building or rebuilding of the dam, a new water supply for the city of San Diego totaling—

Fifteen million gallons of water per day! Virtually doubling the city's water supply over the present requirements.

This projected development was suggested to the city council today by City Hydraulic Engineer H. N. Savage in his first really important communication since he resumed control of the city's water development program several weeks ago.

While he does not directly recommend building or rebuilding at Hodges dam immediately, his suggestions, taken into consideration with other known factors in the water situation, indicate that that is what is in his mind.

MORE WATER NEEDED

Hodges dam lies far below the projected Sutherland dam on the same watershed. Sutherland dam, which may be suspended for lack of funds, is becoming involved in many legal and financial difficulties. Many lands required for the development have not been bought by the city, and the owners are holding out for high prices.

A dam on the San Diego river is, for the time being, out of the question, pending settlement of the master suit to determine the extent of the city's water rights on the river.

As to Hodges, Savage points out there is a necessity for making the dam safe at once.

"The development of additional water supply by the city of San Diego is absolutely necessary and at the earliest financially possible date," his communication says.

"The administrative and engineering determination of the plans to accomplish such development should take into full consideration the entire status of the Hodges dam, and the city's responsibilities for its safe and dependable operation.

SURVEYS UNDER WAY

"It is entirely practicable and feasible to develop a greatly increased water supply of about 15,000,000 gallons per day by enlarging the present Hodges reservoir storage capacity, either in conjunction with, and utilizing the present Hodges dam as a portion of a higher and dependable dam, or by the construction of a dependable dam to be located a little higher up in the reservoir basin where there is another well known damsite.

"Investigations, surveys, designs and estimates have already been commenced by me to determine the requirements and the relative controlling factors of developing an additional water supply for the city of San Diego from the San Dieguito drainage basin resources, while at the same time safeguarding the city from possible failure of the Hodges dam."

Savage says it is his "firm belief" that the city should "take the steps necessary to insure the permanency of the San Dieguito water supply works" and to "protect the public against the dam's failure, which might happen at any time, and particularly in consequence of flood runoffs which are inevitable."

comprehensive trip on official business in connection with water development for the city of San Diego, visiting Sacramento for the purpose of conferences with the state officials headquartered at Sacramento and others headquartered at San Francisco and Los Angeles, regarding appropriations of water rights and applications for acquisition of rights of way for reservoirs, dams and water carrying conduits.

The foregoing statements concerning additional water supply resources are for the purpose of advising your honorable body regarding the location, character and extent of the undeveloped water resources nearest to, and naturally tributary to, the city of San Diego, and advising your honorable body regarding the status of the city's allied water rights and rights of way for reservoirs, dams and water carrying systems.

Another communication will immediately follow this letter, outlining and recommending specific projects and features of water development and water carrying systems, each of urgent importance for immediate accomplishment, and suggesting a simple and legal method whereby the city of San Diego may provide the majority of funds required immediately to construct the recommended dams and water carrying conduit works. Very respectfully,

H. N. SAVAGE,
Engineer in charge.

SAVAGE URGES CONSERVATION

Expert Declares Problem in City One of Most Difficult

San Diego cannot afford to exhaust its capital water supply in the southern system, but must hurry the development of a new source of water, Hydraulic Engineer H. N. Savage yesterday told the members of the San Diego Advertising club.

"There is sufficient water in the Cottonwood unit for two-thirds of the city's daily demand, but no more," Savage declared. "It will not pay for the city to draw out its capital supply."

Lake Hodges was mentioned by Savage as one of the best potential sources of water in the county.

"The population of San Diego will double in a surprisingly few years if it can be announced to the world that there is an abundant water supply here," Savage told the Ad club members.

He characterized the local water problem as one of the most difficult he had ever seen, or worked on anywhere.

Applause greeted Mayor Harry Clark's assertion that one of the city council's greatest achievements was in getting Savage back to handle the city's water problems.

Clark explained many of the city's problems, outlining needs of a uniform sewer system and plans for a major street program and city-wide zoning map. He said that at least 15,000 bales of cotton probably will be handled out of the port of San Diego through the Allison warehouse this year.

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SAVAGE URGES CHANGE IN CITY'S CHARTER TO AID IN WATER PROJECTS

Emphasizing the importance to San Diego of such projects as the Otay and Hodges conduits, enlargement of Hodges reservoir and safeguarding the dam as well as completion of Morena dam work, Hydraulic Engineer H. N. Savage recommends that action be taken at the next November election to amend the city charter to increase the bonding capacity, in order that these projects may be completed, in a communication filed with the city council today. The communication follows:

TO THE HONORABLE, THE MAYOR, AND COMMON COUNCIL OF THE CITY OF SAN DIEGO, CAL.

Subject: Providing Funds, Legally, for Additional Water Supply Development.

Gentlemen:

In my communications to you dated Aug. 31 and Sept. 4, I recommended as urgent additional water supply projects for prompt construction, the following:

1. The construction of a second main pipe conduit from Otay reservoir to the city distribution system, distance about 20 miles.
2. Conditional upon the relative availability of the required water rights, riparian rights, and rights of way for reservoirs, dams and pipe conduits:

(a) The conservation of the entire runoff from the San Dieguito river drainage basin in a materially enlarged Hodges reservoir.

(b) Safeguarding the Hodges reservoir dam, either by enlarging and heightening the present dam, or by the construction of an independent dam, located a little higher up in the reservoir basin.

(c) The construction of a pipe conduit from the Hodges reservoir to the city of San Diego's distribution system, distance about 25 miles.

3. The completion of the Morena dam work to insure the safety and safe operation of the dam and spillway and appurtenant outlet works, and in conjunction provide an additional safe duty of about 750,000 gallons of water per day.

4. Materially increasing the storage capacity of the present Chollas Heights balancing reservoir.

5. In the above outline of projects, I have temporarily refrained from featuring San Diego river development, which, though logically and physically the most available, and simple, and economical, source of additional water supply for the city of San Diego, can be approached with judgment only after decision is reached by the courts on the pending litigation in which the city is a party, affecting

the paramount water rights of the San Diego river.

Conditional upon the relative availability of the required water rights, riparian rights, and rights of way for reservoirs, dams, and pipe conduits, it will be entirely practicable for the city of San Diego to construct, at least, a low diverting dam across the San Diego river immediately below the old Mission dam, and at a dam-site already owned by the city of San Diego.

Urges Diversion

By means of such a diversion dam, it will, furthermore, be entirely practicable for the city to divert from the unregulated flow of the San Diego river and carry and deliver to the University Heights reservoir throughout an 11-year period an average of over 1,000,000,000 gallons of water per season.

The water, if so diverted and carried and delivered, can most economically be filtered and purified by utilizing the city's University Heights filtration plant, which has just been completed and put into service, primarily to filter and purify water now being pumped from the city's pumping plants in Mission valley, and vicinity of Santee and Lakeside, but recommended by me, having also in mind the probable requirement therefor as above indicated.

In consequence of the recent lowering of the city's property assessment for taxation, the city's voted bonds are already quite in excess of the legal 15 percent limit established by the laws of the State of California.

It is my understanding that sufficient funds for the required water development may be simply and legally provided by amending the city charter to permit the legal issue and sale of water bonds in excess of the present limits fixed by the laws of the state of California.

Consent of the electors would also make it practicable to transfer the funds and bonds heretofore voted and not expended or sold in connection with the construction of the Sutherland project and make these funds

available immediately for the projects now urgently required.

It is recommended that action be taken at the next November election to amend the charter of the city of San Diego so as to increase its bonding capacity, but for water development and water carrying conduits only, and to the extent required for completing the projects which are vitally necessary for the present requirements and for the growing needs of the city's rapidly increasing population.

In conjunction with the suggested charter amendment, it will be practicable to reduce the bonding capacity from the present 15 percent limit to 10 percent, more or less, for all purposes other than for water development.

There is abundant and established legal criterion for the suggested charter amendment which will enable the city of San Diego to immediately recover from its embarrassing financial complications, which is particularly unfortunate on account of water development which is so urgently required.

Very respectfully,

H. N. SAVAGE,
Engineer in Charge.

Principal points in a report made by Engineer Savage yesterday include plans to enlarge Hodges reservoir to hold 15,000,000 gallons daily, in addition to its present capacity, and to enlarge the Chollas reservoir so it will hold 30,000,000 gallons daily.

The council also is advised of details pertaining to securing additional water supply at Morena, Barrett and Marron. The full report follows:

The city of San Diego has obvious, important, and urgent requirement for the consummation of appropriations of water rights; and of applications for rights of way over public lands for additional reservoirs, impounding dams, and pipe conduit carrying water systems, for its existing and rapidly increasing population.

Over 5-Year Period

Investigations, surveys, designs, and estimates previously made by me and brought up to Aug. 8, 1923, now are being extended to comprehend and include all water matters which have developed in the last five year period, for the purpose of determining the City of San Diego's water supply requirement at present and for successive years; also the comparative cost of developing additional water supply from each of the three outstanding independent river resources, and the order and rate of development work required and justified.

The three independent sources of available additional water supply naturally tributary to the City of San Diego, are the drainage basins of the Cottonwood river, San Diego river, and San Dieguito river.

Three Outstanding Basins

There are three outstanding reservoir basins in the Cottonwood river drainage basin, two of which, Morena and Barrett, have already been partly developed; the third, Marron, has been under control and projected for development for many years. The City of San Diego owns and controls practically all of the water rights and practically all the rights of way required for reservoirs, dams and water-carrying conduits in the United States for and from these three reservoir basins.

The Morena dam and spillway enlargement work was designed, put under construction, and nearly completed by me before I left San Diego in 1923, but the work soon after was discontinued, uncompleted.

The work as originally planned, now again, and independently has been recommended and urged as essential and for immediate completion

by the city's recent board of examining engineers, L. C. Hill, A. J. Wiley, C. R. Olberg and C. F. Tolman. The accomplishment of this work would insure the safety and safe operation of the Morena dam and spillway and appurtenant outlet works, and in addition to the present safe duty of about 4,000,000 gallons of water per day would provide an additional safe duty of about three-fourths of a million gallons of water per day, at a merely nominal cost.

Through Barrett Reservoir

The additional water now available for conservation from the Morena drainage basin runoff if saved as recommended, would be passed down to and through the Barrett reservoir and be carried through the Dulzura conduit to Otay reservoir without any additional expense.

The enlargement and heightening of the Barrett dam by about 75 feet was projected and designed by me at the time the original drawings were made in 1919, and the extension work was provided for when the existing structure was constructed.

The added storage capacity which would result from the projected increased heightening of the dam sufficient to impound the total available flood runoff from the tributary drainage basin in addition to the present safe duty of 5,000,000 gallons of water per day, would provide an additional safe duty of about 5,000,000 gallons of water per day, and at a relatively very low cost.

The additional water now available for conservation from the Barrett drainage basin, would, if saved, be carried through the Dulzura conduit to Otay reservoir without additional cost.

Marron Basin Praised

The Marron drainage and reservoir basin offers an excellent and available opportunity for the City of San Diego to secure an additional water supply of about 10,000,000 gallons of water per day at a reasonable cost.

The dam of necessity would be located across and straddle the international boundary line, the left or south abutment being in Lower California.

The damsite is about 150 feet higher than the Lower Otay damsite. Because of the relative high elevation of the reservoir, an independent pipe conduit of relatively small size would carry the water conserved from the Marron reservoir to a connection with the Otay reservoir-San Diego pipe conduit carrying system.

The water resources of the San Diego river drainage basin were comprehensively investigated, surveyed, studied, works designed, and estimated by me, and made one of the prominent features of my voluminous report to the mayor and the common council of the city of San Diego, on "Additional Water Supply for the City of San Diego, California," dated Aug. 8, 1923.

River Water Said Best

The water resources of the San Diego river drainage basin, geographically, topographically, and hydraulically, are physically the most attractive, simple, quickest, and most economical source for immediate development of additional water supply for the city of San Diego.

It is reported that a final opinion and ruling may be expected from the supreme court of California, having highest and last jurisdiction, early in the year 1929, deciding the ownership of the paramount water rights of the San Diego river drainage basin.

The city of San Diego has a lease-

hold and is operating and maintaining and carrying water from the Hodges dam and reservoir, about 25 miles, to the city's distribution system, and also about seven miles to the San Dieguito reservoir for the use of the three adjacent small irrigation districts; also has a binding contract to purchase and acquire the Hodges dam and reservoir and all the additional and undeveloped water supply available for conservation in the drainage basin of the San Dieguito river for reservoir storage.

The Hodges reservoir basin economically is an excellent one to develop, and exposed to only limited evaporation. By suitably enlarging the storage capacity of the reservoir, the entire flood runoff from the tributary 340 square miles drainage basin, can be conserved and in the most comprehensive and advantageous location in the drainage basin.

Additional Safe Duty

When conserved by the maximum storage capacity required, there will be provided, in addition to the present safe duty of about 4,300,000 gallons of water per day, an additional safe duty of about 15,000,000 gallons of water per day, which the city already has contracted to purchase the right to acquire, conserve and carry to San Diego in addition to the up to 3,000,000 gallons of water per day which the city is now taking from the reservoir and carrying to the

city distribution system from the present Hodges reservoir.

The Hodges reservoir and the Hodges dam and its status was made the subject of a separate report by me, dated Sept. 1.

The city of San Diego started the erection of a dam on the Santa Isabel creek branch of the San Dieguito river at the Sutherland site, which is relatively high up in the drainage basin and could intercept the runoff from only about one-sixth of the drainage basin area above the Hodges reservoir.

Depletion of the city's funds available for construction of the Sutherland dam may result in the contract works being suspended.

Chollas Heights

The Chollas Heights balancing reservoir capacity, when constructed in 1900, was sufficient to regulate 30 days' supply for the city's then daily requirements of less than 3,000,000 gallons of water.

Because of the very large growth in the population of the city since 1900, the reservoir capacity now is only sufficient to regulate a three days' supply, thereby exposing the city to grave consequences.

Provision for balancing reservoir capacity sufficient to regulate 30 days' supply, in addition to being an urgent requirement, will have a very material influence on the size and also cost of the additional water car-

rying pipe conduits from the storage reservoirs to the city of San Diego.

Except for a balancing reservoir of adequate size, these conduits will have to be designed and constructed with sufficient carrying capacity to provide for maximum daily seasonal peak requirements, which by 1929 may exceed 30,000,000 gallons of water per day, and will increase annually, although for average daily deliveries may not average, throughout the calendar year 1929, to exceed about 17,000,000 gallons of water per day.

Reservoir and Tunnels

Appropriation of all additional water rights required to conserve all the water of the Cottonwood drainage basin in Morena, Barrett, and Marron reservoirs, and also application for all rights of way required for reservoirs, dams, and water carrying conduits over public lands were initiated by me before I left San Diego, Aug. 21, 1923.

The consummation of these water rights and rights of way was the subject of my last official communication to the mayor and common council of the city of San Diego, dated Aug. 8, 1923, just before my leaving the city of San Diego.

Upon being called professionally by the city of San Diego from Europe to assist in meeting an immediate emergency, and to develop an additional water supply, I deemed it dutiful to divert from prearranged schedule and travel direct to Washington, D. C., for

the purpose of having personal conferences with the United States federal government officials, regarding water rights and rights of way, in conjunction with the three Cottonwood river reservoirs, the Tijuana river projected pumping development and other allied matters in San Diego county concerning additional water supply for the city of San Diego.

Collecting Loose Ends

Since returning to San Diego, I have been collecting and assembling and correlating the loose ends in order, comprehensively, to study all the available sources of development of additional water supply, and also have had additional correspondence with the chairman of the international water commission (United States and Mexico), whom I have known personally more than 20 years, also with other members and officers of the international water commission and also have had personal conferences with United States Congressman Phil D. Swing, and United States Senator Samuel Shortridge, regarding international and allied additional matters of development vitally important to the city of San Diego.

A meeting of the international water commission is expected to be held either at Washington, D. C., or at the City of Mexico, in December or January, next. It is of special importance that the city of San Diego be represented at this meeting.

I have just returned from a com-

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