RUSK COUNTY GROUNDWATER CONSERVATION DISTRICT



DISTRICT ANNUAL REPORT 2021

SEPTEMBER 2020 TO AUGUST 2021

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CURRENT BOARD OF DIRECTORS

BOBBY BROWN – PRESIDENT

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HONORING PAST DIRECTORS

IN MEMORY OF DAVID C. POWELL – CHARTER DIRECTOR (PASSED AWAY 2021)

GENERAL MANAGER

ROBERT THORNTON
REPORT COMPLETED 11/03/2021

REVIEWED BY BOARD DIRECTORS

NOVEMBER 15, 2021

DISTRICT MISSION

"THE RUSK COUNTY GROUNDWATER CONSERVATION DISTRICT'S MISSION IS TO PRESERVE AND PROTECT THE GROUNDWATER RESOURCES OF THE DISTRICT FOR RUSK COUNTY RESIDENTS."

Addressing the Desired Future Conditions of the Groundwater Resources 13

12.7.

METHODOLOGY FOR TRACKING DISTRICT PROGRESS IN ACHIEVING MANAGEMENT GOALS:

An annual report will be prepared and presented to the Board of Directors on District performance about achieving management goals and objectives. The presentation of this report will occur within the first quarter of the following fiscal year. The Annual Report will be prepared in a format reflective of the performance standards listed following each management objective. The District will maintain the reports on file for public inspection at the District's office upon adoption.

MANAGEMENT PLAN GOALS, OBJECTIVES & PERFORMANCE STANDARDS:

The Rusk County Groundwater Conservation District has seven (7) management objectives with fifteen (15) goals detailed in the Management Plan, Section 12, adopted November 12, 2018. These objectives and goals provide details along with the performance of the District in attaining these goals as follows:

12.1. PROVIDING THE MOST EFFICIENT USE OF GROUNDWATER

12.1.A. MAINTAIN A WELL REGISTRATION PROCESS

OBJECTIVE: The District will require the registration of all groundwater wells, exempt and non-exempt, new and existing, within the boundaries of the District to be registered in accordance with the District Rules.

PERFORMANCE STANDARD: The number of new and existing water wells registered with the District will be provided at the regular District Board meetings and in the District's Annual Report.

ACTIVITY AND ACCOMPLISHMENTS:

At each regularly scheduled Board meeting, Well Statistics for the month are recorded and reported to the Board. The following are well statistics for the year for new, existing, exempt, and non-exempt wells and are maintained in the District's database.

12.1.B. MAINTAIN A WELL PERMITTING PROCESS

OBJECTIVE: The District will require all new and existing non-exempt water wells within the boundaries of the District to be permitted in accordance with the District Rules.

PERFORMANCE STANDARD: The District will process applications for operating permits of all non-exempt water wells pursuant to the permitting process of the District Rules. A summary of the number of applications for permitted use of groundwater will be provided at the regular District Board meetings and in the District's Annual Report. See table below.

September 1, 2020 - August 31, 2021			
Authorizations to Drill & Produce Water:	61		
Authorizations to Drill Denied:	0		
Total Authorizations Overall:	1921		
Amended Applications:	5		
Amended Applications Denied:	0		
Total Amended Applications Overall:	13		
Rush Applications:	7		
Total Rush Applications Overall:	49		
Total Registrations Issued, New Wells:	54		
Total Registrations Issued, Existing Wells:	63		
Total Registrations Overall:	5214		
Total Operating Permits (OP) Issued, New Wells:	7		
Total Operating Permits Issued, Existing Wells:	3		
Total Permits OPs Issued Overall:	116		
Total Operating Permits on File:	195		
Transfer Inspections Completed:	1		
Transfer Inspections Overall:	563		
Surface Inspections Completed:	36		
Surface Inspections Overall:	544		
Large Diameter Wells Registered:	1		
Large Diameter Wells Registered Overall:	433		
Large Diameter Wells Plugged:	4		
Large Diameter Wells Plugged Overall:	37		
Plugged Oil and Gas Water Wells Overall:	774		
Wells Plugged or Consumed in Mines Total Overall:	1346		

^{*}Overall: numbers since District or rule creation

ACTIVITY AND ACCOMPLISHMENTS:

At each regularly scheduled Board meeting, Well Statistics for the month are recorded and reported to the board which includes applications for permitted use.

To find more detail on the District managing groundwater supplies, please refer to the District's Management Plan and Rules all available to the public on the District's website, www.rcgcd.org.

See Objective 12.1.A for Activity and Accomplishments regarding District Well Statistics.

12.1.C. MAINTAIN AN ELECTRONIC DATABASE

OBJECTIVE: Maintain the District's Groundwater Well Database for registrations, permits, and groundwater production volume. The database shall include information deemed necessary by the District to enable effective monitoring and regulation of groundwater in the District.

PERFORMANCE STANDARD: The District will document all new and existing wells in the District's database. All new and existing wells documented will be included in the District's Annual Report.

PERFORMANCE STANDARD: The District will include a summary of the estimated volume of water produced in Rusk County in the District's Annual Report.

ACTIVITY AND ACCOMPLISHMENTS:

The District utilizes a web-based Database. All registrations, permits, and groundwater production volumes are accessible from the database for District use.

See Objective 12.1.A for Activity and Accomplishments regarding District Well Statistics.

See Appendix A, for Activity and Accomplishments related to documenting groundwater production.

See Appendix B, for Activity and Accomplishments related to documented new and existing wells in the District's database.

12.2. CONTROLLING AND PREVENTING WASTE OF GROUNDWATER

12.2.A. DISSEMINATE INFORMATION ON WASTE PREVENTION

OBJECTIVE: The District will provide information on an annual basis for educating the public on elimination, reduction, and prevention of the waste of groundwater. The District will use at least <u>one</u> of the following methods to provide information to the public annually:

- a. Distribute literature packets or brochures;
- b. Conduct public or school presentations;
- c. Sponsor an educational program or course;
- d. Provide information on the District's web site;
- e. Submit an article for publication with local papers;
- f. Present displays at public events.

PERFORMANCE STANDARD: A summary of the District's efforts to disseminate information on waste prevention will be included in the District's Annual Report.

ACTIVITY AND ACCOMPLISHMENTS:

The District disseminated waste prevention and conservation literature, materials, and demonstrations to the public in the following ways:

- A. Information on conservation is found on the District's website at reged.org by going to the http://reged.org/water-conservation/ link.
- B. Other disseminations through Social Media, including pointing users back to District's website:
 - a. September 2020: Facebook post on drought update.
 - b. January 2021: Facebook posts on Drought update, snow, rain totals.

- c. February 2021: Facebook posts on winter weather plumbing preps and water conservation during severe cold.
- d. May 2021: Facebook post on conservation tips
- e. August 2021: Facebook posts on water education (floods) and water conservation.
- f. Several Facebook posts on drought and expected rainfall throughout the year.
- C. Press Release in Henderson Daily News
 - a. August 2021, District Ad showing area, aquifer, and directors.
 - b. Tax and Budget Notice.
- D. The District maintains a native, drought tolerant landscape around the District office to serve as an example of plants that can be utilized to minimize waste and promote conservation. The landscape and practice is promoted on the District's website.
- E. The District's Website hosts several educational items available to the public. Specific topics by section on the website regarding waste prevention and conservation are as follows: Monitoring Programs, District Groundwater Geology and Groundwater Resources, Groundwater Well Education, Recharge Enhancement, Water Conservation, Youth Education Program, Groundwater Well Education, Conservation Education, and finally the District's Current Events, News, and Articles. *Total website users for the year were 3,196 up from 1,944 last FY*.
- F. Donated \$500 to Texas 4-H Water Ambassadors Program in support of water education; Received notes of thanks from Ambassadors. Dec 2020: Facebook post with 4-H Water Ambassador plaque presentation with GM.

12.2.B. IDENTIFY WASTEFUL PRACTICES

OBJECTIVE: The District will identify wasteful practices within the boundaries of the District through the following methods:

- a. Track water loss for all water utilities within the District;
- b. Enforce District Rule 9.2.5 requiring inspection and/or plugging of oil and gas groundwater wells.

PERFORMANCE STANDARD: The District will include a summary of the total volume of water loss from water utilities in the District's Annual Report.

PERFORMANCE STANDARD: The District will include the total oil and gas groundwater wells inspected and plugged each fiscal year in the Annual Report.

ACTIVITY AND ACCOMPLISHMENTS:

Through Rule 9.2.5, continued efforts to eliminate comingling of aquifers zones of different quality and prevent waste of water from one zone to another. Abandoned, large diameter wells were inspected and plugged. This prevents contamination of the aquifer.

See Objective 12.1.A Activity and Accomplishments for oil and gas groundwater wells inspected and plugged.

See Appendix A for summary of water loss of Rusk County water utilities.

12.3. ADDRESSING CONJUNCTIVE SURFACE WATER MANAGEMENT ISSUES

12.3.A. PARTICIPATING IN THE REGIONAL WATER PLANNING PROCESS

OBJECTIVE: The District will attend at least one East Texas Regional Water Planning Group (Region I) and the Northeast Texas Regional Water Planning Group (Region D) meeting each fiscal year.

PERFORMANCE STANDARD: The District will participate in the regional planning process by attending at least one meeting of Region I and Region D meetings each fiscal year. A report will be presented at a regular board meeting of the District on conjunctive surface water issues of the appropriate Regional Water Planning Groups. Attendance of meetings for Region I and Region D will be included in the District's Annual Report.

ACTIVITY AND ACCOMPLISHMENTS:

District representatives attended Regional Water Planning Group (RWPG) I meetings. Following attendance of RWPG I meetings, the District Board was briefed on the status and activities at the following regular board meeting in GM Report. The following are dates District Representatives attended and participated in the RWPG D & I meetings:

RWPG	Meeting Date	Representative
Region I	September 16, 2020	Robert Thornton
Region I	August 18, 2021	Robert Thornton

12.4. ADDRESSING NATURAL RESOURCE ISSUES

12.4.A. MONITOR WATER LEVELS

Objective: The District will manage and maintain its existing water level monitoring program. The District will monitor water levels within the District boundaries at least annually and will be recorded in the District's database.

PERFORMANCE STANDARD: A description of the number of wells measured and the monitoring results of the year will be included in the District's Annual Report.

ACTIVITY AND ACCOMPLISHMENTS:

AQUIFER MONITORING

MONTHLY: The District collects static water level readings at 16 monitor wells monthly.

October 2020: Facebook post of monthly water level checks.

December 2020: Facebook post of monthly well checks.

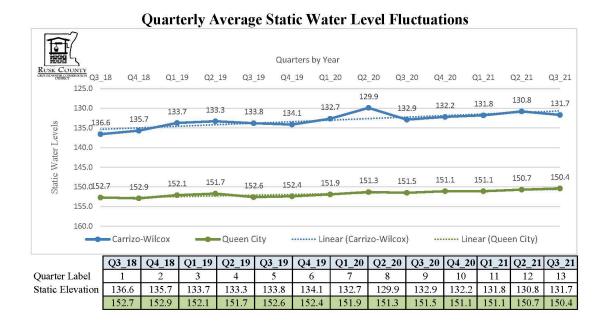
Feb, April, & June 2021: Facebook post of monthly well checks.

QUARTERLY: The District collects static water level readings at about 50 monitor wells quarterly. As wells are plugged by owners, the District shifts its wells monitored and numbers accordingly. This data is maintained in the District's database.

REAL-TIME STATIONS: The District has four (4) real-time water level monitoring stations recorded by transducers. Data from these monitor wells is uploaded daily via satellite to the Texas Water Development Board site and is linked to the District website for real-time coverage locally. June and August 2021: Facebook Posts of TWDB technician repairing real-time stations.

Data is collected in the field and evaluated by depth to water from surface and is kept in the District's database. The District's quarterly average (3rd Qtr.) aquifer levels by Depth to Water are displayed in the following graph.

See Appendix A, for Annual Groundwater Elevations report.



12.4.B. ADDRESS ABANDONED AND NUISANCE WELLS

OBJECTIVE: The District will encourage the plugging of abandoned and nuisance groundwater wells. The District will conduct inspections of groundwater wells within the District's boundaries to encourage proper maintenance of groundwater wells and to document abandoned and nuisance groundwater wells that pose a risk to the District's groundwater resources.

PERFORMANCE STANDARD: A description of the number of wells inspected, the number of wells in violation, and the number of wells brought into compliance or plugged will be included in the District's Annual Report.

ACTIVITY AND ACCOMPLISHMENTS:

The District promotes its Abandoned Well Program to assist and encourage well owners to cap or plug abandoned or nuisance groundwater wells. Many of these are old, large diameter wells.

The District conducts healthy well inspections of existing wells, newly drilled wells, and downhole inspections of groundwater wells for oil and gas rig supply and exploration. This helps the District in identifying potential risks to the aquifer and those well owners by eliminating public health and safety risks of groundwater commingling and abandonment. All inspected wells and recorded and kept on file at the District Office and in the District's Database.

A description of wells identified through the District's healthy well inspection program is outlined below:

District Abandoned & Nuisance Well Prevention						
September 1, 2020 - August 31, 2021	2020- 2021	2019- 2020	2018- 2019	2017- 2018	2016- 2017	
Transfer Inspections Completed:	1	6	11	10	9	
Surface Inspections Completed:	34	95	87	125	67	
Wells sent Notice of Violation:	3	4	12	22	37	
Wells brought into compliance:	0	4	7	12	39	
Wells Plugged or Consumed in Mines:	97	102	109	142	137	
Well Plugging Reimbursements:	0	0	0	0	4	

12.5. Addressing Drought Conditions

12.5.A. DROUGHT CONTINGENCY PLAN

OBJECTIVE: The District will implement its Drought Contingency Plan (DCP) if conditions meet the criteria listed in the plan. The District will evaluate its DCP annually to determine if any amendments are necessary and properly respond to drought conditions locally.

PERFORMANCE STANDARD: A summary of the evaluation of the District's Drought Contingency Plan and any revisions to the plan for proper response to drought conditions will be included in the District's Annual Report.

ACTIVITY AND ACCOMPLISHMENTS:

The District's DCP was evaluated as required annually by the District's Board of Directors and General Manager at the May 2021 meeting. Drought conditions were evaluated. No drought response needed in FY 20-21.

12.5.B. TRACK DROUGHT CONDITIONS

OBJECTIVE: The District will monitor drought conditions using a suitable source such as the U.S. Drought Monitor or the Palmer Drought Severity Index Map.

PERFORMANCE STANDARD: Link's on the District's web page to the Palmer Drought Severity Index, U.S. Drought Monitor, and the TWDB's website on drought will be made available to the public.

PERFORMANCE STANDARD: A summary of monitored drought conditions will be provided at the regular District Board meetings and in the District's Annual Report.

PERFORMANCE STANDARD: Monthly rainfall across Rusk County is monitored through six (6) District rain gauges, and two (2) additional sites – Texas A&M at Overton & a National Weather Service site in Henderson.

ACTIVITY AND ACCOMPLISHMENTS:

Drought conditions are tracked in the District and surrounding area with the Palmer Drought Severity Index Map and the Texas Drought Monitor once a month and presented at the Monthly Board meetings. The Palmer Drought Severity Index Map, Texas Drought Monitor, and the TWDB's website on drought, are made available to the public on the District's web page, http://rcgcd.org/monitoring-programs/. Climate Prediction Center (CPC) resources are also monitored for Drought Outlooks and El Nino/La Nina conditions. Facebook Posts...Sept 2020: TX Drought Update, Oct 2020: Winter Precipitation. Outlook & Tropical System Delta Rain Totals, Nov 2020: Expected Rainfall, Jan 2021: Drought Update, Feb 2021: Drought Outlook, Mar 2021: Drought Outlook (2), April Rain Outlook, Apr 2021: Last 30 Days of Rain, May 2021: Rain Report and Drought Map, June 2021: 30 Days of Rain, July 2021: Drought and Drought Outlook, Aug 2021: Water Conservation Post.

Rainfall fell below Historical YTD Average in November 2020, but by end of 2020, had surpassed the YTD Historical Average by 2.52" The least amount of rain fell in November 2020, when only 1.01" fell on average across the county. The most rainfall was in May 2021, when 9.98" fell across the county.

12.6. ADDRESSING CONSERVATION, RECHARGE ENHANCEMENT, AND RAINWATER HARVESTING

12.6.A. Public Education to Emphasize Water Conservation

OBJECTIVE: In coordination with efforts in waste prevention, the District will provide information on an annual basis to promote conservation. The District will use at least one of the following methods to provide information to the public annually:

- a. Distribute literature packets or brochures;
- b. Conduct public or school presentations;
- c. Sponsor an educational program or course;
- d. Provide information on the District's web site;
- e. Submit an article for publication with local papers; and
- f. Present displays at public events.

PERFORMANCE STANDARD: A summary of the District's efforts to disseminate information on water conservation will be included in the District's Annual Report.

ACTIVITY AND ACCOMPLISHMENTS:

See Objective 12.2.A for Activity and Accomplishments regarding efforts to disseminate information on water conservation. Facebook Posts: Dec 2020: GM Picture with Ambassador presenting the District a plaque. Feb 2021: Winter Weather Plumbing Preps and Water Conservation During Cold Weather. May 2021: Water Conservation Tips. Aug 2021: Water Conservation Info. Donated \$500 to Texas 4-H Water Ambassadors Program; Received notes of thanks from Ambassadors.

12.6.B. RECHARGE ENHANCEMENT

OBJECTIVE: To continue education on the diversity of the resource, the District will provide information relating to recharge enhancement on the District web site.

PERFORMANCE STANDARD: Information that has been provided on the District web site will be included or summarized in the District's Annual Report.

ACTIVITY AND ACCOMPLISHMENTS:

Recharge Enhancement education and external links are made available to the public on the District's web page in the Education Tab at, http://rcgcd.org/205-2/. This material provides information on groundwater movement and aquifer characteristics regarding recharge enhancement within Rusk County.

12.6.C. RAINWATER HARVESTING

OBJECTIVE: The District will promote rainwater harvesting by providing information about rainwater harvesting on the District web site.

PERFORMANCE STANDARD: Information on that has been provided on the District web site will be included or summarized in the District's Annual Report.

ACTIVITY AND ACCOMPLISHMENTS:

Rainwater Harvesting education and external links are made available to the public on the District's web page in the Education Tab at, http://rcgcd.org/rain-water-harvesting/. This material provides information for an alternative water supply, reducing stress on our area aquifers, and complexity of the unit's design.

12.7. ADDRESSING THE DESIRED FUTURE CONDITIONS OF THE GROUNDWATER RESOURCES

12.7.A. MANAGE AND MAINTAIN A WATER LEVEL MONITORING PROGRAM

OBJECTIVE: The District will manage and maintain its existing water level monitoring program. The District will monitor water levels within the District boundaries at least annually and will be recorded in the District's database, as part of Objective 12.4.A. The District will evaluate water level trends and compare to the DFCs adopted by the District's.

PERFORMANCE STANDARD: A description of the number of wells measured and the monitoring results of the year will be included in the District Annual Report.

PERFORMANCE STANDARD: An annual comparison of water level changes to the District's DFC will be evaluated and included in the District's Annual Report.

ACTIVITY AND ACCOMPLISHMENTS:

See Objective 12.4.A. Activity and Accomplishments for the District managing and maintaining its existing water level monitoring program and results.

See Appendix A for annual comparison of water level changes to the District's DFC.

12.7.B. MONITOR ESTIMATE ANNUAL PRODUCTION

OBJECTIVE: The District will estimate total annual groundwater production for each aquifer based on water use reports, estimated exempt use, and other relevant information and compare production estimates to the Managed Available Groundwater (MAG).

PERFORMANCE STANDARD: An annual comparison of total recorded and estimated annual production to the District's MAG will be evaluated and included in the District's Annual Report.

ACTIVITY AND ACCOMPLISHMENTS:

See Appendix A below for total estimated annual production compared to the MAG.

APPENDIX A

DISTRICT MAG & DFC COMPARISON & PRODUCTION REPORTING ANALYSIS 2020



PRODUCTION REPORTING ANALYSIS WITH MAG COMPARISON AND WATER LOSS ANALYSIS 2020

By Robert Thornton, General Manager AUGUST 23, 2021

The Rusk County Groundwater Conservation District (District) requires reporting of groundwater production for all permit holders of non-exempt wells, mining, and oil and gas rig supply and exploration. Meters are required for groundwater production of oil and gas, mining, and permitted wells outside of agricultural and domestic usage.

The District's 2018 Management Plan requires the District to monitor estimated annual production (12.7.B.) and conduct an annual comparison of the District's water level changes to its adopted DFC (12.7.A.). This report reviews the production by type of use with comparisons to past years' statistics.

Acronyms & Definitions

- An acre-foot is defined as the volume of one acre of surface area to a depth of one foot.
- 1 acre-foot = 325,852 liquid gallons
- a/f: acre-feet

- PWS: Public Water Supply
- GAM: Groundwater Availability Model
- MAG: Managed Available Groundwater
- GMA 11: Groundwater Management Area 11
- TCEQ: Texas Commission on Environmental Quality
- TWDB: Texas Water Development Board

PRODUCTION REPORTING STATISTICS

Overall total reports submitted for 2020 were down from 2019, with Mining dropping. Steam Electric stayed the same and Non-Exempt Outside of PWS increased.

Reports Received							
Type	2017	2018	2019	2020			
PWS Total:	87	87	87	88			
Mining Total:	12	9	5	3			
Oil & Gas Total:	12	17	14	6			
Steam Electric Total:	1	1	1	1			
Non-Ex Outside of PWS Total:	41	20	20	23			
Overall Total:	153	134	127	121			

Overall total production decreased by 530.2 a/f from 2019. 2020 saw the lowest amount of groundwater production in the years of 2017-2020 at 8,168 a/f. The largest increase in production came from Mining with 265.1 a/f. Oil and gas was down 11.3 a/f. The largest decrease in production came from PWS entities at 813.9 a/f.

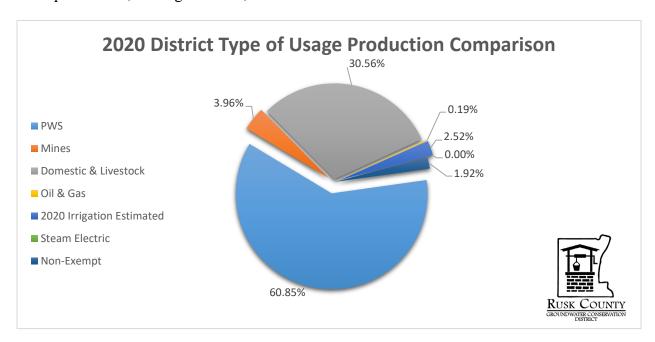
1	Total Production by Type of Use (acre-feet per year)								Difference from
	2017		20	18	2019		2020		2019 to 2020
PWS:	5,693.4	65.6%	6,015.9	66.5%	5,784.2	66.5%	4,970.3	60.9%	-813.9
Mining:	231.3	2.7%	330.7	3.7%	58.1	0.7%	323.2	4.0%	265.1
Oil &									
Gas:	47.2	0.5%	28.8	0.3%	27.2	0.3%	15.9	0.2%	-11.3
Steam									
Electric:	41.4	0.5%	0.0	0.0%	0.0	0.0%	0.0	0.0%	0.0
Non-									
Exempt									
outside of									
PWS:	140.6	1.6%	79.5	0.9%	126.7	1.5%	156.6	1.9%	29.9
Irrigation									
TWDB:	200.0	2.3%	173.0	1.9%	206.0	2.4%	206.0	2.5%	0.0
Domestic									
&									
livestock-									
TWDB:	2,328.0	26.8%	2,412.0	26.7%	2,496.0	28.7%	2,496.0	30.6%	0.0
Overall									
Total:	8,681.9	100%	9,039.9	100%	8,698.2	100%	8,168.0	100%	-530.2

^{*}TWDB irrigation estimates included for '17-'19. '20 Est.

^{*}TWDB Domestic & Livestock production is provided in 5-10 year intervals to coincide with the State Water Plan.

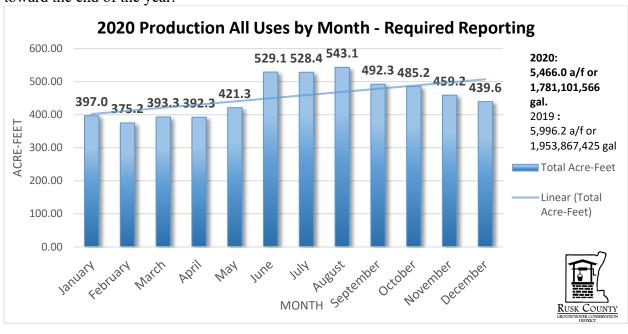
PRODUCTION BY TYPE OF USE

Production by Type of Use in Rusk County in 2020 is led by Public Water Suppliers producing 60.8%, Domestic & Livestock at 30.5%. Smaller amounts were seen in Irrigation at 2.52%, Non-Exempt at 1.92%, Mining at 3.96%, and Oil & Gas at 0.19%.



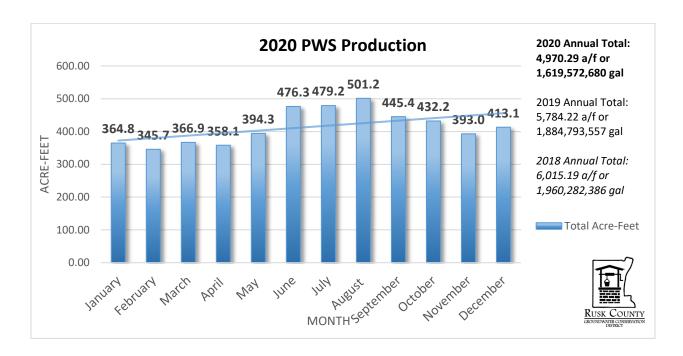
TOTAL PRODUCTION BY MONTH FOR ALL TYPES OF USE

Total Production for all Uses shows the largest month of production was August at 543.1 a/f and the lowest month of production being February at 375.2 a/f. There was a decrease in production toward the end of the year.

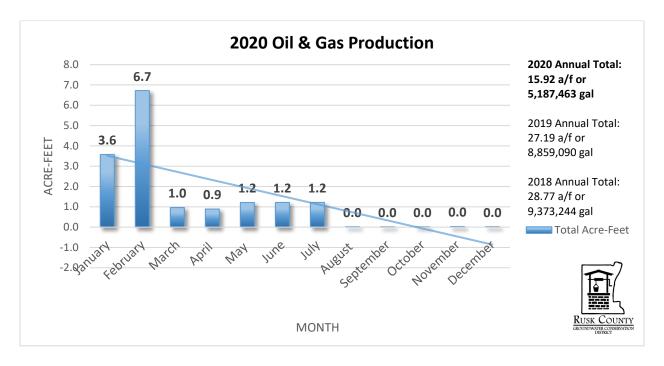


PRODUCTION BY TYPES OF USE

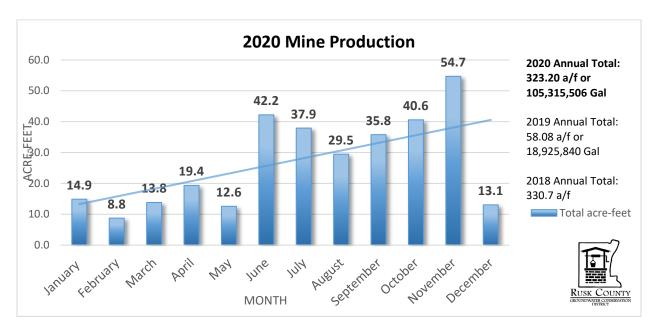
PWS production decreased from 2019 by 813.9 a/f. PWS's largest month of production was August at 501.2 a/f and the lowest month of production, February at 345.7 a/f.



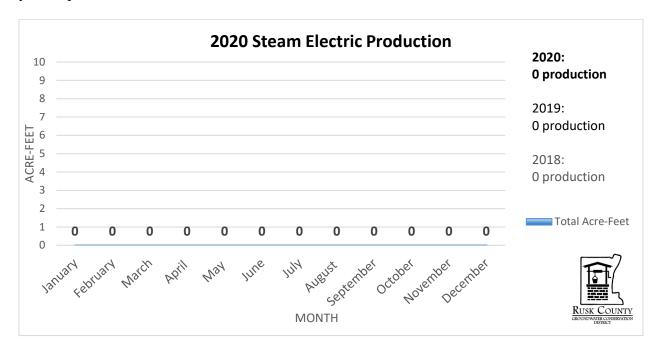
Oil & Gas production decreased from 2019 by 11.3 a/f. Oil and Gas's largest month of production was February at 6.7 a/f and the lowest months of production were August-December at 0 a/f for each month.



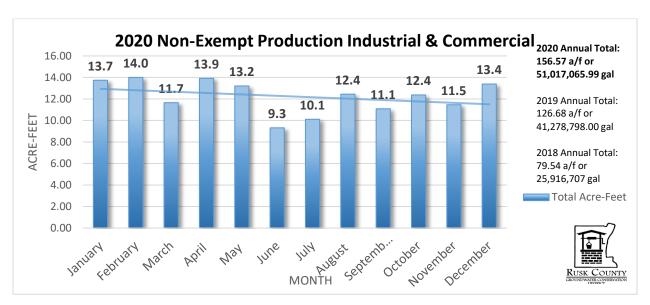
Mine production increased from 2019 by 265.1 a/f. Mining's largest months were June-November with November having the largest use at 54.7 a/f. The lowest month of usage was February at 8.8 a/f.



Steam Electric Production Steam Electric did not produce groundwater during 2020. The last year of production was 2017 at 41.4 a/f.



Non-Exempt outside of PWS production increased 29.9 a/f. Non-exempt's largest month of production was February at 14.0 a/f with the lowest in June at 9.3 a/f.



SUMMARY OF WATER LOSS OF RUSK COUNTY WATER UTILITIES

The District's Management Plan requires a summary of water loss from water utilities (12.2.B). The TWDB provided the District with the most current data regarding water loss as recorded through water utility surveys for Rusk County. All utilities are required to submit an audit every five-years. Utilities required to submit an audit every year are those with more than 3,300 connections, or who have a financial obligation with the agency. The chart below shows those that submitted five-year audits for 2020. In addition, The City of Henderson's yearly audit for 2020 shows the total real water loss in 2020 at 107,571,529.7 gal. or 330.12 a/f. The breakdown of other entities is below:

WSC	2020 Total Real Water Loss (gal. and a/f)
Chalk Hill SUD	17,073,621.42 gal. or 52.40 a/f
City of New London	3,548,323.39 gal. or 10.89 a/f
Cross Roads SUD	2,256,490.04 gal. or 6.92 a/f
Cross Roads SUD Greenwood Ranch	268,087.23 gal. or 0.8 a/f
Dirgin WSC	87,996.66 gal. or 0.27 a/f
Gaston WSC	6,321,433.01 gal. or 19.40 a/f
Goodsprings WSC	11,482,424.23 gal. or 35.24 a/f
Goodsprings WSC Plant C	534,075.76 gal. or 1.64 a/f
Jacobs WSC Plant 3 & 4	1,344,656.71 gal. or 4.13 a/f
Jacobs WSC Plants 1 & 2	1,296,404.74 gal. or 3.98 a/f
Laneville WSC Plant 1	146,134 gal. or 0.45 a/f
Laneville WSC Plant 2	154,118.72 gal. or 0.47 a/f
Minden-Brachfield WSC	13,121,550.57 gal. or 40.27 a/f
Mt Enterprise WSC	12,734,273.76 gal. or 39.08 a/f
Pleasant Hill WSC	74,102.84 gal. or 0.23 a/f
Price WSC	463,794.85 gal. or 1.42 a/f
South Rusk County WSC	22,542,718.43 gal. or 69.18 a/f
South Rusk County WSC – Compton	6342497.55 gal. or 19.46 a/f
Southern Utilities Laird Hill	6,530,530.61 gal. or 20.04 a/f
Leveretts Chapel WSC	31,814,000 gal. or 97.63 a/f

^{*}The city of Henderson used 51.7% surface water and 48.3% groundwater in 2020. The city has been increasing surface water usage in recent years.

Past Data for City of Henderson

The 2017 survey shows the City of Henderson produced 11.2% surface water and produced 88.8% groundwater, with a total real loss of 117,343,563 gallons.

The 2018 survey shows the city of Henderson produced 18.33% surface water and produced 81.67% groundwater, with a total real loss of 121,340,421 gallons. The difference in 2018 and 2019 was due to the replacement of some malfunctioning meters and that documentation was more accurate in 2019, according to city of Henderson.

Past Data for Other Entities

The 2015 survey provided from the TWDB in 2016 was raw data before cleaned up. A clean version of the 2015 survey was provided in 2018. Twenty-one (21) utilities reported water loss in 2015 for a total of 25,897,290 gallons, with 100% groundwater produced and no surface water.

Water loss can be accounted for by line failures and repairs, meter accuracy, and other unmetered fields. In addition, it is also hard to accurately know how much water loss occurs with leaks and firefighting, according to the city of Henderson.

NON-EXEMPT WELLS/PERMITTED WELLS

The total permitted amount of groundwater in the District is to be compared to the Modeled Available Groundwater (MAG) on an annual basis as guided by the District's Management Plan and Chapter 36 of the Texas Water Code in evaluation of the resource.

The District is to issue permits up the point that the total volume of exempt and permitted groundwater production will achieve an applicable desired future condition. Meaning, the District can permit over the MAG if there is no adverse effect on the groundwater levels as compared to the DFCs.

The District has permitted <u>187</u> non-exempt wells, totaling <u>9,638</u> a/f per year permitted production. Due to new operating permits, permit renewals, and identifying historical data for existing wells, there was an increase in permitted production.

The District's current MAG is 20,837 a/f per year.

Non-Exempt Wells Permitted				
Year	Amount of Permits	Permitted Production A/F		
2017	138	7,583		
2018	169	9,295		
2019	183	9,568		
2020	187	9,638		

MODELED AVAILABLE GROUNDWATER (MAG) IN RUSK COUNTY

GMA 11 adopted DFCs January 11, 2017. The District adopted DFCs for Rusk County April 10, 2017. The TWDB developed and produced GAM RUN 17-024 MAG, June 19, 2017.

- MAG of the Carrizo-Wilcox Aquifer from years 2020 to 2040 is **20,837 a/f**.
- MAG of the Carrizo-Wilcox Aquifer from years 2050 to 2070 is 20,818 a/f.

Rusk County MAG Values (acre-feet per year)									
		Regional							
		Water	River	Year					
Aquifer	County	Planning Area	Basin	2020 2030 2040 2050 2060 2070				2070	
Carrizo-Wilcox	Rusk	I	Neches	11,769	11,769	11,769	11,750	11,750	11,750
Carrizo-Wilcox	Rusk	I	Sabine	9,068	9,068	9,068	9,068	9,068	9,068
	Totals 20,837 20,837 20,837 20,818 20,818 20,818								

GMA 11 adopted new DFCs on August 11, 2021. GMA 11 has until October 11, 2021 to submit the new DFCs to the Texas Water Development Board (TWDB). TWDB will review the submitted materials for administrative completeness and will subsequently issue updated MAGs for GMA 11, probably in late 2022.

Based on the materials that will be submitted, it is expected that the Rusk County MAGs for the Carrizo-Wilcox Aquifer will be 14,027 AF/yr. While lower than the previous MAGs as summarized above, the MAG is higher than the estimated highest pumping in recent years (2011) of about 7,313 AF/yr. (this includes the exempt use as well).

DESIRED FUTURE CONDITIONS (DFCs) IN RUSK COUNTY

The District's groundwater elevations are currently compared to the 1999 baseline. The District makes these comparisons on an annual basis for the DFC and MAG, as guided by the District's Management Plan, Chapter 36 of the Texas Water Code, and best management practices of our groundwater resources. A report on the evaluation of the 2020 groundwater elevations to the DFC was provided by William R. Hutchison, Ph.D., P.E., P.G. His analysis found that Rusk County's monitoring data are consistent with the desired future conditions.

The current DFC for the Carrizo-Wilcox Aquifer in Rusk County is an average drawdown of <u>23</u> <u>feet from 1999 to 2070</u> GMA 11 adopted new DFCs on August 11, 2021. These new DFCs are based on an updated Groundwater Availability Model (GAM) which corrects many of the limitations and problems associated with the old GAM. Based on the new model, the new DFC for the Carrizo-Wilcox Aquifer in Rusk County is an average drawdown of 86 feet from 2013 to 2080.

District Rule 8.2, Actions Based on Aquifer Response to Pumping

"The District shall utilize its existing well monitoring program, to access aquifer levels in the District and the effects caused by groundwater production to enforce the District's adopted Desired Future Conditions of the aquifers and to conserve and preserve groundwater availability and protect groundwater users and groundwater ownership and rights."

The District has adopted three threshold average aquifer drawdown levels to act as triggers to provide for increased levels of District regulatory responses based on the average aquifer drawdown levels in three consecutive years. Each level is based on an average of three consecutive years immediately prior to reaching the trigger.

Based on Dr. Hutchison's August 2021 report using the updated DFC, no threshold levels have been triggered. Average precipitation since 2013 has been slightly above average, with the last three years all above average. Current pumping is about half of the assumed pumping that was the basis for the DFC simulation. Given the assumed pumping in the DFC simulation, average drawdown from 2013 in the 35 monitoring wells used by the District is estimated to be about 65 feet in 2020. In contrast, actual monitoring data show that there has been about a 2 ft. rise in groundwater levels in 2020 as compared to the groundwater levels in 2013.

DR. BILL HUTCHISON REPORT ON GROUNDWATER ELEVATIONS

On August 11, 2021, GMA 11 adopted new desired future conditions (DFCs) based on Scenario 33 of the new Groundwater Availability Model. The new model addresses and corrects many of the limitations and issues with the old Groundwater Availability Model. Also, the new DFCs are different from the current DFCs. Finally, the expected Modeled Available Groundwater (MAG) values will be different than the current MAGs.

I have completed a review of your annual report that you plan to provide to your Board next week and provided suggested revisions and updates. I have also completed an update of the comparison between the actual groundwater elevations in 35 wells you monitor and the results at those points from the output of Scenario 33. I developed a spreadsheet that you can use to update annual monitoring results through the year 2030. The spreadsheet has been delivered to you via email.

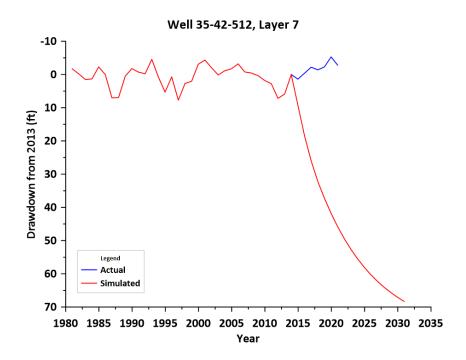
As we discussed, the spreadsheet uses data from the 35 wells that had a data point in the fourth quarter of 2013 (the baseline point for the new DFCs). All other wells should be monitored as usual, but only the results from the 35 wells in the spreadsheet can be used for comparison with the DFCs because these are the wells with a measured baseline.

A summary table from the spreadsheet for the period 2013 to 2020 is included below. Note that the average actual drawdown for all years shown is about 1 ft. In contrast, the simulated drawdown average for all years shown is about 45 feet. The simulation assumes pumping in Rusk County would be about twice the current levels as explained in the Technical Memorandum associated with Scenario 33 (the simulation that is the basis for the new DFC). Precipitation values for the individual years are also shown to provide some context with wet and dry years.

Year	Annual Precipitation (in)	Precipitation Difference from Long-Term Average (in)	Actual Drawdown (ft from 2013)	Simulated Drawdown (ft from 2013)
2013	48.17	0.21	0.00	0.00
2014	41.41	-6.55	2.33	30.23
2015	66.45	18.49		40.29
2016	50.36	2.40	8.18	47.81
2017	45.18	-2.78	-0.65	53.62
2018	63.19	15.23	0.01	58.16
2019	52.16	4.20	-2.11	62.05
2020	59.26	11.30	-2.05	65.42
Average	47.96	5.31	0.82	44.70

Note: average precipitation is from 1940 to 2020

As an example, below is a hydrograph of one of the 35 wells with simulated (through 2030) and actual drawdown from 2013 to 2020. Please note that all the graphs of the other 34 wells are similar to this example.



Note that the 1980 to 2013 drawdown is from the model calibration period (red line that rises and falls due to a combination of wet years, dry years, and changes in pumping). After 2013, the simulated drawdown drops significantly because the simulated pumping after 2013 is about double the historic pumping and does not vary during the simulation. For the 2013 to 2080 period, there is an assumption of average rainfall and recharge conditions in the simulation (although the results are only shown through 2030). This means that the characteristic fluctuation due to wet years and dry years observed during the calibration period is not present in the post-2013 simulation results. Also, please note that the actual drawdown from 2013 to 2020 (the blue line) is generally consistent with the model calibration fluctuations.

These results are consistent with the expectation that, until pumping increases significantly in Rusk County, there will be minimal drawdown in the groundwater levels due to pumping, and the monitoring data can be used to evaluate the impact of pumping infuture years until the next round of joint planning (next proposed DFC is due on May 1, 2026).

APPENDIX B

DOCUMENTED NEW & EXISTING WELLS IN DISTRICT DATABASE

The District recorded 125 wells in its database. Recorded Exempt Wells totaled 117: 15 dewatering, 43 monitor, 52 domestic, 7 irrigation/livestock, 2 Rig/Supply-Oil & Gas, and 6 other or unknown uses. Recorded Non-Exempt Wells totaled 8: 6 Domestic, 1 Irrigation, and 1 Public Water.

		Documented Wells FY 2020-2	021	
Well Type	Type of Use	Well Owner (Current) Name	Well ID	Date Entered
Exempt	Dewatering	Luminant Mining Co, LLC	RC2020-0130	9/16/2020
Exempt	Dewatering	Luminant Mining Co, LLC	RC2020-0131	9/16/2020
Exempt	Dewatering	Luminant Mining Co, LLC	RC2020-0148	10/9/2020
Exempt	Dewatering	Luminant Mining Co, LLC	RC2020-0149	10/9/2020
Exempt	Dewatering	Luminant Mining Co, LLC	RC2020-0155	10/13/2020
Exempt	Dewatering	Luminant Mining Co, LLC	RC2020-0156	10/13/2020
Exempt	Dewatering	Luminant Mining Co, LLC	RC2020-0157	10/13/2020
Exempt	Dewatering	Luminant Mining Co, LLC	RC2020-0158	10/14/2020
Exempt	Dewatering	Luminant Mining Co, LLC	RC2020-0159	10/14/2020
Exempt	Dewatering	Luminant Mining Co, LLC	RC2020-0160	10/14/2020
Exempt	Dewatering	Luminant Mining Co, LLC	RC2020-0161	10/14/2020
Exempt	Dewatering	Luminant Mining Co, LLC	RC2020-0162	10/14/2020
Exempt	Dewatering	Luminant Mining Co, LLC	RC2020-0163	10/14/2020
Exempt	Dewatering	Luminant Mining Co, LLC	RC2020-0164	10/14/2020
Exempt	Dewatering	Luminant Mining Co, LLC	RC2020-0187	11/16/2020
Exempt	Domestic	Penny Linkinhoker	RC2020-0124	9/8/2020
Exempt	Domestic	Stephen Brady	RC2020-0133	9/25/2020
Exempt	Domestic	Efrain Vanegas	RC2020-0136	9/30/2020
Exempt	Domestic	Tanya Cooper	RC2020-0137	10/1/2020
Exempt	Domestic	Keith Sullens	RC2020-0150	10/12/2020
Exempt	Domestic	Gregory Tate	RC2020-0170	10/16/2020
Exempt	Domestic	Lloyd Marvel	RC2020-0171	10/19/2020
Exempt	Domestic	Kyle Lee	RC2020-0172	10/23/2020
Non exempt	Domestic	J & E Ranch, LLC	RC2020-0173	10/29/2020
Exempt	Domestic	Patricia Dowdy	RC2020-0175	11/5/2020
Exempt	Domestic	Carl Linkinhoker	RC2020-0176	11/5/2020
Exempt	Domestic	Polve, Kinney	RC2020-0186	11/13/2020
Exempt	Domestic	Peter J. Campbell	RC2020-0189	11/24/2020
Exempt	Domestic	John M. Fagg	RC2020-0195	11/30/2020
Exempt	Domestic	Cynthia McBride	RC2020-0196	11/30/2020
Exempt	Domestic	Danny Burks	RC2020-0198	12/18/2020
Exempt	Domestic	Phyllis Melton	RC2020-0199	12/31/2020
Exempt	Domestic	Jose Reynoso	RC2021-0001	1/4/2021
Exempt	Domestic	Curtis Clader	RC2021-0002	1/21/2021
Exempt	Domestic	Billy Smallwood	RC2021-0003	1/25/2021
Exempt	Domestic	Marion Smith	RC2021-0005	2/3/2021
Exempt	Domestic	Richards, Wayne	RC2021-0006	3/1/2021
Exempt	Domestic	Krystal Okelberry	RC2021-0007	3/1/2021
Non exempt	Domestic	Tom Eatherton	RC2021-0008	3/1/2021
Exempt	Domestic	Gabriel Norman	RC2021-0009	3/8/2021

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Exempt	Domestic	Eddie Turner	RC2021-0010	3/11/2021
Exempt	Domestic	Angela Taylor	RC2021-0011	3/12/2021
Exempt	Domestic	Shelly Chavers	RC2021-0012	3/16/2021
Exempt	Domestic	Mike Bryce	RC2021-0013	3/16/2021
Exempt	Domestic	Clay Dupree	RC2021-0014	3/17/2021
Exempt	Domestic	Mark Jackson	RC2021-0015	3/19/2021
Exempt	Domestic	Dadrian Johnson	RC2021-0016	3/22/2021
Non exempt	Domestic	Green, Derial	RC2021-0017	4/6/2021
Exempt	Domestic	Lloyd Marvel	RC2021-0018	4/9/2021
Exempt	Domestic	Cody Shelton	RC2021-0019	4/9/2021
Exempt	Domestic	Chance and Jennifer Bell	RC2021-0020	4/15/2021
Exempt	Domestic	Craig Fowler	RC2021-0021	4/27/2021
Exempt	Domestic	Anthony B. Davis	RC2021-0024	5/7/2021
Exempt	Domestic	Joseph Gentry	RC2021-0025	5/7/2021
Exempt	Domestic	Freddy Campos	RC2021-0027	5/12/2021
Non exempt	Domestic	Hunter Wood	RC2021-0028	5/19/2021
Exempt	Domestic	Oscar Perdomo	RC2021-0029	5/25/2021
Exempt	Domestic	Cody R. Baker	RC2021-0030	6/1/2021
Exempt	Domestic	Mary Young & Mark Sindelir	RC2021-0031	6/7/2021
Exempt	Domestic	Christopher Cormican	RC2021-0032	6/8/2021
Exempt	Domestic	Devin Parsons	RC2021-0033	6/16/2021
Exempt	Domestic	Billy Lee	RC2021-0034	7/2/2021
Exempt	Domestic	Jacob Davis	RC2021-0040	7/22/2021
Non exempt	Domestic	Tom Eatherton	RC2021-0041	7/26/2021
Non exempt	Domestic	Paul & Cecelia Adams	RC2021-0043	8/17/2021
Exempt	Domestic	Trina Fyffe	RC2021-0044	8/17/2021
Exempt	Domestic	Nestor Erick Arce	RC2021-0045	8/23/2021
Exempt	Irrigation	Tressie Grant	RC2020-0174	11/4/2020
Non exempt	Irrigation	Cefco / Fikes Wholesale, Inc.	RC2020-0197	12/15/2020
Exempt	Livestock	Lisa Savage	RC2020-0125	9/16/2020
Exempt	Livestock	Chase Richards	RC2021-0004	1/27/2021
Exempt	Livestock	Andrew S. Focht	RC2021-0022	5/5/2021
Exempt	Livestock	Andrew Gardner	RC2021-0026	5/7/2021
Exempt	Livestock	Marc Matulich	RC2021-0042	8/2/2021
Exempt	Monitor	Fikes Wholesale, Inc.	RC2020-0120	9/3/2020
Exempt	Monitor	Fikes Wholesale, Inc.	RC2020-0121	9/3/2020
Exempt	Monitor	Fikes Wholesale, Inc.	RC2020-0122	9/3/2020
Exempt	Monitor	Luminant Mining Co, LLC	RC2020-0126	9/16/2020
Exempt	Monitor	Luminant Mining Co, LLC	RC2020-0127	9/16/2020
Exempt	Monitor	Luminant Mining Co, LLC	RC2020-0128	9/16/2020

Exempt	Monitor	Luminant Mining Co, LLC	RC2020-0129	9/16/2020
Exempt	Monitor	Luminant Mining Co, LLC	RC2020-0132	9/16/2020
Exempt	Monitor	Luminant Mining Co, LLC	RC2020-0138	10/2/2020
Exempt	Monitor	Luminant Mining Co, LLC	RC2020-0139	10/2/2020
Exempt	Monitor	Luminant Mining Co, LLC	RC2020-0140	10/2/2020
Exempt	Monitor	Luminant Mining Co, LLC	RC2020-0141	10/2/2020
Exempt	Monitor	Luminant Mining Co, LLC	RC2020-0142	10/2/2020
Exempt	Monitor	Luminant Mining Co, LLC	RC2020-0143	10/2/2020
Exempt	Monitor	Luminant Mining Co, LLC	RC2020-0144	10/2/2020
Exempt	Monitor	Luminant Mining Co, LLC	RC2020-0145	10/8/2020
Exempt	Monitor	Luminant Mining Co, LLC	RC2020-0146	10/9/2020
Exempt	Monitor	Luminant Mining Co, LLC	RC2020-0147	10/9/2020
Exempt	Monitor	Luminant Mining Co, LLC	RC2020-0151	10/13/2020
Exempt	Monitor	Luminant Mining Co, LLC	RC2020-0152	10/13/2020
Exempt	Monitor	Luminant Mining Co, LLC	RC2020-0153	10/13/2020
Exempt	Monitor	Luminant Mining Co, LLC	RC2020-0154	10/13/2020
Exempt	Monitor	Luminant Mining Co, LLC	RC2020-0165	10/15/2020
Exempt	Monitor	Luminant Mining Co, LLC	RC2020-0166	10/15/2020
Exempt	Monitor	Luminant Mining Co, LLC	RC2020-0167	10/15/2020
Exempt	Monitor	Luminant Mining Co, LLC	RC2020-0168	10/15/2020
Exempt	Monitor	Luminant Mining Co, LLC	RC2020-0169	10/16/2020
Exempt	Monitor	Luminant Mining Co, LLC	RC2020-0177	11/9/2020
Exempt	Monitor	Luminant Mining Co, LLC	RC2020-0178	11/9/2020
Exempt	Monitor	Luminant Mining Co, LLC	RC2020-0179	11/9/2020
Exempt	Monitor	Luminant Mining Co, LLC	RC2020-0180	11/12/2020
Exempt	Monitor	Luminant Mining Co, LLC	RC2020-0181	11/12/2020
Exempt	Monitor	Luminant Mining Co, LLC	RC2020-0182	11/12/2020
Exempt	Monitor	Luminant Mining Co, LLC	RC2020-0183	11/12/2020
Exempt	Monitor	Luminant Mining Co, LLC	RC2020-0184	11/12/2020
Exempt	Monitor	Luminant Mining Co, LLC	RC2020-0185	11/12/2020
Exempt	Monitor	Luminant Mining Co, LLC	RC2020-0188	11/16/2020
Exempt	Monitor	Fikes Wholesale, Inc.	RC2020-0191	11/25/2020
Exempt	Monitor	Fikes Wholesale, Inc.	RC2020-0192	11/25/2020
Exempt	Monitor	Fikes Wholesale, Inc.	RC2020-0193	11/25/2020
Exempt	Monitor	Fikes Wholesale, Inc.	RC2020-0194	11/25/2020
Exempt	Monitor	Sheuli Investments, Inc.	RC2021-0036	7/15/2021
Exempt	Monitor	Sheuli Investments, Inc.	RC2021-0037	7/15/2021
Exempt	Rig Supply	Mud Creek Operating	RC2021-0035	7/15/2021
Exempt	Rig Supply	Sabine Oil & Gas Corporation	RC2020-0123	9/8/2020
Exempt	Pond	Kirk Carter	RC2021-0023	5/5/2021
Non exempt	Public Water	Church Hill WSC	RC2020-0135	9/28/2020

Exempt	Unknown	Stephen Brady	RC2020-0134	9/25/2020
Exempt	Unknown	Kirk Olson	RC2020-0190	11/24/2020
Exempt	Unknown	Joyce Lockridge	RC2021-0038	7/19/2021
Exempt	Unknown	Mathew Brandon King Trust	RC2021-0039	7/19/2021