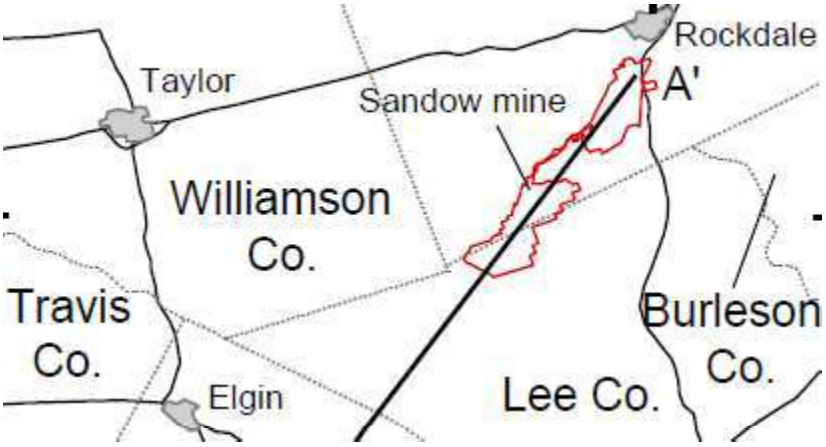
Appendix B: Curtis Chubb Report

VULNERABILITY OF THE SIMSBORO AQUIFER EXPOSED BY ALCOA'S LIGNITE COAL MINES

A Study by Dr. Curtis Chubb – Milam County, Texas – May 2019

Summary: This study of the Simsboro Aquifer's response to the mining of lignite coal from Alcoa's Sandow and Three Oaks Mines revealed a critical vulnerability that places Milam and Burleson Counties at risk. The study's primary conclusion is that the Simsboro could require 500 years to fully recover from 30 years of Vista Ridge pumping its full permitted amount of Simsboro groundwater – a conclusion supported by Alcoa reports. The study's findings confirm in stark detail that if decisions made by the Post Oak Savannah Groundwater District allow the Simsboro water levels to drop too low, the Simsboro's low recharge rate will prevent speedy corrective remedies for the harm done to the Milam and Burleson County communities.

The Sandow Mine was Alcoa's initial source of lignite coal used to produce aluminum at its smelter southwest of Rockdale. In the following figure, the red line marks the boundaries of the Sandow Mine as approved by the Railroad Commission of Texas.



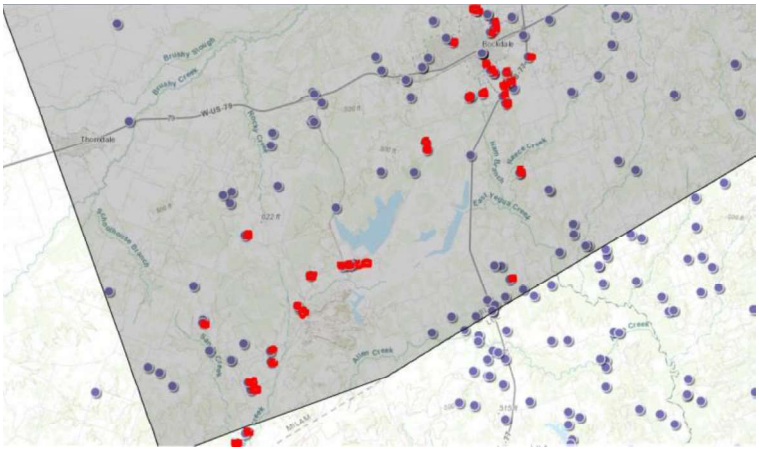
The maximum size of the mine was 18,000 acres. It was actually a "strip mine" which required the removal of about 200 feet of soil and rocks to reach a 5 foot-thick seam of coal.

Groundwater presented a major challenge for the Sandow Mine's operations for two reasons: 1) the strip mine was actually located within the Calvert Bluff Aquifer; and 2) the coal seam at the bottom of the mine sat on top of the Simsboro Aquifer. In short, Alcoa expended significant amounts of money and time to "dewater" the Calvert Bluff and to "depressurize" the Simsboro so that groundwater would neither flood the mine nor cause an upheaval of the mine's floor.

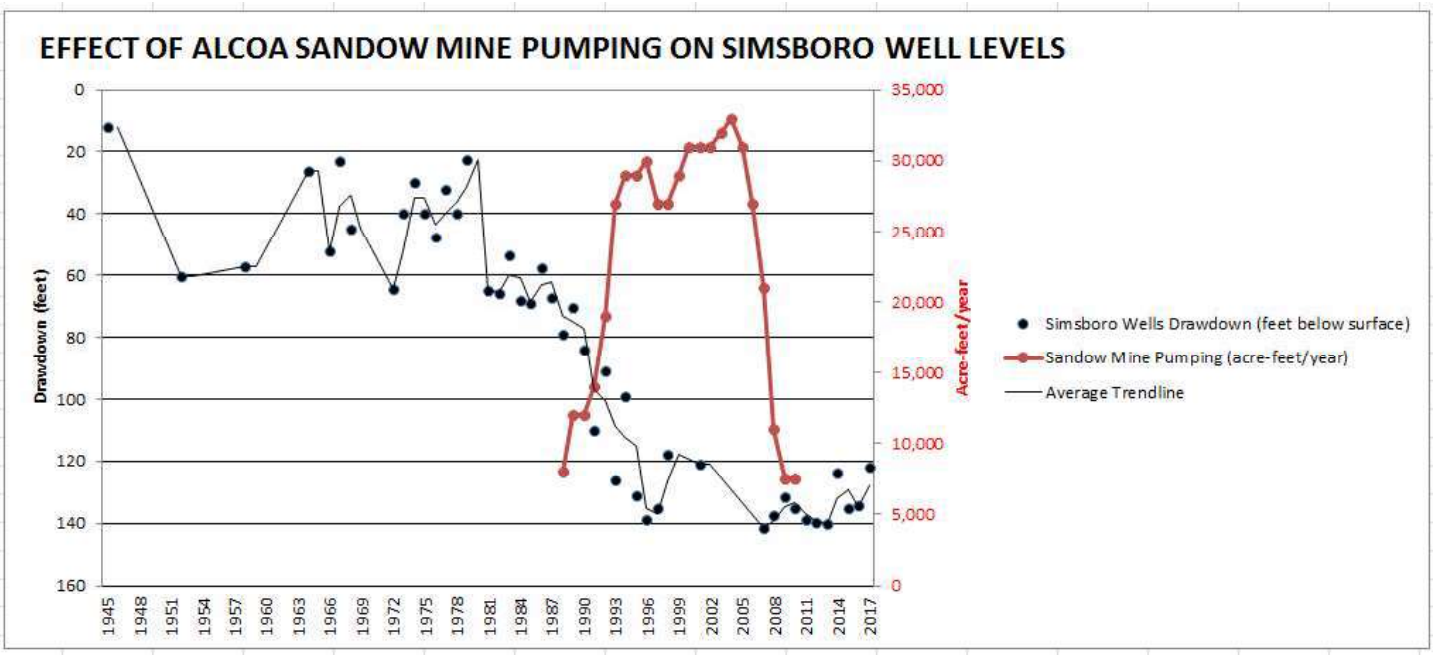
My interest in the Sandow Mine started when I discovered that an average 23,000 ac-ft/yr of Simsboro groundwater was pumped from 1988 to 2010 to depressurize the aquifer by lowering the water levels – the pumped groundwater was released into creeks and eventually reached Lake Somerville 30 miles distant. Then I read the following December 2008 statement made by Rockdale Mayor John Shoemake: "…excessive pumping within the Shallow Simsboro will lower

the water table by 100 feet within ten years, as proven by Alcoa's dewatering of the lignite fields…" I wanted to determine if Shoemake's observation was accurate - PLUS if it was true, I wanted to determine if the Simsboro had recovered from the Sandow Mine's pumping.

For my study, I used the Groundwater Data Viewer provided online by the Texas Water Development Board to study 144 wells near the Sandow Mine. The area I studied was roughly bounded by US 79, US 77, and the Milam Countyline southwest of Rockdale. From those 144 wells, I selected the 50 wells identified as Simsboro wells for further study. (*The selected Simsboro wells are marked with red dots in the following figure.*)



The results from my study are presented in the following graph which compares Simsboro well levels from 1945 to 2017 to the reported pumping used to depressurize the Simsboro Aquifer.



Although Alcoa purchased the Sandow Mine in 1952, Alcoa reported that Simsboro pumping greatly increased starting in 1988 as depicted in the graph. The increased pumping correlates with the decline of Simsboro water levels. Water levels dropped so low that Alcoa had to either modify or replace 485 landowner wells in Milam and Lee Counties between 1988 and 2009.

The graph documents that nine years after Simsboro pumping decreased significantly in 2008, Simsboro water levels did not rebound and remained 90 feet lower than those recorded before 1988 as Mayor Shoemake indicated (*Simsboro drawdown levels averaged 46 feet from 1945-1987 and 134 feet from 2011-2017*). The reason that Simsboro water levels have not recovered after the excessive Sandow Mine pumping stopped is explained by hydrology studies including one by the District's hydrologist that have reported extremely low recharge rates for the Simsboro. For example, recent reports confirm that the Simsboro total recharge from rain falling on its narrow outcrop zone in Milam County is less than 4,000 ac-ft/yr with less than 10% of the total recharge actually entering the deeper confined portions of the aquifer.

Importantly, the adverse impact of the Sandow Mine pumping on the Simsboro provides a real-life preview of the Vista Ridge Project's future impacts on the Simsboro – no computer model needed. The Vista Ridge Project plans to pump 37,500 ac-ft/yr of Simsboro groundwater for 30 years which equals a total amount of 1.1 million acre-feet of Simsboro groundwater. The present study supports the conclusion that if the Vista Ridge overpumping of the Simsboro is stopped in 30 years, it will take hundreds of years to restore the Simsboro to pre-Vista Ridge levels due to its low recharge rate. Stunningly, after the Vista Ridge Project closes up shop in 30 years, the wells, pumps, tanks, and pipelines will be transferred to San Antonio which plans to continue the excessive Simsboro pumping in perpetuity.

I was astonished to discover that Alcoa had provided unequivocal support for my conclusion that hundreds of years will be needed for the Simsboro to recover from its overpumping *if it ever ceases*. The Alcoa data were found in the U.S. Army Corps of Engineer's 2003 Environmental Impact Statement for the Three Oaks Mine: Three Oaks is located in Lee/Bastrop Counties and replaced the Sandow as Alcoa's source of coal. In the Impact Statement, Alcoa reports that the Simsboro would have to be depressurized by pumping an average 7,500 ac-ft/yr for 26 years. More importantly, Alcoa reported that they "*anticipated that complete recovery of the [Simsboro] aquifer would take approximately 100 years" after the closing of the Three Oaks Mine*.

Since Vista Ridge will annually pump five times more Simsboro groundwater than the Three Oaks Mine (37,500 vs. 7,500), I multiplied the "100 years" complete recovery time reported for Three Oaks Mine by FIVE to estimate that "500 years" would be needed to restore the Simsboro after 30 years of Vista Ridge pumping. To test the validity of my estimate, I calculated the recharge rate needed to replace 1.1 million acre-feet of Simsboro groundwater (the total amount Vista Ridge will pump during 30 years) over a 500-year period. The calculated recharge rate was 2,200 ac-ft/yr (1.1 million/500) - a rate that approximates the previously discussed estimates for Simsboro recharge.

In conclusion, this study highlights the vulnerability of the Simsboro Aquifer. If the groundwater district allows overpumping to make the Simsboro inaccessible to landowners, cities, and companies, it will take hundreds of years to rectify their error – an unacceptable/unrealistic timeframe. The only realistic solution is to prevent the Simsboro overpumping in the first place.