S T A T E M E N T

-of-

C. R. R O C K W O O D

IN THE MATTER OF THE LIABILITY OF THE CALIFORNIA DEVELOPMENT COMPANY FOR THE FLOODING OF SALTON BASIN.

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The contracts between the California Development Company and the several mutual water companies, governing the distribution of water in the Imperial Valley, are practically the same..

The "Sociedad Irrigacion y Terrenos de la Baja California Sociedad Anonima", hereafter called the Mexican Company, contracted with the various mutual water companies, agreeing to deliver to them at the International Boundary Line between Mexico and the United States, four acre feet of water per annum, on demand, for each share of stock issued. The California Development Company became a third party to these contracts and assumed responsibility as far as it legally might for the fulfillment of the Mexican Company's agreement.

The California Development Co. further agreed with Imperial Water Co. No. 1, to construct and maintain a main canal from that point on the International Boundary Line where the Mexican Co. agreed to deliver the water; through the lands of No. 1 and to deliver the water thereafter into the main lateral ditches of the No. 1 system. It agreed with Imperial Water Company No. 4 to carry the water delivered by the Mexican Company at the International Boundary Line from such point of delivery to the south line of the No. 4 tract.

With No. 8, it agrees to deliver the water from the main at a point south of the New River, very near the No. 4 delivery.

With Imperial Water Co. No. 5, it agreed to allow the water delivered by the Mexican Company to run down the Alamo River to a point near the south line of the No. 5 tract where it was to be delivered to Imperial Water Company No. 5 by means of structures constructed by the California Development Co., but to be maintained by Imperial Water Co. No. 5. This point of delivery has since been changed.

Imperial Water Cos. No. 6 and 7 are bounded on the south by the International Boundary Line and receive their water from the Mexican Company at the line without the intervention of The California Development Co.

Map Exhibit "A" shows the canal system in the U. S. A. and the points of delivery to the various water companies.

TheCalifornia Development Company has either directly or by sub-contract built the water distributary system for each of the mutual water companies, taking in payment therefor the stock of the said companies.

By the terms of the contracts, as soon as any ditch forming a part of the system was completed, it was to be turned over to the Mutual Water Co. for maintainance and operation, and in no instance has The California Development Company operated the distributary system or delivered water to the individual stockholders of the Mutual Water Companies, except during the time of construction; it follows then that the California Development Co. has no control of the water after it has been delivered to the mutual company, and can not regulate its distribution and use or

prevent its waste.

Water for the irrigation of the lands of Imperial Water Companies No. 1 and No. 4 was turned into the Main Canal in March, 1902.

Water for the Imperial Water Co. No. 5 was furnished in the late Fall of 1902.

Water Companies No. 7 and No. 8 received water in the Fall of 1903.

Water Company No. 6 received water in the Fall of 1904.

To all of these companies water for the irrigation of the first season's crops was furnished free of charge, and thereafter until February, 1905, it was furnished at the minimum rate; that is, previous to February, 1905, the water furnished to the companies was not measured, but they were given all they might demand. The California Development Co. receiving payment for one acre foot per annum only for each share of issued stock of the mutual companies. Under this arrangement, the waste of water by the people was very great; but it is impossible to estimate the amount even approximately.

A rough idea of the natural seepage from the irrigated section when the users of waters are obliged to pay for the full amount delivered, can be obtained from the measurements of the New and Alamo Rivers, made near Rockwood Station on the S. P. R.R., under my direction, on the 28th day of November, 1906. It was found that the Alamo was carrying on that date 40 second feet and the New River 80 sec.feet. These points of measurements are north of the irrigated area.

At this time there was a shortage of water in the Valley, consequently none was wasted either by The California Development Co. or the water users. At this time, there was not to exceed 100,000 acres in crop.

This run off from seepage through the soil it is impossible to control, and it will increase rapidly as the acreage under cultivation increases and as the lands become saturated with water. The acreage that will eventually be under cultivation in the Salton Sink drainage basin will be not less than 700,000. If, at the present time, the seepage from 100,000 acres equals 120 cubic feet per second, it is quite safe to assume that the seepage from 700,000 will eventually be not less than 1000 feet per second, which would in time fill the basin, but for the fact that the evaporation, which is approximately 8 ft. per annum, will offset most of this inflow, I am of the opinion, however, that the natural and rapidly increasing volume of seepage, plus the run off from precipitation, will in time be sufficient to maintain a permanent though shallow lake in the bed of the sink.

DRAINAGE AREA OF SALTON SINK.

I attach hereto "Exhibit B", a map of Southern California, published in 1906, by Punnett Bros., of San Francisco, which I believe to be the most accurate map published, covering that portion of the drainage area of the Salton Sink, situated in California. On this map I show in blue the bed of the Salton Sink as it was previous to the rise of the waters in 1904.

In red, the area from which the drainage must necessar-

ily flow into the sink.

In green, the lands now under the constructed portion of the Imperial Canal system.

And in yellow, the additional irrigable area under the line of flow of the canal and to which it is probable that the system will be eventually extended.

From this map I estimate the drainage area of the sink to be in California 5544 square miles, and from a map of the U. S. Geological Survey, published in 1906, and attached hereto ("Exhibit C") I estimate the area in Lower California that would drain into the sink at 600 sq.miles, or a total of 6144 square miles.

The Geological Survey map "Exhibit C" gives the area of the sink in January, 1906, as 247 square miles, with the water 34 feet in depth.

From the Punnett map (exhibit B) I estimate the area of the sink previous to the inflow of 1904 at 150 square miles. In 1893, I had occasion to determine the area of the sink and at that time arrived at the same result, hence I believe it to be reasonably correct.

The major portion of this drainage area is very precipitous, the mountains on the west rising to an extreme elevation of 9600 feet above sea level, with an average of between 5000 and 6000 feet, while the San Bernardino range on the east has an average elevation of between 3000 and 4000 feet above sea level.

The mean annual precipitation on this drainage area is necessarily small, otherwise a permanent lake would un-

doubtedly be maintained in the lowest part of the Salton Sink. No rainfall records have been kept in the mountain regions and but partial records in the low lands. It is well known, however, that this entire territory is subject to very heavy torrential rains and during these storms, the amount of water run into the sink must be great. It is well known that beginning in August, 1904, and lasting through the year 1905, a series of very heavy rains occurred. The records of the U. S. Weather Bureau show that on August 7th, 1904, 2" of rain fell at Salton. At Calexico on the 22nd of the same month, 2" fell, 1 1/2" of this falling in 15 minutes. During this same storm 1" fell at Volcano on the S. P., showing that the storm was widely distributed.

On January 10, 1905, 1.5" fell at Calexico, 1 5/10" fell at Imperial and 1 8/10" at Salton.

In the storm of Feb. 17 and 18, 1905, 1.87" fell at Calexico; 1.55" fell at Imperial; .74 fell at Salton, 1" fell at Indio and 2.18" fell at Cabazon, showing that this stormwas general over the entire drainage area. Probably the mean precipitation was greater in the mountains than in the low lands during this storm.

In the Geological Survey Report of "Progress of Steam Measurements for the Calendar year 1905", Page 30, it will be found that On February 20th the fourth day after the beginning of this storm, W. V. Hardy measured the water flowing in the Alamo at a point near Rockwood on the Imperial Branch of the S. P. R.R. and found a flow of 530 cubic feet per second. This was two days after the storm had passed and at a time when no water was being used for irrigation,

and when the Mexican Co. was wasting all surplus water into the New River and none in the Alamo. During the heighth of the storm, the run-off must have been many times 530 cubic feet per second. The Alamo drainage area, contributing to this run-off is not to exceed 250 square miles, consequently, the run-off at this time was closely 2 cubic feet per second per square mile of drainage area, and it is safe to assume that the mean run-off for the four days, including the two days of rain, was twice this or 4 cubic feet per second. per sq mile

This very heavy rain was general over the entire Salton Basin drainage area.

The Alamo drainage area embraces no mountains. The precipitation in the mountains was undoubtedly greater than on the Alamo, as witness the Weather Bureau record of Cabazon, the highest point at which records were kept, gives 2.18 inches for the storm while Salton, the lowest point, gives .73 only.

It is then, I believe, reasonable to assume that the mean run-off for this storm equalled 4 cubic feet per second, per square mile of drainage area for a run of four days, or a total of 24,576 cubic feet per second.

A cubic foot per second will cover approximately 2 acres one foot deep in 24 hours; 24,576 cubic feet will cover approximately 49,000 acres one foot deep in 24 hours, and in four days would cover 196,000 acres one foot deep. The bed of the Salton covers 150 square miles or 96,000 acres and 196,000 acre feet spread over this surface would have covered it 2.04 feet in depth. This is for the storm of Feb. 17th and 18th, 1905.

The August storms of 1904 were more violent for a shorter time, giving 2" in one day at Salton and Calexico. The percentage of run-off must have been greater for the area covered, but the storms were not as widely distributed over the drainage area.

The August storms of 1904 and the January and February storms of 1905, washed out several structures of the S.P.R.R. main line and several also on the Imperial Branch. Since then the S.P.Co. has put in several new structures on the Branch line and enlarged several of the original ones, in order to increase the area of water openings.

In March, 1905, I instructed Mr. F. F. Hall, one of my assistant engineers, together with R. H. McPherrin, to make a trip around the sink and obtain data that would form a basis for an estimate of the possible and probable inflow into the Sink during the storms of the previous few months. Mr. Hall's field notes are contained in a book which I attach hereto, marked "Exhibit D". From this data and other figures obtained from the S.P.R.R., I have compiled a map, attached hereto, marked "Exhibit E", showing the location of the distinct water ways on the west and north of the Sink, as located by Mr. Hall, and in addition thereto the approximate location and size of the water openings in the S.P. R.R. main line, and the Imperial Branch between Imperial Junction and the Alamo River.

On the west and north sides of the sink from San Felipe Creek to Mecca, Mr.Hall locates 41 distinct water ways, which, including the San Felipe Creek, aggregate in width 3110 feet. This gives, however, no idea of the width of water way during a heavy storm, as the channels are mostly

shallow and an examination of Hall's notes shows that many of them had been running full and over their banks.

San Felipe Creek, for instance, from my calculations, based on Hall's notes, must have been carrying between its banks 3309 cubic feet per second; but as from these notes the water overflowed the banks, it may have been a mile wide, and there is no possible way of estimating the run-off from this San Felipe drainage area.

Water way No. 27 (Hall's notes) on this map is only 35 feet in width, but it shows a depth of 6 1/2 ft. of water carried on a grade of one foot in 100, and must have run off at least 3000 cubic feet per second during the height of the storm.

Opening 674-A on the Imperial branch of the S.P. was running full at some time during the storm of February 17th and 18th, 1905. This structure was 75 feet wide and the depth of water was 11 feet. As thegrade is 6 ft. per mile, the volume of water passing through this one opening during the height of the storm was not less than 5400 cubic feet per second. This structure has since been lengthened to 105 ft.

As originally built, the Imperial Branch line from Imperial Junctiom to the Alamo River, a distance of 11.95 miles, had water openings as follows: six 15 ft.openings; eight 30 ft., one 60 ft. and three 75 ft. Since the rains of 1904 and 1905, they have added three 12 1/2 ft.openings, one 15 ft., one 25 ft., four 30 ft. and one 45 ft., and have lengthened other openings as follows: one 15 ft. has

been made 45; one 15 has been made 30 ft., one 30 has been made 60; one 60 has been increased to 75, and one 75 to 105. The original total length of all water openings on this 12 miles was 540 ft., or 45 ft. per mile. This length of opening has since been increased to 892 1/2 ft. or 75 ft.per mile.

I estimate, as shown before, that through one of these openings 75 ft. in width at least 5400 cubic feet of water per second must have been passing. The total length of water openings at this time was 540 feet or 7.2 times 75 ft. During the storm, several of these structures were washed out and in several places water went over the R. R. track, hence the 540 lineal feet of water opening by no means represent the actual breadth of flowing water during the February, 1905, storm. I believe, then, that I am reasonable and on the safe side to assume that the actual constructed openings being 7.2 times in length the one through which I have calculated the flow that the total run-off during the height of the storm was at least 3 1/3 times the 5400 cubic feet per second or 18,000 cubic feet, equal to 1500 cubic feet run-off per lineal mile of track.

From Imperial Junction to Mecca by rail is a distance of 42 miles. In this distance the S. P. R.R. had in its track on January 1, 1905, the following water openings of 8 feet in length or over,

2/8s	45/10s	4/12 1/2s	15/15s	37/16s
14/25s	24/30s	7/32s	4/37 1/2s	1/40
10/45s	1/48	3/50s	3/60s	1/64
1/75	4/80s	3/90s	1/96	1/180 1/200

and 2/210s. To this should be added a large number of boxes

and pipes laid through the bank but eliminating these, we find a total length of water openings in the main line of track between Imperial Junction and Mecca of 5270 feet or 125 feet per mile on the branch. This is made necessary by the mountainous area drained and represents, I believe, a fair ratio between the two areas, that is, if the drainage through the Imperial Branch is 1500 cubic feet per second per lineal mile, the drainage through the main line would be during the same storm 1 2/3 times this or 2500 cubic feet per second per lineal mile.

For the purpose of this estimate, however, I assume the drainage during this February storm was the same per lineal mile all around the sink or 1500 cu.ft.per second.

From the Alamo River to Mecca by rail is 54 miles. From the maps, I assume this to be one-half the circumference or the total circumference to be 108 miles; 108 miles multiplied by 1500 gives 162,000 cubic feet per second as the total probable run-off entering the Sink during the height of the storm. This would have continued, of course, but for a short time. Had it lasted 24 hours, it would have covered the bed of the sink 3.4 feet in depth, which is very improbable; but it confirms the reasonableness of my previous estimate that the total run off of this storm of Feb. 17 and 18, 1905, was sufficient to fill the sink to a depth of 2.04 feet.

The heavy rains of the previous August must have run off at least half as much, but it must be remembered, that as soon as the water courses leave the mountains, they spread out in channels, gradually increasing in width, and

diminishing in depth until they reach the flat smooth slope of the basin proper. Here the waters would spread out into a very thin sheet moving slowly toward the point of greatest depth in the sink, which from the testimony of Sherman and Dubbers is about five miles S.W. of Salton. Previous to August, 1904, there had been no general rain for many months, consequently the bottom of the sink must have been dry and would have taken up much of the August rain which would then have drained gradually to the extreme bottom. Also the evaporation in August from this sheet spread over the bottom would have been excessive, and while we have no exact record of the date when water began to appear in the extreme bottom, I would hardly expect it to reach the bottom in any amount for several days, perhaps weeks, after the storm, and it is probable that this amount of water alone at this time of year would HAVE EVAPORATED so quickly that the Liverpool Salt Co. would not have been injured, but this run-off from the heavy rains was augmented by the natural seepage from the irrigated lands to the south, which I find to be now 120 cubic feet per second, equal to 7200 acre feet per month. By the excessive waste from the irrigated lands, due to the fact that during that year the user of water paid 50 ¢ per acre and the water was not measured to him. And also by the excessive amount of overflow water running into the sink through the New River, during the months of July and August. I have no way of determining the volume of this flow as measurements were not made. During the flood of 1903, measurements of the New River made by Roadhouse, showed that 2700 cubic feet per second were passing Calexico. From my

recollection of the height of water surface in the river during the flood of 1904, I estimate that not less than 2000 feet per second was passing Calexico. During the year 1904, measurement of the flow into the Main Canal at Hanlons were made by the U. S. Geological Survey and beginning with July, 1904, measurements of the water entering California through the various canals of the Imperial System were made by the same service. From these records I find that the volume of water entering the Canal at Hanlons from May 4th to Sept. 24th varies between 868 cubic feet per second and 2097, with a mean of about 1600 cubic feet.

In order to scour out the silt deposits in the first four miles of the main canal, I was anxious during the flood season of that year, 1904, to carry through that part of the canal as large a volume as possible without endangering our structures near Calexico or causing an amount of waste to enter the Salton Sink that would endanger the plant of the Liverpool Salt Company.

Carrying out this idea in the spring of 1904, I caused a waste gate to be built about ten miles below Hanlons, that I believed would carry all surplus water into the Rio Paradones and thence through the Hardy to the gulf. The waste-way consisted of eight openings or bays, each 5 ft. in width, and the floor was placed four feet below the bottom of the main canal as then built, and even with what I intended to be the final bottom grade of the canal. This is the gate mentioned in the testimony of Messrs. Duryea, Sherman and Dubbers.

I estimated the amount of water required in the Valley that summer at approximately 1000 cubic feet per second. The records of the U. S. Geological Survey, before referred to, show from Hardy's measurements that a mean of approximately 900 feet was entering California through the various canals during July, August and September. On August 3d, W. D. Smith, for the Geological Survey, measured the amount entering the main at Hanlons and found 1646 cubic feet per second. On the same day, he measured the water passing through the waste gate and his records show 609 cubic feet; 1037 ft. were then passing towards Calexico. The loss by seepage and evaporation between the headgate and Hanlons was in 1903 estimated at 150 cubic feet per second. It is evident then that but very little of the water entering the head of the canal during the summer flood of 1904, could have found its way to the sink, except that wasted by the mutual companies and the run-off from seepage.

The California Development Company had but one waste-way in the Valley, the one from the main canal at the five gates near the center of Sec. 36, Tp. 16 S., R. 14 E. As we were not measuring the water that year, I am unable to give the amount of waste water turned through this gate during the year 1904. Often it was none at all. Mr. Sherman, in his testimony, states that on Dec. 14th he visited this gate and estimates the amount of waste at over 100 second feet. This is quite possible, as while usually at this time the users required all of the water we were bringing through, we had on Dec. 9th at Calexico, in the southern

part of the valley, where the major portion of the irrigated lands lay, a rainfall of 42/100 of an inch, which would have lessened the demand for water and permitted that amount of waste.

If it is conceded, however, that The California Development Company can be held responsible for only that damage done by its waste waters, I am willing to admit an average waste of 100 cubic feet per second for every day in the year, for this reason. As soon as the waste down New River reaches the Sink, it spreads out in a thin sheet over the surface. I understand from Mr. Sherman's testimony that the Liverpool Salt Company's lands are all in Township 8, South of Range 10, East. South of this township, the bed of the sink covers an area of 80,000 acres, approximately.

The average daily evaporation for the year at Calexico is 27/100 of an inch. 100 cubic feet per second spread out 27/100 of an inch in thickness would cover only 8810 acres.

The evaporation from a body of water covering the 80,000 acres south of the lands of the Liverpool Salt Co. would be closely 900 cubic feet per second, hence it is not possible that the waste alone from the system of the California Development Co. could have reached the lands of the Liverpool Salt Co. during the year 1904.

REASONS FOR CUTTING INTAKE NO. 3, AND HISTORY OF THE ATTEMPTS TO CLOSE IT.

As stated in a previous paragraph, I caused a waste-way to be built ten miles down the canal in the spring of 1904, in order to allow a large volume of water to pass continuously through the upper four miles of the canal, during the summer flood. As shown: this wasteway took the surplus during the summer and allowed no more to reach our diversion gates near Calexico than was required.

During the flood seasons of 1901-1902 and 1903, we had allowed no more water to enter the headgates at Hanlons than was required for use in the valley, and the canal through the upper four miles carrying a small amount of the heavily silt-laden flood waters, would not carry it at sufficient velocity to prevent silt deposits.

During the crop season of 1903-4, a general shortage of water in the Valley due to the silted condition of this upper four miles, caused a heavy loss to the farmers and to the California Development Co. as well. Our dredgers were at work, one attempting to remove the silt; the other extending the canal to a connection with a well-defined branch of the Alamo River, in order that the water might be confined in a narrow channel, and avoid the excessive loss by evaporation and seepage that had occurred up to this time, due to the fact that from a point about eight miles below Hanlons, the water flowed out over the country, forming a lake or swamp, from which it gradually found its own way

into the Alamo channel. The hydraulic machine that was being used to clean out the upper four miles proved to be inadequate for the work, and I attempted, during the summer of 1904, to scour out the canal as shown before by turning a large volume of water in at the head and wasting into the Paradones. At first this plan seemed to work and in June, from soundings I made personally, I estimated the canal to be two feet deeper than in May. In July, however, I found that, carrying approximately the same volume of water, the canal had again silted up, and the bottom was evidently nearly a foot higher than in May.

I then employed in August the Steamer Cochan, and making her haul a heavy drag, worked her up and down this upper four miles in hopes that by stirring up the bottom sands, the water would keep it moving. This plan was a failure. In the meantime, I had brought the Big Dipper Dredge back to help in moving the silt, but soon came to the conclusion that it would take her until February to make a channel large enough to supply the needs of the Valley.

Judging from the gauge readings of the river at Yuma, I expected the water to fall to a level that would cause a greater shortage of water in the Valley than obtained the previous year. I believe that such a shortage would ruin many of the farmers of the Valley and the California Development Company, as well, and hence, after consultation with my associates, we decided to do the only thing that could be done to avoid a serious shortage in the Valley, namely, from a point below the silted portion to cut a new in-take

to the river. This was done in October, 1904; we objected to doing it for the reason that we had no authority from Mexico to do it until the government had approved our plans for a controlling gate. But we had no time to get this approval or build the gates. It was a choice of two evils, and we decided to make the cut and settle with Mexico afterwards.

I doubt if any one connected with the company at that time, or any engineers who understood the conditions, believed that we were incurring any danger of turning the river through that channel. During the seasons of 1901-1902-1903, I had cut a bye-pass around the old wooden head gate in intake No. 1, at low water, in order to increase the winter flow, and had successfully closed this pass on the approach of high water. This, together with the failure of the past summer's attempt to scour out the upper channel, led me to believe, as it did everyone with whom I have discussed the matter, that there was no danger of excessive scour, and that the channel could be dammed before the approach of the summer floods of 1905, even though we could not get a gate in the intake during the winter. This we could not undertake until Mexico had approved the plans, and while these were forwarded to Mexico in November, 1904, they were not approved until December, 1905.

At first, No. 3 intake did not materially increase the supply in the main canal. Twice it silted up and twice I dredged it out. Finally I decided, in December, to close intakes one and two, believing that by so doing I would draw water through intake No. 3 at a much greater velocity, and would scour it out. This was partially successful, as

it scoured out the channel to the bottom cut with the dredger, but the amount coming in through the one opening was some less than through the three.

On December 20, 1904, (see Geological Survey report, Progress Stream Measurements for the calendar year 1904, page 28) we were taking in at the three intakes 899 cubic feet per second, with the gauge at Yuma registering 19'.

Intakes one and two were closed on the 23d of Dec. On the 28th, from the same authority, the discharge from intake No.3 was 607 cu. ft., with the Yuma gauge reading 18.3. This condition was alarming, as the discharge was insufficient for the use of the Valley. I then had the dam removed there from Intake No.2.

On January 12 (same authority) with the Yuma gauge registering 19.2, Intake No.2 was discharging 380 ft. and No.3, 520, a total of 900.

On the 18th of January, 1905, the river at Yuma rose to 23.8. Naturally, I expected this flood would deepen Intake No.3, and leave us sufficient carrying capacity when the river fell to its ordinary low water stage, but on the 23th of January, with the Yuma rod at 19/75 Intake No.3 was discharging but 550 cu.ft., showing that the carrying capacity of this channel was slightly less than before the high water of the 18th. This was at the time a great disappointment to me, as from the history of the river I knew the chances for a rise in February were about even, but in all probability it would be of but short duration. and the river would fall to 18 or below during the months of

March and April, at which time would occur the greatest demand for water.

The river remained, however, at approximately the same level until February 5th, when it rose to 20.3, and then began a series of floods without precedent in the history of the river. On Feb. 9th it rose to 28.75. On March 1st, it was at 23.9, and while I still expected it to fall below 20, I believed it would remain high enough to furnish the amount needed through intakes 1 and 2 and I decided to close Intake No.3. At this time it was not over 60 ft. in width, nor was its bottom more than one foot below the grade to which it was originally dug. We attempted to close in March by the ordinary method of a pile and brush dyke which we had successfully used on three different occasions, inclosing Intake No.1, twice against as great a head of water as we now had to contend with in Intake No.3, but on March 30th the river rose to 30.3, the highest point reached since the great flood of 1891, and swept away the work.

Another attempt was made and the work swept away by the flood of April 14th, which reached a height of 29.65.

At the time the company was practically without funds, and all attempts to secure a loan proving unavailing, nothing more was done until about the middle of May, when the Imperial Water Company No.1 advanced the company $5,000.00 to be expended in another effort to close the Intake before the June floods could come down the river. Personally, I had nothing to do with this effort, as I was in New York,

attempting to carry out the conditions of an agreement with the S.P.R.R., whereby they had agreed to finance the company, providing the control of its affairs should be left to them. Mr. C. N. Perry was in charge of this effort to close the Intake, and he was in daily consultation with Thomas Beach, the superintendent of Water Company No.1, which was furnishing the money, and in frequent consultation with engineers of the S.P. R.R.Co. which company was becoming alarmed for the safety of their track. On June the 18th, having returned from New York, I went to Intake No. 3. The Yuma gauge at this time registered 28.95. The whole country below Yuma was under water. It was impossible in consequence to prosecute the work with any hope of success, and I caused it to be abandoned.

Mr. Duryea criticises not only the plan of this attempt but the vigor with which it was prosecuted. I criticise it on the ground that any effort on any plan at that time must necessarily have been a failure.

When the work began, the gauge at Yuma registered 85, with every probability that it would continue to rise until flood height in June. All the force of machinery and men that could have been crowded on the work could not possibly have completed it until after the summer flood had passed. I objected to any effort at this time as useless waste of money. Mr. Duryea states that he visited this work on June 5th and that the waters were at medium height. The Yuma gauge registered on that day 28.35, which height had been reached but five times since the gauge was established at Yuma in 1878, namely, once in June, 1884, when it read

28.5; once in February, 1891, and the other three times were in the floods of February, March and April of 1895.

When this work began in May, Intake No. 3 was discharging over 4000 cu.ft. per second, and the stream was rising to a summer flood, which was probably less than 40 days away. Mr. Duryea seems to think it could have been closed within this time if the work had been prosecuted more vigorously and on a slightly different plan, and yet in his proposition to Mr. Randolph, in October of the same year, when the total flow of the river was less than 6000 cu.ft. and falling, he was wise enough to demand 90 days to do the work, and wouldn't guarantee that time. This effort was abandoned on June 18th by my orders. On the 20th of June, Mr. Randolph, in accordance with our agreement with the S.P. Co. was elected President and General Manager of the California Development Company. It was then decided to make no further effort until the summer flood had passed. It began to recede on June 24th, and on July 9th, with the gauge at Yuma reading 23.8, and the river discharging 35,500 cu.ft., 65% of which was going into the canal, forces were started on a new plan. This plan was the construction of a light diversion jetty from the upper end of the island opposite Intake No.2. The theory of this plan was that the river might form a bar behind the obstruction and largely do the work of turning itself. No one had much faith in the success of the plan, but it was the quickest and least expensive plan proposed. No other plan could be carried out in time to save inundation of a portion of the S.P. R.R., and it was decided to attempt it. I was personally in charge of the work, and spent over

half of my time on the ground. When I was away, it was in charge at first of one of my assistants, George Sexsmith, who had been with me for several years; afterward, E. H. Gaines had charge in my absence. Mr. Duryea thinks this work was not prosecuted vigorously enough; he says we should have had more piledrivers, and yet from his own testimony, the one driver kept well ahead of the brush work. In the hauling of brush and materials, I was using all of the available force of steamers and barges, with men enough to handle them with the least possible delay. On July 30th, Mr. H.T. Cory, representing Mr. Randolph, concluded with me that it was useless to prosecute this attempt further, and it was abandoned. Mr. Duryea criticises the character of piling used on this work. I had on hand plenty of Oregon pine piles for use where it was n ecessary to use the strong pile. Where a cottonwood would answer equally as well, I used it in preference. When the work was abandoned, we had a large number of pine piles left, how many I do not know.

It was then decided to construct a large gate at the side of the intake and about 3000 feet from the River, through which the water would be turned. With the water running through this gate, the Intake could be dammed. The gate plan at the time was agreed to by all parties directly interested, with whom I talked, as the most feasible plan. Mr. Randolph decided to adopt this plan on Aug. 4th. On Aug. 8, material began leaving Los Angeles on rush orders. The excavation for the gates proved more difficult than anticipat-

ed, and we had much trouble with our dredger, which caused delay. On September 13th, all of the material necessary was on the ground. A bye-pass around the gate site had been constructed. Two lines of piling were driven across the Intake preparatory to delivering all of the water through the bye-pass. On this date, September 13th, Mr. Randolph decided with me that I could not attend to the general business of the company and give the time necessary to the river work, and that it was best to put someone elsd in charge of the river work. On the 16th he arranged with Mr. F. S. Endlinger, for years superintendent of bridges for the S.P. Co., to take active charge of the diversion work.

On Oct. 11th, Mr. Randolph decided to abandon the gate plan for what is known as the Edinger dam, and on the 13th work began on this dam, which was to consist of a woven matt foundation on which a superstructure of piles and brush was to be erected, of sufficient strength to raise the water and force it into the channel east of the Island. Work was prosecuted on this dam with all the men and equipment that could be crowded on it. Whether it would have been a success or not, neither Mr. Duryea nor any other man could tell, but it was apparently solid and was forcing a portion of the water down the east channel when, on the 30th day of November, the river rose to 31.3 at Yuma and carried away the work and the upper end of the Island, against which it was being built.

The question then arose with the S. P. management as to whether they would advance any more money, or whether they would abandon the effort to control the river and rebuild

their track around the Sink at some point above sea-level. It was decided, however, in December, to make another trial of the gate plan. New materials had to be gotten, as the material ordered for the first gate had either been used in the Edinger dam or washed away by the November flood. The gate now had to be made much larger, as it was not thought that the structure could be completed before April, 1906, when it would have to discharge a larger volume of water in order to effect control than the first gate which it was estimated at the start could have been completed in November, 1905.

Work of driving piles for the foundation and coffer-dam of the new gate commenced on Jan. 8th, 1906. An electric lighting plant was set up and work was rushed night and day with as large a force as could be crowded on the work. I established my headquarters at the work and took personal charge. On March 15th, the river at Yuma rose to 27.55 and greatly delayed the work. On March 29th the River again rose to above 28 ft., but nevertheless the structure was practically completed on April 13th, but the river was too high to attempt to turn it through the structure, and it was decided not to attempt the final effort until the summer flood of 1906 had passed. This decision was wise, as the water did not fall until October to a point where it would have been feasible to pass the entire volume through the structure. In January, 1906, when this work began, the intake at the proposed dam site was 600 ft. wide. When the flood had passed in August, it was 2600 ft. wide, and a much more elaborate method of turning the water through

the gate was demanded, and the S.P.Co. decided to build a spur, from their main line, 8 miles in length, in order to furnish materials and equipment. This was done, and the result has proven that at this time it was an absolute necessity, and the closing, which was finally effected on November 4th, would have failed without the R. R. spur. Probably the closing could have been effected in the fall of 1905 and at a comparatively small expense, had the spur track been built then, but it must be remembered that there was but very little precedent in engineering history to guide the men who were responsible for the success or failure. Many different plans and ideas were submitted by engineers and others who had been on the ground or read about it. Most of them were visionary and cast aside. Some outside ideas were adopted. The management undoubtedly did the best it could and availed itself of what it believed to be expert knowledge.

Personally, I did not talk to Mr. Duryea in October, regarding his plans and ideas of closure. I did not see him at that time. Mr George Sexsmith, who was at Yuma during Mr. Duryea's visit in October, saw Mr. Duryea there and came from there to Los Angeles on Oct. 18th, to tell me of Mr Duryea's objection to the Edinger dam, and of his willingness to undertake to close the break and turn the river. I asked Sexsmith what Duryea's plan was, and he stated that Duryea refused to divulge his plans, saying that his ideas were his only capital. As I had never in my experience heard of a case where an engineer refused to discuss his structural plans with an employer until a contract had been

made, and as I had not then nor have not now any information that would lead me to believe that Mr. Duryea had had great experience in a work presenting the difficulties of this one, I believed his proposition to be a fake, and as Mr. Randolph was in Los Angeles at the time I instructed Sexsmith to see Randolph regarding Duryea's proposition. He did so and the result is, I believe, outlined in Duryea's deposition. I have never seen his written proposition.

On Mr. Duryea's visit to the Intakes on February 14th, mentioned in his deposition, he thought Intake No. 3 should be closed. I was unwilling to do this at the time, as, judging from the past history of the river, I fully believed that the water would soon fall to a point where there would be no waste into the Sink, and that if I closed intake No.3, therw would surely be a shortage of water in the Valley. I so stated to him and he replied that temporary controlling works of brush matt and piling could be put in the Intake that would regulate the water coming in, at a cost of $3000.00 or $4000.00. I did not think this expenditure necessary or wise, as I had every right to believe the river would fall immediately and stay down, nor had I much faith in the success of the plan; but I offered to furnish the money and let Mr. Duryea do the work according to his plans, providing the Liverpool Salt Co. would give us a quit claim from damage. This proposition was not accepted. Whether or not he referred it to the Liverpool Salt Co. I do not remember.

OVERFLOW OF THE COLORADO.

COMPARISONS BETWEEN THE YEARS 1891 AND 1905.

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Whenever the surface of the river rises on the Yuma gauge to a certain elevation, a general inundation of the west bank of the Colorado below the upper Intake has taken place. A study of the river and gauge records since 1878 shows that the bed of the river as well as the elevation of the banks is rising slowly, consequently the 1905 overflow line, as shown by the Yuma gauge, would be some higher than in 1891.

Mr. Sherman, in his testimony, page 183, states that in one of his visits to the canal heading, when the water registered 22 and a fraction on the gauge at Yuma, he stood on dry ground below Intake No.1, but that the water was within 3" of the top of bank, consequently, a rise of 3" must have caused a general inundation of the banks and a general overflow; for the highest ground along the river is immediately at the break off of the bank. For several miles along the west bank in the vicinity of Intake No. 3, the ground falls away from the river at a mean rate of 7/10 per 100 feet for a distance of 400 to 500 feet. That is to say, at a distance of 500 feet from the bank, the ground surface is an average of 3 1/2 feet lower than the bank itself For this reason the elevation of the top of bank marks the general over-flow line; but as many shallow water ways lead from the river into the lower ground, a large volume of overflow may be run into the back country without the water going over the banks at all. I have seen this myself on several occasions.

Accepting Mr. Sherman's statement as correct, I assume that the mean overflow line of 1905 was 23' on the Yuma gauge and that the mean overflow line of 1891 was 22' on the Yuma gauge or one foot lower, I attach hereto a profile (Exhibit F) of the daily rod readings of the Yuma gauge for the years 1891, 1905 and 1906, platted to the same scale and from the same datum.

From this profile, assuming the 1891 overflow line to be 22', I find that during the entire year there was a total of 57 days of overflow, varying in depth from 1/10 of a foot to 10 feet, with a mean depth of 1.437 feet for the entire time.

In 1905, assuming the line of overflow to be one foot higher or 23 feet, the river would have been over its banks for 129 days, in depths varying between 1/10 of a foot and 8 3/10 feet with a mean depth of 3.119 feet.

The total amount of overflow for the two seasons would compare as the products of the mean depths multiplied by the times, or as 1 to 4.85, but for the fact that in any flowing stream to increase the mean depth of water increases its velocity and in an overflow of this nature, when the entrance into the back country is greatly retarded by the dense growth of brush, increasing the mean depth at the river bank, would also increase the rate of fall which would also increase the velocity.

It is, however, impossible to estimate even approximately what the increase in velocity of the overflow water would be, due to the causes given. It might double it, and I am surely fair in assuming an increase of 20 per cent. due to these causes, unless local changes have taken place in the interior of the overflow lands that would diminish the velocity. No

change could take place that would do this except an increase of vegetation that might retard the flow. I was all through this country in 1892 and 1893, and made several surveys through it. But little, if any change has taken place. There are a few more roads, a few more people and more stock, all of which will have a tendency to remove vegetation and make the flow of water easier; hence, I believe that 20% should be added to the 485 and that in 1905 the overflow was at least 5.82 times that of 1891.

The questions arise as to whether the Imperial Canal increased or diminished the amount of water that reached the sink in 1905; also if the 1905 overflow was 5.82 times that of 1891, would 5.82 times as much water have reached the sink in 1905 if the Imperial Canal had not been in existence?

I attach hereto a copy of a report on the 1891 flood, made by H. Hawgood to the S. P. Co. on Aug.15, 1891. Mr. Hawgood was at the time the Resident Engineer at Los Angeles of the S.P. Co.

This report confirms my own observations and belief, namely, that the flood of February, 1891, was impounded for a long time between the mesa on the East of the Valley and a ridge of sand hills lying on the west of the Alamo. These sand hills, which begin in Mexico, extend north into California about eight miles, where they had drifted across the old Alamo Channel, forming a natural dam. The February, 1891, flood made a lake back of this natural dam, covering not less than 50 square miles. On the Geological Survey map, Exhibit C, I show the location and extent of this lake. The February, 1891, flood waters did not begin to appear at Salton until late in June, four months after the flood occurred. They remained impounded behind

these sand hills until the summer flood of that year arrived, when enough water was added to cause it to break through the dam and the water drained off rapidly.

The loss by evaporation and seepage in this 1891 lake, during the four months of its existence, must have been a large percentage of the whole. The bed and sides were of sand and the water found its way into and among the sand hills. I would estimate the percentage of loss of water in transit from the Colorado River to the Salton Sink in the year 1891 to 30% greater than those of later years, which have had a comparatively open channel to run in.

By this estimate, which I think is conservative, the volume of water reaching the Sink in 1905, would have been 8.3 times that of 1891. If the filling in 1891 was 429.000 acre-feet, that in 1905 would have been 3.560.000 acre-feet, by the estimated ratio. J.D.S.

The 1891 flood found the bed of the Sink dry and a large part of it was lost in seepage. The 1905 floods, when they reached the sink, were added to waters all ready there.

From data obtained from the records of the S.P. R.R. the water in the Sink reached an elevation of 276.77 below sea level, on Aug. 3d, 1891. They show the bottom to be 280.8 below and the bottom of tie at Salton to be 267.9 ft. below sea level; that is, the depth of water was 4.03 feet and its surface was 8.87 feet below the track.

I assume that if the Sink in 1891 had been saturated as it was in 1905, that this depth of four feet would have been five instead; that is, it took one foot in depth to fill the dry earth of the bed. I estimate the bottom area as 150 square miles. The

Geological Survey Map (Exhibit C) gives the area in January, 1906, with 34 feet of water as 247 square miles, practically an increase in area of three square miles for each increase of one foot in depth.

From this I estimate the volume of the 1891 flood reaching the Sink at 491.520 acre feet, and that of 1905 at 4,079.616 acre feet, which would have raised the surface 32 feet above the elevation of surface on January 1, 1905. This must have been approximately 279 below sea level. A rise of 32' would give an elevation of 247, from which should be substracted the annual evaporation, which is closely 8 feet, or the probable elevation of the water surface in the Salton Sea on Jan. 1st, 1906, would have been 255' below sea level, if the Imperial Canal System had never been built: This would have been 12.9 feet above the base of R.R. ties in the S.P. track at Salton, and 20 feet over the floor of the Salt Works, and 2 feet below the actual elevation determined by the U. S. Geological Survey.

The series of floods, beginning in 1905, continued through the year 1906.

On March 16th, 1906, the Yuma gauage read 27.55.

On March 29th, it read 27.95

In the months of April, May and June, the discharge was greater than ever before known in the history of the river.

I have platted the profile of the gauge for 1906 from January to October on the same sheet with the 1891 and 1905 readings.

The rod readings in this case, however, do not show a proper comparison between the volumes of discharge for the reason that the river channel had deepened at Yuma, due to a retrogression

of grade back through the canal and Intake No.3 during the year 1905:

From a comparison between the discharge measurements for the years 1904, 1905 and 1906, made by the Geological survey, leads me to believe that if this retrogression of grades had not occurred, that is, if the river during 1905 and 1906 had been running down the old channel and on the established grade, the daily gauge readings at Yuma for the year 1906 would have read a mean of 2 ft. higher than they did and the readings from June to December, in the year 1905, would have read fully a mean of one foot higher; that is, the height of all floods was diminished by the influence of the increased grade through Intake No.3. Making no allowance for this, however, I find that between January 1st and October 1st, 1906, the water has been above the 23 foot stage for a period of 86 days and for a mean depth of overflow of 5.03, or it equals 63% of that of 1905 or 2,510,158 acre feet, a sufficient amount making six feet allowance for evaporation to have raised the lake 9 ft. above the theoretical elevation of January 1st, 1906, or to 246 ft. below sea level.

It is quite possible that if the Imperial Canal had not been in existence to provide an artificial water way, that the result of this unprecedented series of floods would have been the same. It is evident that the sink has at some past time, and probably on more than one occasion, been filled with fresh water, which could only have come from the Colorado River.

Every ordinary overflow has sent some water into the sink. On July 28th, 1905, I visited Salton, and in conver-

sation with the Superintendent of The Liverpool Salt Company, Mr. _____, was told by him that twice since the flood of 1891 and previous to the inflow of 1904, the waters had come in on them.

The Government maps. computed from the land surveys of 1854 and 1856, show Indian villages on the New River. The ruins of one settlement on the Alamo of not very ancient days shows that people lived there and they could not live without water. I have been told that in 1891, when the waters began to come into the sink, the Indians working at the Salt Works left the country because of their traditions that a great water at times came and filled the basin.

Neither Mr. Duryea nor Mr. Sherman in their testimony, seemed to know anything about the overflow of the Colorado. They saw no overflow, no channel leading from the river to the canal. They saw breaks in the canal banks through which the water was flowing from the canal. Mr. Sherman saw evidences of work to protect the canal, sand bags, etc., which he states was to prevent the water from running out. (See his estimate page 146)

The evidences of past work on the banks that Mr. Sherman saw was work done during the year 1903 to protect the canal banks from the overflow water, which, in places, stood high against the banks. In 1903, the banks broke in several places by the overflow. In 1904 the south bank was greatly stremgthened, and no breaks occurred. In 1905, I think but very little if any overflow water entered the canal previous to the summer flood. The south bank was not broken

by the overflow, but did stand and forced the water to the southwest into the Paradones. The south bank on overflow lands was cut by the canal water during the February, 1905, flood, in two places only, both places being on curves below a point known as Dos Alamos. I examined both points immediately after the flood of February 8th, and came to the conclusion that at these points there was but little danger of the overflow coming into the canal, as the ground was higher than the general surface and kept the overflow away from the Bank; below this point, for a distance of two and one-half miles, the ground was lower, and it was through this section that most of the overflow reaching the Alamo flowed. Through this section, the banks stood until May or June; in fact, they were broken in but few places until the summer flood began to recede. As the water surface in the canal fell, the saturated banks began to slip into the channel and they rapidly disappeared.

Duryea's statement that water ran from the canal through the breaks mentioned is quite true. The water in the canal was very high well above the surrounding country and above the overflow water, which had a greater opportunity to spread to the south and west, consequently when the canal was high it would usually run out on to the over-flow country. When it was low, in this season of 1905, there was no overflow coming in.

I attach hereto marked "Exhibit G", a sketch map of the territory from the canal heading to Quail River, showing the location of the waste way and the various Intakes and

structures at the heading. The location of the several attempts to close Intake No.3, the location of the heavy levees built this year to keep out the overflow, also the location of a survey called D3 line projected in November, 1905, as the preliminary for a R.R., and also to determine the height to which the overflow water rose. The profile showing these water elevations is attached hereto marked D3.

I also attach profiles of the levee lines along the River, showing the ground surface and the high water mark of the river and the height to which the river levees are now built or being built as at this date, December 8th, 1906; they are not quite completed.

Question has been raised as to the efficiency of the Paradones Wasteway, Messrs. Duryea and Sherman stating that at the time of their visit but little water could be forced through it. This is correct, and yet the gate served its purpose during the year 1904. It was the intention at the time this waste gate was built to put in a regulating gate below it, across the main canal, in the winter of 1905, and to dredge a channel from the wasteway to the Paradones. At the time the wasteway was built, I had neither time, force nor money to do the other work before hot weather, so believing the wastegate alone would answer my purpose for 1904, the other work was not then attempted. The wasteway discharged into a slough that ran out on to a flat country. The large amount of silt carried in the water discharged through this gate in 1904, finally raised the level of these flat lands so that the gate became ineffective until a channel

could be dredged to the Paradones, and as it would require three miles of dredging, it could not have been used as a means of giving quick relief to the conditions at Salton in the spring of 1905.

Messrs, Duryea, Sherman and Dubbers criticise the wooden headgate in Intake No.1. The fact that the concrete gate built under my direction last winter was not constructed in the first place. In fact, according to them the whole plan of procedure was bad. I doubt if either of these gentlemen have had sufficient experience in this class of work to allow them to qualify as experts, and I am very sure that neither of them have given sufficient study to the Colorado River, or have sufficient knowledge of the circumstances surrounding the inception and growth of the Imperial Canal System to make their judgment of any value.

In 1892 and 1893, I made the first surveys to exploit this scheme and determine its feasibility. I was working at the time for a Denver company, called the Colorado River Irrigation Company.

This company failed. In 1895, I took up the promotion of the enterprise, joining with me in the active promotion Mr. S. W. Ferguson. In December, Mr. A. H. Heber joined us in the work. In April, 1896, the California Development Company was organized. An option had been taken on the lands in Mexico through which the canal must pass. It was the intention to put the title to these lands directly in The California Development Company. After trying for two years to get the consent of the Mexican Government to the California Development Company holding the title and operate

in Mexico, we failed, and were forced to organize a company under the laws of Mexico to hold these titles and to build and operate the system in Mexico.

General Guillermo Andrade, the owner of the lands, organized the Mexican Company, was its first president, and owned all the stock, which he afterwards sold to The California Development Co. We find it impossible to finance the enterprise and secure money for construction until April, 1900, when a contract was entered into with George Chaffey, of Los Angeles, whereby he agreed to build a canal from Hanlons to the Alamo, and from the Alamo at a point seven miles east of Calexico to a point on the International boundary line about 3 1/2 miles east of Calexico. Under this agreement, Chaffey became president of The California Development Company. At that time the California Development Company had no intention of building the distributing systems in California. This work was to be done by the mutual water companies. This plan, however, proved unfeasible and the California Development Co. was obliged to undertake it, although it was not properly financed for it at the time, and never did succeed in raising enough money to carry out the work in accordance with the wishes of myself and associates.

When the work began, it was the intention to take the canal from the river at a point about 1 1/4 miles up the river from Intake No.1, where it runs against a gravel and cement hill. The work for this 1 1/4 miles was very heavy. Down in the Valley, all water for construction and domestic use had to be hauled many miles from stagnant holes. The

necessity of getting a better water supply to the Valley, north of Calexico, in order to permit the work to proceed there, was paramount, and to save time Mr. Chaffey decided to begin work at Intake No.1 and dredge from the river into a high water slough that ran practically parallel with the canal route and to then dredge out this slough. I had nothing to do with the work in Mexico. It was entirely under the direction of Mr. Chaffey. My work was in California, in planning and building the distributing system.

Mr. Chaffey began work at Intake No.1 in August. I was at the time in the City of Mexico, getting permits and rights to carry our machinery and forces into Mexico, which I did not obtain until October, 1900, after which the dredge crossed the line into Mexico. In the winter, Mr. Chaffey began the construction of the wooden headgate. This was considered at the time as a temporary gate to control the waters until such time as he could extend the canal up the river the 1 1/4 miles to the point where it was then intended to make the permanent heading. He had a great deal of trouble in getting in the foundations of this structure, on account of the quicksand formation, and finally, in order to complete it before high water, was obliged to leave the floor 5 feet above the intended canal grade. As it was, he did not complete the structure until May 14, 1901. The water at that time was very high. This gate had allowed us to control the water entering Intake No.1 at high water, but during the low water season it has been necessary to open a bye pass around it, in order to obtain sufficient water. This has in no way effected the flow

of water into the Salton Sink, and I am unable to see where it enters into the question. Had the gate in the first place been built of concrete and located on the rock point where the new one now stands, with its floor below the bottom of the river, it would have made no difference whatever in the present situation. The Canal would have silted up just the same and the same reasons would have existed for cutting Intake No.3 in October, 1905.

It was not a question of the elevation of the floor of the gate in Intake No.1, or the character of its construction. The gate was well built, and will remain there until it decays. It was a question of keeping the canal for the upper four miles from silting up or of removing the silt rapidly enough if it did silt.

To prevent it from silting, I had two plans,-one to work back from the Alamo River, creating a steeper grade; the other to shut down the headgates in the summer when the waters carry the heavy silt and take into the canal only overflow water, which is comparatively free from silt. With the machinery we had, one dipper dredge and one hydraulic, we attempted to remove the silt and did clean out the upper four miles of the canal once, but the hydraulic proved insufficient for the work and the dipper inefficient, as it could not reach over the banks already built. In 1903 I got bids on machines that I believed would do the work, but the cost would have been $75,000, and we could not raise the money.

Mr. Chaffey sold out his interest in the company in February, 1902, after which I had charge of construction and operation until May 1st, this year, under the direction of

Mr. A. H. Heber, Gen, Manager, until June, 1905---then under the direction of Mr. Epes Randolph. Under the present management, the S. P. Co. furnishing the money, we have built the concrete controlling gates at a cost of about $55,000, and have built the dredge to remove the silt at a cost of about $80,000, all of which would have been done as soon as we realized the necessity of doing it, if the money could have been secured.

Our inability to raise funds sufficient to carry out our plans was due to many reasons beyond our control. The history of the Colorado desert was such that capital could not in the first place be induced to come in until a demonstration had been made. Mr. Chaffey had sufficient faith to make the demonstration and could at the time furnish the funds to do that and no more.

The demonstration was proving a success, when, in the winter of 1901-1902 the Department of Agriculture sent an inexperienced young man into the Valley to study the soils. His report was so condemnatory that it, for a while, stopped emigration and made it almost impossible to secure funds. In 1903 the Government Reclamation Service began its work on the Colorado, appropriated all of the unappropriated waters and questioned our rights to take water from the river. In 1904, an agitation for government ownership of the system was started among the settlers in the Valley, with the avowed purpose of forcing the company to sell out at a nominal figure to the Reclamation Service . They, the people, or some of them, openly stated that they would so ruin our credit that we could

not carry on the work and would force us to sell. To further this end, damage claims and suits were filed against us, aggregating between $500,000 and $600,000. They succeeded in ruining what credit we had left and it was only by enormous sacrifices that we could raise any money at all, until in June, 1905, when the S. P. Co. to save themselves, agreed to advance the money needed, provided the management was turned over to them.

The California Development Company has never paid a dividend and every dollar it has been able to raise has been used in building or bettering the system. With the means and information we had, we have, I believe, done the best that could be done.

It must be remembered that but very little was known regarding the conditions surrounding the enterprise. The Blyth Canal at Ehrenberge, the Andrade ditch down the river in Sonora, had failed through their inability to prevent the silting up of the canals. The Farmers ditch and the Ludy Canal below Yuma, in Arizona, are practical failures, for the same reason. The Engineers of the reclamation service and many others predicted that the Imperial Canal would be a failure for the same reason. No man could tell, when we began, what was just the right thing to do; we had to experiment.

Question has been raised by Duryea and Sherman as to whether the water washed through the Paradones wastegate reached the Gulf or the Salton Sea.

The water leaving that gate, as well as the water forced to the south and west by the canal banks, entered the Paradones

the upper part of which is locally known as the Quail River. This is for the major portion of its length a broad, clearly defined channel and about 40 years ago probably carried more water than the Colorado itself. It enters what is known as the Volcano lake, and from there its outlet is usually through the Hardy's Colorado, so named for the reason that Lieutenant Hardy, in his explorations, believed this to be the main river, as perhaps it was at that time. At times in low water, there is no water in the lake, but the Paradones water has crossed its bottom in a shallow and wide channel diredtly leading to the outlet, The Hardy's.

During high water in the Colorado, the lake has filled and when the water had reached a depth of about 6 or 7 feet, then a portion of it had flowed to the north through the New River.

On the 11th of December, 1905, I sent my assistant, E. H. Gaines, with a party down the Paradones, to examine its condition. He reported a clear channel to within about six miles from the lake; here it passed on to flat lands and had usually had several branches converging again at the lake, but at this time a drift dam had been formed which had silted up the channel for several miles and raised the water, some of it passing to the north and entering the New River though most of it went to the south,

Evidences show that this same thing has taken place before on the lower reaches or delta of the Paradones. In time the water will cut for itself a new channel around the obstruction. Perhaps has done so already, but I have no information

regarding its condition since the report referred to.

I believe it is the intention of the company this winter to build about six miles of levee along the north bank of the Paradones, to prevent the possibility of any overflow entering the New River.

At the time of the 1891 flood, Messrs. H. Hawgood and E.L. Swain made a study of it and reported to the S.P.Co.

Mr. J. S. Carter, now living at Hanlons, was living there during the flood of 1891, and went down the Alamo in a boat to Salton.

In 1900, I forget the exact date, I was in the train coming from Flowing Well to Los Angeles. Mr. George Durbrow got on the train at Indio, and in the conversation which followed, I, in joke, remarked to Mr. Durbrow, that he had better move out of Salton, as we were liable to drown him out. He replied that all of the water we might send down there would never reach them and that a little would benefit them. He then told me that when the 1891 flood came in on them, that he thought they were ruined. but while they were put out of business for a while, that after the waters had evaporated, he came to the conclusion that they had been greatly benefitted. That before the flood they had been obliged to refine their salt; that now all they had to do was to wash and grind it. That the salt will be destroyed or injured by any silt deposits brought in from the river is preposterous. Even if the water is muddy when it comes in, it will soon settle, and the waters of the Sea are today clear. The salt must necessarily all

be taken up in solution and when the water evaporates, will be again precipitated on top of the silt, as had undoubtedly occurred many times in the history of the Salton Sink.

Respectfully submitted.

Signed C R Rockwood