# Santa Maria Project

Thomas A. Latousek
Bureau of Reclamation
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# The Santa Maria Project

The beautiful, broad Santa Maria Basin opens eastward from the Pacific Ocean toward the Sierra Madre Mountains where the sources of the rivers that sculpted the valley lie. Upon viewing such fertile grandeur, sea-going travelers as far back as the eighteenth- and nineteenth-centuries were so impressed that they described the area as a future agricultural paradise. Years later, corporate interests would see opportunity in the valley's deep, alluvial soil and extensive underground fresh water supply, constructing the first, albeit short-lived, irrigation project in Santa Maria.

Before long, though, such bounty brought forth problems. By the 1930's, farmers were pumping for water deeper, more often, and at more expense than ever before. Floods often plagued Santa Maria's wide, low-lying floodplain of a valley. Consultants were brought in and told locals that they were pumping the aquifer faster than it was being naturally replenished and that if they continued to do so salt water might intrude upon their source. First, Santa Marians needed to recharge their aquifer resource. If they built levees and cleared the river channel they might also be able to protect their property from floods.

At about the same time, local water developers such as T. A. "Cap" Twitchell and "Brad" Bradbury (after whom the Cachuma Dam was renamed) were just beginning to learn how to build large, local water projects. The desperately thirsty residents of the Santa Barbara area were first in line and got their needs quenched in 1948 with the Cachuma Project authorization. Santa Maria wanted their own "Cachuma" for the northern portion of the county. Not until a Reclamation meeting with the Army Corps of Engineers took place in November, 1949, at which it was agreed to investigate a joint conservation and flood control project for the basin was the Santa Maria Project provided with the impetus it needed to be built. Perhaps now, with the help of two federal water resource managers, the success predicted by early travelers for the beautiful, wide, sea coastal plain would be assured long into the future.

**Project Location**

The Santa Maria Project took shape in its namesake river basin - the Santa Maria, in northern Santa Barbara County, sixty miles northwest of the city of Santa Barbara and 130 miles from Los Angeles. The Santa Maria River Basin is comprised of 1,880 square miles, making it one of the larger coastal drainage basins in California. The Santa Maria watershed includes the north half of Santa Barbara County (with Santa Barbara's Cachuma Project taking up the southern half) and very small portions of San Luis Obispo, Ventura, and Kern Counties. The Santa Maria River is formed by the confluence of the Cuyama and Sisquoc Rivers, which meet about twenty miles from the coast, flowing westward to the Pacific as the Santa Maria. The largest town in the area served by the project is Santa Maria, which lies on the river about eleven miles inland and is the second most populated city in Santa Barbara County.[1]

The annual average flow of the Cuyama River, which is dammed about six miles above its confluence with the Sisquoc is 40,400 acre-feet (a-f). The river is dry much of the year, with a sizeable stream flow occurring only following the storms of the wet season. Like the project area of its neighboring Reclamation project in southern Santa Barbara County, Cachuma, Santa Maria is characterized by a brief rainy season in the winter months and a long dry season the remainder of the year. The basin averages fourteen inches of rain per year, though it, too, has exhibited wildly fluctuating amounts of precipitation, from a low of four inches to a high of thirty.[2]

The primary feature of the Santa Maria Project is the Twitchell Dam (formerly named the Vaquero Dam; it was renamed in 1957 to honor T. A. "Cap" Twitchell, a long-time, local proponent of the project and head of the local water district). The dam is located on the Cuyama River about six miles upstream from that river's junction with the Sisquoc and where the river becomes the Santa Maria.

## Historic Setting

### Prehistoric Setting

1. Bureau of Reclamation, *Santa Maria Project, Southern Pacific Basin, California, 1951*, Record Group 115, 1.
2. *Ibid*, p.3.

Spaniards observed forty-nine Chumash Indian villages in the Santa Maria area when they first visited the area briefly in the late 1700's. By the time the basin was settled in the mid-1800's, the natives were largely gone.

Evidence still exists of the Chumash and their predecessors in the valley in the form of petrographs appearing on rock formations in the Sisquoc backcountry east of Santa Maria and Twitchell Dam, and of shell mounds located near the coast. The Chumash subsisted largely on fish and shellfish from the sea (a steelhead salmon run took place on the Santa Maria River until the early 1900's) and game taken from the mountain regions.[3]

## Historic Setting

The first visit to the Santa Maria area by Europeans occurred in 1776 when the Juan Bautista De Anza expedition camped in the valley, recognizing it for its fertile plain and agricultural possibilities.

Others also saw the potential in the broad basin. Duflot de Mofras, traveling on a Spanish ship in the early 1800's, described his travels along the Pacific coast and referred to Santa Maria. "The eighteen leagues that separate the Mission de la Concepcion (near Lompoc) from that of San Luis Obispo consist primarily of an extensive plain called La Larga (a name used by early explorers for the Santa Maria Basin). This, watered by the San Geraldo River, is noted for its fine grazing."[4]

Settlement of the region did not take place until 1840, though, when the Mexican government issued the 30,000 acre, Rancho Guadalupe land grant to Teodoro Orrellanes and Diego Olivera. They raised cattle on their lands, as did the others that followed until the disastrous drought of the 1860's killed most of the livestock. After this, the American farmers of the valley switched their agriculture activity to growing grain and fruit.[5]

The San Francisco Journal of Commerce extolled the agricultural virtues of the area when it stated in April, 1887, "There are unmistakable evidences that the Santa Maria Valley

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3. Vada Carlson, *This Is Our Valley*, (Los Angeles: Westernlore Press, 1959), 2.
4. Carlson, 4.
5. Reclamation, *Santa Maria Project, Southern Pacific Basin, California, 1951*, RG 115, 5.

was in the remote past an extensive bay, extending inland from the ocean, and the soil shows a richness for a depth of 75 feet in many places that cannot be surpassed in any other section of the country."[6]

Heeding this call was the Union Sugar Company of San Francisco, precursor of agribusiness in the Santa Maria Valley. It appeared on the scene in 1897 and had the means to search out and then construct the first irrigation system in the basin. They were followed in 1905 by a private irrigation venture organized for the purpose of taking water from the Sisquoc River and transporting it to Santa Maria by gravity canal. However, when a flood destroyed this operation in 1909, no efforts were made to reconstruct it.[7] Agriculture in the area had come to rely on the huge aquifer residents had discovered underlaying nearly the entire valley.

The presence of this underground water, in addition to the aforementioned floods, explain Santa Maria's water history - past, present, and future. The Santa Maria Valley consists mostly of a broad, alluvial floodplain area known as the Santa Maria Plain. Bordering the plain on the north and south are elevated terraces or mesas, with the Sierra Madre Mountains rising to the east. As the observant Duflot de Motras related in the eighteenth century, the plain was, in fact, not too long ago part of the Pacific, as is evident in the area's hydrogeology. When the land receded and lifted, the alluvium stayed put. Streams running down from the mountains such as the Sisquoc and Cuyama replenished the vacated space with freshwater, creating the water source that Santa Maria's farmers would tap for years to come.[8] Hydrogeologists studying this source believe the main water body is as much as 8 miles wide and underlies approximately 110,000 acres of the basin. The total freshwater volume is estimated to be 10 million a-f, but only a small portion (approximately 50,000 a-f/yr) of the total volume can be withdrawn for use without exceeding the annual average yield. Exceeding that amount could allow sea water to degrade the freshwater source.[9]

By 1950 some deep wells which had formerly produced 1,000 gallons per minute (GPM)

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6. Carlson, 6.
7. Reclamation, *Santa Maria Project, Southern Pacific Basin, California*, 6.
8. Bureau of Reclamation, *Santa Maria Project, Geology of the Santa Maria Basin*, RG 115, 33.
9. Reclamation, *Santa Maria Project, Southern Pacific Basin*, 32.

from the principal water-bearing alluvium were reduced to 250 GPM. Farmers in those areas were forced either to pump elsewhere, to pump deeper, or to pump more often to make up for the less efficient production, all expensive options. Without a source of aquifer replenishment, increasingly expensive pumping would become even more widespread in the valley.[10]

The conspicuous topography of the broad, alluvial Santa Maria Plain, together with the strong Pacific storms that deluge the area from time to time, conspired to make this valley, in particular, one fraught with flooding problems. Historical accounts of floods dating back to 1811 show twenty-five flood events sufficient to cause widespread damage.[11] To make matters worse, recent siltation of the Santa Maria River has increasingly clogged the channel for storm runoff, making the likelihood of future floods very real. The annual average value of property damage caused by floods in the Santa Maria Valley prior to the Santa Maria Project was $710,000 (1950).[12]

Despite the growing need to confront these recurrent issues, this roughly thirty-five mile long, three- to ten-mile wide basin known as the "Valley of Gardens" continued to make itself known for its agricultural production, particularly with regard to its vegetable and flower seed crops. With the area's fortuitous climate allowing for an annual growing season of over 275 days, and, hence, two to three harvests per year - and a sizeable local water source - the area had become one of the top agricultural producers in the region.

## Authorization

The first discussions concerning the valley's water needs were prompted in 1924 in response to lowering underground water levels. The Santa Maria Chamber of Commerce initiated the first comprehensive survey of the Cuyama River watershed. From this study, directed by irrigation engineer Martin C. Polk of Chico, California, the Chamber of Commerce concluded that the cost of a viable, local water project was prohibitive at that point in time.[13]

A subsequent hydrologic report by J. B. Lippincott submitted to Santa Barbara County in

10. *Ibid*., 33-5.
11. Reclamation, *Santa Maria Annual Project History, 1958,* RG 115, 5.
12. *Ibid*., 5.
13. Reclamation, *Santa Maria Annual Project History, 1955,* 2.

1931 discussed, for the first time, the feasability of storage reservoirs on the Cuyama and Sisquoc Rivers, but the report was shelved until after World War II.[14]

In 1937, the water issue became pressing enough to put the creation of a local water conservation district to a vote. When a flood struck three days before the election, ripping out highways, bridges, and powerlines, and drowning cattle, any opposition was squelched and the pro-district side won easily. T. A. "Cap" Twitchell, the son of a Santa Maria pioneer, a strong proponent of water development in the valley, and instigator of Santa Barbara's Cachuma Project, was voted to head the Santa Maria Valley Water Conservation District (SMVWCD).[15]

Reclamation's first activity in Santa Maria was a land classification survey in 1942. This was followed in 1946 by a report on the Santa Maria Basin as part of a Santa Barbara County-wide analysis of its water resources. Although this activity resulted in the eventual construction of Santa Barbara's Cachuma Project, Santa Maria's needs were not, at that moment, deemed quite as critical as were Santa Barbara's, so their report was shelved. Not Reclamation and the Corps of Engineers met in Los Angeles, in November, 1949, was impetus given for construction of the Santa Maria Project. At that conference the two parties, together with the SMVWCD, agreed to investigate a joint conservation and flood-control project for the basin.[16]

The reconnaissance geologic survey made of the Santa Maria Basin during Reclamation's investigation included profiling 68 miles of river and 14 damsites, the seven most promising of which were studied in more detail. Three foundation explorations were made before the site of Twitchell Dam was finally selected. The resultant "Report on Santa Maria Project, Southern Pacific Basin, California," formed the basis of ultimate authorization for the project on September 3, 1954.[17]

In Santa Maria, the directors of the SMVWCD decided to form the "Committee of 35," a unique advisory group comprised of a cross-section of Santa Maria citizens selected to help the directors formulate a fair project repayment plan. The committee voted unanimously in favor of

14. Reclamation, *Santa Maria Project, Southern Pacific Basin*, 12.
15. Carlson, 140.
16. Reclamation, *Santa Maria Project, Southern Pacific Basin*, 13.
17. Reclamation, *Santa Maria Annual Project History, 1958*, 6.

calling an election on a special ad valorem assessment on lands to be taxed to provide for repayment. The directors then placed the $13.96 million Vaquero Project (its original name) repayment contract with the SMVWCD on the ballot for voter approval. On January 31, 1956, the Santa Maria Project was given the official go-ahead.[18]

The objectives of the Santa Maria Project were to recharge the critically-depleted groundwater reservoir underlying the basin and to eliminate the future flood threat to valley lands. There would be no surface water deliveries from the new reservoir since what water was captured would typically be immediately released to replenish underground supplies. Since the reservoir would be empty most of the year, Reclamation made no plans for recreation.

Being a conservation and flood-control project, both Reclamation and the Army Corps of Engineers participated. The percentage breakdown of total costs were 82.25% to irrigation and, hence, Reclamation, and 17.75% to flood control and the Corps of Engineers. The planned 239,000 af capacity reservoir was slated to reserve 150,000 af for conservation purposes and 89,000 af for flood control. It was planned that a reservoir this size could reduce a potential 230,000 cfs, 400-year flood to one that becomes a less threatening 150,000 cu-ft-sec, and at the same time produce an average annual yield of 18,500 af of increased recharge to groundwater basins, overcoming a 14,000 af overdraft and providing for municipal and industrial needs as well.[19]

Operation of the conservation side of the project would be such that dam operators would attempt to most closely replicate the stream channel's percolation rate, releasing flood water stored in the conservation space of the reservoir at a rate that was determined to be approximately 300 cfs. Anything less would be absorbed by the river channel and fail to make it to deposits tapped downstream; too large a flow would waste to the sea.[20]

The Corps' flood control design consisted of a series of levees and channel improvements along the Santa Maria River to protect the city and its valley lands. One levee was raised on the

18. *Ibid*., p. 3.
19. Bureau of Reclamation, Santa Maria Project, Southern Pacific Basin, California, Appendix I, *Hydrology of Santa Maria Basin, 1952*. 30.
20. *Ibid*.

south bank extending from Fugler Point (the confluence of the Cuyama and Sisquoc Rivers) westward for seventeen miles, and another on the opposite bank stretching five miles downstream. Bradley Canyon, a smaller side canyon and notoriously flood-prone, was outfitted with a 1.9-mile levee to divert its floodwaters into the newly-reinforced Santa Maria River. The Corps' channel clearing project on the Santa Maria from Fugler Point to the sea was designed to increase the river's capacity, which had been reduced by heavy sedimentation. The Corps' plan would protect Santa Maria from a 150,000 cu-ft-sec flood peak, assuming partial capture (89,000 ac-ft) by Twitchell Dam.[21]

## Construction History

The contract for construction of the Vaquero Dam was awarded to Mittry Construction of Los Angeles for $6.17 million. They began work on the structure in July, 1956.

The outlet works were constructed early on in order to divert Cuyama River flowage, allowing Mittry to place the embankment the entire length of the dam. The outlet works consist of: an inlet structure, 350-feet of concrete conduit 15-feet in diameter; 322-feet of concrete-lined circular tunnel 15-feet in diameter; 422-feet of concrete-lined horseshoe tunnel 19-feet by 17-feet; and a chute 30-feet long with 56-foot high vertical walls. A vertical shaft bisects the outlet works tunnel at the end of the circular section. This vertical shaft is for the placement, operation, and maintenance of four 4-foot by 7-foot control gates for the outlet works. The control gates provided measured releases to coincide with the river bed's natural percolation rate.

Mittry also constructed a spillway for protection of the dam to allow uncontrolled spillage when the reservoir's water surface elevation reaches 651.5 feet (the crest of the dam is at 692). The spillway is a steep, inclined, concrete-lined shaft bored through the mountain-side to the right of the dam's right abutment. The shaft connects with a concrete-lined tunnel 23-feet in diameter and 695-feet long, with a 125-foot concrete chute at the end. This allows spilled water to flow into an adjacent canyon which joins the Cuyama River downstream from the dam.

The dam itself is 218 feet high with a crest length of 1804 feet. It is an earthfill structure

21. Reclamation, *Santa Maria Project Report, Southern Pacific Basin*, 29.

containing 5.8 million cubic yards of material.[22]

The Vaquero Dam's name was changed to Twitchell during ceremonies on September 20, 1957, in order to honor the recently-deceased, former director of the SMVWCD, T. A. "Cap" Twitchell. The dam was finished on June 28, 1958, at a final cost of $12.04 million, a remarkable 30 percent under the originally authorized figure of $16.9 million. This was due primarily to Reclamation being able to procure flowage easements on lands needed for the reservoir, instead of having to purchase the land outright, reducing the project's costs substantially. Since the maximum reservoir water level would be rarely if ever hit, nearby landowners were allowed by their easements to graze their cattle inside the reservoir area.[23]

Reclamation transferred operation of the Twitchell Dam to the SBCWA and physical operation of it to the SMVWCD on June 1, 1959.

**Post-Construction History**

The first river flowage to pass through Twitchell Dam and replenish Santa Maria's underlying aquifers occurred in early 1959, with outlet gates not being closed for floodwater storage purposes until February, 1962.

Southern California's dry chaparral landscape, wildfires, and rainstorm-induced landslides caused perennial sedimentation problems in most all water projects in the region, with the Santa Maria Project proving to be no exception. Silting problems were observed by 1967, less than ten years into the life of Twitchell Dam, when the stilling basin elevation was measured at a 425-foot elevation and the silt deposit level at 459.5.[24] Log booms were soon placed near the reservoir inlet to help block much of the incoming sediment, but by 1990 it was estimated that ten percent of the reservoir's capacity was lost to sedimentation.

With regard to the outlet works, the water district installed steel plates on the trashrack of the intake structure to elevation 512 to prevent silt from also entering the outlet works. Such preventive procedures also provided a measure of flood-control since they prevented a build-up

22. Reclamation, *Santa Maria Annual Project History, 1958.* 12-5.
23. *Ibid*., 16-7.
24. Reclamation, *Santa Maria Annual Project History, 1968,* 3.

of silt in the river channel downstream.[25]

Another problem that the Santa Maria Project shared with other Southern California water developments was dealing with the seismicity of the region. Although it was not originally believed that Twitchell Dam was located within one mile of a fault, a 1983 SEED Report (Safety Evaluation of Existing Dams) stated that recent seismotectonic studies suggested that "blind thrust" faults capable of quakes of a 7.0 (Richter Scale) or more may exist near Twitchell. The SEED report stated, furthermore, that based on descriptions of the dam's foundation materials consisting of poorly-graded, uncompacted sands and gravel, "there appears to exist a significant potential for seismic-induced liquefaction of the foundation of Twitchell Dam."[26] Consequently, the dam was given a "Poor" safety classification grade in the report. These problems have since been mitigated and the dam's safety classification grade satisfactory.

The Santa Maria water district was also pressured into converting Twitchell Reservoir into a recreational area much like its Reclamation neighbor to the southwest, Lake Cachuma, which drew one million visitors to its shores in 1980. Although Twitchell was dry most of the year, commercial developers in the area called for a change in the project's objectives, adding recreational boating, fishing, camping, and other activities to the agenda. The water district, however, claimed it was financially incapable of doing so, since the project's funding was based on an ad valorem tax that precluded recreation; consequently, the water district had neither the capital to purchase the necessary lands near the reservoir inlet, where the only public access was and upon which it only held easements, nor did it have the legal means by which it could have broadened its operation into the recreation arena.[27]

The Santa Maria Project, like the nearby Cachuma Project, underwent demographic pressures that rendered it, in part, unable to fulfill its original goal - that of providing for the valley's water needs for decades to come. Little did the project's founding fathers know that such

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25. Reclamation, *Santa Maria Biennial Project History, 1980-1981*, 1.
26. Bureau of Reclamation, Division of Dams and Structural Safety, *SEED Report: Twitchell Dam, 1983*, (Denver, Colorado), 3.
27. Reclamation, *Santa Maria Annual Project History, 1968*, 4; Telephone interview with Maurice Twitchell, Director, Santa Maria Valley Water Conservation District, July 7, 1995.

increased demands would come to bear on the project that by 1990 municipal population growth would cause an estimated 15,000-30,000 af overdraft and force the community to take part in the State Water Project to satisfy its increasing needs.

**Settlement of the Project**

The Santa Maria area was largely settled by the 1950's when the project began to take shape but the growth of Vandenberg Air Force Base to the south near Lompoc brought with it much new residential development to Santa Maria's south in a sandy area near the sea called Orcutt. When the Santa Maria Project began in the 1950's, this area was home to perhaps one thousand people. By 1990, over 40,000 people would populate what had become a small city.[28] Combined with the still-burgeoning agriculture of the region (particularly in strawberry and grape production), that put much pressure on the water supply, causing the aforementioned overdraft and forcing the city of Santa Maria to participate in the State Water Project. While Santa Maria's needs were met for the time being (although State water comes at a price of $800-$900 per ac-ft), Orcutt, like Santa Barbara in 1979, rejected participation in State water due to non-growth issues (Santa Barbara would later approve participation in 1991). The Santa Maria agricultural community's future is also up in the air. While the underground supply still meets its base demand, it is finite. Consequently, should Orcutt and agriculture need a larger supply some day, it would not be from the aquifer. They, too, would probably either have to participate in the State Water Project at a great price, or, ironically, even purchase water from Santa Barbara's desalination plant.

Despite its uncertain future, the Santa Maria Project's agricultural legacy has been prodigious. Its tradition of high-value farming has given the project membership in Reclamation's "Billionaire's Club," making it one of nineteen projects that have grossed over one billion dollars worth of crops (or, in Santa Maria's case, two billion dollars) over the life of the project (1990). It is also the youngest Reclamation project on the list.[29]

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28. Telephone interview with Maurice Twitchell, SMVWCD, July, 7, 1995.
29. United States Department of the Interior, Bureau of Reclamation, *Summary Statistics - Land, Water, and Related Data*. (Denver: 1990), 4.

## Uses of Project Water

Project water replenishes the underground water body from which the Santa Maria water district customers pump all of their water supply. From this, the Santa Maria area's total water requirement, as it stood in the 1950's and upon which project planning was based, was 82,200 a-f per year. Of that, approximately 60,000 a-f fills irrigation needs; 11,000 a-f goes to irrigation losses; 6,500 a-f to municipal and industrial needs; and 4,900 a-f is used to prevent sea water intrusion into the basin.[30] By the 1990's, irrigation and municipal needs would skew these figures, increasing their demands drastically and causing the current 15,000-30,000 a-f overdraft which endangers the future of this critical and finite supply base.

Seventy-five percent of the supply in the Santa Maria Valley goes to irrigation, watering crops such as sugar beets, strawberries, alfalfa, and, more recently, grapes. The area is now home to over twenty wineries. There is no recreation at Twitchell Reservoir.

## Conclusion

The Santa Maria area may still be called the "Valley of Gardens" but how much longer it will described as such remains in doubt. Municipal growth, in particular, has put tremendous pressure on the underground supply and irrigation needs show no sign of slowing down, either. The municipal population of the Santa Maria area approaches 150,000 (1995). The project was planned primarily with irrigation in mind, certainly not for such an exploding municipal demand. The new combination of water needs means neither has enough supply to take it comfortably into the future. In the meantime, the area's quality of life continues to attract a stream of former Los Angeles residents even though there is little water for them.

Floods do not besiege the area anymore and the valley remains a top agricultural producer. The Santa Maria Project ensured this for at least a few decades. But like much of Southern California, there never seems to be enough water. People keep streaming in, increasing the overdraft of the water supply.

The "Cap" Twitchells of the region could not have possibly planned for such high levels

30. Reclamation, *Santa Maria Project, Southern Pacific Basin*, 16.

of future consumption of water - and from a dwindling supply. Santa Marians believed themselves very fortunate for a long time, living over a huge freshwater supply that took care of their present needs and future hopes. But the bounty that even early day travelers saw present in the valley could not last forever. While the Santa Maria Project met past, obsolete needs, as well as most present demands, its future depends on how area water managers come to grips with the new, difficult, and complex water issues they currently face.

## Bibliography

### Manuscripts and Archival Material

Record Group 115. Department of the Interior. Bureau of Reclamation Records. National Archives and Records Administration, Denver, Colorado office.

*Annual Project History, Santa Maria Project*: 1958, 1968, 1980-1

### Project Reports, Santa Maria Project

Bureau of Reclamation. *Santa Maria Project, Southern Pacific Basin, California, 1951*.

Bureau of Reclamation. *Santa Maria Project, Geology of the Santa Maria Basin, 1951*.

Bureau of Reclamation. Santa Maria Project, *Hydrology of the Santa Maria Basin, 1952*.

### Government Documents

Water and Power Resources Service. *Project Data*. Denver: Government Printing Office, 1981.

United States Department of the Interior, Bureau of Reclamation. *Summary Statistics - Land, Water, And Related Data*. Denver, 1990.

### Books

Carlson, Vada. *This Is Our Valley*. Los Angeles: Westernlore Press, 1959.

### Interviews

Telephone Interview with Maurice Twitchell, Director - Santa Maria Valley Water Conservation District, Santa Maria, California, July 7, 1995.

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