

**STATE OF NEW MEXICO  
ENERGY, MINERALS AND NATURAL RESOURCES DEPARTMENT  
OIL CONSERVATION COMMISSION**

**APPLICATION OF AGAVE ENERGY COMPANY  
FOR AUTHORIZATION TO INJECT,  
LEA COUNTY, NEW MEXICO**

**CASE NO. 14720**

**TARGA NORTHERN DELAWARE, LLC'S NOTICE OF  
UPDATED SUBMISSION OF INJECTION DATA AND UPDATED PLUME MODEL**

Targa Northern Delaware, LLC<sup>1</sup> is submitting to the New Mexico Oil Conservation Commission ("Commission"): (1) updated injection data for the first four years of operation of the Red Hills AGI #1 Well; and (2) an updated model of the projected scope of the injection plume after 30 years of injection. A previous version of these documents was submitted to the Commission on November 30, 2022, in accordance with Ordering Paragraph 2(c) of Order No. R-13507-D.

Respectfully submitted,

HINKLE SHANOR LLP

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*Counsel for Targa Northern Delaware, LLC*

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<sup>1</sup> Targa Northern Delaware, LLC, is the successor in interest to Lucid Energy and is the current operator of the Red Hills AGI #1.

**Certificate of Service**

I hereby certify that a true and correct copy of the foregoing notice was served on the following counsel by electronic mail on this 31<sup>st</sup> day of March, 2023:

Jesse Tremaine – jessek.tremaine@emnrd.nm.gov  
*Counsel for the New Mexico Oil Conservation Division*

/s/ Dana S. Hardy  
Dana S. Hardy



# TARGA

AUTHORITY TO INJECT  
CASE NO.14720  
ORDER NO. R-13507-D  
CONDITIONAL GRANT UPDATE

**RED HILLS AGI #001**

**API NO. 30-025-40448**

**SEC. 13- TWP. 24S-33E**

**LEA COUNTY, NEW MEXICO**

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**Prepared For:**

Targa Northern Delaware, LLC

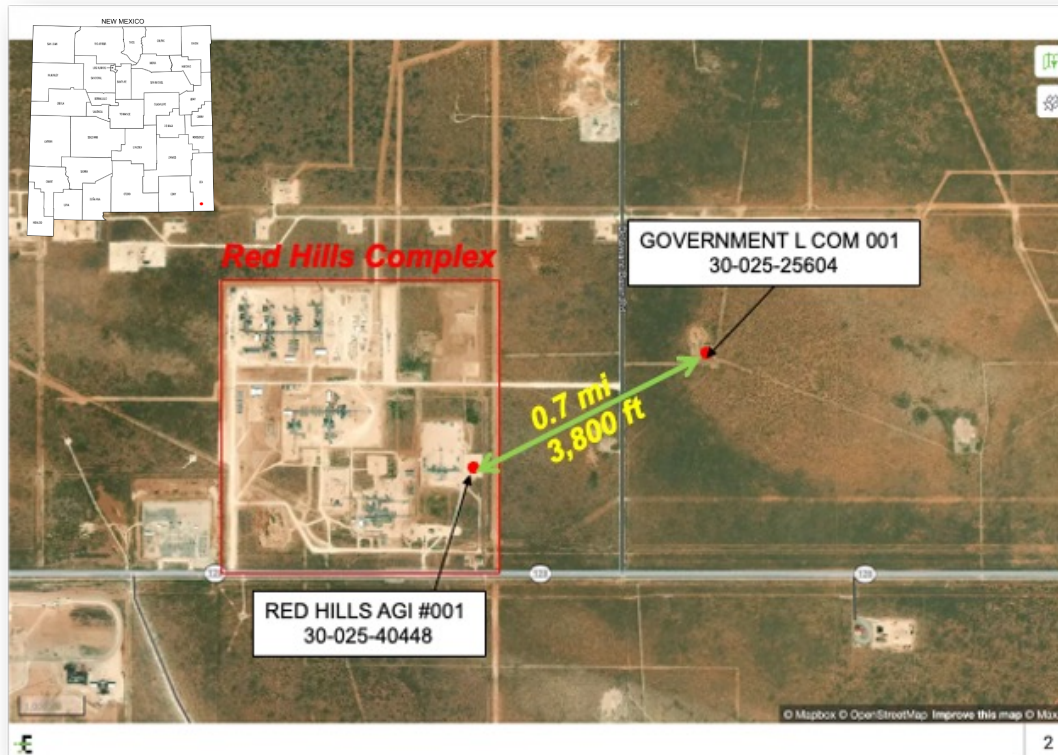
**Prepared By:**

New Mexico Institute Of Mining And Technology  
Petroleum Recovery Research Center  
Socorro, NM 87801

April 2023

# Background

- The Red Hills natural gas processing complex (RH Facility) is located in Lea County, NM.
- On December 6<sup>th</sup>, 2012, the New Mexico Oil Conservation Commission (NMOCC) granted Agave Energy Company (“Agave”) the amended second motion to Order NO. R-13507, which was then passed to **Targa Northern Delaware, LLC** (“Targa”) through Lucid Energy Delaware, LLC (“Lucid”).





# Background

- Order NO. R-13507-D conditionally waived the requirement of Agave placing a balanced cement plug in the **Government L Com #002** (“Gov. L C. #2”) well across the injection zone of **Red Hills AGI #001** (“RH AGI#1”) well, due to technical difficulty accessing the target depth at the wellbore.
- The conditions require Agave, now represented by Targa, shall submit to the NMOCC **six (6) months prior to the end of the fifth (5<sup>th</sup>) year from the date TAG injection into the RH AGI#1 well** with:
  - (1). Injection data covering the first four (4) years of Agave (Targa)’s operation of the RH AGI#1 well, and
  - (2). An updated model of the projected scope of the injection plume after 30 years of injection based on the injection data and other relevant data concerning the reservoir.



# Timeline of RH AGI #001 well



- In May of 2022, marking the end of the fourth (4<sup>th</sup>) year TAG injection in RH AGI#1 well, Lucid retained the Petroleum Recovery Research Center (PRRC) of New Mexico Institute of Mining and Technology (NMT) to initiate the study on the impact of subsurface TAG injection with actual injection history and updated data *in compliance with the NMOCC Order R-13507-D*.
- The study is updated in March 2023 prior to the hearing date on April 13<sup>th</sup>, 2023 to reflect the most accurate results



# TARGA

## RED HILLS AGI #001: 5-YEAR TAG INJECTION REVALIDATION STUDY

**RED HILLS AGI #001**

**API NO. 30-025-40448**

**SEC. 13- TWP. 24S-33E**

**LEA COUNTY, NEW MEXICO**

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**Prepared For:**

Targa Northern Delaware, LLC

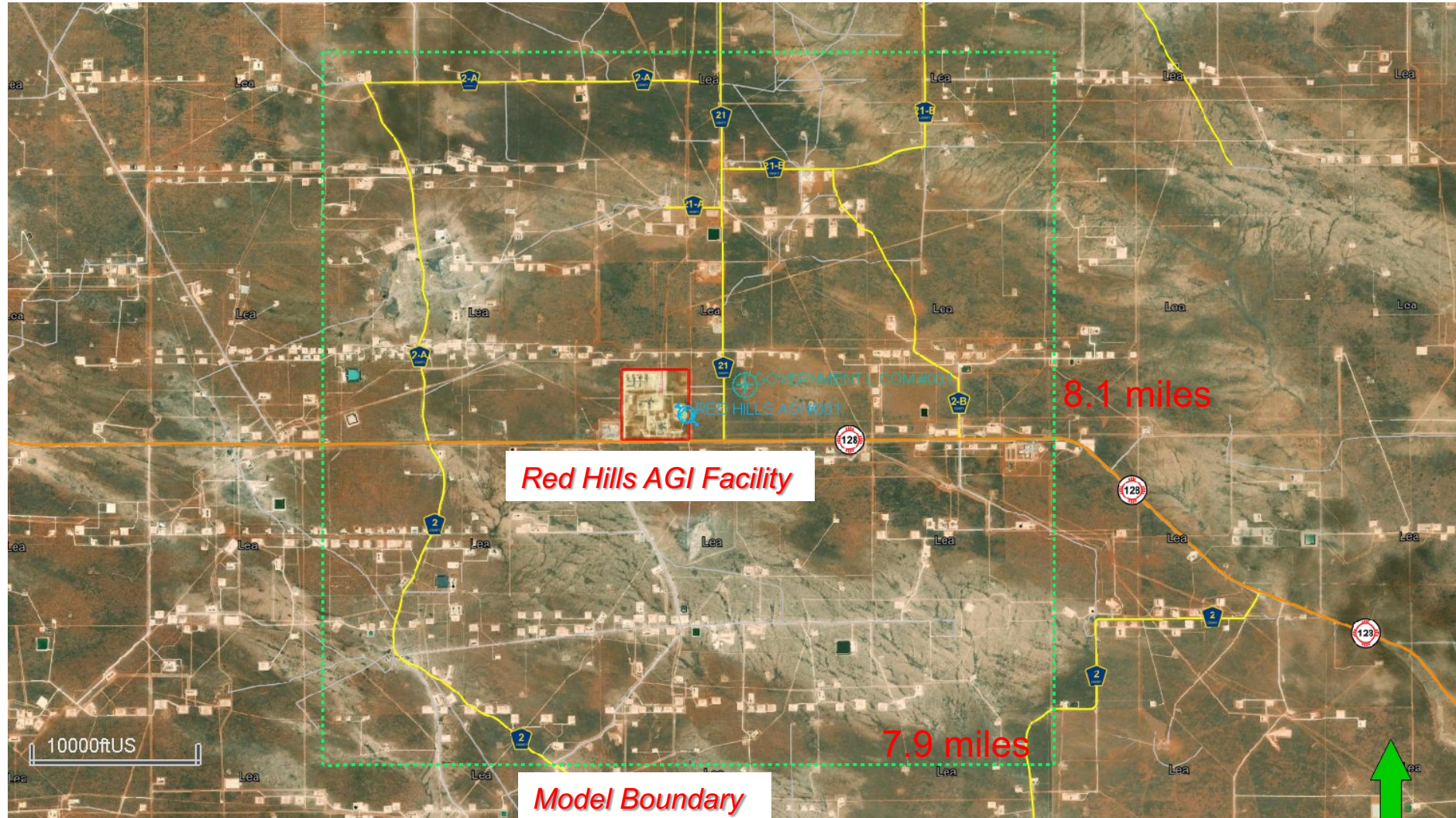
**Prepared By:**

New Mexico Institute Of Mining And Technology  
Petroleum Recovery Research Center  
Socorro, NM 87801

November 2022



# Model Description





**RED HILLS AGI #001**  
**30-025-40448**

AGE		CENTRAL BASIN PLATFORM- NORTHWEST SHELF		DELAWARE BASIN	
Cenozoic		Alluvium		Alluvium	
Triassic		Chinle Formation		Chinle Formation	
Permian	Lopingian (Ochoan)	Santa Rosa Sandstone		Santa Rosa Sandstone	
		Dewey Lake Formation		Dewey Lake Formation	
		Rustler Formation		Rustler Formation	
		Salado Formation		Salado Formation	
				Castile Formation	
	Guadalupian	Artesia Group	Tansill Formation	Delaware Mountain Group	Lamar Limestone
			Yates Formation		Bell Canyon Formation
			Seven Rivers Formation		Cherry Canyon Formation
			Queen Formation		
			Grayburg Formation		
		San Andres Formation			Brushy Canyon Formation
		Cisuralian (Leonardian)	Yeso		Glorieta Formation
	Paddock Mbr.				
	Blinebry Mbr				
	Tubb Sandstone Mbr.				
	Drinkard Mbr.				
	Wolfcampian	Abo Formation			
		Hueco ("Wolfcamp") Fm.		Hueco ("Wolfcamp") Fm.	

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**\* Stratigraphic column for the Delaware basin, the Northwest Shelf and Central Basin Platform (modified from Broadhead, 2017).**

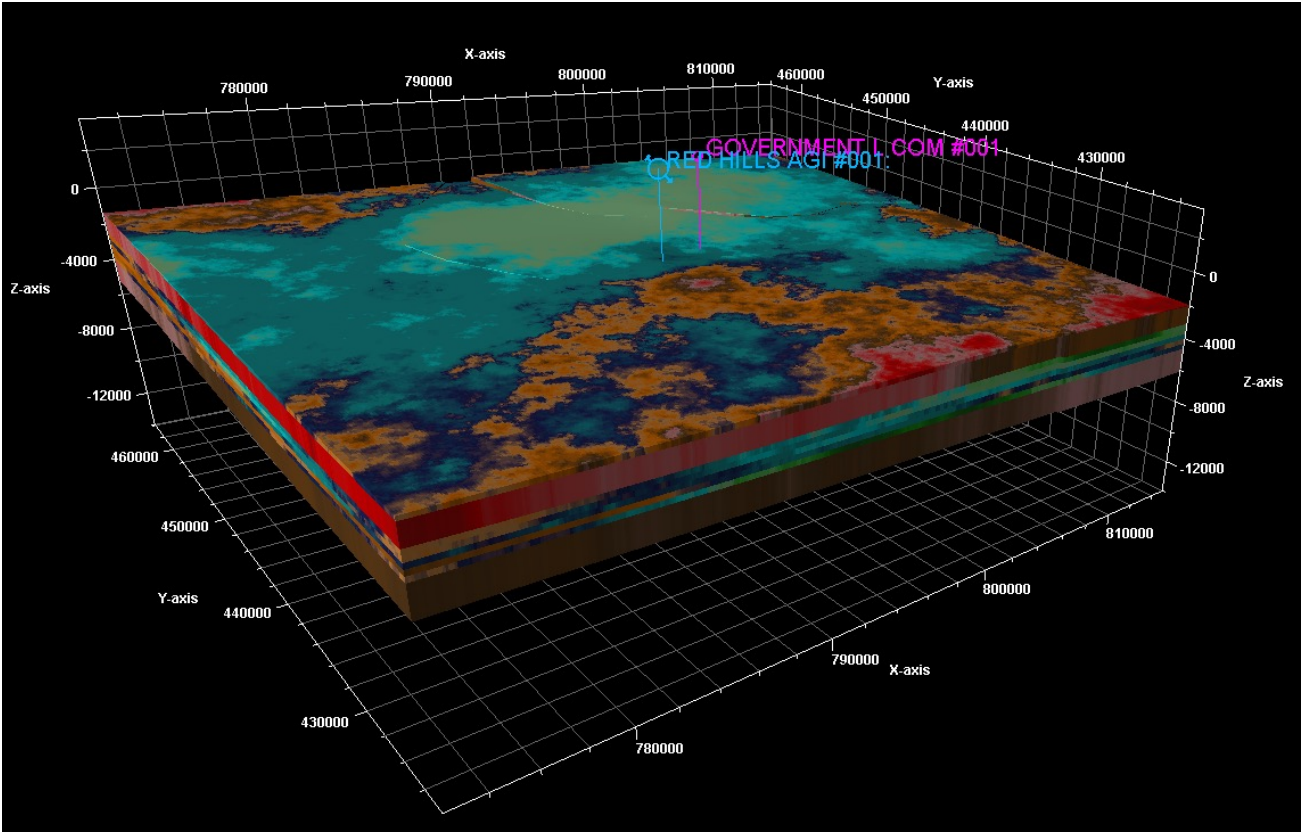
# Model Description

## Dimension:

- 429 x 418 x 8
- 1,434,576 total grids
- 100 sq.ft average grid size

## Zones modeled:

Layer No.	Formation	Rock Type
1	LAMAR	Caprock
2	BELL CANYON	
3	CHERRY CANYON	Storage Reservoir
4		
5		
6		
7		
8	BRUSHY CANYON	Bedrock



# Model Initialization

## Pressure:

- Cherry Canyon ~ 3250 psi @ RH AGI#1 location

## Temperature:

- Cherry Canyon ~105.2 F @ RH AGI#1 location

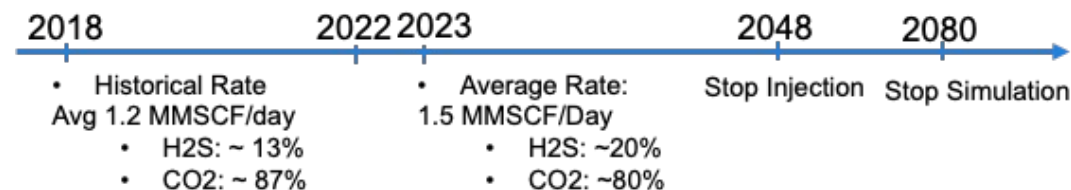
## Fluid Saturation:

- Initial  $S_w = 1.0$ ,  $S_{wi} = 0.2$

## Salinity:

- 20,000 ppm for all intervals is assumed

## Well Operation:



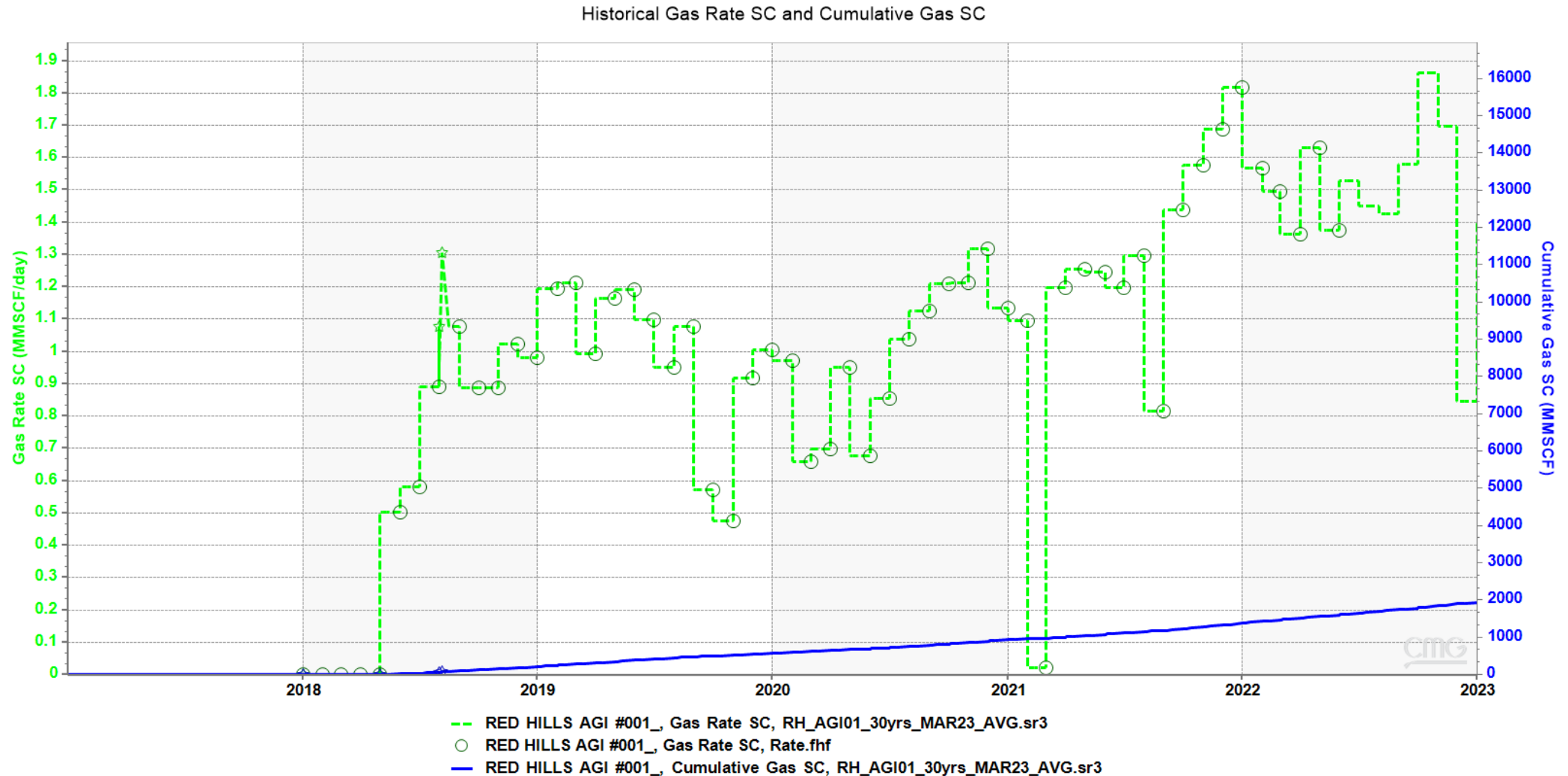
*\* Though RH AGI#1 is permitted to inject with a rate of 13 MMSCFD, the maximum injection rate cannot exceed 6 MMSCFD, due to the pressure limitation.*

*\*The maximum daily injection rate in the past 5 years did not exceed 2.0 MMSCFD*

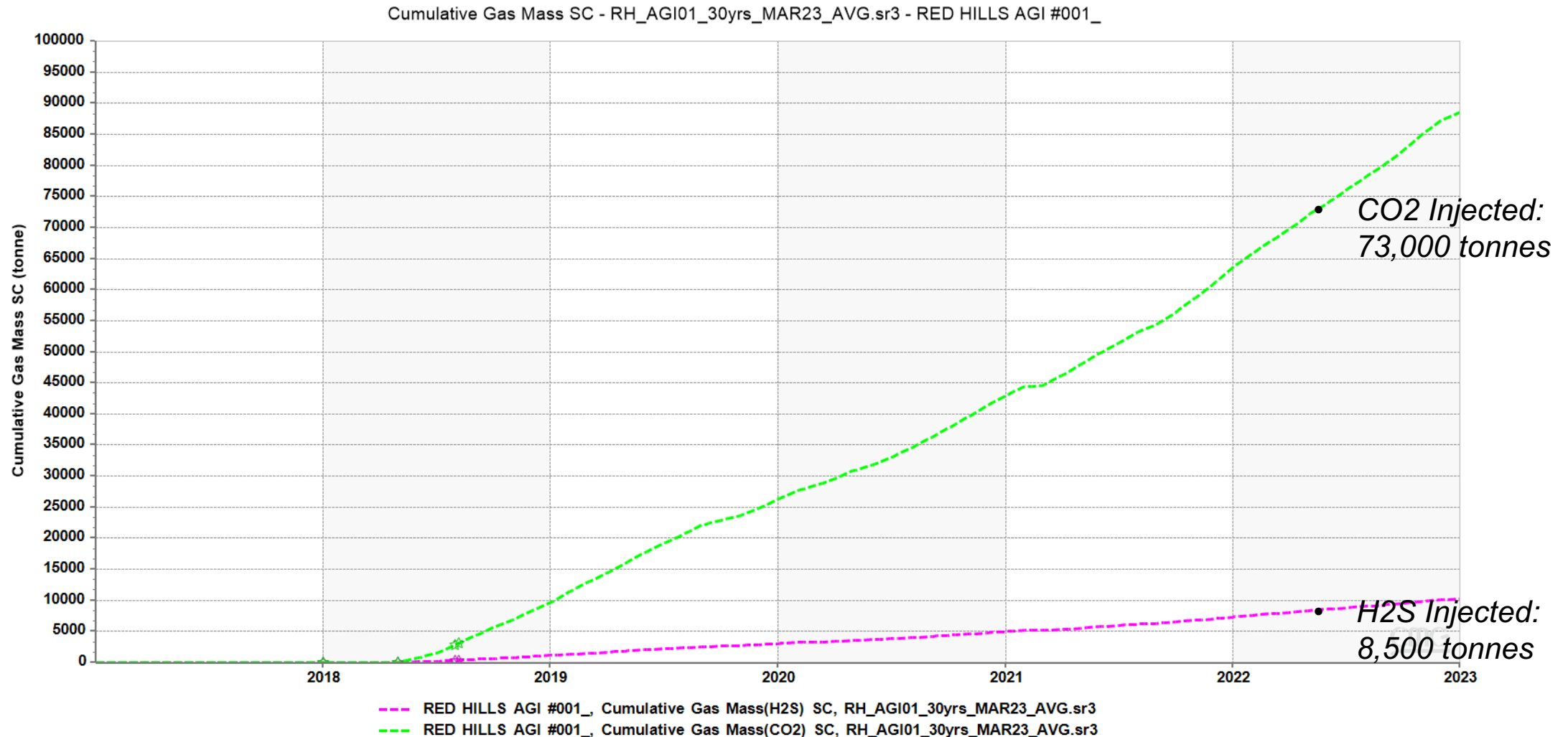
*\*RH AGI#1 is expected to be turned into a backup injector following the activation of RH AGI#2 and #3, injecting to Silurian-Devonian Formation*



# Historical Injection – Gas Rate

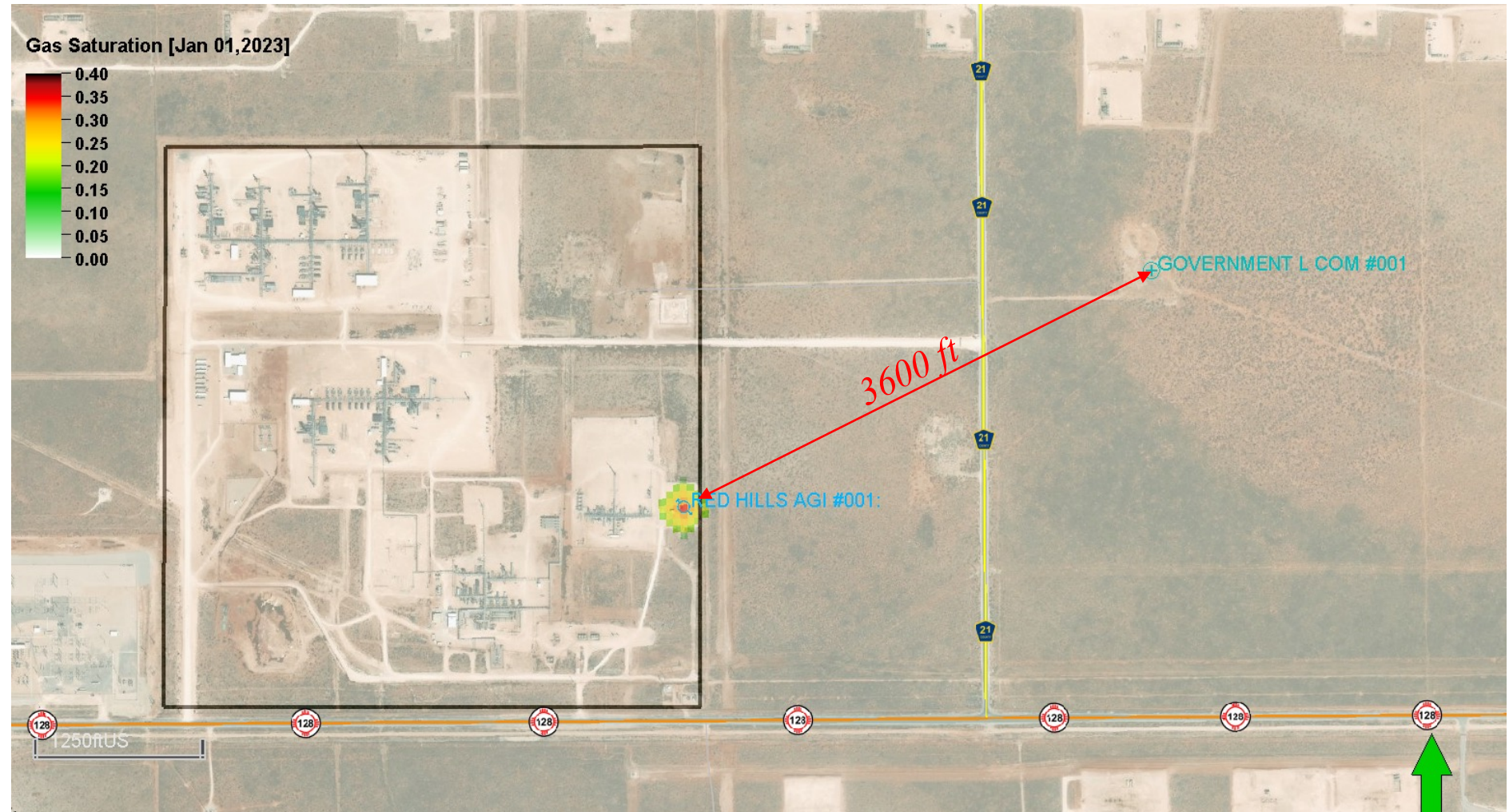


# Historical Injection – Injected of CO<sub>2</sub> and H<sub>2</sub>S



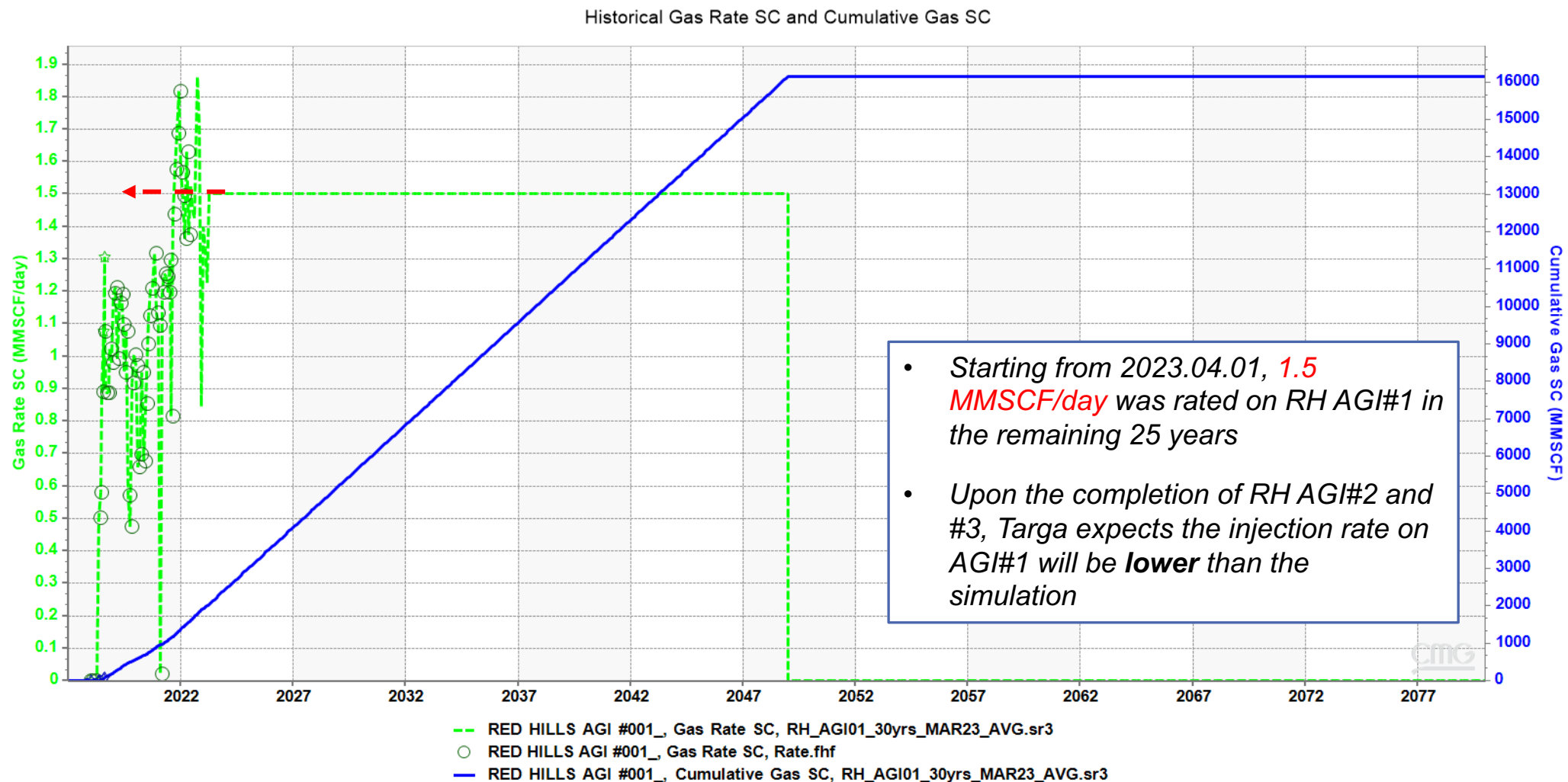
# Revalidation Results – Gas Plume

- At the end of the 4<sup>th</sup> year, the TAG plume is expected to be 400 ft in diameter
- The distance from the TAG plume front to Gov. L COM #1 is 3600 ft (0.68 mi)



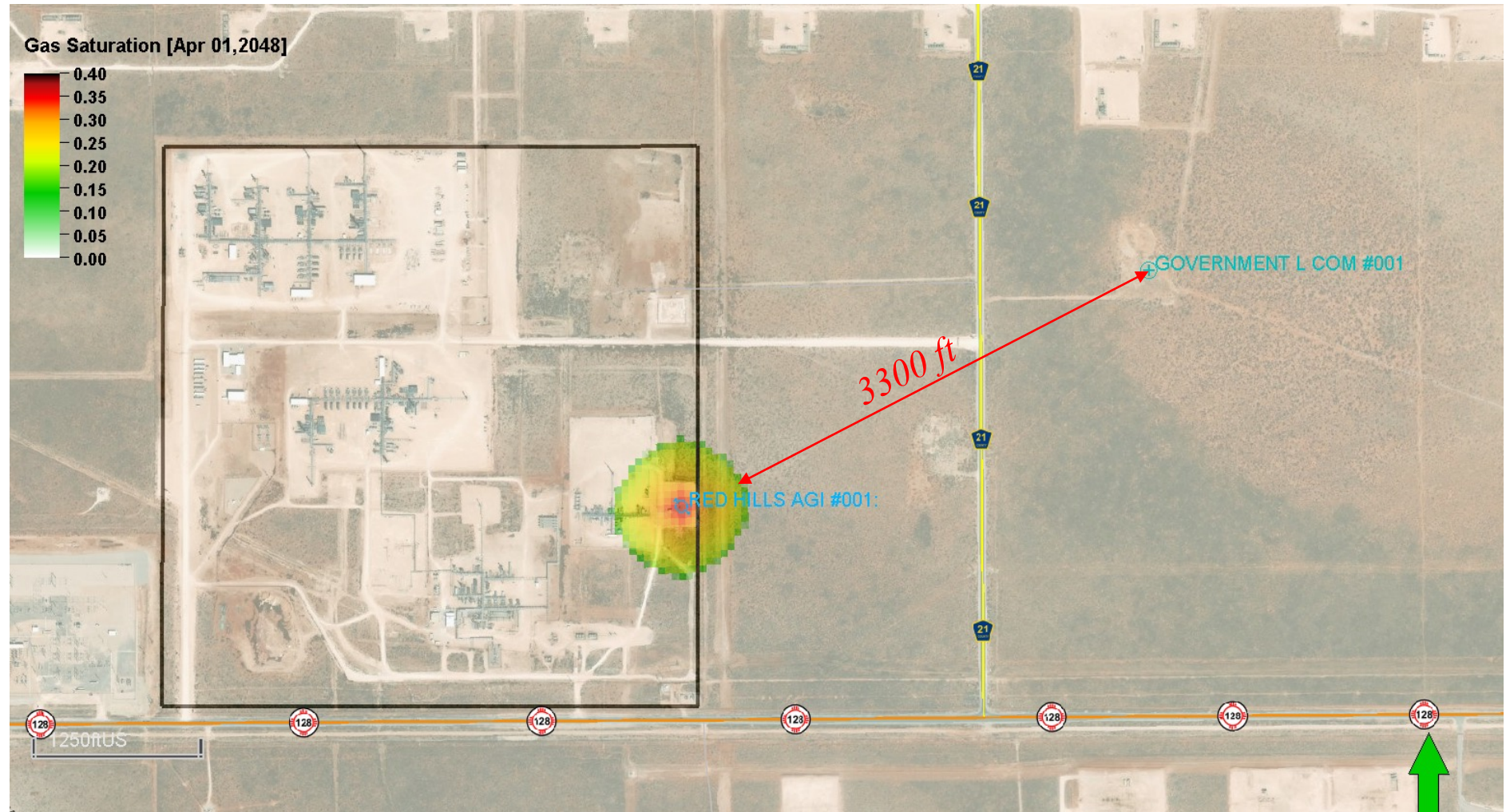


# Prediction – Gas Rate



# Prediction Results –Plume Development

- If the AGI#1 continue to inject with the average rate, at the end of the 30<sup>th</sup> year, the TAG plume is expected to be 1,000 ft in diameter
- The distance from the TAG plume front to Gov. L COM #1 is 3300 ft (0.625 mi)





# Conclusions and Recommendations

Based upon careful geologic characterization and reservoir numerical simulation with updated data,

**engineers and geologists at the NMT-PRRC performed that:**

1. A new geologic model was constructed with newly delineated formations from updated well tops and structural features.
2. High-fidelity reservoir numerical simulation of the projected scope of 30 years of TAG injection given historical TAG injection rate and composition in RH AGI#1 well, and adjacent legacy well activities.

**It is found that:**

1. The average TAG injection rate through RH AGI#1 well in the past 4 years (since 05/2018) is 1.2 MMSCF/day, which is less than 10% of the permitted max rate of 13MMSCF/day.
2. The distance between RH AGI#1 well and Gov. L C.#1 well is 3,800 ft;  
*and* as of 01/2023, the TAG plume front is estimated to be 3,600 ft away from the Gov. L C.#1 well (**95%** of the distance between the two wells).  
*and* at the end of the 30-year injection, the TAG plume front is predicted to be 3,300 ft away from the Gov. L C.#1 well (**85%** of the distance between the two wells).

**It is concluded that:**

1. The historical TAG injection rate (1.2 MMSCF/day on average) of RH AGI#1 well has been drastically under the permitted rate of 13MMSCF/day.
2. The TAG plume resultant by RH AGI#1 well poses a diminutive impact on the Gov. L C.#1 well at the end of 30 years permitted injection period.

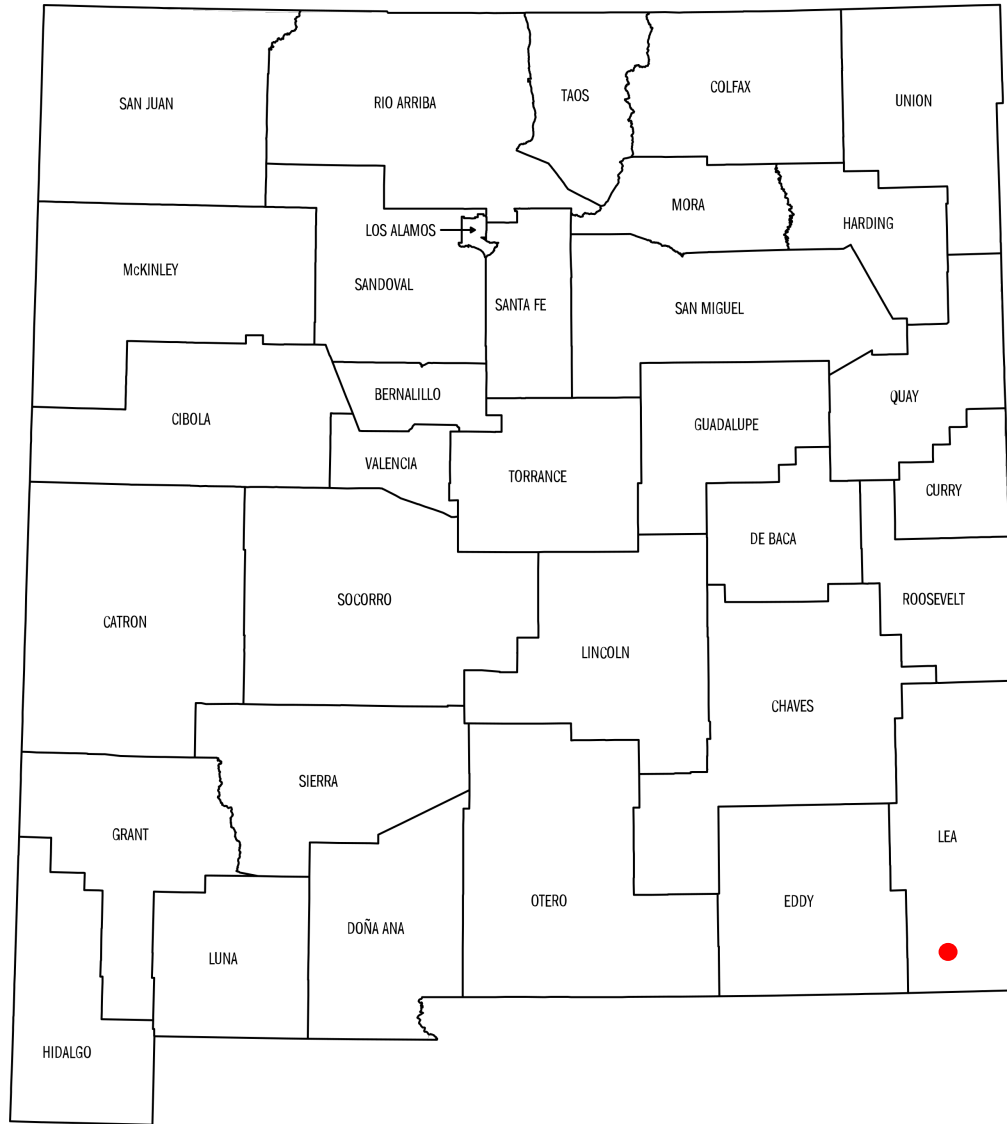
**It is therefore recommended that:**

Targa to file Motion to Amend Order No. R-13507 to NMOCC to **eliminate or extend the waiver on the Gov. L C.#1 well replugging requirement.**





# NEW MEXICO









# Geologic Review

RED HILLS AGI #001  
30-025-40448

AGE		CENTRAL BASIN PLATFORM- NORTHWEST SHELF		DELAWARE BASIN		
Cenozoic		Alluvium		Alluvium		
Triassic		Chinle Formation		Chinle Formation		
		Santa Rosa Sandstone		Santa Rosa Sandstone		
Permian	Lopingian (Ochoan)	Dewey Lake Formation		Dewey Lake Formation		
		Rustler Formation		Rustler Formation		
		Salado Formation		Salado Formation		
				Castile Formation		
				Lamar Limestone		
	Guadalupian	Artesia Group	Tansill Formation		Delaware Mountain Group	Bell Canyon Formation
			Yates Formation			
			Seven Rivers Formation			Cherry Canyon Formation
			Queen Formation			
			Grayburg Formation			
		San Andres Formation			Brushy Canyon Formation	
	Cisuralian (Leonardian)	Yeso	Glorieta Formation			Bone Spring Formation
			Paddock Mbr.			
			Blinberry Mbr			
			Tubb Sandstone Mbr.			
			Drinkard Mbr.			
	Wolfcampian	Abo Formation				
		Hueco ("Wolfcamp") Fm.		Hueco ("Wolfcamp") Fm.		

\* Stratigraphic column for the Delaware basin, the Northwest Shelf and Central Basin Platform (modified from Broadhead, 2017).



# Well control

