FRONTIER
CARBON SOLUTIONS

UNDERGROUND INJECTION CONTROL
CLASS VI APPLICATION

Project Speed Goat
Lincoln, Uinta, and Sweetwater Counties, Southwestern Wyoming

Facility ID No. WYS-023-00212 UIC

Class VI Permit Application Nos.:
2024-0116v1.0, 2024-0117v1.0, 2024-0118v1.0,
2024 0119v1.0, 2024-0120v1.0, 2024-0121v1.0, and 2024-0122v1.0



FORM A
PROJECT INFORMATION

TABLE OF CONTENTS

1.0 Company Overview 1

2.0 Public Notice 1

3.0 Access for Inspections 1

4.0 Existing Environmental Permits 3

5.0 Other Permits 3

6.0 Investigated and Identified Surface and Subsurface Features 4

7.0 Title of CO_2 4

LIST OF TABLES

Table A.1. Existing Environmental Permits 3

Table A.2. Other Required Permits 3

Table A.3. Investigated and Identified Surface and Subsurface Features in the PSG AoR 4

LIST OF FIGURES

Figure A.1. PSG Access Route Map. 2

Figure A.2. Investigated and Identified Surface and Subsurface Features in the PSG AoR ..... Appendix A

Figure A.3. All water quality management plan areas, wellhead protection areas, and source water protection areas ..... Appendix A

ABBREVIATIONS/ACRONYMS

AoR	Area of Review
BLM	Bureau of Land Management
CO_2	carbon dioxide
FCS	Frontier Carbon Solutions Holdings, LLC
N/A	not available
NPDES	National Pollutant Discharge Elimination System
PSG	Project Speed Goat
RCRA	Resource Conservation and Recovery Act
ROW	right-of-way
SCS Hub	Sweetwater Carbon Storage Hub
TBD	to be determined
UIC	Underground Injection Control
WDEQ	Wyoming Department of Environmental Quality
W.S.	Wyoming Statute

FRONTIER CARBON SOLUTIONS
PROJECT SPEED GOAT
CARBON SEQUESTRATION UIC CLASS VI APPLICATION

FORM A - PROJECT INFORMATION
Water Quality Rules, Chapter 24 Section 10

1.0 Company Overview

Frontier Carbon Solutions Holdings, LLC (FCS), a privately held, limited liability corporation is a carbon dioxide (CO_2) transportation and sequestration company headquartered in Dallas, Texas, and is sponsored by affiliates of Tailwater Capital, LLC, a Dallas, Texas-based energy investment platform with more than USD 4.7 billion of committed capital raised since inception. The FCS team includes a full complement of reservoir, facilities, and process engineers with construction and upstream experience across the Rockies. FCS's mission is to develop safe, permanent carbon storage hubs for emitters across the Mountain West region, including the Sweetwater Carbon Storage Hub (SCS Hub), for which affiliates of FCS received three Class VI Permits from the Wyoming Department of Environmental Quality (WDEQ) in December 2023. FCS now seeks to further develop additional carbon storage hubs in the approximately 99,840 acres, more or less, contiguous to and surrounding the SCS Hub, known as Project Speed Goat (PSG or "the Project") The Project is anticipated to store CO_2 from nearby industrial emitters.

FCS has prepared this application and supporting documentation to develop seven Class VI injection wells for the Project, which will be constructed in phases and operational for over a 20-year injection period. FCS will be the sole owner and operator of the Project and wells.

2.0 Public Notice

In accordance with Wyoming Statute (W.S.) § 35-11-313(f)(ii)(N), FCS will provide notice of the application for the Project. As required, proof of notice will be issued to surface owners, mineral claimants, mineral owners, lessees, and other owners of record of subsurface interests that are located within one mile of the proposed boundary of the geologic sequestration site (i.e., plume boundary). The required publishing notice will be posted in a newspaper of general circulation in each county of the proposed operation at weekly intervals for four weeks consecutively. FCS will provide an affidavit of all notices no more than 14 days following the submission of the permit application.

3.0 Access for Inspections

In accordance with W.S. § 35-11-303, FCS certifies WDEQ personnel shall have access to the permitted facility. This will include (i) permission to access the land where the facility is located, (ii) permission to collect resource data as defined by W.S. § 6-3-414, and (iii) permission to enter and cross all properties necessary to access the facility if the facility cannot be directly accessed from a public road throughout all phases of PSG construction, injection, and post-injection. **Figure A.1** is a map of access routes in the PSG project area. A full-scale version of this figure is included in ***Appendix A***.

I, Alicia Summers, certify under penalty of perjury that the applicant has secured and shall maintain permission for WDEQ personnel and their invitees to access the permitted facility, including (i) permission to access the land where the facility is located, (ii) permission to collect resource data as defined by W.S. § 6-3-414, and (iii) permission to enter and cross all properties necessary to access the facility if the facility cannot be directly accessed from a public road.

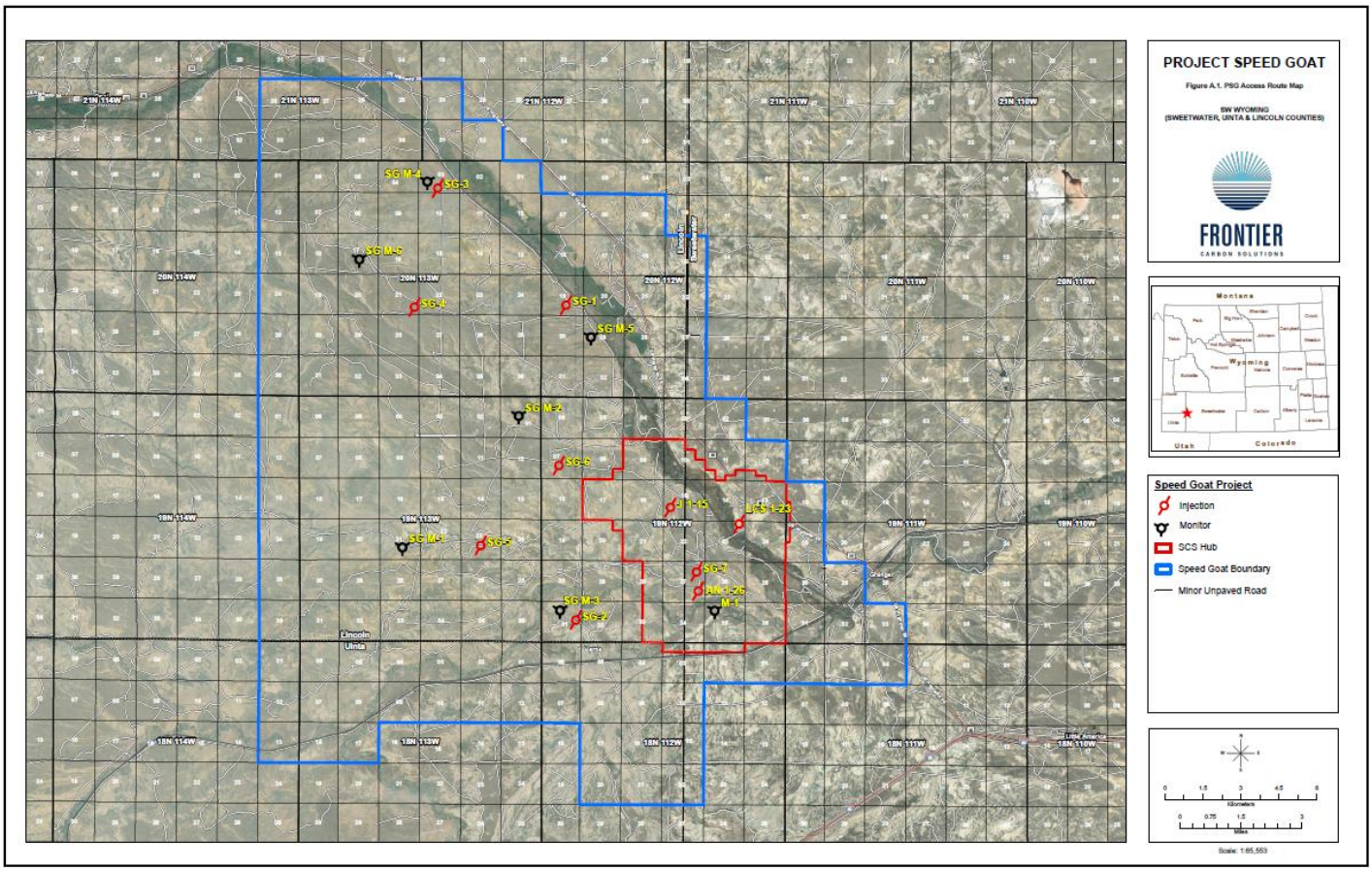


Figure A.1. *PSG Access Route Map.*

4.0 Existing Environmental Permits

A listing and status of all permits or construction approvals associated with PSG received or applied for under any of the other programs within the Area of Review (AoR) is included in **Table A.1**.

Table A.1. Existing Environmental Permits			
RCRA – Hazardous Waste Management	Permit No.:	N/A	☒
UIC – Underground Injection of Fluids	Permit No.: 2022-242, 2022-243, 2022-244	N/A	☐
NPDES – Discharge of Surface Water	Permit No.:	N/A	☒
Prevention of Significant Deterioration – Air Emissions from Proposed Sources	Permit No.:	N/A	☒
Nonattainment Program under the Clean Air Act	Permit No.:	N/A	☒
National Emissions Standards for Hazardous Air Pollutants pre-construction approval under the Clean Air Act	Permit No.:	N/A	☒
Dredge and fill permitting program under section 404 of the Clean Water Act	Permit No.:	N/A	☒
Other (specify)	Permit No.:	N/A	☒

5.0 Other Permits

A list of other relevant permits associated with PSG, the geologic sequestration project that FCS is required to obtain (excluding other Class VI wells and associated monitoring wells), are listed in **Table A.2**.

Table A.2. Other Required Permits			
Bureau of Land Management (BLM) SF-299 Pore Space Right-of-Way (ROW)[1]	Grant No.: TBD	In-progress	☐
Other ROW[2]	Permit No.:	TBD	☐
Road Use[3]	Permit No.:	TBD	☐
Pipeline[2]	Permit No.:	TBD	☐
Water Crossing	Permit No.:	TBD	☐
Railroad	Permit No.:	TBD	☐

[1] *In April 2023 FCS, through its affiliate, Pond Field LLC, submitted an SF-299 ROW application with the Kemmerer Field Office of the BLM to access the subsurface pore space underlying all Federal lands contained within the PSG, which comprises approximately 44% of the total pore space acreage within the PSG. The application is currently pending, and FCS anticipates a ROW grant before the end of 2024.*

[2] *All the fee lands on which each Class VI well is located, and those fee lands surrounding each Class VI well location, are owned by a single private landowner. Accordingly, FCS will have to negotiate with only two counterparties, including the BLM, to obtain all necessary surface use, ROW and pipeline easements, which FCS intends to secure prior to commencement of construction or injection operations.*

[3] *The surface area of the Project already possesses a substantial amount of existing lease roads. FCS intends to negotiate use and access to these lease roads from the private landowner as well as the BLM.*

6.0 Investigated and Identified Surface and Subsurface Features

Table A.3 describes investigated surface and subsurface features identified within PSG's AoR, consistent with Water Quality Rules, Chapter 24 Section 13. The information listed in this table is depicted on maps shown in **Figures A.2** through **A.3** included in ***Appendix A***.

Table A.3. Investigated and Identified Surface and Subsurface Features in the PSG AoR

Surface and Subsurface Features	Investigated and Identified	Investigated but Not Found in AoR	Figure
Producing (active wells)	✓		**Figure A.2**
Abandoned Wells	✓		**Figure A.2**
Plugged Wells or Dry Holes	✓		**Figure A.2**
Deep Stratigraphic Boreholes		✓	N/A
Subsurface Cleanup Sites		✓	N/A
Surface Bodies of Water	✓		**Figure A.2**
Other pertinent surface features, structures intended for human occupancy included	✓		**Figure A.2**
Springs		✓	N/A
Water Wells	✓		**Figure A.2**
Mines (surface and subsurface)	✓		**Figure A.2**
Quarries	✓		**Figure A.2**
Subsurface Structures (e.g., coal mines)	✓		**Figure A.2**
Location of Proposed Wells	✓		**Figure A.2**
Location of Proposed Cathodic Protection Boreholes		✓	N/A
Any Existing Aboveground Facilities	✓		**Figure A.2**
Roads	✓		**Figure A.2**
State Boundary Lines		✓	N/A
Indian Boundary Lines		✓	N/A
Known or Suspected Faults	✓		**Figure A.2**
Other Pertinent Surface Features	✓		**Figure A.2**
All water quality management plan areas, wellhead protection areas, and source water protection areas	✓		**Figure A.3**

7.0 Title of CO_2

FCS will be the injector and operator of PSG and shall take and hold title to any CO_2 that is injected into and stored in the pore space underlying the designated unit area for each Class VI well. FCS shall retain title for any injected CO_2 until the department issues a certificate of project completion as specified in W.S. § 35-11-319. During any time FCS holds title to CO_2, FCS shall be liable for any damage the injected or stored CO_2 may cause, including damage caused by CO_2 that escapes or is released from where it is being stored underground.

APPENDIX A

PROJECT INFORMATION

TABLE OF CONTENTS

LIST OF TABLES

Table A.1. Existing Environmental Permits 1
Table A.2. Other Required Permits 1
Table A.3. Investigated and Identified Surface and Subsurface Features in the PSG AoR 2

LIST OF FIGURES

Figure A.1. PSG Access Route Map. 3
Figure A.2. Investigated and Identified Surface and Subsurface Features in the PSG AoR..... 4
Figure A.3. All water quality management plan areas, wellhead protection areas, and source water protection areas 31

TABLES

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Nonattainment Program under the Clean Air Act	Permit No.:	N/A	☒
National Emissions Standards for Hazardous Air Pollutants pre-construction approval under the Clean Air Act	Permit No.:	N/A	☒
Dredge and fill permitting program under section 404 of the Clean Water Act	Permit No.:	N/A	☒
Other (specify)	Permit No.:	N/A	☒

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Table A.3. Investigated and Identified Surface and Subsurface Features in the PSG AoR			
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Abandoned Wells	✓		**Figure A.2**
Plugged Wells or Dry Holes	✓		**Figure A.2**
Deep Stratigraphic Boreholes		✓	N/A
Subsurface Cleanup Sites		✓	N/A
Surface Bodies of Water	✓		**Figure A.2**
Other pertinent surface features, structures intended for human occupancy included	✓		**Figure A.2**
Springs		✓	N/A
Water Wells	✓		**Figure A.2**
Mines (surface and subsurface)	✓		**Figure A.2**
Quarries	✓		**Figure A.2**
Subsurface Structures (e.g., coal mines)	✓		**Figure A.2**
Location of Proposed Wells	✓		**Figure A.2**
Location of Proposed Cathodic Protection Boreholes		✓	N/A
Any Existing Aboveground Facilities	✓		**Figure A.2**
Roads	✓		**Figure A.2**
State Boundary Lines		✓	N/A
Indian Boundary Lines		✓	N/A
Known or Suspected Faults	✓		**Figure A.2**
Other Pertinent Surface Features	✓		**Figure A.2**
All water quality management plan areas, wellhead protection areas, and source water protection areas.	✓		**Figure A.3**

FIGURES

PROJECT SPEED GOAT

Figure A.1. PSG Access Route Map

SW WYOMING
(SWEETWATER, UINTA & LINCOLN COUNTIES)

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Speed Goat Project

- Injection
- Monitor
- SCS Hub
- Speed Goat Boundary
- Minor Unpaved Road

N
W E
S

0 1.5 3 4.5 6
Kilometers

0 0.75 1.5 3
Miles

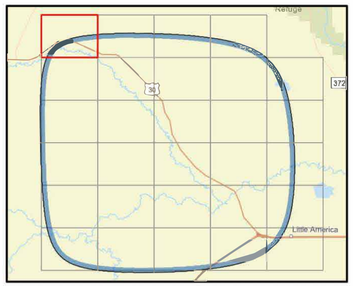
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PROJECT SPEED GOAT
SURFACE AND SUBSURFACE FEATURES
FIGURE A.2
(1 OF 29)

SW WYOMING
(SWEETWATER, UINTA & LINCOLN COUNTIES)

FRONTIER
CARBON SOLUTIONS

Extent of Main Map



Legend

- Area of Review

EXISTING ABOVEGROUND FACILITY
- Industrial
- Residential/Agricultural

ACTIVE MINE
- Sand and Gravel Mine (Small Mine)

WYOMING OIL AND GAS CONSERVATION COMMISSION WELLS
- Abandoned Well

WYOMING STATE ENGINEERS OFFICE PERMITTED WATER SOURCE
- Water Well
- Surface Water Source

- Township Boundary
- Section Boundary

Notes:
1. Wyoming Oil and Gas Conservation Commission Wells labelled with API number.
2. Wyoming State Engineer's Office Permitted Water Sources labelled with permit number.

N

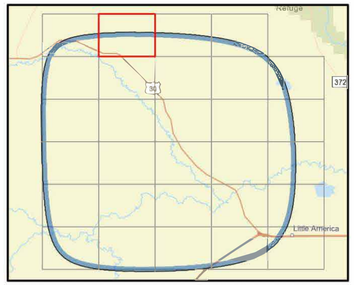
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PROJECT SPEED GOAT
SURFACE AND SUBSURFACE FEATURES
FIGURE A.2
(2 OF 29)

SW WYOMING
(SWEETWATER, UINTA & LINCOLN COUNTIES)

FRONTIER
CARBON SOLUTIONS

Extent of Main Map



Legend

- Area of Review

ACTIVE MINE

- Sand and Gravel Mine (Small Mine)

WYOMING OIL AND GAS CONSERVATION COMMISSION WELLS

- Producing (Active Well or Permit)
- Abandoned Well
- Township Boundary
- Section Boundary

Notes:
1. Wyoming Oil and Gas Conservation Commission Wells labelled with API number.
2. Wyoming State Engineer's Office Permitted Water Sources labelled with permit number.

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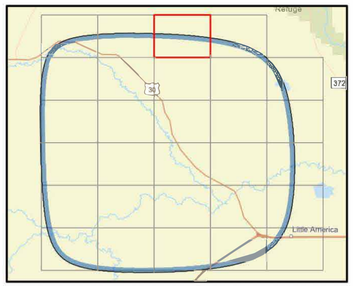
PROJECT SPEED GOAT
SURFACE AND SUBSURFACE FEATURES

FIGURE A.2
(3 OF 29)

SW WYOMING
(SWEETWATER, UINTA & LINCOLN COUNTIES)

FRONTIER
CARBON SOLUTIONS

Extent of Main Map



Legend

- Area of Review

WYOMING OIL AND GAS CONSERVATION COMMISSION WELLS
- Producing (Active Well or Permit)
- Abandoned Well

WYOMING STATE ENGINEERS OFFICE PERMITTED WATER SOURCE
- Surface Water Source
- Township Boundary
- Section Boundary

Notes:
1. Wyoming Oil and Gas Conservation Commission Wells labelled with API number.
2. Wyoming State Engineer's Office Permitted Water Sources labelled with permit number.

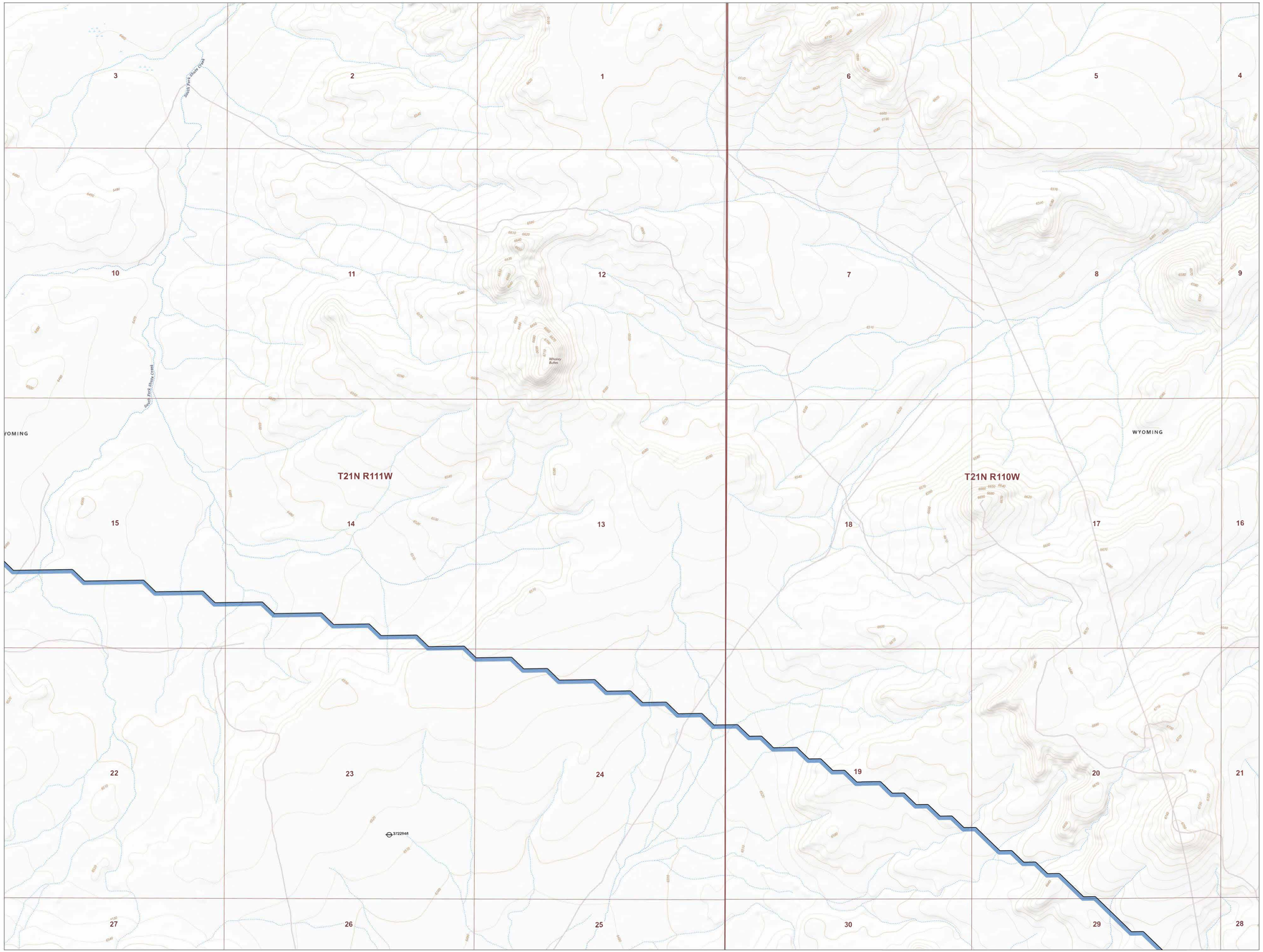
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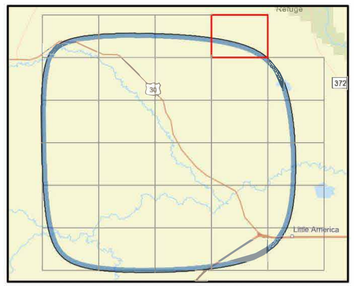
PROJECT SPEED GOAT
SURFACE AND SUBSURFACE FEATURES
FIGURE A.2
(4 OF 29)

SW WYOMING
(SWEETWATER, UINTA & LINCOLN COUNTIES)

FRONTIER
CARBON SOLUTIONS



Extent of Main Map



Legend

Area of Review

WYOMING OIL AND GAS CONSERVATION COMMISSION WELLS

Abandoned Well

Township Boundary

Section Boundary

Notes:
1. Wyoming Oil and Gas Conservation Commission Wells labelled with API number.
2. Wyoming State Engineer's Office Permitted Water Sources labelled with permit number.

N

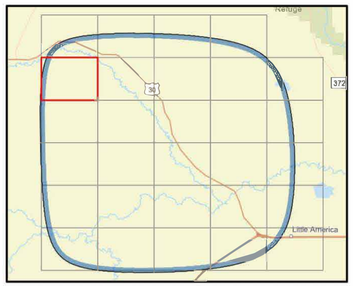
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PROJECT SPEED GOAT
SURFACE AND SUBSURFACE FEATURES
FIGURE A.2
(5 OF 29)

SW WYOMING
(SWEETWATER, UINTA & LINCOLN COUNTIES)

FRONTIER
CARBON SOLUTIONS

Extent of Main Map



Legend

- Area of Review

WYOMING OIL AND GAS CONSERVATION COMMISSION WELLS
- Abandoned Well

WYOMING STATE ENGINEERS OFFICE PERMITTED WATER SOURCE
- Water Well
- Township Boundary
- Section Boundary

Notes:
1. Wyoming Oil and Gas Conservation Commission Wells labelled with API number.
2. Wyoming State Engineer's Office Permitted Water Sources labelled with permit number.

N

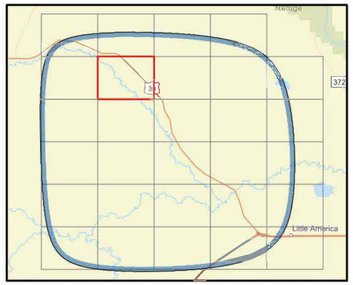
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PROJECT SPEED GOAT
SURFACE AND SUBSURFACE FEATURES
FIGURE A.2
(6 OF 29)

SW WYOMING
(SWEETWATER, UINTA & LINCOLN COUNTIES)

FRONTIER
CARBON SOLUTIONS

Extent of Main Map



Legend

- Area of Review
- Proposed FCS Well Location

EXISTING ABOVEGROUND FACILITY
- Industrial
- Residential/Agricultural

ACTIVE MINE
- Sand and Gravel Mine (Small Mine)

WYOMING OIL AND GAS CONSERVATION COMMISSION WELLS
- Shut-In (Plugged Well)
- Producing (Active Well or Permit)
- Abandoned Well

WYOMING STATE ENGINEERS OFFICE PERMITTED WATER SOURCE
- Water Well
- Surface Water Source

- Township Boundary
- Section Boundary

Notes:
1. Wyoming Oil and Gas Conservation Commission Wells labelled with API number.
2. Wyoming State Engineer's Office Permitted Water Sources labelled with permit number.

N

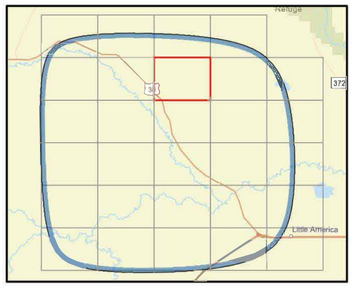
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PROJECT SPEED GOAT
SURFACE AND SUBSURFACE FEATURES
FIGURE A.2
(7 OF 29)

SW WYOMING
(SWEETWATER, UINTA & LINCOLN COUNTIES)

FRONTIER
CARBON SOLUTIONS

Extent of Main Map



Legend

- Area of Review

WYOMING OIL AND GAS CONSERVATION COMMISSION WELLS
- Shut-In (Plugged Well)
- Producing (Active Well or Permit)
- Abandoned Well

WYOMING STATE ENGINEERS OFFICE PERMITTED WATER SOURCE
- Water Well
- Surface Water Source

- Township Boundary
- Section Boundary

Notes:
1. Wyoming Oil and Gas Conservation Commission Wells labelled with API number.
2. Wyoming State Engineer's Office Permitted Water Sources labelled with permit number.

N

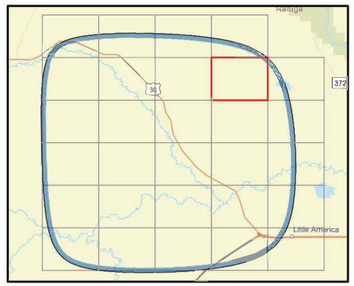
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PROJECT SPEED GOAT
SURFACE AND SUBSURFACE FEATURES
FIGURE A.2
(8 OF 29)

SW WYOMING
(SWEETWATER, UINTA & LINCOLN COUNTIES)

FRONTIER
CARBON SOLUTIONS

Extent of Main Map



Legend

- Area of Review
- ACTIVE MINE
  - Trona Mine (May Include Subsurface Structures)
- WYOMING OIL AND GAS CONSERVATION COMMISSION WELLS
  - Abandoned Well
- WYOMING STATE ENGINEERS OFFICE PERMITTED WATER SOURCE
  - Water Well
  - Surface Water Source
- Township Boundary
- Section Boundary

Notes:
1. Wyoming Oil and Gas Conservation Commission Wells labelled with API number.
2. Wyoming State Engineer's Office Permitted Water Sources labelled with permit number.

N

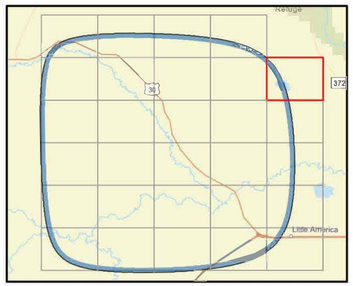
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PROJECT SPEED GOAT
SURFACE AND SUBSURFACE FEATURES
FIGURE A.2
(9 OF 29)

SW WYOMING
(SWEETWATER, UINTA & LINCOLN COUNTIES)

FRONTIER
CARBON SOLUTIONS

Extent of Main Map



Legend

- Area of Review

EXISTING ABOVEGROUND FACILITY
- Industrial

ACTIVE MINE
- Trona Mine (May Include Subsurface Structures)

WYOMING OIL AND GAS CONSERVATION COMMISSION WELLS
- Abandoned Well

WYOMING STATE ENGINEERS OFFICE PERMITTED WATER SOURCE
- Water Well
- Township Boundary
- Section Boundary

Notes:
1. Wyoming Oil and Gas Conservation Commission Wells labelled with API number.
2. Wyoming State Engineer's Office Permitted Water Sources labelled with permit number.

N

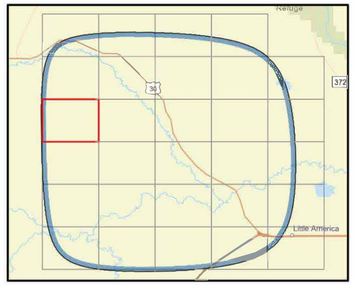
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PROJECT SPEED GOAT
SURFACE AND SUBSURFACE FEATURES
FIGURE A. 2
(10 OF 29)

SW WYOMING
(SWEETWATER, UINTA & LINCOLN COUNTIES)

FRONTIER
CARBON SOLUTIONS

Extent of Main Map



Legend

- Area of Review

WYOMING OIL AND GAS CONSERVATION COMMISSION WELLS

- Abandoned Well
- Known or Suspected Fault (Identified by FCS Survey)
- Township Boundary
- Section Boundary

Notes:
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2. Wyoming State Engineer's Office Permitted Water Sources labelled with permit number.

N

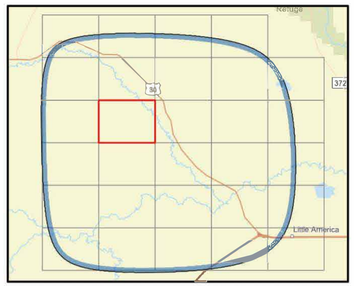
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PROJECT SPEED GOAT
SURFACE AND SUBSURFACE FEATURES
FIGURE A.2
(11 OF 29)

SW WYOMING
(SWEETWATER, UINTA & LINCOLN COUNTIES)

FRONTIER
CARBON SOLUTIONS

Extent of Main Map



Legend

- Area of Review
- Proposed FCS Well Location

WYOMING OIL AND GAS CONSERVATION COMMISSION WELLS
- Producing (Active Well or Permit)
- Abandoned Well

WYOMING STATE ENGINEERS OFFICE PERMITTED WATER SOURCE
- Surface Water Source
- Known or Suspected Fault (Identified by FCS Survey)
- Township Boundary
- Section Boundary

Notes:
1. Wyoming Oil and Gas Conservation Commission Wells labelled with API number.
2. Wyoming State Engineer's Office Permitted Water Sources labelled with permit number.

N

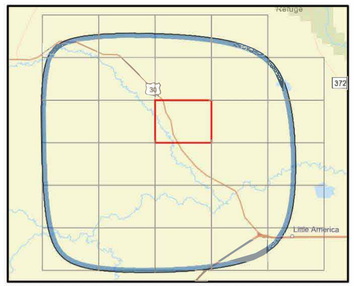
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Feet

PROJECT SPEED GOAT
SURFACE AND SUBSURFACE FEATURES
FIGURE A.2
(12 OF 29)

SW WYOMING
(SWEETWATER, UINTA & LINCOLN COUNTIES)

FRONTIER
CARBON SOLUTIONS

Extent of Main Map



Legend

- Area of Review

EXISTING ABOVEGROUND FACILITY

- Residential/Agricultural

WYOMING OIL AND GAS CONSERVATION COMMISSION WELLS

- Injector
- Shut-In (Plugged Well)
- Producing (Active Well or Permit)
- Abandoned Well

WYOMING STATE ENGINEERS OFFICE PERMITTED WATER SOURCE

- Water Well
- Surface Water Source
- Known or Suspected Fault (Identified by FCS Survey)
- Township Boundary
- Section Boundary

Notes:
1. Wyoming Oil and Gas Conservation Commission Wells labelled with API number.
2. Wyoming State Engineer's Office Permitted Water Sources labelled with permit number.

N

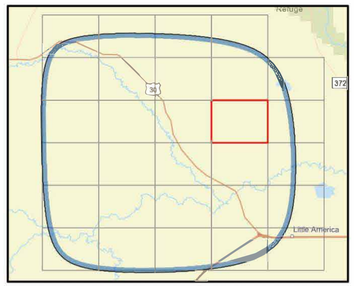
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PROJECT SPEED GOAT
SURFACE AND SUBSURFACE FEATURES
FIGURE A.2
(13 OF 29)

SW WYOMING
(SWEETWATER, UINTA & LINCOLN COUNTIES)

FRONTIER
CARBON SOLUTIONS

Extent of Main Map



Legend

- Area of Review
- EXISTING ABOVEGROUND FACILITY
  - Industrial
- ACTIVE MINE
  - Trona Mine (May Include Subsurface Structures)
- WYOMING OIL AND GAS CONSERVATION COMMISSION WELLS
  - Producing (Active Well or Permit)
  - Abandoned Well
- WYOMING STATE ENGINEERS OFFICE PERMITTED WATER SOURCE
  - Water Well
  - Surface Water Source
- Township Boundary
- Section Boundary

Notes:
1. Wyoming Oil and Gas Conservation Commission Wells labelled with API number.
2. Wyoming State Engineer's Office Permitted Water Sources labelled with permit number.

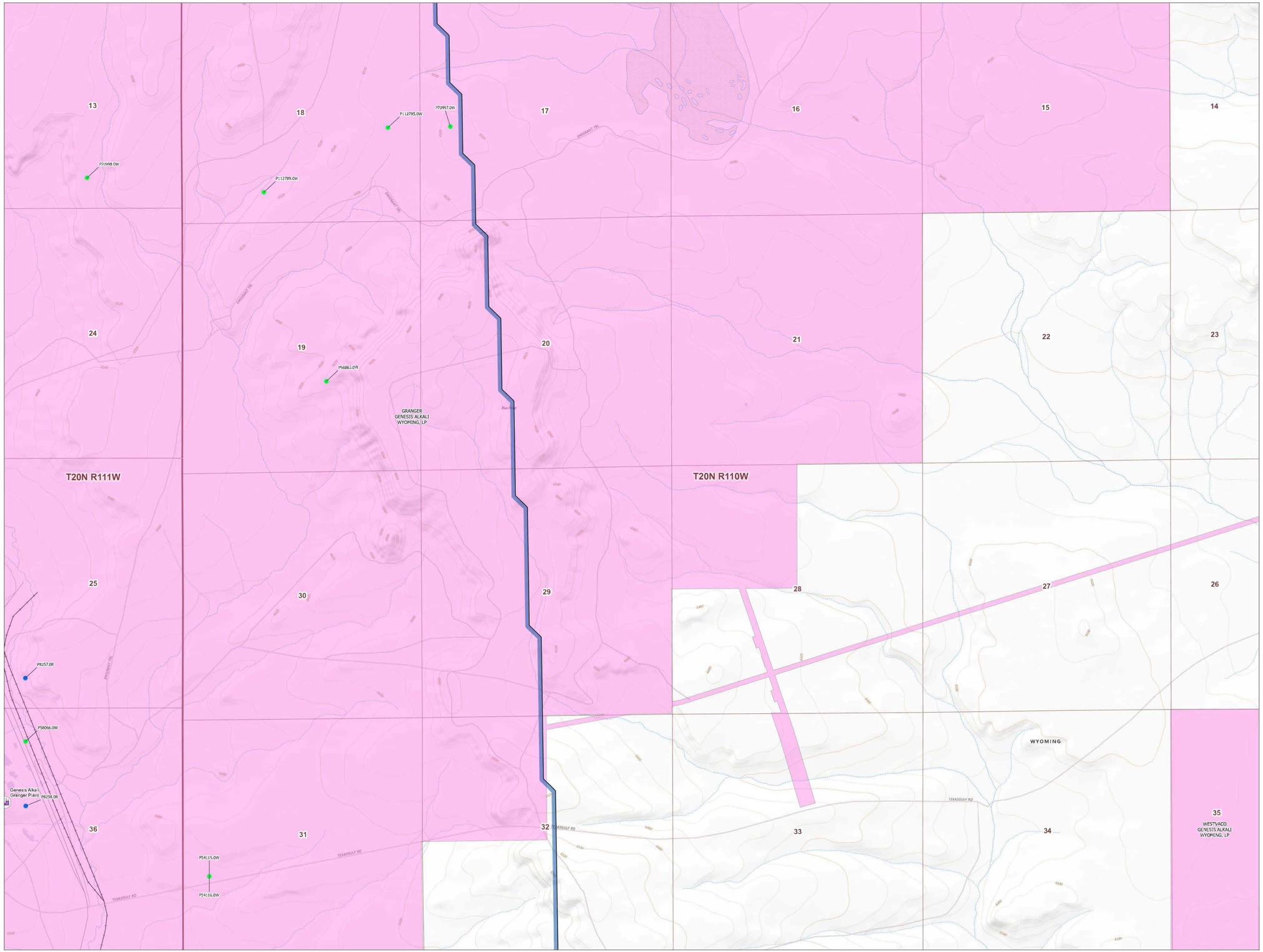
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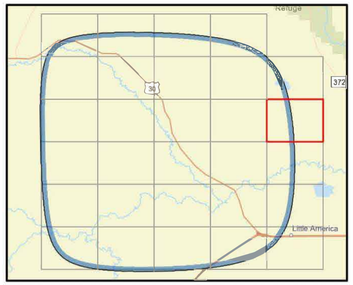
PROJECT SPEED GOAT
SURFACE AND SUBSURFACE FEATURES
FIGURE A.2
(14 OF 29)

SW WYOMING
(SWEETWATER, UINTA & LINCOLN COUNTIES)

FRONTIER
CARBON SOLUTIONS



Extent of Main Map



Legend

- Area of Review
- EXISTING ABOVEGROUND FACILITY
  - Industrial
- ACTIVE MINE
  - Trona Mine (May Include Subsurface Structures)
- WYOMING STATE ENGINEERS OFFICE PERMITTED WATER SOURCE
  - Water Well
  - Surface Water Source
- Township Boundary
- Section Boundary

Notes:
1. Wyoming Oil and Gas Conservation Commission Wells labelled with API number.
2. Wyoming State Engineer's Office Permitted Water Sources labelled with permit number.

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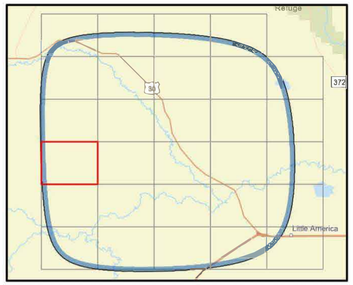
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PROJECT SPEED GOAT
SURFACE AND SUBSURFACE FEATURES
FIGURE A.2
(15 OF 29)

SW WYOMING
(SWEETWATER, UINTA & LINCOLN COUNTIES)

FRONTIER
CARBON SOLUTIONS

Extent of Main Map



Legend

- Area of Review

WYOMING OIL AND GAS CONSERVATION COMMISSION WELLS

- Abandoned Well
- Known or Suspected Fault (Identified by FCS Survey)
- Township Boundary
- Section Boundary

Notes:
1. Wyoming Oil and Gas Conservation Commission Wells labelled with API number.
2. Wyoming State Engineer's Office Permitted Water Sources labelled with permit number.

N

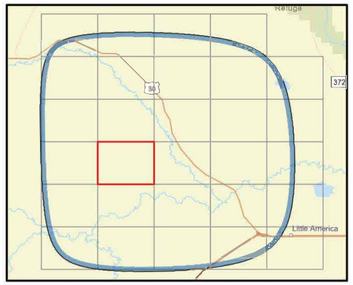
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PROJECT SPEED GOAT
SURFACE AND SUBSURFACE FEATURES
FIGURE A.2
(16 OF 29)

SW WYOMING
(SWEETWATER, UINTA & LINCOLN COUNTIES)

FRONTIER
CARBON SOLUTIONS

Extent of Main Map



Legend

- Area of Review
- Proposed FCS Well Location

WYOMING OIL AND GAS CONSERVATION COMMISSION WELLS
- Producing (Active Well or Permit)
- Abandoned Well

WYOMING STATE ENGINEERS OFFICE PERMITTED WATER SOURCE
- Water Well
- Township Boundary
- Section Boundary

Notes:
1. Wyoming Oil and Gas Conservation Commission Wells labelled with API number.
2. Wyoming State Engineer's Office Permitted Water Sources labelled with permit number.

N

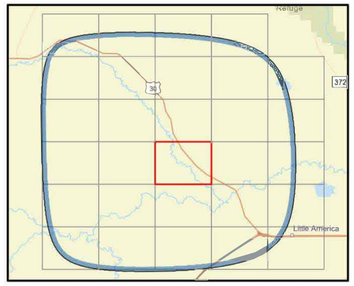
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PROJECT SPEED GOAT
SURFACE AND SUBSURFACE FEATURES
FIGURE A.2
(17 OF 29)

SW WYOMING
(SWEETWATER, UINTA & LINCOLN COUNTIES)

FRONTIER
CARBON SOLUTIONS

Extent of Main Map



Legend

- Area of Review
- Proposed FCS Well Location

EXISTING ABOVEGROUND FACILITY
- Residential/Agricultural

ACTIVE MINE
- Gravel Mine (Limited Operations)

WYOMING OIL AND GAS CONSERVATION COMMISSION WELLS
- Producing (Active Well or Permit)
- Abandoned Well

WYOMING STATE ENGINEERS OFFICE PERMITTED WATER SOURCE
- Water Well
- Surface Water Source

- Township Boundary
- Section Boundary

Notes:
1. Wyoming Oil and Gas Conservation Commission Wells labelled with API number.
2. Wyoming State Engineer's Office Permitted Water Sources labelled with permit number.

N

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Feet

PROJECT SPEED GOAT
SURFACE AND SUBSURFACE FEATURES
FIGURE A. 2
(18 OF 29)

SW WYOMING
(SWEETWATER, UINTA & LINCOLN COUNTIES)

FRONTIER
CARBON SOLUTIONS

T20N R111W

T19N R111W

CR CR07/449

P7463.05

3722884

3722897

3724455

3723259

GRANGER GENESIS ALKALI WYOMING, LP

P157597.0W

3721991

3722940

3722138

3722957

3722673

3721511

3720393

3721627

3723310

P7465.05

CR CR07/454

CR CR07/455

P7466.05

3721907

3723163

3725946

3724836

3722880

3723170

P104673.0W

GRANGER GRAVEL GENESIS ALKALI WYOMING, LP

P2025.0W

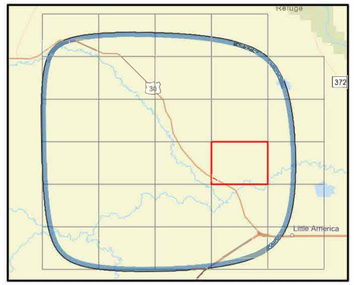
3722769

3723176

3721912

3724317

Extent of Main Map



Legend

- Area of Review
- ACTIVE MINE
  - Sand and Gravel Mine (Small Mine)
  - Trona Mine (May Include Subsurface Structures)
- WYOMING OIL AND GAS CONSERVATION COMMISSION WELLS
  - Producing (Active Well or Permit)
  - Abandoned Well
- WYOMING STATE ENGINEERS OFFICE PERMITTED WATER SOURCE
  - Water Well
  - Surface Water Source
- Township Boundary
- Section Boundary

Notes:
1. Wyoming Oil and Gas Conservation Commission Wells labelled with API number.
2. Wyoming State Engineer's Office Permitted Water Sources labelled with permit number.

N

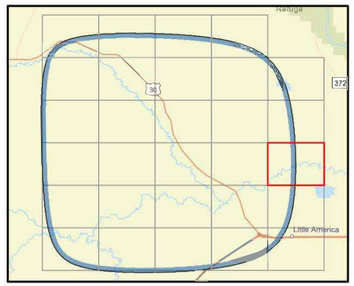
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PROJECT SPEED GOAT
SURFACE AND SUBSURFACE FEATURES
FIGURE A.2
(19 OF 29)

SW WYOMING
(SWEETWATER, UINTA & LINCOLN COUNTIES)

FRONTIER
CARBON SOLUTIONS

Extent of Main Map



Legend

- Area of Review
- ACTIVE MINE
- Trona Mine (May Include Subsurface Structures)
- WYOMING STATE ENGINEERS OFFICE PERMITTED WATER SOURCE
- Water Well
- Surface Water Source
- Township Boundary
- Section Boundary

Notes:
1. Wyoming Oil and Gas Conservation Commission Wells labelled with API number.
2. Wyoming State Engineer's Office Permitted Water Sources labelled with permit number.

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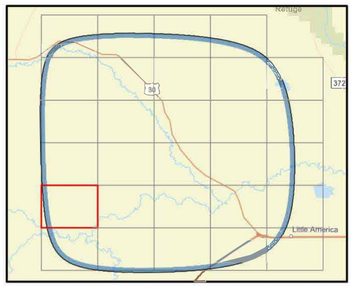
PROJECT SPEED GOAT
SURFACE AND SUBSURFACE FEATURES

FIGURE A.2
(20 OF 29)

SW WYOMING
(SWEETWATER, UINTA & LINCOLN COUNTIES)

FRONTIER
CARBON SOLUTIONS

Extent of Main Map



Legend

- Area of Review
- WYOMING OIL AND GAS CONSERVATION COMMISSION WELLS
  - Producing (Active Well or Permit)
  - Known or Suspected Fault (Identified by FCS Survey)
  - Township Boundary
  - Section Boundary

Notes:
1. Wyoming Oil and Gas Conservation Commission Wells labelled with API number.
2. Wyoming State Engineer's Office Permitted Water Sources labelled with permit number.

N

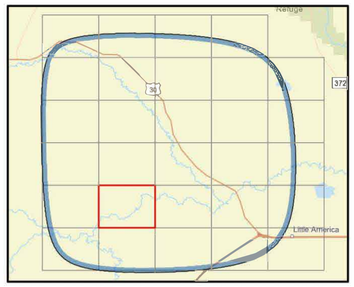
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PROJECT SPEED GOAT
SURFACE AND SUBSURFACE FEATURES
FIGURE A.2
(21 OF 29)

SW WYOMING
(SWEETWATER, UINTA & LINCOLN COUNTIES)

FRONTIER
CARBON SOLUTIONS

Extent of Main Map



Legend

- Area of Review
- Proposed FCS Well Location

EXISTING ABOVEGROUND FACILITY
- Industrial

WYOMING OIL AND GAS CONSERVATION COMMISSION WELLS
- Producing (Active Well or Permit)
- Abandoned Well

WYOMING STATE ENGINEERS OFFICE PERMITTED WATER SOURCE
- Water Well
- Surface Water Source

- Known or Suspected Fault (Identified by FCS Survey)
- Township Boundary
- Section Boundary

Notes:
1. Wyoming Oil and Gas Conservation Commission Wells labelled with API number.
2. Wyoming State Engineer's Office Permitted Water Sources labelled with permit number.

N

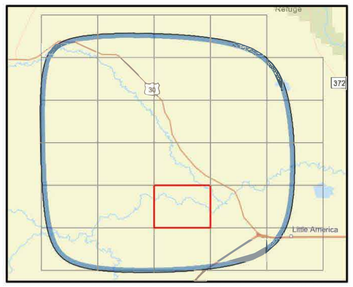
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PROJECT SPEED GOAT
SURFACE AND SUBSURFACE FEATURES
FIGURE A.2
(22 OF 29)

SW WYOMING
(SWEETWATER, UINTA & LINCOLN COUNTIES)

FRONTIER
CARBON SOLUTIONS

Extent of Main Map



Legend

- Area of Review
- Proposed FCS Well Location
- Town of Granger (Aboveground Facilities and Structures Intended for Human Occupancy not Individually Identified within Town Limits)

EXISTING ABOVEGROUND FACILITY

- Industrial

WYOMING OIL AND GAS CONSERVATION COMMISSION WELLS

- Shut-In (Plugged Well)
- Producing (Active Well or Permit)
- Abandoned Well

WYOMING STATE ENGINEERS OFFICE PERMITTED WATER SOURCE

- Surface Water Source
- Township Boundary
- Section Boundary

Notes:
1. Wyoming Oil and Gas Conservation Commission Wells labelled with API number.
2. Wyoming State Engineer's Office Permitted Water Sources labelled with permit number.

N

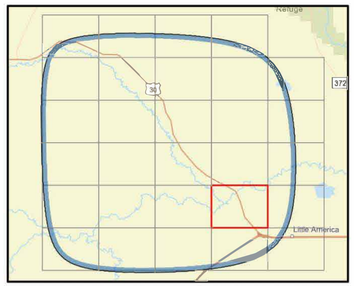
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Feet

PROJECT SPEED GOAT
SURFACE AND SUBSURFACE FEATURES
FIGURE A.2
(23 OF 29)

SW WYOMING
(SWEETWATER, UINTA & LINCOLN COUNTIES)

FRONTIER
CARBON SOLUTIONS

Extent of Main Map



Legend

- Area of Review
- Town of Granger (Aboveground Facilities and Structures Intended for Human Occupancy not Individually Identified within Town Limits)

EXISTING ABOVEGROUND FACILITY

- Industrial
- Residential/Agricultural

ACTIVE MINE

- Sand and Gravel Mine (Small Mine)

WYOMING OIL AND GAS CONSERVATION COMMISSION WELLS

- Producing (Active Well or Permit)
- Abandoned Well

WYOMING STATE ENGINEERS OFFICE PERMITTED WATER SOURCE

- Water Well
- Surface Water Source
- Township Boundary
- Section Boundary

Notes:
1. Wyoming Oil and Gas Conservation Commission Wells labelled with API number.
2. Wyoming State Engineer's Office Permitted Water Sources labelled with permit number.

N

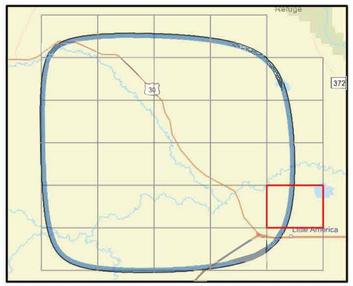
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Feet

PROJECT SPEED GOAT
SURFACE AND SUBSURFACE FEATURES
FIGURE A.2
(24 OF 29)

SW WYOMING
(SWEETWATER, UINTA & LINCOLN COUNTIES)

FRONTIER
CARBON SOLUTIONS

Extent of Main Map



Legend

- Area of Review

ACTIVE MINE

- Trona Mine (May Include Subsurface Structures)
- Township Boundary
- Section Boundary

Notes:
1. Wyoming Oil and Gas Conservation Commission Wells labelled with API number.
2. Wyoming State Engineer's Office Permitted Water Sources labelled with permit number.

N

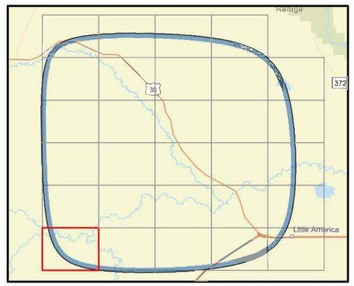
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Feet

PROJECT SPEED GOAT
SURFACE AND SUBSURFACE FEATURES
FIGURE A.2
(25 OF 29)

SW WYOMING
(SWEETWATER, UINTA & LINCOLN COUNTIES)

FRONTIER
CARBON SOLUTIONS

Extent of Main Map



Legend

- Area of Review
- WYOMING OIL AND GAS CONSERVATION COMMISSION WELLS
  - Abandoned Well
- WYOMING STATE ENGINEERS OFFICE PERMITTED WATER SOURCE
  - Surface Water Source
- Township Boundary
- Section Boundary

Notes:
1. Wyoming Oil and Gas Conservation Commission Wells labelled with API number.
2. Wyoming State Engineer's Office Permitted Water Sources labelled with permit number.

N

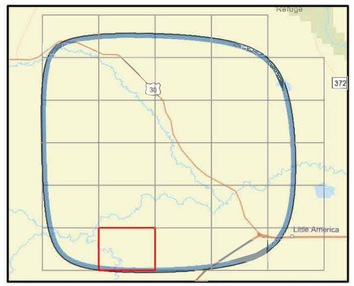
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PROJECT SPEED GOAT
SURFACE AND SUBSURFACE FEATURES
FIGURE A.2
(26 OF 29)

SW WYOMING
(SWEETWATER, UINTA & LINCOLN COUNTIES)

FRONTIER
CARBON SOLUTIONS

Extent of Main Map



Legend

- Area of Review

WYOMING OIL AND GAS CONSERVATION COMMISSION WELLS
- Shut-In (Plugged Well)
- Producing (Active Well or Permit)
- Abandoned Well

WYOMING STATE ENGINEERS OFFICE PERMITTED WATER SOURCE
- Surface Water Source
- Township Boundary
- Section Boundary

Notes:
1. Wyoming Oil and Gas Conservation Commission Wells labelled with API number.
2. Wyoming State Engineer's Office Permitted Water Sources labelled with permit number.

N

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Feet

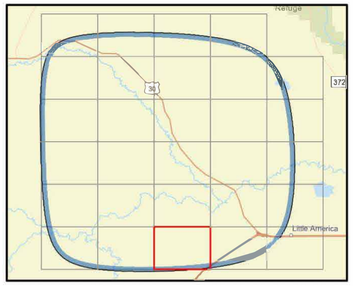
PROJECT SPEED GOAT
SURFACE AND SUBSURFACE FEATURES

FIGURE A.2
(27 OF 29)

SW WYOMING
(SWEETWATER, UINTA & LINCOLN COUNTIES)

FRONTIER
CARBON SOLUTIONS

Extent of Main Map



Legend

- Area of Review

EXISTING ABOVEGROUND FACILITY

- Industrial

WYOMING OIL AND GAS CONSERVATION COMMISSION WELLS

- Shut-In (Plugged Well)
- Producing (Active Well or Permit)
- Abandoned Well

WYOMING STATE ENGINEERS OFFICE PERMITTED WATER SOURCE

- Surface Water Source
- Township Boundary
- Section Boundary

Notes:
1. Wyoming Oil and Gas Conservation Commission Wells labelled with API number.
2. Wyoming State Engineer's Office Permitted Water Sources labelled with permit number.

N

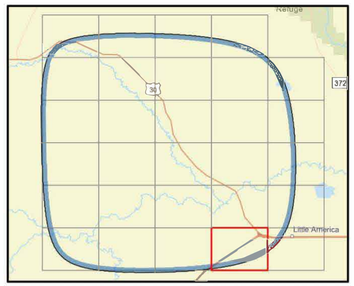
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PROJECT SPEED GOAT
SURFACE AND SUBSURFACE FEATURES
FIGURE A.2
(28 OF 29)

SW WYOMING
(SWEETWATER, UINTA & LINCOLN COUNTIES)

FRONTIER
CARBON SOLUTIONS

Extent of Main Map



Legend

- Area of Review

EXISTING ABOVEGROUND FACILITY

- Industrial

WYOMING OIL AND GAS CONSERVATION COMMISSION WELLS

- Producing (Active Well or Permit)
- Abandoned Well

WYOMING STATE ENGINEERS OFFICE PERMITTED WATER SOURCE

- Water Well
- Surface Water Source
- Township Boundary
- Section Boundary

Notes:
1. Wyoming Oil and Gas Conservation Commission Wells labelled with API number.
2. Wyoming State Engineer's Office Permitted Water Sources labelled with permit number.

N

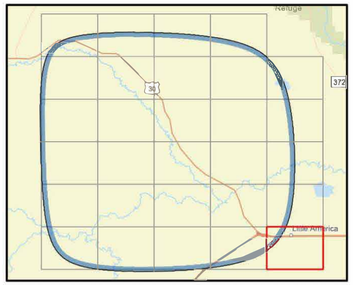
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PROJECT SPEED GOAT
SURFACE AND SUBSURFACE FEATURES
FIGURE A.2
(29 OF 29)

SW WYOMING
(SWEETWATER, UINTA & LINCOLN COUNTIES)

FRONTIER
CARBON SOLUTIONS

Extent of Main Map



Legend

- Area of Review

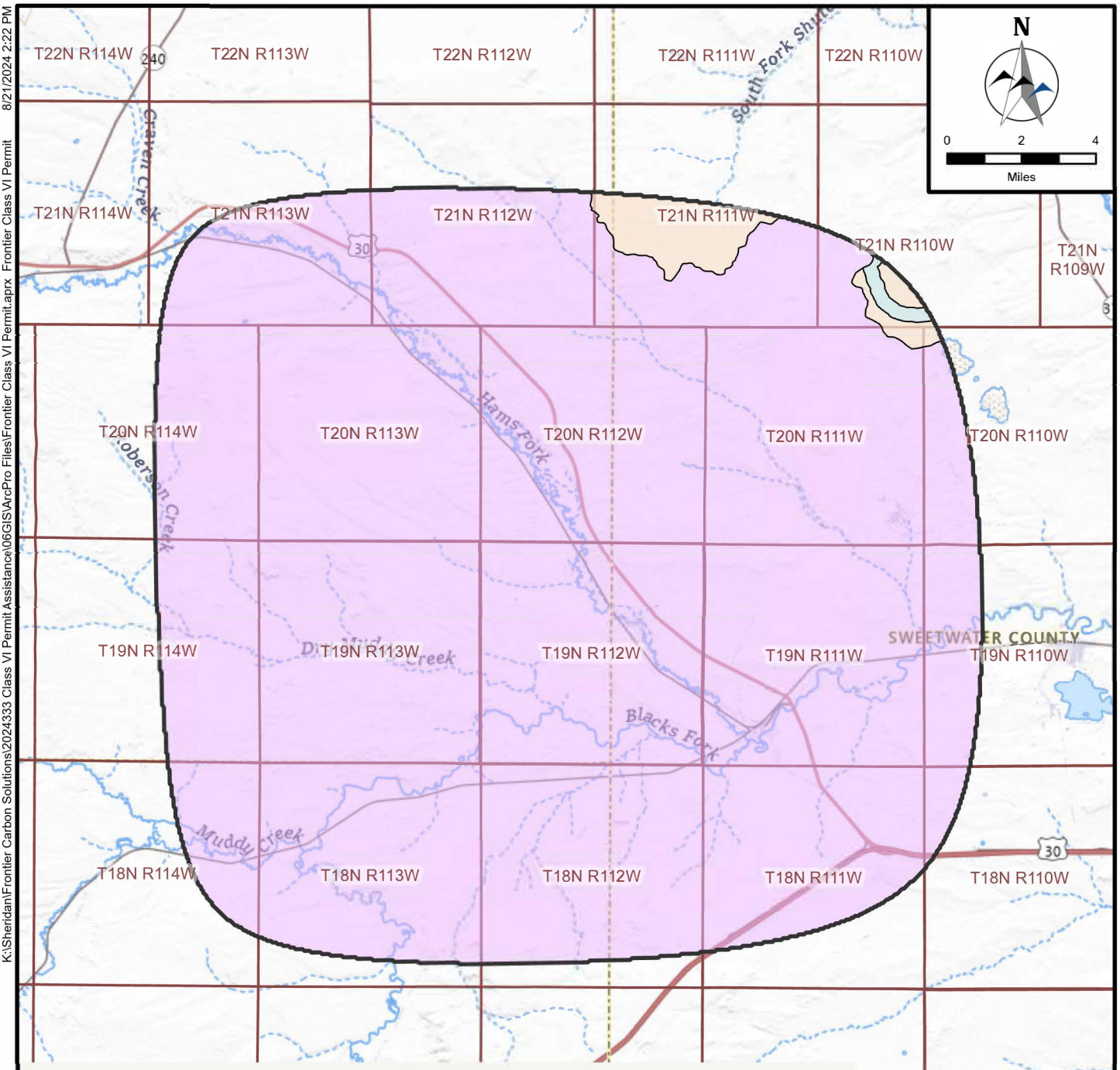
ACTIVE MINE

- Trona Mine (May Include Subsurface Structures)
- Township Boundary
- Section Boundary

Notes:
1. Wyoming Oil and Gas Conservation Commission Wells labelled with API number.
2. Wyoming State Engineer's Office Permitted Water Sources labelled with permit number.

N

0 2,000 4,000
Feet



LEGEND

- Area of Review

SOURCE WATER PROTECTION AREAS

- Zone 2 (WY5600120)
- Zone 2 (WY5600914)
- Zone 3 (WY5680120, WY5601181, WY5600914, WY5600810, WY5600636, WY5600634, WY5600050)

Source: WDEQ/WQD (2024), ESRI (2024)

NO.	REVISION	BY	DATE
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3	---	---	---
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FRONTIER CARBON SOLUTIONS

DRAWN BY: RAV
CHECKED BY: KBV
APPROVED BY: KBV
DATE: 08/22/2024

SWEETWATER HUB
SOURCE WATER PROTECTION AREAS

FIGURE
A.3

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FORM A-1
SITE CHARACTERIZATION

TABLE OF CONTENTS

1.0 Executive Summary 1
1.1 Overview of Project Area Geology 3
1.1.1 Discussion of Production and Well Data 3
1.1.2 Geologic Setting 6
1.1.3 Environment of Deposition, Lithology, and Tectonic Setting 7
1.1.4 Regional Stratigraphy 16
1.1.5 Regional Hydrostratigraphy and Groundwater Flow 21
1.1.5.1 Description of Freshwater Aquifers 24
1.1.5.2 Description of Injection Zone Aquifers 34
1.1.5.3 Hydrogeology Summary 42
1.1.6 Surface Air and/or Soil Gas Monitoring Data 42
1.2 Storage Reservoir Geology 43
1.2.1 Lateral Extent of the Injection Zones 44
1.2.2 Facies Continuity in the Injection and Confining Zones 46
1.2.3 Structure and Thickness of Injection and Confining Zones 47
1.2.4 Petrophysical Properties of Injection and Confining Zones 56
1.2.5 Core Data and Mineralogy of Storage Zones 62
1.2.6 Geochemistry and Potential Interactions with CO_2 Injection 68
1.2.6.1 Potential Geochemical Interactions 68
1.2.6.2 PSG Geochemical Modeling 69
1.2.6.3 Compatibility of the CO_2 with Subsurface Fluids and Minerals 70
1.2.7 Geomechanical Information of the Confining Zones 70
1.2.8 Faults and Fractures 77
1.2.9 Seismic Activity 80
1.2.10 Models 83
1.2.10.1 Static Model 83
1.2.10.2 Dynamic Model 86
1.2.11 Mechanisms of Geological Confinement 88
1.2.12 Injection Zone Storage Capacity 89
1.3 References 90

LIST OF TABLES

Table A-1.1. Water Quality of the Receiving Formation (Nugget) 37

Table A-1.2. Water Quality of the Receiving Formation (Madison) 41

Table A-1.3. Formations Comprising the CO_2 Storage Area 44

Table A-1.4. Properties of Upper and Lower Confining Zones for the Madison Injection Zone 57

Table A-1.5. Description of Additional Confinement above the Immediate Upper Confining Zone 58

Table A-1.6. Properties of the Upper and Lower Confining Zones for the Nugget Injection Zone 59

Table A-1.7. Porosity and Permeability of the Injection and Confining Zones 60

Table A-1.8. Confining Zone Core Porosity and Permeability 61

Table A-1.9. Expected Capillary Pressure of the Injection and Confining Zones 61

Table A-1.10. Madison Formation Mineral Composition from 1,000+ Foot of Core in Three Wells (Thayer, 1983) 63

Table A-1.11. Table A-1.12. Mineral Composition of Fracture Fill from a One-foot Core (Honarpour, et.al. 1986) 63

Table A-1.12. Madison Core Data (Thayer, 1983) 63

Table A-1.13. Identified Nugget Mineralogy from Kayser, (1964) 65

Table A-1.14. Mineralogy of Framework Grains, as Identified in Keele and Evans (2008) 65

Table A-1.15. Identified Cement Mineralogy Keele and Evans (2008) 66

Table A-1.16. Nugget Core Data (Picard, 1975) 67

Table A-1.17. Expected CO_2 Stream Composition 69

Table A-1.18. Temperature Measurements and Calculated Temperature Gradients 71

Table A-1.19. Pressure Measurements and Calculated Pressure Gradients 72

Table A-1.20. Elastic Properties Measured at Different Confining Pressures (Literature) 74

Table A-1.21. Description of Microfracture Tests 75

Table A-1.22. Storage Reservoir Microfracture Results (Estimated) 76

Table A-1.23. Average Minimum Stress of the Injection Formation as Determined by Horizontal Stress Model 76

Table A-1.24. Summary of Earthquakes in Wyoming within a Five-mile Radius of PSG Center 82
Table A-1.25. Seismic Horizons Used for Structural Framework 85
Table A-1.26. Static Model Zones and Layers 85

LIST OF FIGURES

Figure A-1.1. Project Speed Goat (PSG) topographic map 1
Figure A-1.2. Moxa Arch within the Greater Green River Basin 2
Figure A-1.3. Oil and gas fields along the Frontier crest of the Moxa Arch, modified after Enverus 4
Figure A-1.4. South-to-north cross section of wells with log data through the Nugget 5
Figure A-1.5. South-to-north cross section 6
Figure A-1.6. Madison time, modified after Blakey. The study area was covered by shallow seas 9
Figure A-1.7. Paleogeography in Nugget time, modified after Blakey. Arid conditions with water bodies characterized the study area 10
Figure A-1.8. Western inner Cretaceous seaway. Modified from Blakey, 2023 12
Figure A-1.9. Stratigraphic column showing thicknesses, depths, and function of formations 13
Figure A-1.10. Type log with lithology 15
Figure A-1.11. Aerial extent of the Madison and equivalents denoted by location of shelves, after Sando, 1988 16
Figure A-1.12. Regional view showing location of the Madison Sea and formations, modified after Peterson 1984 17
Figure A-1.13. Regional east-west cross section through PSG showing its relationship to other structural features in the GGRB (from Clarey et.al., 2010 and references therein) 20
Figure A-1.14. Stratigraphy with aquifers from the surface to the Precambrian 22
Figure A-1.15. Water wells yield at least 100 gallons per minute 23
Figure A-1.16. Springs within the GGRB. The AoR is in an area without mapped springs, modified after WWDC 2009 24

Figure A-1.17. Bridger aquifer thickness and extent relative to PSG, modified after WWDC 2009 25
Figure A-1.18. Bridger aquifer groundwater flow and potentiometric surface, modified after WWDC 2009 26
Figure A-1.19. Laney aquifer thickness and extent relative to PSG, modified after WWDC 2009 27
Figure A-1.20. Laney aquifer groundwater flow and potentiometric surface, modified after WWDC 2009 28
Figure A-1.21. Vertical movement of groundwater in Tertiary aquifers 29
Figure A-1.22. Wasatch aquifer structure, modified after WWDC 2009 30
Figure A-1.23. Wasatch aquifer thickness and extent relative to PSG, modified after WWDC 2009 31
Figure A-1.24. Wasatch aquifer groundwater flow and potentiometric surface, modified after WWDC 2009 32
Figure A-1.25. Cloverly aquifer thickness and extent relative to PSG, modified after WWCG 2009 34
Figure A-1.26. Saturated thickness of the Nugget aquifer relative to PSG, modified after WWDC 2009 35
Figure A-1.27. Salinity of the Sundance and Nugget aquifers, modified after WWCG 2009 ... 36
Figure A-1.28. Potential recharge via precipitation into Nugget, modified after WWDC 2009 38
Figure A-1.29. Potential recharge into Nugget via stream recharge, modified after WWDC 2009 38
Figure A-1.30. Possible vertical flow between the Mesozoic and Paleozoic (including the Nugget and Madison aquifers), modified after WWDC 2009 39
Figure A-1.31. Spring discharge from Sundance, Nugget, or Mesaverde aquifers. Modified after WWDC 2009 39
Figure A-1.32. Thickness and lithology of the upper Madison aquifer, relative to PSG. Modified after WWDC 2009 40
Figure A-1.33. Thickness and lithology of the lower Madison aquifer, relative to PSG. Modified after WWDC 2009 41
Figure A-1.34. Madison aquifer groundwater flow and potentiometric surface, modified after WWDC 2009 42
Figure A-1.35. Aerial extent of the Madison Formation, as defined by well data 45
Figure A-1.36. Extent of the Nugget Formation, Agrawal 2019 46

Figure A-1.37. Regional mapping outline relative to PSG and the 3-D seismic area..... 48
Figure A-1.38. Regional seismic line and Second Frontier structure map (Stockton and Hawkins, 1985 49
Figure A-1.39. Three Forks Formation (lower confining zone to the Madison injection zone) structure and isochore maps..... 50
Figure A-1.40. Madison Formation structure and isochore maps..... 51
Figure A-1.41. Amsden Formation structure and isochore maps..... 52
Figure A-1.42. Phosphoria (secondary upper confining zone) isochores 53
Figure A-1.43. Ankareh Formation (lower confining zone to the Nugget injection zone) structure and isochore maps..... 54
Figure A-1.44. Nugget Formation structure and isochore maps..... 55
Figure A-1.45. Twin Creek Formation (upper confining zone to the Nugget injection zone) structure and isochore maps..... 56
Figure A-1.46. Ternary diagrams per Keele and Evans (2008) show the Nugget to be grain dominated and a subarkose. Petrographic analysis based on Gazzi-Dickinson point counting method of 58 thin sections. Samples were taken from Anschutz Ranch, southwest of PSG..... 66
Figure A-1.47. XRD results for Nugget Sandstone from Keele and Evans (2008). Microcline is the dominant feldspar and ferrodolomite is the dominant carbonate cement 67
Figure A-1.48. Geomechanical properties for Bruff Unit 1. Track 1: Formation top; Track 2: gamma ray (0-150); Track 3: RHOB (1.95-2.95 g/cc); Track 4: compressional and synthetic shear slowness (240-40 μs/feet); Track 5: dynamic (black) and static (red) Young's modulus (0-20 Mpsi); Track 6: dynamic (black) and static (red) Poisson's ratio (0-0.5); Track 7: minimum horizontal stress profile in black curve and calibration data in blue dots (Cipolla et al., 1994) (0.4-0.9 psi/feet) 73
Figure A-1.49. Faults of the GGRB (modified after WSGS, USGS Geologic Map of Wyoming, Love and Christiansen, 1985) 78
Figure A-1.50. Pertinent faults identified on the seismic data and planned well locations for the SCS Hub (approved) and the PSG expansion area 79
Figure A-1.51. Historical Earthquakes (USGS Earthquake Hazards Program 2024) near injection wells recorded by USGS since 1975 (WSGS GIS Data-Geology, 2024) 81
Figure A-1.52. Seismic hazard distribution for Wyoming, the contours represent the percent chance of potentially damaging ground motion (MMI=VI) through 2123. The red polygon is PSG. County lines are shown in white. Data per USGS, 2023. 83

Figure A-1.53. Model polygons, PSG area, SCS Hub and Bruff 1 well 84
Figure A-1.54. Effective porosity model 86
Figure A-1.55. Location of PSG injector wells and PSG static and dynamic model boundaries 87
Figure A-1.56. Trapping mechanisms act across different timescales (Intergovernmental Panel on Climate Change, 2005, p. 208) 89

ABBREVIATIONS/ACRONYMS

%	Percent
AoR	Area of Review
API	American Petroleum Institute
ASTM	American Society of Testing and Materials
CaCO3	calcium carbonate
CO_2	carbon dioxide
EPA	Environmental Protection Agency
FCS	Frontier Carbon Solutions Holdings, LLC
GGRB	Greater Green River Basin
gpm	gallons per minute
H_2	hydrogen
H_2CO_3	carbonic acid
HCO_3	bicarbonate
mD	millidarcy
mg/L	milligram per liter
$MgCO_3$	magnesium carbonate
mi^2	square miles
N_2	nitrogen
NA	not available
Near-surface SAP	Near-surface Sampling and Analysis Plan
ppm	parts per million
PSG	Project Speed Goat
QFL	Quartz Feldspar Lithics
SCS Hub	Sweetwater Carbon Storage Hub
SHmax	vertical stress, minimum horizontal stress (Shmin), and maximum horizontal stress
TBD	to be determined
TDS	total dissolved solids
UGS	Utah Geological Survey
USDW	underground source of drinking water

USGS	U.S. Geological Society
WDEQ	Wyoming Department of Environmental Quality
WOGCC	Wyoming Oil and Gas Conservation Commission
WWDC	Wyoming Water Development Commission
XRD	X-Ray Diffraction

FRONTIER CARBON SOLUTIONS
PROJECT SPEED GOAT
CARBON SEQUESTRATION UIC CLASS VI APPLICATION

FORM A-1 – SITE CHARACTERIZATION
Water Quality Rules, Chapter 24 Section 10 and 12

1.0 Executive Summary

Frontier Carbon Solutions Holdings, LLC (FCS) will be the owner and operator of Project Speed Goat (PSG) located on the Moxa Arch in the Greater Green River Basin (GGRB). PSG is an expansion of FCS's first unit known as the Sweetwater Carbon Storage Hub (SCS Hub) situated in southwestern Wyoming at the corners of Lincoln, Sweetwater, and Uinta counties, as shown in **Figure A-1.1**. FCS is developing the SCS Hub and PSG to be a commercial open-source, large-scale geologic sequestration hub for neighboring industrial emitters.

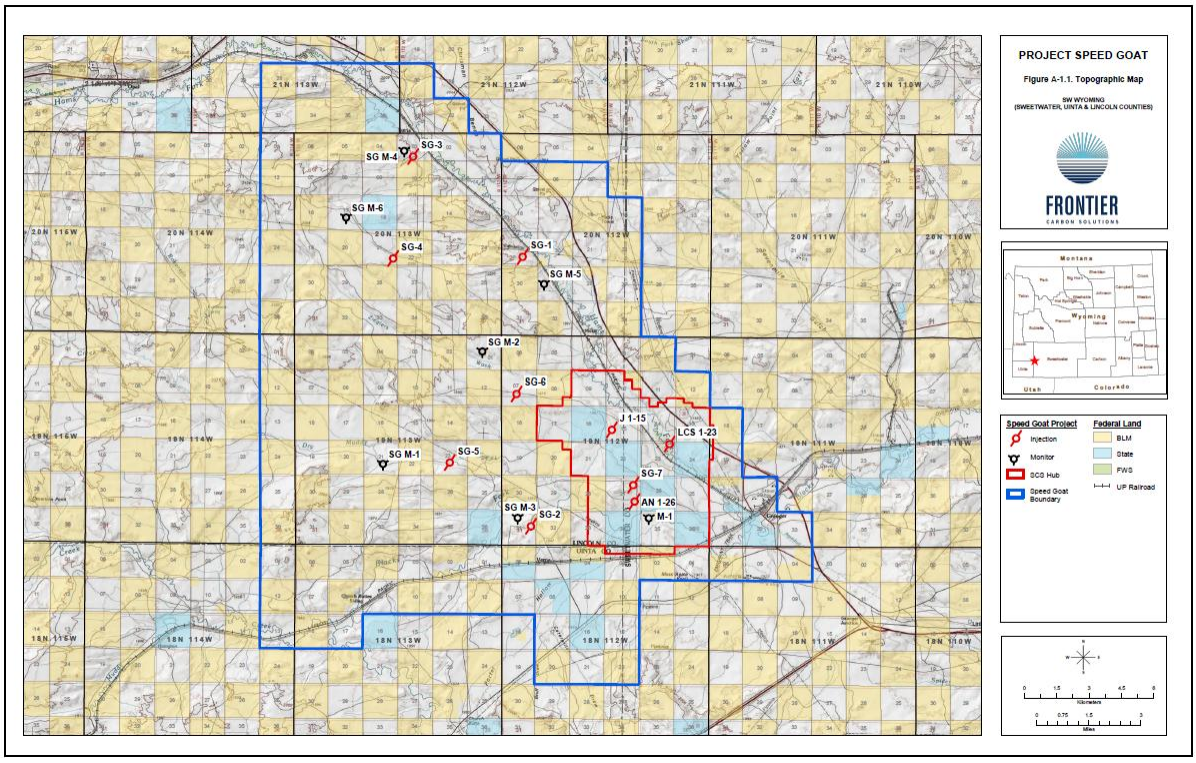


Figure A-1.1. *Project Speed Goat (PSG) topographic map.*

The SCS Hub is the location of Wyoming's first-Class VI permits to construct. All three permits to construct are for carbon dioxide (CO_2) injection into the deep saline sandstone Nugget Formation. The current application is for the permitting of six additional wells to inject anthropogenic CO_2 in the Nugget and Madison Formations within the PSG and one additional well to inject in the Madison within the SCS Hub.

The Moxa Arch (**Figure A-1.2**) is an ideal candidate for safe, secure, permanent carbon storage because of its proximity to large industrial emitters and several reservoirs with geologic qualities suitable for injection. The Nugget and Madison injection targets are located more than a thousand feet below the lowest known underground source of drinking water (USDW) and thousands of feet

below oil and gas producing reservoirs. The depth of the targets (approximately 13,700 feet and 17,500 feet) below the surface enables maintaining the CO_2 in a dense phase with multiple seals providing trapping redundancy.

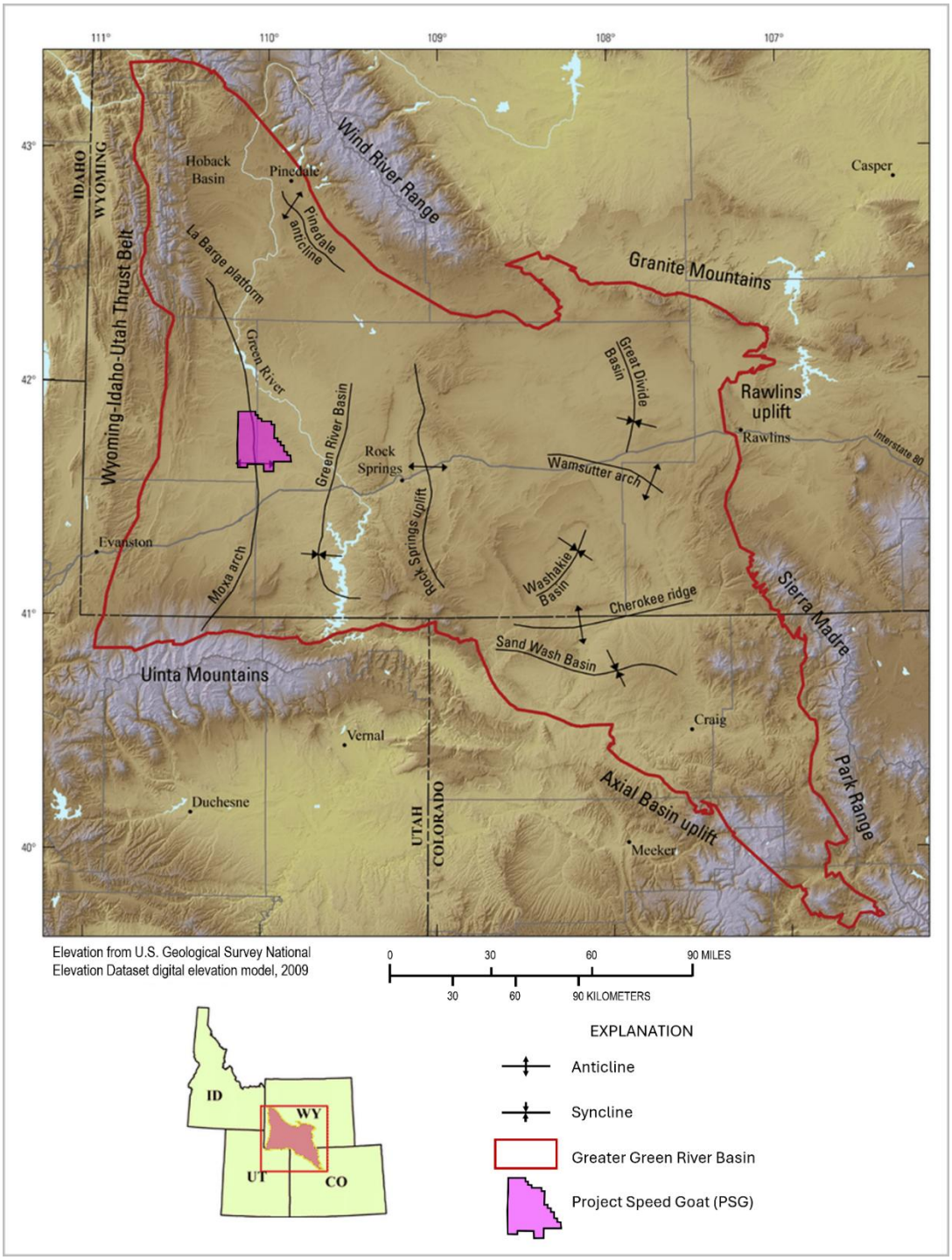


Figure A-1.2. *Moxa Arch within the Greater Green River Basin.*

1.1 Overview of Project Area Geology

1.1.1 Discussion of Production and Well Data

The GGRB has several oil and gas fields located along the Moxa Arch and LaBarge platform, including Bruff and Church Buttes fields to the southeast, and Whiskey Butte and Cow Hollow to the north (**Figure A-1.3**). LaBarge Field, known for its methane and helium production, CO_2 sequestration, and acid gas injection into the Madison, is 30 miles to the north. Most of the oil and gas fields are located on the crest of the Moxa Arch and produce from the 2nd Frontier, Dakota, Almy (Ft. Union), Mesaverde, Mowry, Hilliard (Baxter), or Bear River Formations. Drilling activity was highest in the 1970s, 1990s, and 2000s.

The Moxa Arch is well defined above the injection targets with ample well control because of the oil and gas production in the Cretaceous formations. There are comparatively few deep logged penetrations into the Nugget and Madison formations, with 16 wells penetrating the Nugget and nine penetrating the Madison within and immediately surrounding PSG. There is more well control in the north-south direction and limited well control in the west-east direction, particularly to the west.

The cross-section locator map (**Figure A-1.4**) shows the location of the key wells with well log data penetrating the Nugget or deeper. The corresponding cross section is shown in **Figure A-1.5** and a large-scale version is included in ***Appendix A-1***.

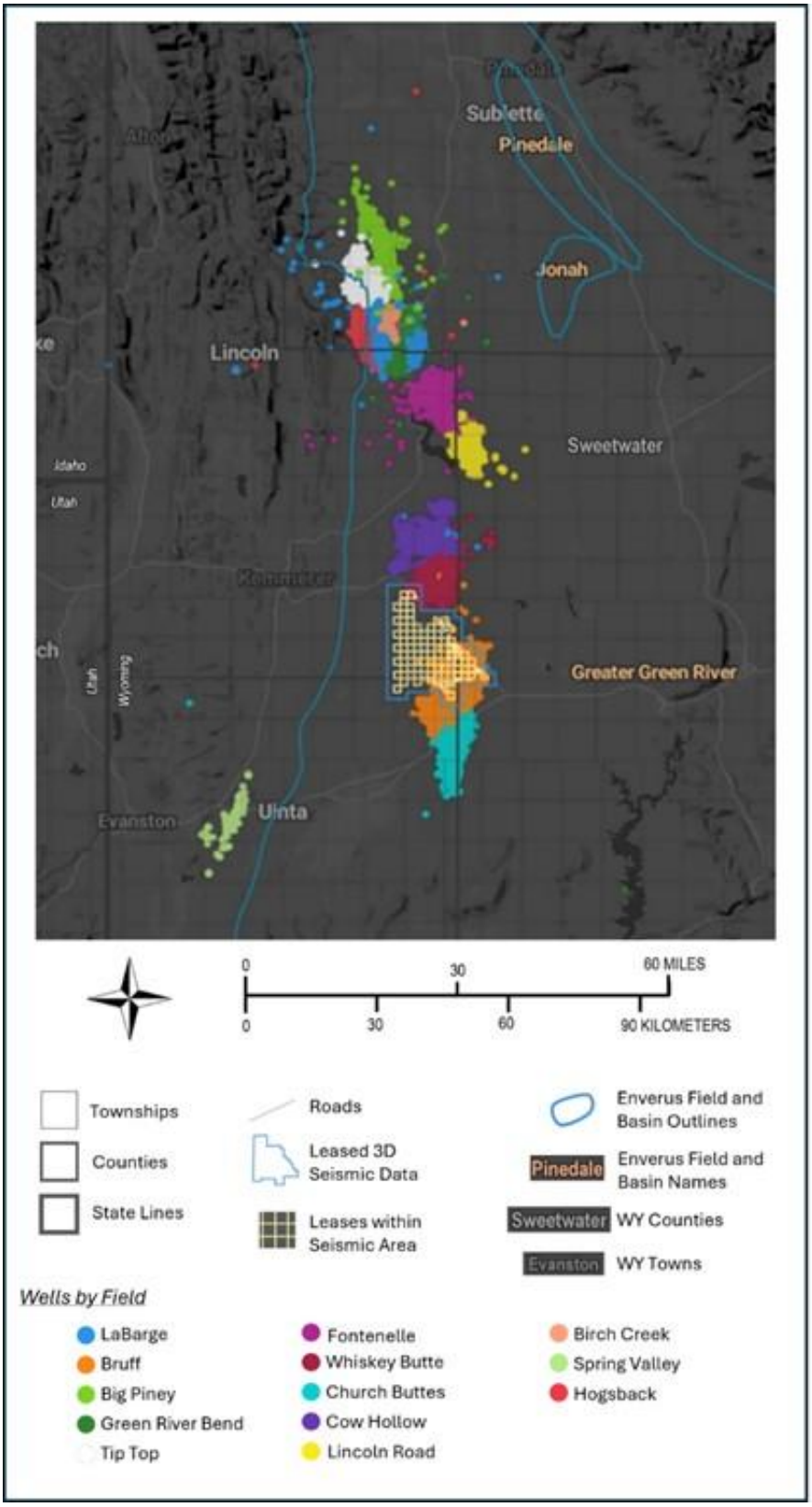


Figure A-1.3. *Oil and gas fields along the Frontier crest of the Moxa Arch, modified after Enverus.*

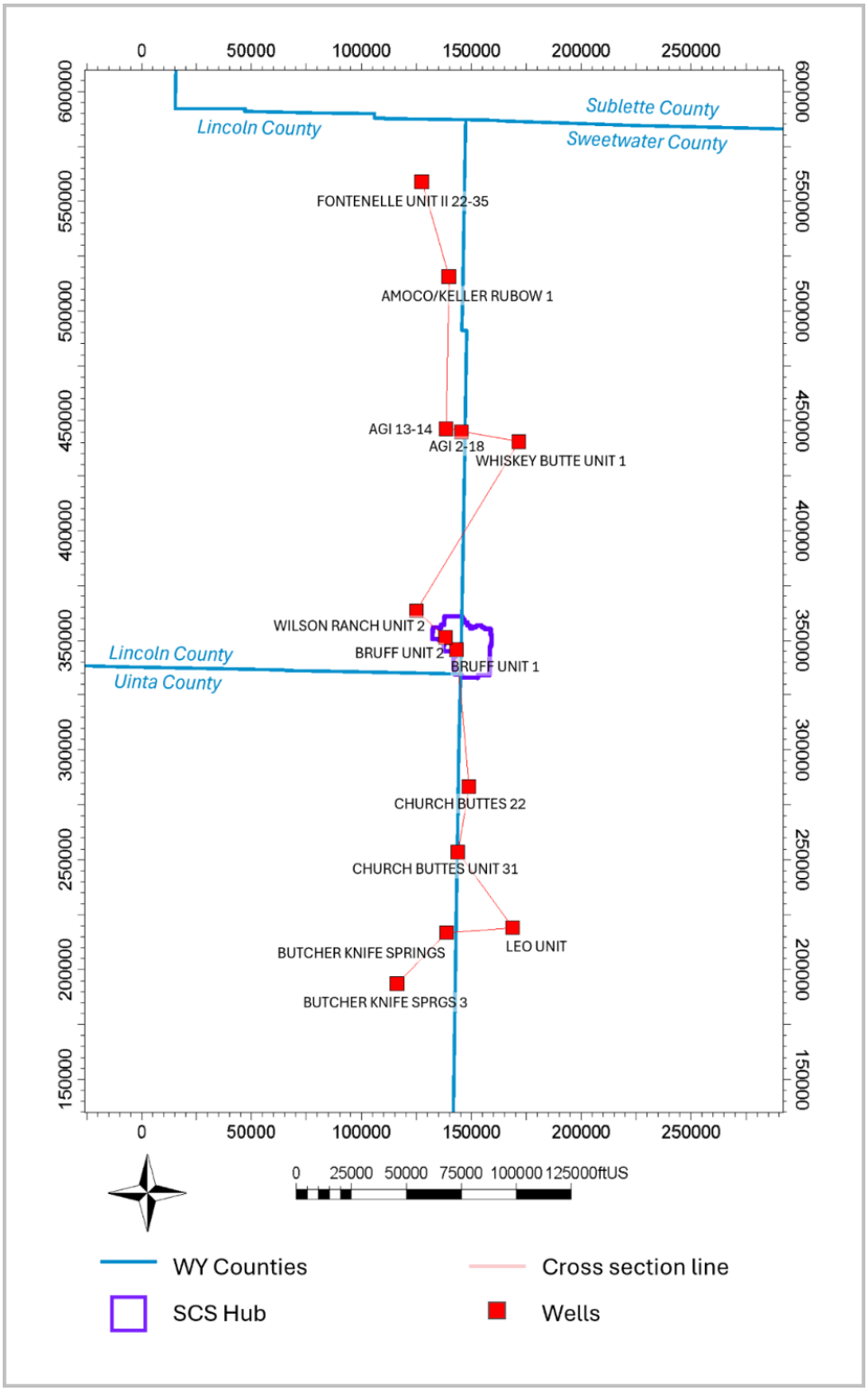


Figure A-1.4. *South-to-north cross section of wells with log data through the Nugget.*

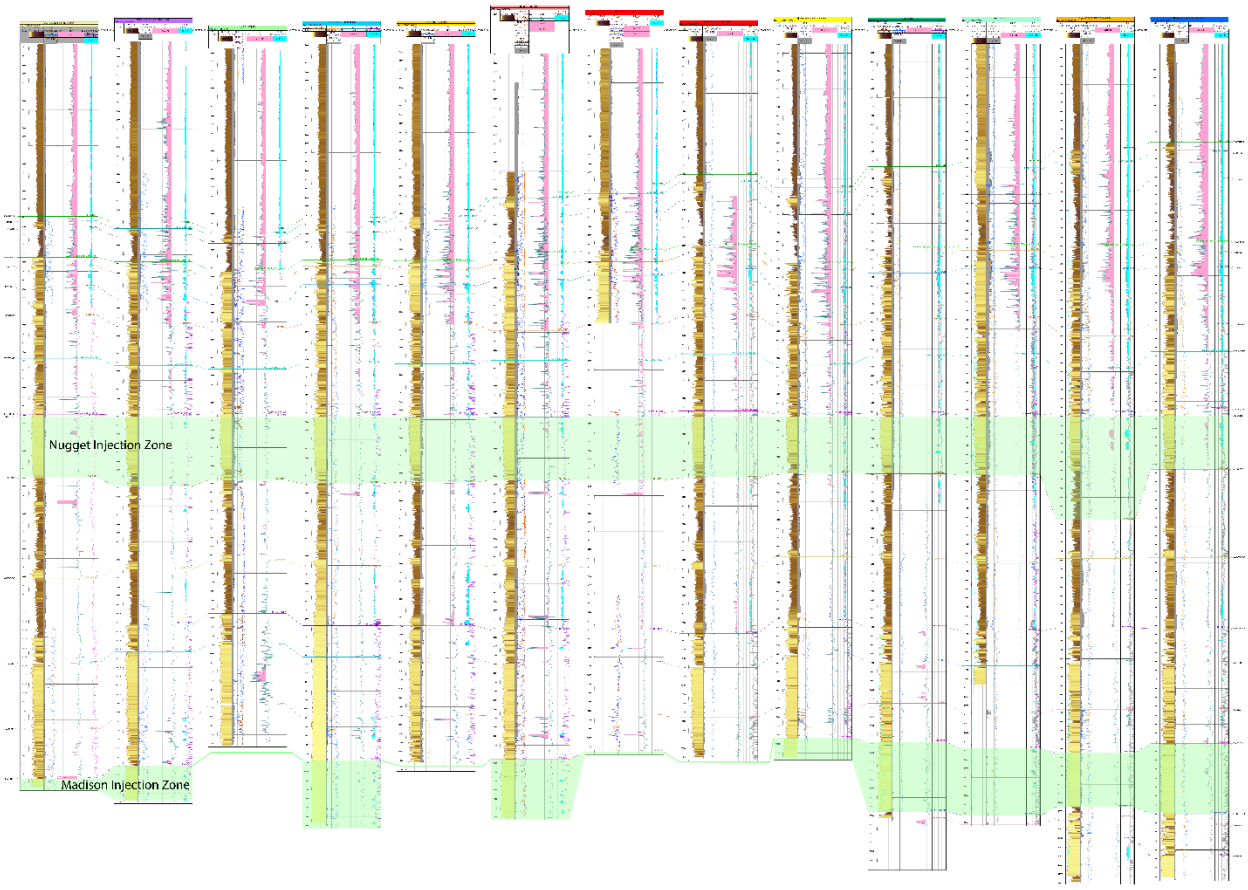


***Figure A-1.5**. South-to-North cross section*

1.1.2 Geologic Setting

The GGRB covers an area of about 23,000 square miles (mi^2) and is bounded to the west by the Wyoming Thrust Belt, to the north by the Wind River Range and the Granite Mountains, to the east by the Rawlins uplift and Sierra Madre and Park Range mountains, and to the south by the Axial Basin uplift and Uinta Mountains, as shown in **Figure A-1.2**. This foreland basin was accentuated by structural flexure as the Rocky Mountains rose to the west. Thrusting took place primarily from late Jurassic through Eocene time. Within the GGRB there are several structural features including arches, platforms, ridges, and subbasins. The SCS Hub and PSG expansion area is situated on the Moxa Arch, at the junction of Uinta, Lincoln, and Sweetwater counties, 15 miles east of the Kemmerer and 25 miles west of Green River, Wyoming. The Moxa Arch is surrounded by the Wyoming Thrust Belt to the west, the LaBarge platform to the north, the Rock Springs Uplift to the east, and the Uinta Mountains to the south. It is about 75 miles long and 15 miles wide, trending north south and plunging to the south (Smith 2010). The Moxa Arch shows no surface expression, where Quaternary and Tertiary units are horizontally overlying (Stockton and Hawkins 2009), but is asymmetric in the subsurface, with stronger dips on the eastern limb. Structural growth of the Moxa Arch began during the Upper Cretaceous (when the Frontier was being deposited) and continued throughout most of the

Cretaceous, (Stockton and Hawkins 2009, Smith 2010) as demonstrated by thickening to the east on the steepened limb. Jurassic and older units that formed pre-Laramide deformation show the opposite trend, with thickness generally increasing to the west. The structural formation of the Moxa Arch was controlled by the tectonic forces of the Sevier and Laramide orogenies.

1.1.3 Environment of Deposition, Lithology, and Tectonic Setting

The PSG area hosts rocks ranging from Precambrian to Quaternary in age. The target injection zones are the Mississippian Madison Limestone and the Triassic-Jurassic Nugget Sandstone. The deepest possible USDW is the Cretaceous Dakota Formation. The formations are reviewed in ascending stratigraphic order starting with the oldest rocks confining the deeper injection zone.

During Devonian and Mississippian time, the open sea was to the west and the North American craton to the east. The tectonic environment was characterized by the Antler Orogeny, as terrain accreted onto the craton from the west (Gill and Cobban 1973). The PSG area was located about 5° north of the equator, and covered in shallow, warm sea (**Figure A-1.6**). This sea extended regionally over 1,000 miles long from Canada to the southern U.S. and was approximately 125 miles wide (Westphal et al., 2004). The rock record demonstrates the alternating advance and retreat of the shallow sea onto the continent. The Jefferson Formation is overlain by the Three Forks Formation, both marine carbonates. The Madison Limestone, which hosts limestone, dolomite, and anhydrite, unconformably overlies the Three Forks. During the Mississippian era, the climate became colder, and glaciation became widespread. The Pennsylvanian was characterized by sea level fall as the fluvial Darwin Sandstone and nearshore marine Amsden Formation were deposited, followed by the Weber Formation, deposited in a lower to upper shoreface environment. In Permian time the Phosphoria Formation, dominated by organic rich shale, was deposited under shallow marine conditions, while a tidal flat environment of deposition dominated to the east. While the Madison is generally considered self-sealing, with low porosity collapse breccias associated with paleokarst topography commonly present at the top (Sando and Dutro 1974, Sando 1974, Clarey et al. 2010), the Amsden and Phosphoria Formations are additional confining layers.

The Triassic period was characterized by deposition of red beds in a shallow marine to tidal flat environment of deposition. The fossiliferous Dinwoody Formation is dominated by shale and limestone with some gypsum (Condit 1916). The Woodside Shale is dominantly dark-red shale with mud cracks and ripple marks (Boutwell 1907), and the Thaynes Formation is composed of alternating red shale, limestone, and calcareous sandstone (Boutwell 1907). The Ankareh Formation was deposited on a broad alluvial plain to shallow water or tidal flat environment and is characterized by dominantly red shales alternating with coarse sandstones and fossiliferous limestones (Boutwell 1907). During late Triassic to lower Jurassic time, the environment became increasingly arid, as shown in **Figure A-1.7**. A large aeolian dune field was established, which covered much of the western U.S, for millions of years (Britt et al. 2016). This erg was situated about 15° to 25° N latitude (Kocurek 1981) and spread across present-day Wyoming, Idaho, Colorado, Utah, California, Nevada, New Mexico, and Arizona

and covered an area up to 850,000 mi^2 (Kocurek and Dott 1983, Blakey 1988). The Nugget Sandstone consists mainly of large-scale quartz-rich aeolian cross-bedded sandstone, but the desert environment hosts many depositional environments including fluvial, lacustrine, wadi, and others, leading to heterogeneity (Blakey 1988). Gradually, relative sea level rose, and the area was inundated by warm shallow waters. The marine Twin Creek Limestone (a member of the Sundance Formation) was formed during these conditions and acts as a confining layer to the Nugget Sandstone. The Sundance also contains marine shale, sandstone, and limestone. The Nevadan Orogeny led to the formation of the Elko Highlands with the adjacent Morrison Basin to the east. The Morrison Formation was deposited under conditions ranging from swamp and lacustrine to fluvial.

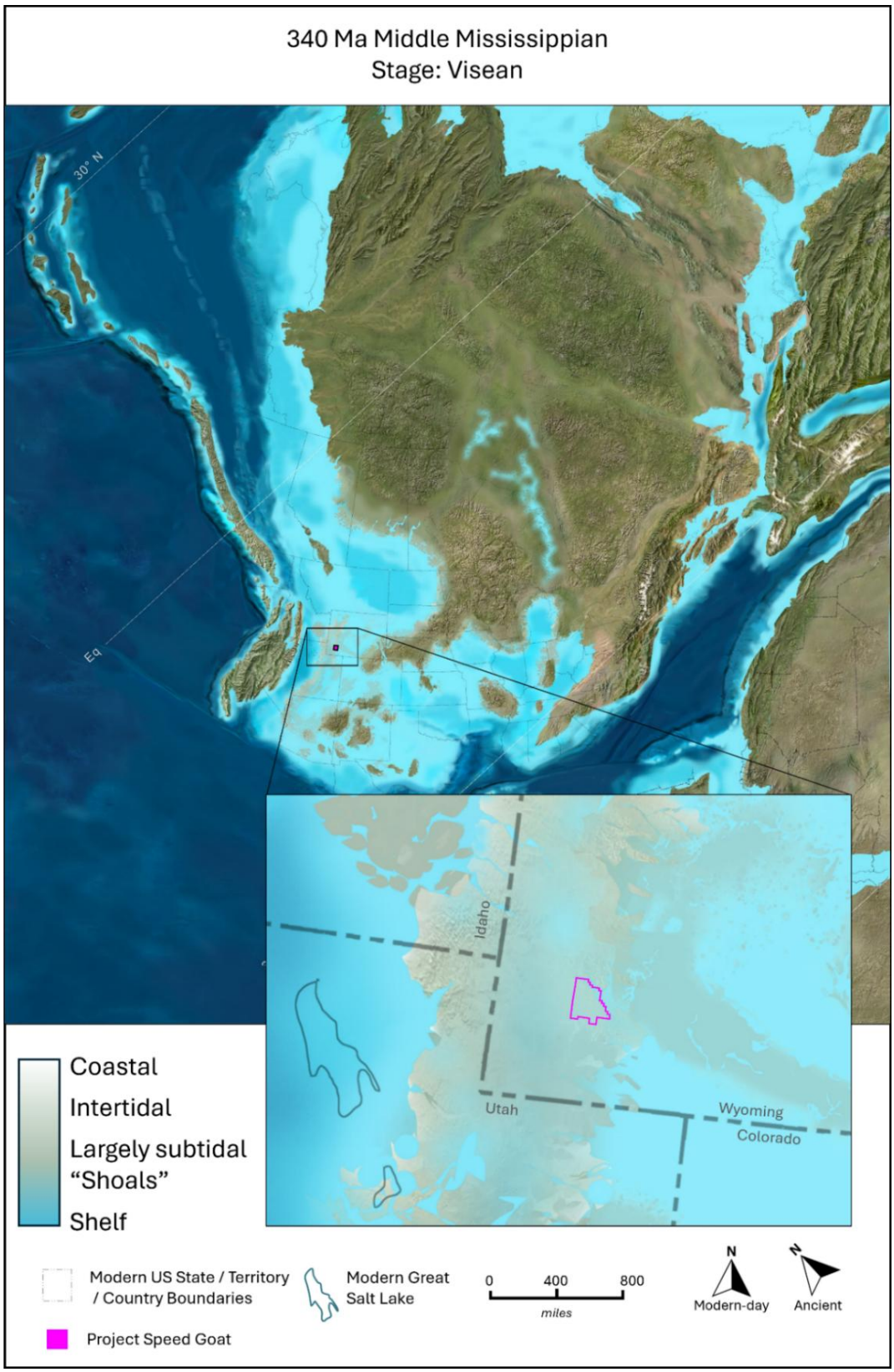


Figure A-1.6. *Madison time, modified after Blakey. The study area was covered by shallow seas.*

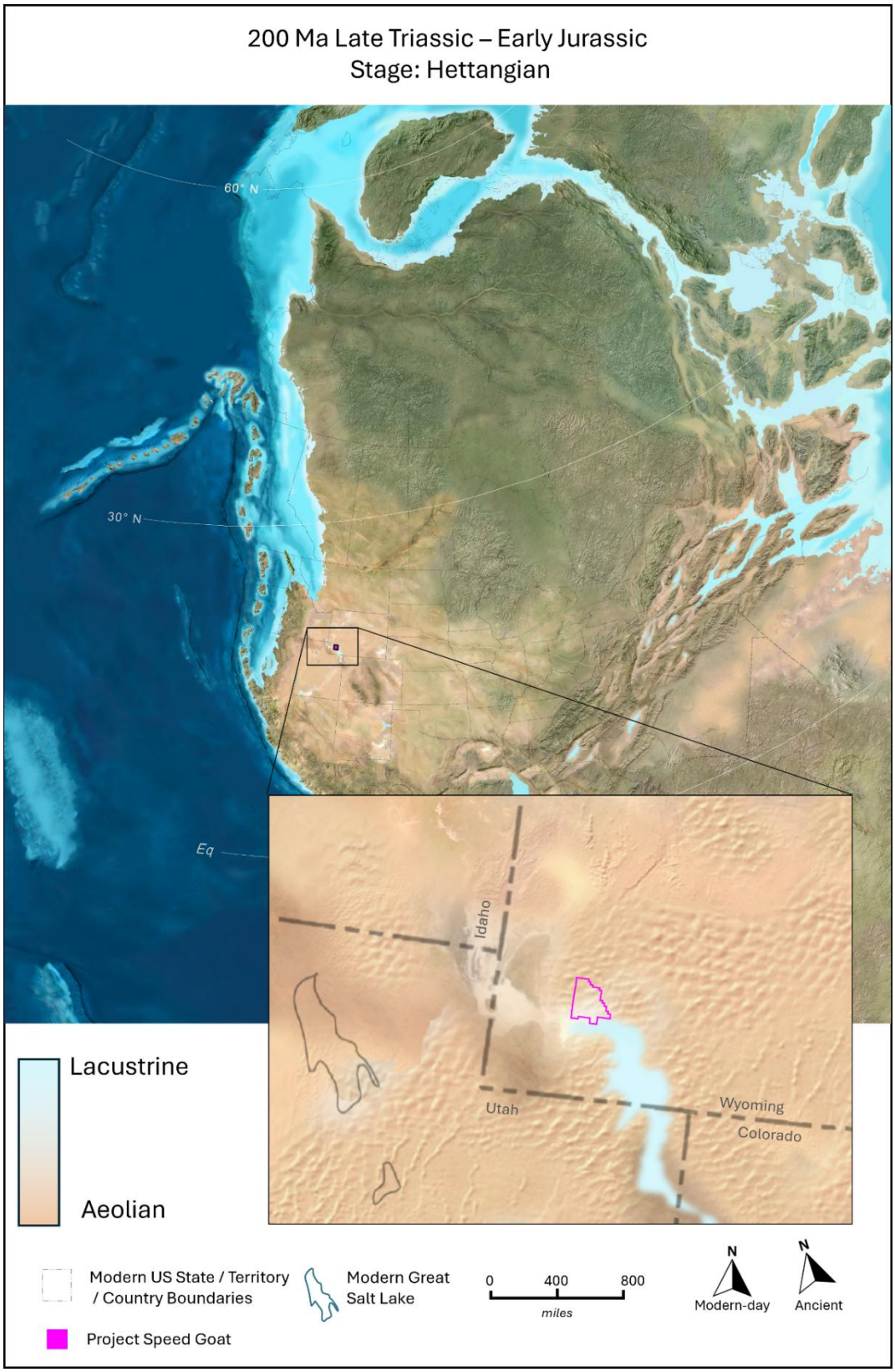


Figure A-1.7*. Paleogeography in Nugget time, modified after Blakey. Arid conditions with water bodies characterized the study area.*

Tectonic forces continued to shape the terrain during the Cretaceous with the rise of the Cordilleran Mountains to the west and the subsequent adjacent foreland basin opening to the east. The Cretaceous Western Interior Seaway formed, dividing the continent from the Arctic to Mexico, as shown in **Figure A-1.8**. The primarily clastic Dakota Formation (comprised of sandstones and conglomerates) was deposited, followed by a transgressive-regressive sequence including the marine Thermopolis Shale and the clastic Bear River Formation. The Mowry Shale (also known as Aspen) is a marine formation, easily identified on well logs, and was deposited in the Cretaceous Western Interior Seaway. The Frontier Formation consists of alternating shale and sandstone units representing a change in the environment of deposition from marine to nonmarine. The regression of Frontier time was followed by westward transgression resulting in the deposition of the Hilliard Shale (also called Baxter or Mancos), which is easily identifiable on well logs. The Mesaverde Group is a regressive-transgressive sequence including formations of fluvial, deltaic, and marine rocks. The growth of the Moxa Arch ceased about the end of the Cretaceous and the inner Cretaceous seaway began to close. This regression resulted in an unconformity above the Mesaverde. The Tertiary Almy (Hoback) Formation was deposited on an alluvial plain and consists of fluvial sediments and coal beds. The foreland basin adjacent to the Rocky Mountain highlands resulting from Laramide compression began to subside at an increased rate that continued through the Eocene. The Wasatch Group including the Almy Formation was deposited under fluvial conditions, while the Green River Formation was deposited under lacustrine conditions. Eocene deposition finished with the Bridger Formation, which consists of limestone, tuff, tuffaceous sandstone, and mudstone deposited in playa, lacustrine, fluvial, and volcanic settings (Murphey and Evanoff, 2007, Surdam 2010). Quaternary deposits include the Browns Park Formation, which is dominantly friable sandy tuff and tuffaceous sandstone (Hansen, 1986) and Quaternary alluvium with modern day sedimentation from rivers, including Hams Fork, which runs through the PSG area.

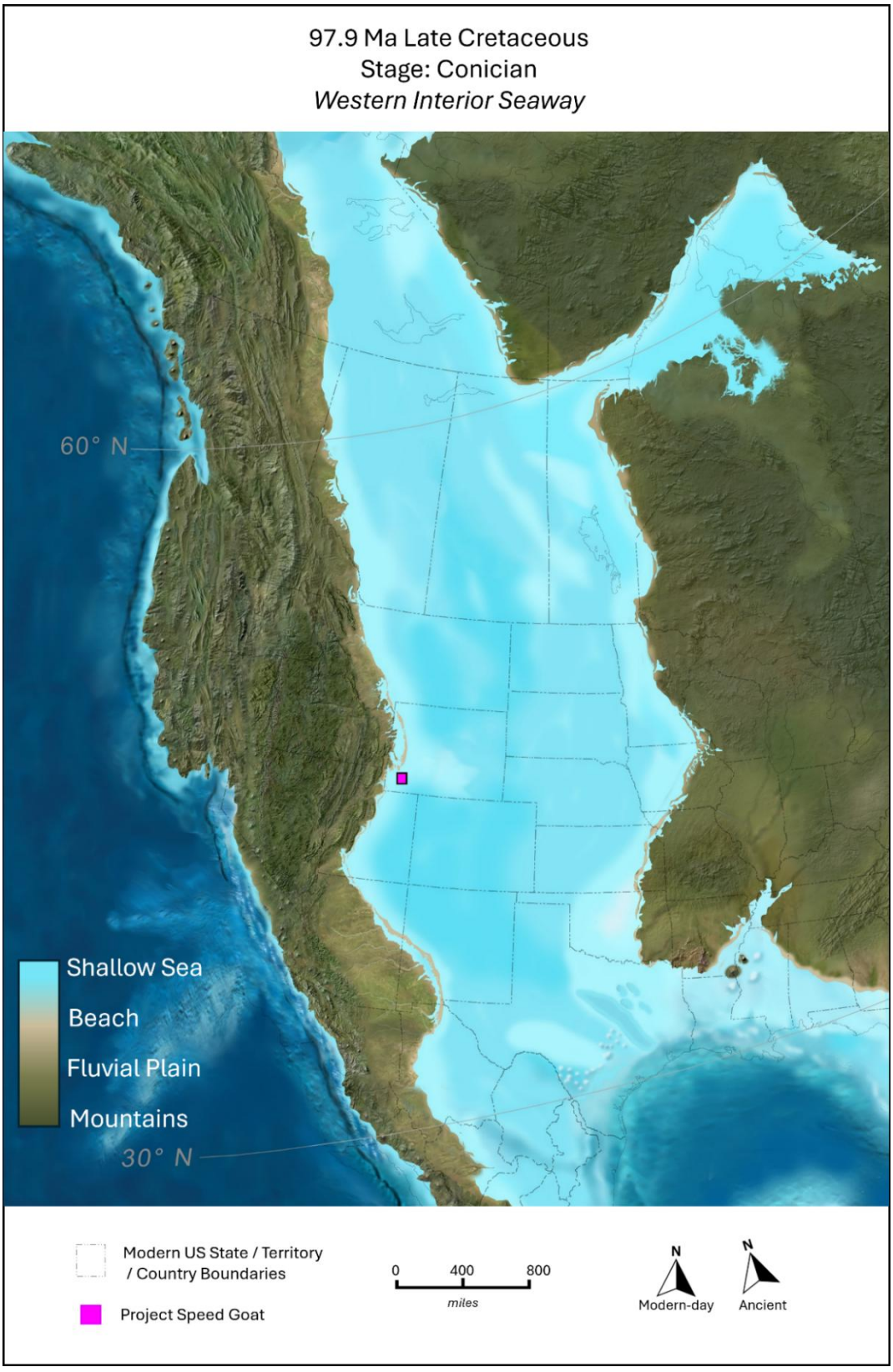


Figure A-1.8. *Western inner Cretaceous seaway. Modified from Blakey, 2023.*

A stratigraphic column for the Moxa Arch with dominant nomenclature, age and depth of the formations, and the type of reservoir is shown in **Figure A-1.9.** As discussed, the PSG area is delineated by shallow oil and gas wells, but the Nugget and Madison injection zones are a thousand or more feet deeper than oil and gas activity, and a thousand or more feet deeper than the shallowest possible USDW in the Dakota. The stratigraphic column shows that the target injection zones are over 700 feet thick with multiple confining zones that are each hundreds of feet thick.

Stratigraphic Section			
Age	**Formation / *Submember***	**Depth Below Surface (ft)**	**Approximate Thickness**
Neogene	Browns Park FM, Qa		
Paleogene	Bridger FM — Confirmed USDW	0	600
	Green River FM — Confirmed USDW	600	1,000
	Wasatch / Knight FM — Confirmed USDW	1,600	2,500
	Almy FM / Fort Union	4,100	1,600
Cretaceous	Mesaverde Group	5,700	2,100
	Lance FM	*5,700*	500
	Almond FM	*6,200*	500
	Ericson Sandstone — Possible USDW	*6,700*	1,100
	Hilliard/Baxter Shale — Confining	7,800	3,450
	Frontier FM — O&G Res / Possible USDW	11,250	250
	Aspen/Mowry Shale — Confining	11,500	400
	Bear River FM — Possible USDW	11,900	100
	Dakota Sandstone — O&G Res / Possible USDW	12,000	200
Jurassic	Morrison FM	12,200	700
	Sundance FM	12,900	800
	Stump	*12,900*	100
	Preuss	*13,000*	100
	Twin Creek Limestone	*13,100*	550
	Gypsum Spring FM — Confining	*13,650*	50
	Nugget Sandstone — CO_2 Storage	13,700	700
Triassic	Ankareh FM — Confining	14,400	600
	Thaynes Limestone	15,000	400
	Woodside Shale	15,400	600
	Dinwoody FM	16,000	100
Permian	Phosphoria FM — Confining	16,100	400
Carboniferous	Tensleep/Weber Sandstone	16,500	500
	Amsden FM — Confining	17,000	500
	Madison Limestone — CO_2 Storage	17,500	700
Devonian	Three Forks Shale — Confining	18,200	100
	Jefferson Limestone	18,300	200
Ordovician	Bighorn Dolomite	18,500	300

Figure A-1.9. *Stratigraphic column showing thicknesses, depths, and function of formations.*

The Fontanelle Unit II 35-22 (API 49-023-20483) type log with interpreted lithologies for all formations is found in **Figure A-1.10**, and a full-scale high-resolution copy is in ***Appendix A-1***. This well is 28 miles to the north of PSG (Sec 35 T26N R112W) but was selected based on its complete set of logs across all possible zones of interest from the Frontier to the Bighorn Dolomite. The interpreted shale volume and porosity logs demonstrate the clean nature of the injection zones and their relatively high porosity. The porosity and shale volume of the injection zones contrasts sharply with that of the confining zones (Twin Creek Limestone, Ankareh, Amsden, and Three Forks), which show high shale volume and low porosity. Note the redundancy in confining intervals, with the Madison being self-sealing and the Phosphoria acting as a secondary seal. Many subunits of the Sundance (such as the Gypsum Spring Formation) and parts of the Morrison are also considered sealing.

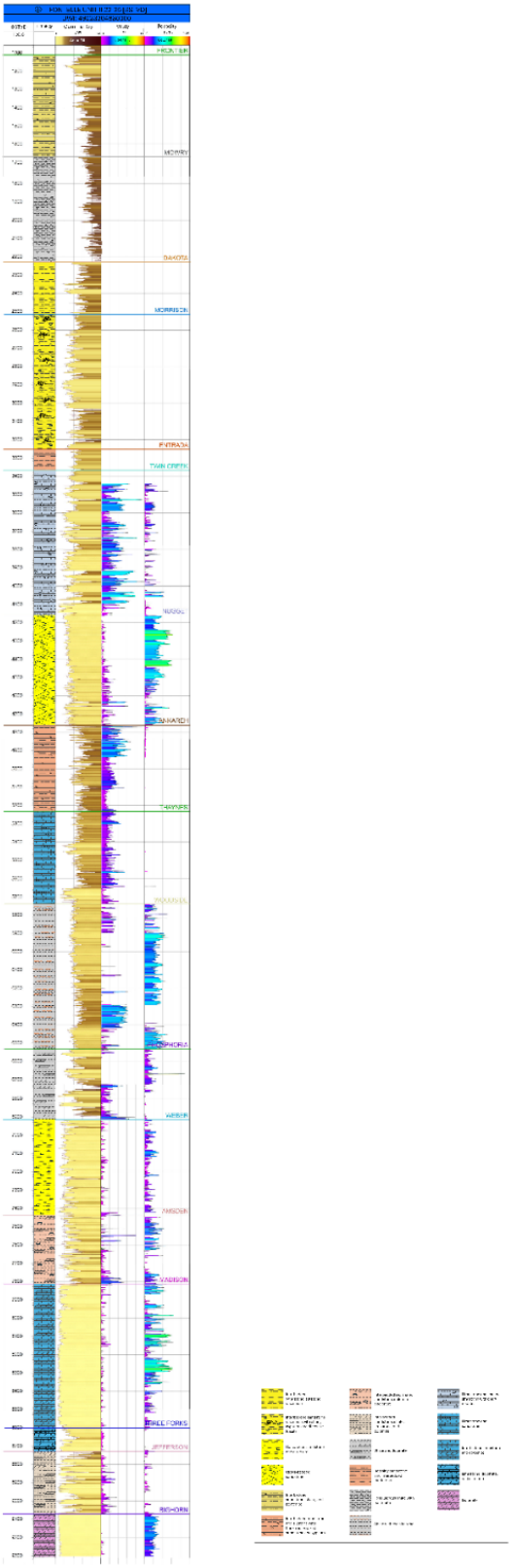


Figure A-1.10. *Type log with lithology.*

1.1.4 Regional Stratigraphy

In the previous section, the environment of deposition, lithology, and tectonic setting for the strata from the confining zones of the Devonian up through the Eocene were discussed. In this section, the stratigraphic descriptions are revisited in a regional context. Several of the formations at PSG are regionally widespread, with presence across Wyoming, Idaho, Montana, North Dakota, Colorado, Utah, New Mexico, Arizona, and other locations. In many cases, the formations have multiple names. The injection zones at PSG are located deep in the subsurface, but there are surface outcrops in prominent national parks and reserves from which to draw an understanding of their stratigraphy, fabric, and properties.

The Bighorn Dolomite is also known as the Fish Haven Formation in Utah and is widespread across the mountain west. Regionally, the Devonian strata are most commonly undifferentiated and called the Darby. At PSG, the Devonian is differentiated into the Jefferson Limestone below and the Three Forks Shale above. The Jefferson Limestone and Three Forks Shale are named for their exposures along the Jefferson Rivers in the Three Forks quadrangle, Montana (Ott 1980).

The Madison Limestone, a target injection zone, formed along an extremely extensive shelf margin that continued from northern Canada to the southern U.S., **Figure A-1.11** and **Figure A-1.12** show the interpreted position of the Madison shelf as well as the extent of the Madison Formation and other correlative limestones.

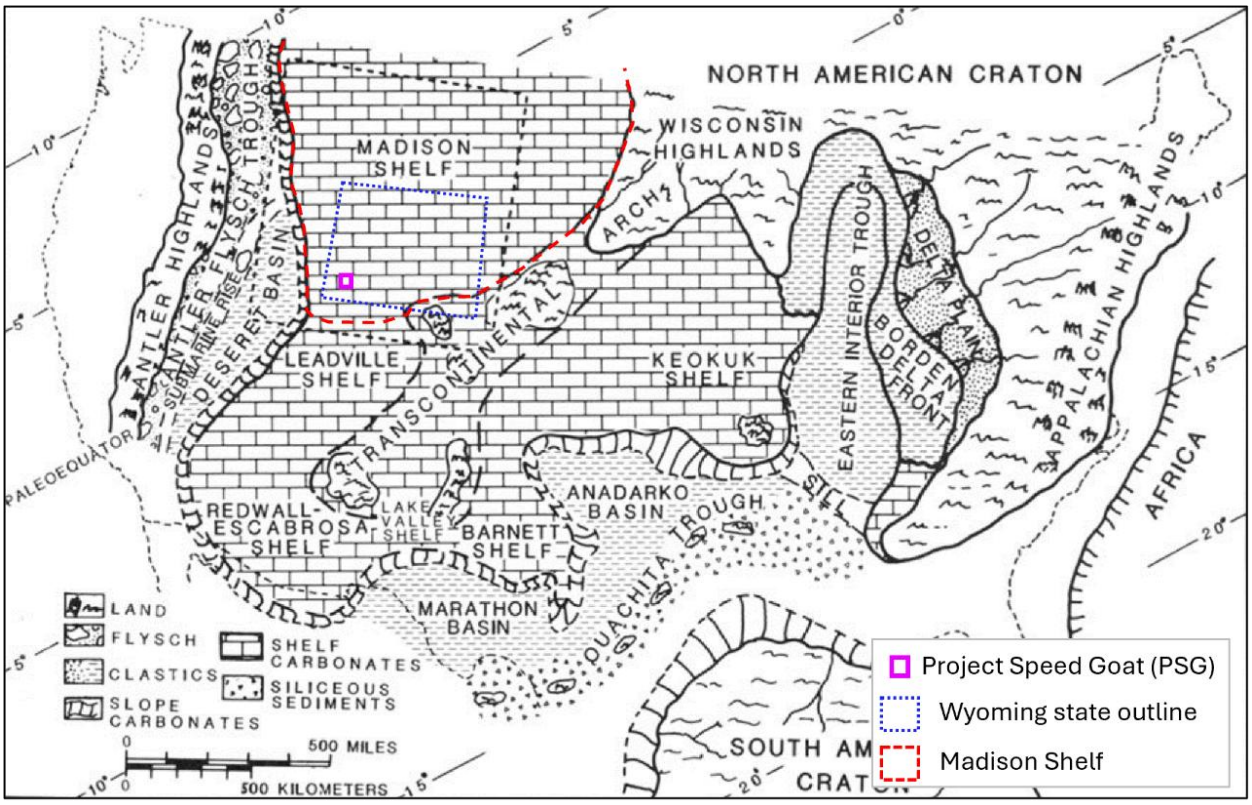


Figure A-1.11. *Aerial extent of the Madison and equivalents denoted by location of shelves, after Sando, 1988.*

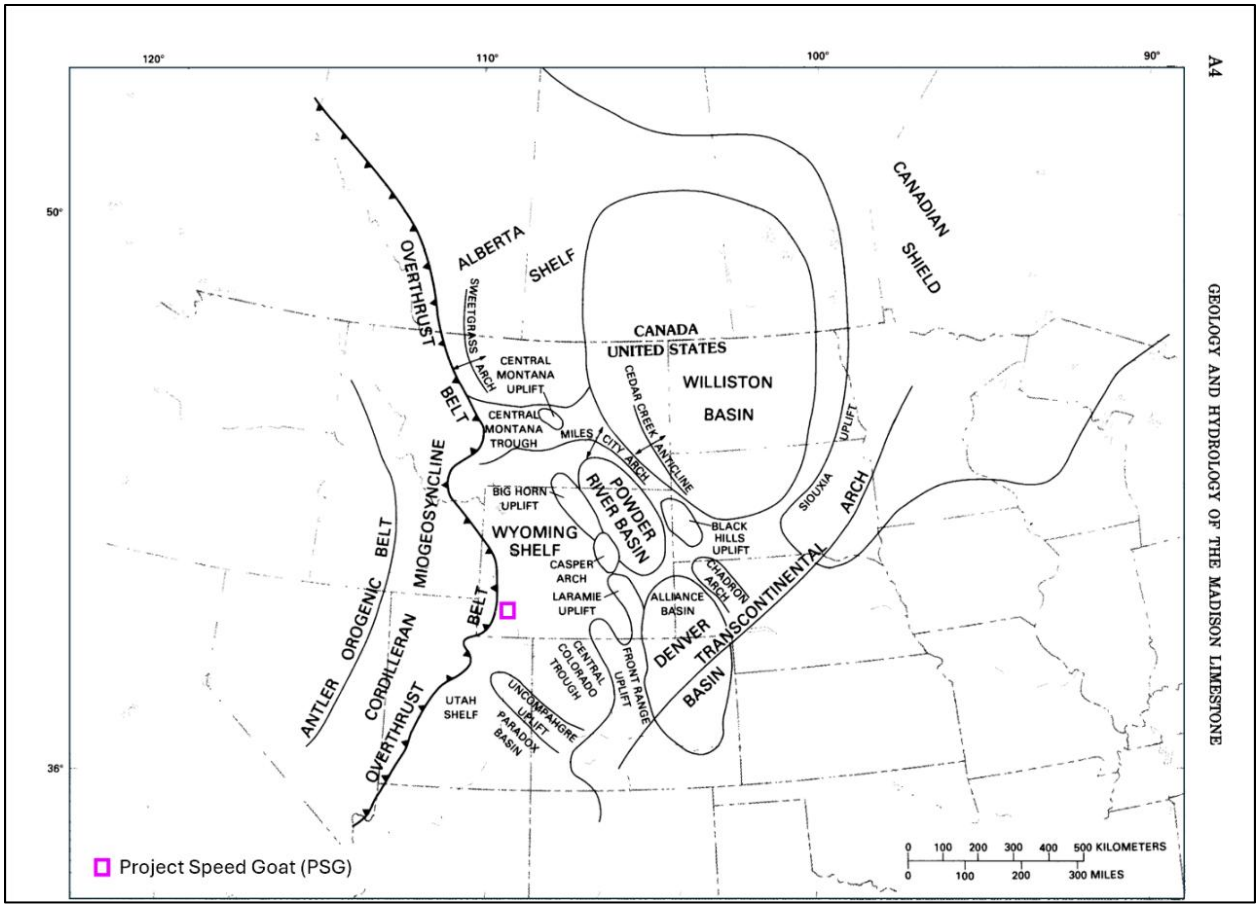


Figure A-1.12. *Regional view showing location of the Madison Sea and formations, modified after Peterson 1984.*

The shallow sea that enabled the deposition of the Madison Formation was very extensive and sequence boundaries within the Madison can be traced for tens of miles (Surdam 2010). The Madison may be differentiated into the Mission Canyon above and Lodgepole Limestone below. The Lodgepole Limestone is also called the Deseret Limestone, and its type locality is Lodgepole Canyon, Montana. The Mission Canyon Formation is also called the Brazer, and its type locality is Brazer Canyon in Utah (Ott 1980). Mount Sacajawea in the Wind Rivers Range is composed of Mission Canyon limestone and as such the formation is also called Sacajawea Formation (U.S. Geological Society (USGS) Geolex – Sacajawea Formation). The Mission Canyon also has outcrops along the Gallatin River at Logan, Montana (Sando and Dutro 1974), the Missouri River in the Gates of the Mountains, and in Deseret Canyon, Utah. Perhaps the most famous location of all to view Madison rocks is Lewis and Clark Caverns in Montana.

At the top of the Madison Formation is an unconformity representing sea level regression and subaerial exposure. This unconformity is associated with erosion and brecciated dissolution of the upper part of the Madison. This regressive event was superseded by the upper Pennsylvanian transgression of the Amsden Sea, which deposited shale in the solution joints and caverns of the upper Madison and acts as an effective seal above the Madison (Ott 1980). The widespread Amsden Formation, also known as the Fountain Arkose in other parts of

Wyoming and the Morgan in Utah (Sprinkel 2010) is named after the Amsden Branch of the Tongue River in Sheridan, Wyoming (USGS Geolex - Amsden n.d.).

At Moxa Arch, the Weber Sandstone nomenclature is typically used, while the name "Tensleep" dominates elsewhere in Wyoming and "Weber" dominates in Utah. The formation was named for its type locality in Weber Canyon, Utah (USGS Geolex – Weber Formation n.d.). Dinosaur National Monument has an impressive outcrop of Weber Sandstone. The Phosphoria is also called the Embar, Chugwater, or Park City Formation. It is named for its type locality in Phosphoria Gulch near Meade Park, Idaho (Ott 1980).

The overlying Dinwoody Formation is also referred to as the Embar or Chugwater and is named after the Dinwoody Canyon in the Wind River Range (Ott 1980). The Triassic Chugwater group is typically composed of the Woodside Shale, Thaynes Limestone, and Ankareh Formations. The Woodside Shale is also called the Red Peak Member or the Moenkopi and is named for its type locality in Woodside Gulch, Park City, Utah (Ott 1980, USGS Geolex – Woodside n.d.). The Thaynes Limestone is sometimes grouped with the Red Member and is named after Thaynes Canyon, Park City, Utah (Ott 1980). The Ankareh is time equivalent to the Popo Agie, the Jelm, and the Chinle in southern Utah and Arizona. It is named after Ankareh Ridge in Park City Utah and after the Chinle Valley of Apache County in Arizona (Ott 1980).

The Late Triassic-Early Jurassic Nugget Sandstone may be differentiated into the Lower Bell Springs Member or Shurtz Sandstone Tongue and the shallower Upper Member or Lamb Point Tongue (Sprinkel et al. 2011). The Nugget, which is an injection target, is called the Navajo in Arizona and many parts of Utah. Generally, where the Kayenta Formation is present as part of the Glen Canyon Group, the term Navajo is used (Sprinkel et al. 2011). The Kayenta Formation is a thin-bedded dark-red formation made up of lenticular, discontinuous sandstones, limestones and shales deposited in a fluctuating fluvial environment. Note that in some of these places, the Navajo Formation lies directly on top of the Kayenta Formation.

The Jurassic Gypsum Spring Formation, also called the Temple Cap Formation in Utah, is a member of the Sundance Formation and is present in southcentral Montana, Wyoming, and Utah. The Twin Creek Limestone, the upper confining zone for the Nugget, is also known as the Carmel Formation, especially in southern Utah (Everett, et al., 1989). It is named for its type locality on Twin Creek between Sage and Nugget, Wyoming (Imlay 1967). The Sundance Formation may be differentiated into the Stump and underlying Preuss (Entrada equivalent in Utah). Furthermore, the Stump is split into the Redwater and Curtis members in parts of Utah. The type locality is Stump Peak, Idaho (Ott 1980). The Upper Jurassic Morrison Formation is very extensive, with presence across the Rocky Mountain region as well as the plains of the Central U.S. and south into Texas. The Morrison Formation, named after Morrison, Colorado, and outcrops occur in Dinosaur National Monument, Arches National Park, Bighorn Canyon National Recreation Area, Glacier National Park (Montana), Glen Canyon National Recreation Area, Yellowstone National Park, and Wind Cave National Park.

Following an unconformity in the late Jurassic is the lower Cretaceous Dakota or Cloverly Formation, part of the Gannet Group. The Bear River Formation, named after Bear River City, Wyoming (Ott 1980) is sometimes differentiated into the lower Thermopolis Shale Member and the upper Muddy Sandstone Member. The Frontier Formation may also be called the Carlile or the Greenhorn. The very thick and extensive Hilliard or Baxter Shale has many names including the Mancos Shale, Niobrara, Cody and Lewis (Shaw and McGrew 1957). The overlying Adaville Formation is co-relative to the Niobrara and Cody as described. The Upper Cretaceous Mesaverde overlies, followed by the Tertiary Almy or Hoback Formation, also commonly called the Fort Union. In some Wyoming basins, the names Ferris or Polecat Bench are used as Almy time equivalents. The Knight or Wasatch Formation may also be called the Wildwood or Wind River Formation. The Green River Formation is named for its exposures along the Green River. The Bridger Formation may be called the Tatum. Finally, Quaternary fill tops the stratigraphic record including the Browns Park Formation.

The regional cross section shown in **Figure A-1.13** summarizes the geologic units and present-day structural elements. The Moxa Arch is in a structurally simple location relative to the Rock Springs Uplift to the east or the overthrust to the west (just west of the cross-section). Additional seismic data were acquired at PSG since the submission of the first three permits in the SCS Hub. The seismic data confirms the regional structural interpretation and shows the expanded area of investigation to be structurally quiet with very limited faulting. Further discussion of mapped faults follows in this form.

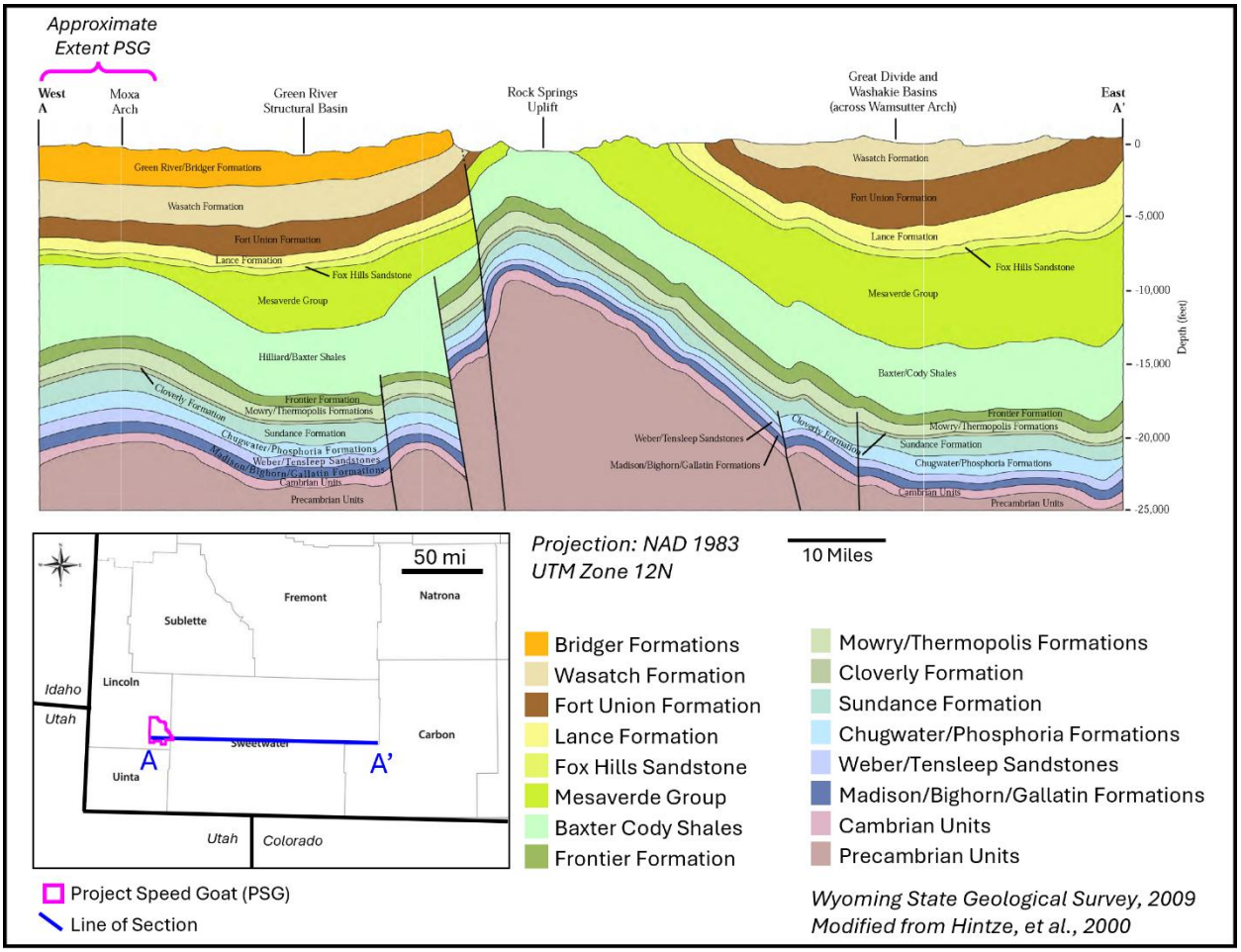


Figure A-1.13. *Regional east-west cross section through PSG showing its relationship to other structural features in the GGRB (from Clarey et.al., 2010 and references therein).*

1.1.5 Regional Hydrostratigraphy and Groundwater Flow

The content of **Section 1.1.5** relies heavily on images and data provided by the Wyoming Water Development Commission (WWDC). Unless otherwise cited, references are WWDC 2009. The GGRB has several aquifers from the surface to the Precambrian basement, most of which are saline (**Figure A-1.14.**). The Environmental Protection Agency (EPA) defines USDWs as those with total dissolved solids (TDS) less than 10,000 parts per million (ppm). Major aquifers are defined by the Wyoming Framework Water Plan (WWC Engineering, 2007) as aquifers that are water saturated and have permeability sufficient for deliverability. Minor aquifers have lower reservoir quality and are often less regionally extensive than major aquifers, with wells yielding 50 gallons per minute (gpm) or less. Marginal aquifers are recharged at outcrops on the basin margins and may produce oil and gas from further within the basin.

Fresh water major aquifers within the GGRB include the Bridger, Green River (Laney Member), and Wasatch Formations. The Frontier Formation and the Bear River Formation are considered marginal aquifers and USDWs although they are oil and gas producers regionally and in the Area of Review (AoR). The Dakota Formation is a major aquifer with water samples demonstrating a wide range of salinity from fresh to saline and is a hydrocarbon producer. Conservatively, the PSG AoR has been defined using the Dakota as the lowest known USDW. Several saline aquifers including the Fort Union, Mesaverde, Sundance, Nugget, Thaynes, Woodside Shale, Phosphoria, Weber, Madison, Bighorn Dolomite, Gallatin, Flathead, and Precambrian Formations are present in the AoR.

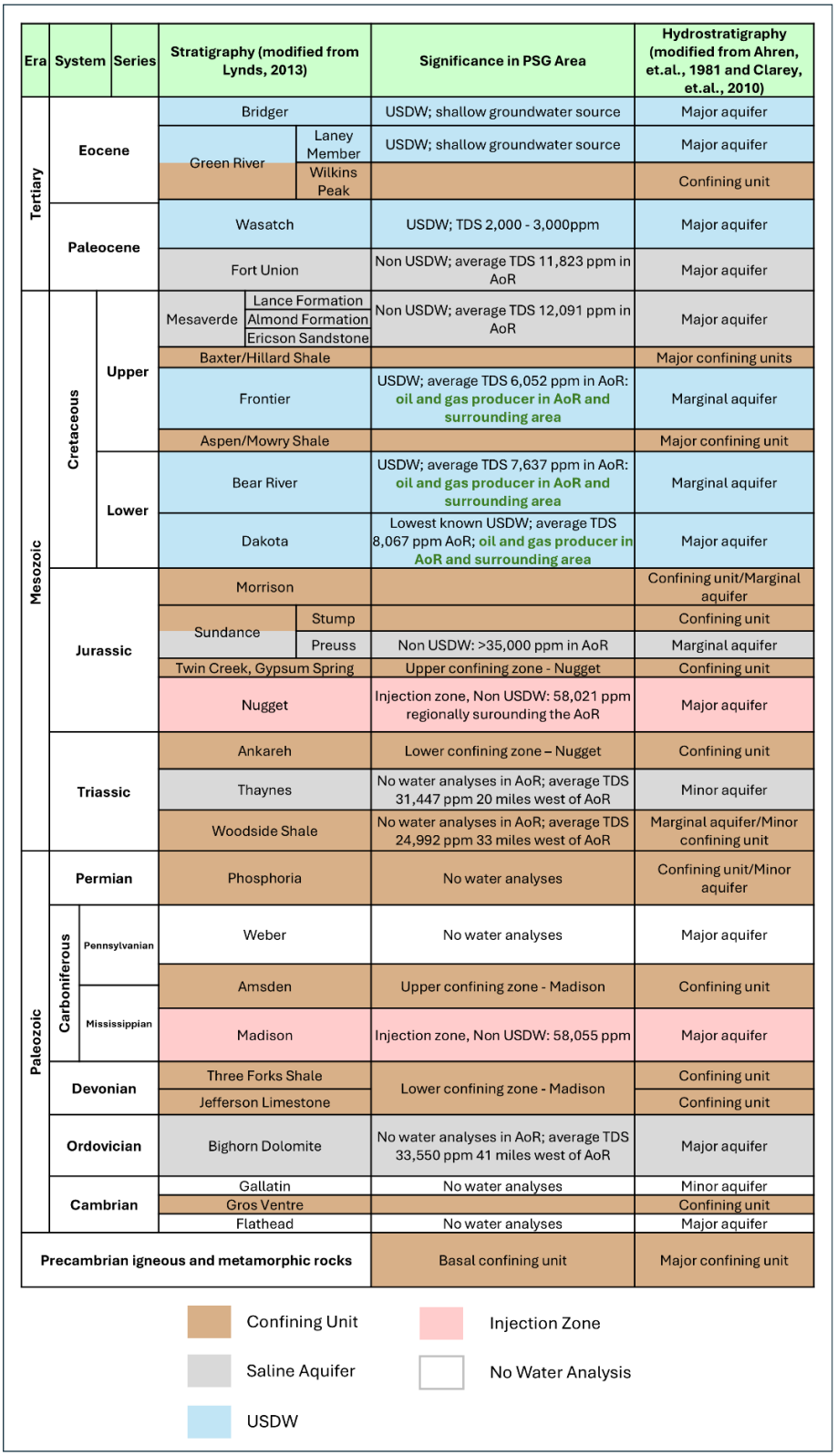
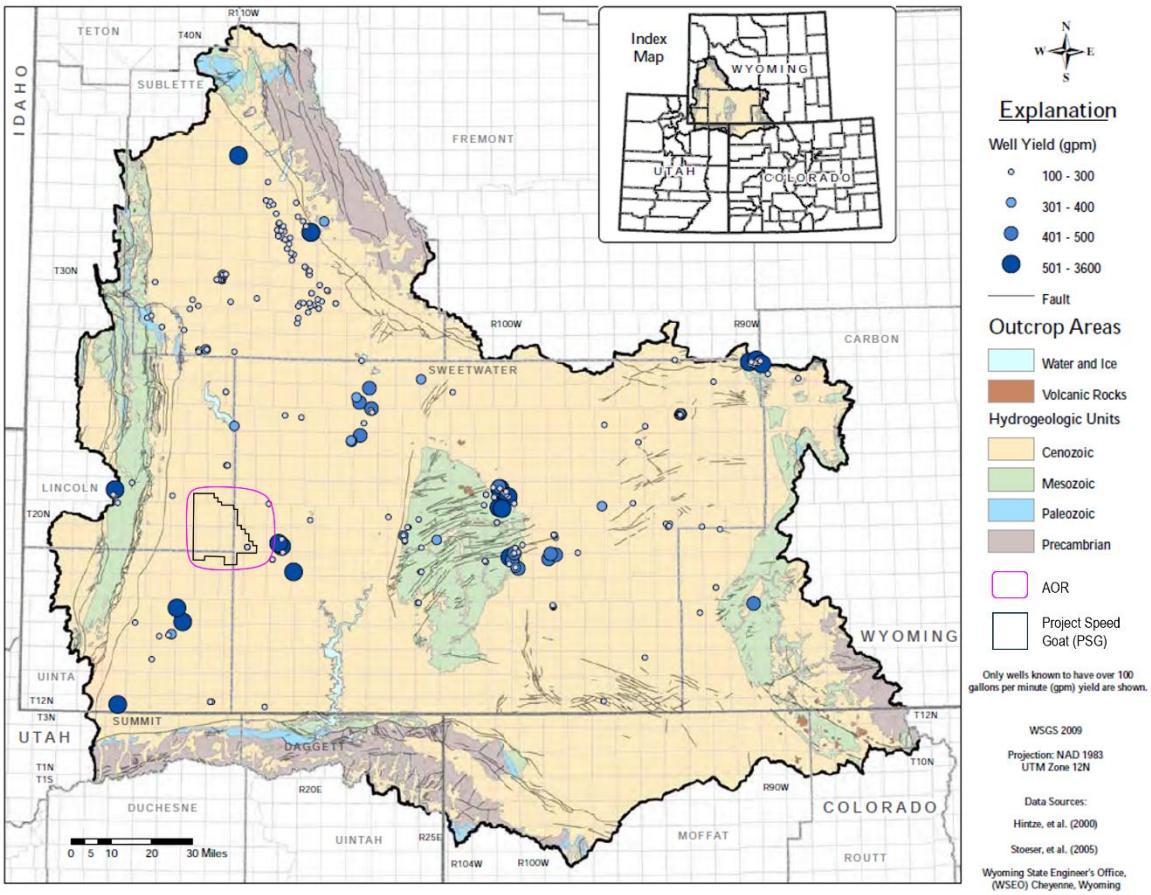


Figure A-1.14. *Stratigraphy with aquifers from the surface to the Precambrian.*

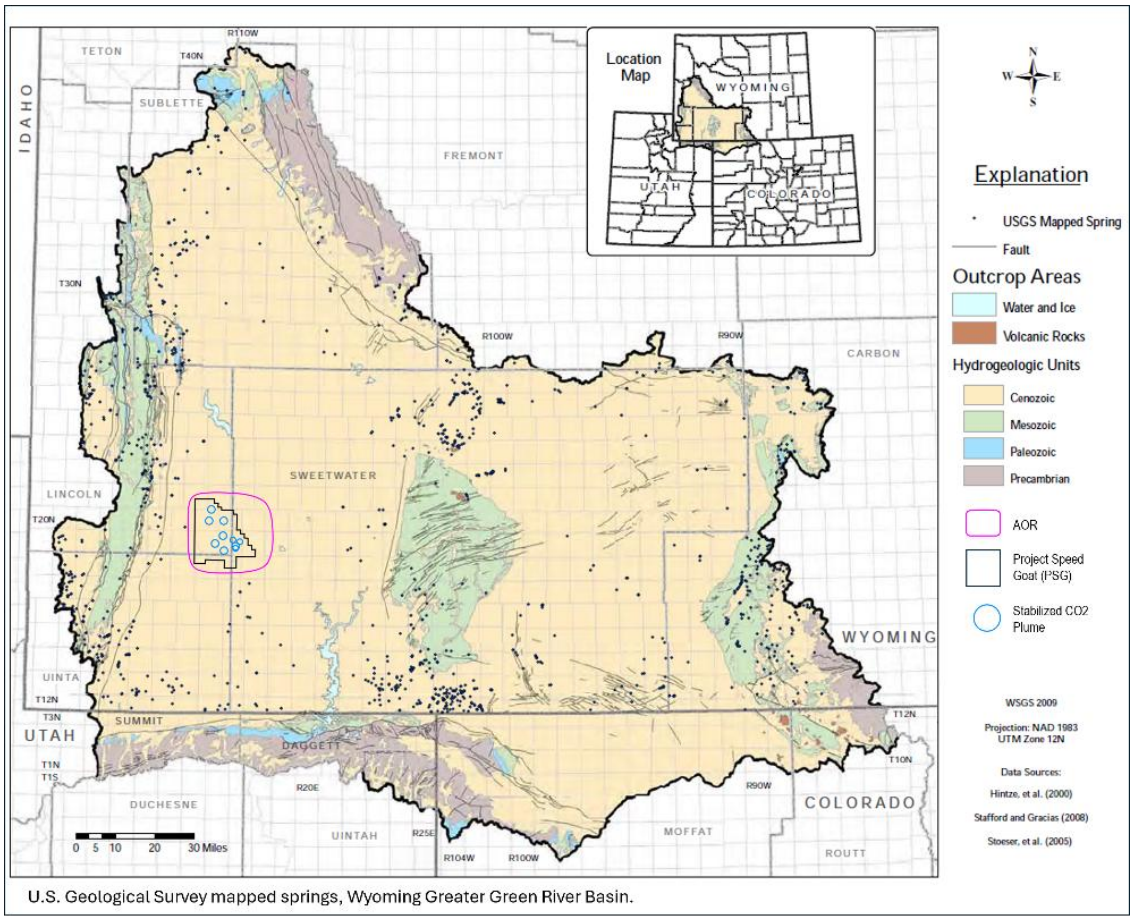
A map of wells in the AoR including oil and gas wells and groundwater wells is presented in ***Form A project Information, Appendix A, Figure A.2 (1 through 29)***. Within the AoR, there are several relatively low yield water wells as shown by the Wyoming State Engineer's Office. Only two of these produce 100 to 300 gpm as seen in **Figure A-1.15.**



Yields greater than 100 gallons per minute from wells permitted by the Wyoming State Engineer's Office, Wyoming Greater Green River Basin.

Figure A-1.15. *Water wells yield at least 100 gallons per minute.*

Springs identified by the USGS within the GGRB are shown in **Figure A-1.16**. No springs intersect the PSG location, stabilized plumes related to CO_2 injection of the PSG and SCS Hub wells, or the AoR.



U.S. Geological Survey mapped springs, Wyoming Greater Green River Basin.

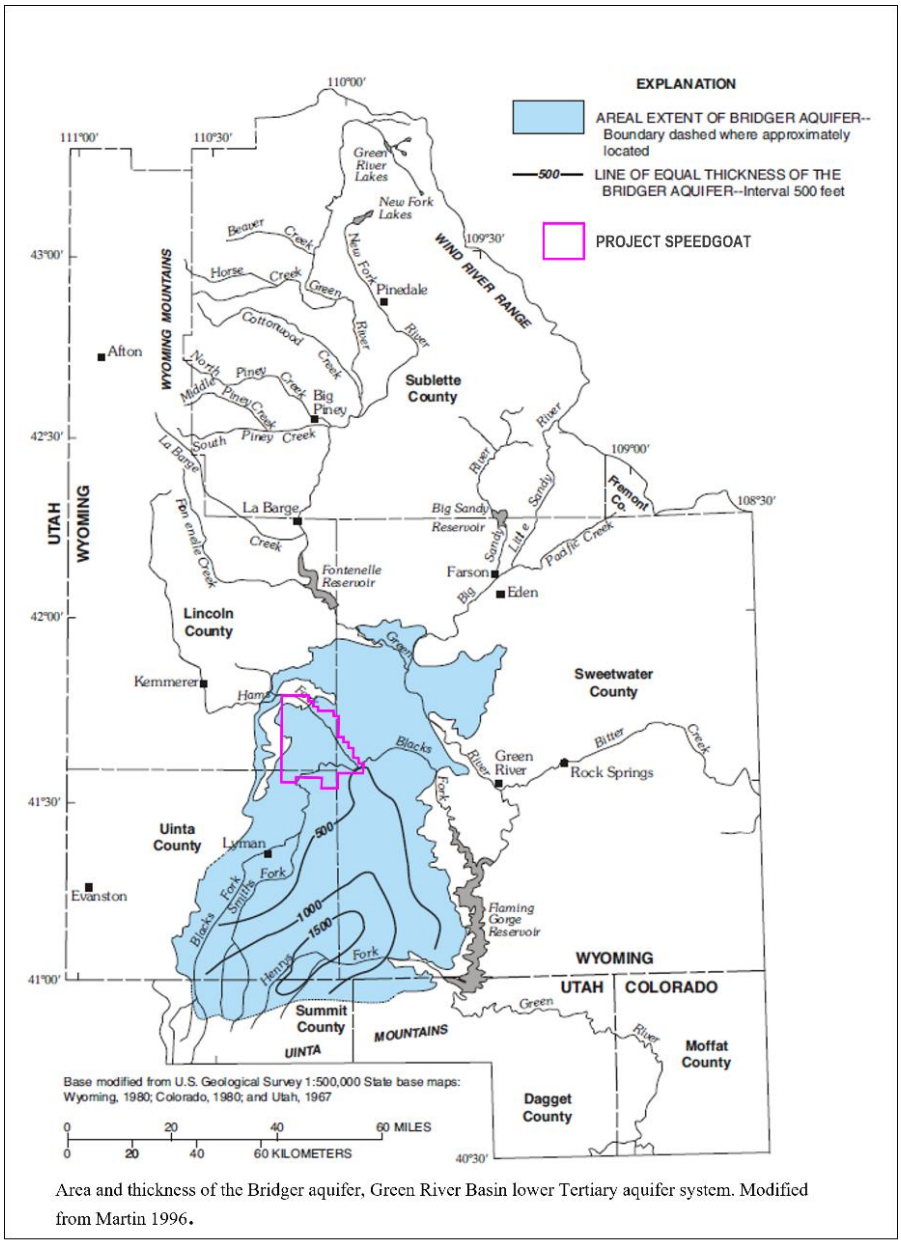
Figure A-1.16*. Springs within the GGRB. The AoR is in an area without mapped springs, modified after WWDC 2009.*

1.1.5.1 Description of Freshwater Aquifers

The freshwater aquifers from the surface to the Precambrian are detailed in this section. Lithology, thickness, regional extent, potentiometric surfaces and direction of groundwater flow are given as available.

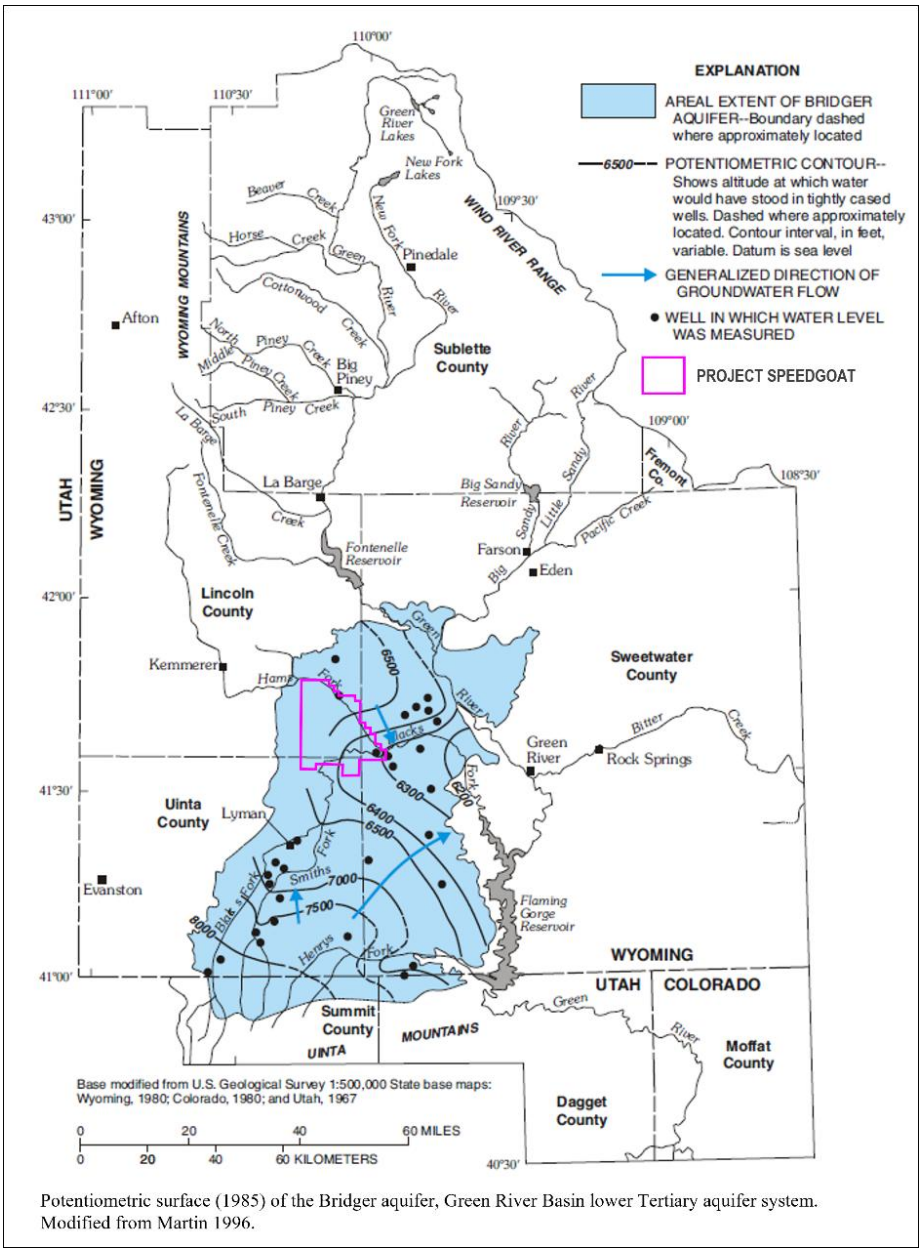
Bridger Major Aquifer

The Eocene Bridger Formation was deposited in floodplain and fluvial environments with the imprint of several volcanic eruptions. The dominant lithology is tuffaceous mudstone with interbedded sandstone, limestone and volcanic ash. The formation is locally about 500 feet thick. **Figure A-1.17** shows the thickness of the Bridger and **Figure A-1.18** shows the potentiometric surface and direction of groundwater flow.



Area and thickness of the Bridger aquifer, Green River Basin lower Tertiary aquifer system. Modified from Martin 1996.

Figure A-1.17. *Bridger aquifer thickness and extent relative to PSG, modified after WWDC 2009.*

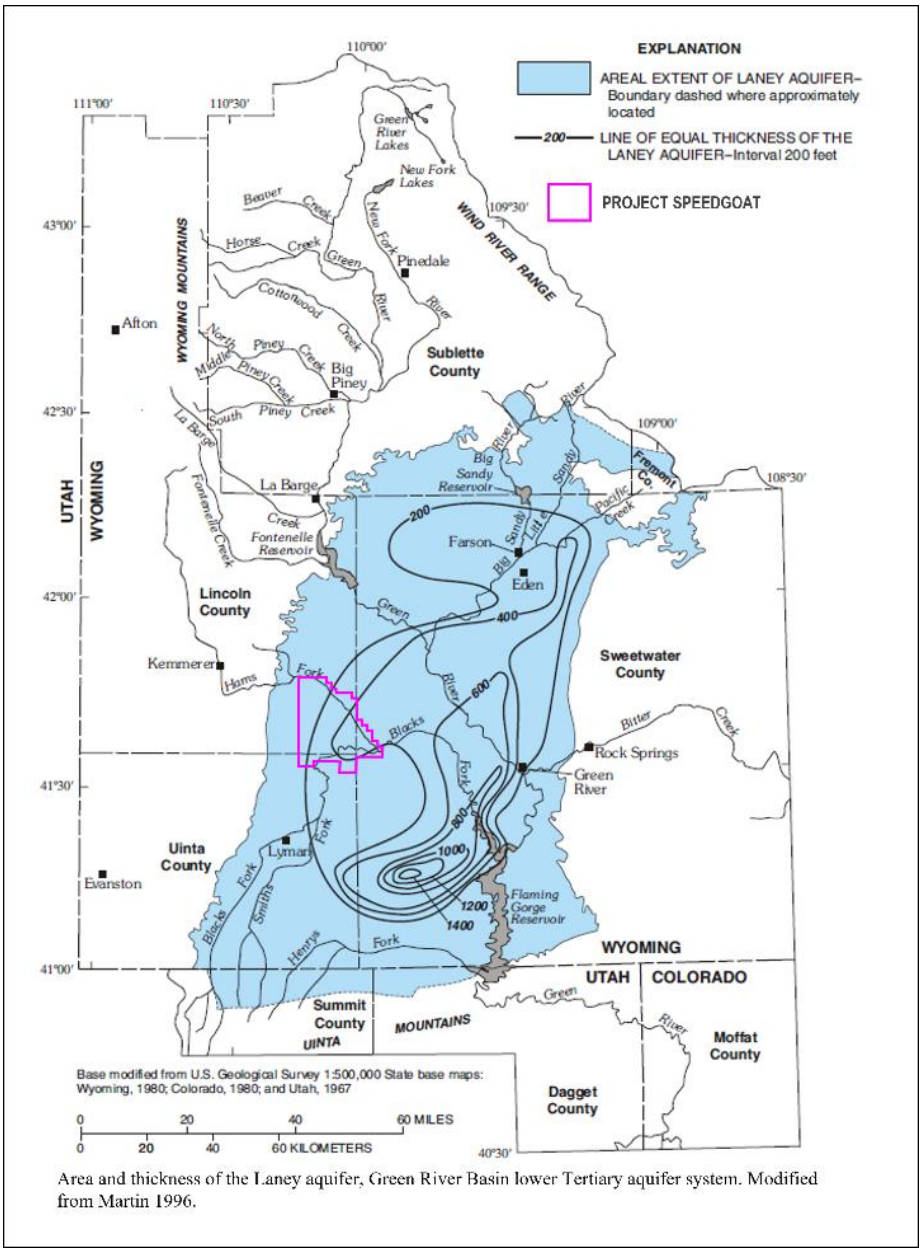


Potentiometric surface (1985) of the Bridger aquifer, Green River Basin lower Tertiary aquifer system. Modified from Martin 1996.

Figure A-1.18. *Bridger aquifer groundwater flow and potentiometric surface, modified after WWDC 2009.*

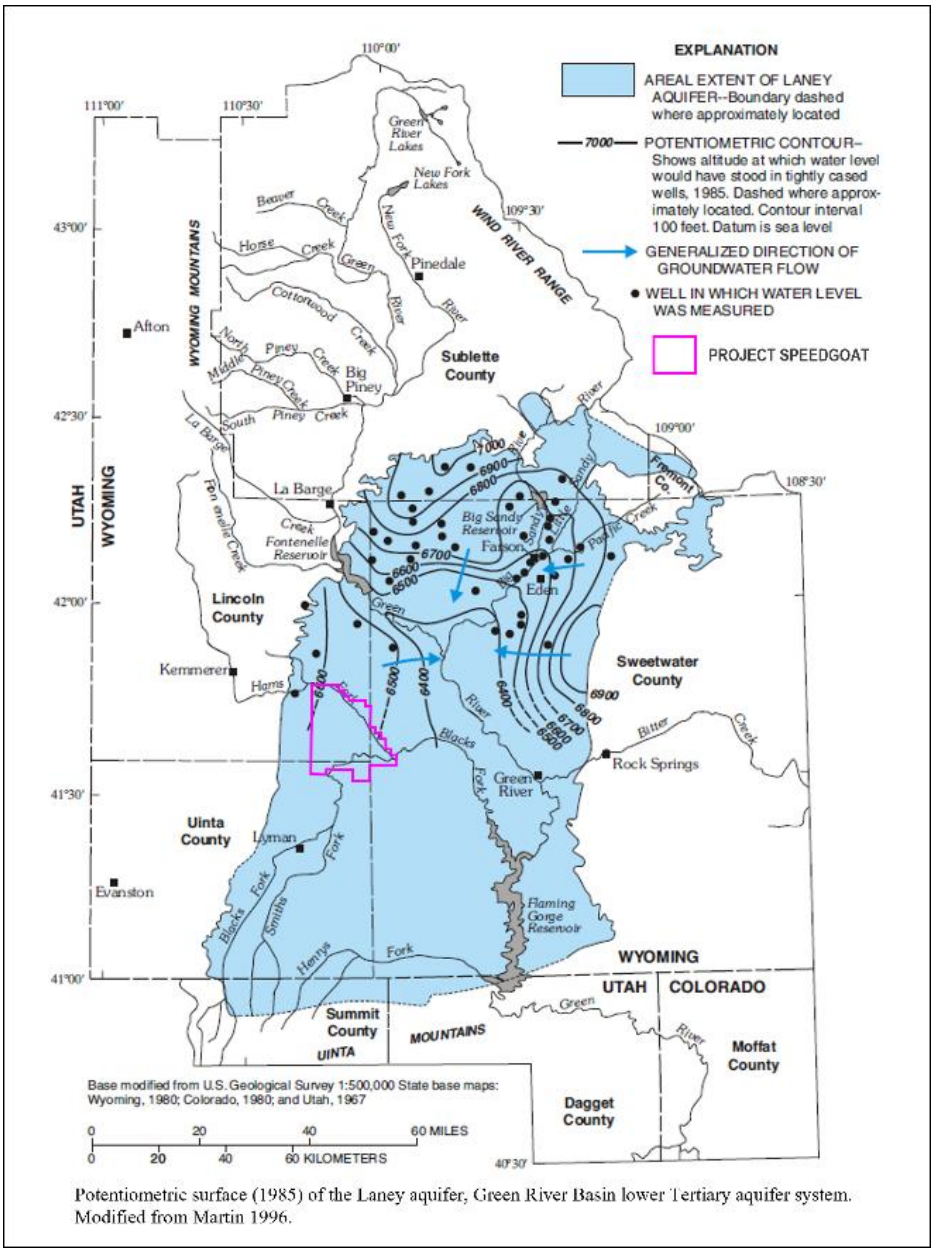
Laney Major Aquifer

The Eocene Green River Formation is a sandy mudstone that was deposited in a largely lacustrine environment. The Laney member is composed of shale and muddy sandstone with some marl and volcanic input. In the PSG AoR it is about 200 feet (**Figure A-1.19**). The potentiometric surface and groundwater flow in the Laney aquifer is shown in **Figure A-1.20**. To the north, the Laney aquifer intertongues with the Wasatch-Fort Union aquifer with water moving from the Fort Union into the Laney as shown in **Figure A-1.21**.



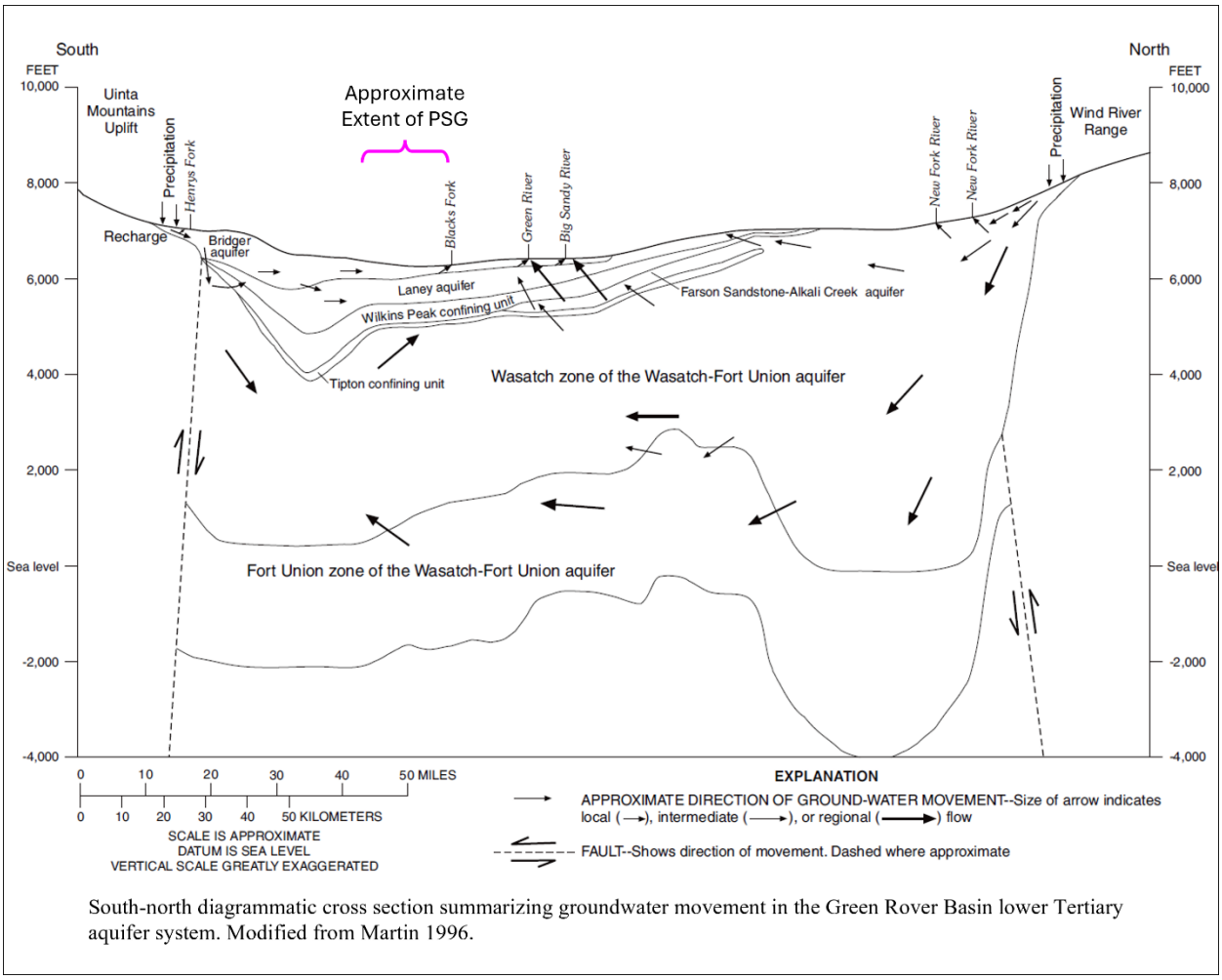
Area and thickness of the Laney aquifer, Green River Basin lower Tertiary aquifer system. Modified from Martin 1996.

Figure A-1.19. *Laney aquifer thickness and extent relative to PSG, modified after WWDC 2009.*



Potentiometric surface (1985) of the Laney aquifer, Green River Basin lower Tertiary aquifer system. Modified from Martin 1996.

Figure A-1.20. *Laney aquifer groundwater flow and potentiometric surface, modified after WWDC 2009.*

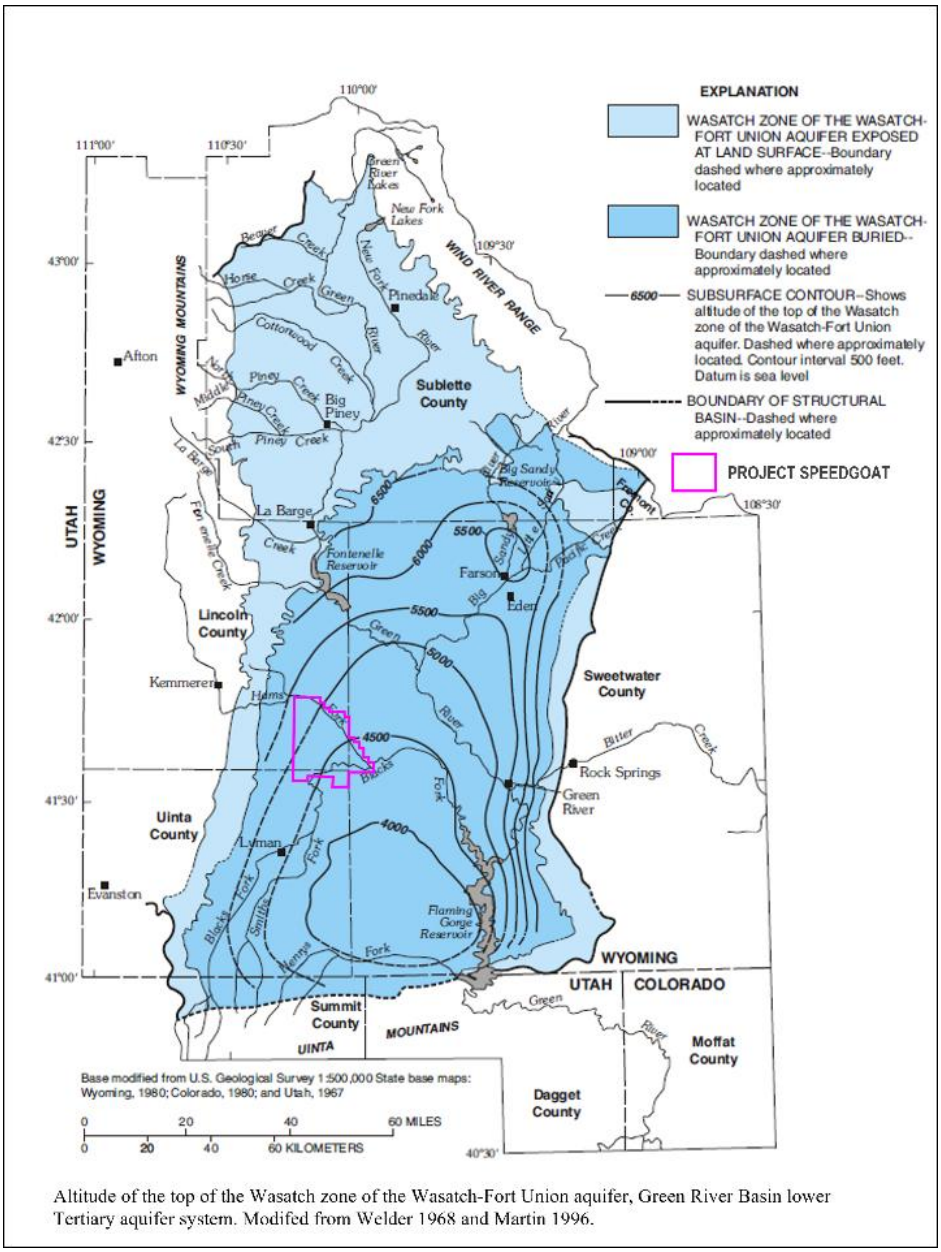


South-north diagrammatic cross section summarizing groundwater movement in the Green Rover Basin lower Tertiary aquifer system. Modified from Martin 1996.

Figure A-1.21. *Vertical movement of groundwater in Tertiary aquifers.*

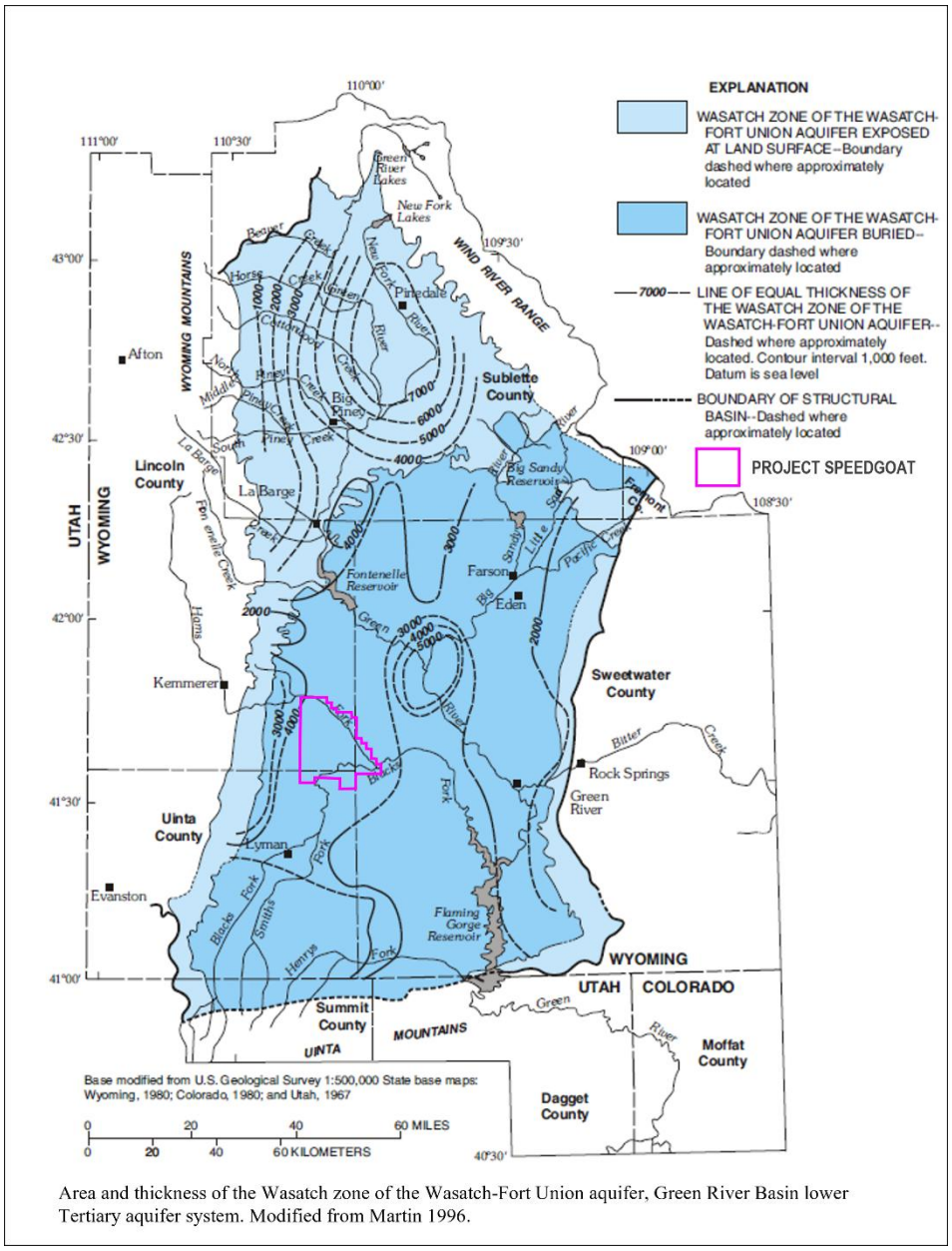
Wasatch Major Aquifer

The Eocene Wasatch Formation was deposited into the ancient Lake Gosiute of the Green River Basin. The sediments record episodic rising and falling water levels and are largely fluvial, alluvial, lacustrine, and deltaic. The Wasatch Formation can be subdivided into several interfingering deposits and members. Many lithologies are represented but sandstone, mudstone, and conglomerate dominate. The Wasatch Formation deepens to the southeast (**Figure A-1.22**) and is about 3,000 feet thick in the AoR (**Figure A-1.23**). The potentiometric surface and direction of groundwater flow in the Wasatch-Fort Union aquifer is shown in **Figure A-1.24**.



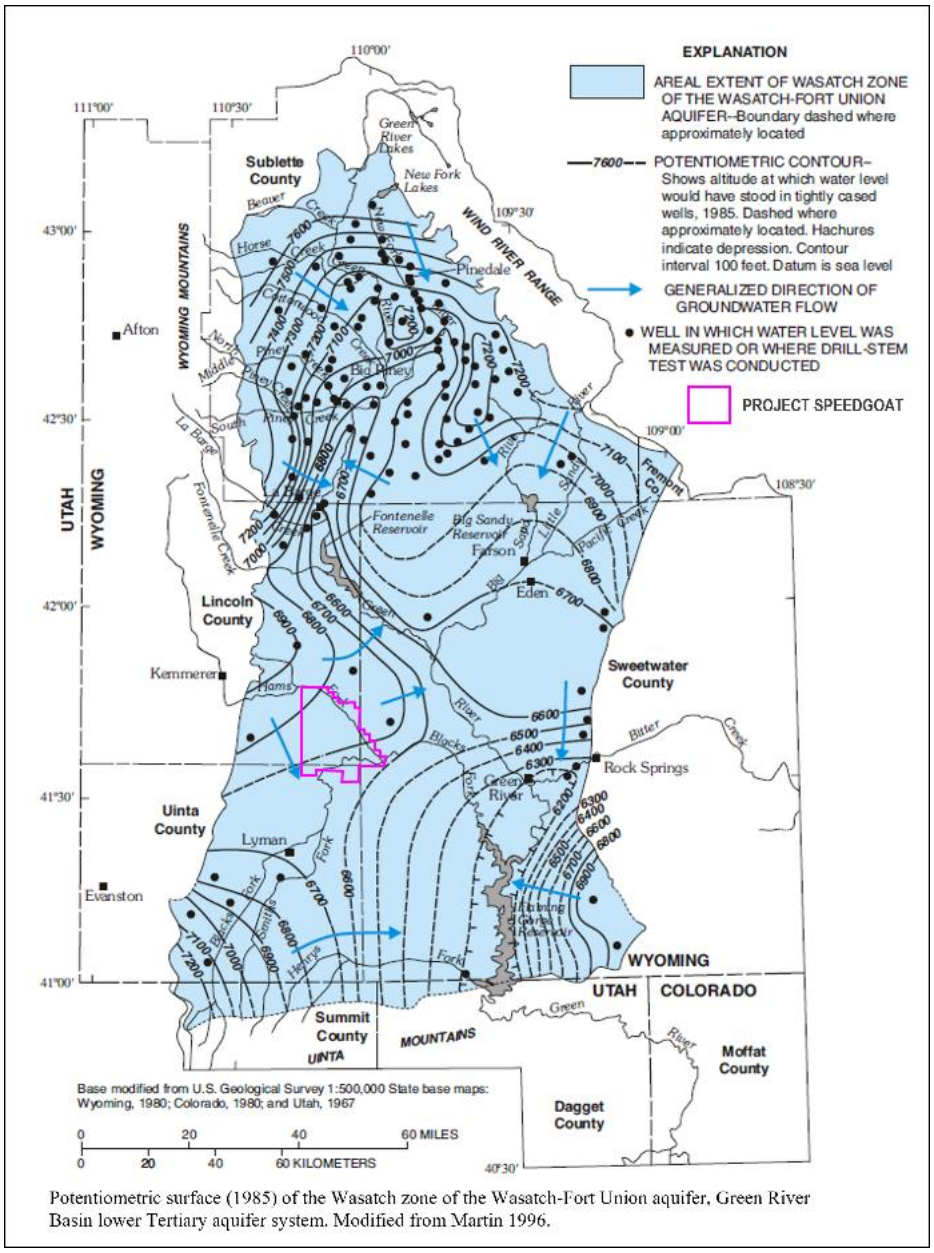
Altitude of the top of the Wasatch zone of the Wasatch-Fort Union aquifer, Green River Basin lower Tertiary aquifer system. Modifed from Welder 1968 and Martin 1996.

Figure A-1.22. *Wasatch aquifer structure, modified after WWDC 2009.*



Area and thickness of the Wasatch zone of the Wasatch-Fort Union aquifer, Green River Basin lower Tertiary aquifer system. Modified from Martin 1996.

Figure A-1.23. *Wasatch aquifer thickness and extent relative to PSG, modified after WWDC 2009.*



Potentiometric surface (1985) of the Wasatch zone of the Wasatch-Fort Union aquifer, Green River Basin lower Tertiary aquifer system. Modified from Martin 1996.

Figure A-1.24. *Wasatch aquifer groundwater flow and potentiometric surface, modified after WWDC 2009.*

Frontier Marginal Aquifer

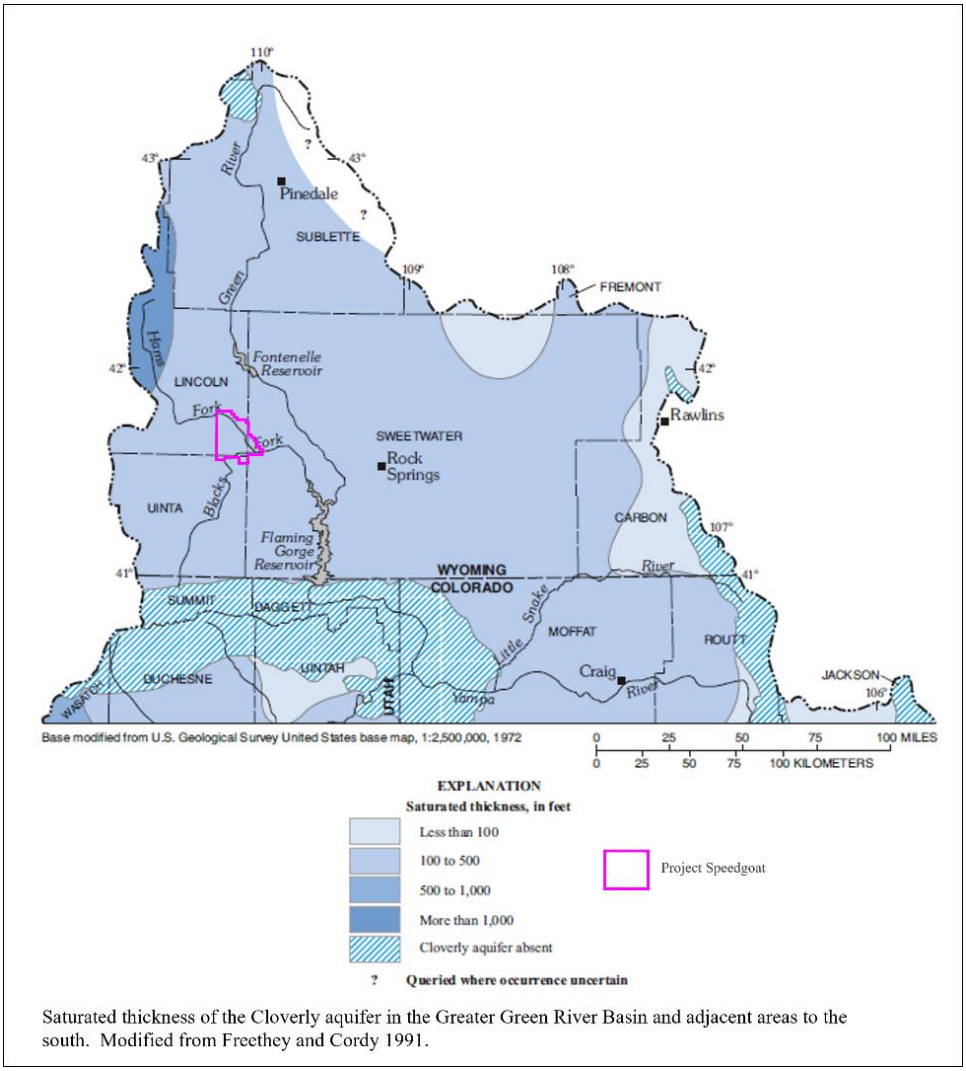
The Frontier Sandstone was deposited in a marine environment and is composed of sandstone, shale, and conglomerate. The Frontier is a marginal aquifer that outcrops along the basin edges in uplifted areas and produces oil and gas. It is about 250 feet thick in the PSG AoR. No potentiometric surface or groundwater flow figures are available from the WWDC for this aquifer.

Bear River (Muddy) Marginal Aquifer

The Lower Cretaceous Bear River Formation or Muddy Sandstone outcrops near the basin edges, produces oil and gas centrally, and as such is classified as a marginal aquifer. The Bear River Formation is often differentiated as the Muddy Sandstone Member above and the Thermopolis Shale below, especially to the east. The fine- to medium-grained sandstone is about 100 feet thick in the PSG AoR. No potentiometric surface or groundwater flow figures are available from the WWDC for this aquifer.

Dakota Major Aquifer and Lowest Possible USDW

The Lower Cretaceous Dakota Formation is an oil and gas producer and a major aquifer. Salinity values vary widely regionally and within the PSG AoR. This range in values causes some uncertainty, but the Dakota Formation is conservatively used as the lowest known USDW for establishing the PSG AoR. The Dakota Formation is a fluvial deposit, which is composed largely of sandstone with some quartzite, conglomerate, shale and coal. Locally the Dakota Formation is about 200 feet thick as seen in **Figure A-1.25**.



Saturated thickness of the Cloverly aquifer in the Greater Green River Basin and adjacent areas to the south. Modified from Freethey and Cordy 1991.

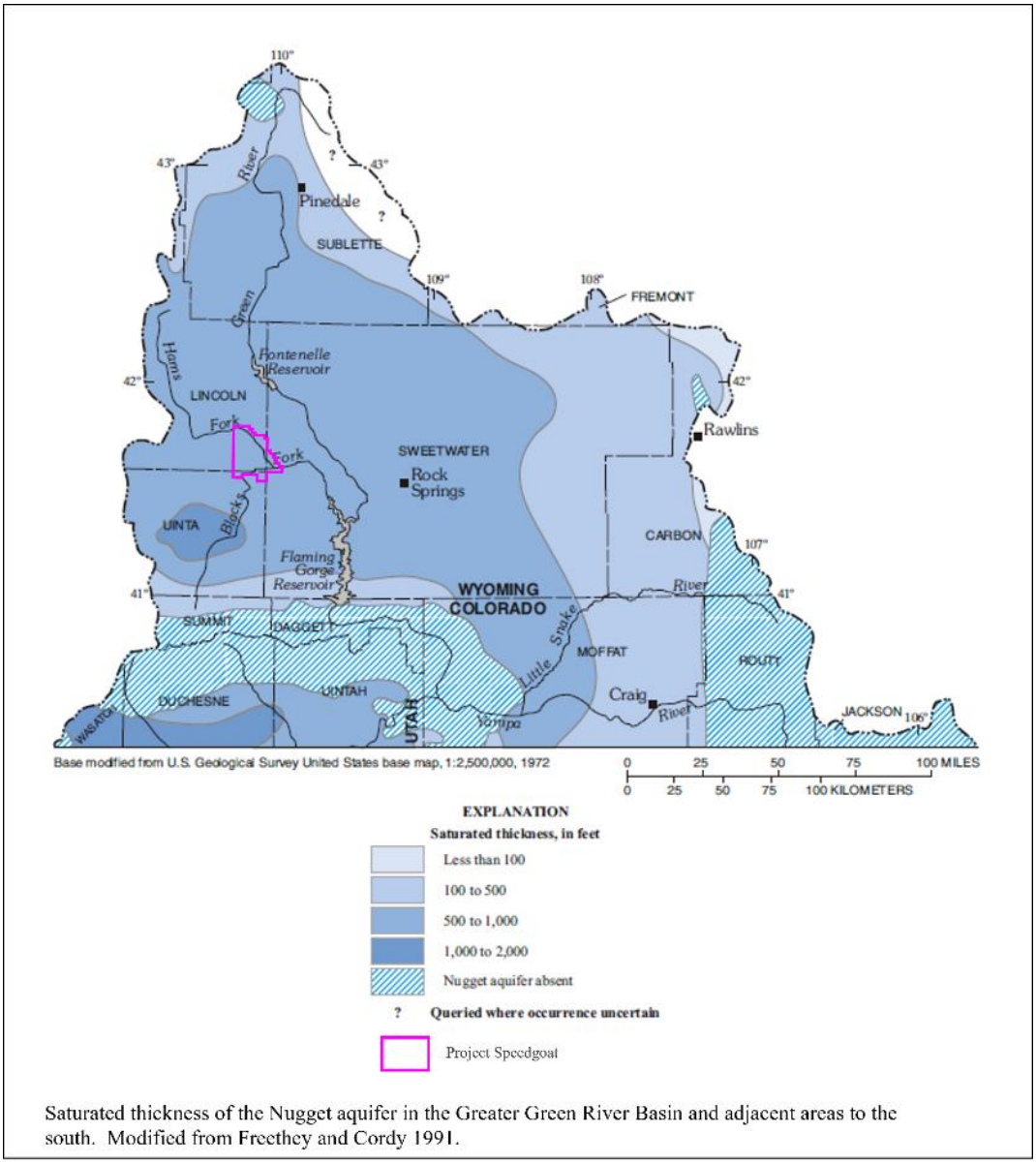
Figure A-1.25. *Cloverly aquifer thickness and extent relative to PSG, modified after WWCG 2009.*

1.1.5.2 Description of Injection Zone Aquifers

The Nugget and Madison injection zones are saline aquifers. Their thickness, extent, salinity, and any available information about recharge, discharge, and groundwater flow is presented below.

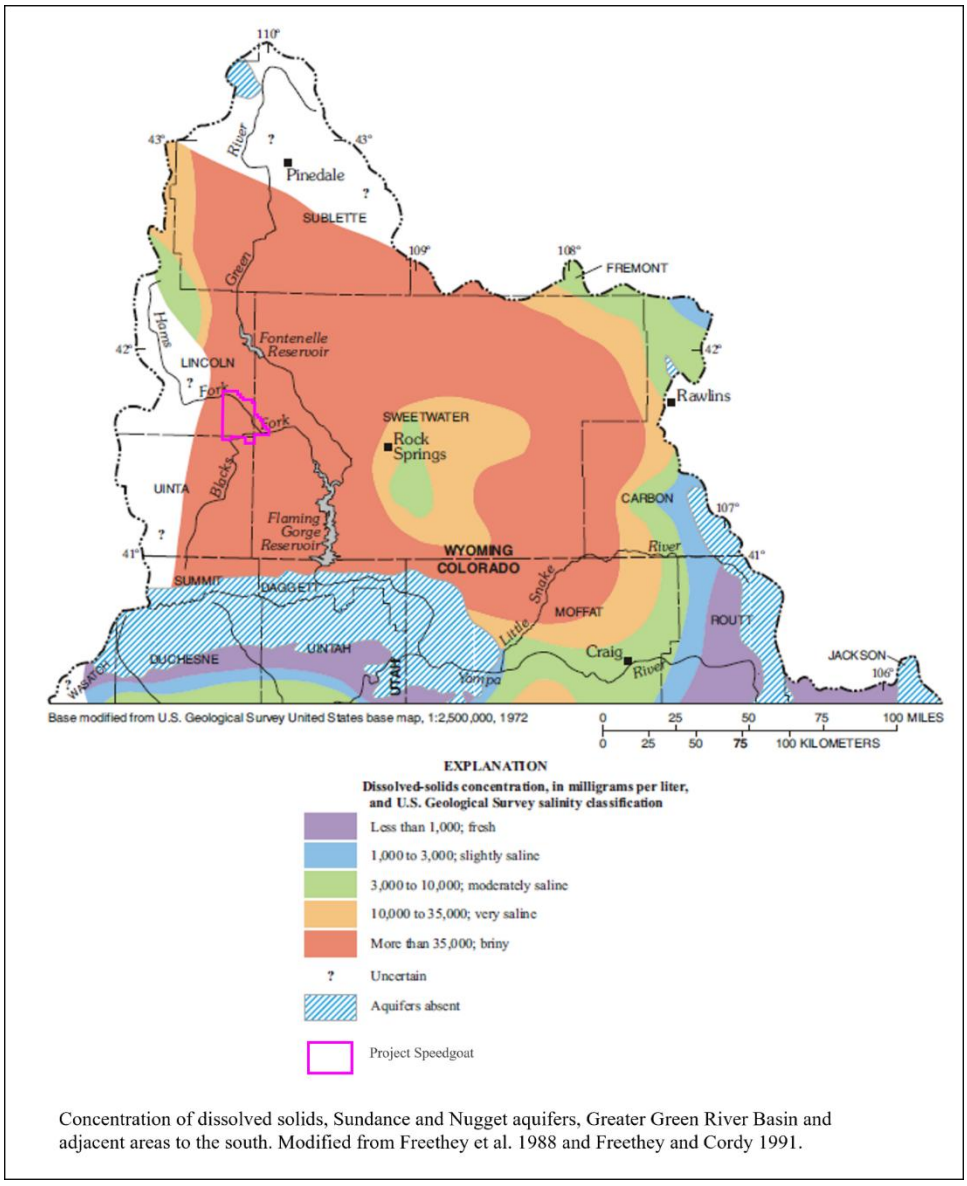
Nugget Injection Zone Major Aquifer

The Triassic-Jurassic Nugget Formation is an eolian sandstone about 700 feet thick in the AoR (**Figure A-1.26**). The aquifer has high salinity as seen in **Figure A-1.27** and regional data show an average salinity of 58,021 ppm (**Table A-1.1**) with salinity at Moxa Arch significantly higher. Potential areas of recharge into the Nugget are shown in **Figure A-1.28** and **Figure A-1.29** and vertical flow between Paleozoic and Mesozoic aquifers is shown on **Figure A-1.30**. Nugget spring discharge is shown in **Figure A-1.31**.



Saturated thickness of the Nugget aquifer in the Greater Green River Basin and adjacent areas to the south. Modified from Freethey and Cordy 1991.

Figure A-1.26. *Saturated thickness of the Nugget aquifer relative to PSG, modified after WWDC 2009.*

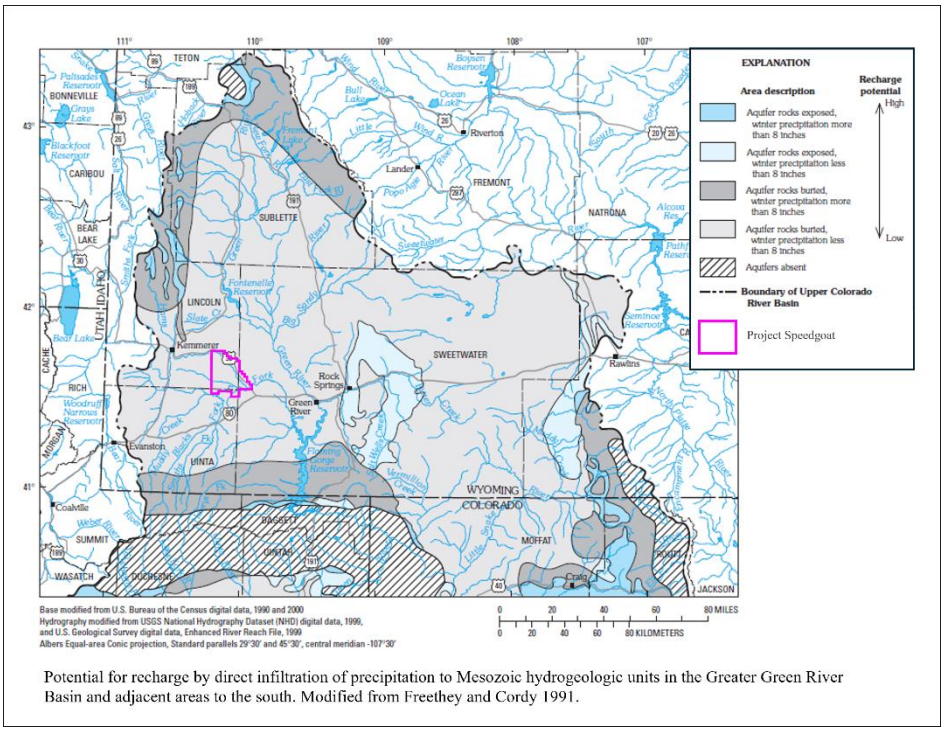


Concentration of dissolved solids, Sundance and Nugget aquifers, Greater Green River Basin and adjacent areas to the south. Modified from Freethey et al. 1988 and Freethey and Cordy 1991.

Figure A-1.27. *Salinity of the Sundance and Nugget aquifers, modified after WWCG 2009.*

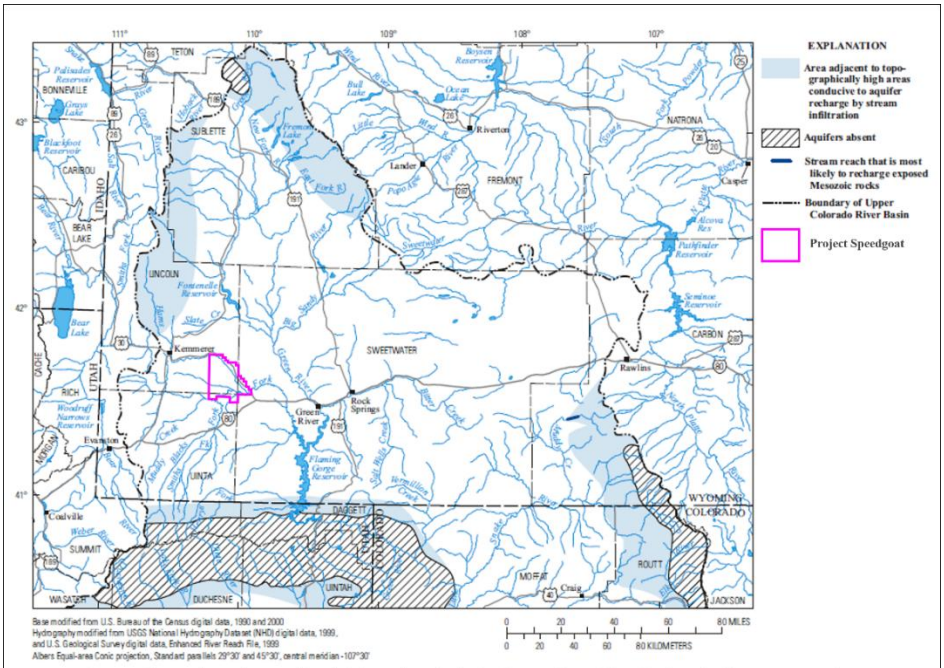
Table A-1.1. Water Quality of Receiving Formation (Nugget)							
API	**Distance from proposed injection well, miles**	**Formation**	**Depth of sample, feet**	**Date of Sample Collection**	**Constituent**	**Concentration (mg/L)**	**Location**
4903520165	52.3	Nugget	10,994	1/14/1981	TDS	60,923	NW SW SEC 10 T 27 N R 114 W
4903520239	52.6	Nugget	11,179	1/14/1981	TDS	59,405	SE NW SEC 4 T 27 N R 114 W
4903520218	52.6	Nugget	10,988	1/14/1981	TDS	56,007	NW SE SEC 4 T 27 N R 114 W
4903520279	50.1	Nugget	10,823	1/14/1981	TDS	53,442	SW NW SEC 10 T 27 N R 114 W
4903520302	49.6	Nugget	10,945	1/14/1981	TDS	60,512	NW NE SEC 9 T 27 N R 114 W
4903520891	52.5	Nugget	10,885	3/22/1986	TDS	65,492	NW NE SEC 35 T 28 N R 114 W
4903505450	45.8	Nugget	10,128-10,178	4/25/1961	TDS	98,105	NE NW SEC 14 T 27 N R 113 W
4903505450	45.8	Nugget	10,128-10,176	3/21/1957	TDS	101,460	NE NW SEC 14 T 27 N R 113 W
4903505450	45.8	Nugget	10,128-10,176	3/26/1957	TDS	100,446	NE NW SEC 14 T 27 N R 113 W
4904120019	28.5	Nugget	14,597-14,463	4/1/1972	TDS	76,557	SW NE SEC 29 T 15 N R 112 W
4904105230	21.1	Nugget	14,526-14,646	1/19/1950	TDS	78,417	SW NW SEC 17 T 16 N R 112 W
4904120208	34.6	Nugget	NA	6/3/1979	TDS	28,152	C SW SEC 5 T 18 N R 119 W
4904120210	36.7	Nugget	NA	1/25/1988	TDS	18,614	SW NE SEC 9 T 16 N R 119 W
4904105215	33.9	Nugget	1,923-2,003	8/29/1949	TDS	27,544	SW SW SEC 32 T 16 N R 117 W
4904105218	33.7	Nugget	NA	3/8/1951	TDS	21,454	NW NW SEC 33 T 16 N R 117 W
4904105218	33.7	Nugget	2,135	8/8/1951	TDS	21,809	NW NW SEC 33 T 16 N R 117 W
					Average	**58,021**	

Legend
Wells north of AoR on edge of Overthrust
Wells in northern Moxa Arch
Wells in southern Moxa Arch
Wells to west and southwest of AoR



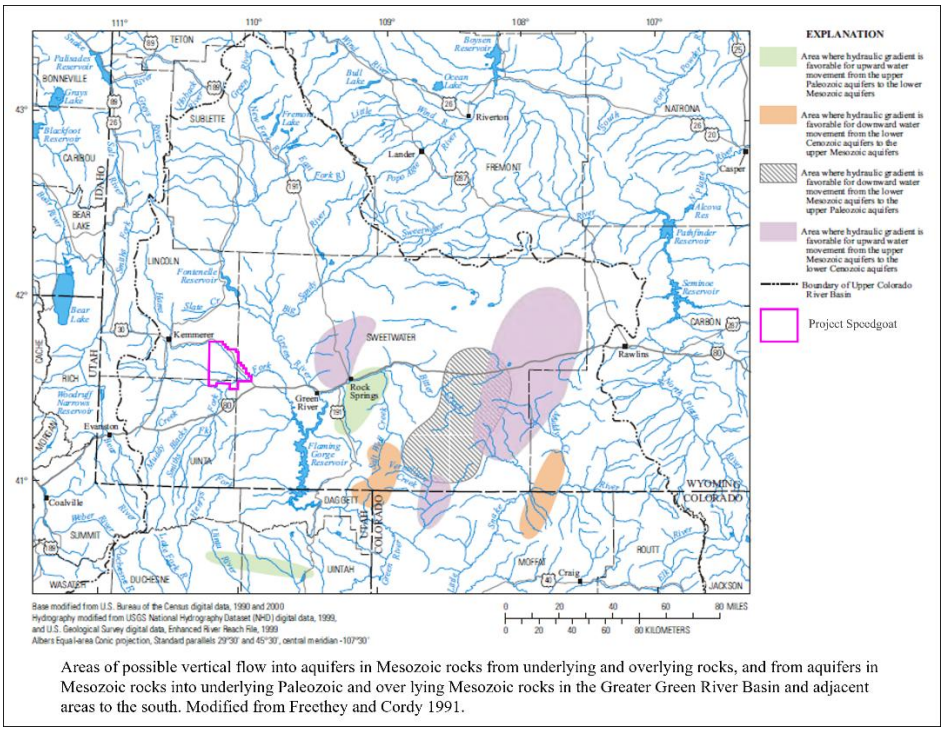
Potential for recharge by direct infiltration of precipitation to Mesozoic hydrogeologic units in the Greater Green River Basin and adjacent areas to the south. Modified from Freethey and Cordy 1991.

Figure A-1.28. *Potential recharge via precipitation into Nugget, modified after WWDC 2009.*



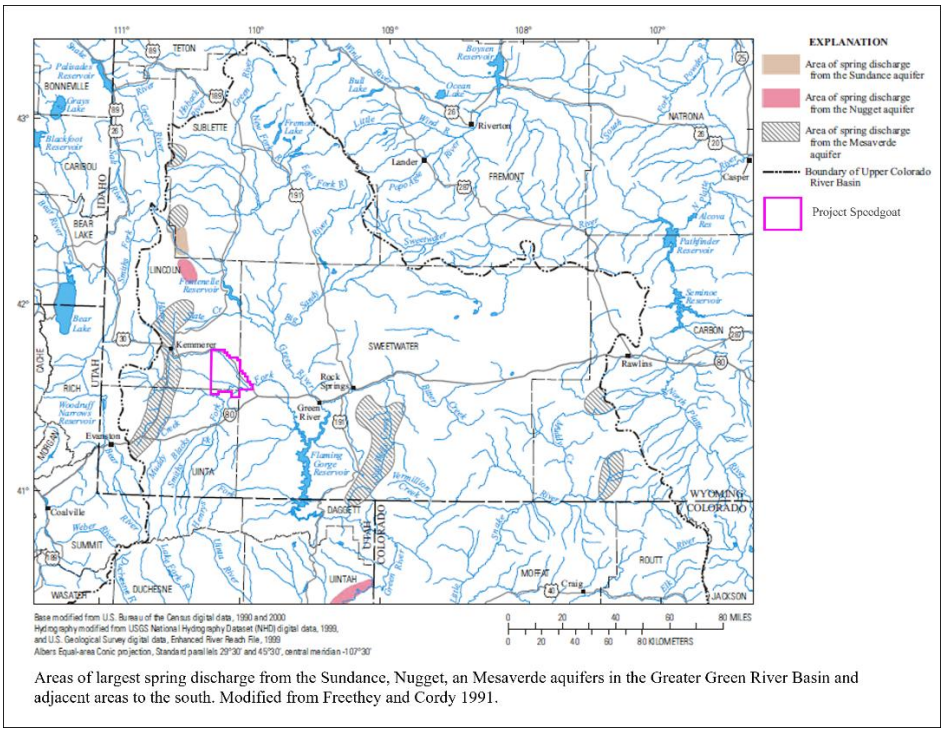
Areas of stream flow recharge into aquifers in Mesozoic rocks in the Greater Green River Basin and adjacent areas to the south. Modified from Freethey and Cordy 1991.

Figure A-1.29*. Potential recharge into Nugget via stream recharge, modified after WWDC 2009.*



Areas of possible vertical flow into aquifers in Mesozoic rocks from underlying and overlying rocks, and from aquifers in Mesozoic rocks into underlying Paleozoic and over lying Mesozoic rocks in the Greater Green River Basin and adjacent areas to the south. Modified from Freethey and Cordy 1991.

Figure A-1.30. *Possible vertical flow between the Mesozoic and Paleozoic (including the Nugget and Madison aquifers), modified after WWDC 2009.*

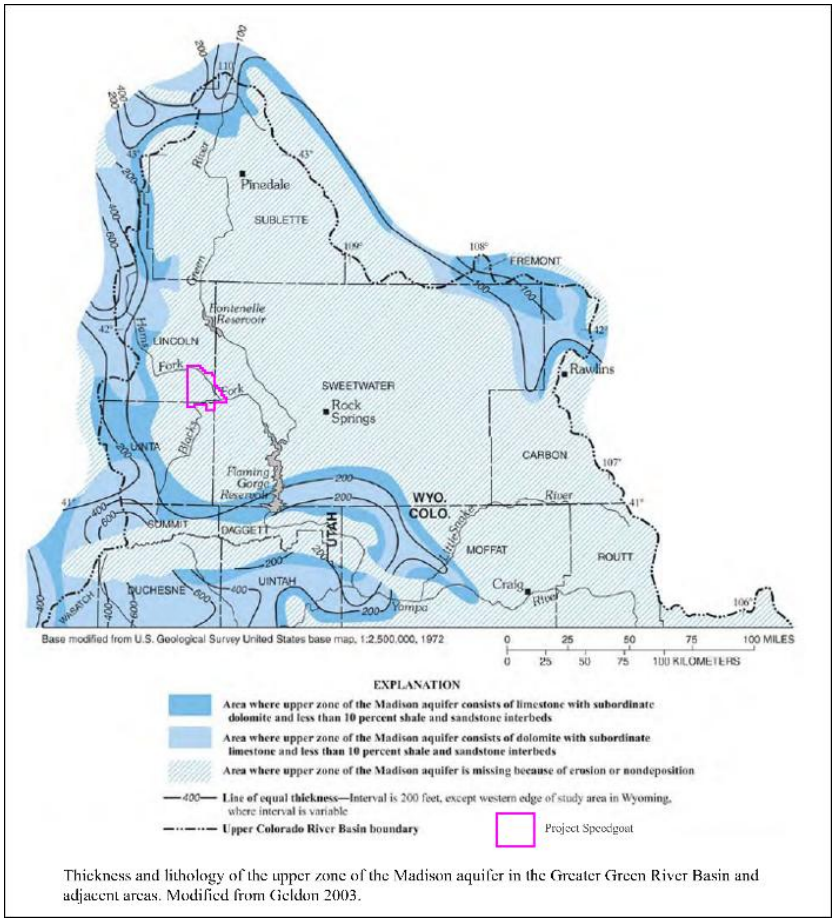


Areas of largest spring discharge from the Sundance, Nugget, an Mesaverde aquifers in the Greater Green River Basin and adjacent areas to the south. Modified from Freethey and Cordy 1991.

Figure A-1.31. *Spring discharge from Sundance, Nugget, or Mesaverde aquifers. Modified after WWDC 2009.*

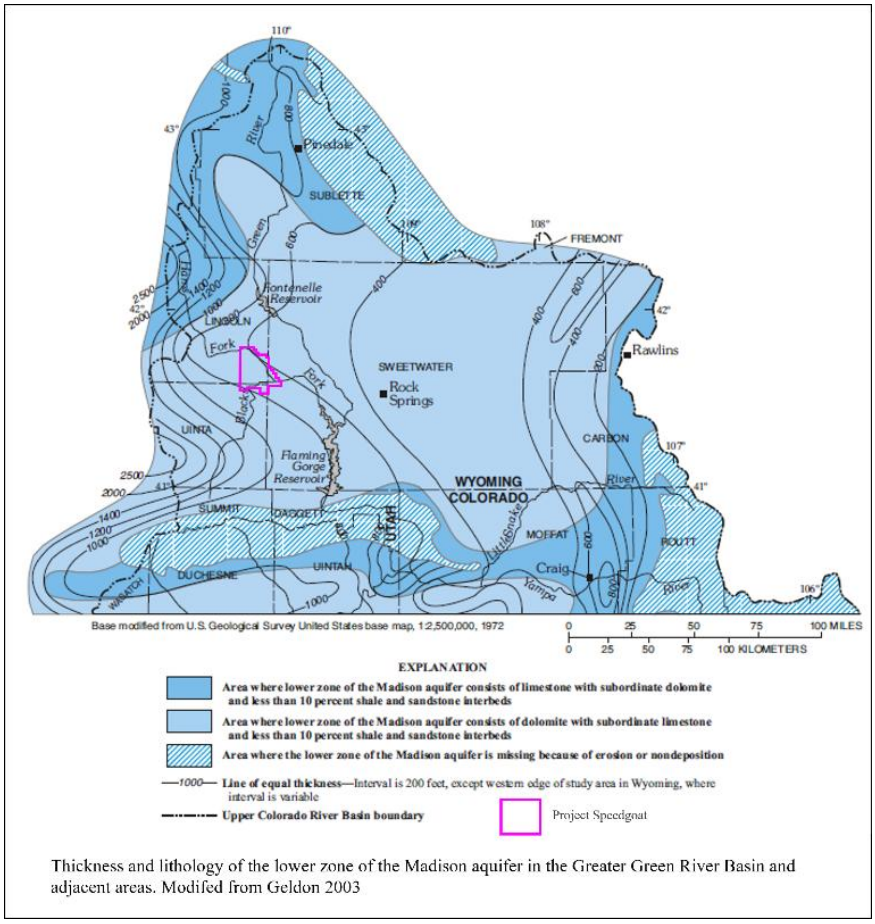
Madison Injection Zone Major Aquifer

The Mississippian Madison aquifer can be broken up into an upper and lower zone. The upper zone is anticipated to be missing from the AoR (**Figure A-1.32**). The lower zone is dominated by dolomite and small amounts of limestone, shale and sandstone (**Figure A-1.33**). The Madison is about 700 feet thick in the study area. The aquifer is saline with an average 58,055 TDS in the region (**Table A-1.2**). The groundwater flow direction and potentiometric surface is shown in **Figure A-1.34**.



Thickness and lithology of the upper zone of the Madison aquifer in the Greater Green River Basin and adjacent areas. Modified from Geldon 2003.

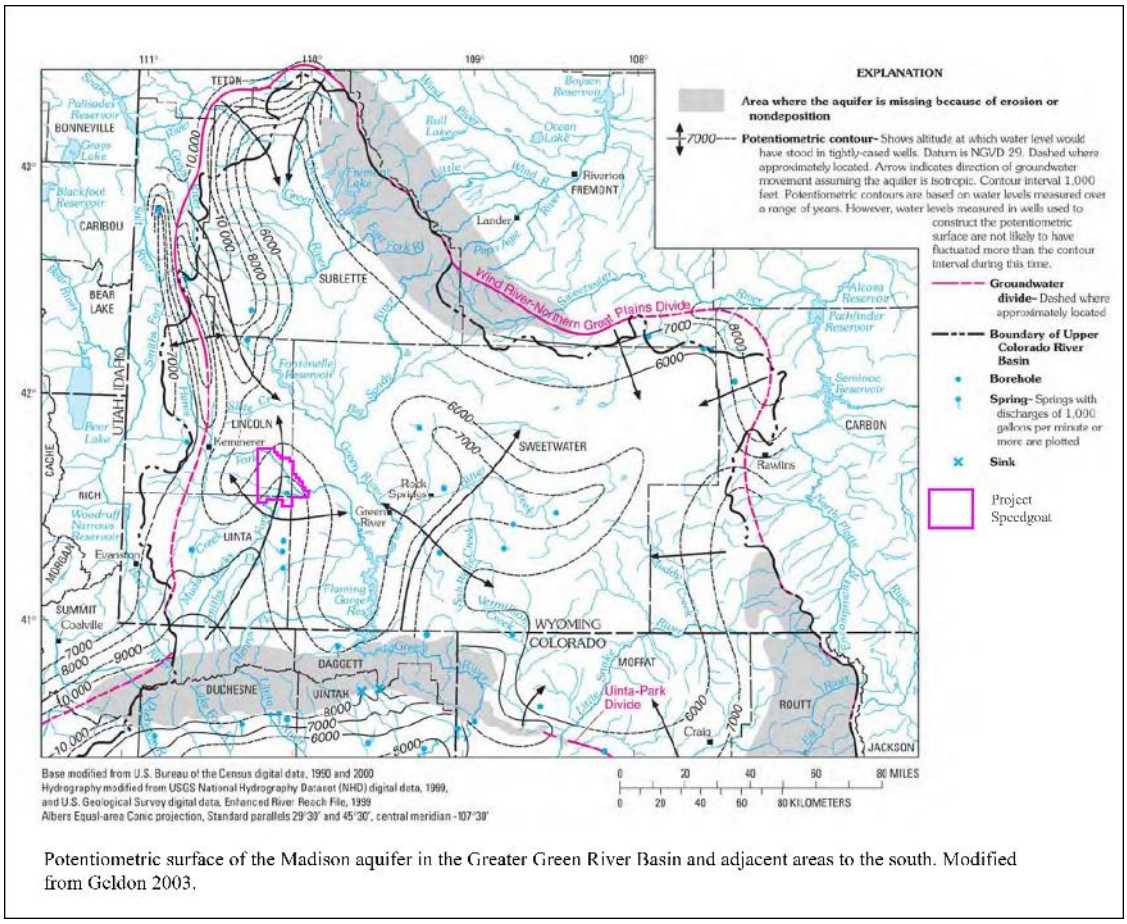
Figure A-1.32. *Thickness and lithology of the upper Madison aquifer, relative to PSG. Modified after WWDC 2009.*



Thickness and lithology of the lower zone of the Madison aquifer in the Greater Green River Basin and adjacent areas. Modifed from Geldon 2003

Figure A-1.33. *Thickness and lithology of the lower Madison aquifer, relative to PSG. Modified after WWDC 2009.*

Table A-1.2. Water Quality of Receiving Formation (Madison)							
API	**Distance from proposed injection well, miles**	**Formation**	**Depth of sample, feet**	**Date of Sample Collection**	**Constituent**	**Concentration (mg/L)**	**Location**
4902321674	16.5	Madison	17,140	9/5/2002	TDS	56,140	NE SE SEC 14 T 22 N R 112 W
4902321687	16.7	Madison	17,130	1/4/2003	TDS	59,970	SW SW SEC 18 T 22 N R 111 W
					Average	**58,055**	



Potentiometric surface of the Madison aquifer in the Greater Green River Basin and adjacent areas to the south. Modified from Geldon 2003.

Figure A-1.34. *Madison aquifer groundwater flow and potentiometric surface, modified after WWDC 2009.*

1.1.5.3 Hydrogeology Summary

There are four confirmed USDWs in the GGRB including the Bridger, Green River, Wasatch, and Frontier aquifers. The Bear River and Dakota aquifers have substantial variability in salinity data and may be USDWs. The lowest possible USDW is the Dakota Formation. The base of the Dakota is approximately 890 feet above the top of the Nugget injection zone and 2,225 feet above the top of the Madison injection zone. Several confining zones, which will be discussed in greater detail in ***Section 1.2.3 Structure and Thickness of Injection and Confining Zones,*** are present between the injection zones and the lowest possible USDW, providing protection against contamination.

1.1.6 Surface Air and/or Soil Gas Monitoring Data

FCS has engaged an environmental consultant to develop a near-surface groundwater and soil gas sampling and monitoring program. The program will include the acquisition of baseline air and soil gas samples in which to compare future test results, and an appropriate sampling and monitoring program throughout all phases of the project life (development and pre-injection, operation or injection, and post-injection). The Near-Surface Sampling and Analysis

Plan (Near-Surface SAP) will be comprised of (1) sampling of shallow groundwater aquifers (USDWs); and (2) sampling of soil gas in the shallow vadose zone. Sampling and chemical analysis of these zones provide concentrations of chemical constituents, including CO_2, to ensure CO_2 is staying in place in the storage reservoirs. Testing parameters will be documented, and testing will be conducted according to American Society of Testing and Materials (ASTM) standard procedures for soil gas sampling and analysis. Upon completion of the near-surface groundwater and soil gas sampling and monitoring plan, the program will be submitted to the Wyoming Department of Environmental Quality (WDEQ) Administrator with accompanying documentation and figures.

1.2 Storage Reservoir Geology

The dolomitic Mississippian Madison Formation at approximately 17,500 feet deep and the Triassic-Jurassic Nugget Formation, an eolian sandstone buried to a depth of approximately 13,700 feet are the target storage formations at PSG. Multiple confining zones are present, but the immediate confining zones to the Madison are the Three Forks below and the Amsden above. The immediate confining zones to the Nugget are the Ankareh below and the Twin Creek Limestone above. **Table A-1.3** provides the thickness, depth, and lithology of the injection and confining zones. The following sub-sections discuss the lateral extent, thickness, structure, petrophysical properties, mineralogy, and geomechanical properties of the injection zones and their confining layers in detail. This information provides confidence in the storage capacity of the injection zones and in the sealing potential of the confining layers.

Table A-1.3. Formations Comprising the CO_2 Storage Area				
Formation	**Purpose**	**Average Thickness at PSG, feet**	**Average Depth at PSG, SSTVD feet**	**Lithology**
Twin Creek	Upper confining zone	650	6,710	Limestone, shaley limestone, chert, limey gypsum
Nugget	Injection zone	690	7,340	Sandstone
Ankareh	Lower confining zone	600	8,030	Mudstone, siltstone, gypsum, sandstone
Amsden	Upper confining zone	490	10,670	Shale, dolomite, sandstone, chert
Madison	Injection zone	700	11,160	Dolomite and limestone
Three Forks	Lower confining zone	100	11,860	Siltstone and limestone

Note: Lithology is from the literature. Depths and thicknesses are from the Bruff 1, except for Three Forks. Bruff 1 does not penetrate Three Forks, so regional average is used for depth.

1.2.1 Lateral Extent of the Injection Zones

The Madison Formation is very extensive stretching along western Canada and the U.S. **Figure A-1.11** and **Figure A-1.12** show estimates of the shelf and shelf positioning during Madison time. Well data of Madison and Madison equivalents as presented by Enverus are shown in **Figure A-1.35** and show the presence of the Madison across southern Canada, Montana, the Dakotas, Wyoming, Utah, and Colorado.

The Nugget Sandstone is also laterally extensive, spreading across parts of Wyoming, Idaho, Colorado, Utah, California, Nevada, New Mexico, and Arizona as observed in **Figure A-1.36**. PSG is in the center of a giant paleo dune field.

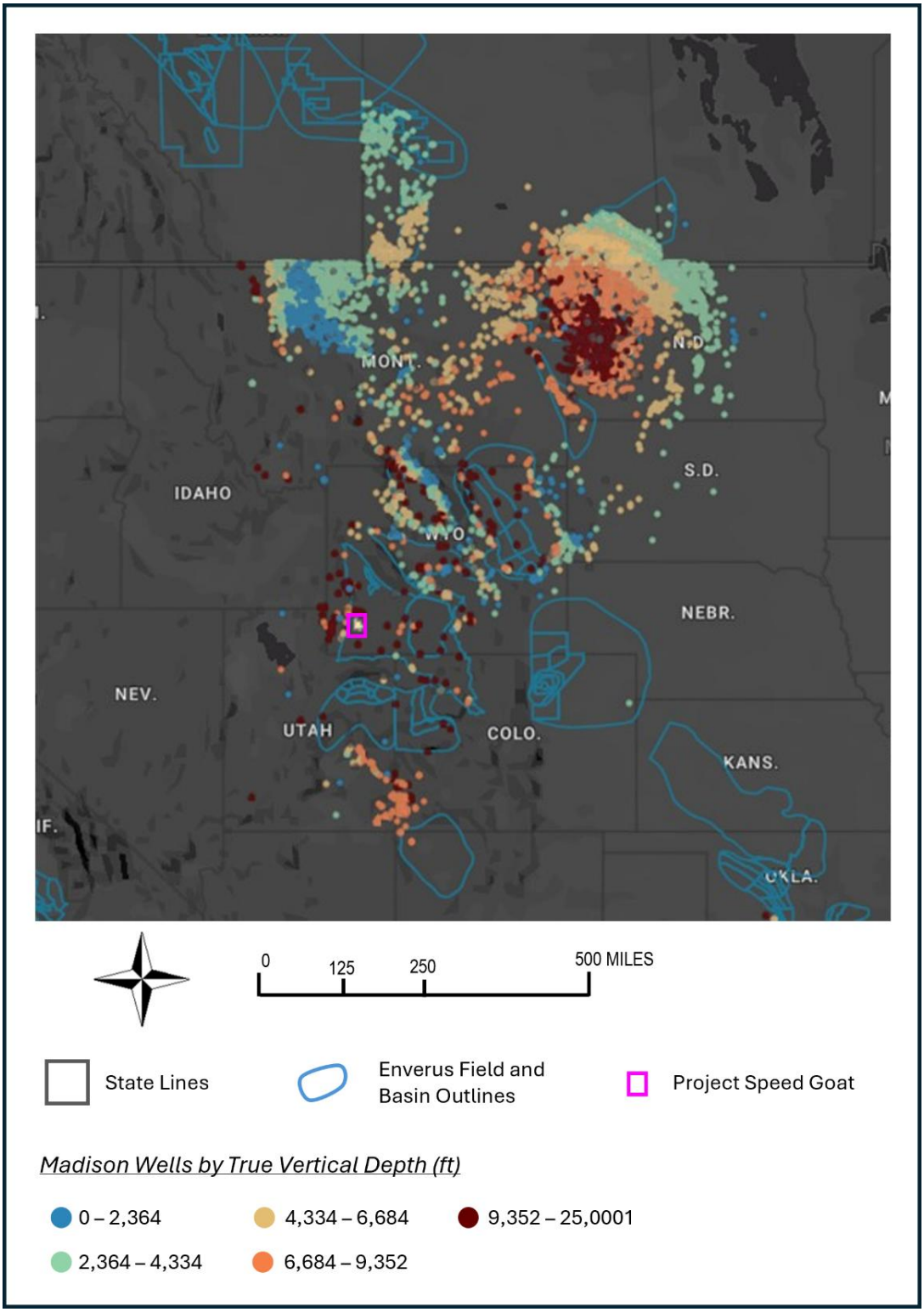


Figure A-1.35. *Aerial extent of the Madison Formation, as defined by well data.*

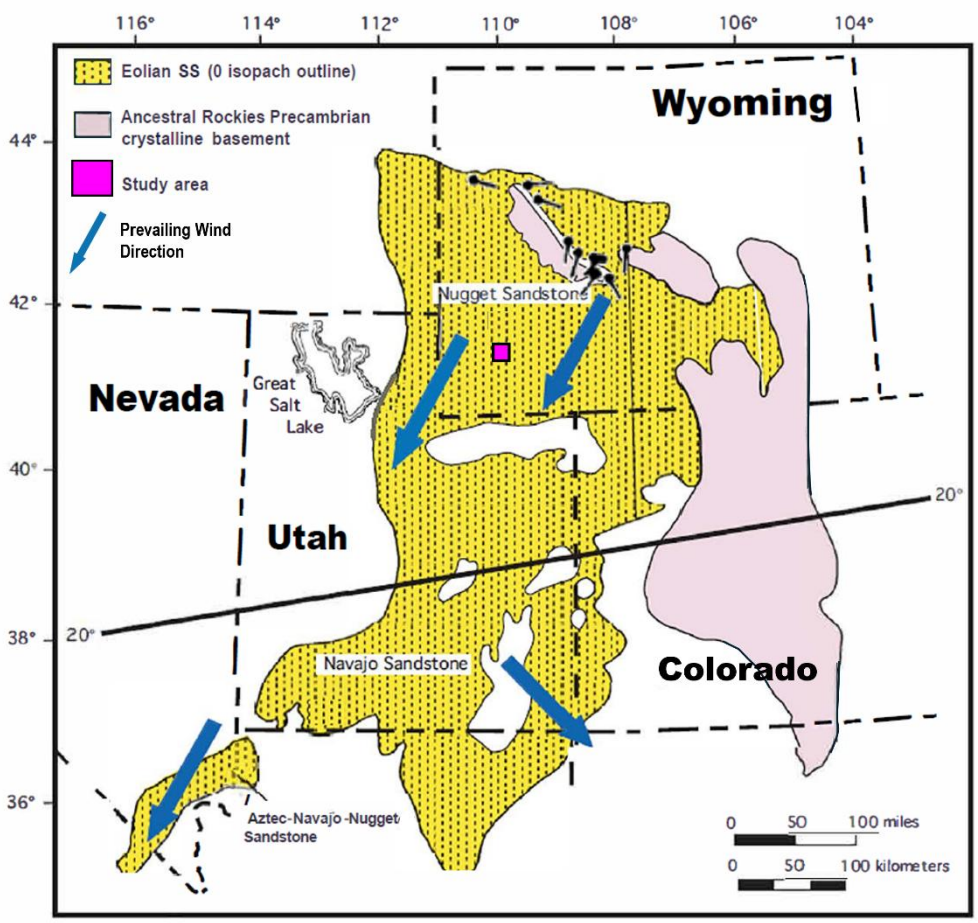


Figure A-1.36. *Extent of the Nugget Formation, Agrawal 2019.*

1.2.2 Facies Continuity in the Injection and Confining Zones

The Nugget Sandstone was formed in an eolian dunal environment, but intermittently, water was present. Dunes are characterized by changes in sorting vertically and laterally. Interdunal areas typically have poorer sorting, more fines, increased carbonate content, and increased evaporites. The rock texture and fabric associated with the environment of deposition leads to anisotropy in the reservoir. The Nugget Sandstone is laterally continuous, and reservoir description demonstrates adequate presence for CO_2 sequestration and storage. However, lateral and vertical facies variations do occur and will lead to additional confinement of the CO_2.

The Madison Formation has extensive lateral continuity, with sequence boundaries that can be traced for tens of miles. Vertically, there are facies changes from limestone to dolomite. Solution and fault breccias impact porosity and permeability locally with solution locations frequently clay filled. Many consider the Madison to be self-sealing due to brecciation near the top. The Madison has many baffles and barriers to vertical flow as well as some lateral changes related to position along the shelf, water depth, and dolomitization.

The Twin Creek, confining zone to the Nugget, is regionally extensive. It is characterized by many facies changes and produces hydrocarbon in parts of Utah. Where production occurs, the Twin Creek is self-sealing. The Twin Creek has regional seals, traceable many miles beyond the PSG that include shales and tight limestones. The Amsden, confining zone to the Madison, is also regionally extensive, deposited with the transgressing Amsden sea. While it also contains many facies, it has regionally continuous shales with strong sealing ability.

1.2.3 Structure and Thickness of Injection and Confining Zones

Frontier has leased a 110-mi^2 3-D seismic survey from Seitel that covers most of PSG. Structure maps were made for the key formations from the Three Forks up to the 2nd Frontier. Surfaces were interpreted on the 3-D seismic survey and then converted to depth. Regional and local well data were used to pick formation tops, and both refine and expand the mapping based on seismic interpretation alone.

Figure A-1.37 shows the 3-D seismic footprint relative to PSG and the regional mapping extent. Well control diminishes with depth, leading to some uncertainty, but the structure has a similar expression from the Frontier to the Madison, as noted on the regional seismic line in expression from the Frontier to the Madison, as noted on the regional seismic line in **Figure A-1.38** (Stockton and Hawkins, 1985). The character of the structure through depth provides the confidence to isochore down from shallower surfaces with abundant well control and gives a guide for the deeper formations with less well control.

The structure of the injection and confining zones is dominated by the Moxa Arch, which grew during the Upper Cretaceous Frontier time. Regional seismic demonstrates the nature of the structure, apparent from below the Madison to above the Hilliard (or Baxter) Shale, as seen in **Figure A-1.38**. The crest of the structure runs roughly north-south through the PSG expansion area acreage. The crest of the structure shifts slightly westward with progressively younger units. The Moxa Arch exhibits similar structural expression across the injection and confining zones because it developed in Frontier time, after deposition of the Madison and Nugget. Dips are generally lower than 5° and are slightly steeper on the east flank than the west flank. In general, the units thicken slightly to the west.

The Madison and Nugget injection zones are at depths of approximately 17,500 and 13,700 feet, respectively, and have redundancy in confining zones, with extensive impermeable zones, which form a strong confining system. Regionally, there is naturally trapped helium, CO_2, and hydrocarbon at various locations in these reservoirs, which also demonstrates the strength of the confining layers.

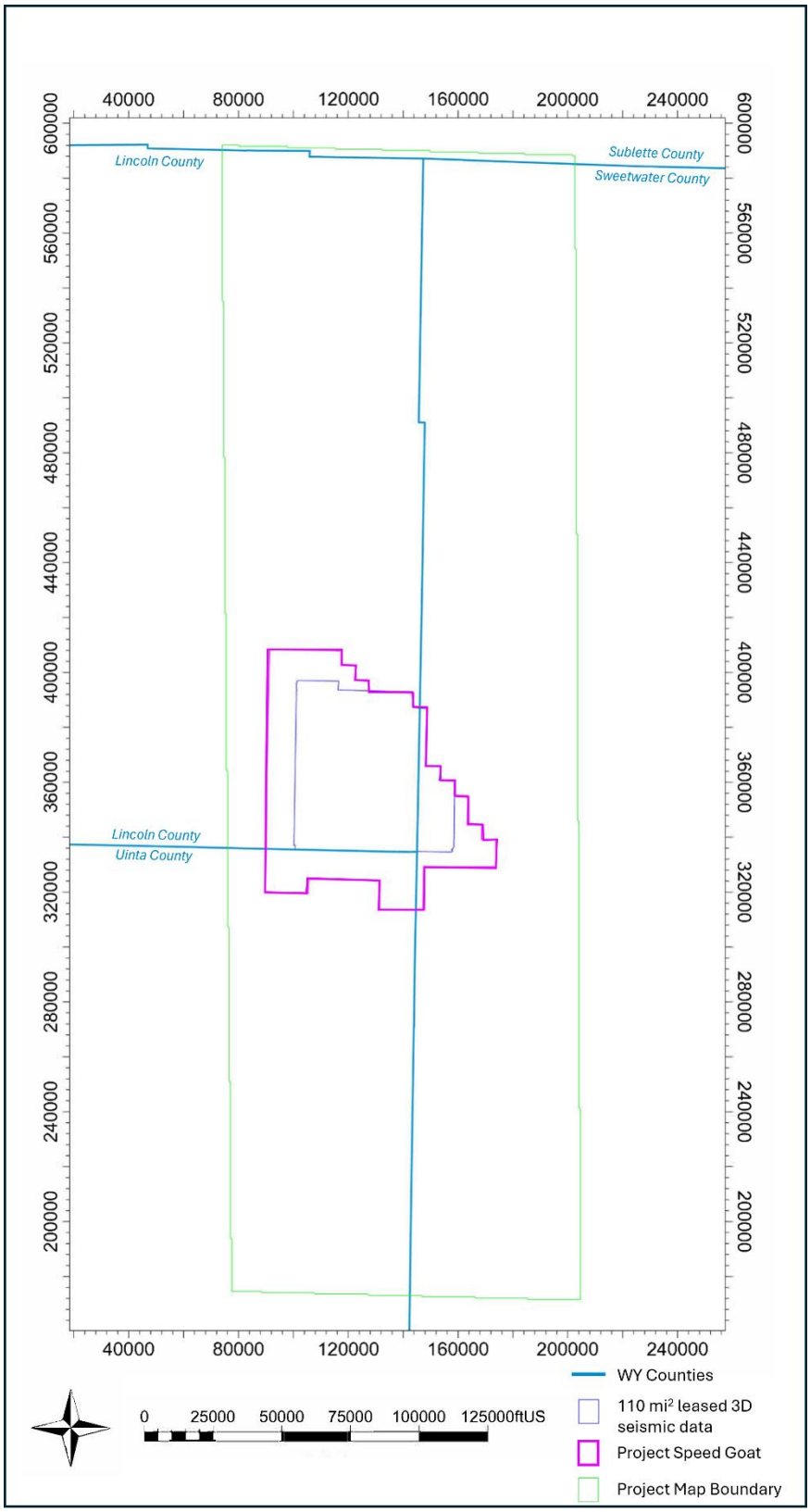


***Figure A-1.37**. Regional mapping outline relative to PSG and the 3-D seismic area.*

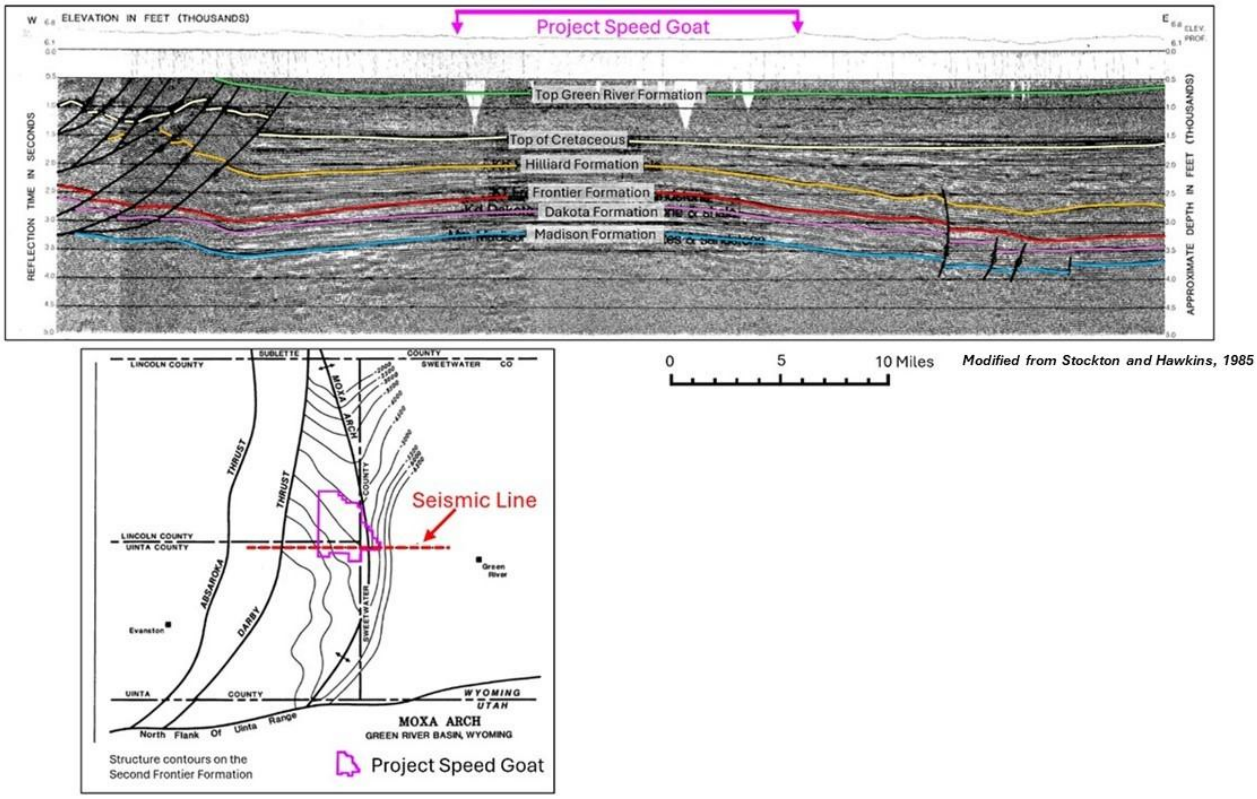


***Figure A-1.38**. Regional seismic line and Second Frontier structure map (Stockton and Hawkins, 1985).*

Structure and thickness maps of the Madison, Nugget, and their respective confining zones are presented in **Figure A-1.39** through **Figure A-1.45**. The Madison target injection zone is confined by the Three Forks Formation below and the Amsden Formation above. There are no complete penetrations of the Three Forks at PSG, but on regional mapping a thickness of about 100 feet is expected (**Figure A-1.39**). The Madison Formation is approximately 700 feet thick in the study area (**Figure A-1.40**) and is sealed vertically by the Amsden Formation, which averages greater than 400 feet thickness across the study area (**Figure A-1.41**). In ***Section 1.1.3 Environment of Deposition, Lithology, and Tectonic Setting***, the extent of the transgressing Amsden sea was discussed, which deposited red shales and tight shaley or cherty limestones in a near-shore environment. The Madison isochore was developed with regional and local seismic data, well control and influenced by the general positioning of the shelf. The shaley Permian Phosphoria **(Figure A-1.42),** acts as a secondary confining zone to the Madison and averages 350 feet in thickness in the project area.

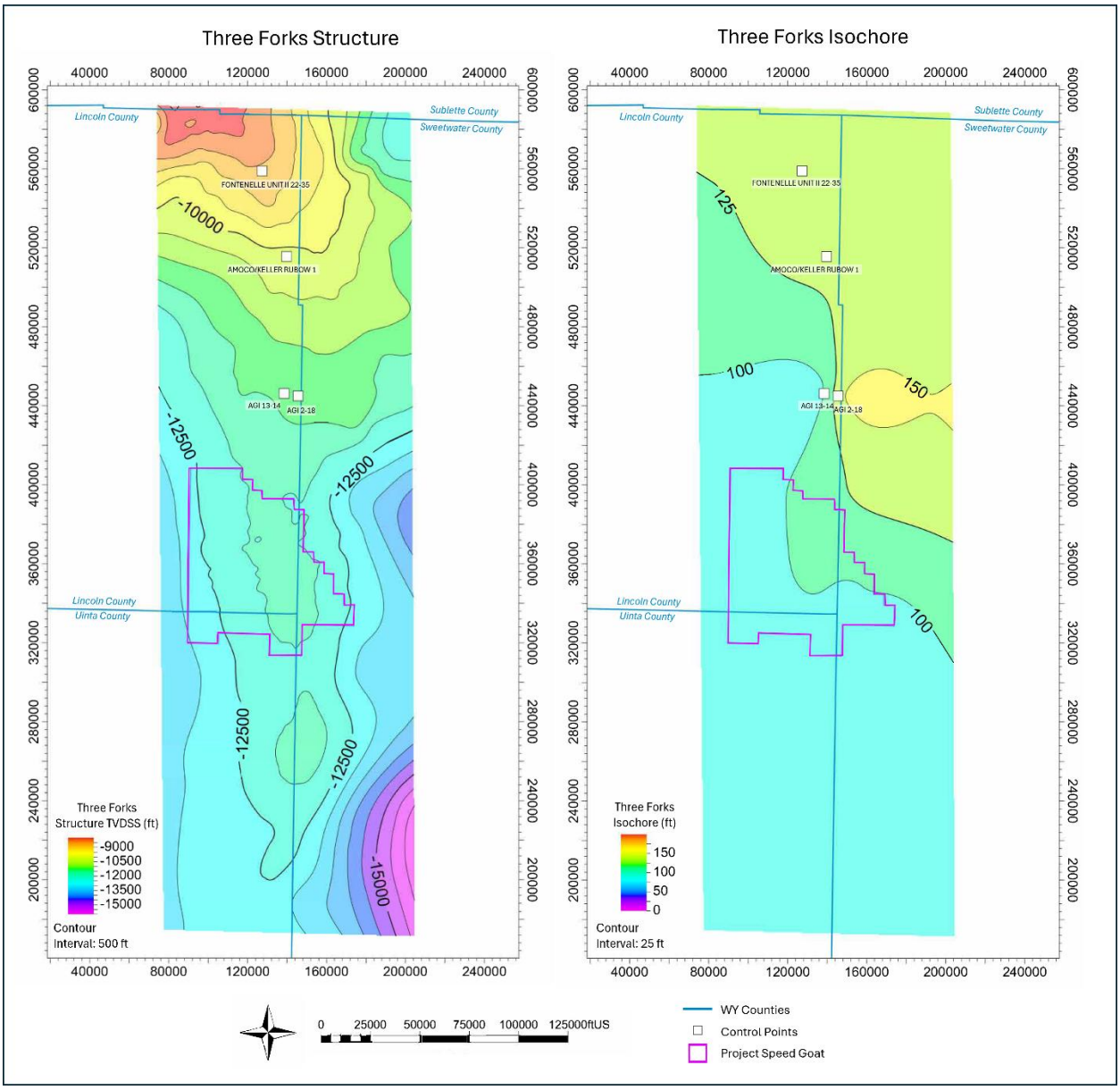


Figure A-1.39. *Three Forks Formation (lower confining zone to the Madison injection zone) structure and isochore maps.*

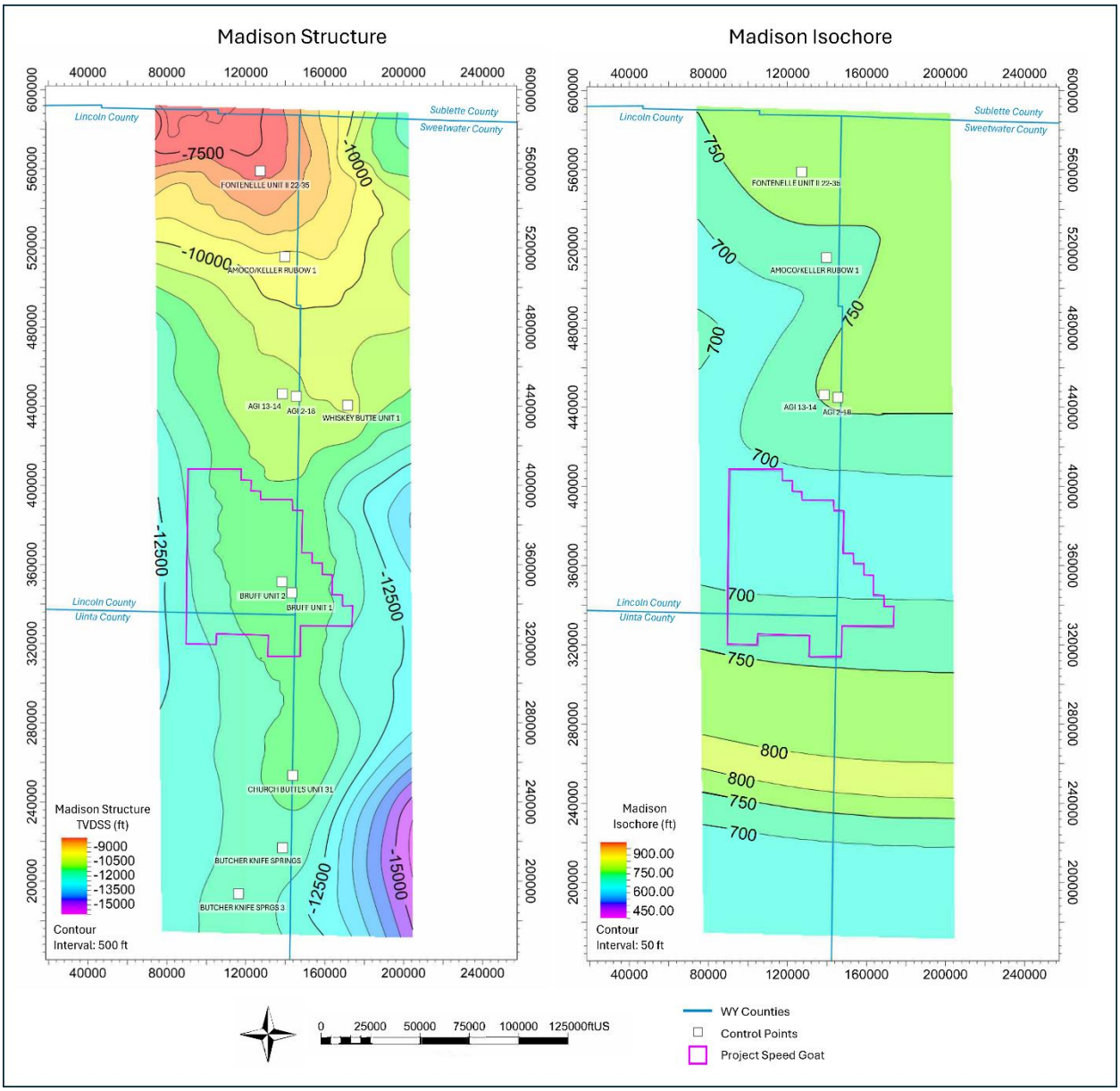


Figure A-1.40. *Madison Formation structure and isochore maps.*

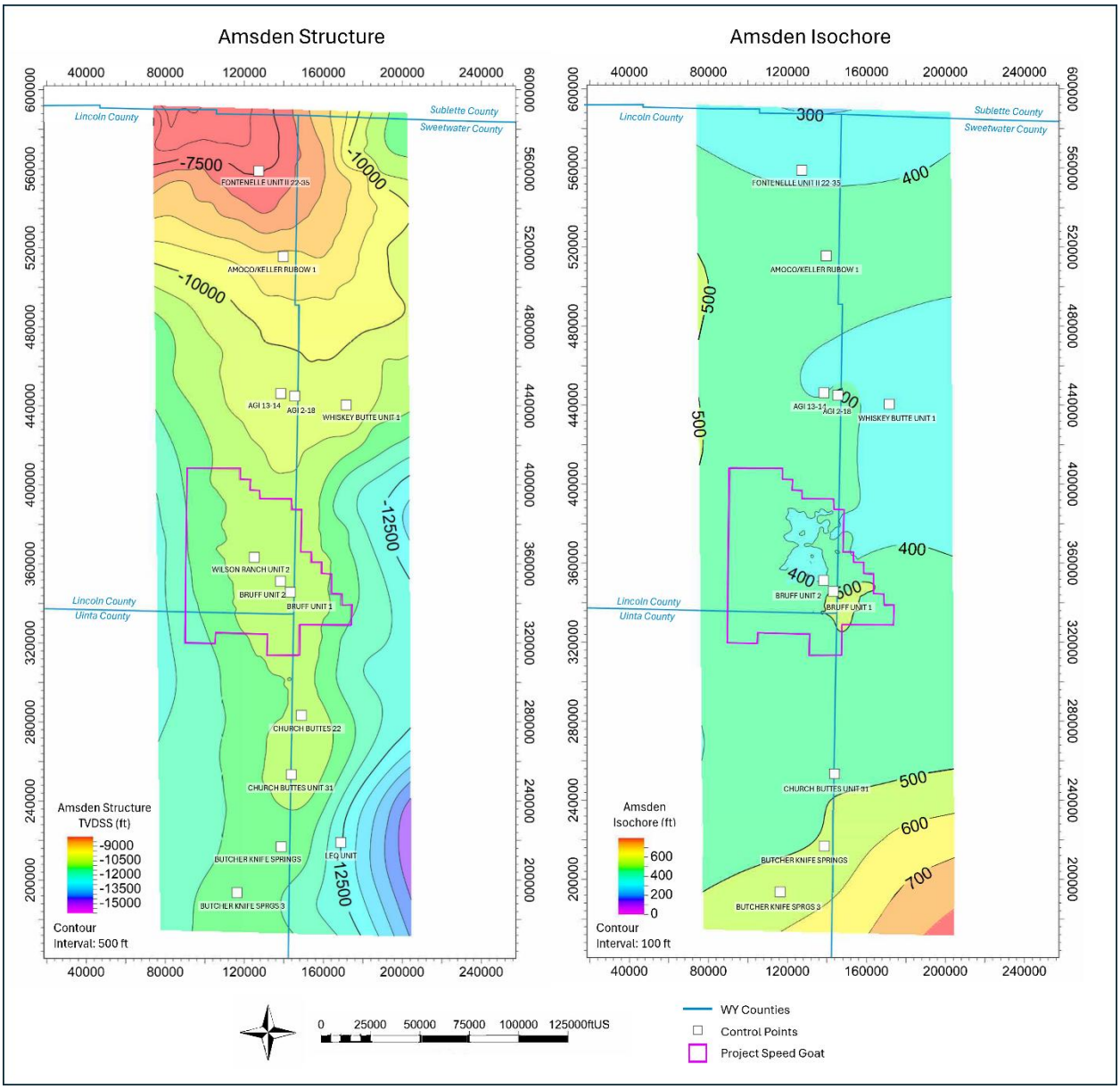


Figure A-1.41. *Amsden Formation structure and isochore maps.*

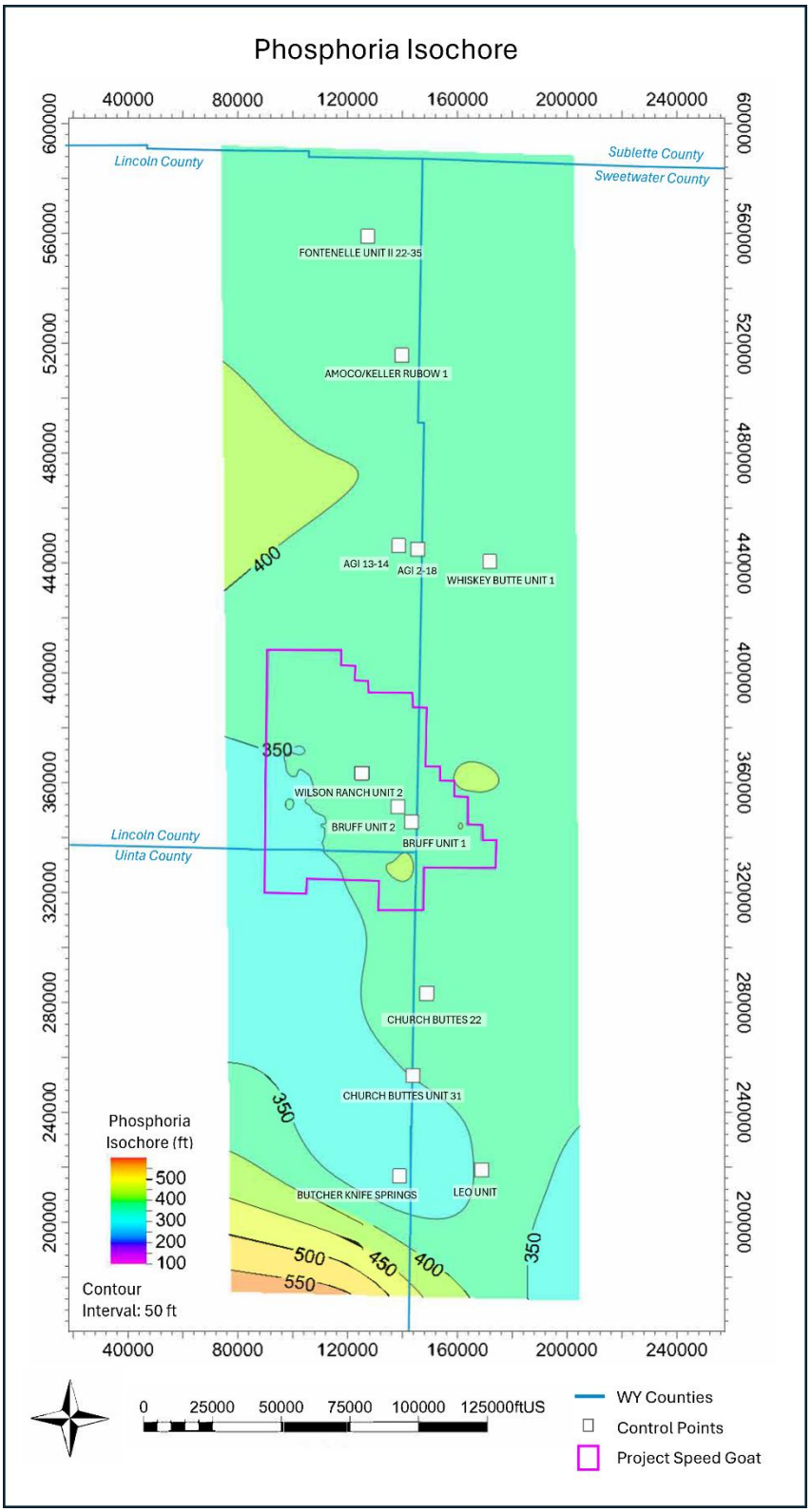


Figure A-1.42. *Phosphoria (secondary upper confining zone) isochores.*

The Nugget target injection zone is confined by the Ankareh Formation below and the Twin Creek Limestone Formation above. The Ankareh lower confining zone averages 600 feet at PSG and consists of mudstone, siltstone, gypsum, and sandstone. The Nugget Formation is approximately 700 feet thick (**Figure A-1.44**) at the study area and is sealed vertically by the Twin Creek Limestone Formation which also averages about 700 feet in thickness (**Figure A-1.45**). The Twin Creek Limestone is dominantly limestone and shaley limestone, but has lenses of sandy, porous and permeable rock which produce oil and gas at some locations. These zones are self-sealing, demonstrating the sealing characteristics of the unit interval. The Nugget isochore in **Figure A-1.44** was developed with regional and local seismic data and well control.

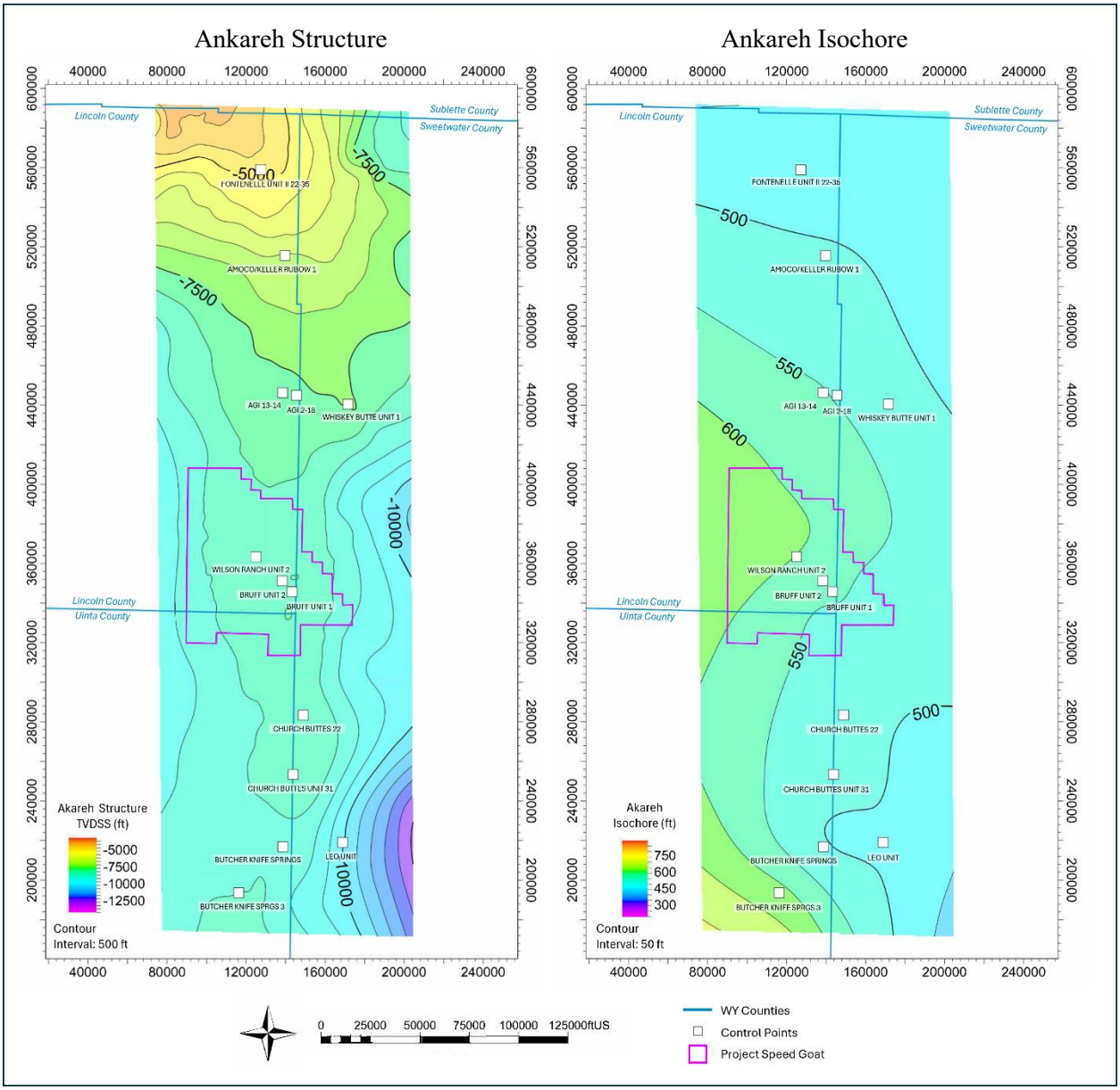


Figure A-1.43. *Ankareh Formation (lower confining zone to the Nugget injection zone) structure and isochore maps.*

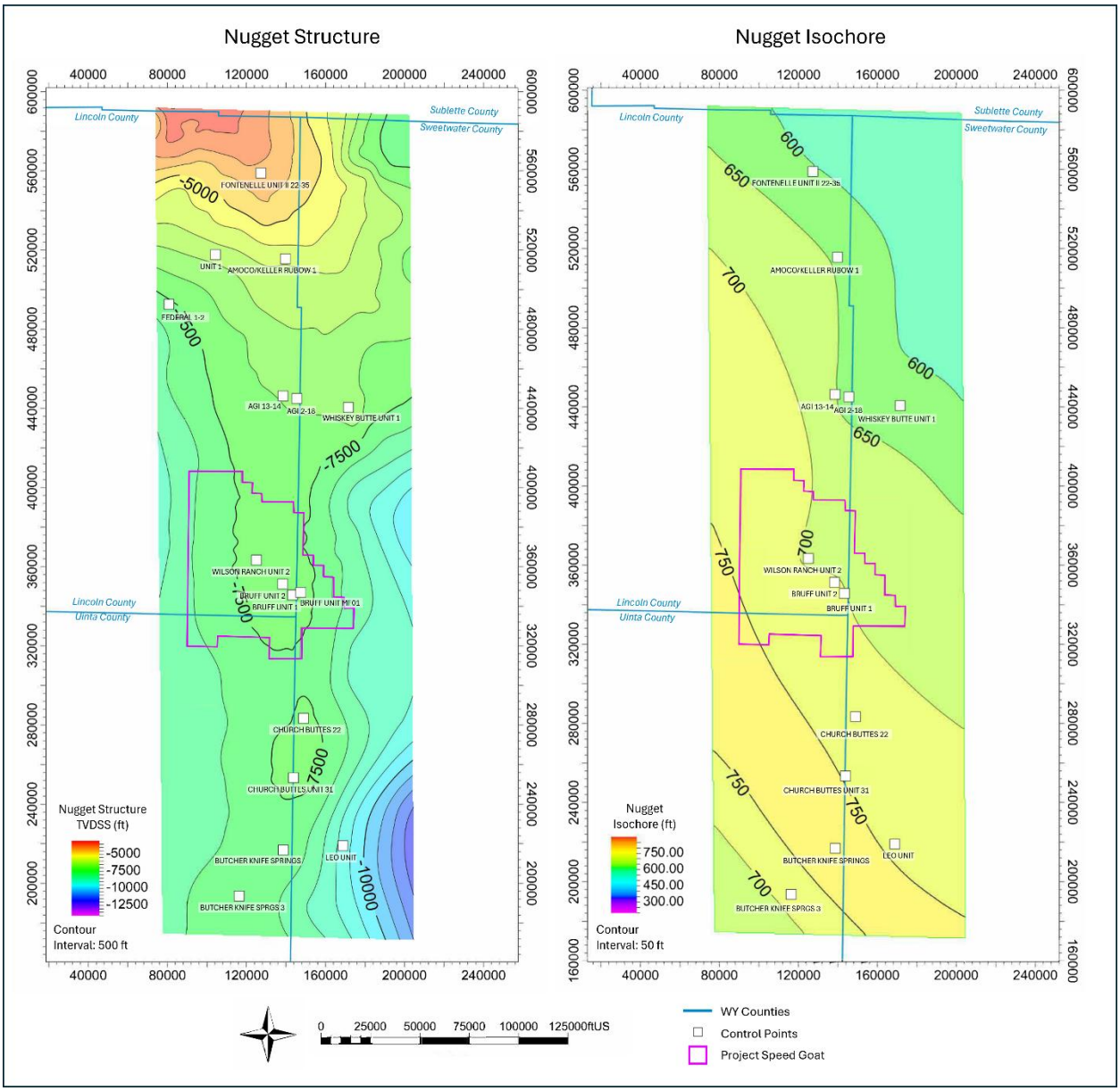


Figure A-1.44. *Nugget Formation structure and isochore maps.*

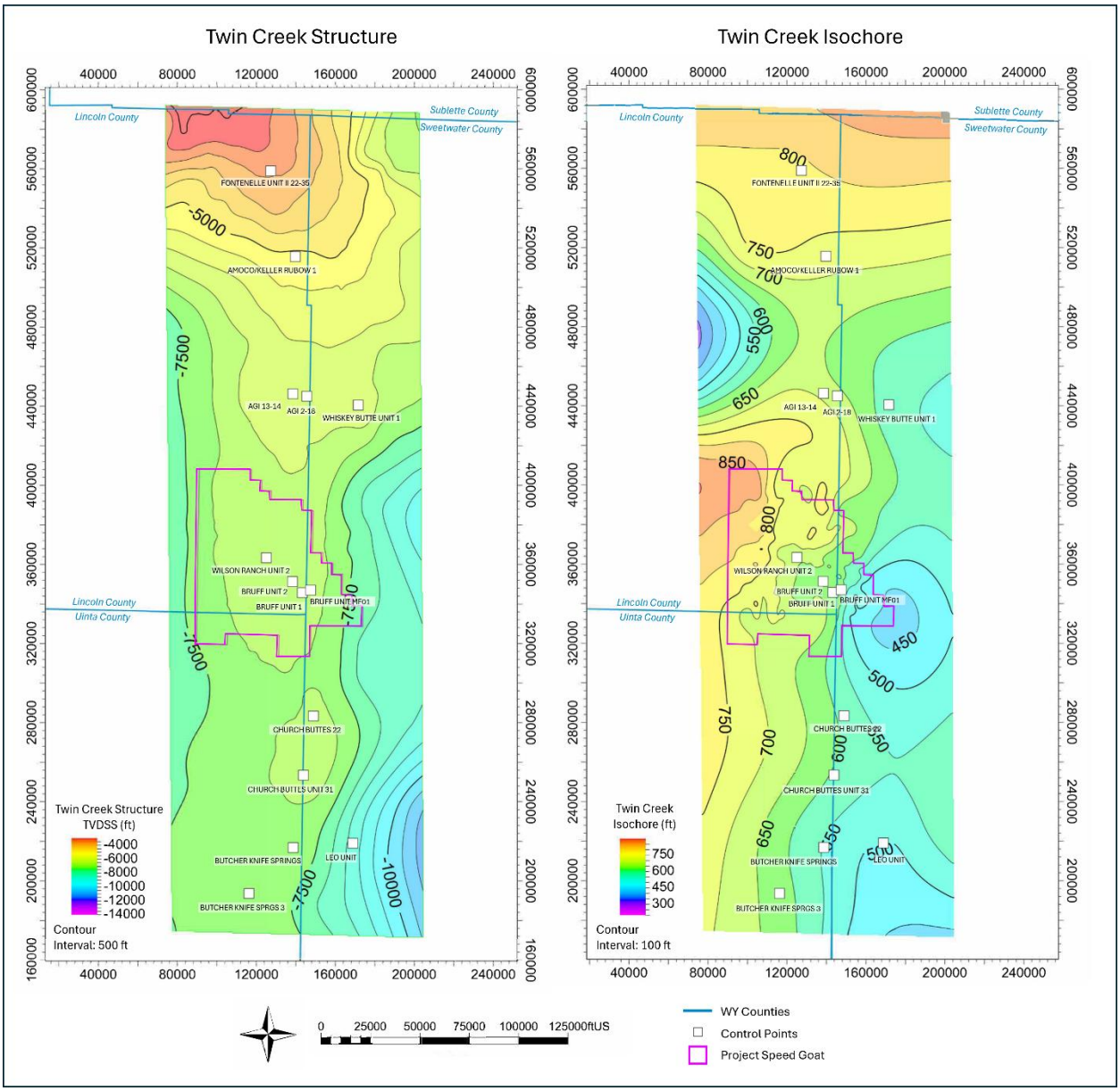


Figure A-1.45. *Twin Creek Formation (upper confining zone to the Nugget injection zone) structure and isochore maps.*

1.2.4 Petrophysical Properties of Injection and Confining Zones

Petrophysical log analysis was performed on a dataset of ten wells at PSG and across the Moxa Arch. The injection and confining zone data discussed here are from the average gross values of the Moxa Arch regional dataset (unless otherwise mentioned), and each formation has at least three wells with data. Permeabilities are given as arithmetic averages.

Madison

The Madison lower confining zone is the Three Forks Shale, with 0.01 millidarcy (mD) permeability and 0.3% effective porosity, on average. The upper confining zone to the Madison is the Amsden Formation, with 0.9 mD permeability and 2.4% effective porosity, on average. While the above values are calculated across the gross interval, several subunits with much lower porosity and permeability are present. Furthermore, vertical permeability is approximately $1/10^{th}$ of horizontal permeability, guarding against vertical migration into any shallower zones or USDWs. Petrophysical analysis of the regional Amsden shale (subunit of the Amsden) shows permeability of 0.2 mD and <1% effective porosity. A sealing subunit of the Phosphoria, (a secondary upper confining zone to the Madison) comprised of shales and carbonates, has 0.03 mD permeability and 0.5% effective porosity.

In contrast to the very low porosity and permeability of the sealing members of the confining zones, the Madison injection zone has permeability of 18 mD and effective porosity of 11%, on average, as compiled from the regional well log data. A summary of the porosity and permeability values within the Madison injection and confining zones are shown in **Table A-1.4 and Table A-1.5**. In addition to these petrophysical data, which indicate the confining ability of the seals, the Madison has also produced large volumes of helium, methane, and CO_2 at Labarge to the north, as well as hydrocarbon in the Bighorn and Wind River basins. The Madison is sometimes thought to be self-sealing with breccias and poor porosity rock often capping the sequence. The regional production demonstrates the sealing capacity of the Madison and overlying Amsden. The Madison confining zones are several thousand feet deeper than the lowest possible USDW (**Table A-1.4** and **Table A-1.5**).

Table A-1.4. Properties of Upper and Lower Confining Zones for the Madison Injection Zone

Confining Zone Properties	Upper Confining Zone	Lower Confining Zone
Formation Name	Amsden	Three Forks
Lithology	Shale, dolomite, sandstone, chert	Siltstone and limestone
Formation Top Depth, feet Measured Depth	17,055	18,245
Thickness, feet	490	~100
[1]Porosity, %	3.1 (Total), 2.4 (effective)	0.7 (Total), 0.3 (Effective)
[1]Permeability, mD	0.9	0.01
Capillary Entry Pressure (GW), psi	No data but estimated in Table A-1.9	No data but estimated in Table A-1.9
Depth below Lowest Identified USDW, feet	4,845 feet from base of Dakota (lowest possible USDW)	6,035 feet from base of Dakota (lowest possible USDW)

Note: Porosity and permeability are averaged from available well data across the Moxa Arch. Depth and thickness values are rounded averages from gridded well data across the PSG area.

[1]Sealing layers within the Amsden and Three Forks have 1% porosity and µD permeability.

Table A-1.5. Description of Additional Confinement above the Immediate Upper Confining Zone				
Name of Formation	**Lithology**	**Formation Top Depth, feet**	**Thickness, feet**	**Depth below Lowest Identified USDW, feet**
Phosphoria	shale	16,100	350	4,200 feet below base of Dakota (lowest possible USDW)

Nugget

The Nugget upper confining zone is the laterally extensive Twin Creek Limestone composed of shaley limestone, gypsum, chert, shale, and brecciated limestone (Imlay 1967). Intermittent ooid and sandy members are interbedded with low porosity, low permeability units. The Twin Creek has produced oil and gas southwest of the project area from sandy units, in Utah and southwestern Wyoming at Yellow Creek, Pineview, and Anschutz Ranch Fields and is considered self-sealing. The Nugget has produced oil and gas at Painter Field in Utah (30 miles southwest) and is sealed by the anhydritic and evaporitic deposits of the Twin Creek Limestone (Tillman 1989). These examples demonstrate the Twin Creek Limestone's ability to seal hydrocarbons on the geologic time scale and establish its strength as a confining layer. The Twin Creek Limestone has an average 1.9% effective porosity and 0.09 mD permeability as summed across the entire gross interval. The Twin Creek, however, also contains several regionally extensive shales. These shales have nano Darcy permeability and 1% effective porosity. The Nugget's lower confining zone is the Ankareh, which has <1% effective porosity and 0.1 mD permeability. The confining zones are about 1,900 to 2,200 feet below the base of the lowest possible USDW as shown in **Table A-1.6.**

In contrast to the very low porosity and permeability of the confining zones, the Nugget injection zone has permeability of 31 mD and effective porosity of 11%, on average. Nugget porosity is found by Picard (1975) to be 12% at Dry Piney, north of the study area and 10 to 20% across the Utah and Wyoming region as shown in **Table A-1.6.** Regional log-based porosity and permeability values within the Nugget injection and confining zones are shown in **Table A-1.6.** A summary of the Nugget and Madison injection and confining zones and their log-based properties as well as property distribution in the geologic model is found in **Table A-1.7**. The regional well data across the Moxa Arch provides confidence in the lateral continuity of the seals for both the Nugget and Madison injection zones.

Table A-1.6. Properties of the Upper and Lower Confining Zones for the Nugget Injection Zone		
Confining Zone Properties	**Upper Confining Zone**	**Lower Confining Zone**
Formation Name	Twin Creek Limestone	Ankareh
Lithology	Limestone, shaley limestone, chert, limey gypsum	Mudstone, siltstone, gypsum, sandstone
Formation Top Depth, feet Measured Depth	13,100	14,435
Thickness, feet	650	600
Porosity, %	4.9 (Total), 1.9 (Effective)	3.9 (Total), 0.9 (Effective)
[1]Permeability, mD	0.1	0.1
Capillary Entry Pressure (GW), psi	No data but estimated in Table A-1.9	No data but estimated in Table A-1.9
Depth below Lowest Identified USDW, feet	890 feet from **base** of Dakota (lowest possible USDW)	2,225 feet from **base** of Dakota (lowest possible USDW)

Note: Porosity and permeability are averaged from available well data across the Moxa Arch. Depth and thickness values are rounded averages from gridded well data across the PSG area.

[1]Sealing layers within the Twin Creek Limestone and Ankareh have µD permeability.

Table A-1.7. Porosity and Permeability of the Injection and Confining Zones					
Formation	**Porosity, %**	**Effective Porosity, %**	**Permeability, mD**	**Laboratory Analysis[1]**	**Model Property Distribution**
Twin Creek Gross)	4.9	1.9	0.1	TBD	ϕ 1 to 7%, avg 3% 0 to 0.5 mD, avg 0.1 mD
Twin Creek Seal	6.7	1.2	0.0	TBD	ϕ 1% 0.01 mD
Nugget (Gross)	5.2	4.4	7.3	TBD	ϕ 0 to 19%, avg 4% 0 to 84 mD, avg 4 mD
Nugget (Injection Zone)[2]	10.9	10.9	30.8	TBD	ϕ 8 to 19% 10 to 84 mD
Ankareh (Gross)	3.9	0.9	0.1	TBD	ϕ 0 to 16%, avg 2% 0 to 0.6 mD, avg 0.04 mD
Phosphoria Seal	2.7	0.5	0.0	TBD	ϕ 1% 0.25 mD
Amsden (Gross)	3.1	2.4	0.9	TBD	ϕ 1 to 14%, avg 3% 0 to 4.2 mD, avg 0.7 mD
Amsden Seal	1.3	0.9	0.2	TBD	ϕ 3% 0.63 mD
Madison (Gross)	4.6	4.3	4.1	TBD	ϕ 1 to 21%, avg 5% 0 to 169 mD, avg 4.46 mD
Madison (Injection Zone)[2]	11.1	11.0	18.0	TBD	ϕ 8 to 21% 10 to 169 mD
Three Forks	0.7	0.3	0.01	TBD	None[3]

[1] Porosity and permeability results from laboratory analysis will be acquired upon the drilling and construction of the proposed injection wells.

[2] Nugget and Madison injection zones are the high-quality intervals targeted for injection.

[3] Three Forks has regional well data but no data in the Bruff 1, which is the local well tied to seismic and used the populate the model.

As discussed, confining zone rock properties are taken from regional log data. Core data are not locally available for the confining zones (**Table A-1.8**) but will be acquired upon drilling the proposed injection wells.

Table A-1.8. Confining Zone Core Porosity and Permeability		
Sample Depth, feet (Measured Depth)	**Porosity, %**	**Permeability, mD**
NA	NA (no core data)	NA (no core data)

Capillary pressure is the pressure required for the nonwetting fluid to displace the wetting fluid in the pore spaces of the rock. Capillary pressure is a function of the pore throat radius, as well as the interfacial tension and contact angle as seen in the formula below.

$$Pc = \frac{2\sigma cos\theta}{r}$$

Pc = Capillary Pressure

σ= interfacial tension

θ= contact angle

r= pore throat radius

Capillary pressure data was found in the literature for the Madison Formation from the Rock Springs Uplift area, about 30 miles to the east of PSG. Capillary pressure is found to be about 3 psi in the Madison. Capillary pressure data was not found in the literature for the Nugget and confining zones. However, using the above equation to estimate the capillary pressure as a function of the pore throat radius associated with the various lithologies, we can determine the general expected capillary pressure, as shown in **Table A-1.9** The Nugget and Madison are expected to have the lowest capillary pressure, the Amsden and Ankareh the highest at 100 times that of the injection zone. The Twin Creek is expected to have 10 times the capillary pressure of the Nugget, but regional shales will have much higher entry pressure. The Three Forks Limestone is expected to have about five times the capillary pressure of the Madison.

Table A-1.9. Expected Capillary Pressure of the Injection and Confining Zones						
Parameter	**Madison and Confining Zones**			**Nugget and Confining Zones**		
	Three Forks	**Madison**	**Amsden**	**Ankareh**	**Nugget**	**Twin Creek**
r (micro metre)	0.1	0.5	0.005	0.01	1	0.1
Expected P_c[1]	15	3	300	150	1.5	15
Factor (from injection zone)	5		100	100		10

[1]*Capilary pressure derived from the literature for the Madison (Akbarabadi and Piri 2015) and estimated from the equation based on varying pore throat radii for the other formations.*

The capillary pressure of the injection zones is expected to be much lower than the capillary pressure of the confining zones. The high entry pressure expected of the confining zones enables containment of the CO_2 in zone. Upon drilling and core analysis, capillary pressure data of the injection and confining zones will be acquired and analyzed.

1.2.5 Core Data and Mineralogy of Storage Zones

Site-specific core data from the SCS Hub and PSG expansion area are limited, but the literature has several core analyses reports from the surrounding area. The methodologies vary as do the exact mineralogy percentages, but trend toward similar findings, which are presented in this section. Site-specific data will be acquired when the first injectors are drilled, cored, and tested.

Madison

As described, the Madison shelf was extensive, and sequence boundaries can be traced for tens or hundreds of miles. As such, regional core studies are referenced and considered good analogues for PSG. Thayer (1983) analyzed cores from three wells located in southern Montana and northeast Wyoming. A total of 1,062 feet of core was investigated, and methodologies included thin section analysis, XRD, and electron microscopy. The results presented **Table A-1.10** suggest dolomite is the dominant mineral, followed by limestone. Chert, anhydrite, carbonate breccia and mudstone are found in similar quantities, with minor amounts of quartz sandstone. Another study (Honarpour, et.al. 1986) analyzed a one-foot Madison core from Carter Creek Gas Field in southwest Wyoming. The study found a much higher presence of anhydrite and much lower presence of calcite. Because of the small sample size, the Thayer (1983) mineralogy results are considered more reliable. Honarpour, et.al. (1986) did investigate fractures in their small sample and found the fracture filling mineralogy to be 97% dolomite and 3% quartz (**Table A-1.11**). It is unknown whether this small sample size is representative of the Madison overall, but the data provides the basis for present assumptions to be confirmed upon drilling. Thayer (1983) found Madison porosity in line with the log analysis value of 11% **(Table A-1.12**).

In summary, dolomite dominates the mineralogy of the Madison Formation (Barbier, et al., 2015) followed by limestone. Chert and anhydrite are also present in smaller quantities. Porosity is about 11% in the target dolomite injection zone.

Table A-1.10. Madison Formation Mineral Composition from 1,000+ Foot of Core in Three Wells (Thayer, 1983)		
Mineral Data		**%**
Dolomite		69.8
Limestone	Grainstone	8.7
	Packstone-Wackestone	7.2
Chert		4.8
Anhydrite		3.3
Carbonate Breccia		3.2
Carbonate Mudstone		2.8
Quartz Sandstone		0.3

Table A-1.11. Mineral Composition of Fracture Fill from a One-foot Core (Honarpour, et.al. 1986)	
Mineral Data	**%**
Dolomite	97
Quartz	3
Chlorite	trace
Illite	trace

Note: Fractures were found to be partially filled to filled.

Table A-1.12. Madison Core Data (Thayer, 1983)	
Sample Parameters	**Sample and Experiment Information**
Depth:	Unknown
Formation:	Madison
Dry Bulk Density:	Unknown
Diameter:	Unknown
Rock Type:	Very finely crystalline dolomite to medium crystalline dolomite
Porosity:	10.8 to 11.4
Pore Fluids:	Unknown
Entered Length:	Unknown

Note: Data analysis performed by Core Laboratories on 1,000+ ft core. Porosity was evaluated on plugs and whole core.

Nugget

Several Nugget regional core and outcrop data analyses are presented in the literature. Kayser (1964) took samples from various outcrop locations including the Overthrust Belt to the west, the Wind River Range, LaBarge, Kemmerer, and Dinosaur National Park. The mineralogy shown in **Table A-1.13** was determined from thin section counts. Keele and Evans (2008) with the Utah Geological Survey (UGS) performed a similar study with cores from Anschutz Ranch (to the southwest of the project area, in the Overthrust Belt). This study used thin section counts and performed X-Ray Diffraction (XRD). Keele and Evan (2008) identified the mineralogy of fragments as well as cement and provided facies designations of dunal, apron, or interdunal for all samples. More alteration minerals are expected in the Overthrust Belt because of the tectonic regime, relative to the PSG area, but otherwise mineralogy is expected to be similar. The mineralogy from this study is presented in **Table A-1.14, Table A-1.15, Figure A-1.46 and Figure A-1.47**. The Quartz Feldspar Lithics (QFL) diagram shows that the Nugget is classified as subarkose to quartz arenite, with 75 to 95% quartz. The dominant mineralogy across all Nugget facies is quartz, followed by feldspar. The dominant cementing agent is carbonate, followed by quartz and hematite in roughly equal portions. Point counting in Keele and Evans (2008) did not distinguish calcite from dolomite, but XRD results in **Figure A-1.47** suggest that ferrodolomite is the dominant cement. Hematite is more abundant in the interdunal facies. Porosity is 13% from analysis of core at Dry Piney (Picard 1975) as seen in **Table A-1.17**.

Table A-1.13. Identified Nugget Mineralogy from Kayser, (1964)	
Mineral Data	**%**
Quartz	95
Orthoclase	3
Plagioclase, microcline	1
Magnetite	minor
Ilmenite	minor
Tourmaline	minor
Zircon	minor
Garnet	minor

Table A-1.14. Mineralogy of Framework Grains, as Identified in Keele and Evans (2008)	
Framework Grains	**%**
Quartz, including chert	85
Kspar	13
Lithics sedimentary	1
Zeolite	minor
Plagioclase	minor
Lithics plutonic	minor
Lithics volcanic	minor

Table A-1.15. Identified Cement Mineralogy Keele and Evans (2008)	
Cement	**%**
Carbonate[1]	56
Quartz	23
Hematite	21

[1]*Includes calcite and dolomite.*

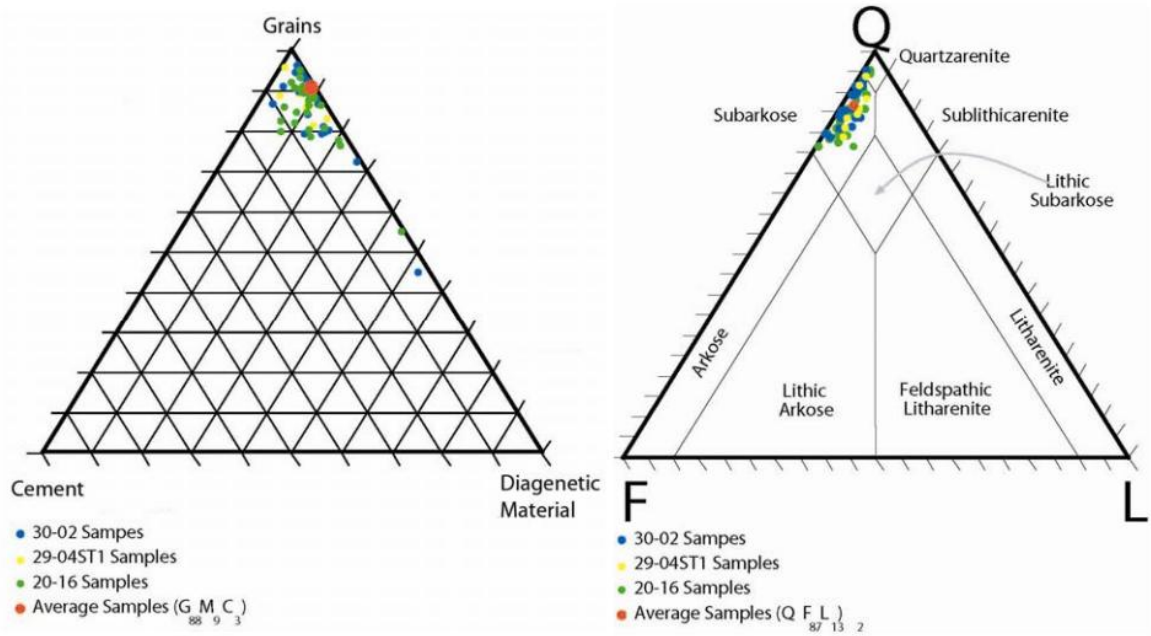


Figure A-1.46. *Ternary diagrams per Keele and Evans (2008) show the Nugget to be grain dominated and a subarkose. Petrographic analysis based on Gazzi-Dickinson point counting method of 58 thin sections. Samples were taken from Anschutz Ranch, southwest of PSG.*

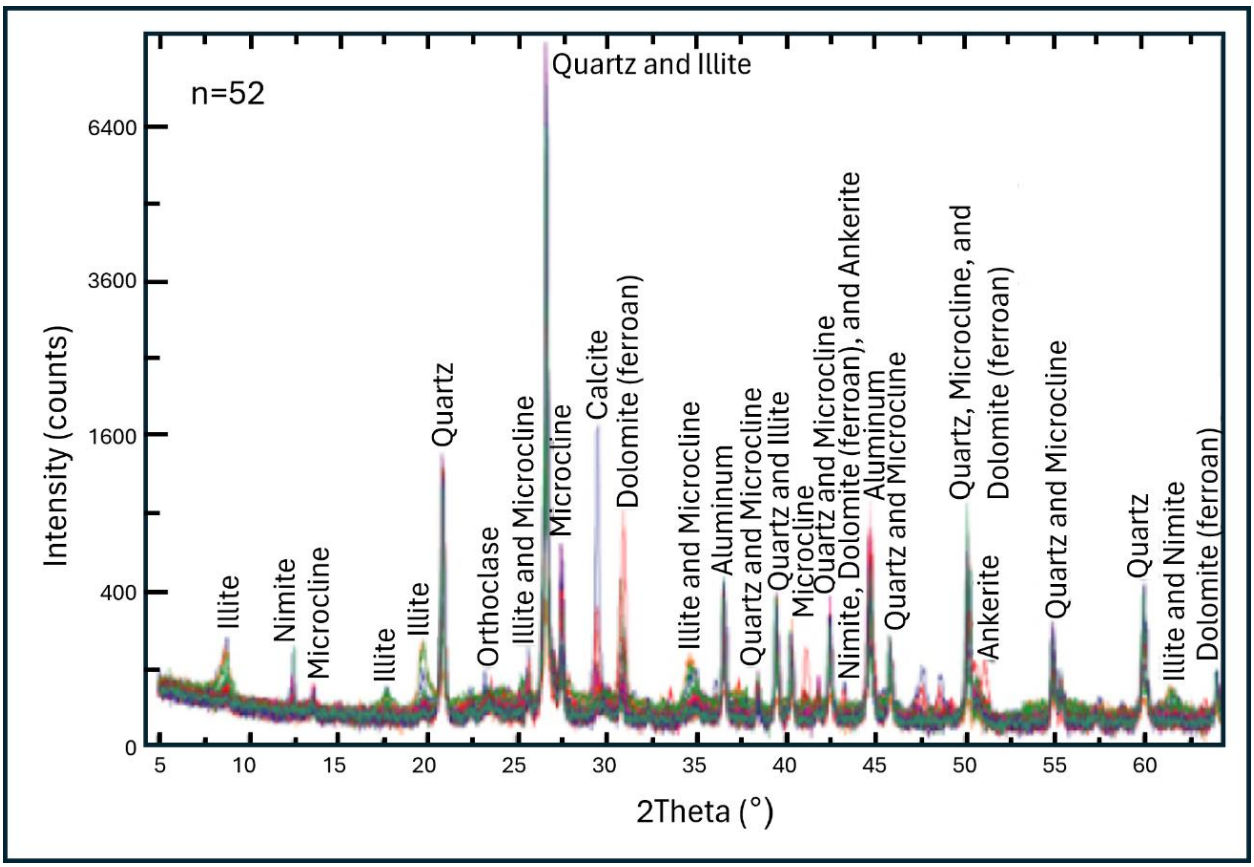


Figure A-1.47. *XRD results for Nugget Sandstone from Keele and Evans (2008). Microcline is the dominant feldspar and ferrodolomite is the dominant carbonate cement.*

Table A-1.16. Nugget Core Data (Picard, 1975)	
Sample Parameters	**Sample and Experiment Information**
Depth:	10,994 to 11,052 feet
Formation:	Nugget
Dry Bulk Density:	Unknown
Diameter:	Unknown
Rock Type:	Subarkose Sandstone
Porosity:	13%
Pore Fluids:	Unknown
Entered Length:	Unknown

Note: Six core samples taken from the productive interval at Dry Piney. This study also took cores from various locations in Wyoming and Utah and found 10 to 20% porosity in the sandstones across the region.

In summary, several Nugget studies describe the Nugget as subarkose to quartz arenite with feldspar being the dominant mineral after quartz. Various minor minerals are found. Dolomite is the dominant cement, but quartz and hematite are also present. Several studies refer to interdunal carbonate lenses identified in outcrop (Britt et al., 2016), however, the core studies tend to focus on dunal facies that have limited carbonaceous material. Porosity is greater than 10% in the target sandstone intervals.

1.2.6 Geochemistry and Potential Interactions with CO_2 Injection

1.2.6.1 Potential Geochemical Interactions

Currently no site-specific data and geochemical modeling exists at PSG. There are, however, studies on the potential geochemical interactions of injected CO_2 with fluids and minerals in the Nugget and Madison.

Madison

Kaszuba, et al. (2011) and Thyne (2011) modeled the injection of CO_2 into the Madison Formation. Kaszuba, et al. (2011) created a simple equilibrium model of the Madison using mineralogic data and published water analyses from southwestern Wyoming including the Moxa Arch to describe reactions among supercritical CO_2, minerals and formation water. The modeling indicated that as CO_2 is injected into the Madison the pH decreases, resulting in small amounts of calcite dissolving and anhydrite precipitating. Iron carbonate (siderite) was not stable because of the increased acidity. The Madison Limestone contains accessory sulfur-bearing minerals, quartz and aluminum-bearing minerals (feldspar, illite, and analcime). TDS increased due to dissolution of calcite and dolomite with an increase in dissolved bicarbonate.

Thyne (2011) evaluated long-term CO_2 storage using reactive transport multiphase flow models that simulated CO_2 injection in a single well for 30 years and followed the fate and transport for an additional 10,000 years. They simulated little measurable effect on the reactive minerals, calcite and dolomite, even after long-term exposure and storage. These carbonates were reactive only near the wellbore in the simulation, which matches observations from the Madison where supercritical CO_2 has been trapped for millions of years (i.e., LaBarge Platform). In summary, two studies model CO_2 injection into the Madison and find that chemical interaction with calcite and dolomite does not limit injectivity.

Nugget

Lu, et.al. (2010) performed experiments to determine the reaction of the Navajo Sandstone (equivalent to Nugget) to long-term injection of CO_2. Their results indicate the Nugget will react with CO_2 impregnated brine during injection and storage but will affect only the near-borehole area. Silicate mineral dissolutions were modeled as the dominant reactions and include an increase of dissolved SiO_2, increase of pH and conversion of smectite to illite. The chemical reactions will likely increase porosity through silicate dissolution, but permeability may be reduced by the precipitation of pore-filling allophane and mobilization

of clays. Mobilization of trace amounts of copper, zinc and barium metals may occur, but at low concentrations. Cementation of the Nugget is largely dolomite. Interaction of the CO_2 and dolomite would lower the pH and tend to increase porosity and permeability (Kaszuba et al. 2011). In summary, CO_2 injection will likely cause some dissolution and reprecipitation in the Nugget. The silica interactions will increase the pH and potentially decrease permeability while the dolomitic interactions will decrease the pH and potentially increase permeability. Any mobilized minerals are expected to be in low concentration.

1.2.6.2 PSG Geochemical Modeling

After the first injection well is drilled and data is collected, geochemical modeling using The Geochemist's Workbench® will be performed with the Nugget and Madison pore water chemistry and mineral composition as model inputs. The simulation will identify the reactions of the minerals-brine system into which the expected CO_2 stream composition stream composition (**Table A-1.17**) is added. This will enable prediction of pH and chemical interactions. Porosity change can be estimated from the quantity of mineral dissolution and precipitation.

Table A-1.17. Expected CO_2 Stream Composition

Component	ppmv	Mol%
CO_2 (minimum)	950,000	95
CO[1]	2,000	0.2
H_2[1]	10,000	1
Argon[1]	40,000	4
Methane[1]	40,000	4
Ethane[1]	40,000	4
N_2[1]	40,000	4
C3+	1,500	0.15
NOx	50	0.005
SOx	50	0.005
H_2S	15	0.0015
NH_3	1,500	0.15
O_2	500	0.05
H_2O	300	0.03
Methanol and Ethanol	500	0.05
Amines	5	0.0005
Glycols	5	0.0005

[1]*Combined total is less than or equal to 4%.*

The geochemical modeling will produce the following deliverables:

- A figure of fluid pH versus time
- Dissolution and precipitation of minerals in the caprock
- Change in percent porosity of the caprock

1.2.6.3 Compatibility of the CO_2 with Subsurface Fluids and Minerals

No potential chemical reactions that could mobilize contaminants and potentially endanger USDWs are expected. Although there is no site-specific data and empirical geochemical modeling in the PSG area, this conclusion is based on compatibility modeling of the of the CO_2 stream with fluids and minerals presented in the previous section (Nugget - (Lu, et.al., 2010) and Madison - (Kaszuba, et.al., 2011 and Thyne, 2011)) and the thickness and stratigraphic position of the confining zones.

The Dakota Formation was identified as the lowest known possible USDW in the PSG area based on water analyses in the Wyoming Oil and Gas Conservation Commission (WOGCC) data site. The thickness of the confining zones and their stratigraphic position below this possible USDW are protective against brine leakage into a USDW. The Twin Creek is 650 feet thick and nearly 900 feet below the base of the Dakota. The Amsden thickness is 490 feet thick, and 4,850 feet below the USDW. There are no known chemical reactions that would allow the injected CO_2 to breach the confining zones.

1.2.7 Geomechanical Information of the Confining Zones

Based on the oil and gas field data reported to the WOGCC, in the injection zones a pore pressure of 0.45 psi/ft was estimated for the Moxa Arch (Thyne, 2011). The DST temperature and pressure profiles for the PSG area were compiled from the WOGCC and S&P Global websites. **Table A-1.18** shows the available temperature and temperature gradient data, and **Table A-1.19** summarizes the available formation pressures per well and formation. Normal hydrostatic pore pressure is observed in the Nugget and Madison (Bruff Unit 1), while the Frontier Formation is overpressured with a pore pressure gradient up to 0.57 psi/ft (Bruff Unit 2). Because of low permeability and lack of reservoir sands, the Mowry Formation in the confining zone has no direct pressure measurements. Therefore, the formation pressure is estimated based on logs and the under-compaction mechanism. An overpressure signature is observed, and a pore pressure gradient of 0.53 psi/ft is estimated, defining the base of the overpressure zone. In the injection zone, no clear formation pressure compartmentalization is observed, and a small vertical variation is presented in **Table A-1.19** (Bruff Unit 1). Therefore, the formation pressure measurements can be classified as normal pressure regime and the vertical variation in a single well may not be representative of the full site scale. Based on these inputs, a hydrostatic pore pressure gradient of 0.45 psi/ft was assumed for the Nugget and Madison in the PSG area. Pressure testing will be undertaken when the injections wells are drilled to confirm this assumed pressure gradient.

Table A-1.18. Temperature Measurements and Calculated Temperature Gradients						
Well Name	**API**	**Formation**	**Test Depth, feet**	**Temperature**		**Gradient, °F/feet**
				°F	**Mean**	
Bruff Unit 1	4902320045	Fort Union	5,431.5	120	NA	0.0109
Bruff Unit 1	4902320045	Mesaverde	7,691.0	140	NA	0.0103
Bruff Unit 1	4902320045	Hilliard	10,493.5	192	NA	0.0125
Bruff Unit 1	4902320045	Nugget	13,868.5	220	NA	0.0115
Bruff Unit 1	4902320045	Phosphoria	16,404.0	300	NA	0.0146
Bruff Unit 1	4902320045	Weber	16,543.5	315	NA	0.0154
Bruff Unit 1	4902320045	Weber	16,603.5	302	NA	0.0145
Bruff Unit 1	4902320045	Weber	16,941.5	301	NA	0.0142
Bruff Unit 1	4902320045	Madison	18,066.0	320	NA	0.0143
Bruff Unit 3	4902320194	Frontier	11,378.0	198	NA	0.0120
Champlin 149 C1	4902320292	2nd Frontier	11,308.5	239	NA	0.0157
Champlin 285 F1	4903721340	2nd Frontier	11,738.0	206	NA	0.0124

Table A-1.19. Pressure Measurements and Calculated Pressure Gradients						
Well Name	**API**	**Formation**	**Test Depth, feet**	**Formation Pressure, psi**	**Mean Pressure**	**psi/ft**
Bruff 2	4902320106	Frontier	11,301.0	6,404.0	6,554.6	0.57
Bruff 3	4902320194	Frontier	11,378.0	6,629.3	6,599.2	0.58
Champlin 149 C1	4902320292	2nd Frontier	11,308.5	6,088.0	6,332.8	0.54
Wilson Ranch Unit 7-1	4902320299	2nd Frontier	11,349.5	6,480.5	6,469.2	0.57
Wilson Ranch Unit 13	4902320303	2nd Frontier	11,312.5	6,226.0	6,448.1	0.55
Bruff Unit 10	4903721187	2nd Frontier	11,527.5	6,501.0	6,570.7	0.56
Champlin 285 F1	4903721340	2nd Frontier	11,738.0	5,438.0	5,399.5	0.46
Bruff Unit 1	4902320045	Fort Union	5,431.5	2,526.0	2,444.2	0.47
Bruff Unit 1	4902320045	Mesaverde	7,691.0	3,484.0	3,537.9	0.45
Bruff Unit 1	4902320045	Nugget	13,868.5	5,911.0	6,240.8	0.43
Bruff Unit 1	4902320045	Weber	16,543.5	5,731.0	7,444.6	0.35
Bruff Unit 1	4902320045	Weber	16,941.5	7,638.0	7,623.7	0.45
Bruff Unit 1	4902320045	Madison	18,066.0	8,210.0	8,129.7	0.45

Under dynamic conditions involving the propagation of an elastic wave in an undrained condition, rocks exhibit a stiffer response (dynamic elastic properties) than they would under quasi-static loading (static elastic properties), such as occurs in a mechanical laboratory test, or under mechanical loading in the ground or near to a wellbore (Fjaer et al. 1992). The dynamic elastic properties of the Bruff Unit 1 were evaluated using the existing acoustic and density logs (**Figure A-1.48**). Because of the lack of shear measurements, an empirical correlation (Greenberg and Castagna 1992) was applied to derive the shear slowness. Therefore, the dynamic elastic properties, including Young's modulus (E) and Poisson's ratio (ν), were computed based on density, compressional slowness, and synthetic shear slowness. After the dynamic elastic properties were computed, the static elastic properties were derived from these dynamic properties using the empirical correlation from (Morales and Marcinew 1993) and assuming the static Poisson's ratio is equal to the dynamic Poisson's ratio (**Figure A-1.48**). These correlations were established to represent wellbore observations and compared to the elastic properties available from literature as shown in **Table A-1.20**, (Ng et al., 2023).

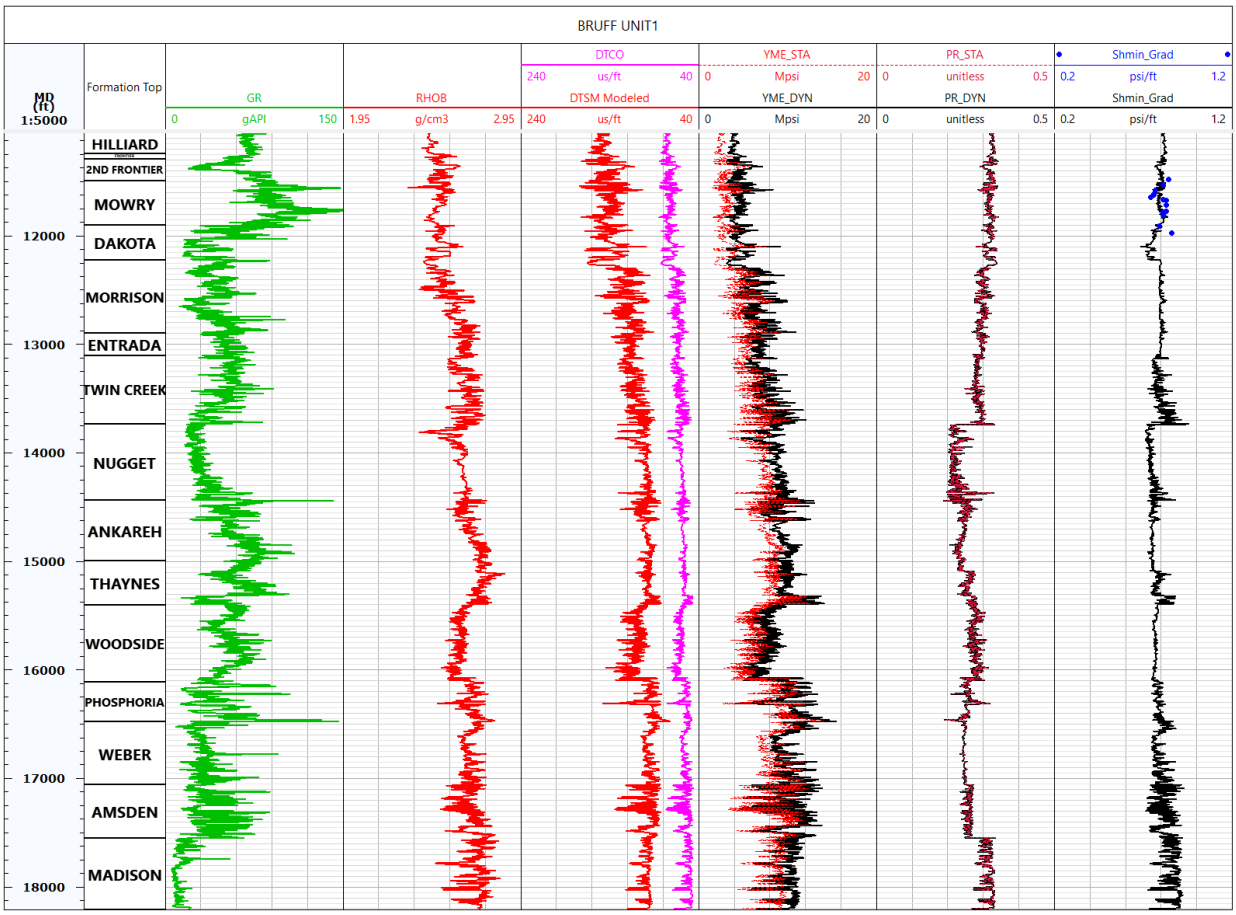


Figure A-1.48. *Geomechanical properties for Bruff Unit 1. Track 1: Formation top; Track 2: gamma ray (0-150); Track 3: RHOB (1.95-2.95 g/cc); Track 4: compressional and synthetic shear slowness (240-40 µs/feet); Track 5: dynamic (black) and static (red) Young's modulus (0-20 Mpsi); Track 6: dynamic (black) and static (red) Poisson's ratio (0-0.5); Track 7: minimum horizontal stress profile in black curve and calibration data in blue dots (Cipolla et al., 1994) (0.4-0.9 psi/feet).*

Table A-1.20. Elastic Properties Measured at Different Confining Pressures (Literature)							
Event	**Conf., MPa**	**Diff., MPa**	**E, GPa**	**n**	**K, GPa**	**G, GPa**	**P, GPa**
Triaxial Test (Madison)	NA	NA	20.16	0.31	17.68	7.69	27.9
Triaxial Test (Madison)	NA	NA	27.8	0.42	57.9	9.78	70.9
Triaxial Test (Madison)	NA	NA	24.6	0.42	51.2	8.66	62.7
Triaxial Test (Madison)	NA	NA	34.2	0.22	20.3	14.0	39.0
Triaxial Test (Madison)	NA	NA	30.1	0.27	21.8	11.8	37.6

Note: Elastic properties of Madison Limestone samples. The source does not specify the confining pressure; therefore, these data can be used as reference value rather than hard calibration data. No data at different known confining pressure available. Results will be updated upon acquisition of data from drilling and construction of the proposed injection well.

E = Youngs Modulus, n = Poisson's Ratio, K = Bulk Modulus, G = Shear Modulus, P = Uniaxial Strain Modulus

For the Nugget injection zone, at the calculated confining pressure, the estimated average Young's modulus and Poisson's ratio were 7.4 Mpsi (51 Gpa) and 0.21 in the Twin Creek upper confining zone, 7.8 Mpsi (53.7 Gpa) and 0.19 in the Nugget injection zone, and 8.0 Mpsi (55.1 Gpa) and 0.23 in the Ankareh lower confining zone.

The average estimated Young's modulus and Poisson's ratio for the Madison injection zone section were 8.6 Mpsi (59.2 Gpa) and 0.24 in the Weber and Amsden upper confining zone, 8.2 Mpsi (56.5 Gpa), and 0.30 in the Madison injection zone. For a given lithology, rock stiffness tends to increase with the confinement (Ng et al. 2019 and Ng and Yu 2023) and varies between different lithologies and formations. From Mavko et al. (1998), in an isotropic, linear elastic medium, only two constants are needed to specify the stress-strain relation completely, and they can be defined from the static Young's Modulus (E) and Poisson's Ratio (v). The static elastic properties were input in the poroelastic model (Thiercelin and Plumb, 1994) to compute the fracture gradient and the stress contrast (stress barriers) between formations and lithologies.

The in-situ stress field consists of three components: vertical stress, minimum horizontal stress (Shmin), and maximum horizontal stress (SHmax). The horizontal stresses were estimated using the poroelastic horizontal strain model, which assumes that the rocks are a semi-infinite poroelastic medium subjected to overburden and horizontal strain loadings (Higgins et al. 2008). The overburden/vertical stress gradient of 1.08 psi/feet for the zone of interest was determined by integrating the density of the rock with depth. The common sources of in-situ horizontal stresses in the subsurface include gravitational loading, tectonic loading (and strains), thermal effects and creep. For the Moxa Arch the main mechanisms identified are gravitational loading and tectonic loading, based on the World Stress Map, proxy stress test, wellbore conditions (caliper logs) and mapped faults. Therefore, under the same tectonic system or stress regime, the poroelastic model is used to derive the fracture gradient profile and the stress contrast.

A recent study of the North America crustal stress field (Lund, 2020, Lund Snee and Zoback, 2020) indicates the storage facility is in a normal to strike-slip stress regime. Because of the lack of measurements of the minimum horizontal stress in the PSG area (**Table A-1.21**), the stress tests in the Frontier from wells within a 5-mile radius (Cipolla et al. 1994) were used to calibrate the minimum horizontal stress profile (**Figure A-1.48,** track 7). For the Nugget injection zone and its confining zones, the estimated lowest minimum horizontal stress gradients per zone are 0.76, 0.72, and 0.74 psi/ft for the Twin Creek, Nugget, and Ankareh formations, respectively. The estimated minimum horizontal stress gradients are 0.8, and 0.78, for the Amsden confining zone and the Madison injection zone. The lower Madison confining zone has no available data or logs, and there is no site-specific core data for rock strength, elastic properties and ductility. **Table A-1.22** and **Table A-1.23** show the fracture propagation pressure, pressure gradient, and minimum horizontal stress for the Nugget and Madison. To prevent the initiation/propagation of fractures, 0.72 psi/ft was assumed as the fracture gradient in the Nugget section and 0.78 psi/ft in the Madison section; 90% of the fracture pressure was used as a constraint for injection pressure in the reservoir simulation. This conservative approach covers the risk of propagating fractures in both injection and confining zones.

Table A-1.21. Description of Microfracture Tests

Formation	Test Depth, ft	Breakdown Pressure		Propagation Pressure	Closure Pressure		Initial Shut-In Pressure	
		Gradient, psi/ft	Avg., psi	Gradient, psi/ft	Avg., psi	Gradient, psi/ft	Avg., psi	Gradient, psi/ft
Nugget	NA	NA	NA	NA	NA	NA	NA	NA
Madison	NA	NA	NA	NA	NA	NA	NA	NA

Table A-1.22. Storage Reservoir Microfracture Results (Estimated)		
Nugget Injection Zone		
Depth, feet	14,400 feet	-
Pressure/Gradient	6,480 psi	0.45 psi/ft
Breakdown	15,840 psi	1.1 psi/ft
Fracture Propagation	10,886 psi	0.756 psi/ft
Closure	10,368 psi	0.72 psi/ft
Madison Injection Zone		
Depth, ft	18,000 feet	-
Pressure/Gradient	8,100 psi	0.45 psi/ft
Breakdown	19,800 psi	1.1 psi/ft
Fracture Propagation	14,742 psi	0.81 psi/ft
Closure	14,040 psi	0.78 psi/ft

In the absence of direct measurements in the AOR, the average formation pressure, breakdown, fracture propagation, and fracture closure pressure are estimated based on the calibrated geomechanical model. Pressure units and gradients units for Nugget and Madison are presented.

Table A-1.23. Average Minimum Stress of the Injection Formation as Determined by Horizontal Stress Model

Depth, ft	Average Propagation Pressure, psi	Reopening Pressure, psi	Closure Pressure, psi	Average Minimum Stress, psi
14,400 **(Nugget)**	10,886	10,886	10,368	10,368
18,000 **(Madison)**	14,742	14,742	14,040	14,040

Geomechanical model estimation of average pressures for propagation pressure, reopening pressure, and minimum horizontal stress per injection zone. Note that the closure pressure and minimum horizontal stress are equal in the model.

Geomechanical properties, including the elastic properties and rock strength, can be measured in the laboratory in oriented core plugs. Geomechanical data will be collected as part of the well sampling plan for the drilling and construction of the proposed wells. These data will be also used to confirm the caprock integrity and stability of fractures and stress faults. Additional tests such as the injection zone pressure fall-off test and microfracture testing will refine our

pressure and stress model as detailed in ***Form A-9, Proposed Quality Assurance and Surveillance Plan***.

1.2.8 Faults and Fractures

The SCS Hub and PSG expansion area are in a structurally quiet area. To the west is the Wyoming-Idaho-Utah Thrust Belt and to the east the Rock Springs Uplift. There is substantial surface faulting associated with these features, but none are observed in the project area as shown in **Figure A-1.49**.

The seismic data have been thoroughly examined for faulting and interpreted faults are posted in **Figure A-1.50**. The west-east fault identified on the seismic appears to extend from the basement into the Madison. A shallower fault trending roughly south to north extends from the Nugget to the 2nd Frontier Formation. There is no data on faults to definitively determine if the faults are open or closed, and their conductivity. Because of this uncertainty, the injection well locations were placed to avoid plume interaction with the faults.

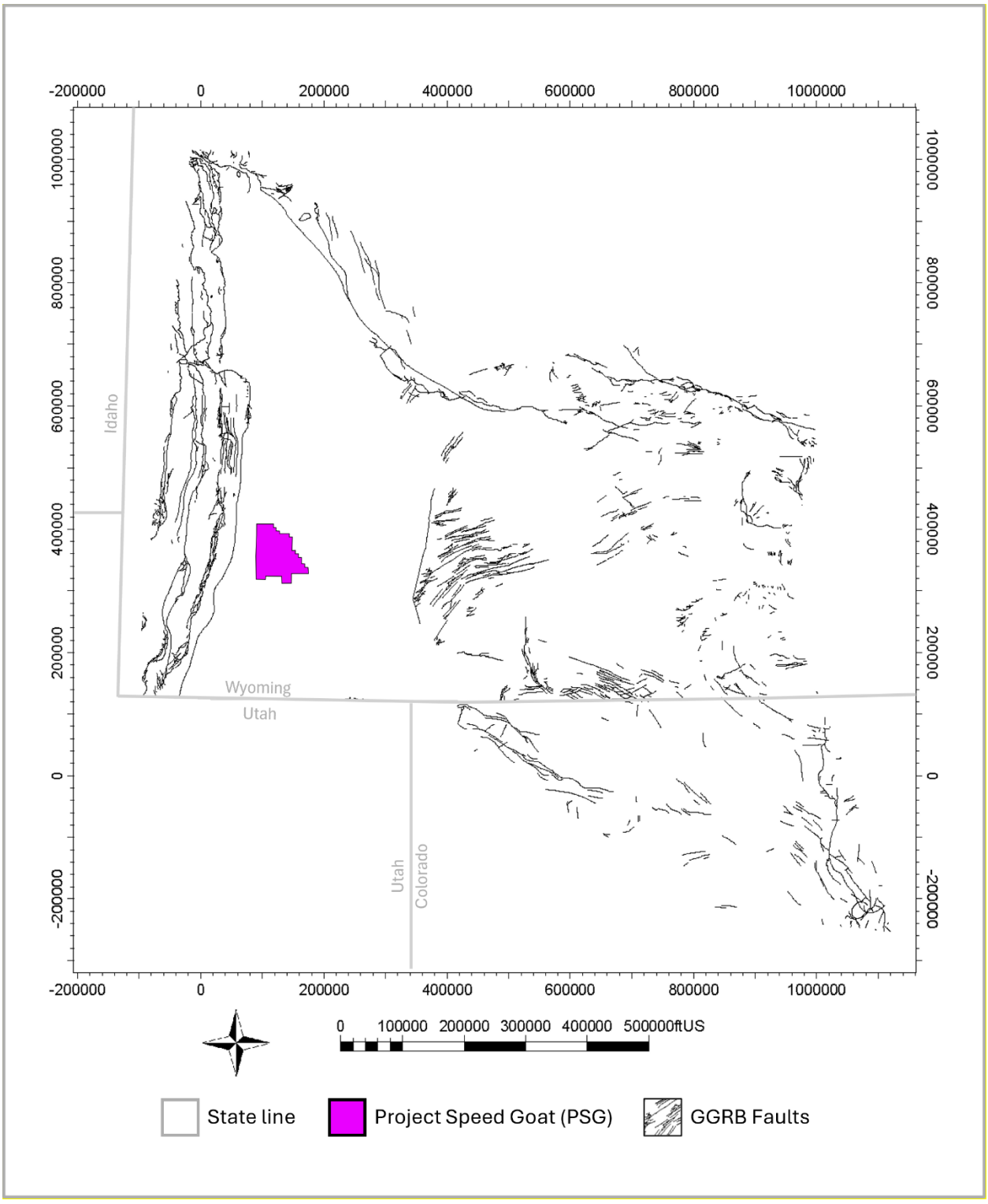


Figure A-1.49. *Faults of the GGRB (modified after WSGS, USGS Geologic Map of Wyoming, Love and Christiansen, 1985).*

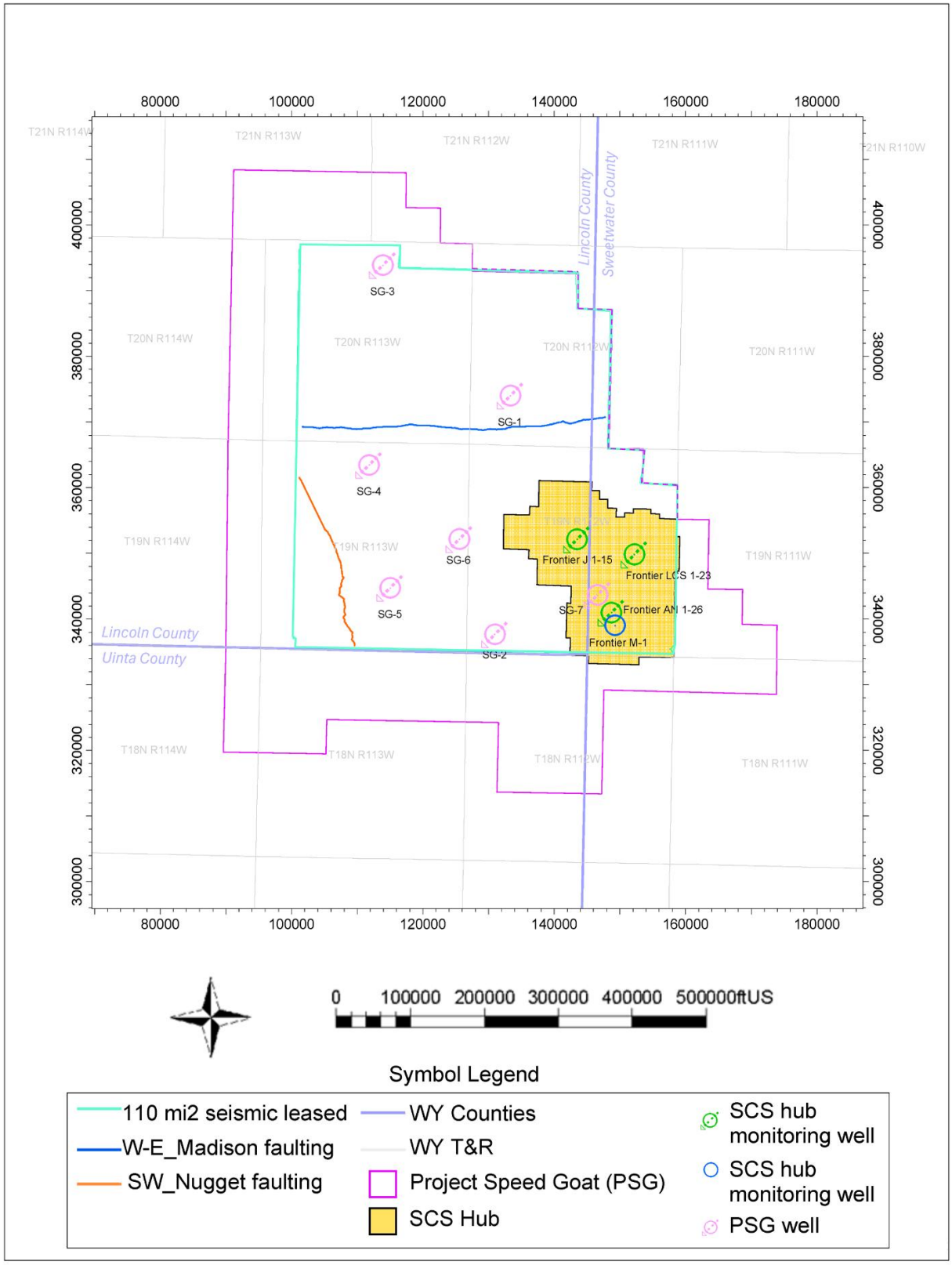


Figure A-1.50. *Pertinent faults identified on the seismic data and planned well locations for the SCS Hub (approved) and the PSG expansion area.*

1.2.9 Seismic Activity

The PSG area is in a tectonically quiet area on the western edge of the GGRB. Most seismic activity occurs along the basin's margins and is mainly associated with tectonically induced faulting, mining, and Yellowstone Caldera volcanic activity. Historical earthquake data were obtained from the USGS Earthquake Hazards database and analyzed (USGS Earthquake Hazards Program, 2024). All area earthquakes were taken into consideration for the risk analysis. **Figure A-1.51** shows the major fault systems in the region associated with primary earthquake activity (WSGS GIS Data-Geology, 2024) and historical earthquakes. There are no USGS mapped faults present in PSG. Five earthquakes were reported to have occurred within five miles of the PSG injection wells since 1975, which is the first date of recorded activity in the USGS earthquake catalog for Wyoming (USGS Earthquake Hazards Program 2024). These five earthquakes are listed in **Table A-1.24**.

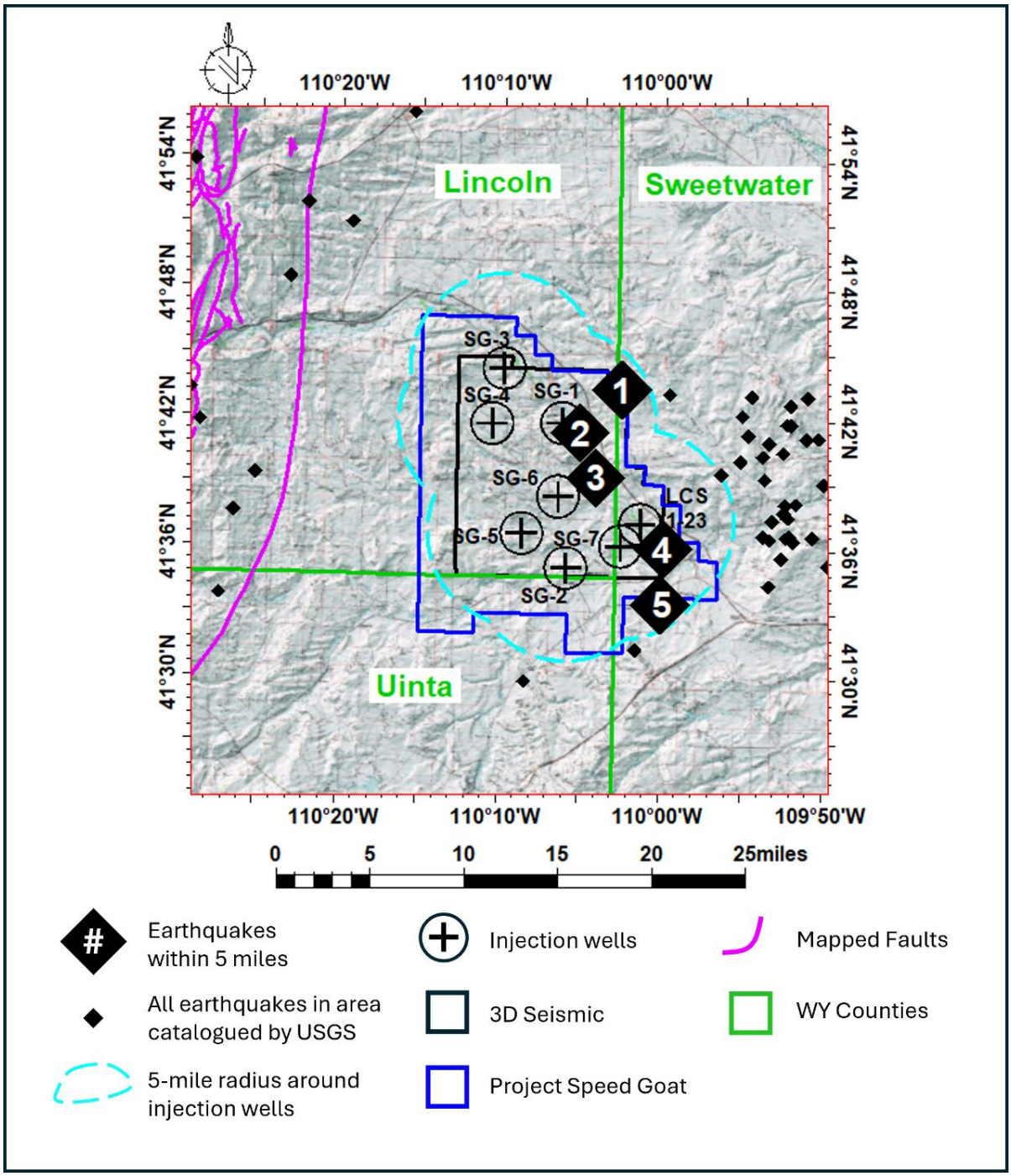


Figure A-1.51. *Historical Earthquakes (USGS Earthquake Hazards Program 2024) near injection wells recorded by USGS since 1975 (WSGS GIS Data-Geology, 2024).*

Table A-1.24. Summary of Earthquakes in Wyoming within a Five-mile Radius of PSG Center						
Date	**Magnitude**	**Depth (MSL), miles**	**Longitude / Latitude**	**City or Vicinity of Earthquake**	**Map Label**	**Distance to project center, miles**
8/28/2018	3.4	-2.08	-110.043, 41.72267	15 km NNW of Granger, Wyoming	1	~5.08
8/28/2018	2.1	3.69	-110.086, 41.68933	Wyoming	2	~1.98
8/28/2018	2.66	2.98	-110.069, 41.65467	10 km NW of Granger, Wyoming	3	~1.68
12/27/2022	1.81	18.06	-109.998, 41.6005	2 km WNW of Granger, Wyoming	4	~6.8
8/28/2018	2.31	4.29	-110.001, 41.55717	4 km SSW of Granger, Wyoming	5	~8.91

Figure A-1.52 shows the relative seismic hazard in Wyoming. PSG has a low risk of seismicity compared with the more active seismic zones associated with major faulting in western and northwestern Wyoming. Historical earthquake activity near the PSG area is sparse with low magnitude. Combining the distal proximity to major fault and earthquake activity, the low magnitude of nearby earthquakes, and the USGS seismic hazard map, a low risk of earthquakes is inferred within the AoR.

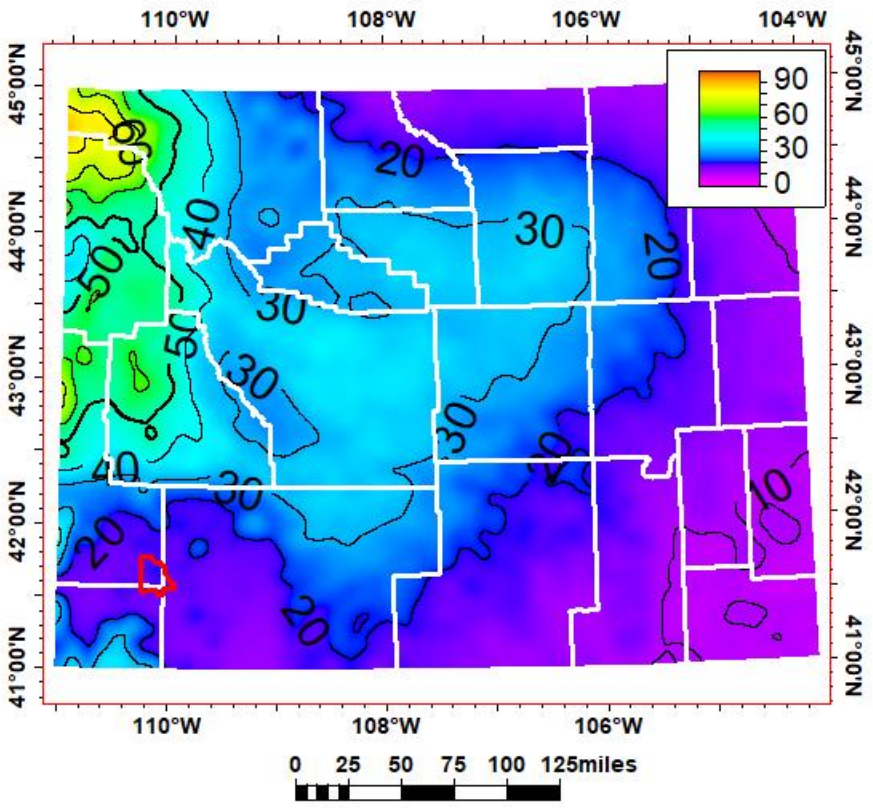


Figure A-1.52. *Seismic hazard distribution for Wyoming, the contours represent the percent chance of potentially damaging ground motion (MMI=VI) through 2123. The red polygon is PSG. County lines are shown in white. Data per USGS, 2023.*

1.2.10 Models

A conceptual layer-cake geologic (static model) was constructed and subsequently used to create a dynamic model for simulation of the CO_2 plume, associated pressure front, and displaced fluids.

1.2.10.1 Static Model

The static modeling process started with the construction of a regional 3D structural framework in *Petrel 2022 (v.5.0)*. This framework covered an area of 1,920 mi^2 (**Figure A-1.53**) and used the following data sets:

- Well-formation tops
- 3-D seismic volume and velocity model.

The well tops were imported and checked to ensure consistency. Inconsistent picks were discarded. Six horizons were interpreted and extracted from the seismic (**Table A-1.25**). These surfaces were re-gridded along with the formation tops to ensure the well data points were honored.

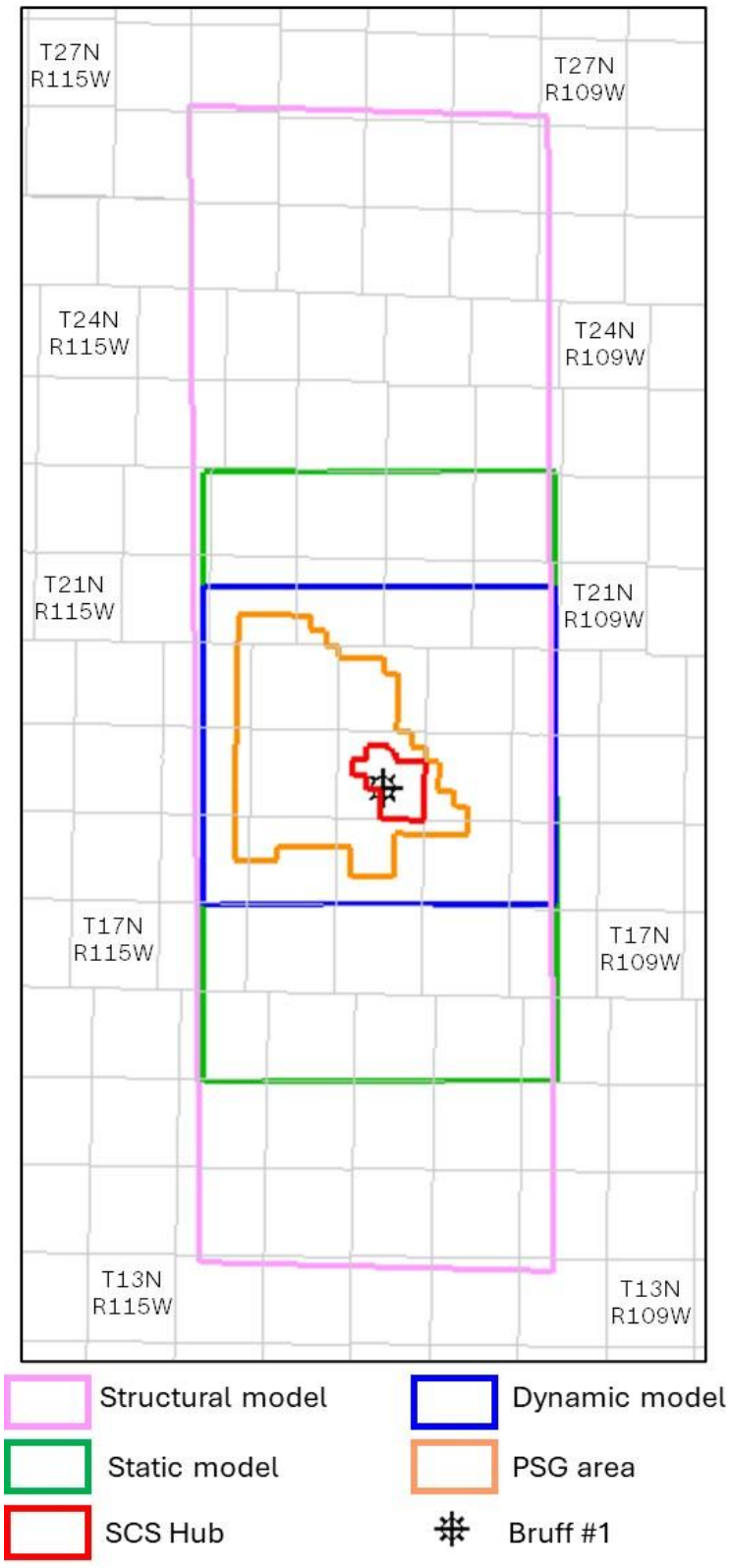


Figure A-1.53. *Model polygons, PSG area, SCS Hub and Bruff 1 well.*

Table A-1.25. Seismic Horizons Used for Structural Framework
2nd Frontier
Morrison
Nugget
Woodside
Phosphoria
Madison

The regional structural framework was then clipped to create a static model area that covers 1,008 mi^2, which includes PSG (489 mi^2). A simple grid was created using 16 structural conformable surfaces (**Table A-1.26**). The individual cell dimension was 250 feet x 250 feet horizontally, with an average layer thickness of ~10.6 feet. The layering was refined to 2.5 feet for the injection zones (Nugget and Madison) to allow for a more detailed distribution of the petrophysical properties. The total number of grid cells in the static model was 301,519,638. The grid was quality-checked to ensure no modeling artifacts were present. The static model was further cropped for dynamic simulation, as detailed below in the computational model section.

Table A-1.26. Static Model Zones and Layers			
Zone	**Average Thickness (feet)**	**Number Layers**	**Average Layer Thickness (feet)**
2ND Frontier	264	1	210
Mowry	522	1	472
Dakota	267	1	253
Morrison	703	1	703
Entrada	184	1	208
Twin Creek	654	20	32
Nugget	674	300	2.3
Ankareh	534	20	27
Thaynes	439	1	416
Woodside	701	1	703
Phosphoria	378	1	369
Weber	586	1	588
Amsden	451	20	21
Madison	841	280	2.7
Three Forks	96	20	5

Effective porosity and permeability values were derived from the Bruff Unit 1, which penetrated 85% of the Madison. The petrophysical properties were upscaled from this well and then populated into the entire model as a constant laterally. The raw logs were incorporated into the grid cells by an averaging method that varied by property. For effective porosity, the arithmetic averaging was selected, and for sample selection, the "neighbor cell" method was used. In this method, values from all the cells that the wellbore penetrates, in the layer of interest, were averaged and the logs were treated as points. For permeability, arithmetic averaging was chosen, and sample selection was the same as effective porosity. Next, using the "Closest" algorithm the petrophysical property values were populated into the entire model area (**Figure A-1.54**). This static model with effective porosity and permeability properties was provided for reservoir simulation (dynamic modeling).

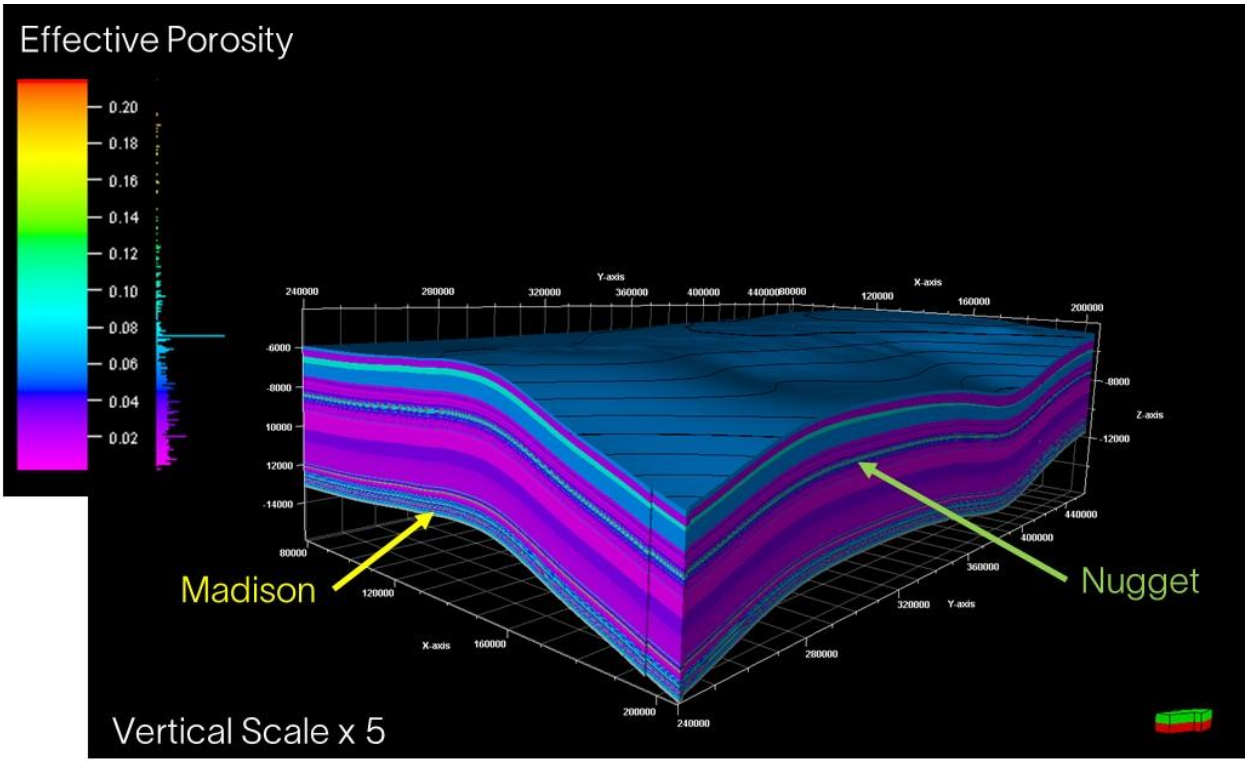


Figure A-1.54. *Effective porosity model.*

1.2.10.2 Dynamic Model

Reservoir simulations were performed on the dynamic model to forecast the geologic CO_2 sequestration volume, considering seven proposed injection wells (**Figure A-1.55**). The dynamic model has the same cell dimensions as the static model but was cropped to an area of 528 mi^2 (24 × 22 miles) with a total number of cells of 156,671,772. The storage capacity and injectivity were assessed over a phased 20-year period in both the Nugget and Madison to determine the reservoir's ability to safely and permanently contain and confine the CO_2. Injection of supercritical CO_2 was modeled for 20 years into the deeper Madison, followed by injection for an additional 20 years into the Nugget. Bottom hole pressure was limited to

90% of the corresponding reservoir fracture pressure at the respective perforation locations. Modeling was performed to optimize well locations and to delineate the AoR.

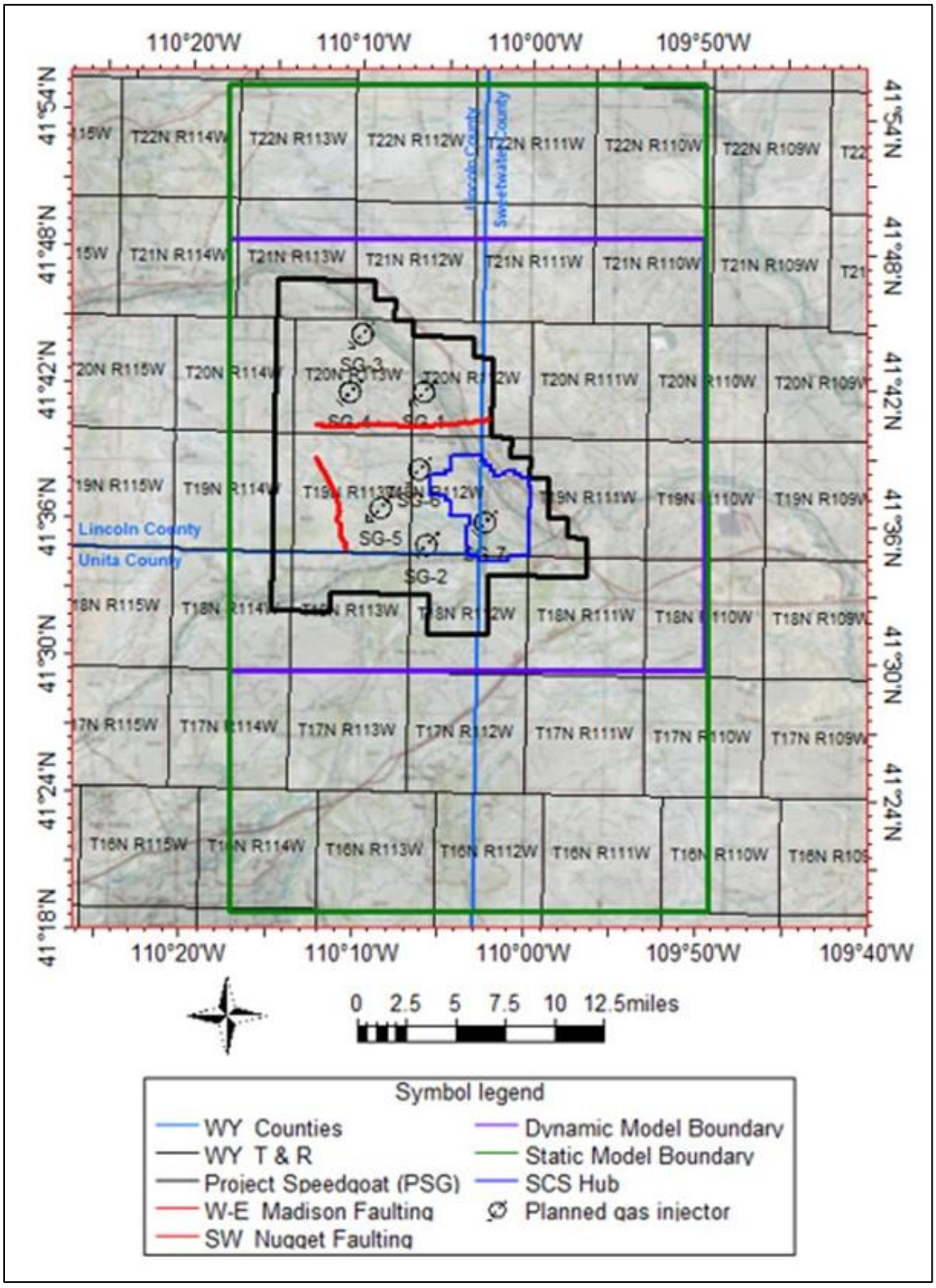


Figure A-1.55. *Location of PSG injector wells and PSG static and dynamic model boundaries.*

1.2.11 Mechanisms of Geological Confinement

Four main mechanisms trap CO_2, over varying time scales and are described below.

1. *Structural Trapping:* As CO_2 is more buoyant than saline water, it will gradually travel to the top of the reservoir until it encounters an impermeable seal or structural trap. Extensive caprocks act as confining layers that trap the CO_2 from moving vertically. PSG is roughly centered over the Moxa Arch, a structural feature that aids in trapping the CO_2. Several confining layers also act as impermeable layers to halt the vertical migration of CO_2. The Nugget Sandstone, at a depth of 13,700 feet, is overlain by the sealing Twin Creek Limestone. The Madison Formation, at a depth of 17,500 feet, is overlain by the shaley Amsden and Phosphoria formations. CO_2 will be vertically trapped by these confining layers. The redundant seals and structural configuration provide a strong trapping mechanism at PSG.

2. *Residual Trapping:* During injection, the CO_2 permeates through the reservoir into the pores and displaces the brine. CO_2 travels away from the wellbore and as CO_2 injection stops, water floods the pores again. Some of the CO_2 then becomes trapped behind the waterfront in the narrow pore spaces, remaining immobile.

3. *Solubility Trapping:* Some of the CO_2 will dissolve in the saline water forming a CO_2-rich solution that eventually becomes denser than the formation water. The denser brine will sink towards the bottom forming a convection pattern as the denser CO_2-rich brine sinks and the less dense CO_2-free brine replaces it (Li et al., 2013). Both carbonic acid (H_2CO_3) and bicarbonate (HCO_3), along with other stable ionic compounds and salts can form.

4. *Mineral Trapping:* Some of the CO_2 will chemically combine in the subsurface to form solid minerals, such as magnesium carbonate ($MgCO_3$) or calcium carbonate ($CaCO_3$). Mineral trapping is a very secure form of trapping that can begin occurring within years but may take thousands of years to complete.

The trapping mechanisms described in the literature above were also modeled using Intersect reservoir simulation, except for mineralization which is expected to begin past the modeling timeframe and therefore not considered. CO_2 movement in the subsurface and subsequent trapping is a dynamic process and the percent of CO_2 trapped by each mechanism changes through time (**Figure A-1.56**). For example, mineralization becomes more significant after 100 years' time. Intersect simulations ended at 20 years post-injection. The simulation results showed CO_2 was stored as approximately 40% mobile CO_2 vapor, contained within structural trapping, 48% immobile CO_2 vapor representative of residual trapping, and 12% aqueous CO_2 representative of solubility trapping. Since the previously approved SCS permits for wells Frontier A-16, Frontier LCS 1-23, and Frontier J 1-15 are located within the PSG area, they were also included in the simulation as their results can impact the newly proposed wells. As time progresses past the end of simulation, solubility and mineral trapping are expected to increase.

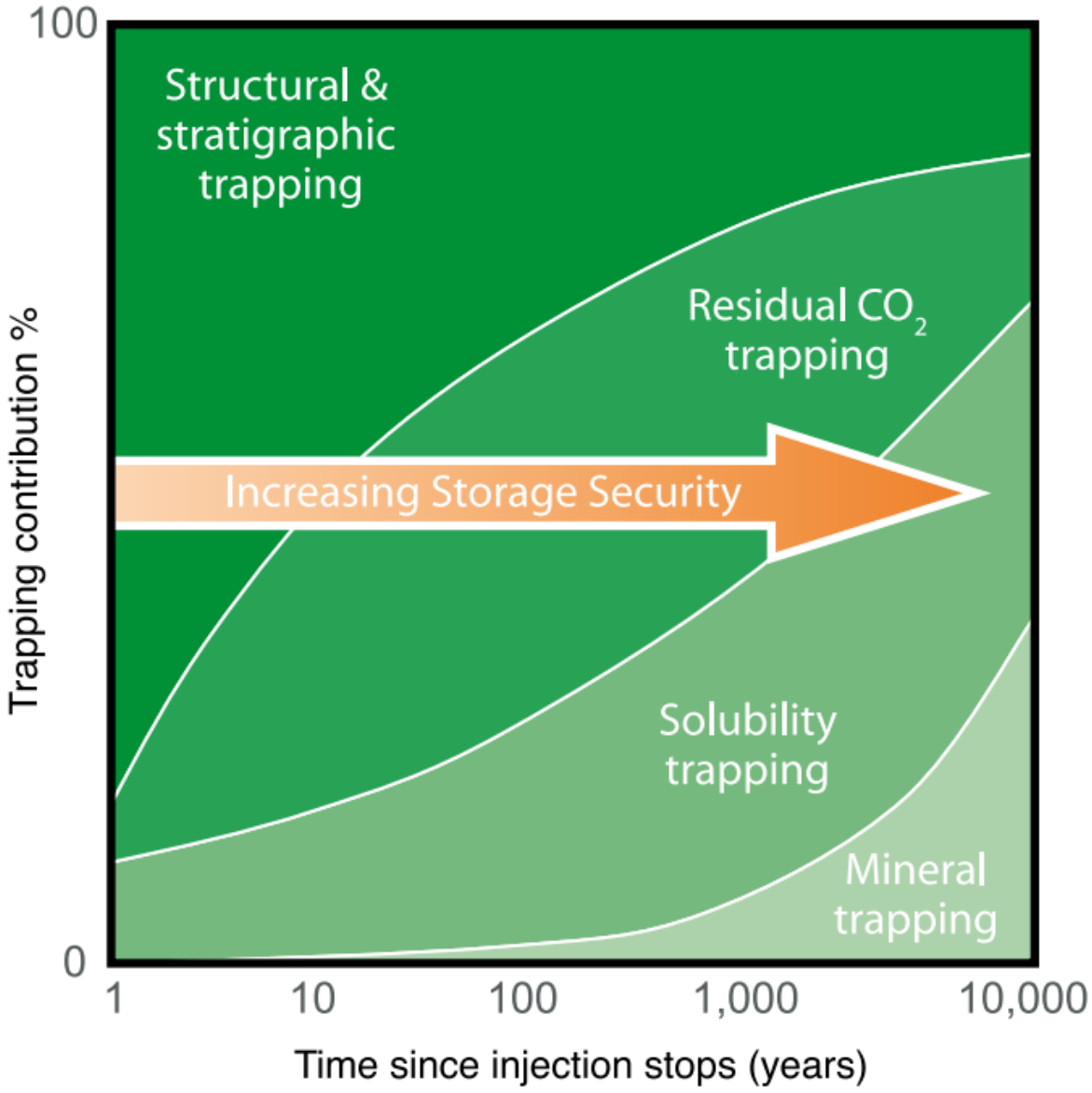


Figure A-1.56. *Trapping mechanisms act across different timescales (Intergovernmental Panel on Climate Change, 2005, p. 208).*

1.2.12 Injection Zone Storage Capacity

The storage capacities of the Nugget and Madison injection zones within the project area were calculated first from the static model, then the planned storage volumes were estimated using dynamic simulation. The model porosity and permeability values, which are the same in the static and dynamic model, were populated from the Bruff Unit 1 which is within the PSG and the 110 mi^2 seismic area, and the CO_2 density was estimated from the simulation. Volumetric P50 storage volumes calculated using Carbon Storage Atlas (Fifth Edition) (Gray, 2015), within PSG for the Nugget and Madison total 184 MMt. The storage capacity identified from

the static model shows ample extent, thickness, porosity, and permeability to accommodate these injection plans.

Current operational plans anticipate filling a fraction of this pore space. Injection rates were constrained conservatively by the bottom hole pressure limit of 90% of the fracture pressure. The modeled trapped injection volumes include those of the three previously permitted wells. Operational plans for the PSG wells entail 20 years of injection into the Madison followed by 20 years of injection into the Nugget. Total storage volumes (including both the SCS Hub and the PSG) are estimated at 43.2 MMt of CO_2 for the Nugget and 40.7 MMt of CO_2 for the Madison. The PSG storage volumes excluding the three original SCS Hub wells are 28.4 MMt for the Nugget and 40.7 MMt for the Madison.

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APPENDIX A-1

SITE CHARACTERIZATION

TABLE OF CONTENTS

LIST OF TABLES

Table A-1.1. Water Quality of the Receiving Formation (Nugget) 1

Table A-1.2. Water Quality of the Receiving Formation (Madison) 2

Table A-1.3. Formations Comprising the CO_2 Storage Area 2

Table A-1.4. Properties of Upper and Lower Confining Zones for the Madison Injection Zone 3

Table A-1.5. Description of Additional Confinement above the Immediate Upper Confining Zone 3

Table A-1.6. Properties of the Upper and Lower Confining Zones for the Nugget Injection Zone 4

Table A-1.7. Porosity and Permeability of the Injection and Confining Zones 5

Table A-1.8. Confining Zone Core Porosity and Permeability 5

Table A-1.9. Expected Capillary Pressure of the Injection and Confining Zones 6

Table A-1.10. Madison Formation Mineral Composition from 1,000+ Foot of Core in Three Wells (Thayer, 1983) 6

Table A-1.11. Mineral Composition of Fracture Fill from a One-foot Core (Honarpour, et.al. 1986) 6

Table A-1.12. Madison Core Data (Thayer, 1983) 7

Table A-1.13. Identified Nugget Mineralogy from Kayser, (1964) 7

Table A-1.14. Mineralogy of Framework Grains, as Identified in Keele and Evans (2008) 7

Table A-1.15. Identified Cement Mineralogy Keele and Evans (2008) 8

Table A-1.16. Nugget Core Data (Picard, 1975) 8

Table A-1.17. Expected CO_2 Stream Composition 9

Table A-1.18. Temperature Measurements and Calculated Temperature Gradients 9

Table A-1.19. Pressure Measurements and Calculated Pressure Gradients 10

Table A-1.20. Elastic Properties Measured at Different Confining Pressures (Literature) 11

Table A-1.21. Description of Microfracture Tests 11

Table A-1.22. Storage Reservoir Microfracture Results (Estimated) 12

Table A-1.23. Average Minimum Stress of the Injection Formation as Determined by Horizontal Stress Model 12
Table A-1.24. Summary of Earthquakes in Wyoming within a Five-mile Radius of PSG Center 13
Table A-1.25. Seismic Horizons Used for Structural Framework 13
Table A-1.26. Static Model Zones and Layers 14

LIST OF FIGURES

Figure A-1.1. Project Speed Goat (PSG) topographic map 15
Figure A-1.2. Moxa Arch within the Greater Green River Basin 16
Figure A-1.3. Oil and gas fields along the Frontier crest of the Moxa Arch, modified after Enverus 17
Figure A-1.4. South-to-north cross section of wells with log data through the Nugget 18
Figure A-1.5. South-to-north cross section 19
Figure A-1.6. Madison time, modified after Blakey. The study area was covered by shallow seas 20
Figure A-1.7. Paleogeography in Nugget time, modified after Blakey. Arid conditions with water bodies characterized the study area 21
Figure A-1.8. Western inner Cretaceous seaway. Modified from Blakey, 2023 22
Figure A-1.9. Stratigraphic column showing thicknesses, depths, and function of formations 23
Figure A-1.10. Type log with lithology 24
Figure A-1.11. Aerial extent of the Madison and equivalents denoted by location of shelves, after Sando, 1988 25
Figure A-1.12. Regional view showing location of the Madison Sea and formations, modified after Peterson 1984 26
Figure A-1.13. Regional east-west cross section through PSG showing its relationship to other structural features in the GGRB (from Clarey et.al., 2010 and references therein) 27
Figure A-1.14. Stratigraphy with aquifers from the surface to the Precambrian 28
Figure A-1.15. Water wells yield at least 100 gallons per minute 29

Figure A-1.16. Springs within the GGRB. The AoR is in an area without mapped springs, modified after WWDC 2009 30
Figure A-1.17. Bridger aquifer thickness and extent relative to PSG, modified after WWDC 2009 31
Figure A-1.18. Bridger aquifer groundwater flow and potentiometric surface, modified after WWDC 2009 32
Figure A-1.19. Laney aquifer thickness and extent relative to PSG, modified after WWDC 2009dsdfsdf 33
Figure A-1.20. Laney aquifer groundwater flow and potentiometric surface, modified after WWDC 2009 34
Figure A-1.21. Vertical movement of groundwater in Tertiary aquifers 35
Figure A-1.22. Wasatch aquifer structure, modified after WWDC 2009 36
Figure A-1.23. Wasatch aquifer thickness and extent relative to PSG, modified after WWDC 2009 37
Figure A-1.24. Wasatch aquifer groundwater flow and potentiometric surface, modified after WWDC 2009 38
Figure A-1.25. Cloverly aquifer thickness and extent relative to PSG, modified after WWCG 2009 39
Figure A-1.26. Saturated thickness of the Nugget aquifer relative to PSG, modified after WWDC 2009 40
Figure A-1.27. Salinity of the Sundance and Nugget aquifers, modified after WWCG 2009 41
Figure A-1.28. Potential recharge via precipitation into Nugget, modified after WWDC 2009 . 42
Figure A-1.29. Potential recharge into Nugget via stream recharge, modified after WWDC 2009 43
Figure A-1.30. Possible vertical flow between the Mesozoic and Paleozoic (including the Nugget and Madison aquifers), modified after WWDC 2009 44
Figure A-1.31. Spring discharge from Sundance, Nugget, or Mesaverde aquifers. Modified after WWDC 2009 45
Figure A-1.32. Thickness and lithology of the upper Madison aquifer, relative to PSG. Modified after WWDC 2009 46
Figure A-1.33. Thickness and lithology of the lower Madison aquifer, relative to PSG. Modified after WWDC 2009 47
Figure A-1.34. Madison aquifer groundwater flow and potentiometric surface, modified after WWDC 2009 48

Figure A-1.35. Aerial extent of the Madison Formation, as defined by well data 49
Figure A-1.36. Extent of the Nugget Formation, Agrawal 2019 50
Figure A-1.37. Regional mapping outline relative to PSG and the 3-D seismic area 51
Figure A-1.38. Regional seismic line and Second Frontier structure map (Stockton and Hawkins, 1985 52
Figure A-1.39. Three Forks Formation (lower confining zone to the Madison injection zone) structure map 53
Figure A-1.39. Three Forks Formation (lower confining zone to the Madison injection zone) isochore map..... 53
Figure A-1.40. Madison Formation structure and isochore maps..... 54
Figure A-1.41. Amsden Formation structure and isochore maps 55
Figure A-1.42. Phosphoria (secondary upper confining zone) isochores 56
Figure A-1.43. Ankareh Formation (lower confining zone to the Nugget injection zone) structure and isochore maps 57
Figure A-1.44. Nugget Formation structure and isochore maps..... 58
Figure A-1.45. Twin Creek Formation (upper confining zone to the Nugget injection zone) structure and isochore maps 59
Figure A-1.46. Ternary diagrams per Keele and Evans (2008) show the Nugget to be grain dominated and a subarkose. Petrographic analysis based on Gazzi-Dickinson point counting method of 58 thin sections. Samples were taken from Anschutz Ranch, southwest of PSG 60
Figure A-1.47. XRD results for Nugget Sandstone from Keele and Evans (2008). Microcline is the dominant feldspar and ferrodolomite is the dominant carbonate cement..... 61
Figure A-1.48. Geomechanical properties for Bruff Unit 1. Track 1: Formation top; Track 2: gamma ray (0-150); Track 3: RHOB (1.95-2.95 g/cc); Track 4: compressional and synthetic shear slowness (240-40 μs/feet); Track 5: dynamic (black) and static (red) Young's modulus (0-20 Mpsi); Track 6: dynamic (black) and static (red) Poisson's ratio (0-0.5); Track 7: minimum horizontal stress profile in black curve and calibration data in blue dots (Cipolla et al., 1994) (0.4-0.9 psi/feet)..... 62
Figure A-1.49. Faults of the GGRB (modified after WSGS, USGS Geologic Map of Wyoming, Love and Christiansen, 1985)..... 63
Figure A-1.50. Pertinent faults identified on the seismic data and planned well locations for the SCS Hub (approved) and the PSG expansion area..... 64
Figure A-1.51. Historical Earthquakes (USGS Earthquake Hazards Program 2024) near injection wells recorded by USGS since 1975 (WSGS GIS Data-Geology, 2024). 65

Figure A-1.52. Seismic hazard distribution for Wyoming, the contours represent the percent chance of potentially damaging ground motion (MMI=VI) through 2123. The red polygon is PSG. County lines are shown in white. Data per USGS, 2023 66
Figure A-1.53. Model polygons, PSG area, SCS Hub and Bruff 1 well..... 67
Figure A-1.54. Effective porosity model 68
Figure A-1.55. Location of PSG injector wells and PSG static and dynamic model boundaries 69
Figure A-1.56. Trapping mechanisms act across different timescales (Intergovernmental Panel on Climate Change, 2005, p. 208)..... 70

TABLES

Table A-1.1. Water Quality of Receiving Formation (Nugget)							
API	**Distance from proposed injection well, miles**	**Formation**	**Depth of sample, feet**	**Date of Sample Collection**	**Constituent**	**Concentration (mg/L)**	**Location**
4903520165	52.3	Nugget	10,994	1/14/1981	TDS	60,923	NW SW SEC 10 T 27 N R 114 W
4903520239	52.6	Nugget	11,179	1/14/1981	TDS	59,405	SE NW SEC 4 T 27 N R 114 W
4903520218	52.6	Nugget	10,988	1/14/1981	TDS	56,007	NW SE SEC 4 T 27 N R 114 W
4903520279	50.1	Nugget	10,823	1/14/1981	TDS	53,442	SW NW SEC 10 T 27 N R 114 W
4903520302	49.6	Nugget	10,945	1/14/1981	TDS	60,512	NW NE SEC 9 T 27 N R 114 W
4903520891	52.5	Nugget	10,885	3/22/1986	TDS	65,492	NW NE SEC 35 T 28 N R 114 W
4903505450	45.8	Nugget	10,128-10,178	4/25/1961	TDS	98,105	NE NW SEC 14 T 27 N R 113 W
4903505450	45.8	Nugget	10,128-10,176	3/21/1957	TDS	101,460	NE NW SEC 14 T 27 N R 113 W
4903505450	45.8	Nugget	10,128-10,176	3/26/1957	TDS	100,446	NE NW SEC 14 T 27 N R 113 W
4904120019	28.5	Nugget	14,597-14,463	4/1/1972	TDS	76,557	SW NE SEC 29 T 15 N R 112 W
4904105230	21.1	Nugget	14,526-14,646	1/19/1950	TDS	78,417	SW NW SEC 17 T 16 N R 112 W
4904120208	34.6	Nugget	N/A	6/3/1979	TDS	28,152	C SW SEC 5 T 18 N R 119 W
4904120210	36.7	Nugget	N/A	1/25/1988	TDS	18,614	SW NE SEC 9 T 16 N R 119 W
4904105215	33.9	Nugget	1,923-2,003	8/29/1949	TDS	27,544	SW SW SEC 32 T 16 N R 117 W
4904105218	33.7	Nugget	N/A	3/8/1951	TDS	21,454	NW NW SEC 33 T 16 N R 117 W
4904105218	33.7	Nugget	2,135	8/8/1951	TDS	21,809	NW NW SEC 33 T 16 N R 117 W
					Average	**58,021**	

Legend
Wells north of AoR on edge of Overthrust
Wells in northern Moxa Arch
Wells in southern Moxa Arch
Wells to west and southwest of AoR

Table A-1.2. Water Quality of Receiving Formation (Madison)							
API	**Distance from proposed injection well, miles**	**Formation**	**Depth of sample, feet**	**Date of Sample Collection**	**Constituent**	**Concentration (mg/L)**	**Location**
4902321674	16.5	Madison	17,140	9/5/2002	TDS	56,140	NE SE SEC 14 T 22 N R 112 W
4902321687	16.7	Madison	17,130	1/4/2003	TDS	59,970	SW SW SEC 18 T 22 N R 111 W
					Average	**58,055**	

Table A-1.3. Formations Comprising the CO_2 Storage Area				
Formation	**Purpose**	**Average Thickness at PSG, feet**	**Average Depth at PSG, SSTVD feet**	**Lithology**
Twin Creek	Upper confining zone	650	6,710	Limestone, shaley limestone, chert, limey gypsum
Nugget	Injection zone	690	7,340	Sandstone
Ankareh	Lower confining zone	600	8,030	Mudstone, siltstone, gypsum, sandstone
Amsden	Upper confining zone	490	10,670	Shale, dolomite, sandstone, chert
Madison	Injection zone	700	11,160	Dolomite and limestone
Three Forks	Lower confining zone	100	11,860	Siltstone and limestone

Note: Lithology is from the literature. Depths and thicknesses are from the Bruff 1, except for Three Forks. Bruff 1 does not penetrate Three Forks, so regional average is used for depth.

Table A-1.4. Properties of Upper and Lower Confining Zones for the Madison Injection Zone		
Confining Zone Properties	**Upper Confining Zone**	**Lower Confining Zone**
Formation Name	Amsden	Three Forks
Lithology	Shale, dolomite, sandstone, chert	Siltstone and limestone
Formation Top Depth, feet Measured Depth	17,055	18,245
Thickness, feet	490	~100
[1]Porosity, %	3.1 (Total), 2.4 (effective)	0.7 (Total), 0.3 (Effective)
[1]Permeability, mD	0.9	0.01
Capillary Entry Pressure (GW), psi	No data but estimated in Table A-1.9	No data but estimated in Table A-1.9
Depth below Lowest Identified USDW, feet	4,845 feet from base of Dakota (lowest possible USDW)	6,035 feet from base of Dakota (lowest possible USDW)

Note: Porosity and permeability are averaged from available well data across the Moxa Arch. Depth and thickness values are rounded averages from gridded well data across the PSG area.

Table A-1.5. Description of Additional Confinement above the Immediate Upper Confining Zone				
Name of Formation	**Lithology**	**Formation Top Depth, feet**	**Thickness, feet**	**Depth below Lowest Identified USDW, feet**
Phosphoria	shale	16,100	350	4,200 feet below base of Dakota (lowest possible USDW)

Table A-1.6. Properties of the Upper and Lower Confining Zones for the Nugget Injection Zone		
Confining Zone Properties	**Upper Confining Zone**	**Lower Confining Zone**
Formation Name	Twin Creek Limestone	Ankareh
Lithology	Limestone, shaley limestone, chert, limey gypsum	Mudstone, siltstone, gypsum, sandstone
Formation Top Depth, feet Measured Depth	13,100	14,435
Thickness, feet	650	600
Porosity, %	4.9 (Total), 1.9 (Effective)	3.9 (Total), 0.9 (Effective)
[1]Permeability, mD	0.1	0.1
Capillary Entry Pressure (GW), psi	No data but estimated in Table A-1.9	No data but estimated in Table A-1.9
Depth below Lowest Identified USDW, feet	890 feet from **base** of Dakota (lowest possible USDW)	2,225 feet from **base** of Dakota (lowest possible USDW)

Note: Porosity and permeability are averaged from available well data across the Moxa Arch. Depth and thickness values are rounded averages from gridded well data across the PSG area.

[1]Sealing layers within the Twin Creek Limestone and Ankareh have μD permeability.

Table A-1.7. Porosity and Permeability of the Injection and Confining Zones					
Formation	**Porosity, %**	**Effective Porosity, %**	**Permeability, mD**	**Laboratory Analysis[1]**	**Model Property Distribution**
Twin Creek Gross)	4.9	1.9	0.1	TBD	ϕ 1 to 7%, avg 3% 0 to 0.5 mD, avg 0.1 mD
Twin Creek Seal	6.7	1.2	0.0	TBD	ϕ 1% 0.01 mD
Nugget (Gross)	5.2	4.4	7.3	TBD	ϕ 0 to 19%, avg 4% 0 to 84 mD, avg 4 mD
Nugget (Injection Zone)[2]	10.9	10.9	30.8	TBD	ϕ 8 to 19% 10 to 84 mD
Ankareh (Gross)	3.9	0.9	0.1	TBD	ϕ 0 to 16%, avg 2% 0 to 0.6 mD, avg 0.04 mD
Phosphoria Seal	2.7	0.5	0.0	TBD	ϕ 1% 0.25 mD
Amsden (Gross)	3.1	2.4	0.9	TBD	ϕ 1 to 14%, avg 3% 0 to 4.2 mD, avg 0.7 mD
Amsden Seal	1.3	0.9	0.2	TBD	ϕ 3% 0.63 mD
Madison (Gross)	4.6	4.3	4.1	TBD	ϕ 1 to 21%, avg 5% 0 to 169 mD, avg 4.46 mD
Madison (Injection Zone)[2]	11.1	11.0	18.0	TBD	ϕ 8 to 21% 10 to 169 mD
Three Forks	0.7	0.3	0.01	TBD	None[3]

[1] Porosity and permeability results from laboratory analysis will be acquired upon the drilling and construction of the proposed injection wells.

[2] Nugget and Madison injection zones are the high-quality intervals targeted for injection.

[3] Three Forks has regional well data but no data in the Bruff 1, which is the local well tied to seismic and used the populate the model.

Table A-1.8. Confining Zone Core Porosity and Permeability		
Sample Depth, feet (Measured Depth)	**Porosity, %**	**Permeability, mD**
N/A	N/A (no core data)	N/A (no core data)

Table A-1.9. Expected Capillary Pressure of the Injection and Confining Zones						
Parameter	**Madison and Confining Zones**			**Nugget and Confining Zones**		
	Three Forks	**Madison**	**Amsden**	**Ankareh**	**Nugget**	**Twin Creek**
r (micro metre)	0.1	0.5	0.005	0.01	1	0.1
Expected P_c[1]	15	3	300	150	1.5	15
Factor (from injection zone)	5		100	100		10

[1]*Capilary pressure derived from the literature for the Madison (Akbarabadi and Piri 2015) and estimated from the equation based on varying pore throat radii for the other formations.*

Table A-1.10. Madison Formation Mineral Composition from 1,000+ Foot of Core in Three Wells (Thayer, 1983)		
Mineral Data		**%**
Dolomite		69.8
Limestone	Grainstone	8.7
	Packstone-Wackestone	7.2
Chert		4.8
Anhydrite		3.3
Carbonate Breccia		3.2
Carbonate Mudstone		2.8
Quartz Sandstone		0.3

Table A-1.11. Mineral Composition of Fracture Fill from a One-foot Core (Honarpour, et.al. 1986)	
Mineral Data	**%**
Dolomite	97
Quartz	3
Chlorite	trace
Illite	trace

Note: Fractures were found to be partially filled to filled.

Table A-1.12. Madison Core Data (Thayer, 1983)	
Sample Parameters	**Sample and Experiment Information**
Depth:	Unknown
Formation:	Madison
Dry Bulk Density:	Unknown
Diameter:	Unknown
Rock Type:	Very finely crystalline dolomite to medium crystalline dolomite
Porosity:	10.8 to 11.4
Pore Fluids:	Unknown
Entered Length:	Unknown

Note: Data analysis performed by Core Laboratories on 1,000+ ft core. Porosity was evaluated on plugs and whole core.

Table A-1.13. Identified Nugget Mineralogy from Kayser, (1964)	
Mineral Data	**%**
Quartz	95
Orthoclase	3
Plagioclase, microcline	1
Magnetite	minor
Ilmenite	minor
Tourmaline	minor
Zircon	minor
Garnet	minor

Table A-1.14. Mineralogy of Framework Grains, as Identified in Keele and Evans (2008)	
Framework Grains	**%**
Quartz, incldg chert	85
Kspar	13
Lithics sedimentary	1
Zeolite	minor
Plagioclase	minor
Lithics plutonic	minor
Lithics volcanic	minor

Table A-1.15. Identified Cement Mineralogy Keele and Evans (2008)	
Cement	**%**
Carbonate[1]	56
Quartz	23
Hematite	21

[1]*Includes calcite and dolomite.*

Table A-1.16. Nugget Core Data (Picard, 1975)	
Sample Parameters	**Sample and Experiment Information**
Depth:	10,994 to 11,052 feet
Formation:	Nugget
Dry Bulk Density:	Unknown
Diameter:	Unknown
Rock Type:	Subarkose Sandstone
Porosity:	13%
Pore Fluids:	Unknown
Entered Length:	Unknown

Note: Six core samples taken from the productive interval at Dry Piney. This study also took cores from various locations in Wyoming and Utah and found 10 to 20% porosity in the sandstones across the region.

Table A-1.17. Expected CO_2 Stream Composition		
Component	**ppmv**	**Mol%**
CO_2 (minimum)	950,000	95
CO[1]	2,000	0.2
H_2[1]	10,000	1
Argon[1]	40,000	4
Methane[1]	40,000	4
Ethane[1]	40,000	4
N_2[1]	40,000	4
C3+	1,500	0.15
NOx	50	0.005
SOx	50	0.005
H_2S	15	0.0015
NH_3	1,500	0.15
O_2	500	0.05
H_2O	300	0.03
Methanol and Ethanol	500	0.05
Amines	5	0.0005
Glycols	5	0.0005

[1]*Combined total is less than or equal to 4%.*

Table A-1.18. Temperature Measurements and Calculated Temperature Gradients						
Well Name	**API**	**Formation**	**Test Depth, feet**	**Temperature**		**Gradient, °F/feet**
				°F	**Mean**	
Bruff Unit 1	4902320045	Fort Union	5,431.5	120	N/A	0.0109
Bruff Unit 1	4902320045	Mesaverde	7,691.0	140	N/A	0.0103
Bruff Unit 1	4902320045	Hilliard	10,493.5	192	N/A	0.0125
Bruff Unit 1	4902320045	Nugget	13,868.5	220	N/A	0.0115
Bruff Unit 1	4902320045	Phosphoria	16,404.0	300	N/A	0.0146
Bruff Unit 1	4902320045	Weber	16,543.5	315	N/A	0.0154
Bruff Unit 1	4902320045	Weber	16,603.5	302	N/A	0.0145
Bruff Unit 1	4902320045	Weber	16,941.5	301	N/A	0.0142
Bruff Unit 1	4902320045	Madison	18,066.0	320	N/A	0.0143
Bruff Unit 3	4902320194	Frontier	11,378.0	198	N/A	0.0120
Champlin 149 C1	4902320292	2nd Frontier	11,308.5	239	N/A	0.0157
Champlin 285 F1	4903721340	2nd Frontier	11,738.0	206	N/A	0.0124

Table A-1.19. Pressure Measurements and Calculated Pressure Gradients						
Well Name	**API**	**Formation**	**Test Depth, feet**	**Formation Pressure, psi**	**Mean Pressure**	**psi/ft**
Bruff 2	4902320106	Frontier	11,301.0	6,404.0	6,554.6	0.57
Bruff 3	4902320194	Frontier	11,378.0	6,629.3	6,599.2	0.58
Champlin 149 C1	4902320292	2nd Frontier	11,308.5	6,088.0	6,332.8	0.54
Wilson Ranch Unit 7-1	4902320299	2nd Frontier	11,349.5	6,480.5	6,469.2	0.57
Wilson Ranch Unit 13	4902320303	2nd Frontier	11,312.5	6,226.0	6,448.1	0.55
Bruff Unit 10	4903721187	2nd Frontier	11,527.5	6,501.0	6,570.7	0.56
Champlin 285 F1	4903721340	2nd Frontier	11,738.0	5,438.0	5,399.5	0.46
Bruff Unit 1	4902320045	Fort Union	5,431.5	2,526.0	2,444.2	0.47
Bruff Unit 1	4902320045	Mesaverde	7,691.0	3,484.0	3,537.9	0.45
Bruff Unit 1	4902320045	Nugget	13,868.5	5,911.0	6,240.8	0.43
Bruff Unit 1	4902320045	Weber	16,543.5	5,731.0	7,444.6	0.35
Bruff Unit 1	4902320045	Weber	16,941.5	7,638.0	7,623.7	0.45
Bruff Unit 1	4902320045	Madison	18,066.0	8,210.0	8,129.7	0.45

Table A-1.20. Elastic Properties Measured at Different Confining Pressures (Literature)							
Event	**Conf., MPa**	**Diff., MPa**	**E, GPa**	**n**	**K, GPa**	**G, GPa**	**P, GPa**
Triaxial Test (Madison)	N/A	N/A	20.16	0.31	17.68	7.69	27.9
Triaxial Test (Madison)	N/A	N/A	27.8	0.42	57.9	9.78	70.9
Triaxial Test (Madison)	N/A	N/A	24.6	0.42	51.2	8.66	62.7
Triaxial Test (Madison)	N/A	N/A	34.2	0.22	20.3	14.0	39.0
Triaxial Test (Madison)	N/A	N/A	30.1	0.27	21.8	11.8	37.6

Note: Elastic properties of Madison Limestone samples. The source does not specify the confining pressure; therefore, these data can be used as reference value rather than hard calibration data. No data at different known confining pressure available. Results will be updated upon acquisition of data from drilling and construction of the proposed injection well.

E = Youngs Modulus, n = Poisson's Ratio, K = Bulk Modulus, G = Shear Modulus, P = Uniaxial Strain Modulus

Table A-1.21. Description of Microfracture Tests								
Formation	**Test Depth, ft**	**Breakdown Pressure**		**Propagation Pressure**	**Closure Pressure**		**Initial Shut-In Pressure**	
		Gradient, psi/ft	**Avg., psi**	**Gradient, psi/ft**	**Avg., psi**	**Gradient, psi/ft**	**Avg., psi**	**Gradient, psi/ft**
Nugget	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Madison	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Table A-1.22. Storage Reservoir Microfracture Results (Estimated)		
Nugget Injection Zone		
Depth, feet	14,400 feet	-
Pressure/Gradient	6,480 psi	0.45 psi/ft
Breakdown	15,840 psi	1.1 psi/ft
Fracture Propagation	10,886 psi	0.756 psi/ft
Closure	10,368 psi	0.72 psi/ft
Madison Injection Zone		
Depth, ft	18,000 feet	-
Pressure/Gradient	8,100 psi	0.45 psi/ft
Breakdown	19,800 psi	1.1 psi/ft
Fracture Propagation	14,742 psi	0.81 psi/ft
Closure	14,040 psi	0.78 psi/ft

Table A-1.23. Average Minimum Stress of the Injection Formation as Determined by Horizontal Stress Model

Depth, ft	Average Propagation Pressure, psi	Reopening Pressure, psi	Closure Pressure, psi	Average Minimum Stress, psi
14,400 (Nugget)	10,886	10,886	10,368	10,368
18,000 **(Madison)**	14,742	14,742	14,040	14,040

Table A-1.24. Summary of Earthquakes in Wyoming within a Five-mile Radius of PSG Center						
Date	**Magnitude**	**Depth (MSL), miles**	**Longitude / Latitude**	**City or Vicinity of Earthquake**	**Map Label**	**Distance to project center, miles**
8/28/2018	3.4	-2.08	-110.043, 41.72267	15 km NNW of Granger, Wyoming	1	~5.08
8/28/2018	2.1	3.69	-110.086, 41.68933	Wyoming	2	~1.98
8/28/2018	2.66	2.98	-110.069, 41.65467	10 km NW of Granger, Wyoming	3	~1.68
12/27/2022	1.81	18.06	-109.998, 41.6005	2 km WNW of Granger, Wyoming	4	~6.8
8/28/2018	2.31	4.29	-110.001, 41.55717	4 km SSW of Granger, Wyoming	5	~8.91

Table A-1.25. Seismic Horizons Used for Structural Framework
2nd Frontier
Morrison
Nugget
Woodside
Phosphoria
Madison

Table A-1.26. Static Model Zones and Layers			
Zone	**Average Thickness (feet)**	**Number Layers**	**Average Layer Thickness (feet)**
2ND Frontier	264	1	210
Mowry	522	1	472
Dakota	267	1	253
Morrison	703	1	703
Entrada	184	1	208
Twin Creek	654	20	32
Nugget	674	300	2.3
Ankareh	534	20	27
Thaynes	439	1	416
Woodside	701	1	703
Phosphoria	378	1	369
Weber	586	1	588
Amsden	451	20	21
Madison	841	280	2.7
Three Forks	96	20	5

FIGURES

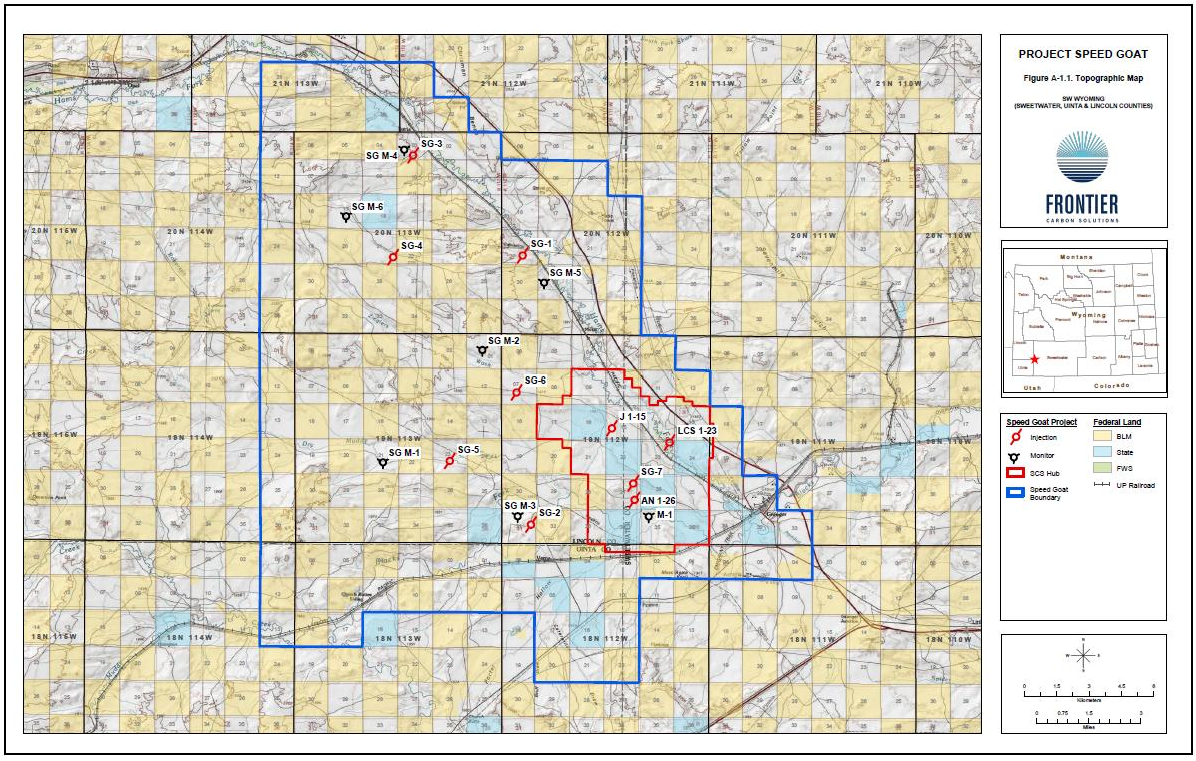


Figure A-1.1. *Project Speed Goat (PSG) topographic map.*

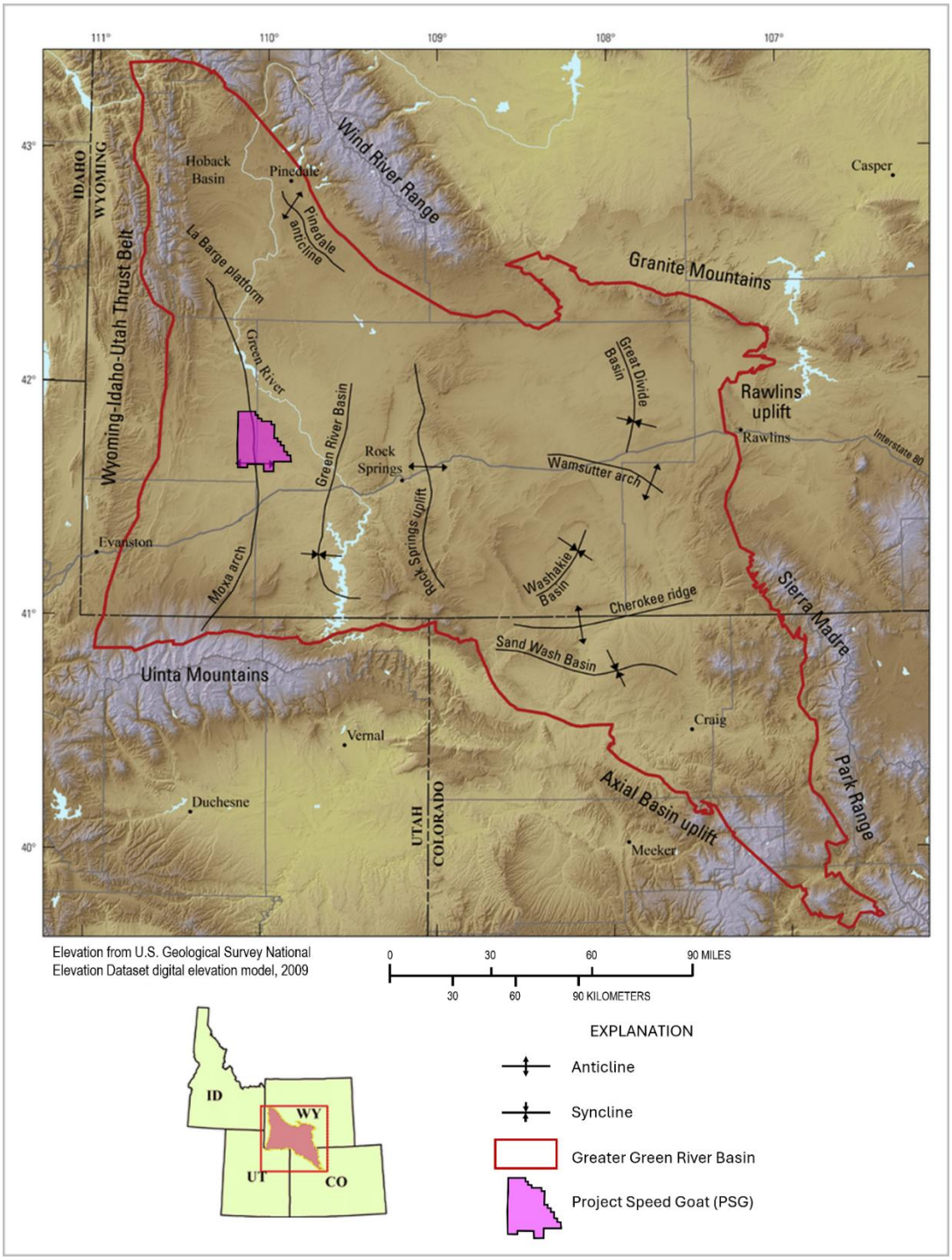


Figure A-1.2. *Moxa Arch within the Greater Green River Basin.*

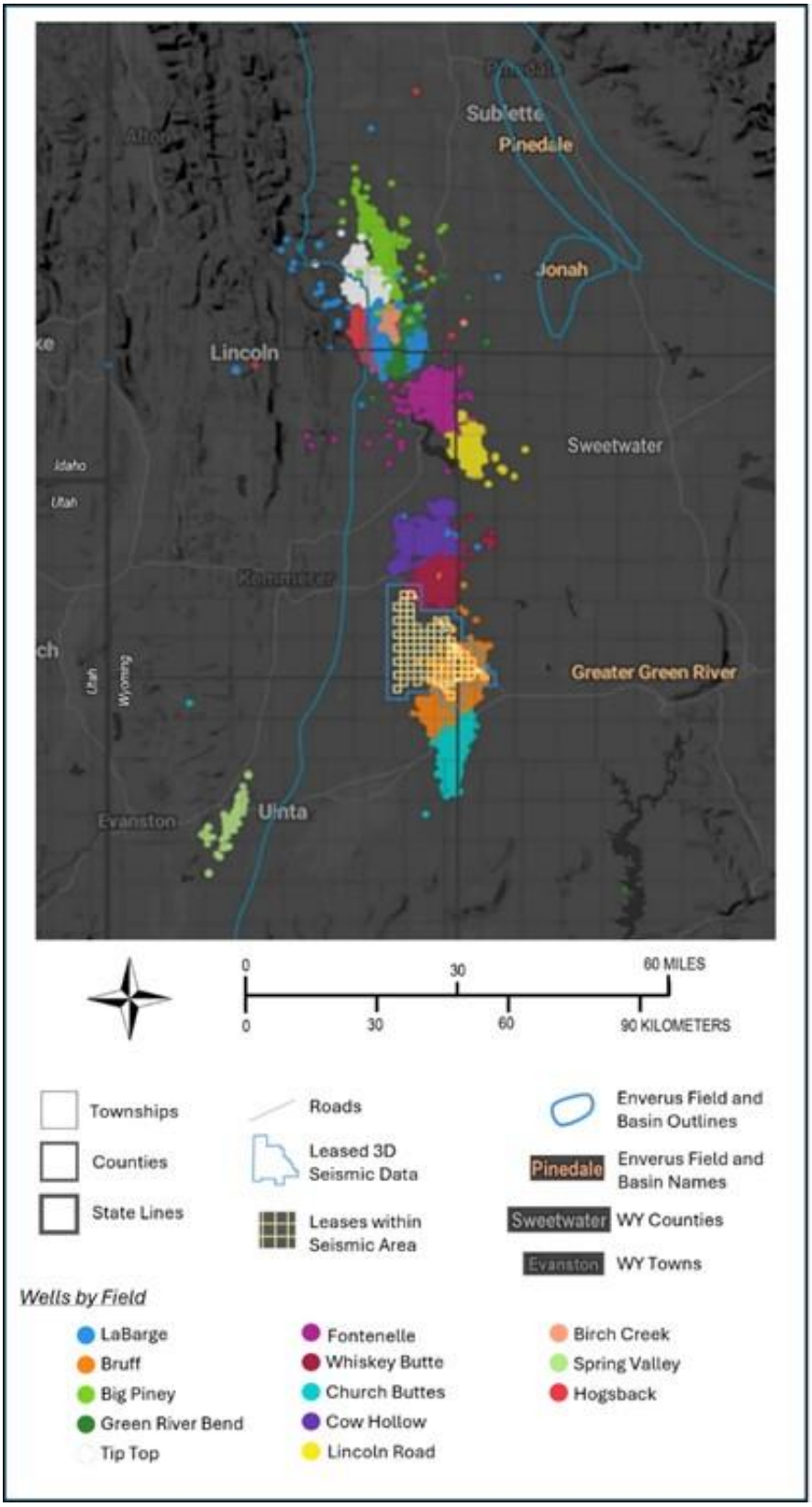


Figure A-1.3. *Oil and gas fields along the Frontier crest of the Moxa Arch, modified after Enverus.*

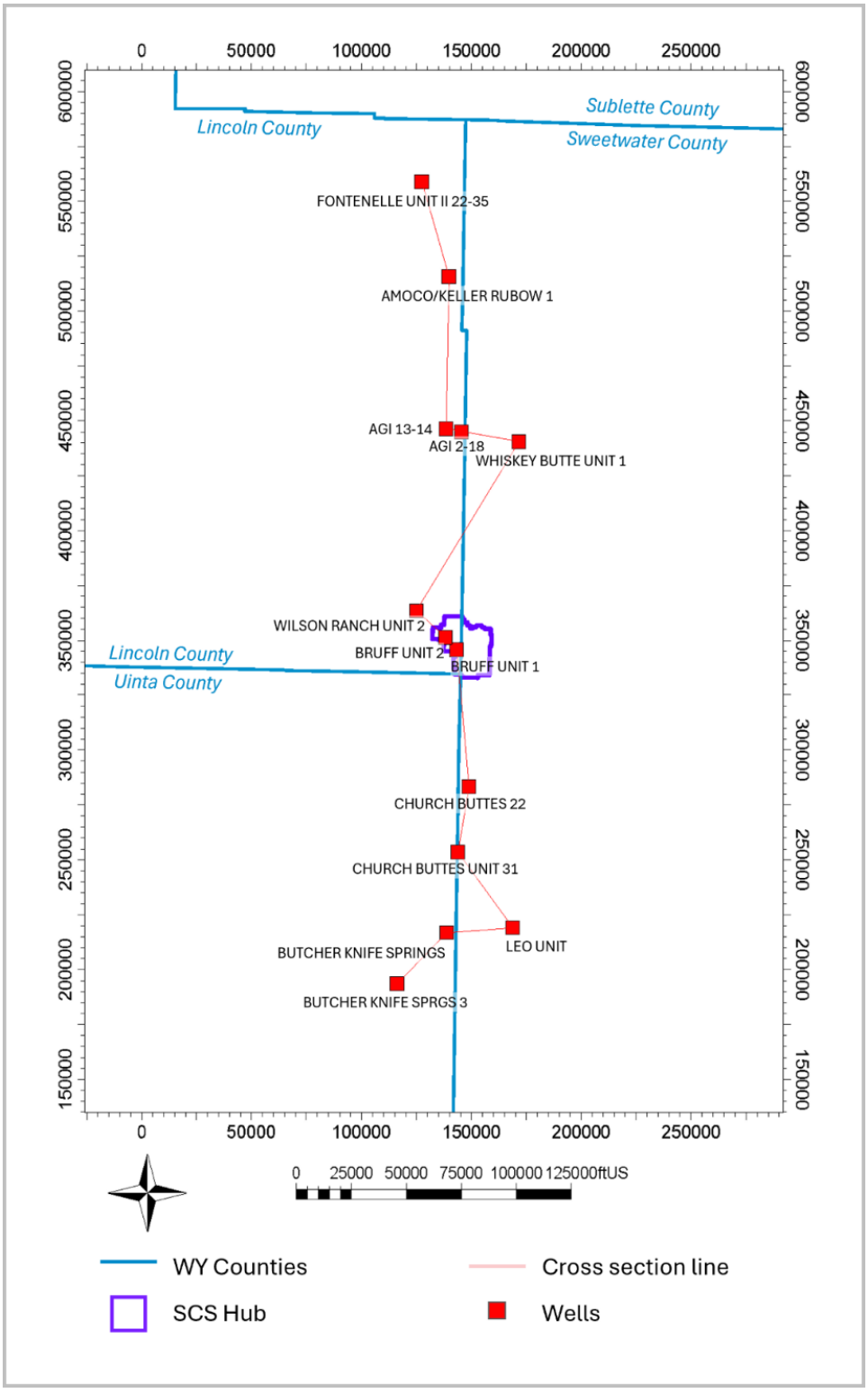


Figure A-1.4. *South-to-north cross section of wells with log data through the Nugget.*

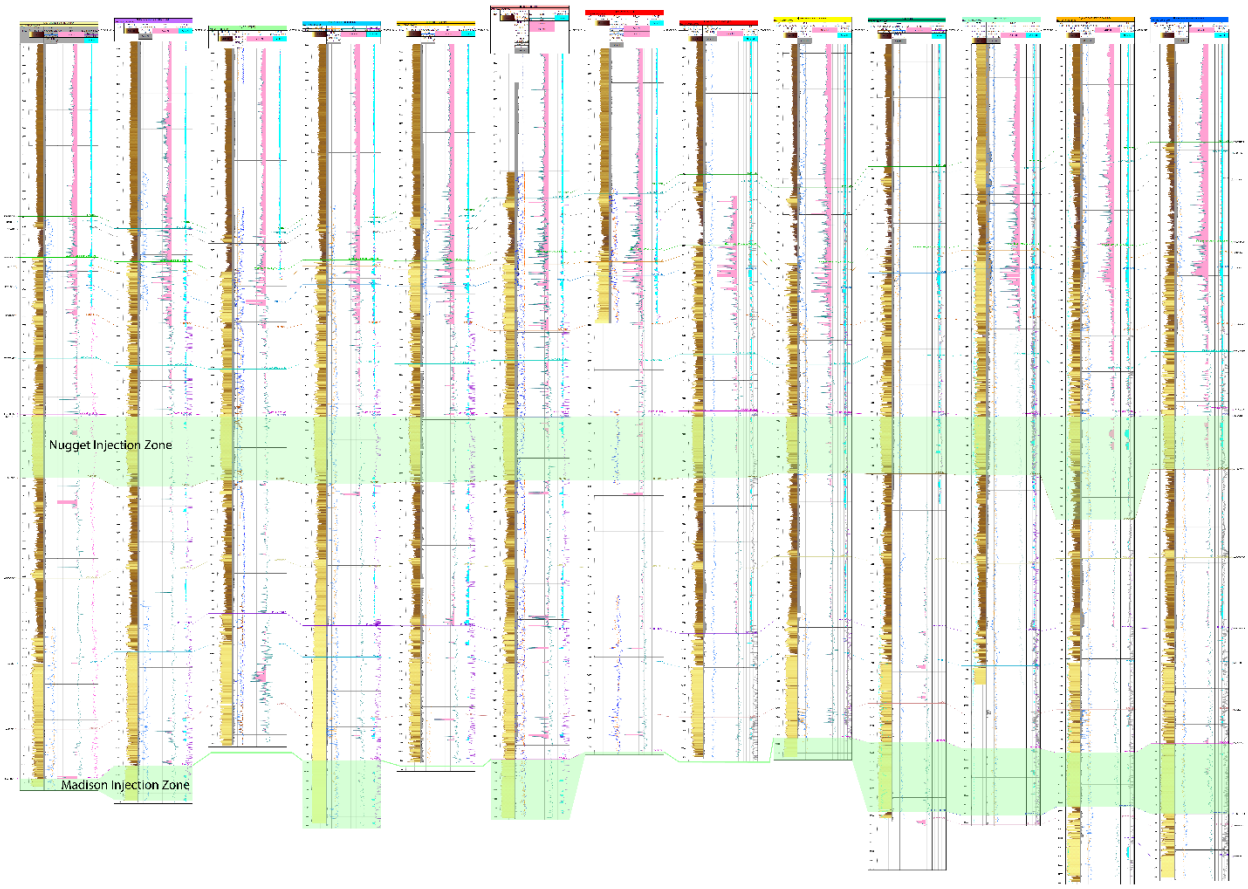


***Figure A-1.5**. South-to-North cross section*

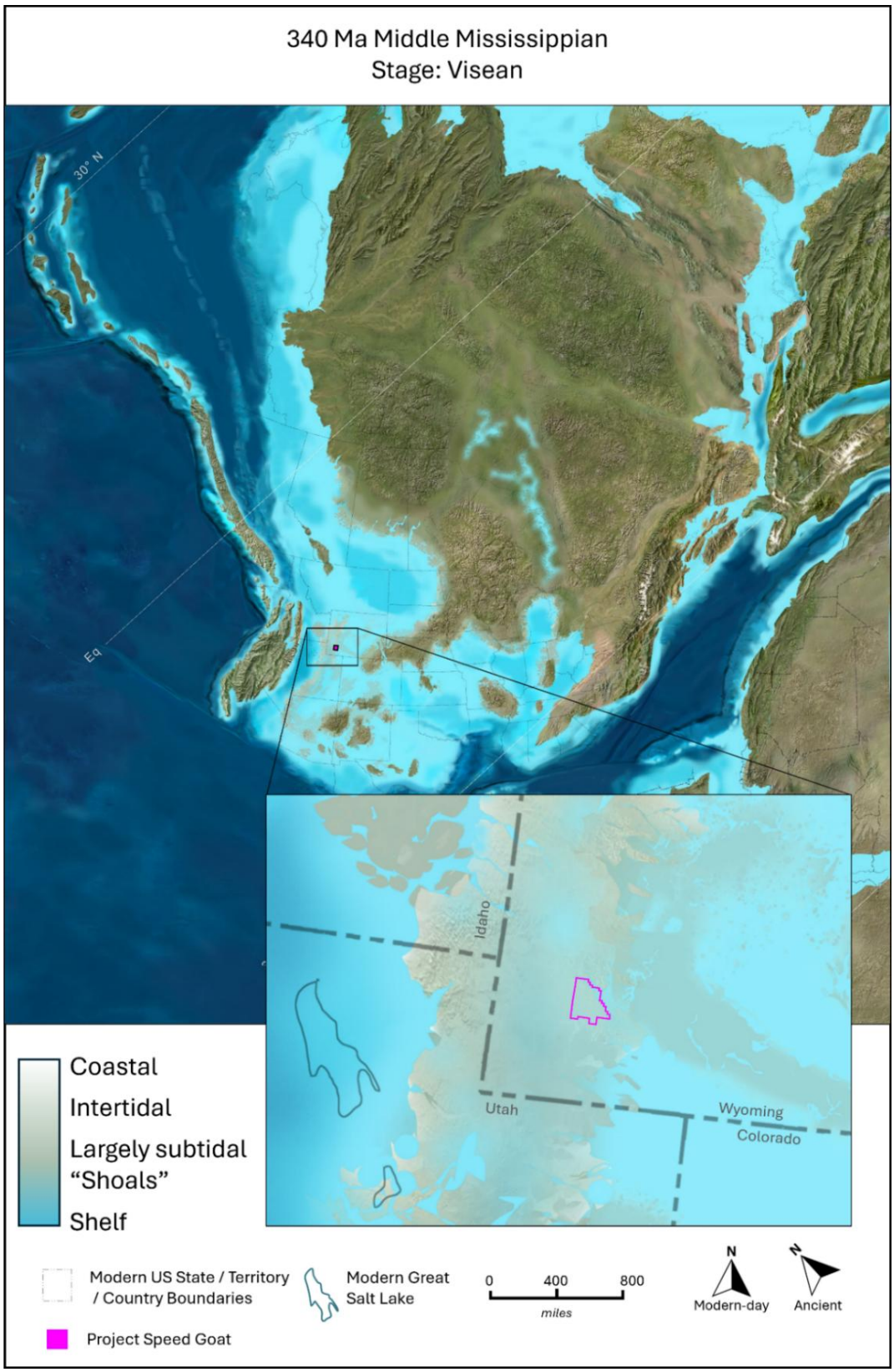


Figure A-1.6. *Madison time, modified after Blakey. The study area was covered by shallow seas.*

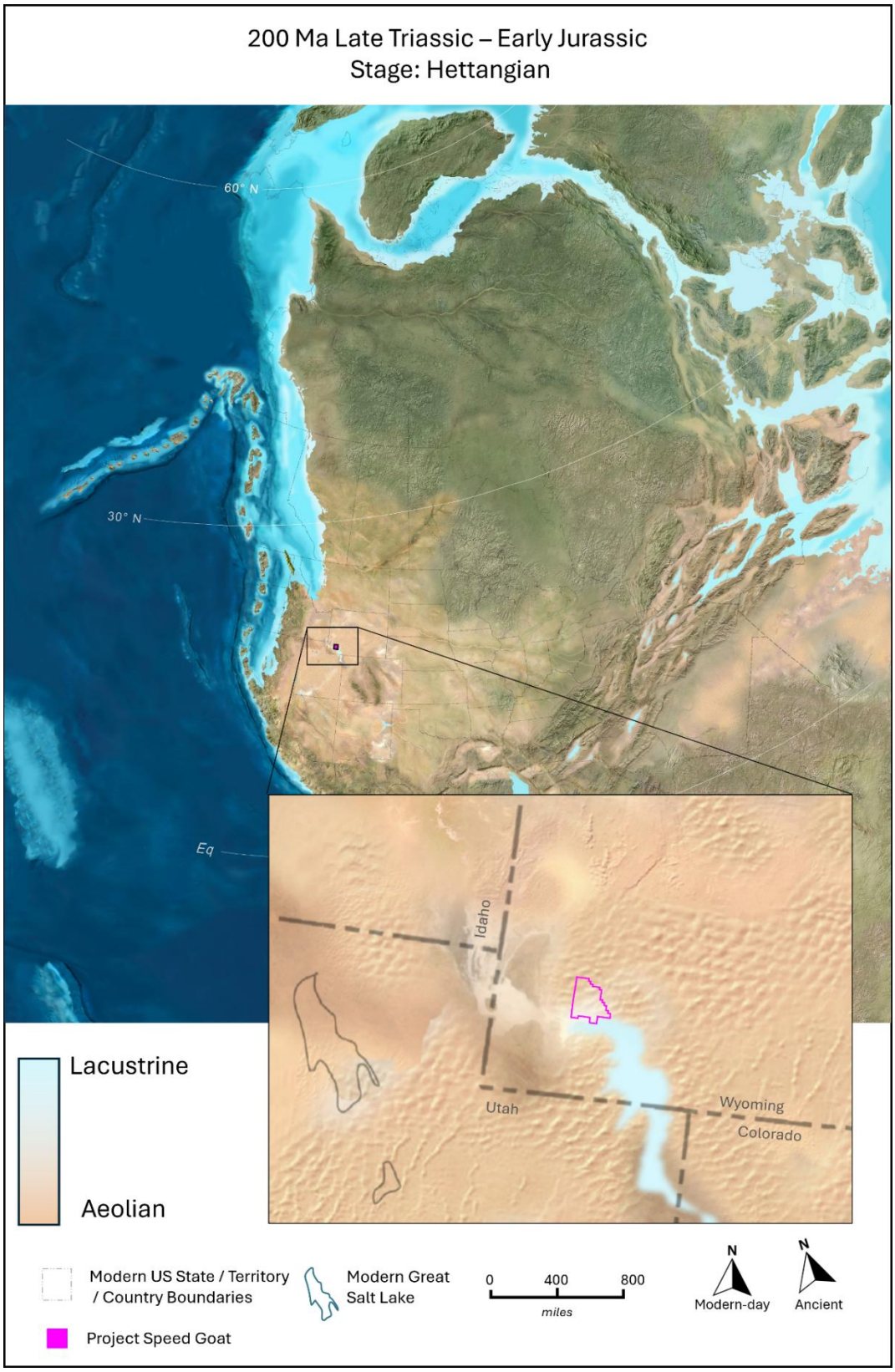


Figure A-1.7*. Paleogeography in Nugget time, modified after Blakey. Arid conditions with water bodies characterized the study area.*

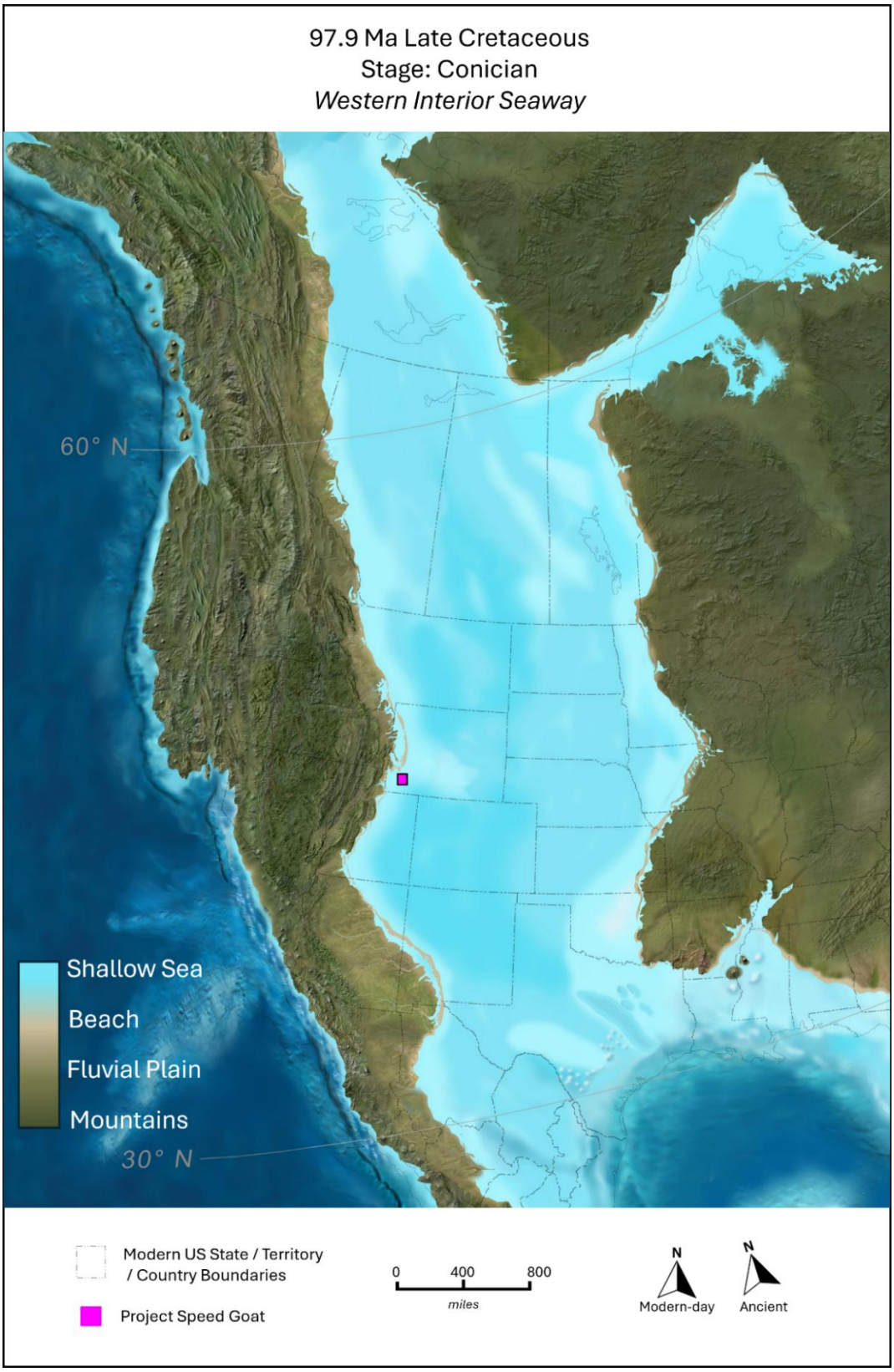


Figure A-1.8. *Western inner Cretaceous seaway. Modified from Blakey, 2023.*

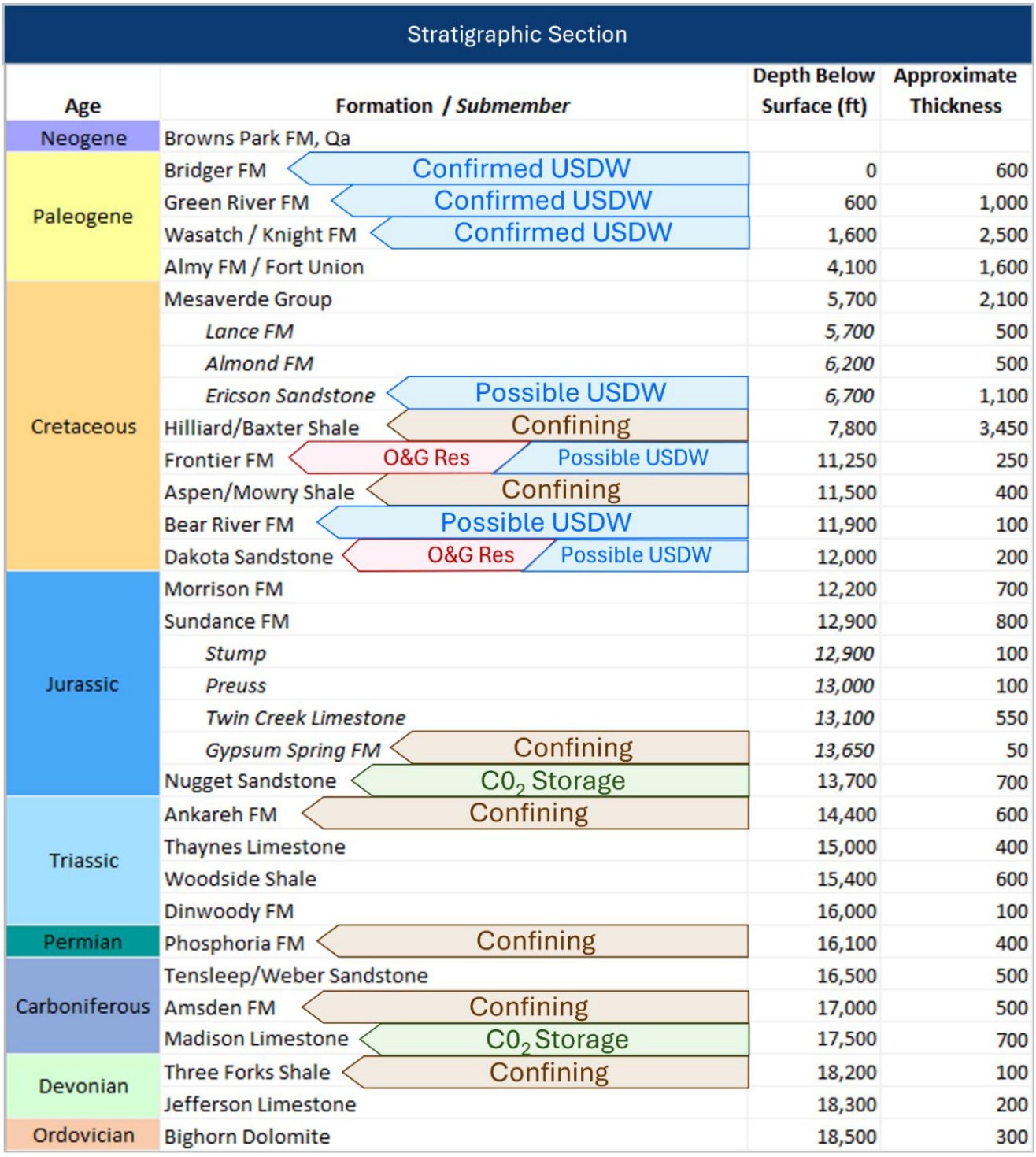


Figure A-1.9. *Stratigraphic column showing thicknesses, depths, and function of formations.*



Figure A-1.10. *Type log with lithology.*

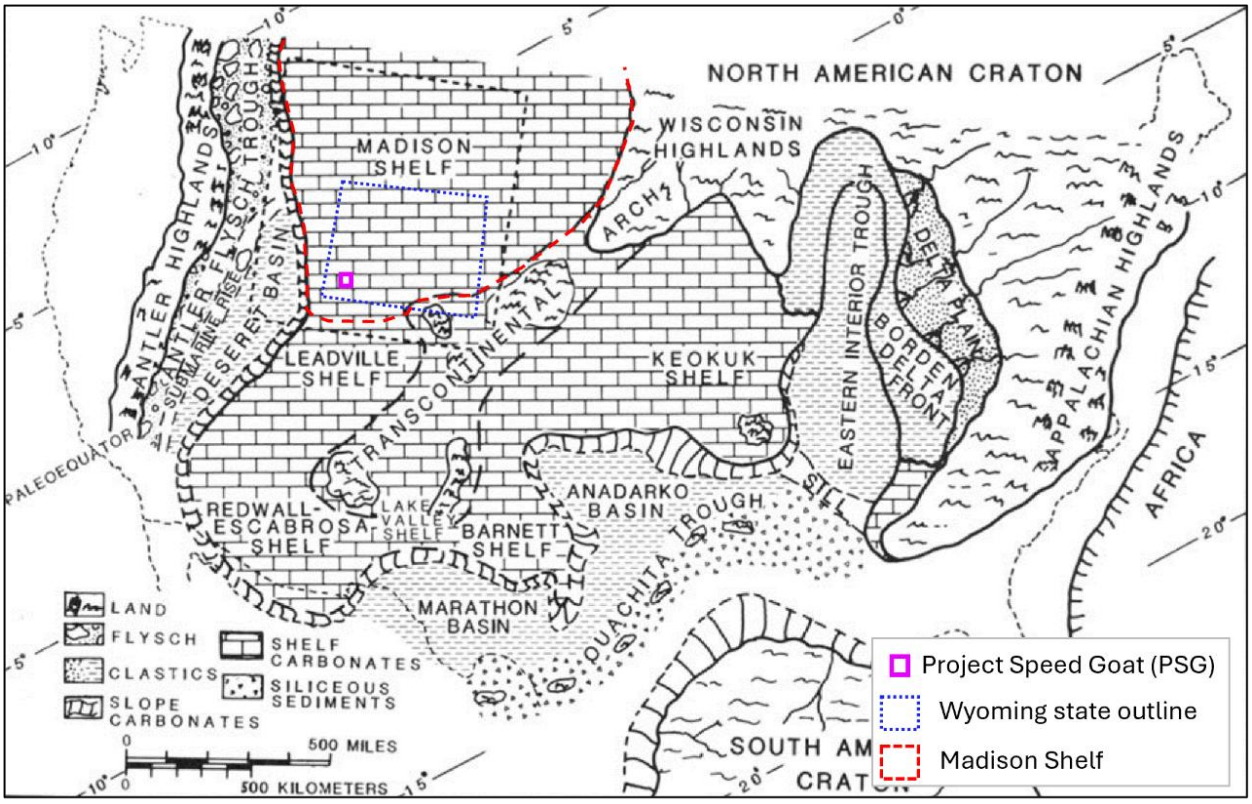


Figure A-1.11. *Aerial extent of the Madison and equivalents denoted by location of shelves, after Sando, 1988.*

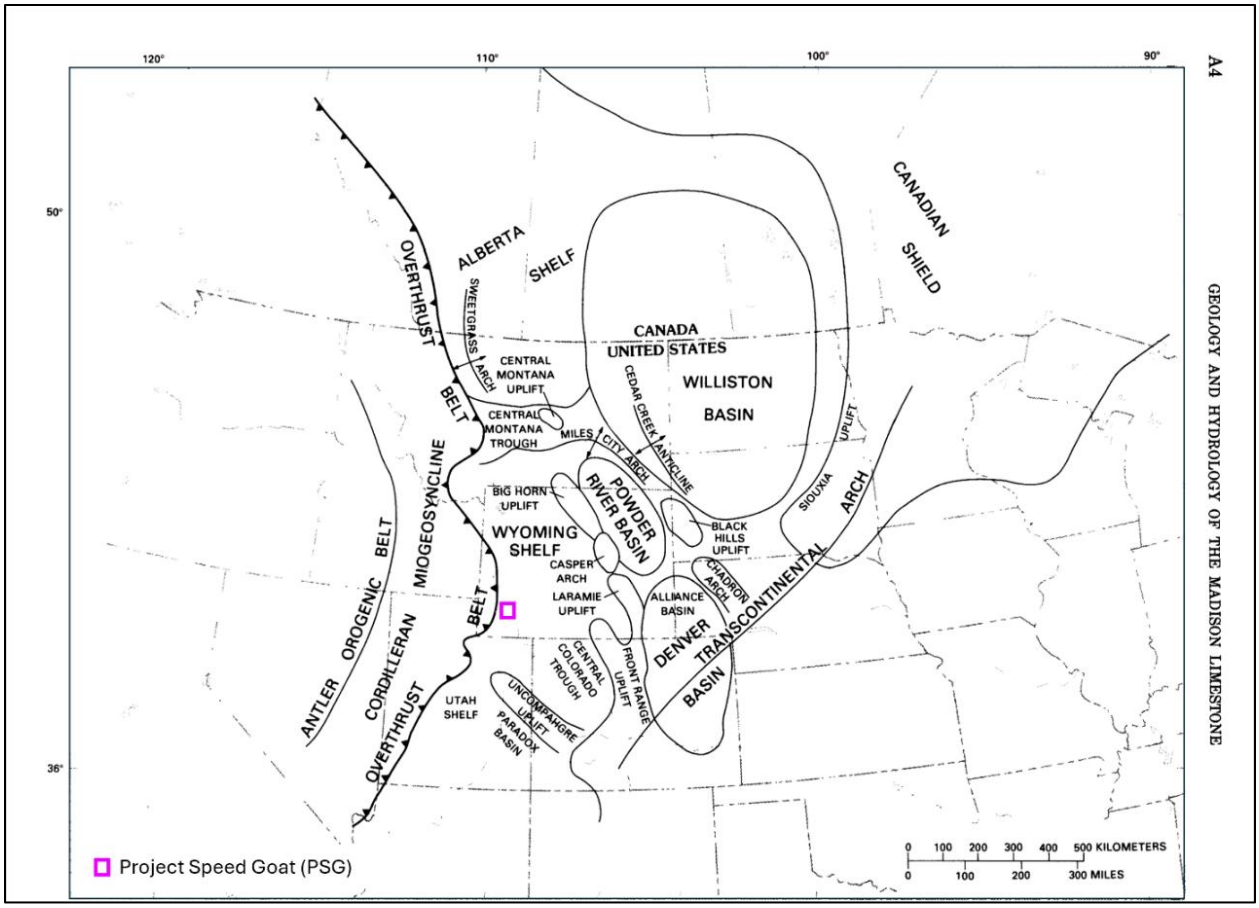


Figure A-1.12. *Regional view showing location of the Madison Sea and formations, modified after Peterson 1984.*

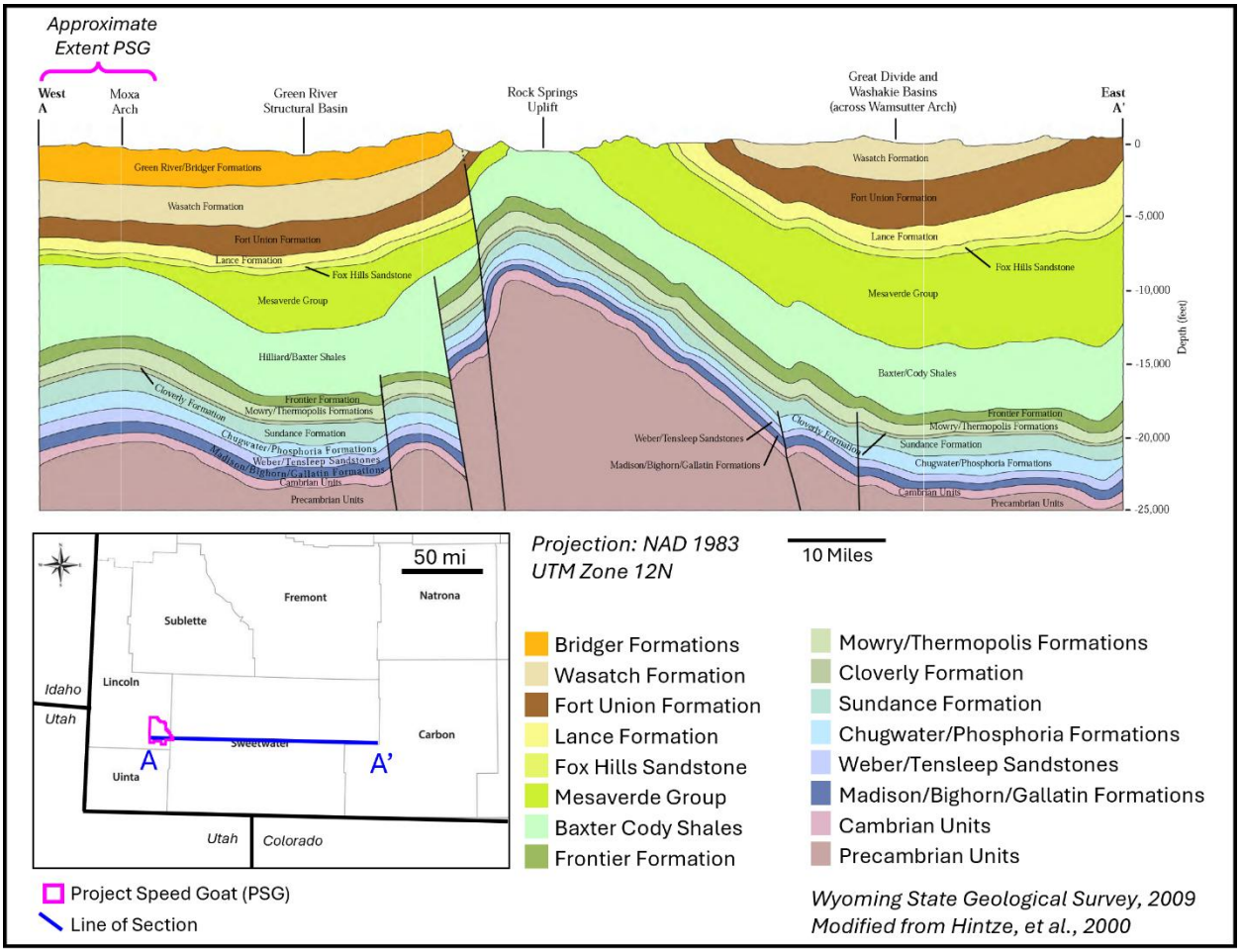


Figure A-1.13. *Regional east-west cross section through PSG showing its relationship to other structural features in the GGRB (from Clarey et.al., 2010 and references therein).*

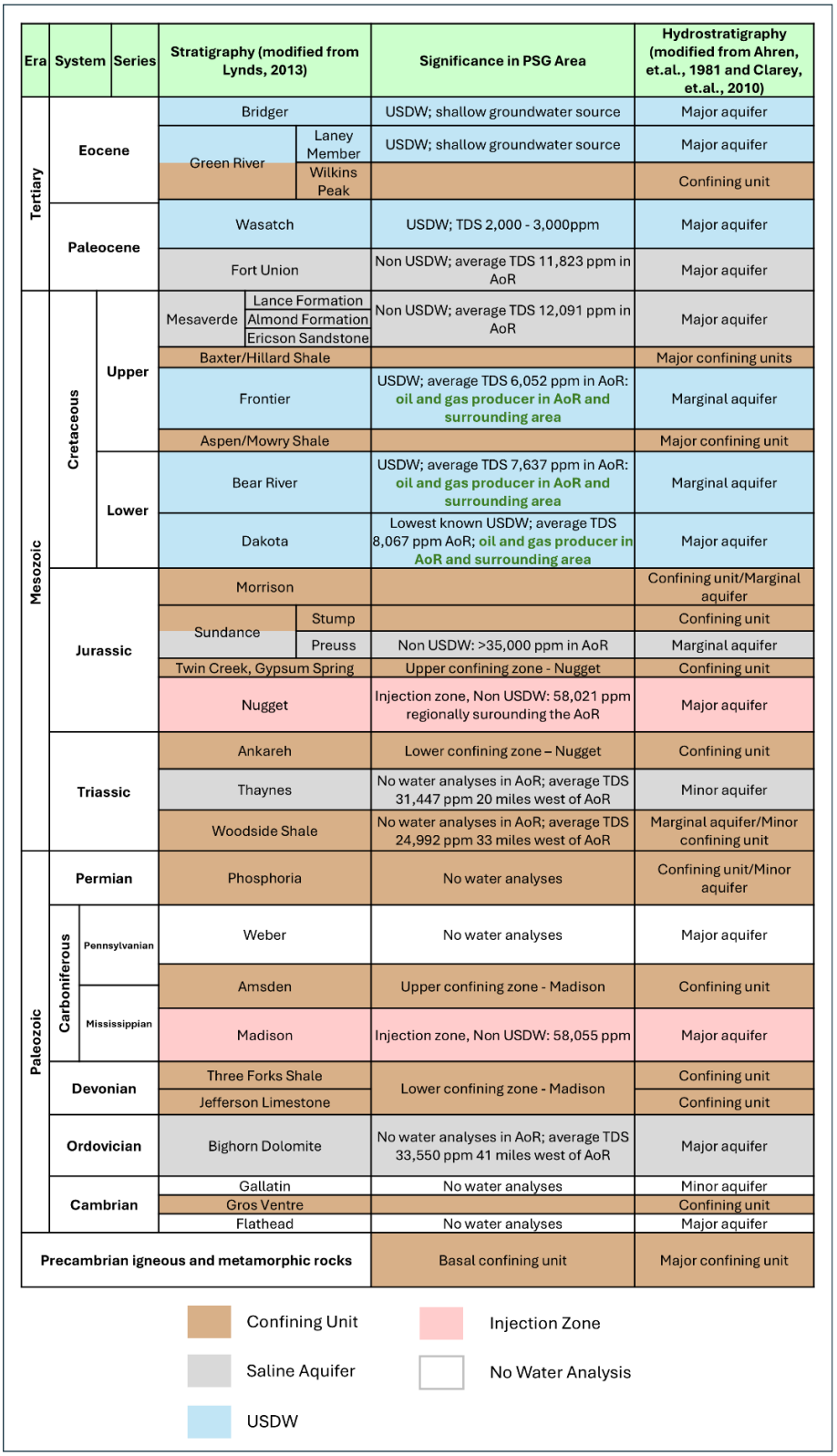
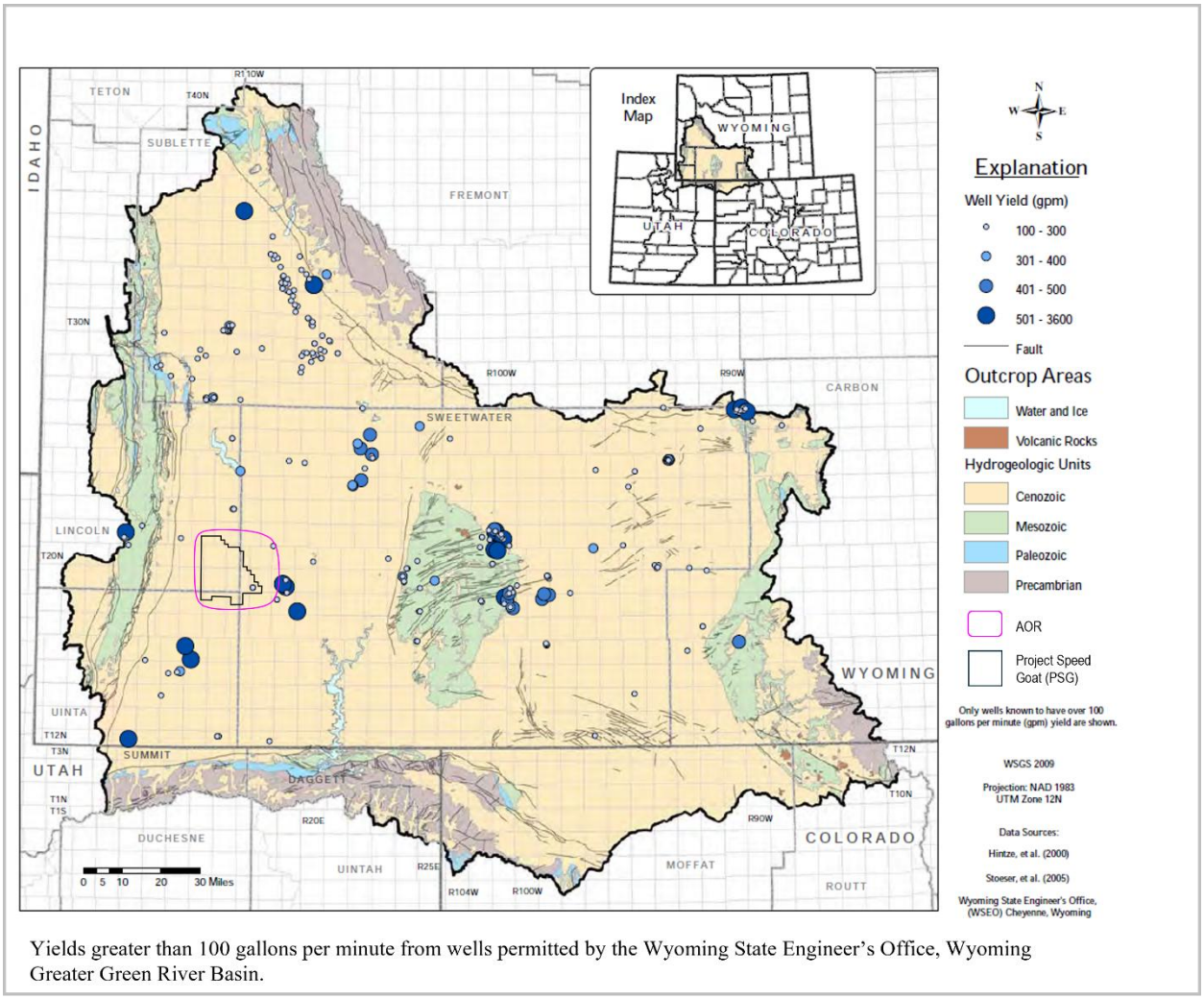
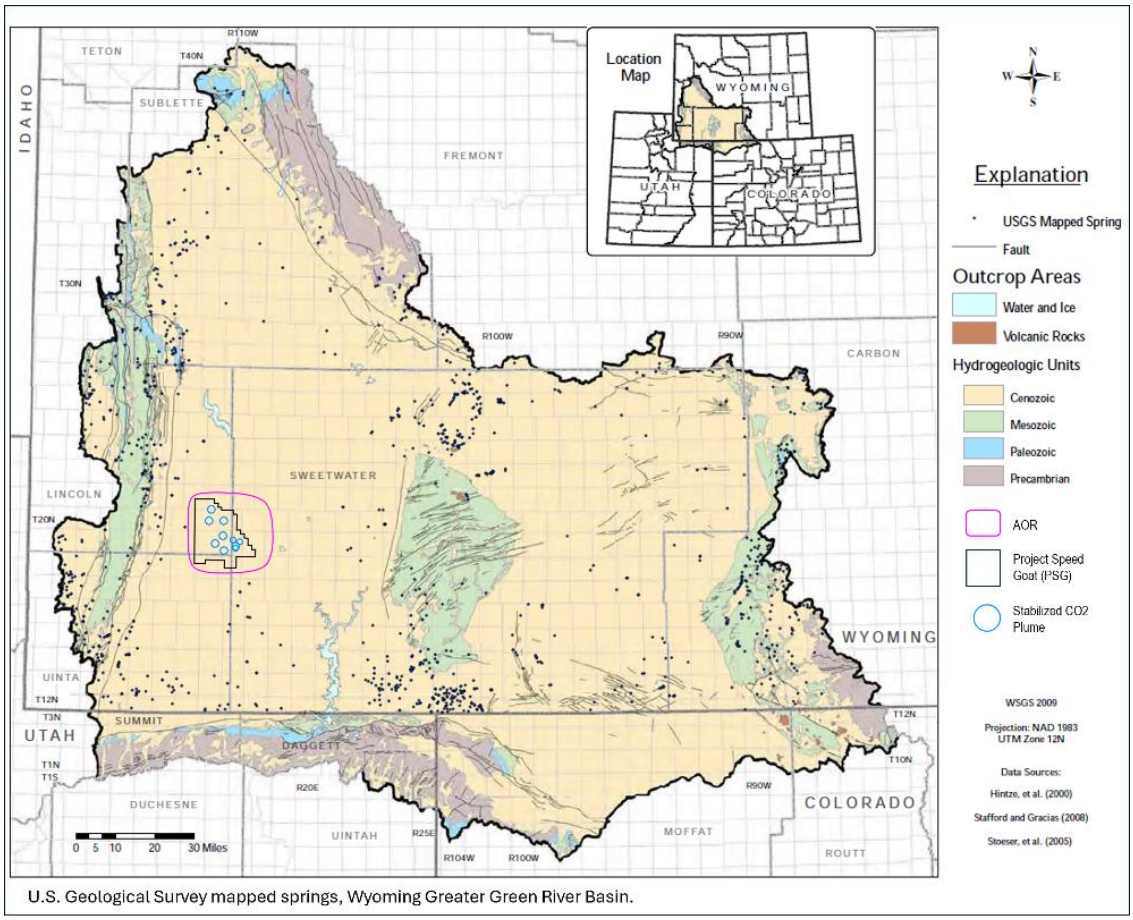


Figure A-1.14. *Stratigraphy with aquifers from the surface to the Precambrian.*



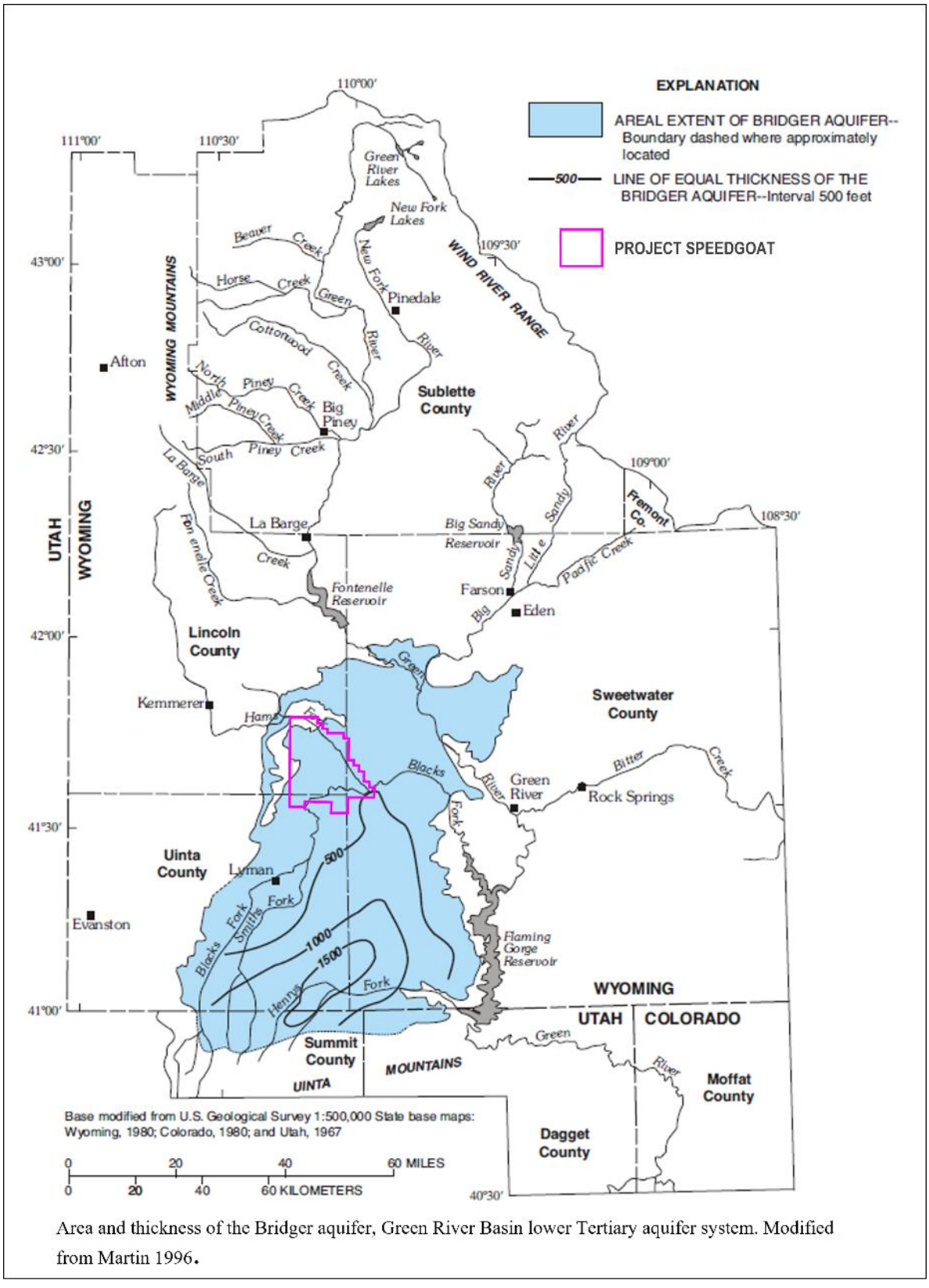
Yields greater than 100 gallons per minute from wells permitted by the Wyoming State Engineer's Office, Wyoming Greater Green River Basin.

Figure A-1.15. *Water wells yield at least 100 gallons per minute.*



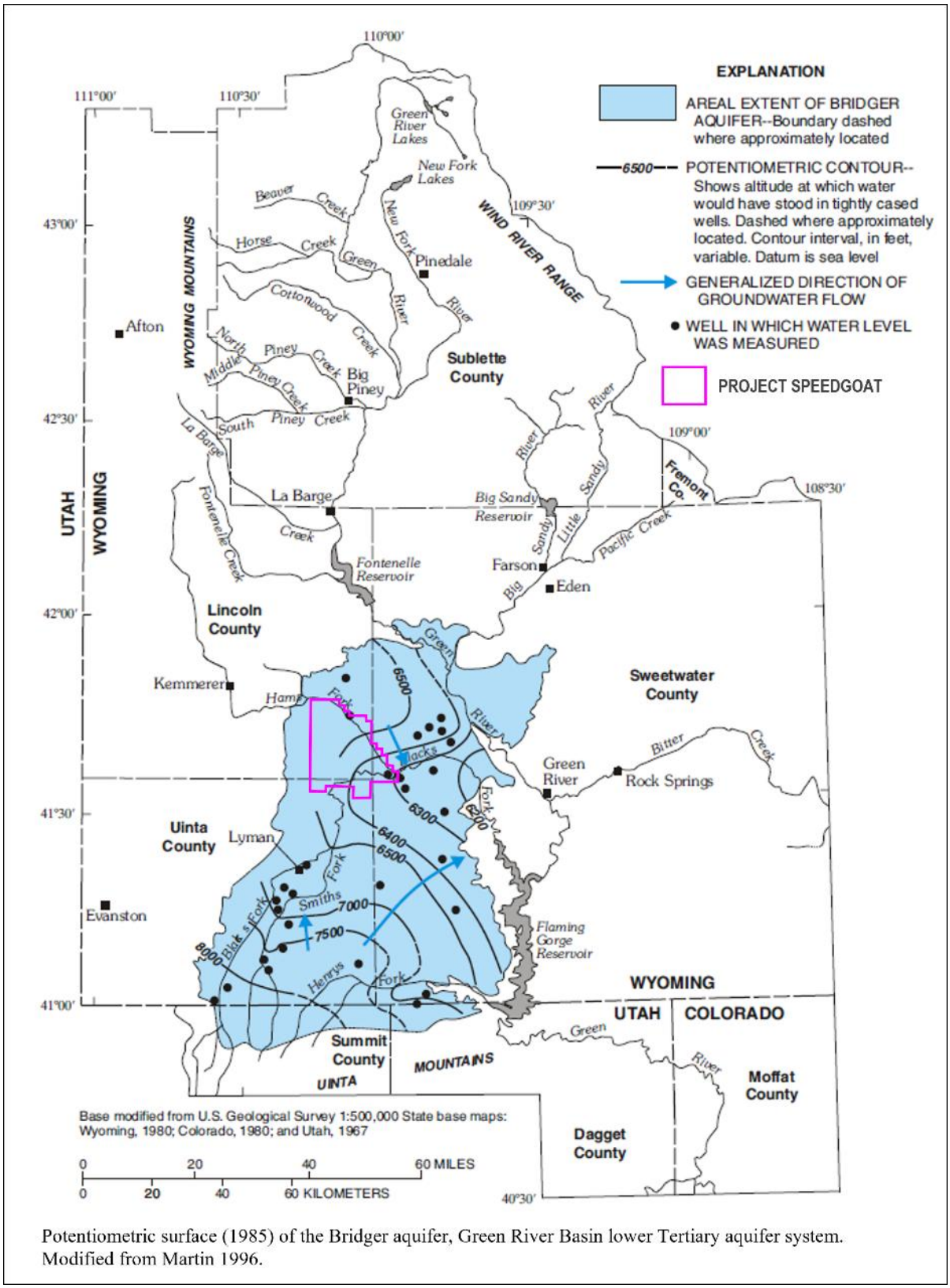
U.S. Geological Survey mapped springs, Wyoming Greater Green River Basin.

Figure A-1.16*. Springs within the GGRB. The AoR is in an area without mapped springs, modified after WWDC 2009.*



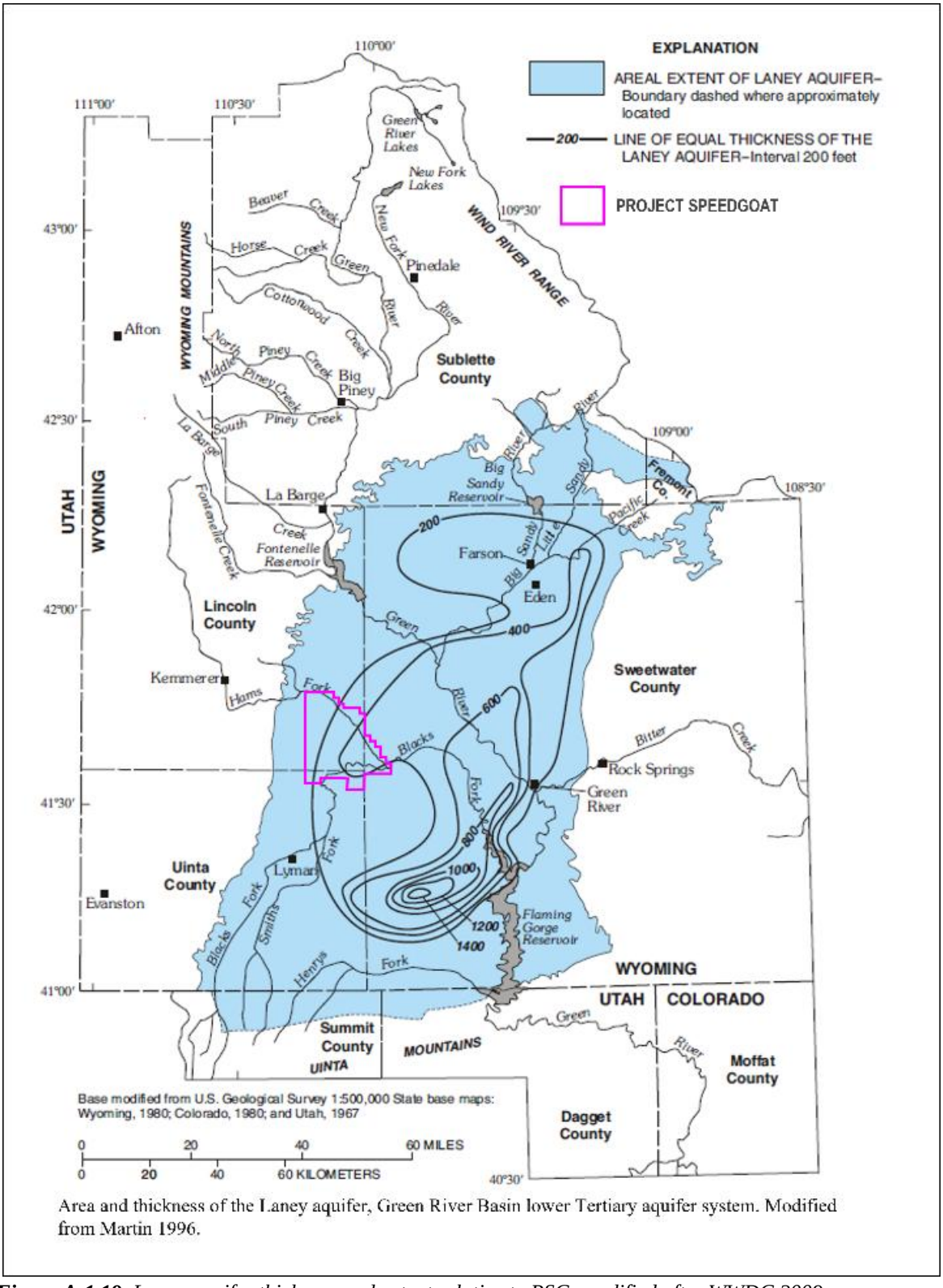
Area and thickness of the Bridger aquifer, Green River Basin lower Tertiary aquifer system. Modified from Martin 1996.

Figure A-1.17. *Bridger aquifer thickness and extent relative to PSG, modified after WWDC 2009.*



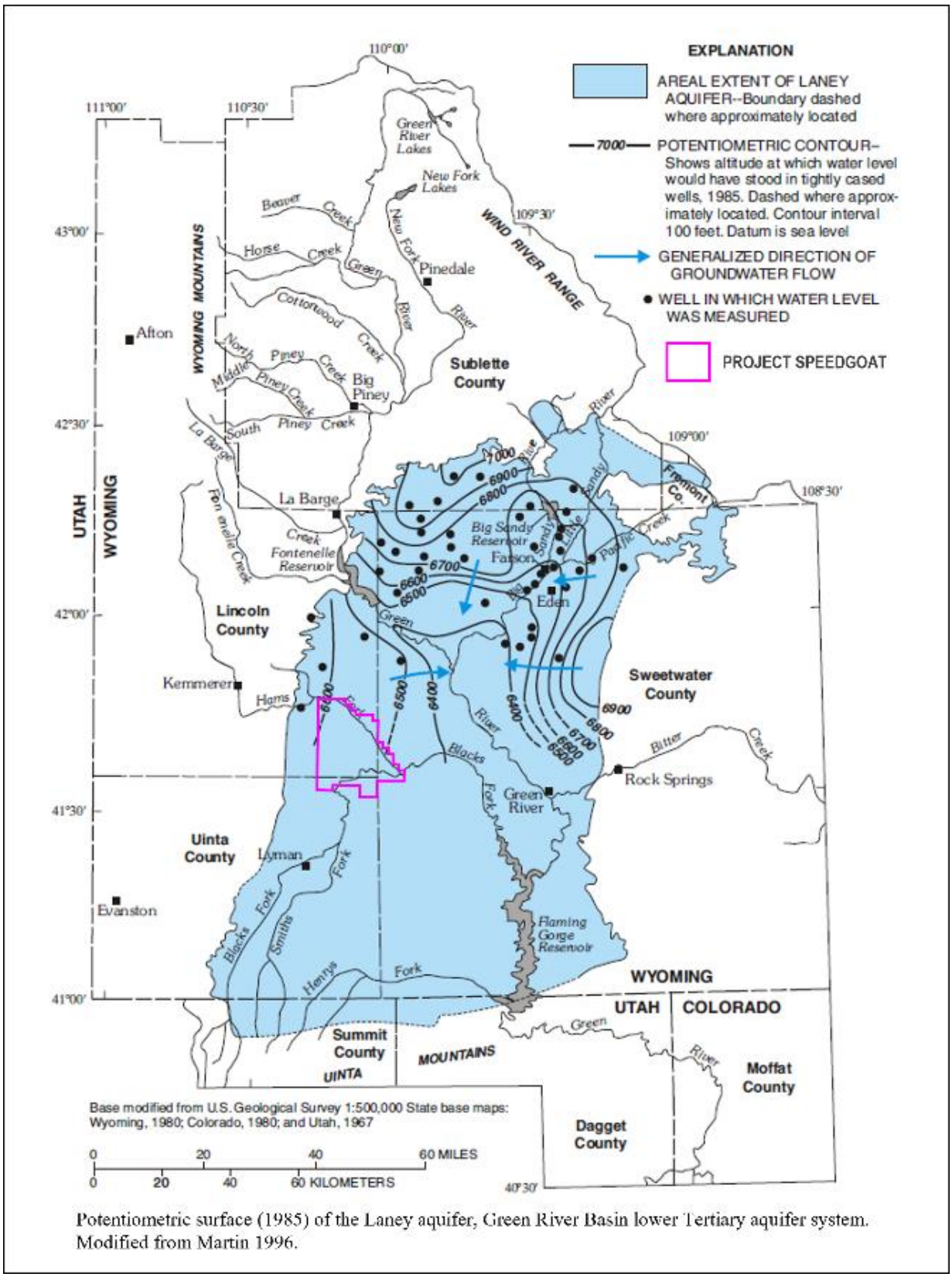
Potentiometric surface (1985) of the Bridger aquifer, Green River Basin lower Tertiary aquifer system. Modified from Martin 1996.

Figure A-1.18. *Bridger aquifer groundwater flow and potentiometric surface, modified after WWDC 2009.*



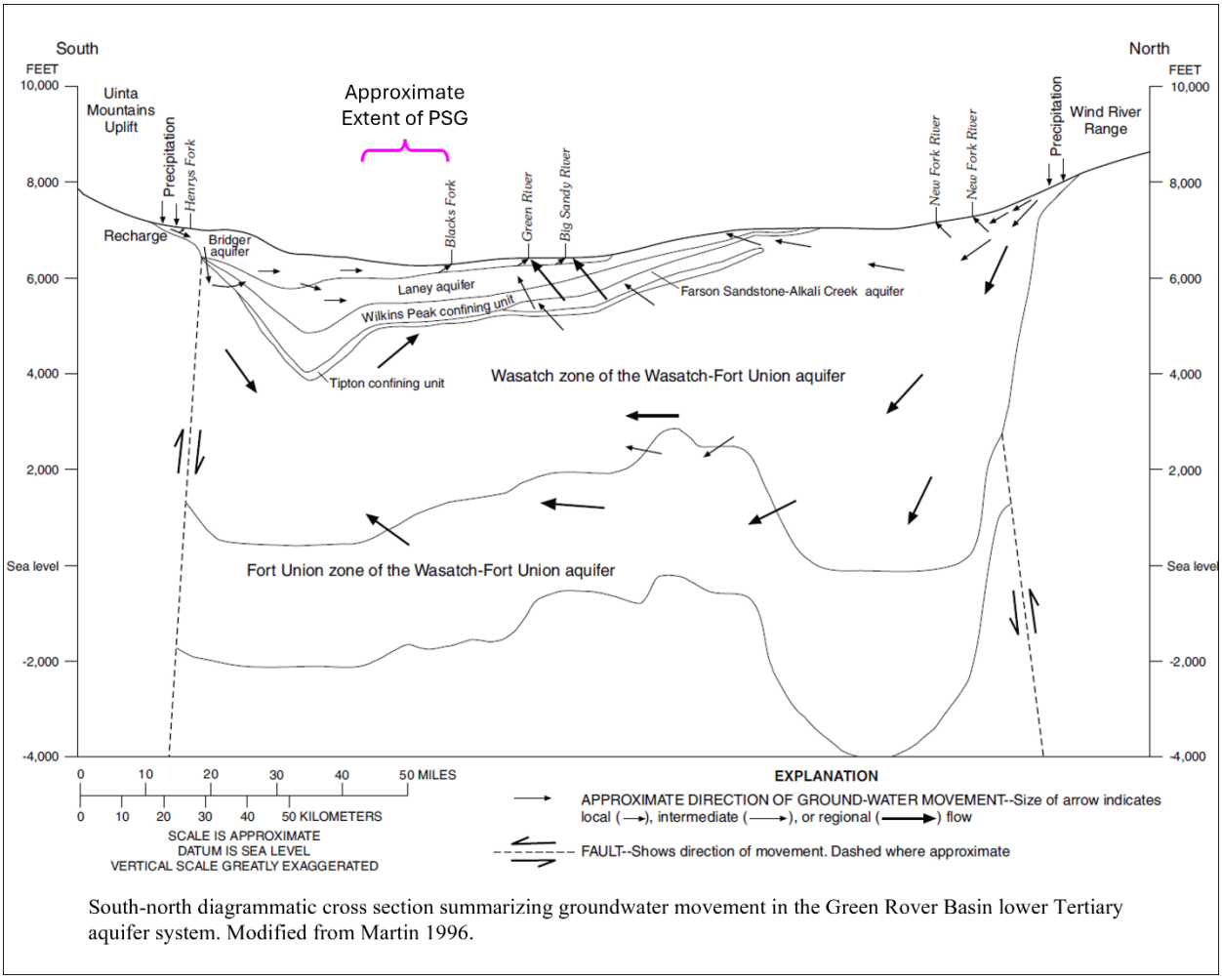
Area and thickness of the Laney aquifer, Green River Basin lower Tertiary aquifer system. Modified from Martin 1996.

Figure A-1.19. *Laney aquifer thickness and extent relative to PSG, modified after WWDC 2009.*



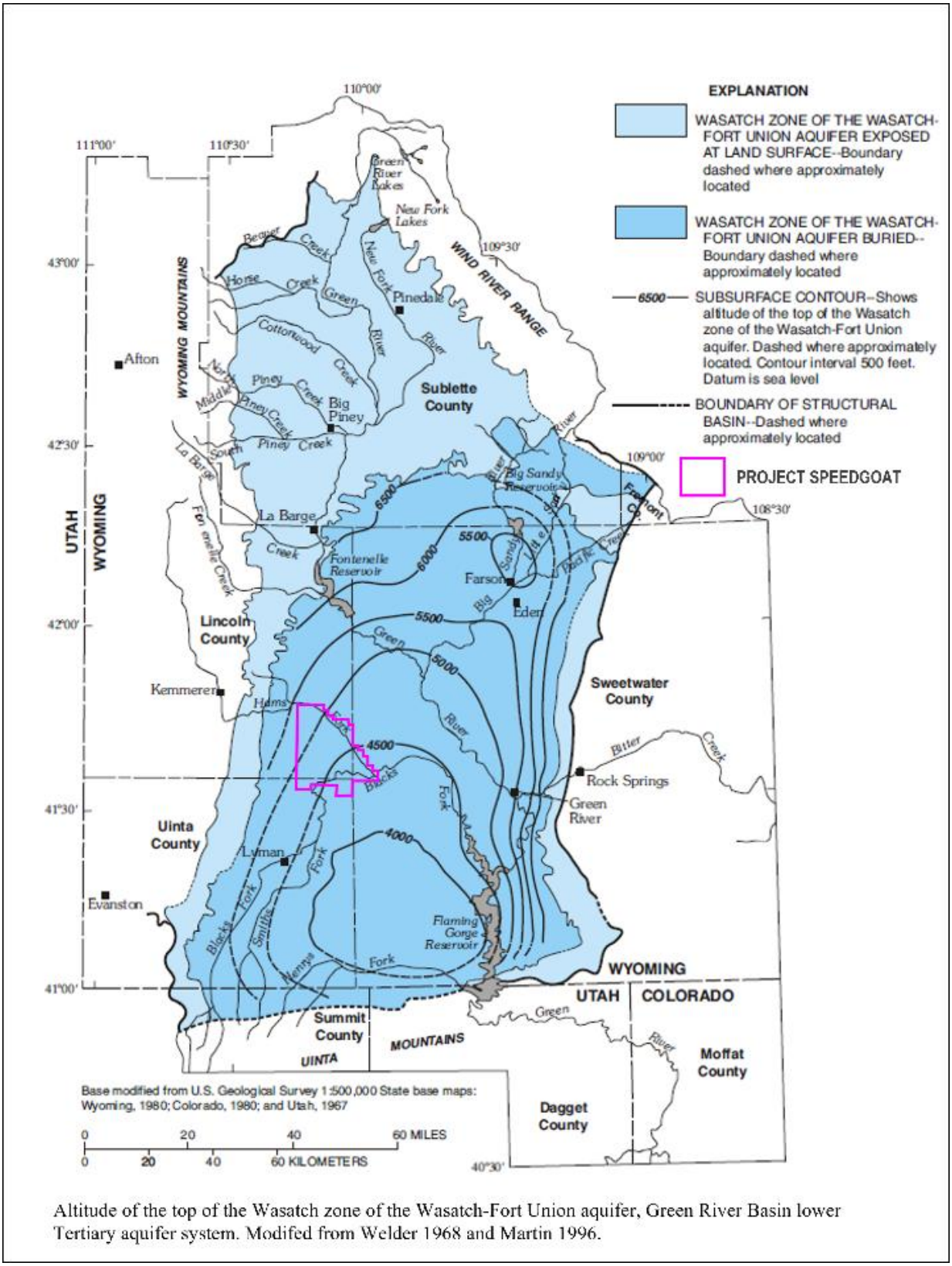
Potentiometric surface (1985) of the Laney aquifer, Green River Basin lower Tertiary aquifer system. Modified from Martin 1996.

Figure A-1.20. *Laney aquifer groundwater flow and potentiometric surface, modified after WWDC 2009.*



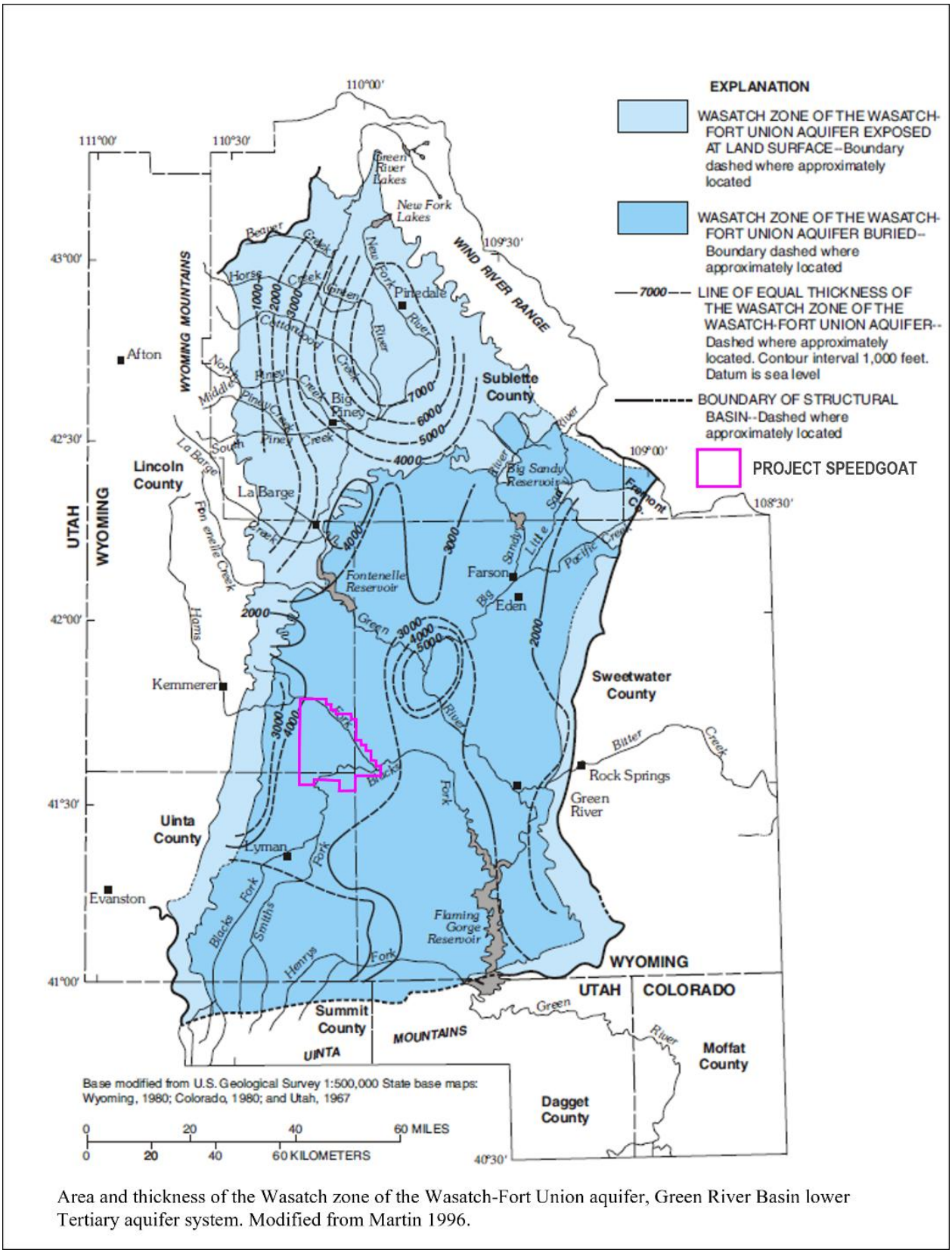
South-north diagrammatic cross section summarizing groundwater movement in the Green Rover Basin lower Tertiary aquifer system. Modified from Martin 1996.

Figure A-1.21. *Vertical movement of groundwater in Tertiary aquifers.*



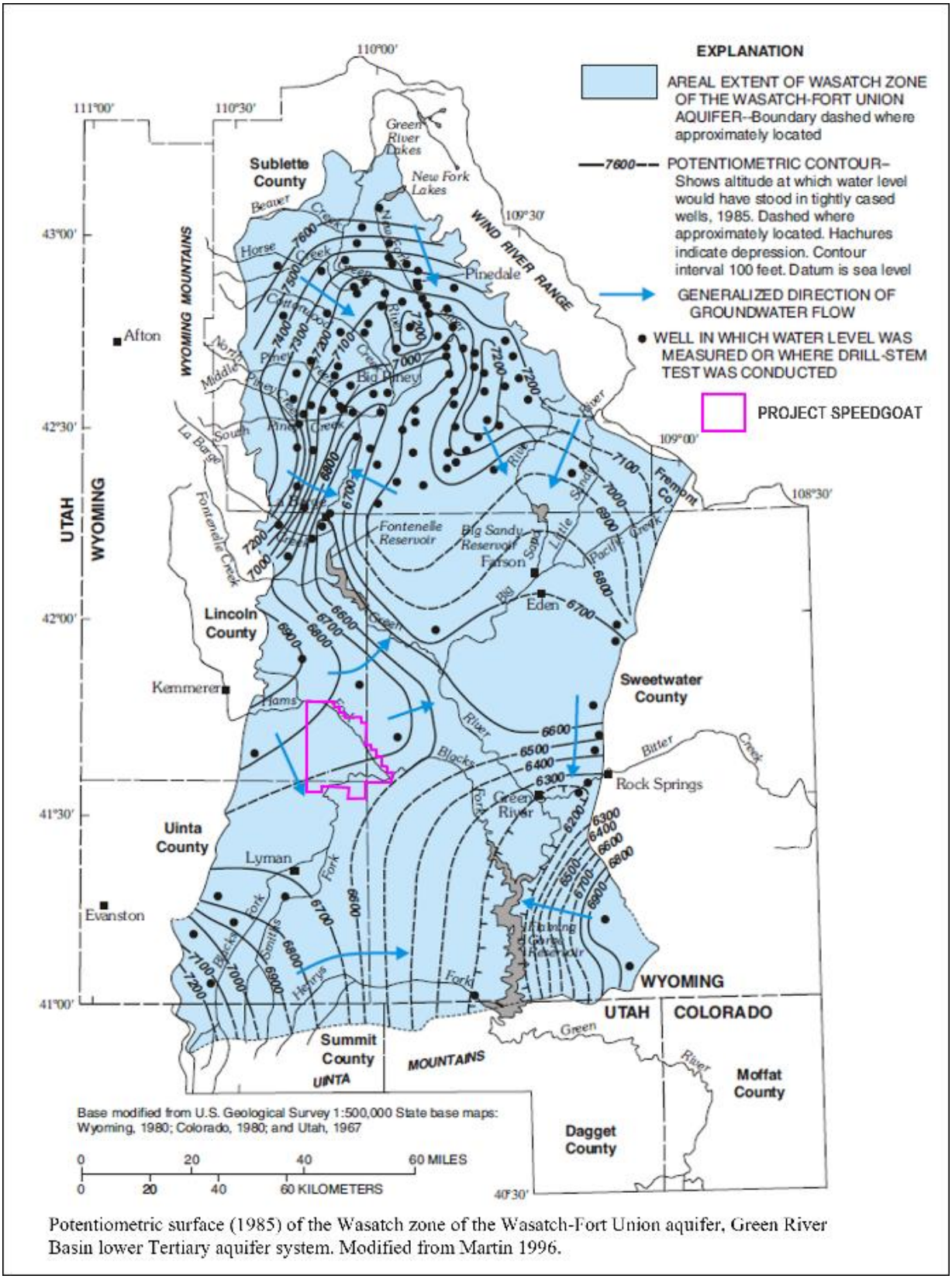
Altitude of the top of the Wasatch zone of the Wasatch-Fort Union aquifer, Green River Basin lower Tertiary aquifer system. Modifed from Welder 1968 and Martin 1996.

Figure A-1.22. *Wasatch aquifer structure, modified after WWDC 2009.*



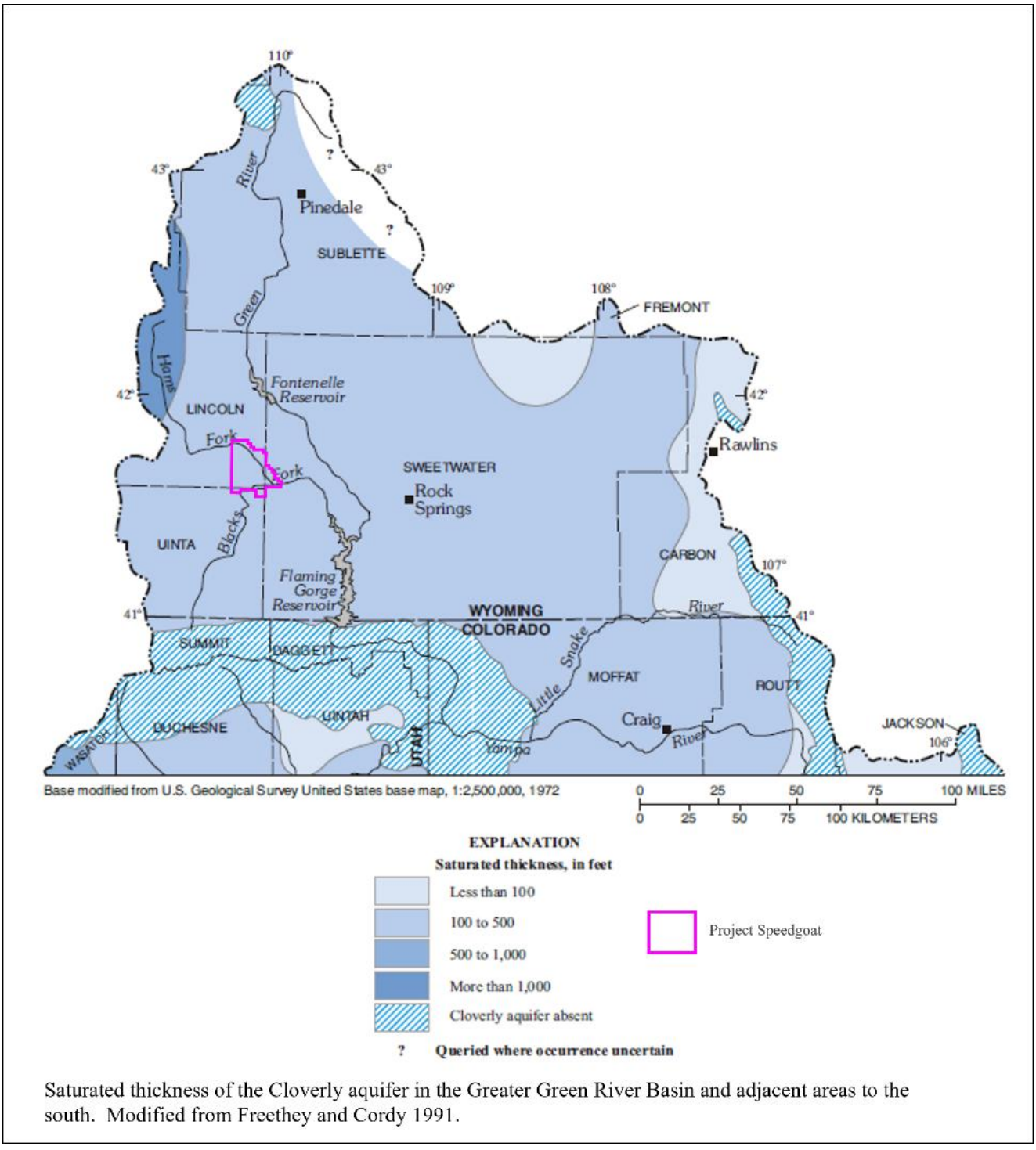
Area and thickness of the Wasatch zone of the Wasatch-Fort Union aquifer, Green River Basin lower Tertiary aquifer system. Modified from Martin 1996.

Figure A-1.23. *Wasatch aquifer thickness and extent relative to PSG, modified after WWDC 2009.*



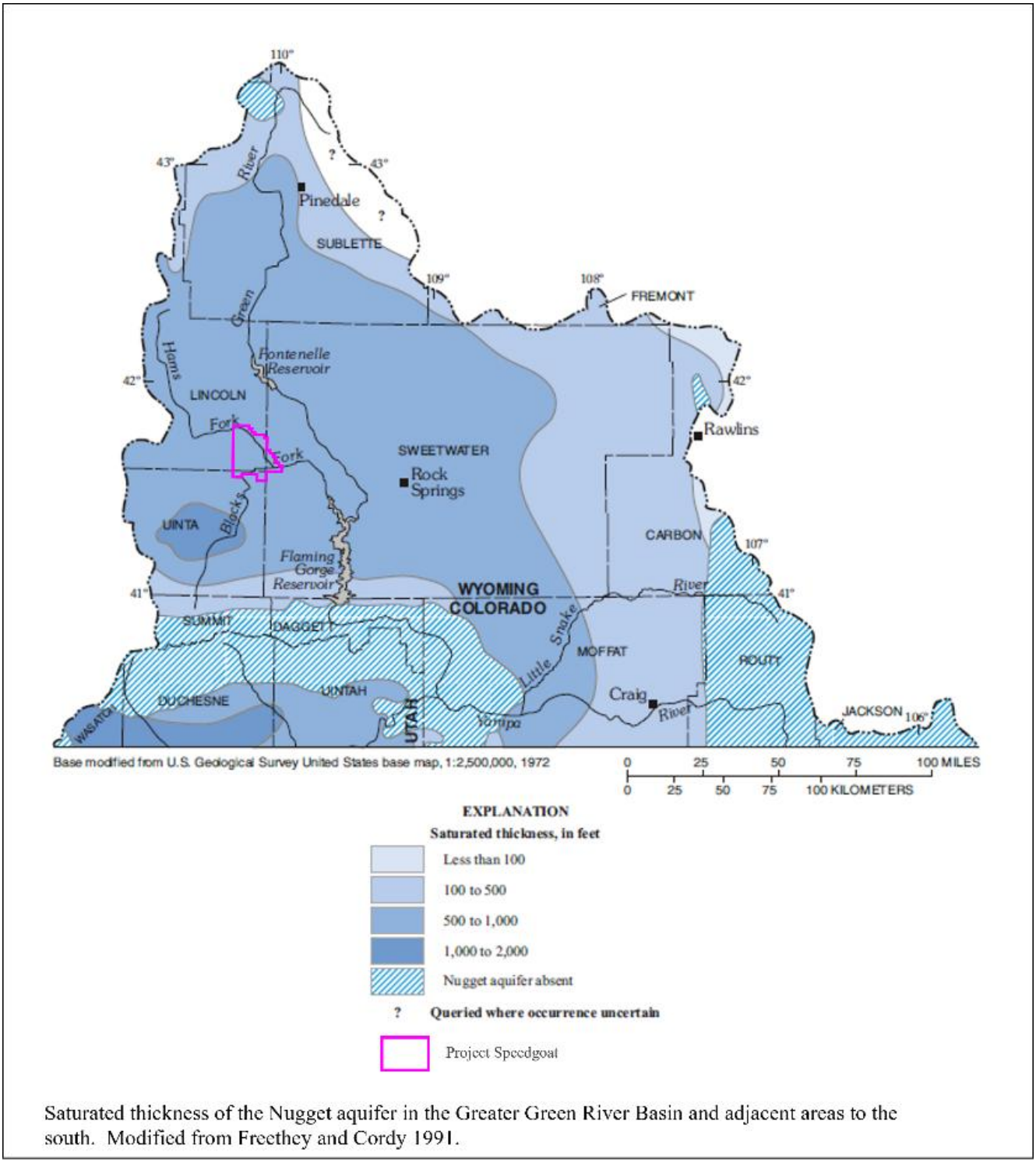
Potentiometric surface (1985) of the Wasatch zone of the Wasatch-Fort Union aquifer, Green River Basin lower Tertiary aquifer system. Modified from Martin 1996.

Figure A-1.24. *Wasatch aquifer groundwater flow and potentiometric surface, modified after WWDC 2009.*



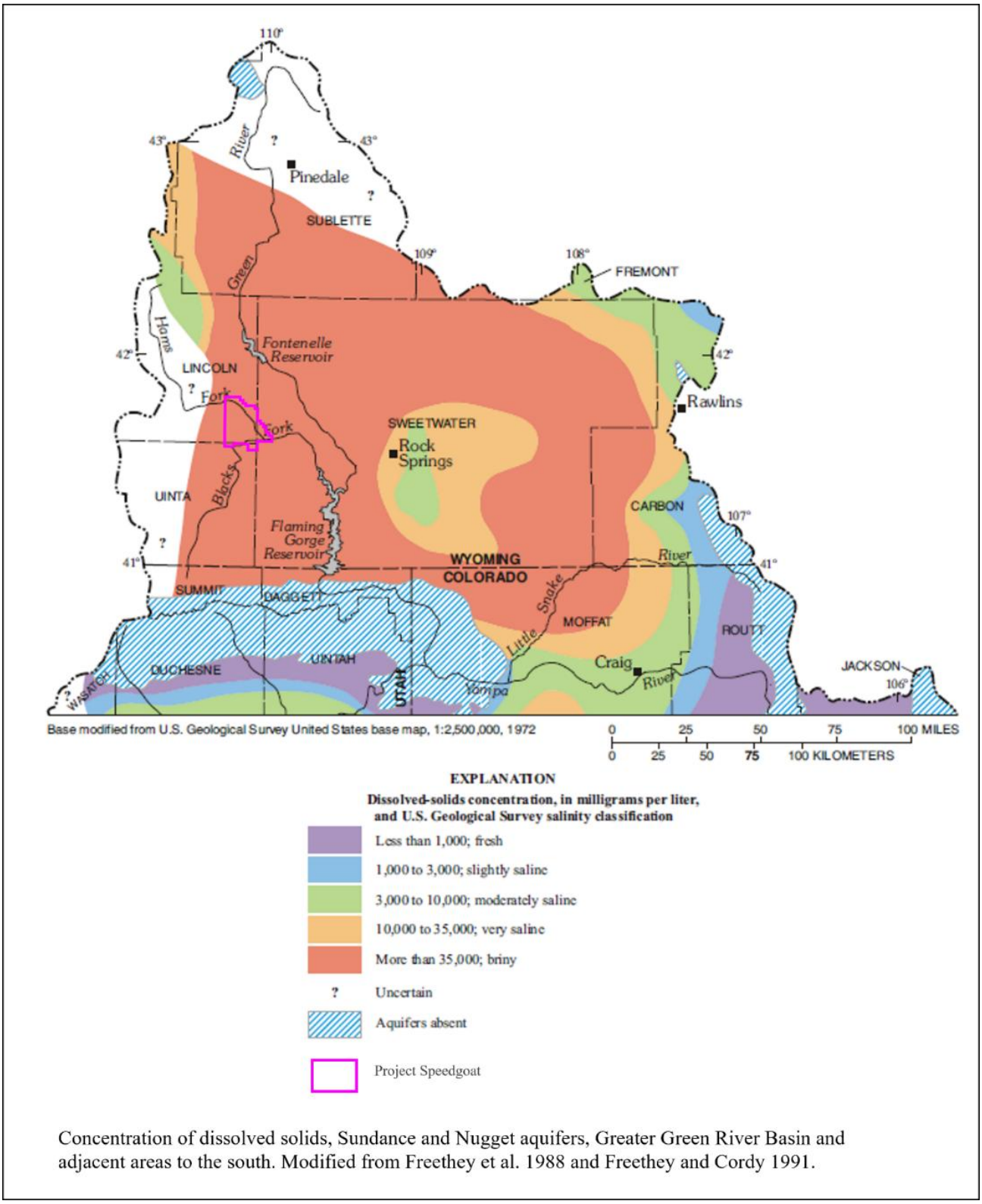
Saturated thickness of the Cloverly aquifer in the Greater Green River Basin and adjacent areas to the south. Modified from Freethey and Cordy 1991.

Figure A-1.25. *Cloverly aquifer thickness and extent relative to PSG, modified after WWCG 2009.*



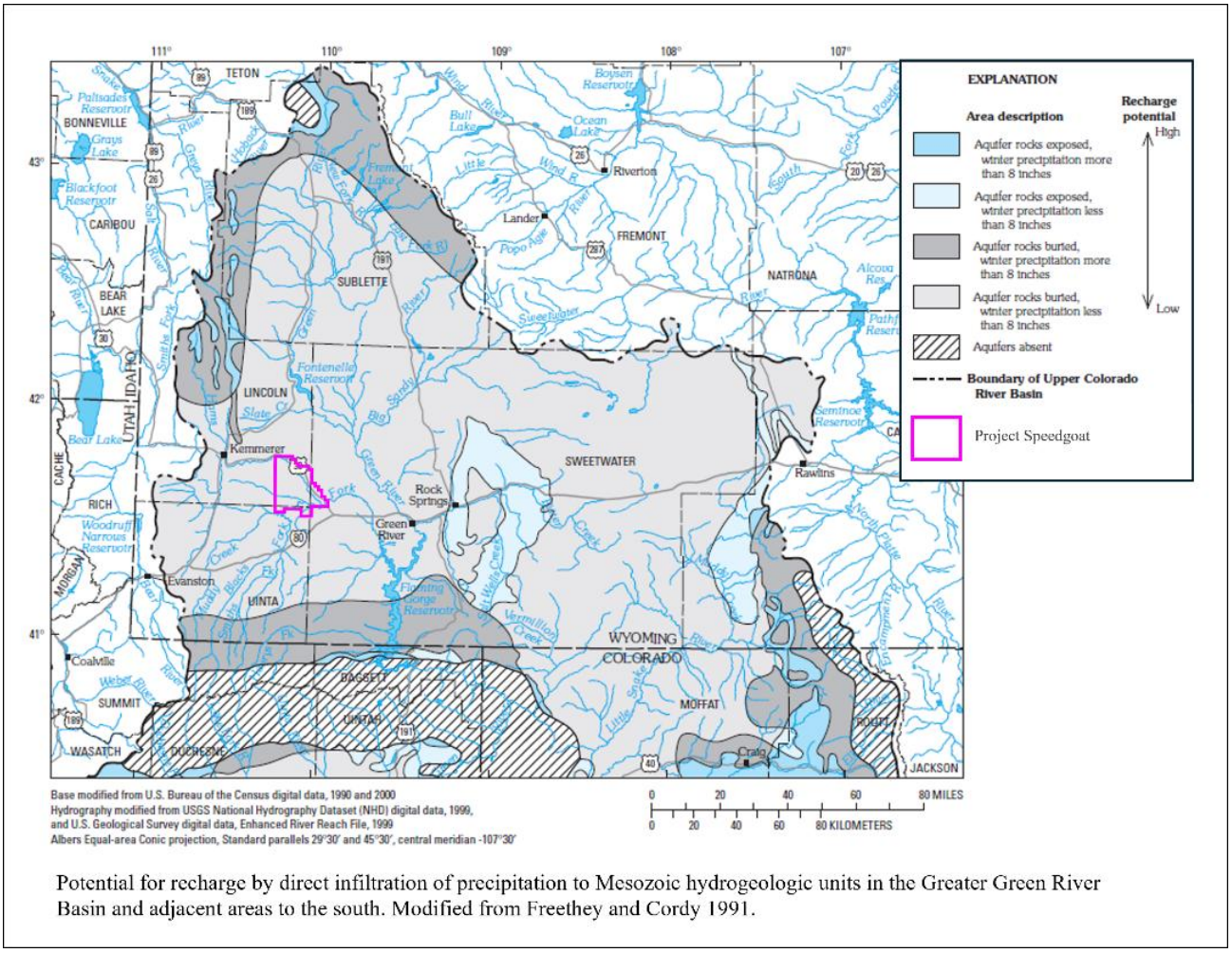
Saturated thickness of the Nugget aquifer in the Greater Green River Basin and adjacent areas to the south. Modified from Freethey and Cordy 1991.

Figure A-1.26. *Saturated thickness of the Nugget aquifer relative to PSG, modified after WWDC 2009.*



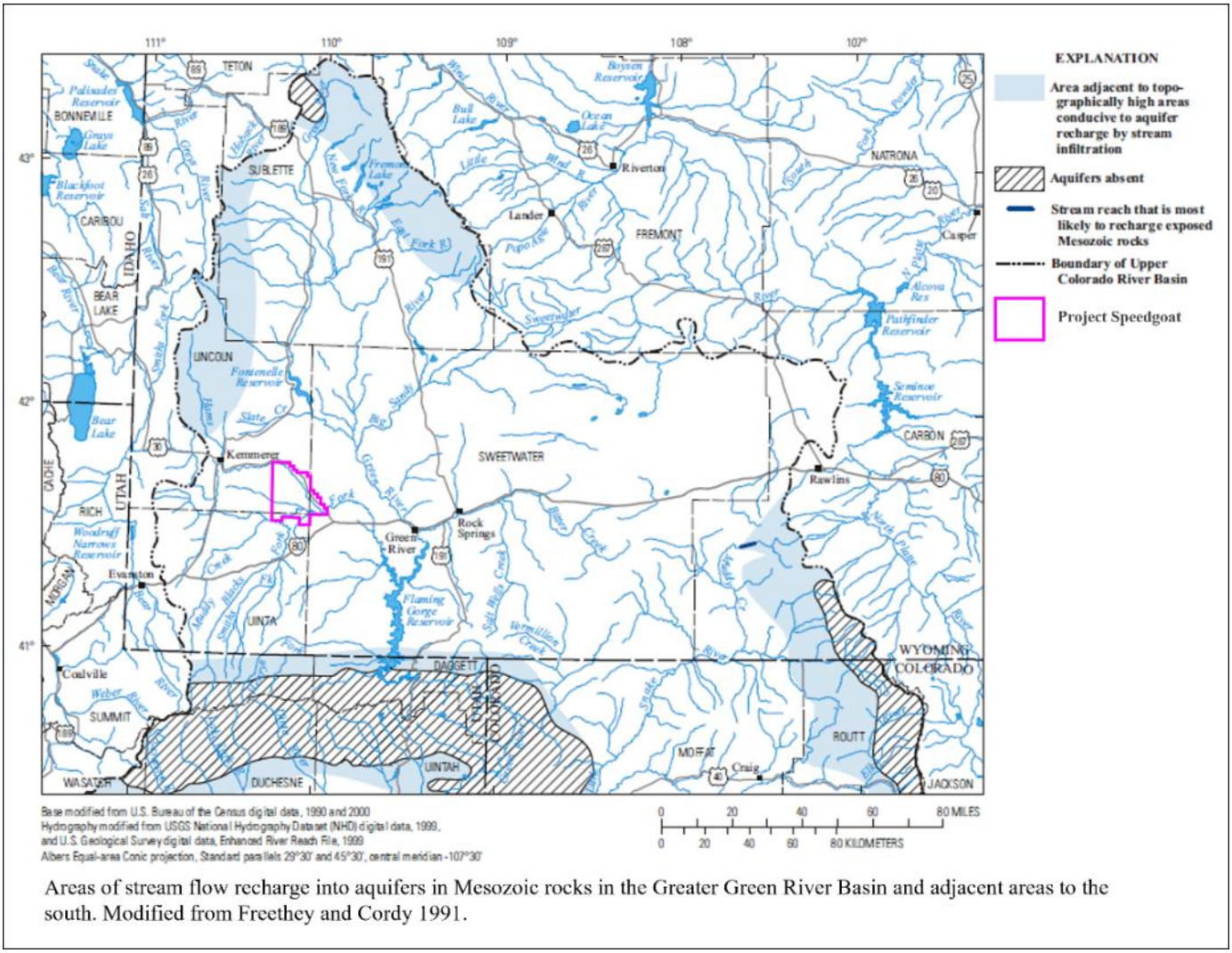
Concentration of dissolved solids, Sundance and Nugget aquifers, Greater Green River Basin and adjacent areas to the south. Modified from Freethey et al. 1988 and Freethey and Cordy 1991.

Figure A-1.27. *Salinity of the Sundance and Nugget aquifers, modified after WWCG 2009.*



Potential for recharge by direct infiltration of precipitation to Mesozoic hydrogeologic units in the Greater Green River Basin and adjacent areas to the south. Modified from Freethey and Cordy 1991.

Figure A-1.28. *Potential recharge via precipitation into Nugget, modified after WWDC 2009.*



Areas of stream flow recharge into aquifers in Mesozoic rocks in the Greater Green River Basin and adjacent areas to the south. Modified from Freethey and Cordy 1991.

Figure A-1.29*. Potential recharge into Nugget via stream recharge, modified after WWDC 2009.*

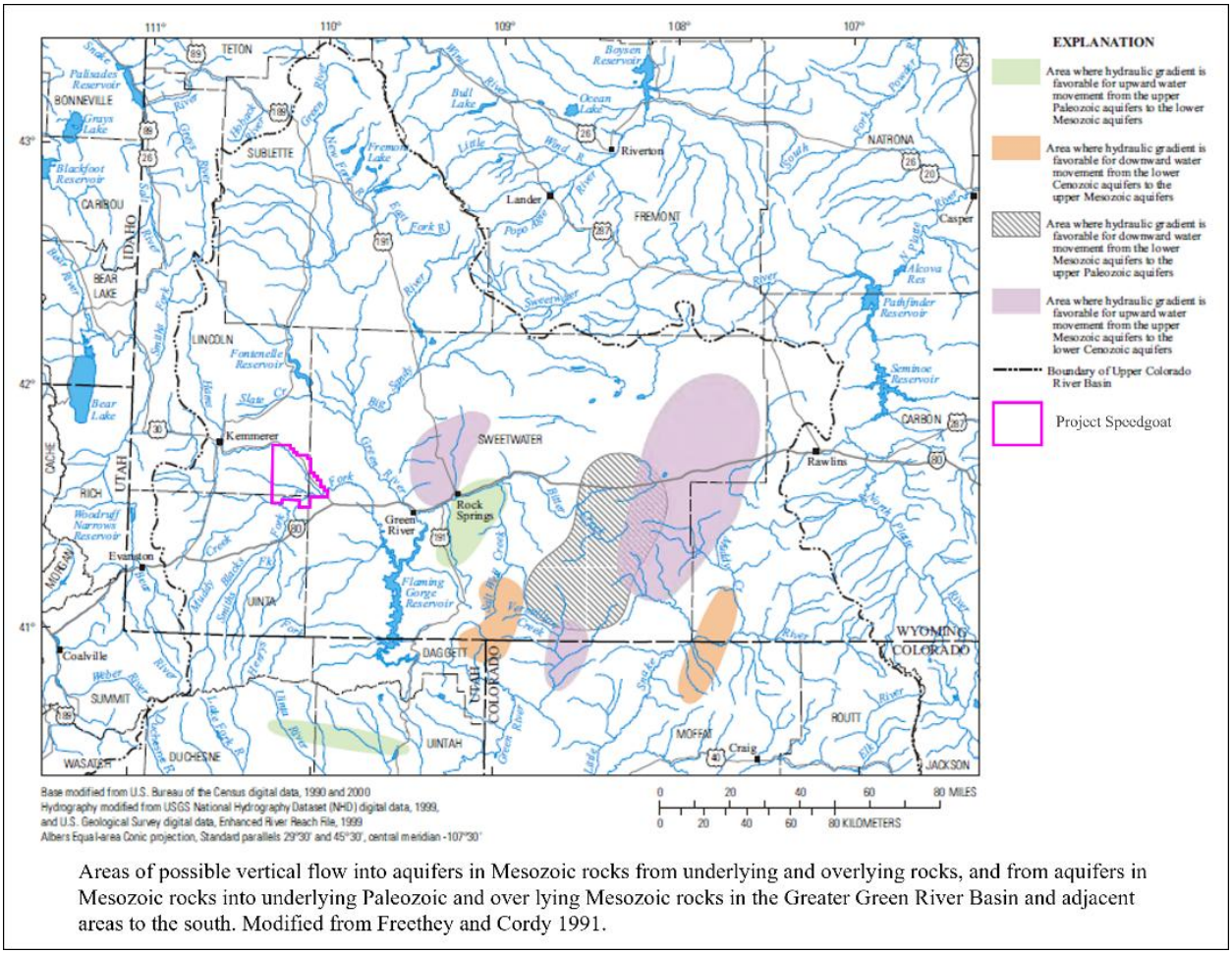
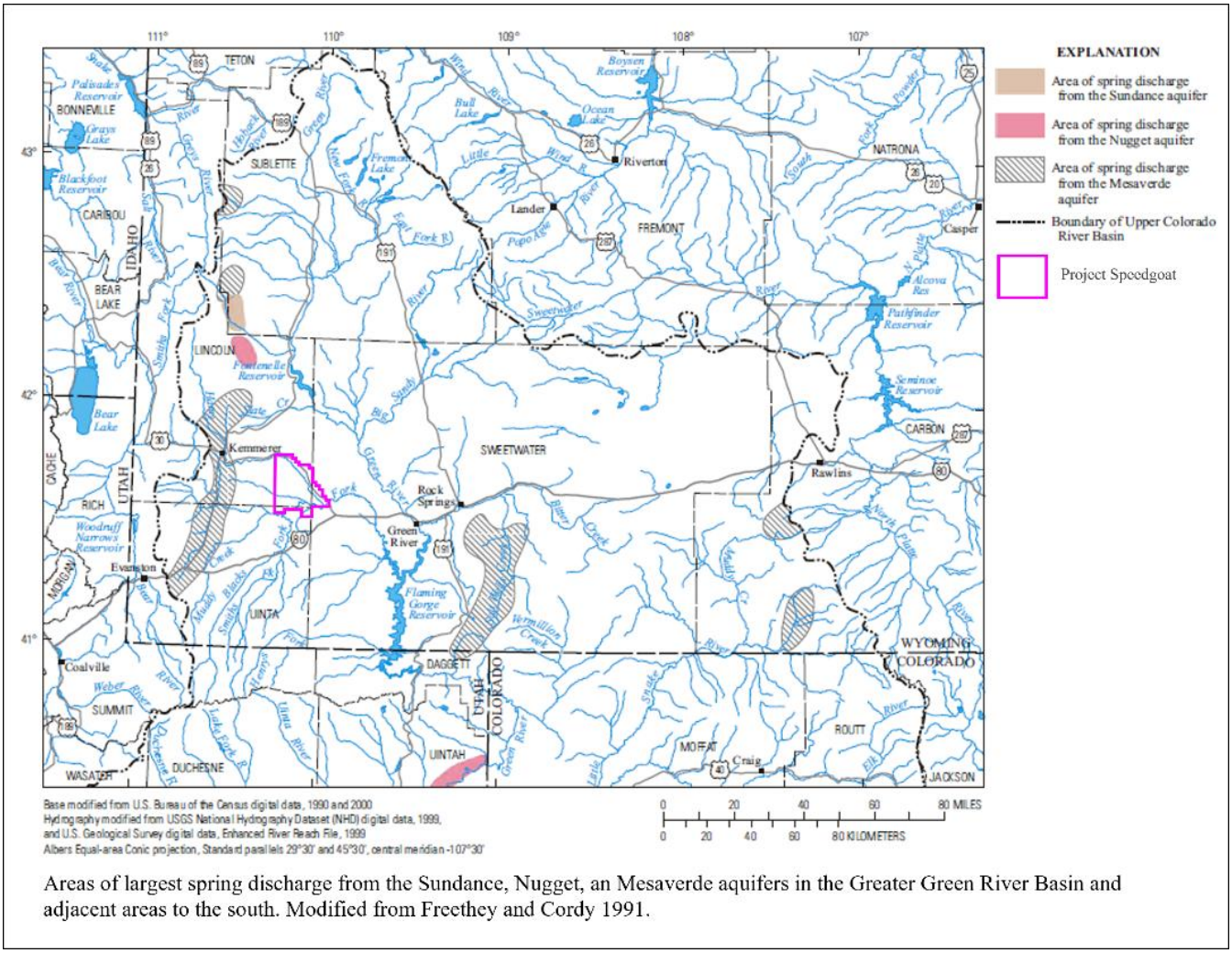
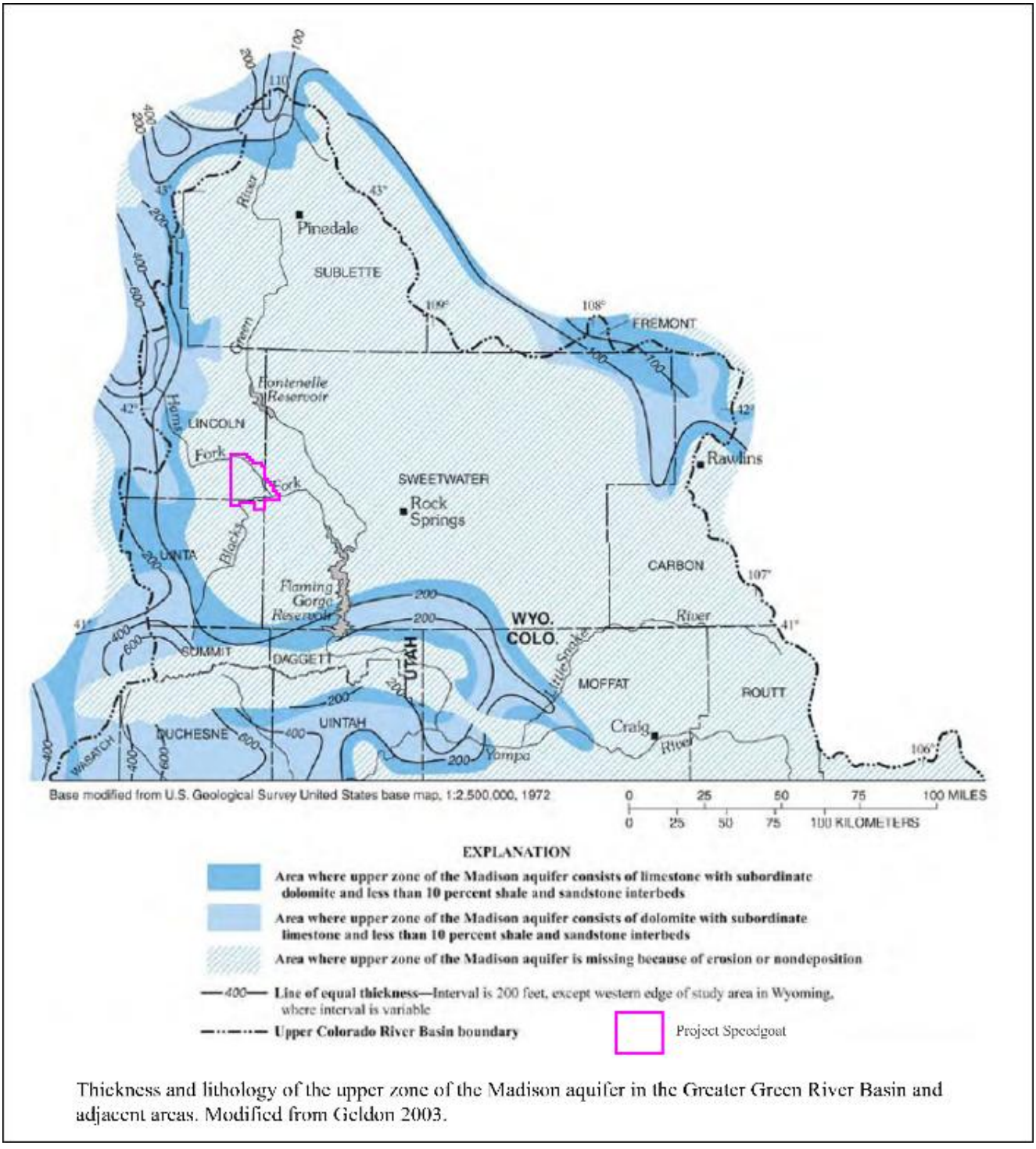


Figure A-1.30. *Possible vertical flow between the Mesozoic and Paleozoic (including the Nugget and Madison aquifers), modified after WWDC 2009.*



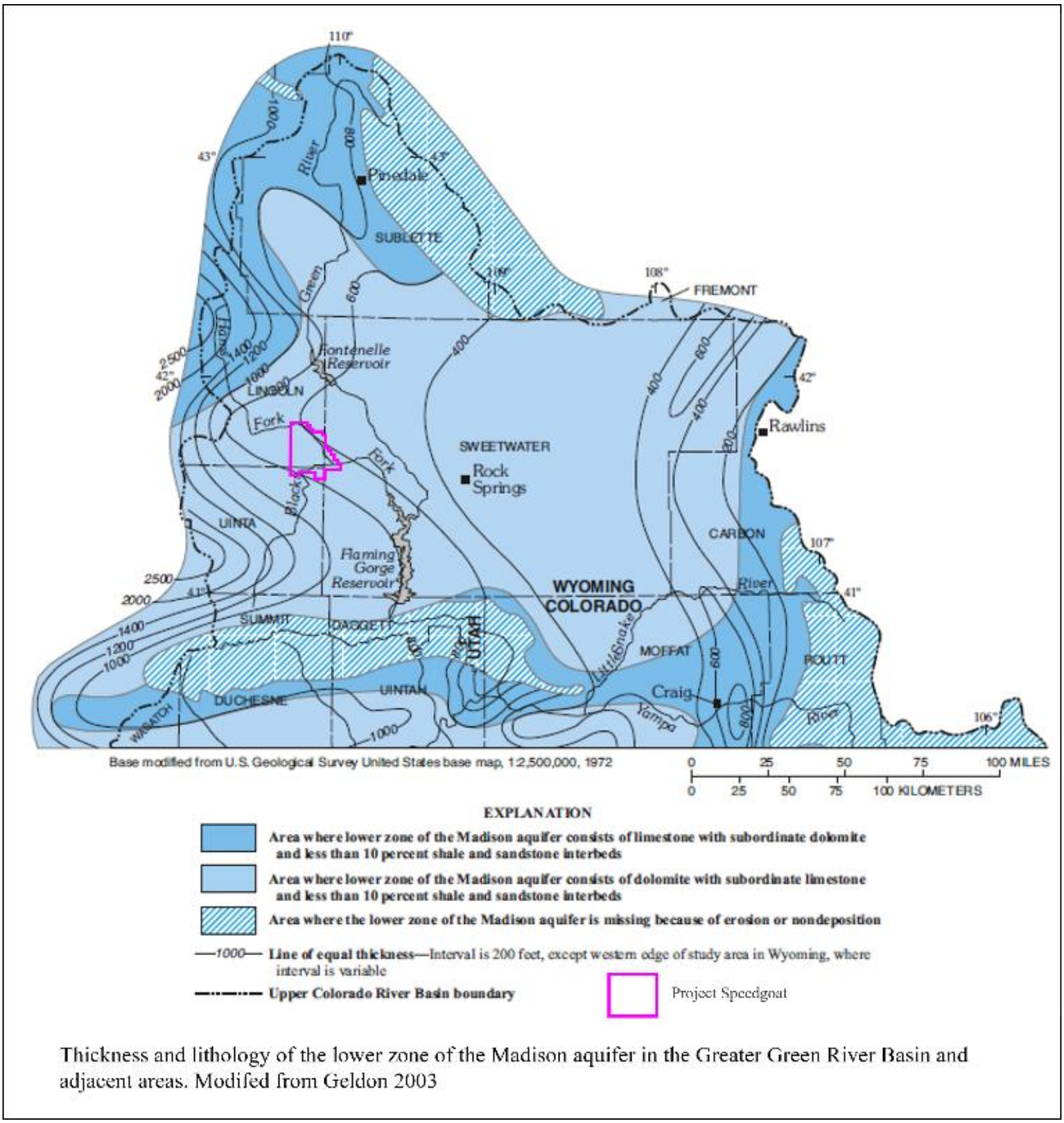
Areas of largest spring discharge from the Sundance, Nugget, an Mesaverde aquifers in the Greater Green River Basin and adjacent areas to the south. Modified from Freethey and Cordy 1991.

Figure A-1.31. *Spring discharge from Sundance, Nugget, or Mesaverde aquifers. Modified after WWDC 2009.*



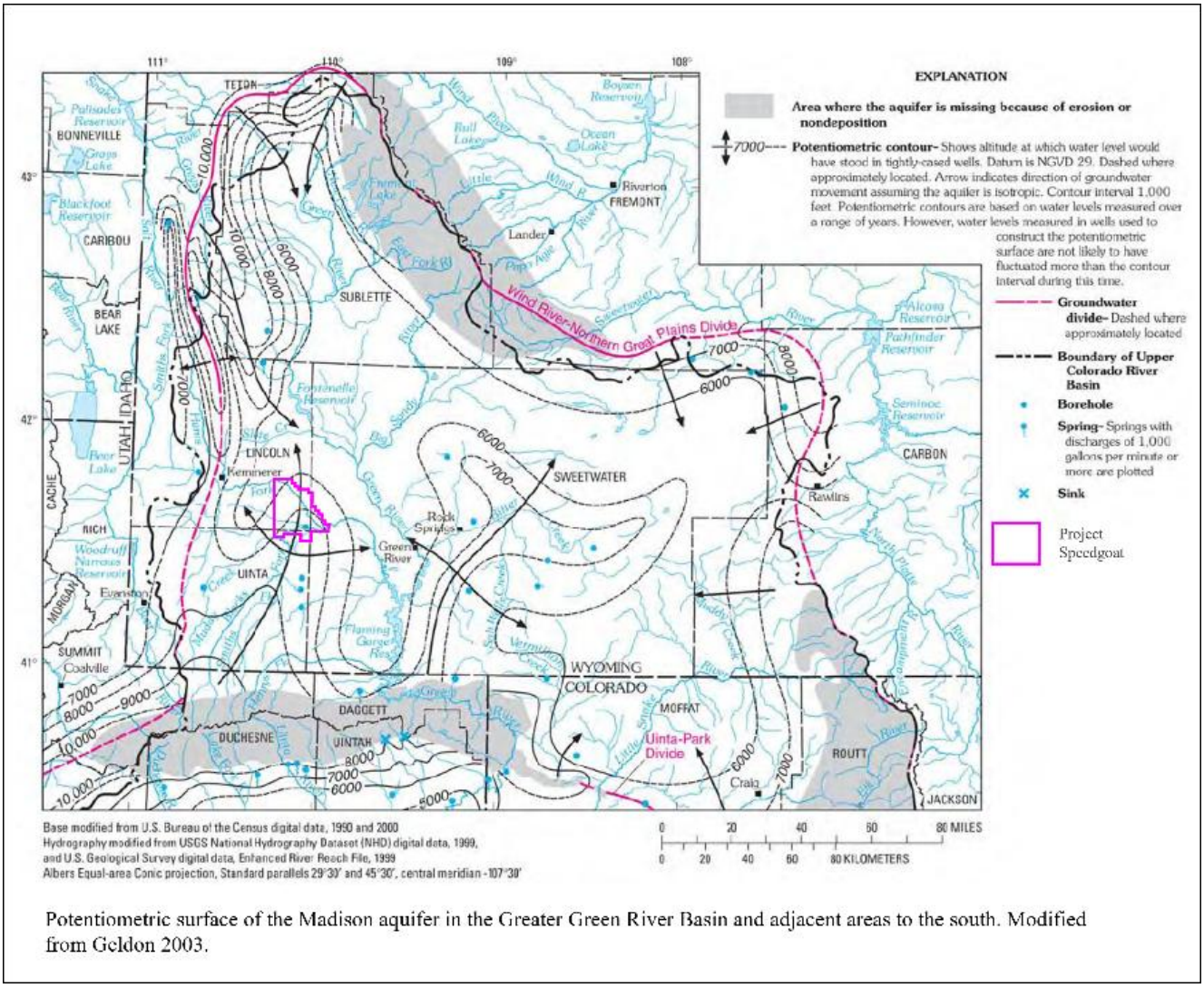
Thickness and lithology of the upper zone of the Madison aquifer in the Greater Green River Basin and adjacent areas. Modified from Geldon 2003.

Figure A-1.32. *Thickness and lithology of the upper Madison aquifer, relative to PSG. Modified after WWDC 2009.*



Thickness and lithology of the lower zone of the Madison aquifer in the Greater Green River Basin and adjacent areas. Modifed from Geldon 2003

Figure A-1.33. *Thickness and lithology of the lower Madison aquifer, relative to PSG. Modified after WWDC 2009.*



Potentiometric surface of the Madison aquifer in the Greater Green River Basin and adjacent areas to the south. Modified from Geldon 2003.

Figure A-1.34. *Madison aquifer groundwater flow and potentiometric surface, modified after WWDC 2009.*

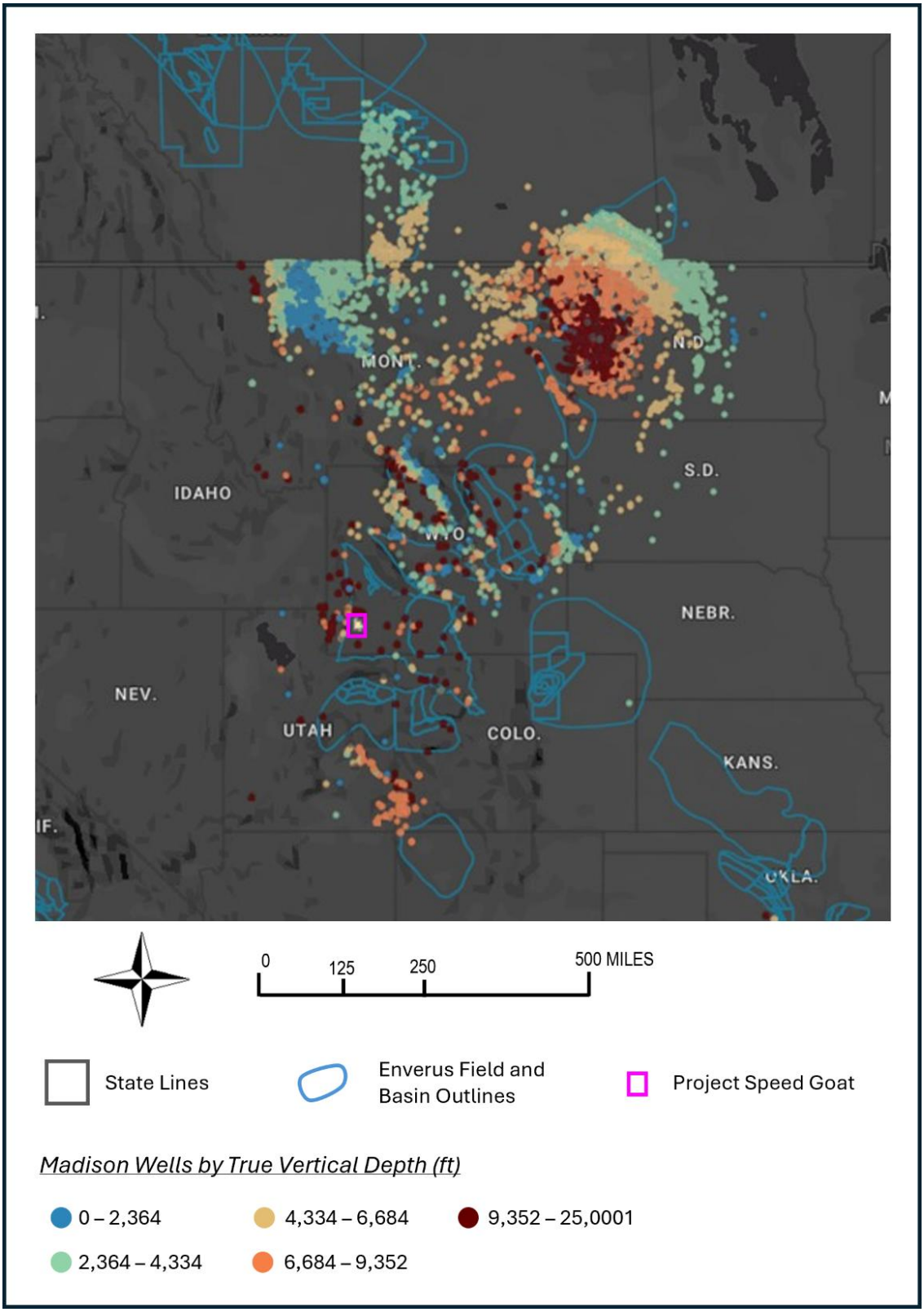


Figure A-1.35. *Aerial extent of the Madison Formation, as defined by well data.*

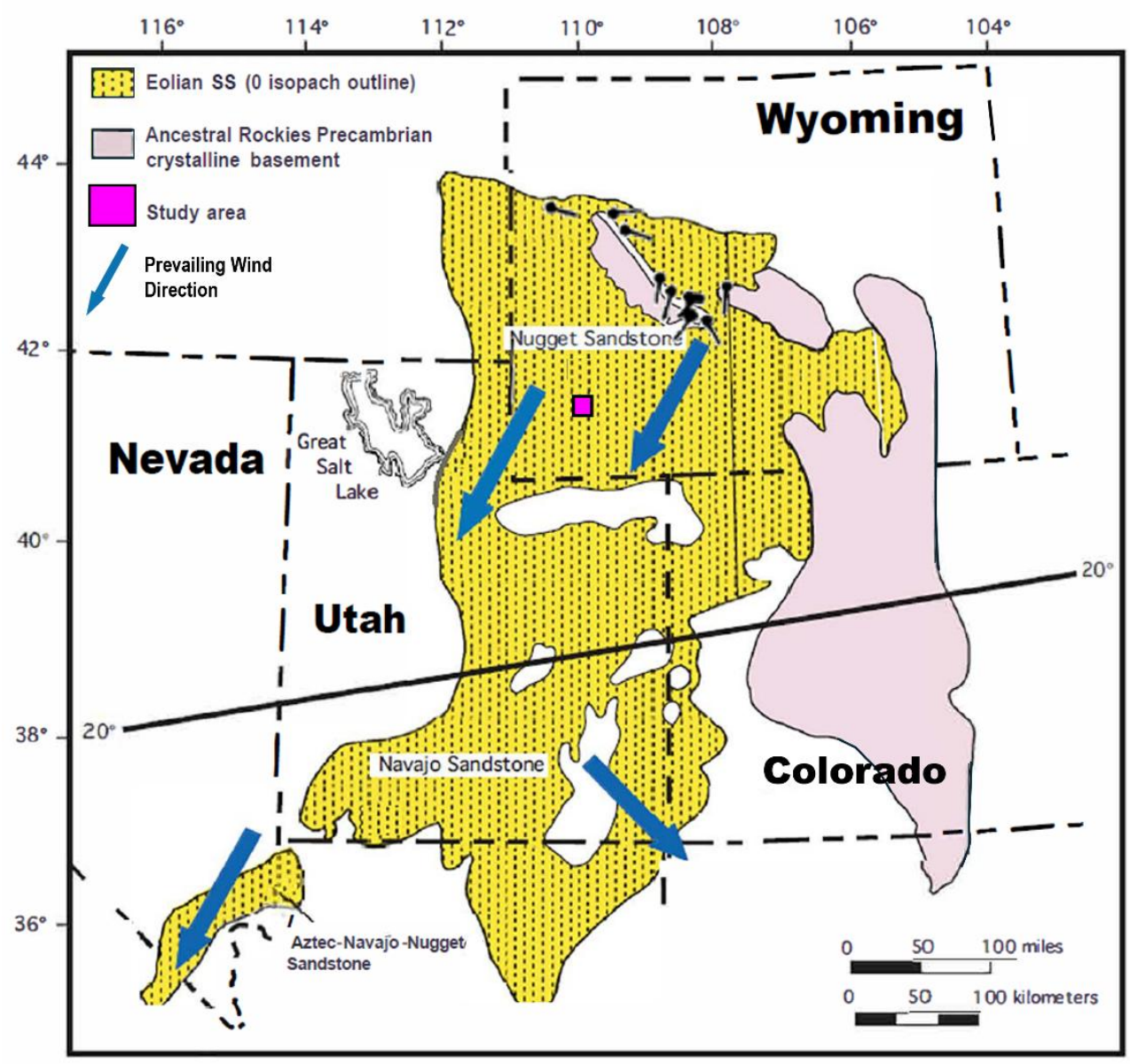


Figure A-1.36. *Extent of the Nugget Formation, Agrawal 2019.*

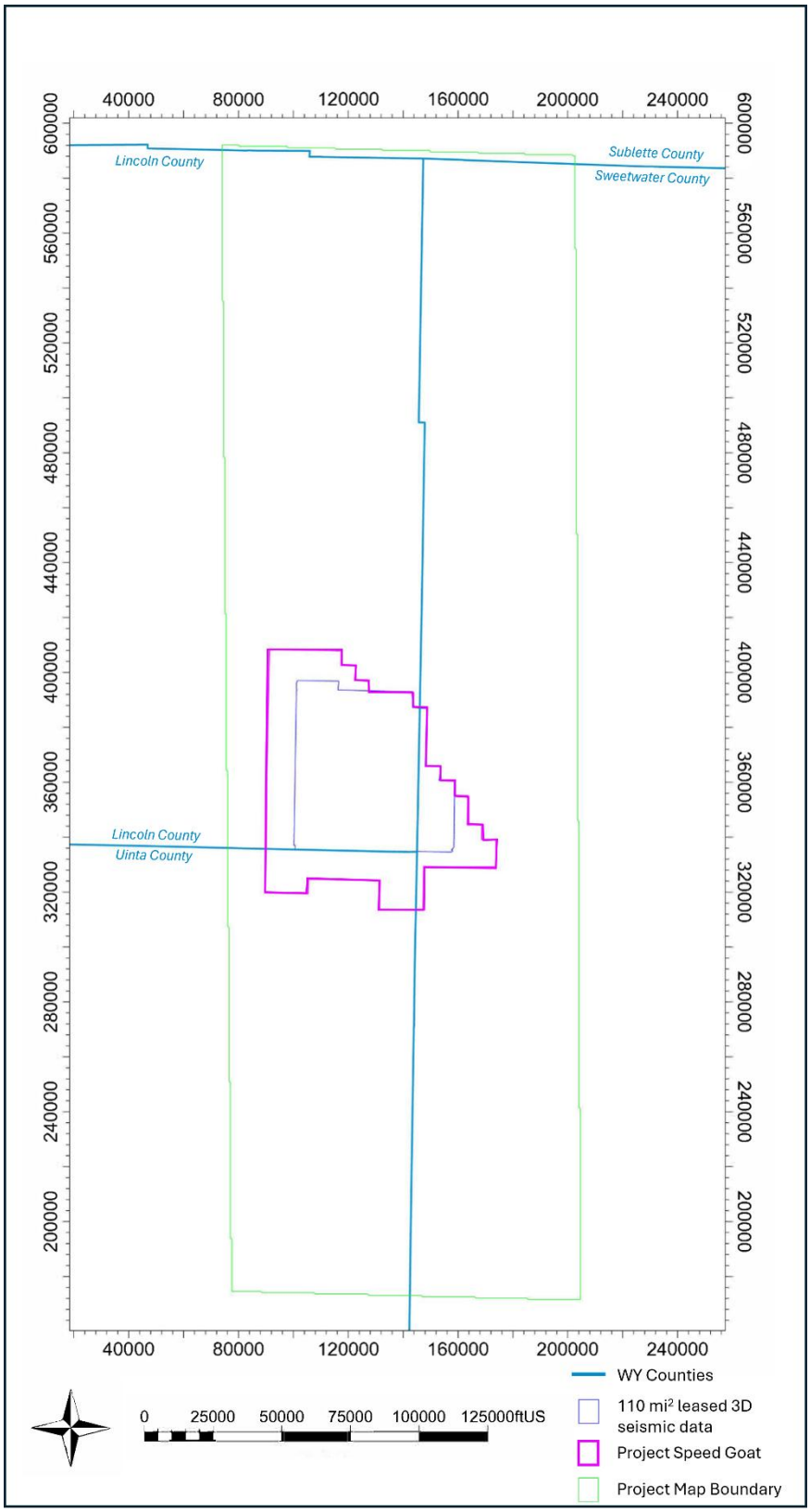


***Figure A-1.37**. Regional mapping outline relative to PSG and the 3-D seismic area.*

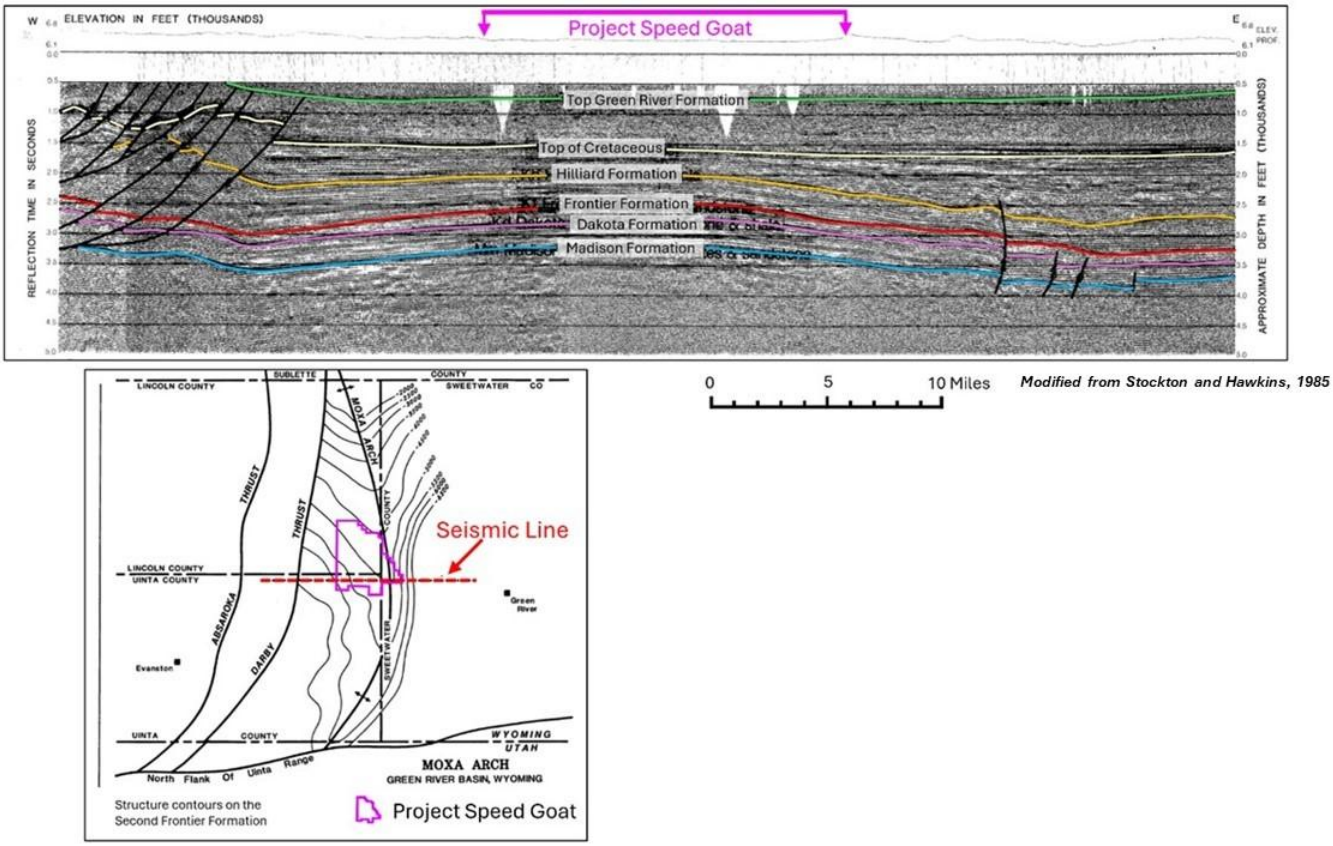


Figure A-1.38. *Regional seismic line and Second Frontier structure map (Stockton and Hawkins, 1985).*

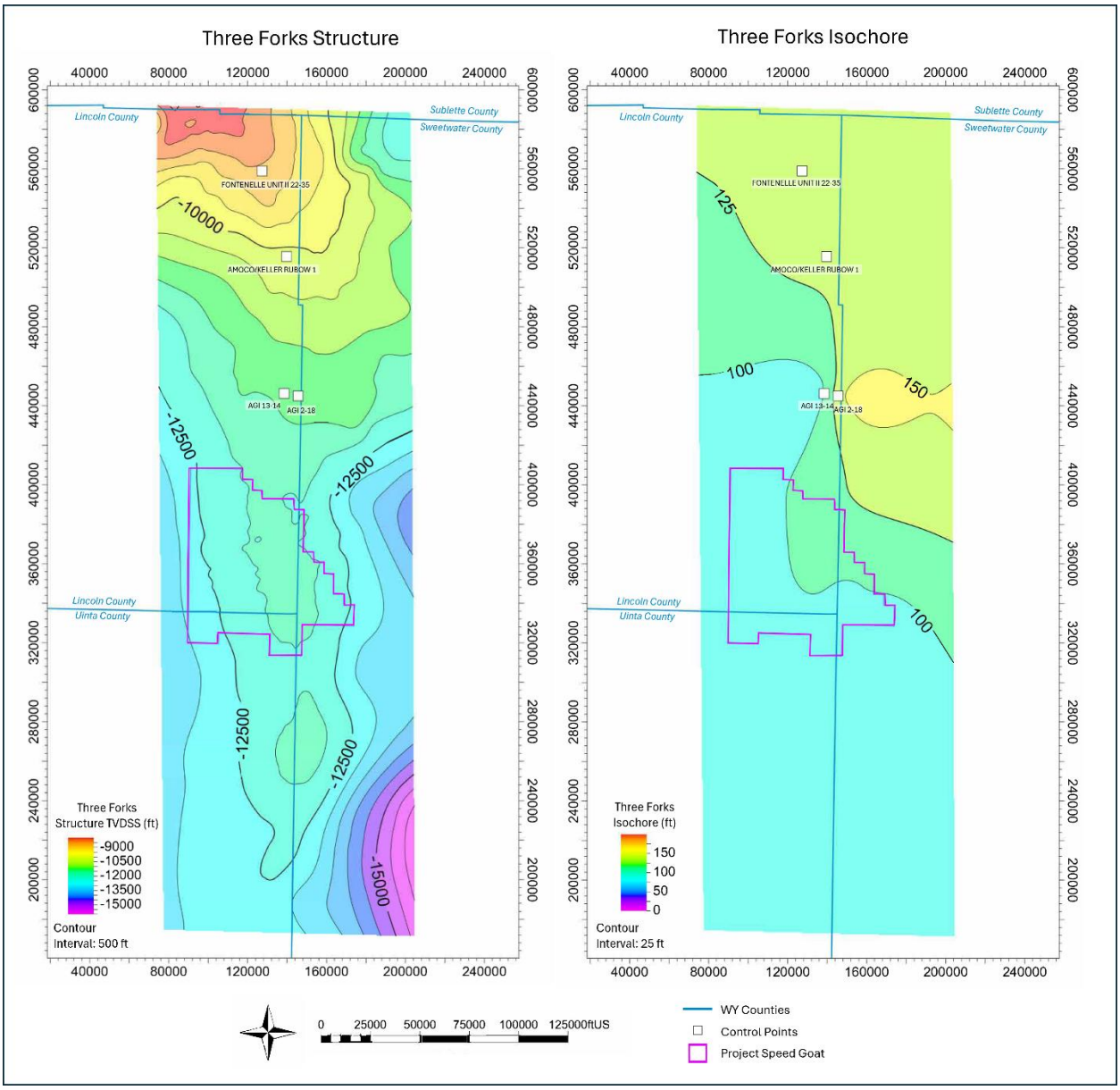


Figure A-1.39. *Three Forks Formation (lower confining zone to the Madison injection zone) structure and isochore maps.*

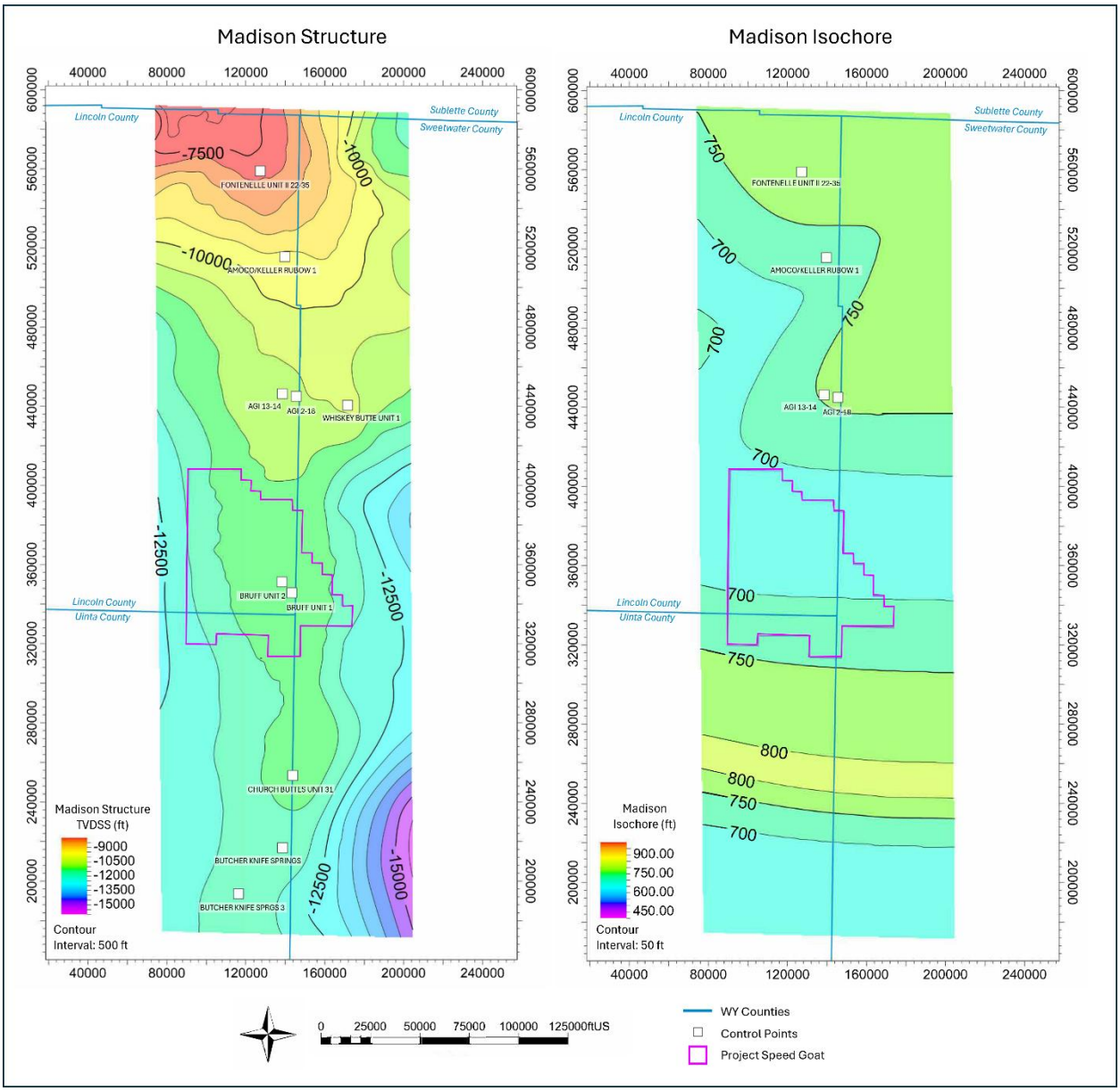


Figure A-1.40. *Madison Formation structure and isochore maps.*

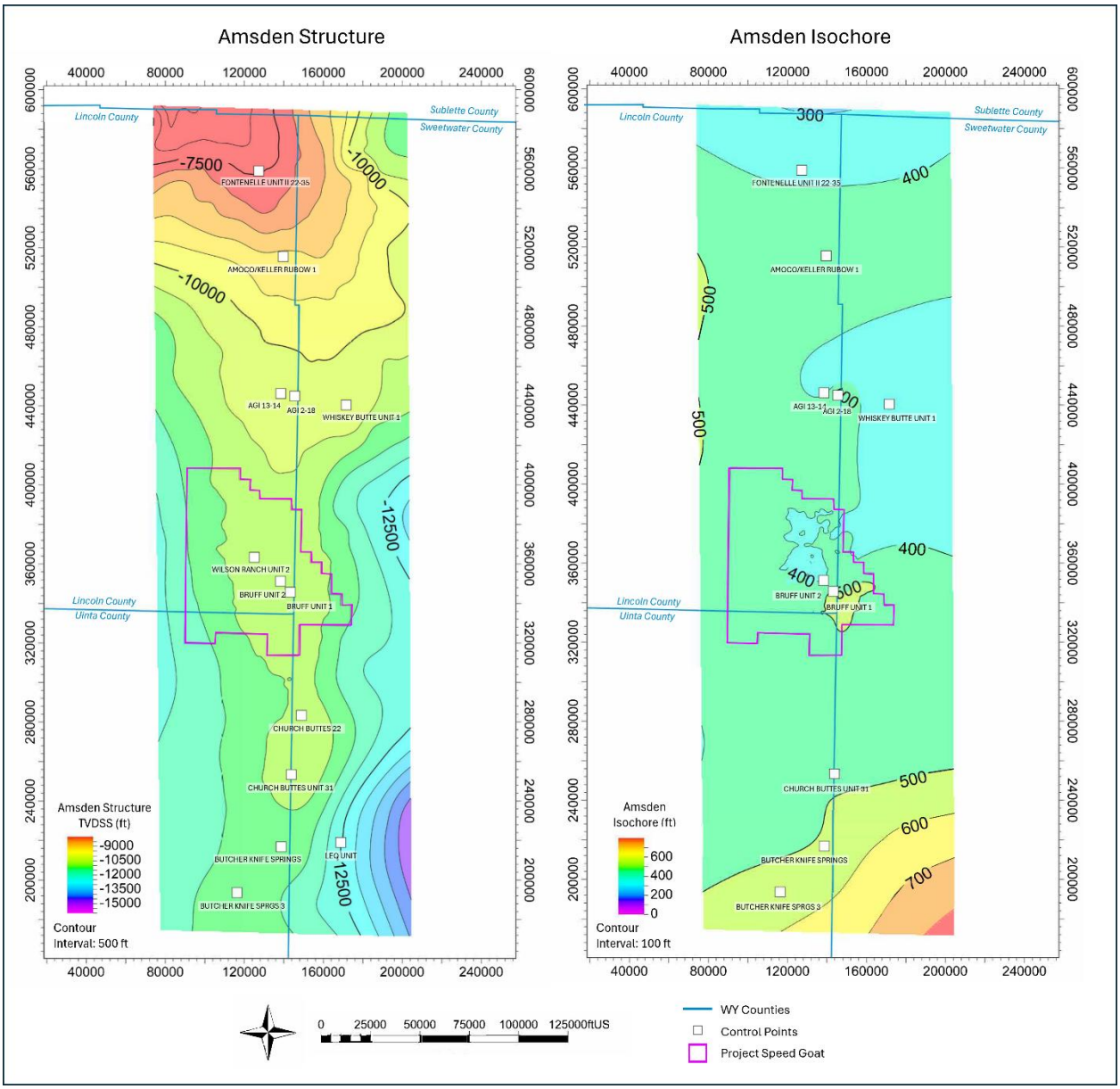


Figure A-1.41. *Amsden Formation structure and isochore maps.*

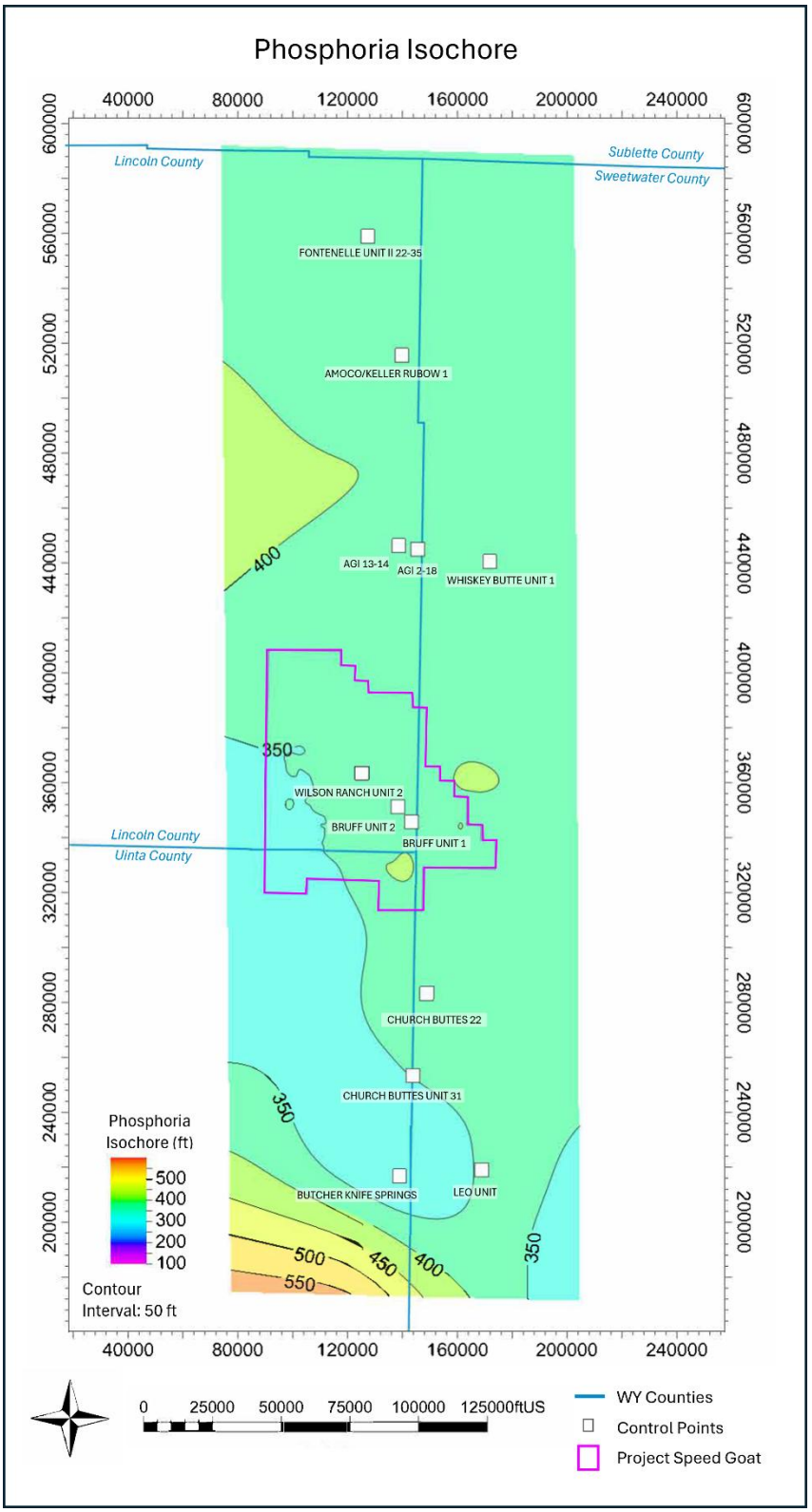


Figure A-1.42. *Phosphoria (secondary upper confining zone) isochores.*

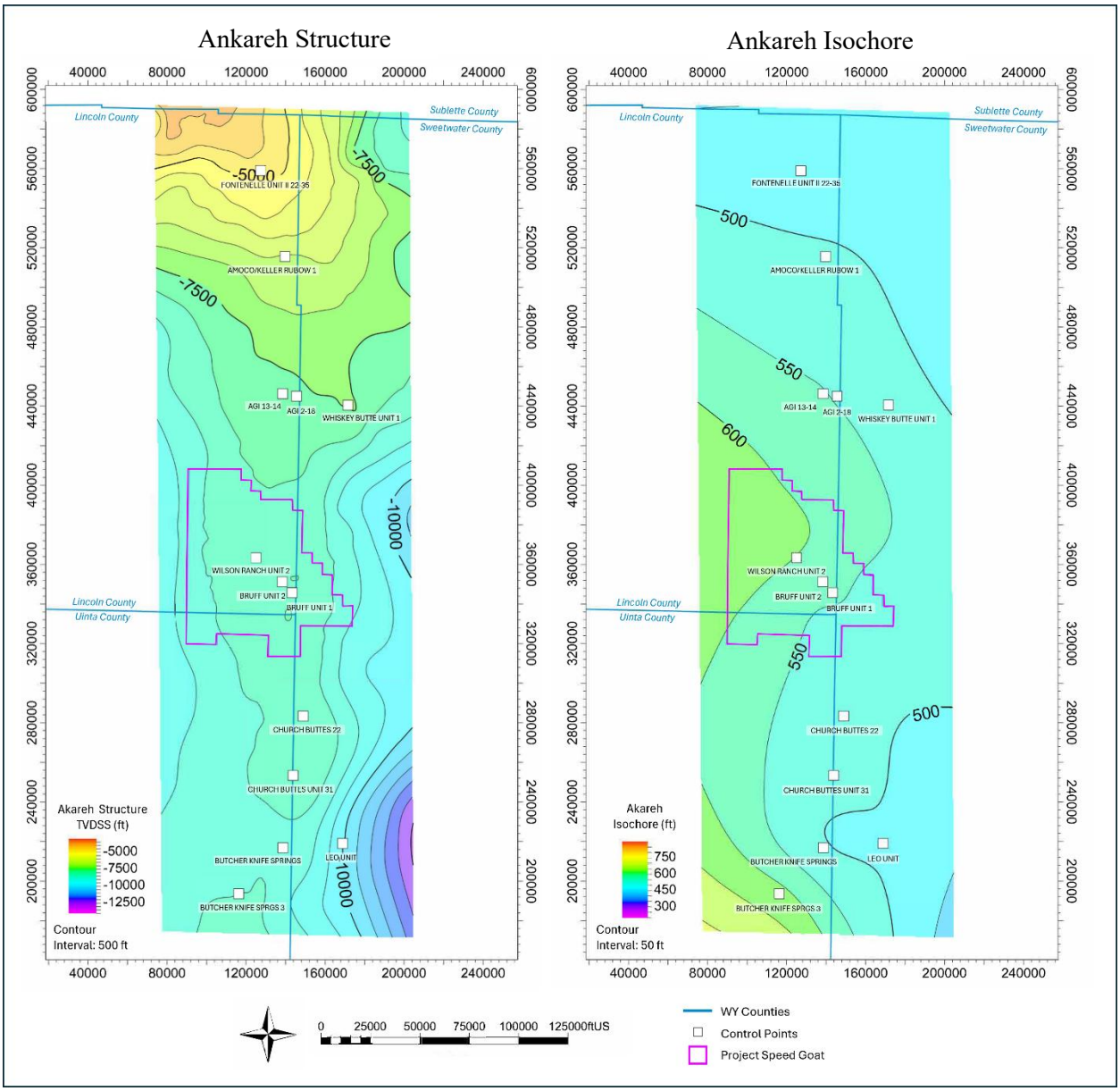


Figure A-1.43. *Ankareh Formation (lower confining zone to the Nugget injection zone) structure and isochore maps.*

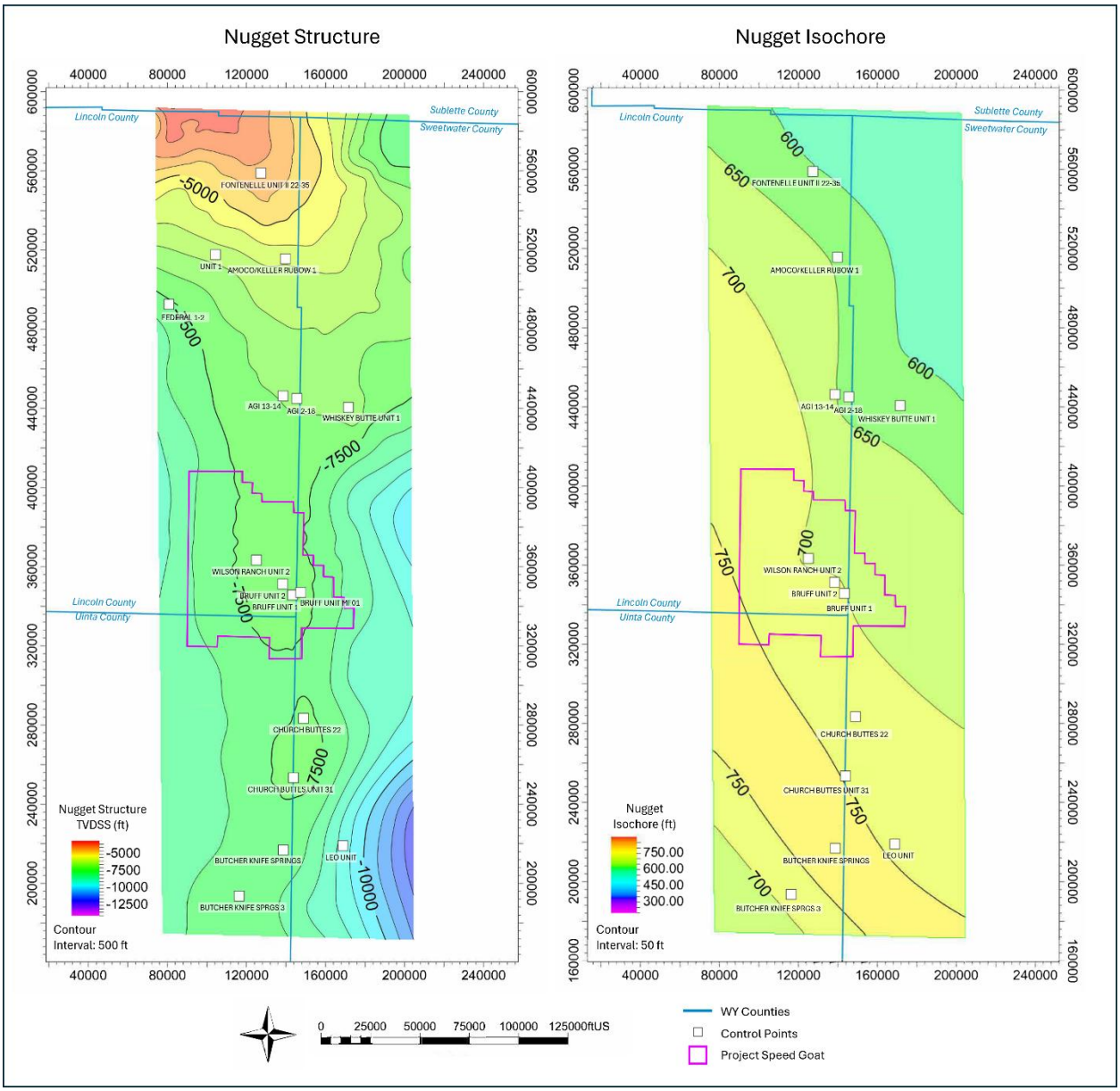


Figure A-1.44. *Nugget Formation structure and isochore maps.*

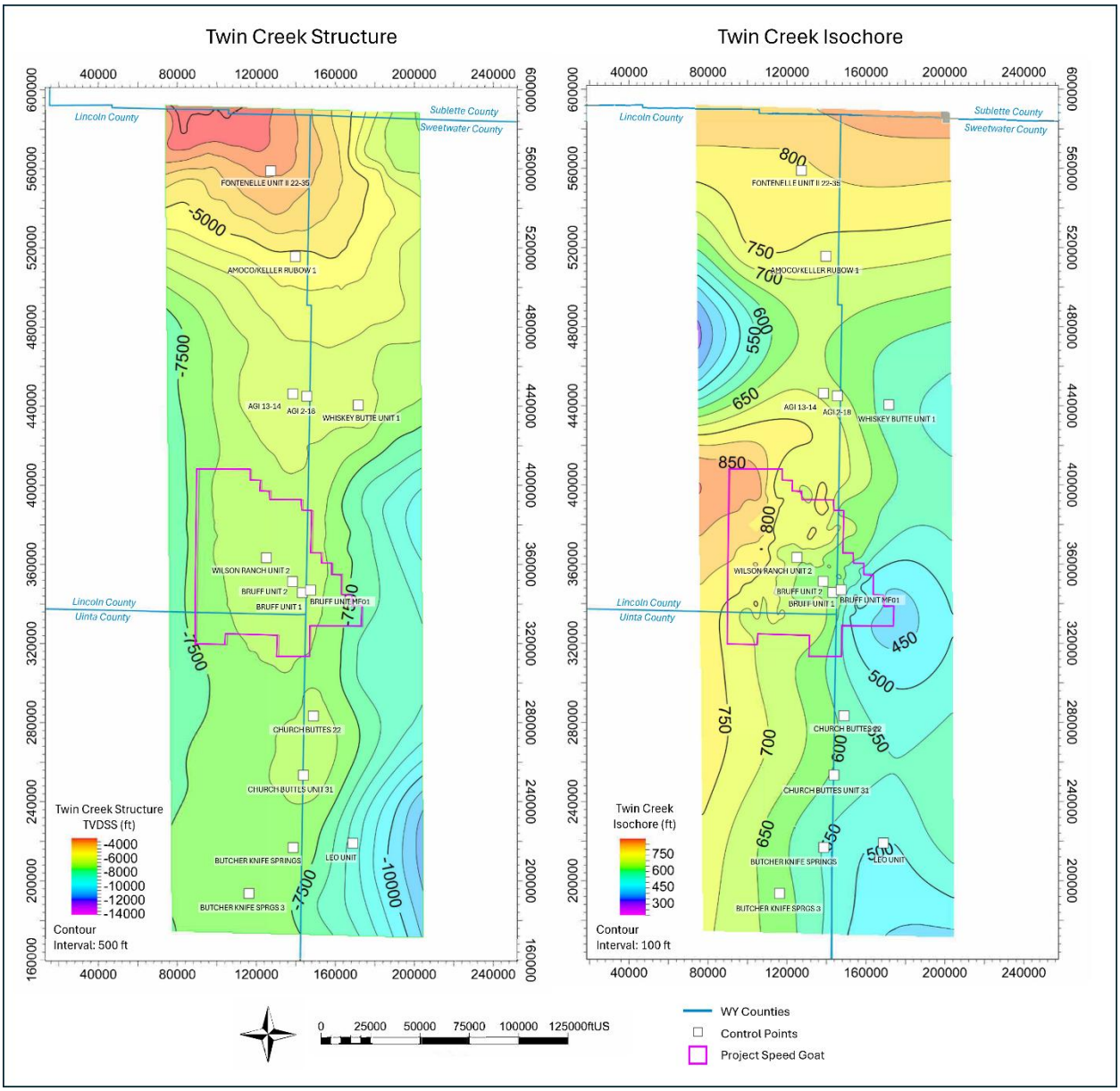


Figure A-1.45. *Twin Creek Formation (upper confining zone to the Nugget injection zone) structure and isochore maps.*

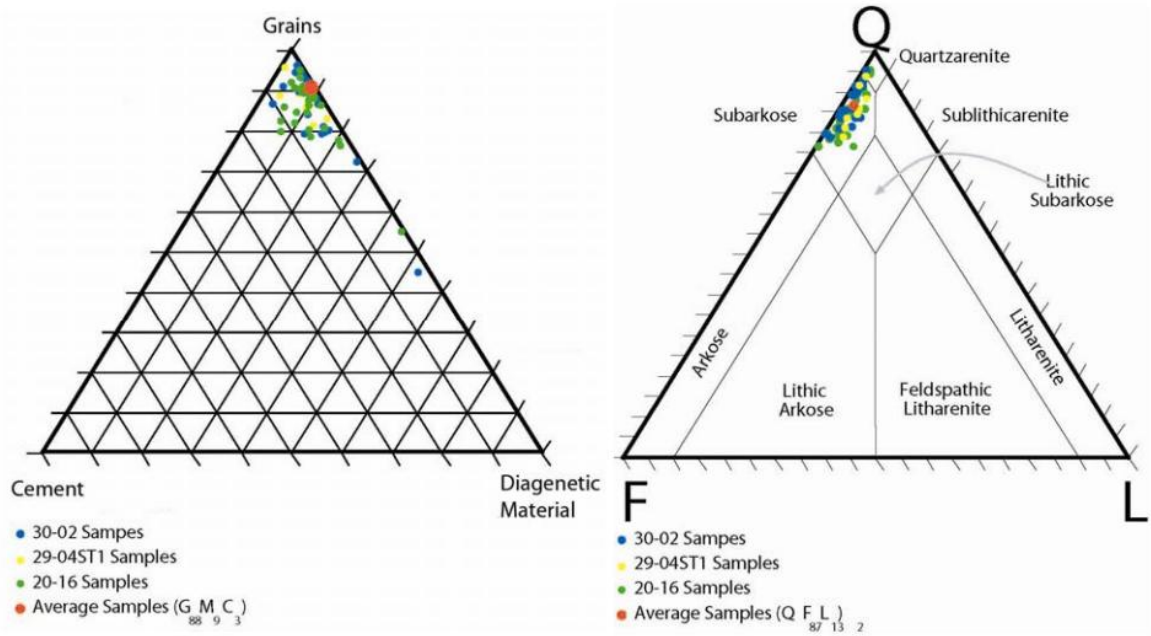


Figure A-1.46. *Ternary diagrams per Keele and Evans (2008) show the Nugget to be grain dominated and a subarkose. Petrographic analysis based on Gazzi-Dickinson point counting method of 58 thin sections. Samples were taken from Anschutz Ranch, southwest of PSG.*

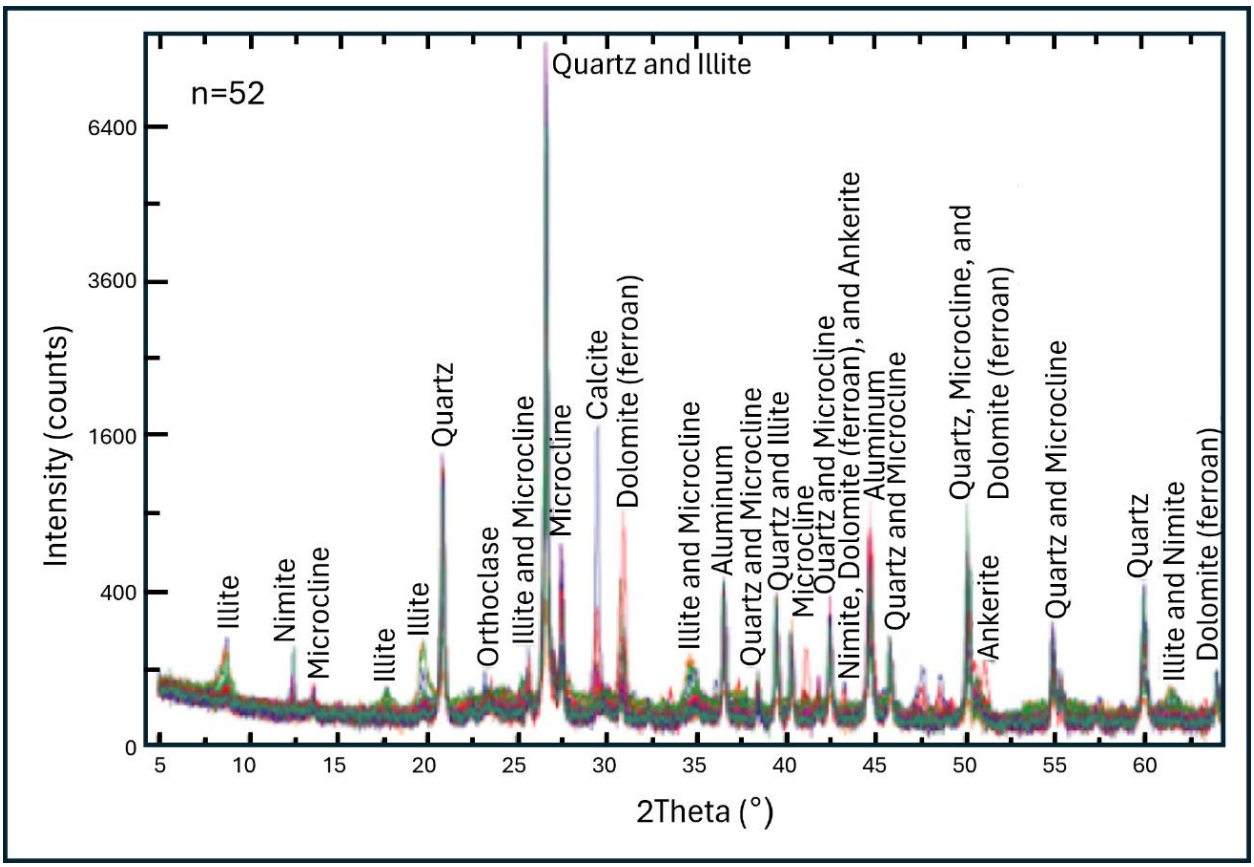


Figure A-1.47. *XRD results for Nugget Sandstone from Keele and Evans (2008). Microcline is the dominant feldspar and ferrodolomite is the dominant carbonate cement.*

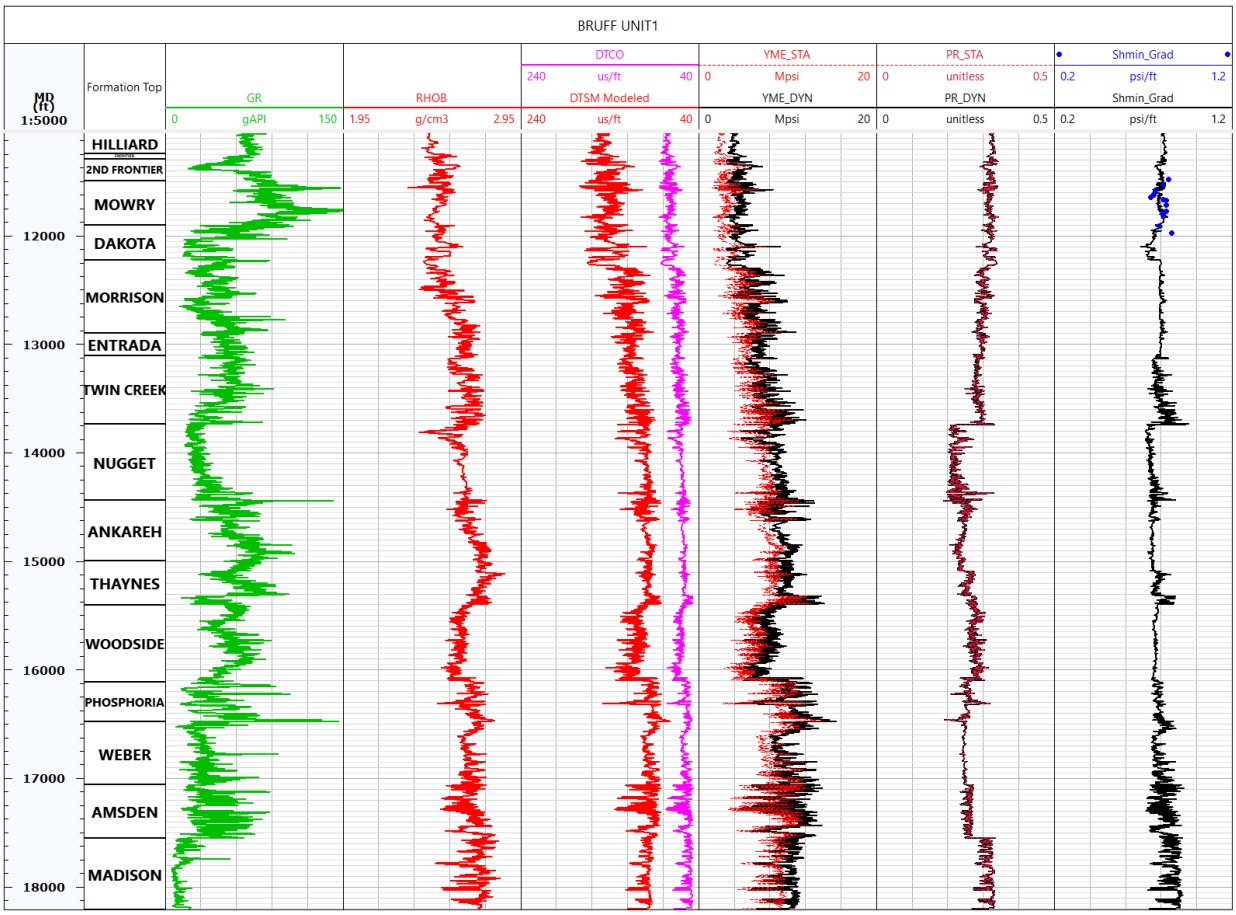


Figure A-1.48. *Geomechanical properties for Bruff Unit 1. Track 1: Formation top; Track 2: gamma ray (0-150); Track 3: RHOB (1.95-2.95 g/cc); Track 4: compressional and synthetic shear slowness (240-40 µs/feet); Track 5: dynamic (black) and static (red) Young's modulus (0-20 Mpsi); Track 6: dynamic (black) and static (red) Poisson's ratio (0-0.5); Track 7: minimum horizontal stress profile in black curve and calibration data in blue dots (Cipolla et al., 1994) (0.4-0.9 psi/feet).*

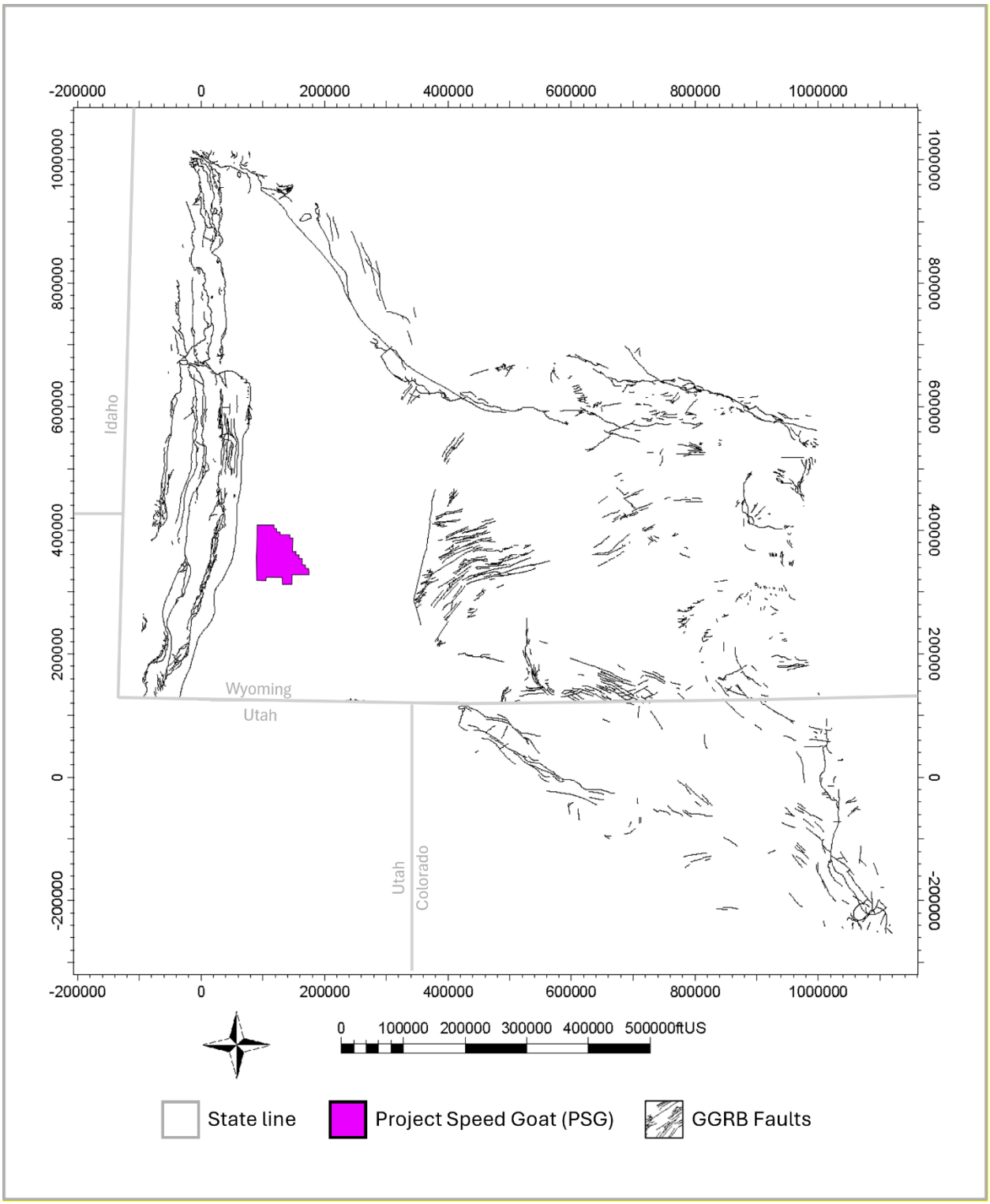


Figure A-1.49. *Faults of the GGRB (modified after WSGS, USGS Geologic Map of Wyoming, Love and Christiansen, 1985).*

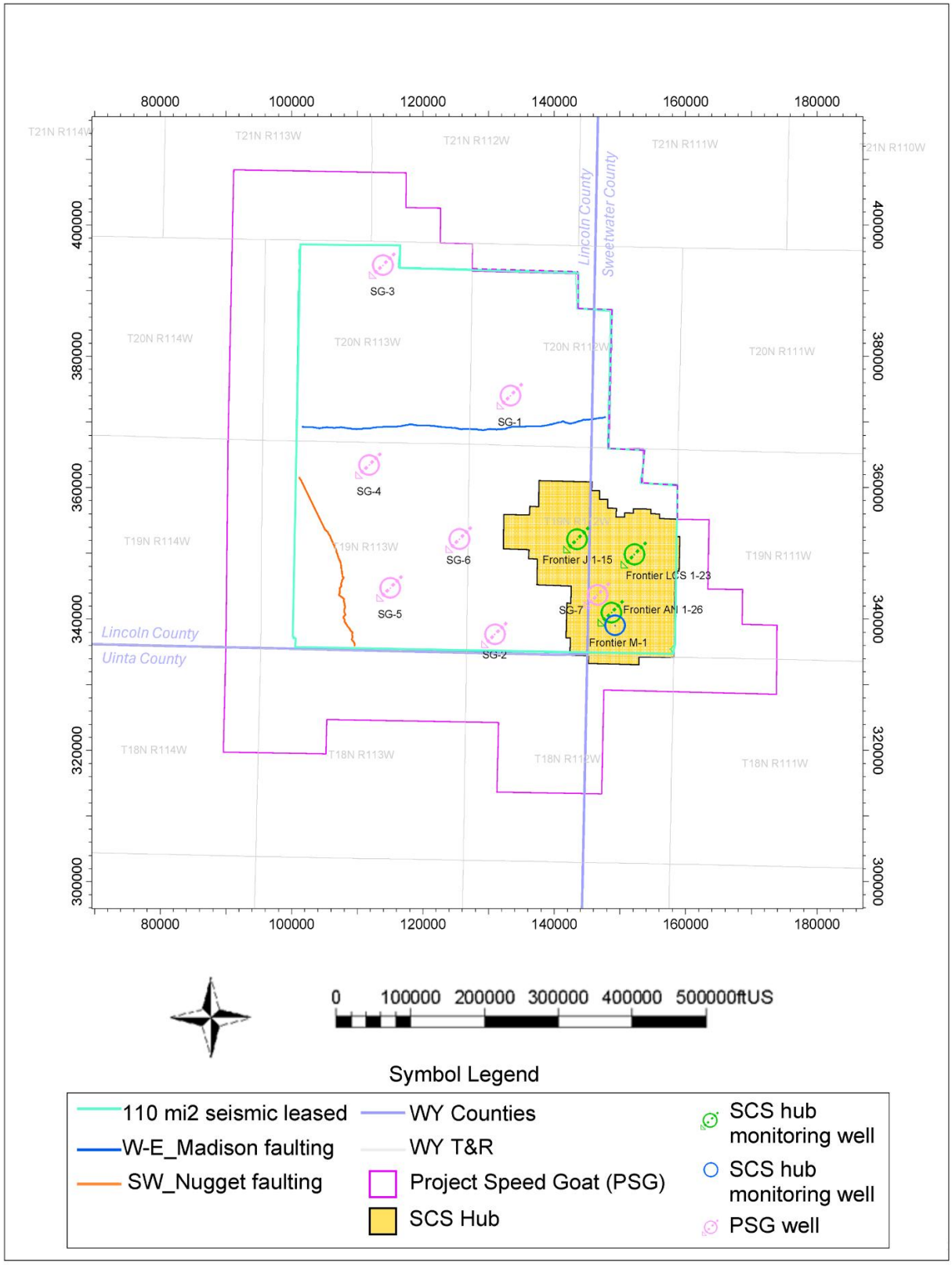


Figure A-1.50. *Pertinent faults identified on the seismic data and planned well locations for the SCS Hub (approved) and the PSG expansion area.*

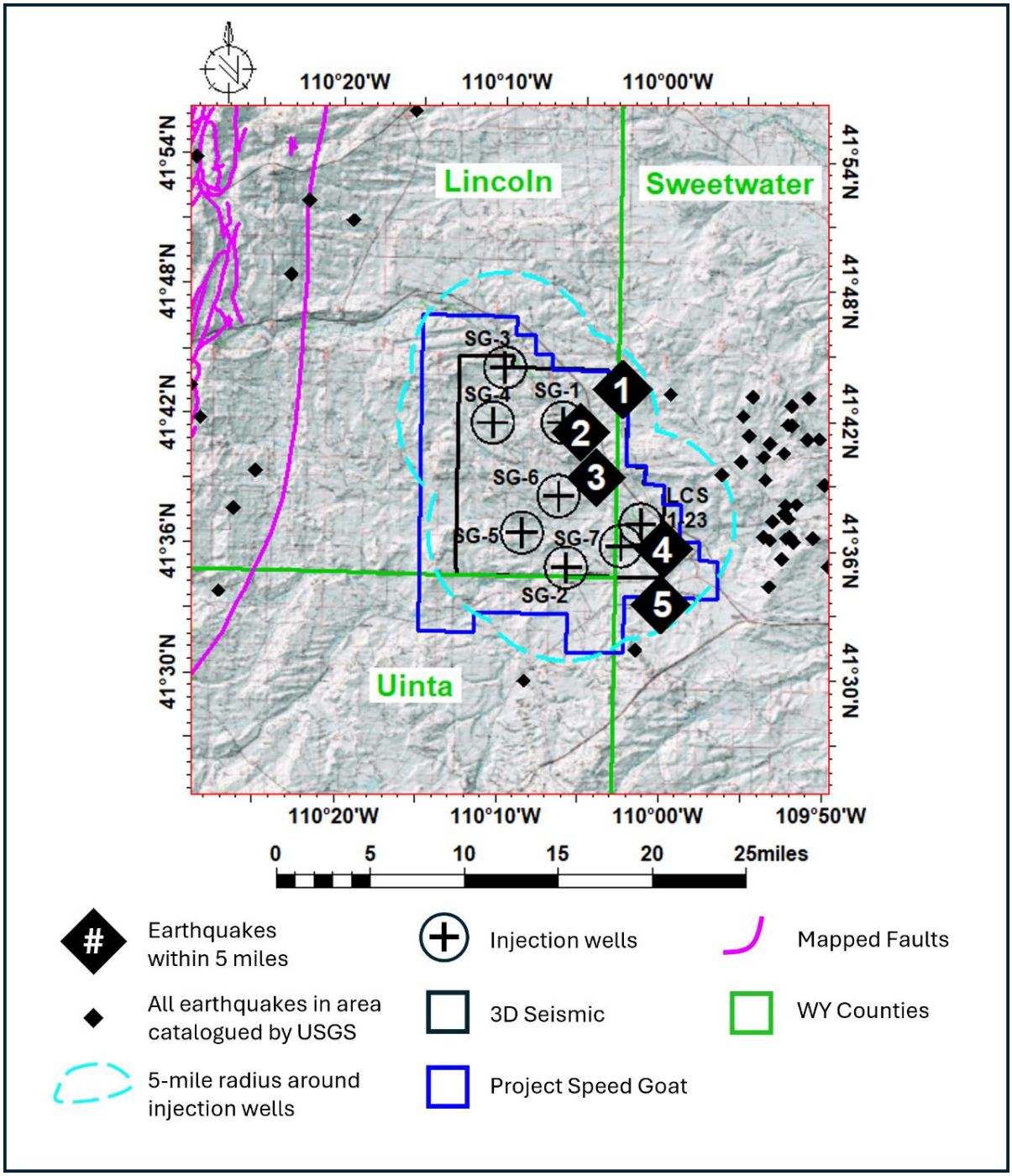


Figure A-1.51. *Historical Earthquakes (USGS Earthquake Hazards Program 2024) near injection wells recorded by USGS since 1975 (WSGS GIS Data-Geology, 2024).*

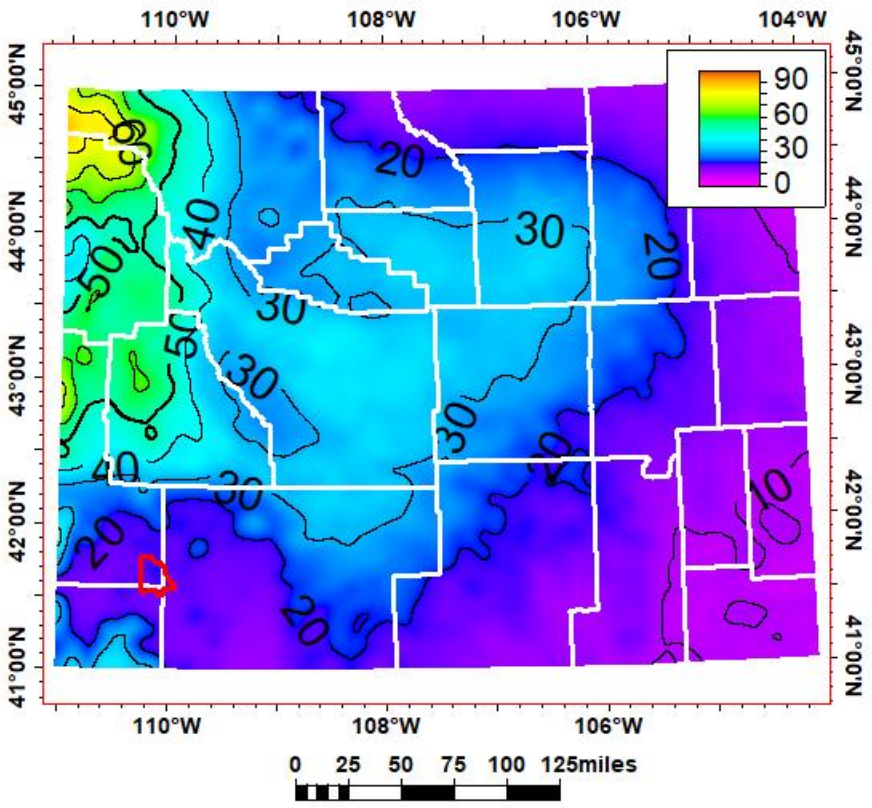


Figure A-1.52. *Seismic hazard distribution for Wyoming, the contours represent the percent chance of potentially damaging ground motion (MMI=VI) through 2123. The red polygon is PSG. County lines are shown in white. Data per USGS, 2023.*

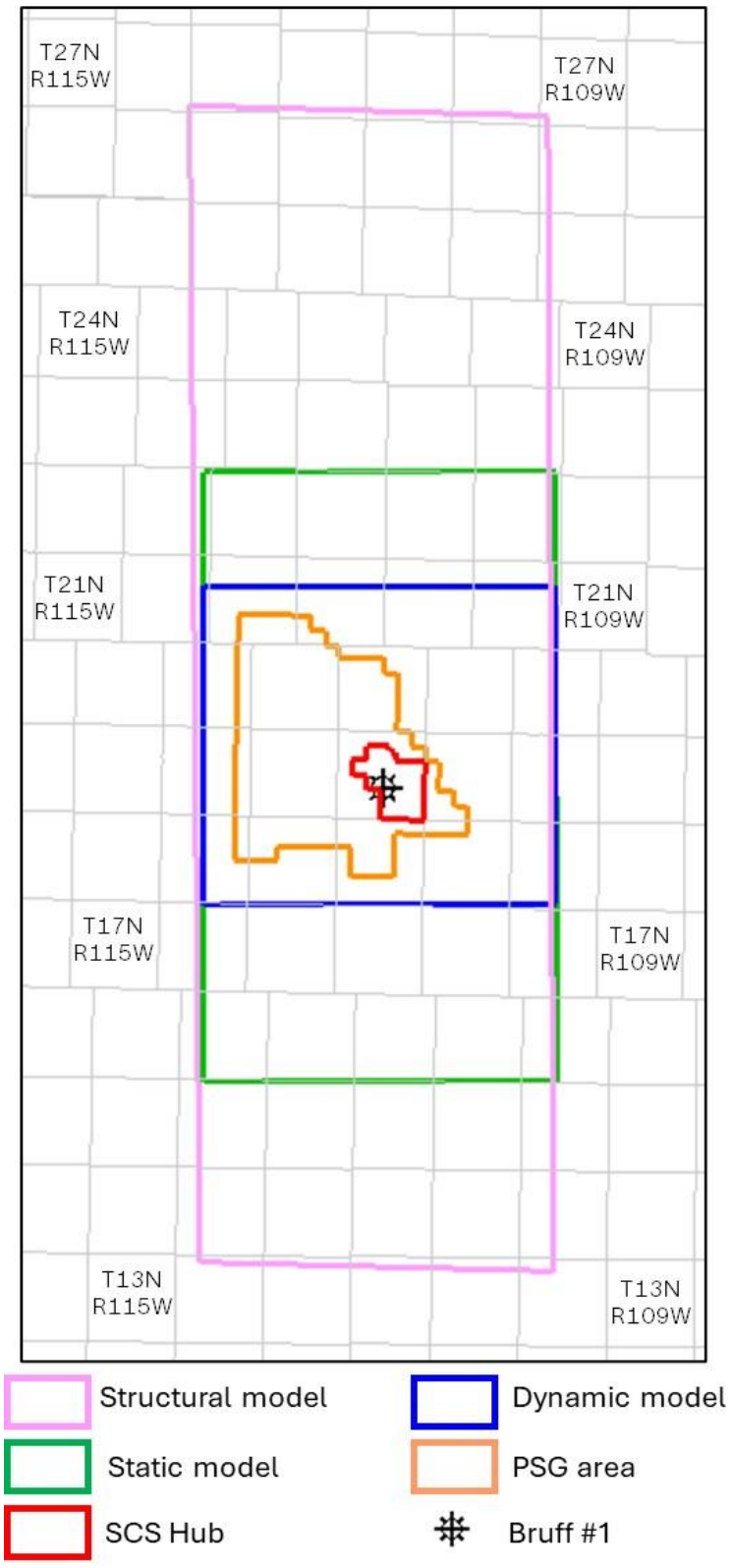


Figure A-1.53. *Model polygons, PSG area, SCS Hub and Bruff 1 well.*

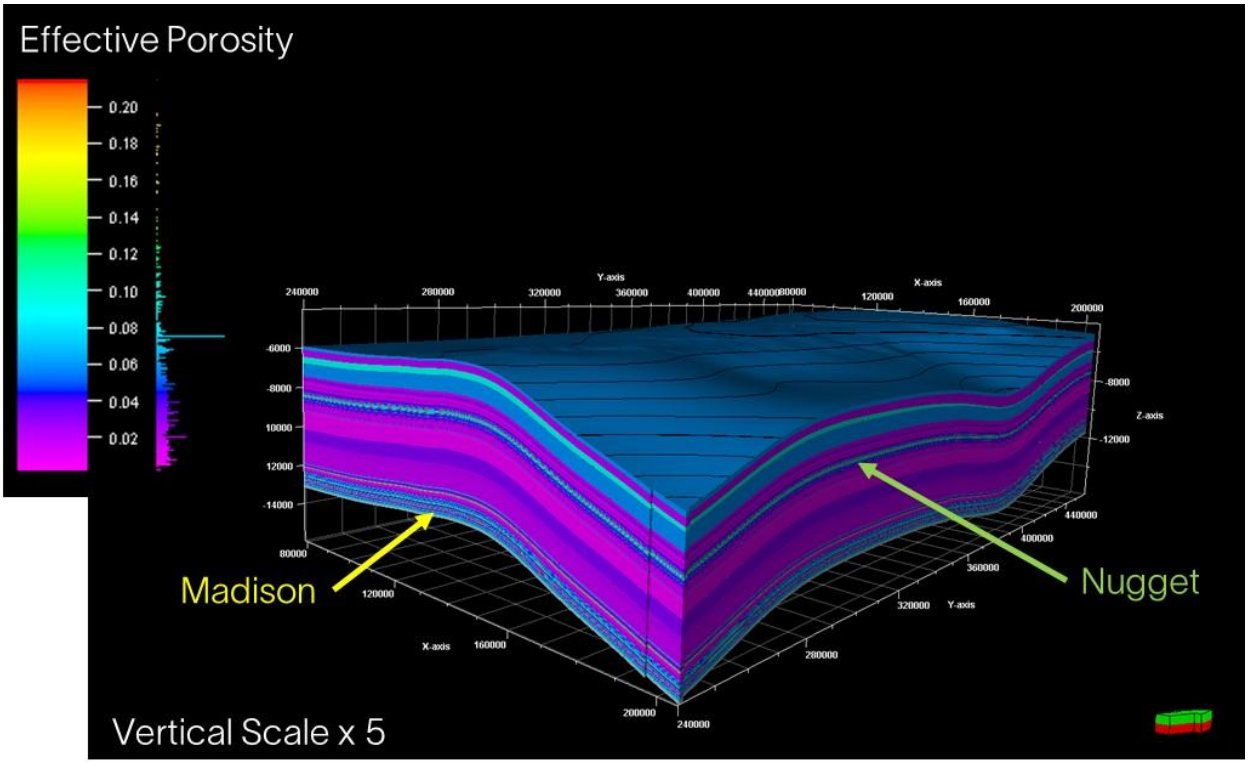


Figure A-1.54. *Effective porosity model.*

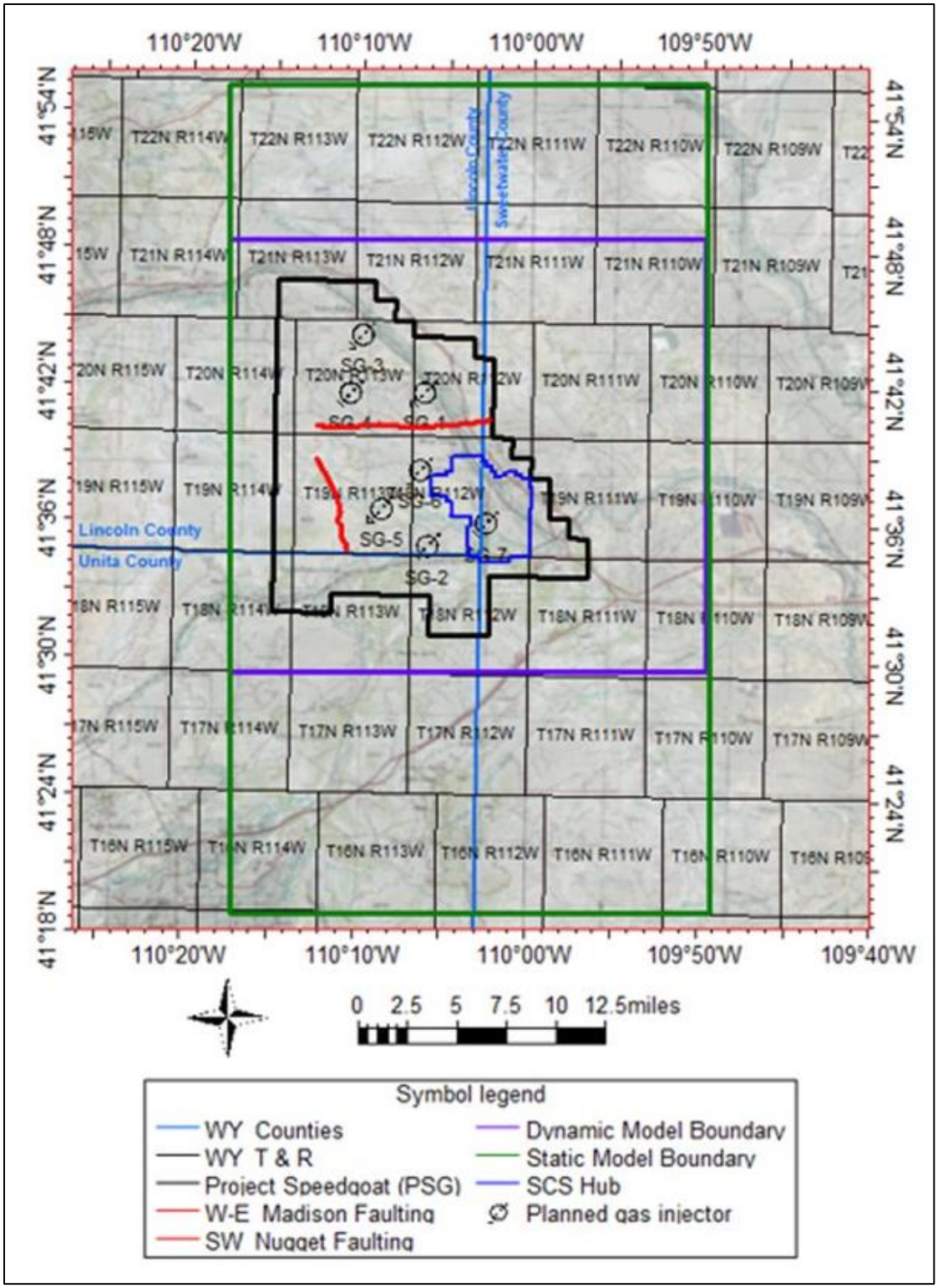


Figure A-1.55. *Location of PSG injector wells and PSG static and dynamic model boundaries.*

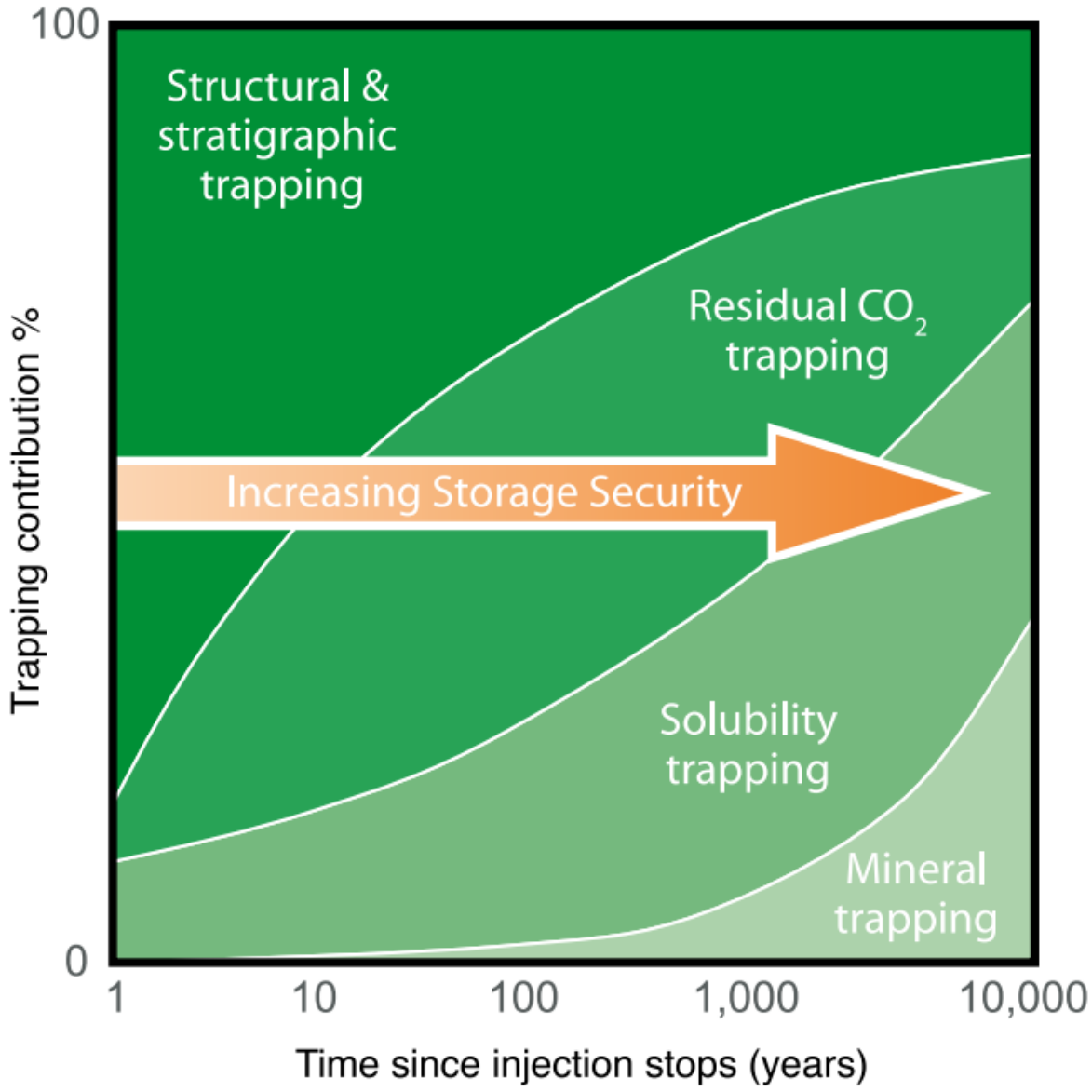


Figure A-1.56. *Trapping mechanisms act across different timescales (Intergovernmental Panel on Climate Change, 2005, p. 208).*

FORM A-2
AREA OF REVIEW

TABLE OF CONTENTS

2.0 Area of Review (AoR) Delineation 1

2.0.1 AoR Overview 1

2.0.2 Written Description 1

2.0.3 Surface and Subsurface Features within the PSG AoR 2

2.1 Model 4

2.1.1 Conceptual Site Model 4

2.1.2 Computational Model 7

2.1.2.1 Computational Modeling Assumptions 7

2.1.2.2 Computational Modeling Processes 8

2.1.2.3 Dynamic Model 12

2.1.2.3.1 Dynamic Model Dimensions 12

2.1.2.3.2 Rock-Fluid Relative Permeability 13

2.1.2.3.3 Porosity and Permeability 16

2.1.2.4 Boundary Conditions 21

2.1.2.5 Initial Conditions 21

2.1.2.5.1 Injection Well Assumptions 23

2.1.2.5.2 CO_2 Injection Scenario 26

2.1.3 Computational Model Results 26

2.1.3.1 Simulated Injectivity 26

2.1.3.2 CO_2 Plume and Associated Pressure Front AoRs 34

2.1.3.3 Model Uncertainties and AoR Re-evaluation 48

2.1.4 Model Calibration and Validation 48

2.1.4.1 Sensitivity Analysis 48

2.1.5 AoR Delineation 75

2.1.5.1 Critical Pressure Calculation 75

2.1.6 Corrective Action Evaluation 76

2.1.7 Protection of USDWs 77
2.2 Area of Review and Corrective Action 79
2.2.1 Corrective Action Plan 79
2.3 Reevaluation of the AoR and Corrective Action Plan 79
2.4 References 80

TABLES

Table A-2.1 Investigated and Identified Surface and Subsurface Features in the PSG AoR ... 3
Table A-2.2 PSG Area of Review Oil and Gas Well Information.....Appendix A-2
Table A-2.3 Seismic Horizons Used for Structural Framework 6
Table A-2.4 Static Model Zones and Layers 6
Table A-2.5 Parameters for Temperatures 99-300°C, 1-600 bar, Spycher and Pruess (2010), temperature in Kelvin 10
Table A-2.6 Model Parameters for Multiphase Fluid Modeling of Geologic Sequestration ...11
Table A-2.7 Madison Bottomhole Pressure Constraint and Fracture Pressure at Injection Site 27
Table A-2.8 Nugget Bottomhole Pressure Constraint and Fracture Pressure at Injection Site 27
Table A-2.9 Average Injection Rate (Metric Tons/Yr) 29
Table A-2.10 Maximum and Average Maximum Tubing Head Pressure (THP) for PSG Wells 33
Table A-2.11 Computational Simulation Sensitivity Parameters 49
Table A-2.12 Input Parameters Used in the EPA Methodology 76
Table A-2.13 PSG AoR Wellbores that Penetrate the Storage Complex 77
Table A-2.14 Lithology, Thickness and Petrophysical Properties of the Upper and Lower Confining Zones for the Nugget and Madison Injection Zones 79

FIGURES

Figure A-2. 1 Map showing the PSG AoR, CO_2 plumes at cessation, stabilized CO_2 plumes at 1-year post-injection, and AoR plus a 1-mile buffer. Note that the CO_2 stabilized plumes at end of monitoring and at 1 year post-injection directly overlap as they are the same size 2

Figure A-2.2 Model polygons, PSG area, SCS Hub and Bruff 1 well 5

Figure A-2.3 Effective porosity model 7

Figure A-2.4 Location of PSG injector wells, monitor wells, and static and dynamic model boundaries 8

Figure A-2.5 PSG dynamic model boundaries 13

Figure A-2.6 Nugget relative permeability curves digitized from Li, et.al.(a) and a zoomed in section (b) (2016) 14

Figure A-2.7 Madison analog, sample Redwater Luc, relative permeability curves digitized from Bennion and Bachu (2010) 15

Figure A-2.8 Madison capillary curve was digitized and scaled from Akbarabadi and Piri (2015). 16

Figure A-2.9 Plot of porosity versus permeability from the dynamic model 17

Figure A-2.10 East-to-west cross section of porosity in dynamic model) 17

Figure A-2.11 Porosity northwest to southeast cross section across pressure AoR 18

Figure A-2.12 North-to-south cross section of permeability in dynamic model 19

Figure A-2.13 Permeability northeast-to-southwest cross section across pressure AoR 20

Figure A-2.14 Pressure variation with depth with literature data from Table A-1.19 22

Figure A-2.15 Temperature variation with depth considering an elevation of 6,435 feet above sea-level 22

Figure A-2.16 Wells SG-1, SG-2, SG-3, and SG-4 logs showing proposed Nugget perforations, porosity, and permeability 23

Figure A-2.17 Wells SG-5 and SG-6 logs showing proposed Nugget perforations, porosity, and permeability 24

Figure A-2.18 Wells SG-1, SG-2, SG-3, and SG-4 logs showing proposed Madison perforations, porosity, and permeability 25

Figure A-2.19 Wells SG-5, SG-6, and SG-7 logs showing proposed Madison perforations, porosity, and permeability 25

Figure A-2.20 CO_2 injection scenario timeline of PSG wells and SCS Hub wells 26

Figure A-2.21 BHP over time. Well SG-7 only injects into the Madison..... 28

Figure A-2.22 Individual well injection rate over time 29

Figure A-2.23 Madison reservoir pressure over time 30

Figure A-2.24 Madison reservoir pressure differential over time..... 30

Figure A-2.25 Nugget reservoir pressure over time 31

Figure A-2.26 Nugget reservoir pressure differential over time..... 31

Figure A-2.27 Tubing head pressure over time..... 33

Figure A-2.28 Cumulative injection over time 33

Figure A-2.29 Field aqueous, mobile vapor and immobile vapor trapping mechanisms over time..... 34

Figure A-2.30 Nugget CO_2 plumes of PSG wells at 1- , 5-year of injection, and at injection cessation. SCS Hub Nugget CO_2 plumes are also present. Nugget structural contour interval is 250 feet..... 35

Figure A-2.31 Nugget pressure front at 1-, 5-year of injection and at injection cessation. Nugget structural contour interval is 250 feet..... 36

Figure A-2.32 Madison CO_2 plumes at 1-, 5-year of injection and at injection cessation. Madison structural contour interval is 250 feet..... 37

Figure A-2.33 Madison pressure front plumes at 1-, 5-year of injection and at injection cessation. Madison structural contour interval is 250 feet 38

Figure A-2.34 Madison and Nugget CO2 plume cross section at plume stabilization..... 39

Figure A-2.35 Nugget CO_2 plumes at 1 year, 20 years, and 50 years post injection. Note the CO_2 plumes are the same size and directly overlap each other. Nugget structural contour interval is 250 feet..... 40

Figure A-2.36 Nugget pressure front at 1 year, 20 years, 50 years, and 100 years post injection. Nugget structural contour interval is 250 feet..... 41

Figure A-2.37 Nugget pressure front at 100 years post injection; pressure contour interval is 5 psi; structural contour interval is 250 feet..... 42

Figure A-2.38 Madison CO_2 plumes at 1 year, 20 years, and 50 years post injection. Note that the CO_2 plumes are the same size and directly overlap each other. Madison structural contour interval is 250 feet..... 44

Figure A-2.39 Madison pressure front at 1 year, 20 years, and 50 years, and 100 years post injection; Madison structural contour interval is 250 feet 45

Figure A-2.40 Largest CO_2 plumes in the Nugget, largest CO_2 plumes in the Madison, largest pressure front in the Nugget and largest pressure front) in the Madison. Madison structural contour interval is 250 feet 46

Figure A-2.41 Delineated PSG AoR and AoR plus 1-mile boundaries 47

Figure A-2.42 Nugget CO_2 plume results for porosity multiplier and permeability transform sensitivity. Nugget structural contour interval is 250 feet 50

Figure A-2.43 Madison CO_2 plume results for porosity multiplier and permeability transform sensitivity. Madison structural contour interval is 250 feet 51

Figure A-2.44 Nugget pressure plume results for porosity multiplier and permeability transform sensitivity. Nugget structural contour interval is 250 feet 32

Figure A-2.45 Madison pressure front and AoR results for porosity multiplier and permeability transform sensitivity. Madison structural interval is 250 feet 53

Figure A-2.46 Nugget CO_2 plume results for kv/kh ratio sensitivity. Nugget structural contour interval is 250 feet 55

Figure A-2.47 Nugget pressure front results for kv/kh ratio sensitivity. Nugget structural contour interval is 250 feet. 56

Figure A-2.48 Madison CO_2 plume results for kv/kh ratio sensitivity; Madison structural contour interval is 250 feet 57

Figure A-2.49 Madison pressure front and AoR results for kv/kh ratio sensitivity. Madison structural contour interval is 250 feet 58

Figure A-2.50 Nugget CO_2 plume results for imbibition critical gas saturation sensitivity. Nugget structural contour interval is 250 feet 60

Figure A-2.51 Nugget pressure front results for imbibition critical gas saturation sensitivity. Note: Nugget structural contour interval is 250 feet 61

Figure A-2.52 Madison CO_2 plume results for imbibition critical gas saturation sensitivity. Madison structural contour interval is 250 feet 62

Figure A-2.53 Madison pressure front and AoR results for imbibition critical gas saturation sensitivity. Madison structural contour interval is 250 feet 63

Figure A-2.54 Nugget CO_2 plume results for Nugget maximum gas relative permeability sensitivity. Nugget structural contour interval is 250 feet 65

Figure A-2.55 Nugget pressure front and AoR results for Nugget maximum gas relative permeability sensitivity. Nugget structural contour interval is 250 feet 66

Figure A-2.56 Madison CO_2 plume results for Madison maximum gas relative permeability sensitivity. Madison structural contour interval is 250 feet 68

Figure A-2.57 Madison pressure front and AoR results for Madison maximum gas relative permeability sensitivity. Madison structural contour interval is 250 feet 69

Figure A-2.58 Nugget CO_2 plume results for fault transmissibility multiplier sensitivity. Nugget structural contour interval is 250 feet..... 71

Figure A-2.59 Nugget pressure front results for fault transmissibility multiplier sensitivity. Nugget structural contour interval is 250 feet..... 72

Figure A-2.60 Madison CO_2 plume results for fault transmissibility multiplier sensitivity Madison structural contour interval is 250 feet 73

Figure A-2.61 Madison pressure front and AoR results for fault transmissibility multiplier sensitivity. Note: Madison structural contour interval is 250 feet..... 74

FRONTIER CARBON SOLUTIONS
PROJECT SPEED GOAT
CARBON SEQUESTRATION UIC CLASS VI APPLICATION

FORM A-2, AREA OF REVIEW
Water Quality Rules, Chapter 24 Sections 10 and 13

2.0 Area of Review (AoR) Delineation

2.0.1 AoR Overview

Per WQR Chapter 24 Section 2(c), the Area of Review (AoR) is defined as the subsurface three-dimensional (3-D) extent of the carbon dioxide (CO_2) plume, associated pressure front, displaced fluids, and the overlying formations and surface area above that delineated region. The predicted AoRs (CO_2 plume and pressure-based) are delineated based on the results from the reservoir model. The predicted AoR will encompass the larger extent of either the plume-based or pressure-based area, and will be used to identify, investigate surface and subsurface features that could potentially be affected by project operations.

2.0.2 Written Description

This application is for CO_2 injection in the deeper Madison for the first 20 years followed by injection into the Nugget for 20 years. Therefore, it was necessary to carry out the injection and CO_2 movement in one reservoir simulation model of both the reservoirs to determine the Project Speed Goat (PSG) AoR. In both the Madison and Nugget reservoirs, the CO_2 plume boundaries were delineated by identifying a gas saturation greater than or equal to 2% in the injection zones at plume stabilization. To identify the associated pressure front AoR, the critical pressure for each injection interval was calculated. Critical pressure is the pressure necessary to potentially cause fluid flow from the injection zone into the formation matrix of a underground source of drinking water (USDW) (EPA, 2013 and Nicot, et al., 2008), as described in section ***2.1.5.1 Critical Pressure Calculation***. For the purposes of this discussion, pressure front will be used to reference the associated pressure front from the injection of CO_2 delineated by the calculated critical pressure.

The predicted AoR for the determination of surface and subsurface features and corrective action wells for investigation will comprise the larger extent of either (1) the CO_2 plumes, or (2) the pressure front. In some fields, the AoR is dominated by the pressure front, while in others, it is dominated by the CO_2 plume. In some, it is a combination of both. For this project, reservoir modeling indicates the AoR is determined by the Madison pressure front (corresponding to the critical pressure of 34.5) psi after 20 years of injection, when the pressure build-up is at its highest (**Figure A-2.1**). Based on the PSG site characterization and subsequent dynamic modeling, the Nugget and Madison reservoirs within this AoR have sufficient storage and geologic integrity to accommodate the injection of CO_2 over a 20-year period, followed by permanent sequestration. This evaluation also indicates the Twin Creek and Ankareh, and the Amsden and Three Forks, to be sufficient for the safe and secure containment and confinement above and below the injection zones, respectively, and to prevent vertical fluid movement and protect mineral and USDW formations. A detailed discussion of how the AoR was derived is provided in the following sections.

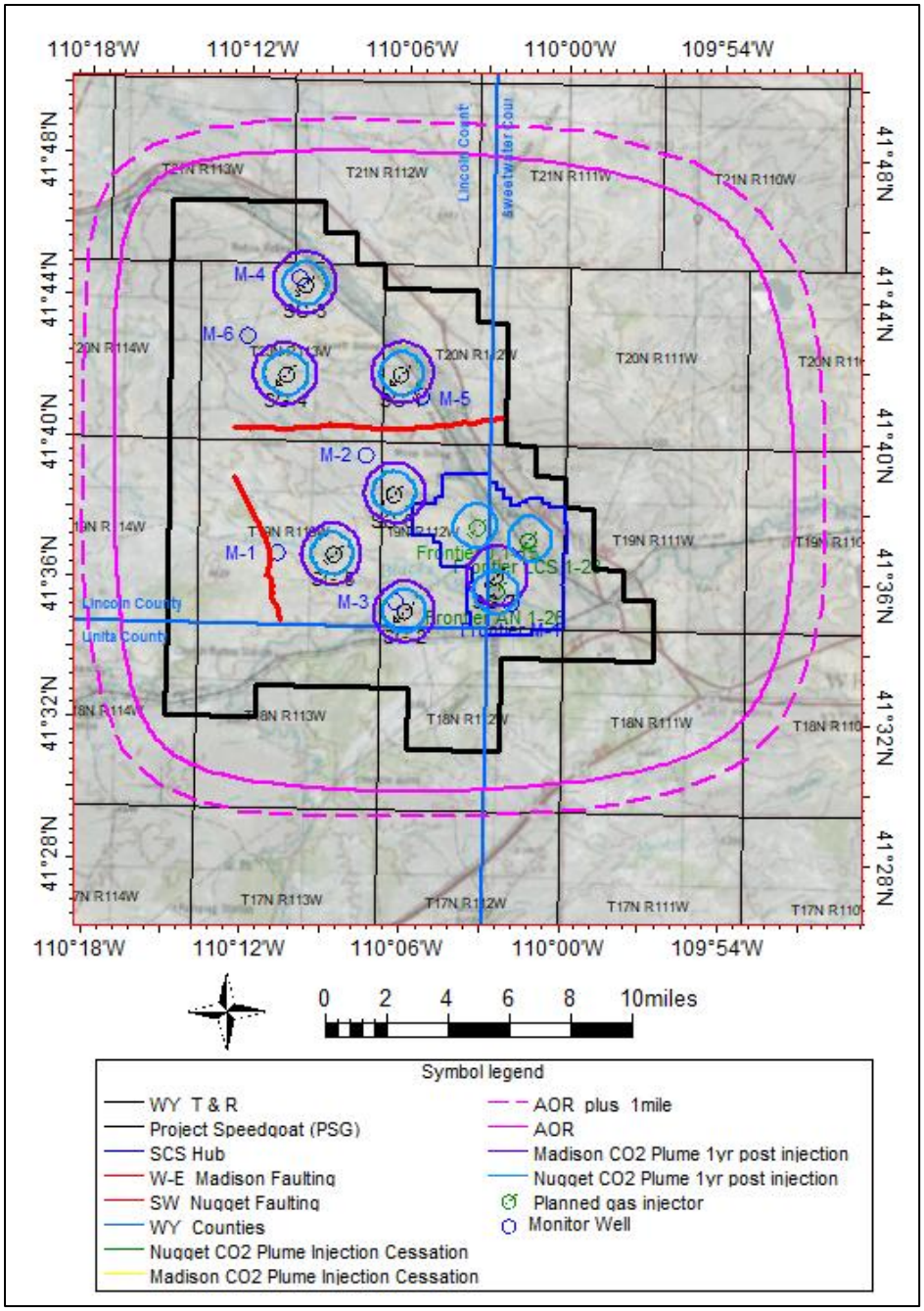


Figure A-2.1. *Map showing the PSG AoR, CO_2 plumes at cessation, stabilized CO_2 plumes at 1-year post-injection, and AoR plus 1-mile buffer. Note that the CO_2 stabilized plumes at end of monitoring and at 1 year post-injection directly overlap as they are the same size.*

2.0.3 Surface and Subsurface Features within the PSG AoR

Table A-2.1 includes a list of surface and subsurface features that were the considered as part of the Class VI application due diligence process. A map of all the features identified to be within the PSG AoR were investigated and can be found in ***Form A, Project Information*** **(Figure A.2,** and **Figure A.3)**. **Table A-2.2** includes a list of all oil, gas, and water wells within the PSG AoR and can be found in ***Appendix A-2***.

Table A-2.1. Investigated and Identified Surface and Subsurface Features in the PSG AoR			
Surface and Subsurface Features	**Investigated and Identified**	**Investigated but Not Found in AoR**	**Map**
Producing (active Wells)	✓		**Figure A.2**
Abandoned Wells	✓		**Figure A.2**
Plugged Wells or Dry Holes	✓		**Figure A.2**
Deep Stratigraphic Boreholes		✓	NA
Subsurface Cleanup Sites		✓	NA
Surface Bodies of Water	✓		**Figure A.2**
Other pertinent surface features, include structures intended for human occupancy.	✓		**Figure A.2**
Springs		✓	NA
Water Wells	✓		**Figure A.2**
Mines (surface and subsurface)	✓		**Figure A.2**
Quarries	✓		**Figure A.2**
Subsurface Structures (e.g., coal mines)	✓		**Figure A.2**
Location of Proposed Wells	✓		**Figure A.2**
Location of Proposed Cathodic Protection Boreholes		✓	NA
Any Existing Aboveground Facilities	✓		**Figure A.2**
Roads	✓		**Figure A.2**
State Boundary Lines		✓	NA
Indian Boundary Lines		✓	NA
Known or Suspected Faults	✓		**Figure A.2**
Other Pertinent Surface Features	✓		**Figure A.2**
All water quality management plan areas, wellhead protection areas, and source water protection areas.	✓		**Figure A.3**

2.1 Model

2.1.1 Conceptual Site Model

A conceptual layer-cake geologic (static model) was constructed for dynamic modeling of the CO_2 plume, associated pressure front, and displaced fluids. The static modeling process started with the construction of a regional 3-D structural framework in *Petrel 2022 (v.5.0)*. This framework covered an area of 1,920 mi^2 (**Figure A-2.2**) and used the following data sets:

- Well-formation tops
- 3-D seismic volume and velocity model

The well tops were imported and checked to ensure consistency. Inconsistent picks were discarded. Six horizons were interpreted and extracted from the seismic (**Table A-2.3**). These surfaces were re-gridded along with the formation tops to ensure the well data points were honored.

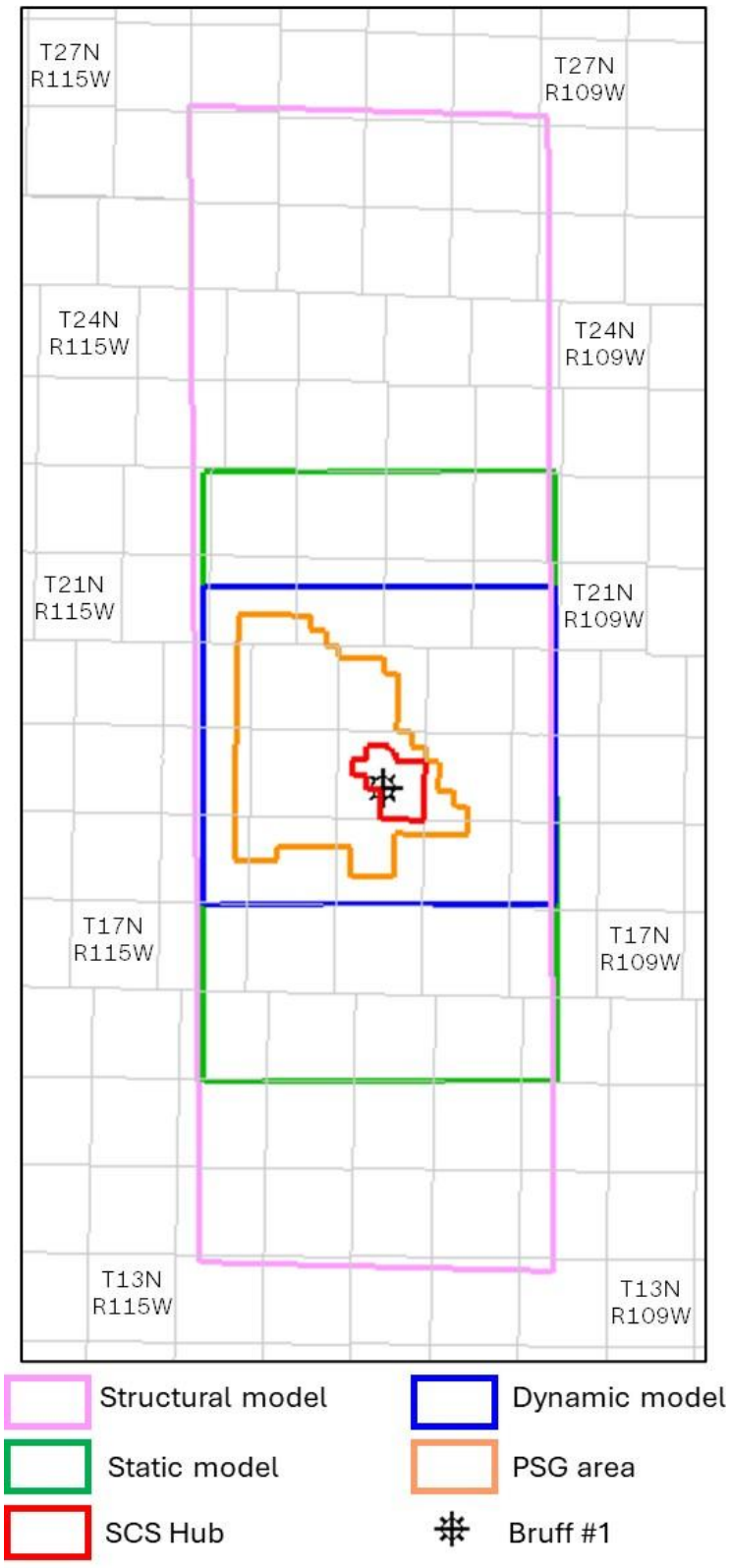


Figure A-2.2. *Model polygons, PSG area, SCS Hub and Bruff 1 well.*

Table A-2.3. Seismic Horizons Used for Structural Framework
2nd Frontier
Morrison
Nugget
Woodside
Phosphoria
Madison

The regional structural framework was then clipped to create the static model area that covers 1,008 mi^2, which includes PSG (489 mi^2). A simple grid was created using 16 structural conformable surfaces (**Table A-2-4**). The individual cell dimension was 250 feet x 250 feet horizontally, with an average layer thickness of ~10.6 feet. The layering was refined to 2.5 feet for the injection zones (Nugget and Madison) to allow for a more detailed distribution of the petrophysical properties. The total number of grid cells in the static model was 301,519,638 and was quality-checked to ensure modeling artifacts were not present. The static model was further cropped for dynamic simulation, as detailed below in the computational model section.

Table A-2.4. Static Model Zones and Layers			
Zone	**Average Thickness (feet)**	**Number Layers**	**Average Layer Thickness (feet)**
2nd Frontier	264	1	210
Mowry	522	1	472
Dakota	267	1	253
Morrison	703	1	703
Entrada	184	1	208
Twin Creek	654	20	32
Nugget	674	300	2.3
Ankareh	534	20	27
Thaynes	439	1	416
Woodside	701	1	703
Phosphoria	378	1	369
Weber	586	1	588
Amsden	451	20	21
Madison	841	280	2.7
Three Forks	96	20	5

Effective porosity and permeability values were derived from the Bruff Unit 1, which penetrated most of the Madison in the PSG area. The petrophysical properties were upscaled from this well and then populated into the entire model as a constant laterally. The raw logs were incorporated into the grid cells by an averaging method that varied by property. For

effective porosity, the arithmetic averaging was selected, and for sample selection, the "neighbor cell" method was used. In this method, values from all the cells that the wellbore penetrates, in the layer of interest, were averaged and the logs were treated as points. For permeability, arithmetic averaging was chosen, and sample selection was the same as effective porosity. Next, using the "Closest" algorithm the petrophysical property values were populated into the entire model area (**Figure A-2.3**). This static model with effective porosity and permeability properties was provided for reservoir simulation (dynamic modeling).

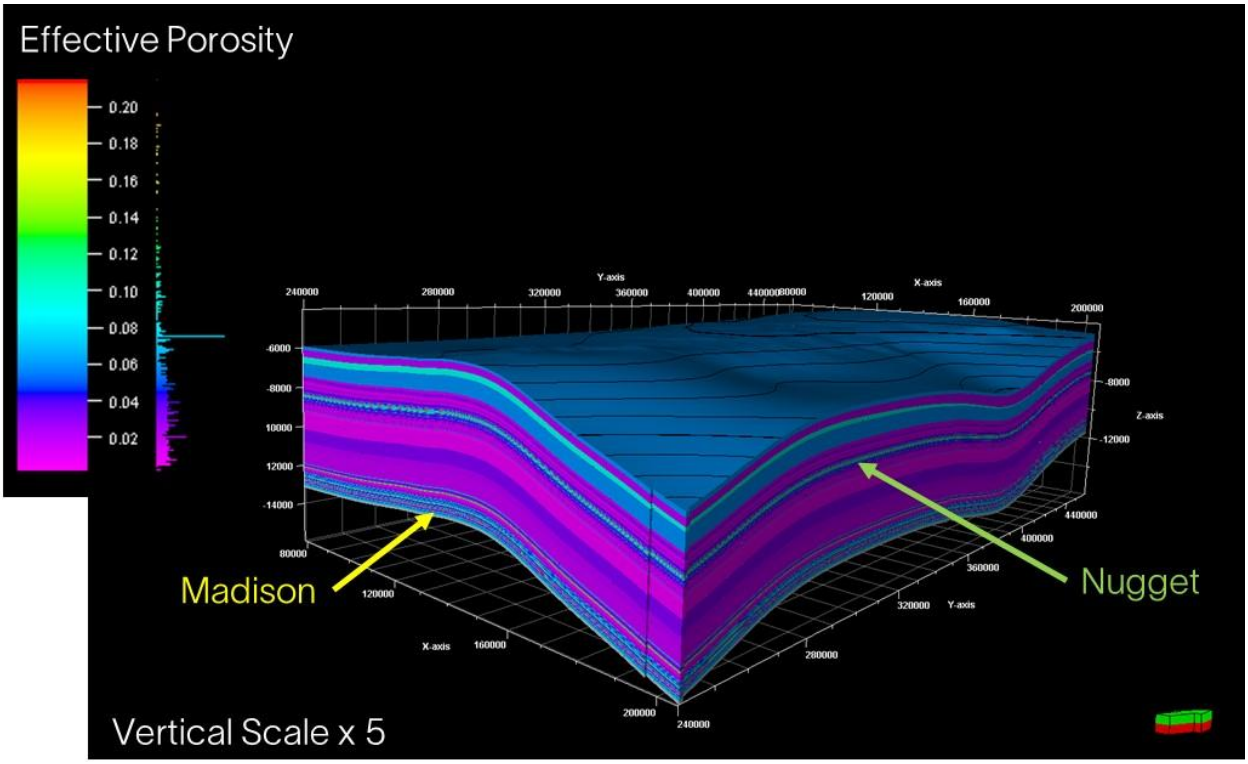


Figure A-2.3. *Effective porosity model.*

2.1.2 Computational Model

2.1.2.1 Computational Modeling Assumptions

The following assumptions govern the simulation phase interactions and are discussed in the sections below.

- Gas properties
- Solubility
- Density
- Viscosity
- Temperature

2.1.2.2 Computational Modeling Processes

Reservoir simulations were performed on the dynamic model to forecast the geologic CO_2 sequestration volume, considering seven proposed injection wells (**Figure A-2.4**). It encompasses an area of 528-mi^2 and is approximately 24 × 22 miles. The cropped dynamic model has the same cell dimensions as the static model with a total number of 156,671,772 cells. The storage capacity and injectivity were assessed over a phased 20-year period in both the Nugget and Madison to determine the reservoirs' ability to safely and permanently contain and confine the injected CO_2. Injection of supercritical CO_2 was modeled for 20 years into the deeper Madison, followed by injection for an additional 20 years into the Nugget. Bottomhole pressure was limited to 90% of the reservoir fracture pressure at the respective perforation locations. Modeling was performed to optimize well locations and to delineate the AoR.

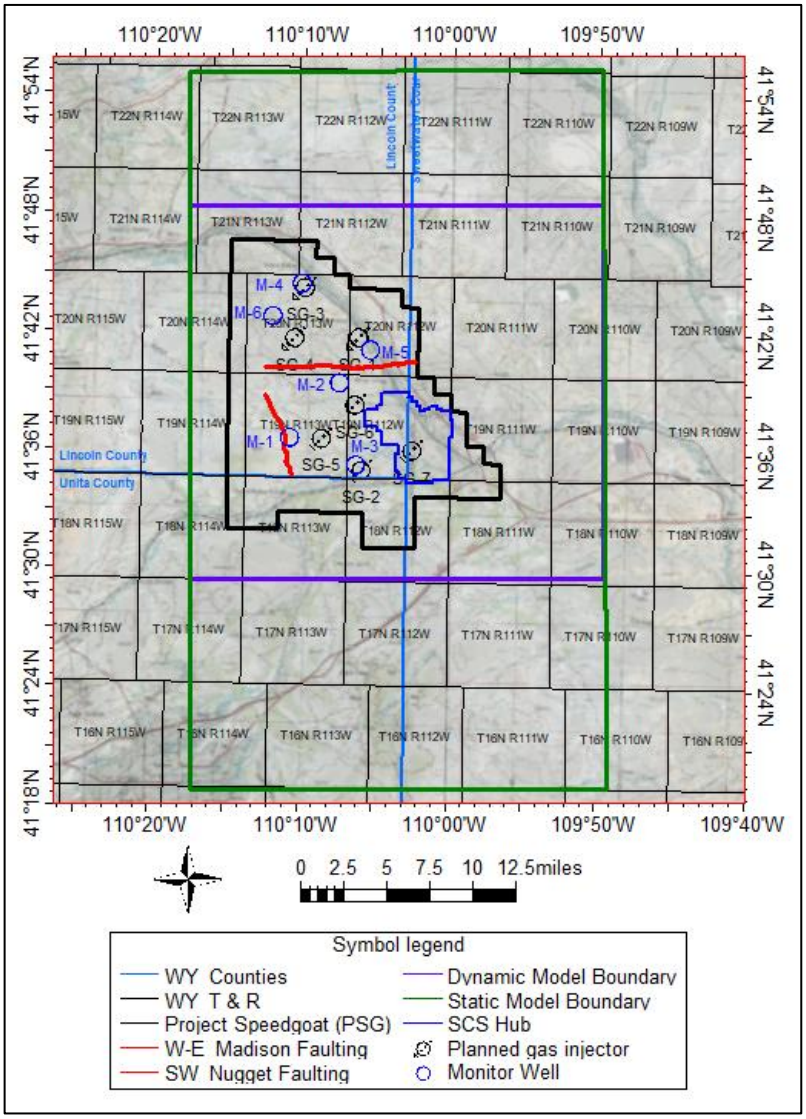


Figure A-2.4. *Location of PSG injector wells, monitor wells, and static and dynamic model boundaries.*

Additional simulation cases were run as sensitivities for comparison to the base case by modifying the primary input variables (relative permeability, porosity, vertical permeability, etc.). These simulation sensitivities were key in understanding reservoir behavior and fluid migration in the Nugget and Madison for geological sequestration of supercritical CO_2 within the AoR. Subsequently, monitoring procedures were developed and documented in this application (***Form A-5, Proposed Testing and Monitoring Plan***). *Petrel v2024*.4 was used for reservoir engineering pre- and post-processing.

The dynamic modeling was performed using *Intersect v2023.4*[*], a numerical reservoir simulator that is capable of modeling black oil, compositional (including CO_2 sequestration) and thermal reservoirs within a single formulation, and supports both structured and unstructured grids with millions of cells. For modeling CO_2 storage in a saline aquifer, the simulation was performed using a three-phase equilibrium of aqueous, liquid, and vapor phases in an isothermal compositional model. The reservoirs were assumed to be 100% brine saturated with an initial formation salinity of 57,975 parts per million (ppm) in the Madison (based on average of 4902321674 and 4902321687 water analyses) and 59,297 ppm in the Nugget (based on average of six water analyses[1] in Townships 27 through 28 North, Range 144 West). For modeling purposes, the injected gas is assumed to be pure CO_2. Mutual solubilities and physical properties (e.g., density, viscosity, enthalpy, etc.) of the H_2O and CO_2 phases are simulated through a range of typical storage reservoir conditions.

Gas Properties calculation: The Soave Redlich-Kwong equation of state is used to calculate the CO_2 properties.

$$P = \frac{RT}{v - b} - \frac{a(T)}{(v)(v + b)}$$

Where:

P is pressure
T is temperature
R is universal gas constant
v is molar volume
a(T) is temperature dependent attraction parameter
b is repulsion parameter

For each reservoir cell, the amount of a component dissolved in water is calculated by fugacity equilibration from the component solubility data provided as a function of pressure. In addition, aqueous phase molar, mass density, and aqueous viscosity were calculated using the Ezrokhi model.

[*] mark of SLB
[1]Wells included in Nugget water analyses: 4903520165, 4903520239, 4903520218, 4903520279, 4903520302, and 4903520891

Spycher and Pruess solubility model (2010) is used in *Intersect* to calculate the mutual solubility of CO_2 and H_2O as a function of pressure, temperature, and aqueous phase salinity. Spycher and Pruess (2010) model covers temperatures up to 300°C (572°F) (**Table A-2.5**). The K-values of CO_2 and H_2O based on the Spycher and Pruess (2010) used in this simulation model is:

$$K_{CO2} = \frac{y_{CO2}}{w_{CO2}} = \frac{55.508\gamma_{CO2}K^o_{CO2}}{\varphi_{CO2}P} exp\left[\frac{(P - P^o)\bar{V}_{CO2}}{RT}\right]$$

$$K_{H2O} = \frac{y_{H2O}}{w_{H2O}} = \frac{\gamma_{H2O}K^o_{H2O}}{\varphi_{H2O}P} exp\left[\frac{(P - P^o)\bar{V}_{H2O}}{RT}\right]$$

Where:

γ is mole fraction component in the CO_2-rich phase

K^o is thermodynamic equilibrium constant for each component and is a function of temperature T at reference pressure P^o

T is temperature

R is universal gas constant

φ is fugacity coefficient of the component in the CO_2-rich phase

P is pressure

P^o is reference pressure

$\bar{V}$ is average partial molar volume of each component over the range of P^o to Pw is mole fraction of components in aqueous phase

For the temperature range in this project, the table below provides the values for K^o , P^o and $\bar{V}$. T_k is the temperature in Kelvin.

Table A-2.5. Parameters for Temperatures 99-300°C, 1-600 bar, Spycher and Pruess (2010), temperature in Kelvin

Correction or Value	Unit
$\log(K^o_{H2O}) = -2.1077 + 2.8127x10^{-2}T_k - 8.4298x10^{-5}T_k^2 + 1.4969x10^{-7}T_k^3 - 1.1812x10^{-10}T_k^4$	bar
$\log(K^o_{CO2}) = 1.668 + 3.992x10^{-3}T_k - 1.156x10^{-5}T_k^2 + 1.593x10^{-9}T_k^3$	bar/mol
$\bar{V}_{H2O} = 18.1 + 3.137x10^{-2}T_k$	cm^3/mol
$\bar{V}_{CO2} = 32.6 + 3.413x10^{-2}T_k$	cm^3/mol
$P^o = -1.9906x10^{-1} + 2.0471x10^{-3}T_k + 1.0152x10^{-4}T_k^2 - 1.4234x10^{-6}T_k^3 + 1.4168x10^{-8}T_k^4$	bar

Multifluid flow including brine-CO_2 hysteresis was also modeled. Drainage and imbibition data obtained from literature were applied to the dynamic model as part of rock-fluid property modelling for both the Nugget and Madison (Li et al., 2016, Bennion and Bachu, 2010). As

CO_2 is injected into the reservoir, it displaces the brine. Once injection ceases, the brine returns, flowing towards the decreased-pressure area around the wellbore and trapping CO_2, acting as one of the trapping mechanisms. Hysteresis and capillary pressure are used to model fluid flow impacting CO_2 plume extent. **Table A-2.6** lists the parameters used as part of the computational modeling processes.

Table A-2.6. Model Parameters for Multiphase Fluid Modeling of Geologic Sequestration

Parameter	Description	Dimensions	Variable Used
Hydrogeologic Properties			
Intrinsic Permeability	The measurement of the permeability, or ability to flow or transmit fluids through a rock, conducted when a single fluid, or phase, is present in the rock	L^2	KNIT_GEO_QE _arithmetic
Porosity	The relative volume of void space within a formation. Controls the volume of carbon dioxide that may be stored.	Dimensionless	PIGN_QE
Capillary Pressure	The pressure difference across the interface of two immiscible fluids (e.g., carbon dioxide and water).	M/LT2	psi
Relative Permeability	Relative permeability is the ratio of effective permeability of a particular fluid at a particular saturation to absolute permeability of that fluid at total saturation.	Dimensionless	Krw/Krg
Fluid Pressure	Force acting on a unit area, measure of the potential energy per volume of fluid.	M/LT2	psi
Temperature	Measure of the internal energy of a fluid.	Temperature	ºF
Formation Compressibility	Measure of the change in aquifer volume with a change in fluid pressure.	LT2/M	1/psi
Water Saturation	The percent of system void space occupied by aqueous fluids.	Dimensionless	100%
Carbon Dioxide Saturation	The percent of system void space occupied by carbon dioxide.	Dimensionless	0%
Storativity	The volume of fluid released from storage per unit decline in head per unit area of the formation.	Dimensionless	N/A
Fluid Properties			
Viscosity	Measure of a fluid's internal resistance to flow.	M/LT	cP
Density	The mass of a fluid per unit volume.	M/L^3	lb/ft^3
Composition	Molecular makeup, by volume or mass, of a fluid. Measurement of salinity, concentration of trace compounds.	M/L^3	ppm, mg/L, lb/gal
Fluid Compressibility	The change in volume of a fluid from a unit change in pressure.	LT^2/M	1/psi
Chemical Properties			
Aqueous	The rate of chemical transport due to a	L^2/T	Ft^2/d

Table A-2.6. Model Parameters for Multiphase Fluid Modeling of Geologic Sequestration			
Parameter	**Description**	**Dimensions**	**Variable Used**
Diffusion Coefficient	concentration gradient.		
Aqueous Solubility	The maximum concentration of a chemical (e.g., carbon dioxide dissolved in the aqueous phase.	M/L^3	K-values
Solubility in Carbon Dioxide	The maximum concentration of a chemical (e.g., water) dissolved in separate-phase carbon dioxide.	M/L^3	N/A
Fluid injection and withdrawal rates			
Injection Rates	Injection rates at each well.	L^3/T	Mscf/d
Withdrawal Rates	Any fluid withdrawal rates within model domain.	L^3/T	N/A
Boundary Conditions	Fluid pressures and/or flow rates at the edges of the model domain.	Varies	N/A
Initial Conditions	Fluid pressures and/or flow rates within the domain at the beginning of the model run.	Varies	Pressure, temperature, salinity
System Orientation and Simulation Controls			
Model Extent (domain)	The lateral extent of the model in all directions.	L	ft
Number of Model Layers	Model vertical discretization.	Dimensionless	N/A
Layer Thickness	Vertical extent of each model layer.	L	ft
Grid Cell Size	Lateral size of each model cell.	L^2	ft
Model Timeframe	The complete duration of the model run.	T	141 years
Time Step Size	The duration of each temporal interval during the model timeframe.	T	367

2.1.2.3 Dynamic Model

2.1.2.3.1 Dynamic Model Dimensions

A dynamic model encompassing an area of 528 mi^2 and approximately 24 × 22 miles was extracted from the regional static model, which was approximately 24 × 42 miles, as shown in Figure A-2.5. This was to facilitate efficient simulator computation and run time.

The dynamic model grid configuration is 508 × 461 × 669 cells (totaling 156,671,772 cells) in the x, y, and z directions, respectively, with an x and y dimension cell size of 250 feet. The vertical thickness of each cell within the model depends on the vertical layering of each horizon ranging from 2 to 950 feet with an average value of 2.3 feet in the Nugget and 2.7 feet in the Madison (**Table A-2.4**). Additionally, the model contains two faults - the Nugget-transecting fault (striking NW-SE) extended through the entire

model zone, and the Madison-transecting fault (striking E-W) extended to the top of the Madison. Discussion on the faults can be found in ***Form A-1, Site Characterization*** (Faults and Fractures).

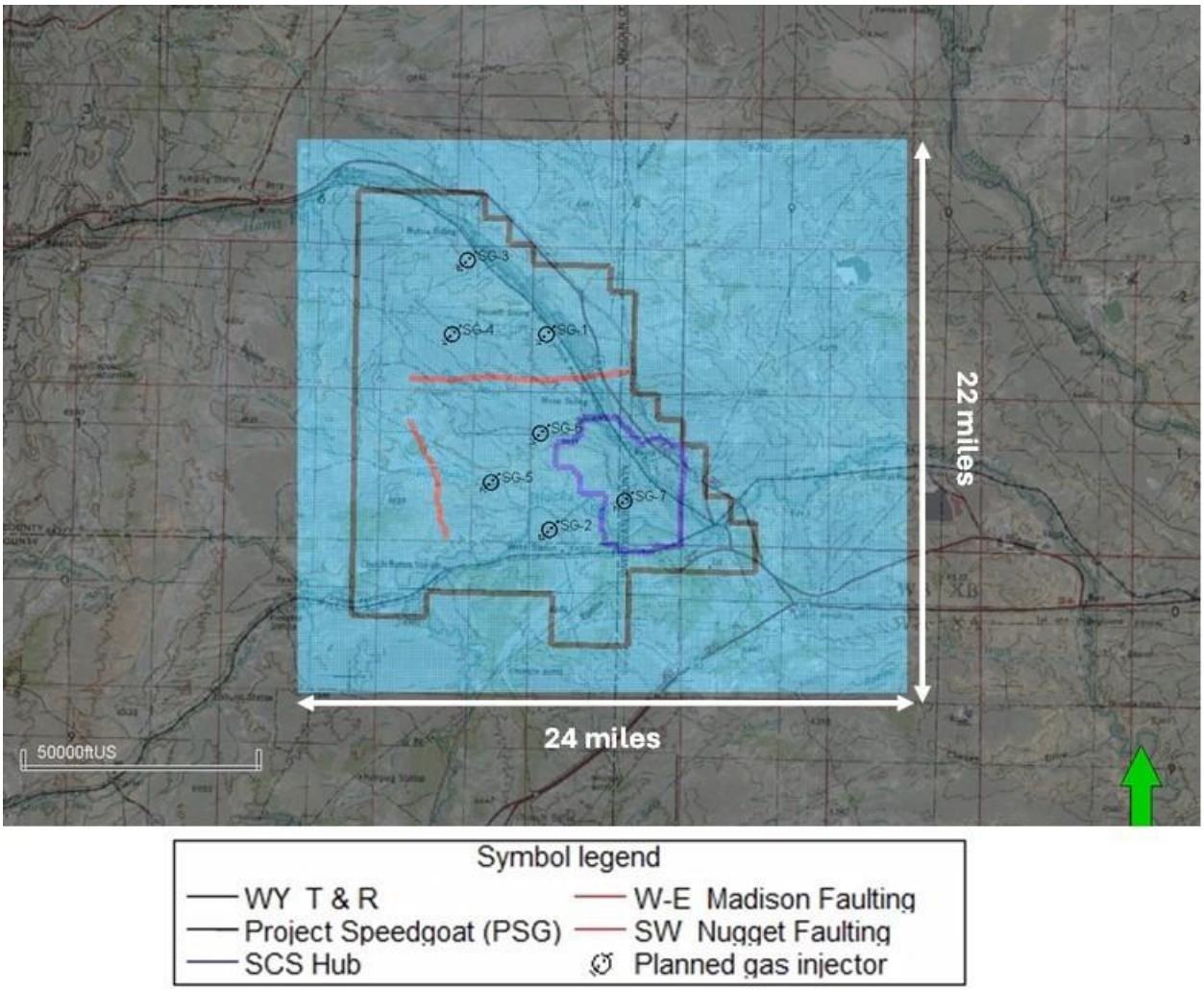


Figure A-2.5. *PSG dynamic model boundaries.*

2.1.2.3.2 Rock-Fluid Relative Permeability

The relative permeability curves discussed in this section consider a CO_2-brine system during drainage and imbibition. k_{rw} and k_{rg} represent the relative permeability of brine and CO_2, respectively. The assumptions for the relative permeability with respect to brine water saturation (S_w) are based on literature review for the Nugget (Li et al., 2016) and Madison (Bennion and Bachu, 2010).

Nugget relative permeability curves were obtained from direct experiments of the Nugget and applied to the model (**Figure A-2.6**). The sample was retrieved from an outcrop in the northern margin of the Green River Basin and is an analog for the reservoir rock at depth (Li et al., 2016). In the paper, relative permeability plot shows an irreducible gas saturation (Sg_{ir}) of zero during drainage and 0.50 during imbibition, which is the minimum fraction of the pore space occupied by CO_2. Endpoint relative permeability (k_{rg}) at irreducible water saturation (which is the minimum fraction of the pore space that can be occupied with water) acquired from the relative permeability curve in the paper (Li et al., 2016) is 0.08.

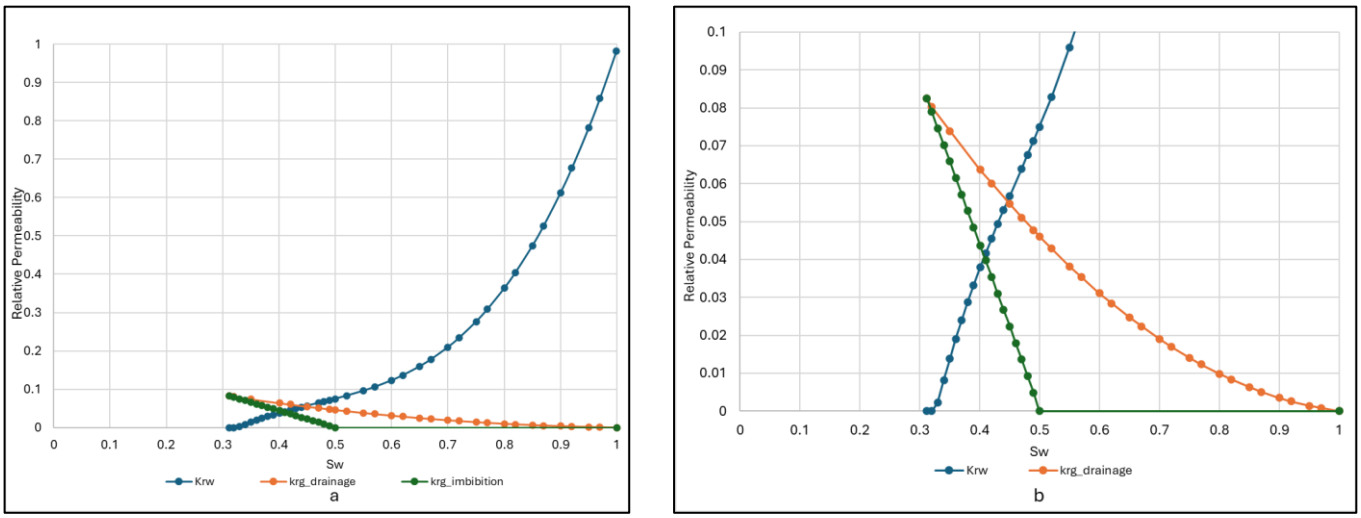


Figure A-2.6. *Nugget relative permeability curves digitized from Li, et al. (a) and a zoomed in section (b) (2016).*

Akbarabadi and Piri (2015) conducted experiments on a sample of the Madison formation, however, the data was unclear. Therefore, an analog carbonate sample, referenced in the same figure of Akbarabadi and Piri (2015), was used from Bennion and Bachu (2010). This analog sample has been identified as the Redwater Leduc from Bennion and Bachu (2010). From the paper, irreducible gas saturation (Sg_{ir}) is 0 during drainage and 0.21 during imbibition, and the endpoint relative permeability (kr_g) at irreducible water saturation is 0.05 (**Figure A-2.7**).

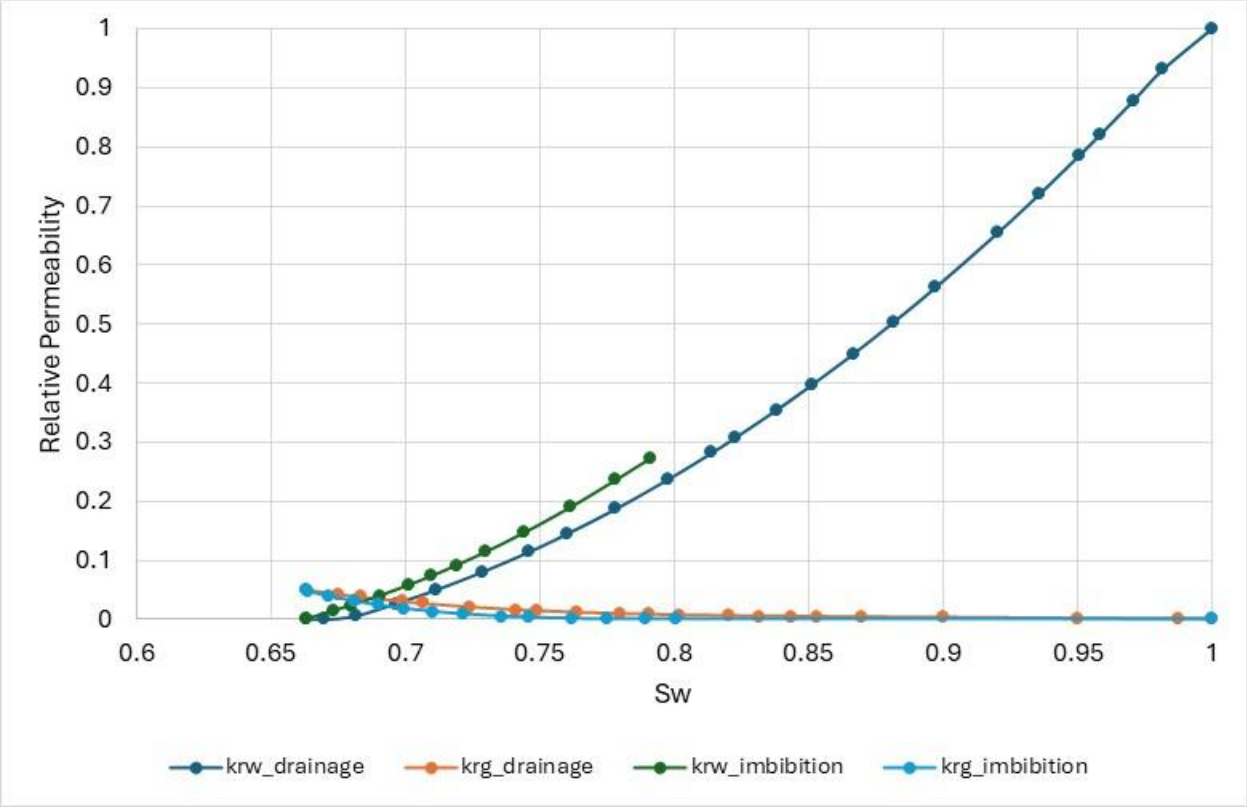


Figure A-2.7. *Madison analog, sample Redwater Luc, relative permeability curves digitized from Bennion and Bachu (2010).*

Capillary pressure was obtained directly from the Akbarabadi and Piri (2015), which includes a Madison rock sample experiment. It was scaled to match the analog sample relative permeability and applied to the fluid model (**Figure A-2.8**).

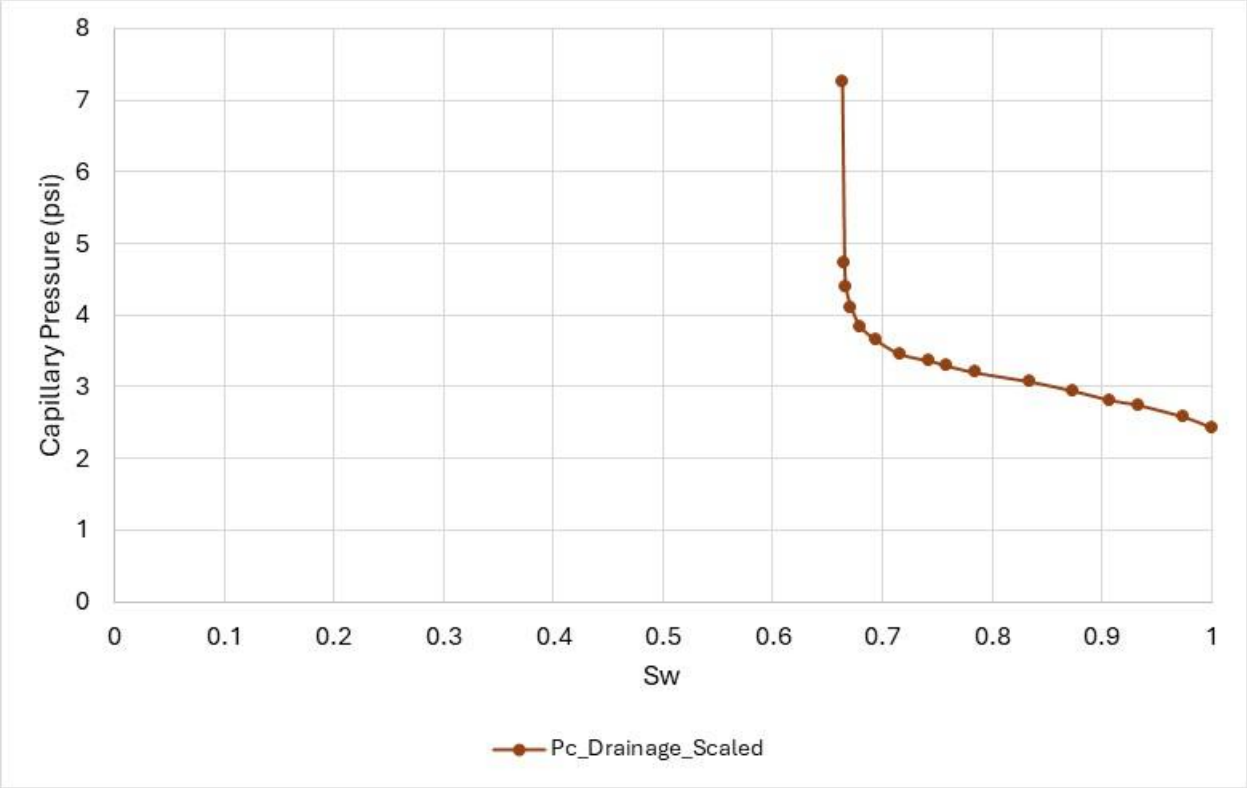


Figure A-2.8. *Madison capillary curve was digitized and scaled from Akbarabadi and Piri (2015).*

However, no capillary pressure data were available in the literature for the Nugget. To address this lack of data, Nugget capillary pressure measurements will be acquired in the PSG area in the future. Vertical permeability for both Nugget and Madison is assumed to equal 10% of the horizontal permeability because no site-specific data is available. This value will be updated after data collection.

2.1.2.3.3 Porosity and Permeability

A cross plot of porosity versus permeability based on the petrophysical log evaluation of the Bruff 1 well is presented in **Figure A-2.9**. Nugget average porosity and average permeability is 4.5% and 3.6 millidarcies (mD), and Madison average porosity and average permeability is 6.5% and 4.2 mD. The porosity distribution in the dynamic model is shown in **Figure A-2.10** and **Figure A-2.11**, while the permeability distribution is presented in **Figure A-2.12** and **Figure A-2.13**.

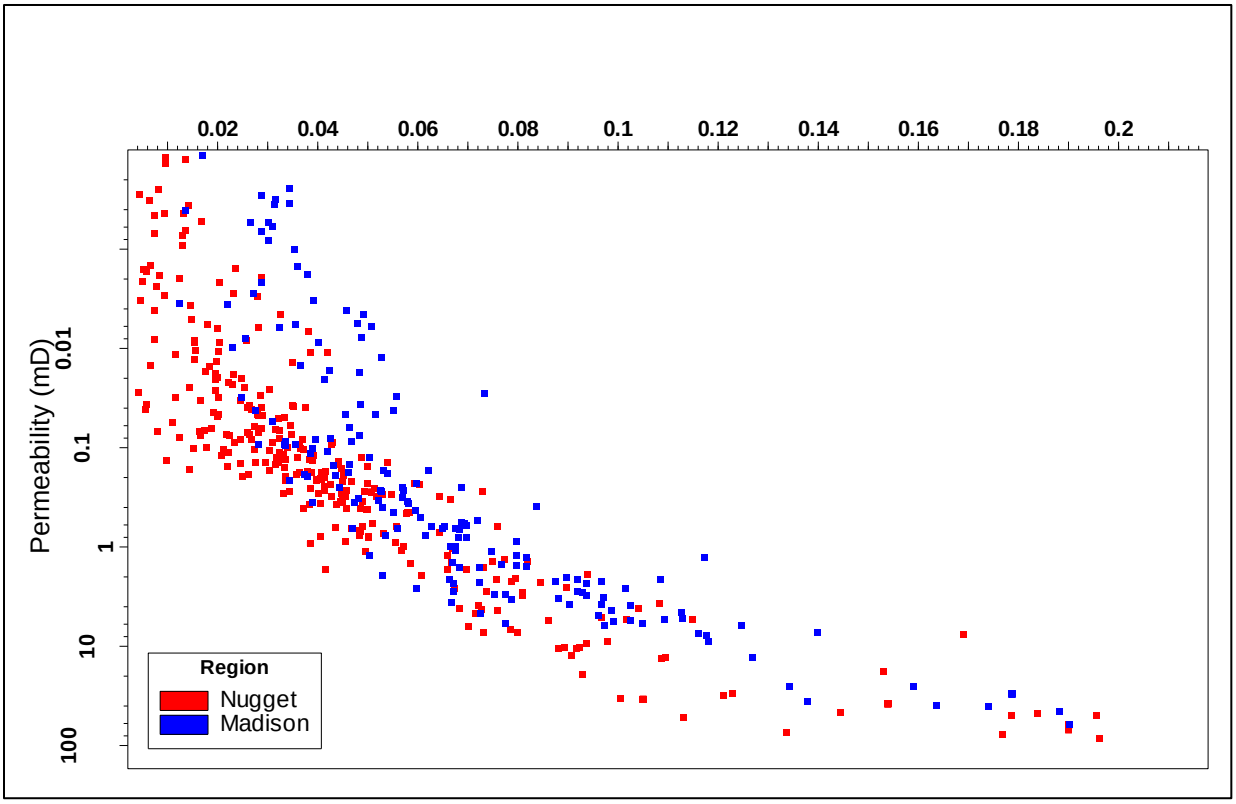


Figure A-2.9. *Plot of porosity versus permeability from the dynamic model.*

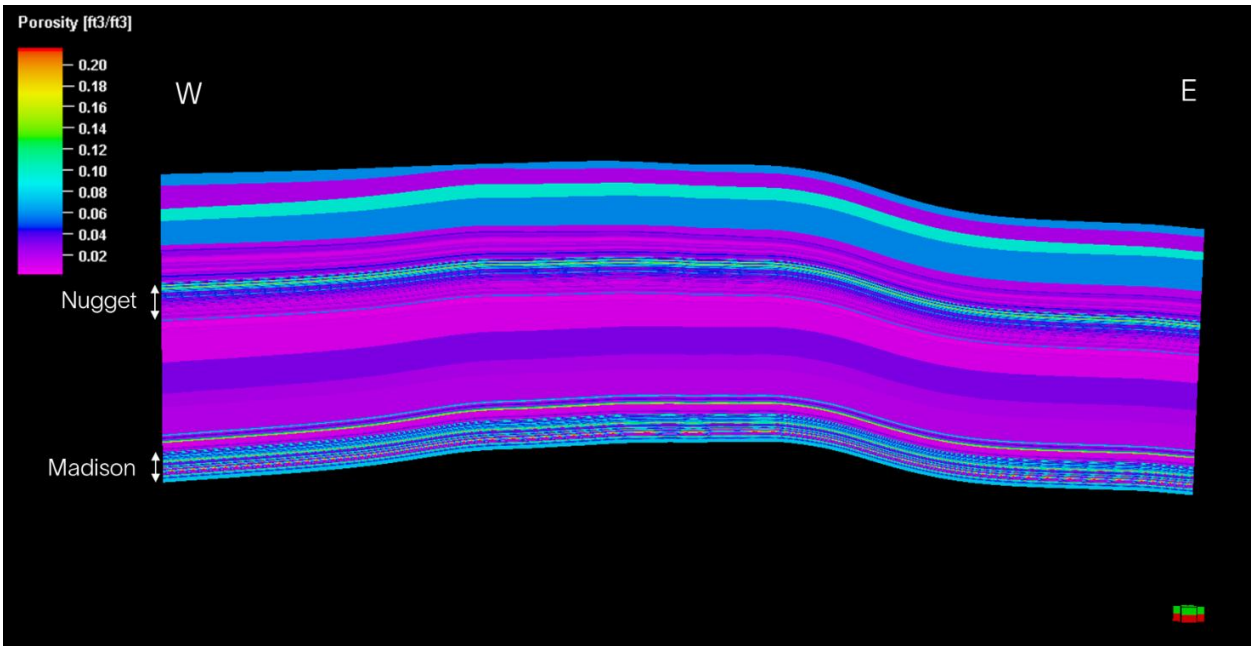


Figure A-2.10. *East-to-west cross section of porosity in dynamic model.*

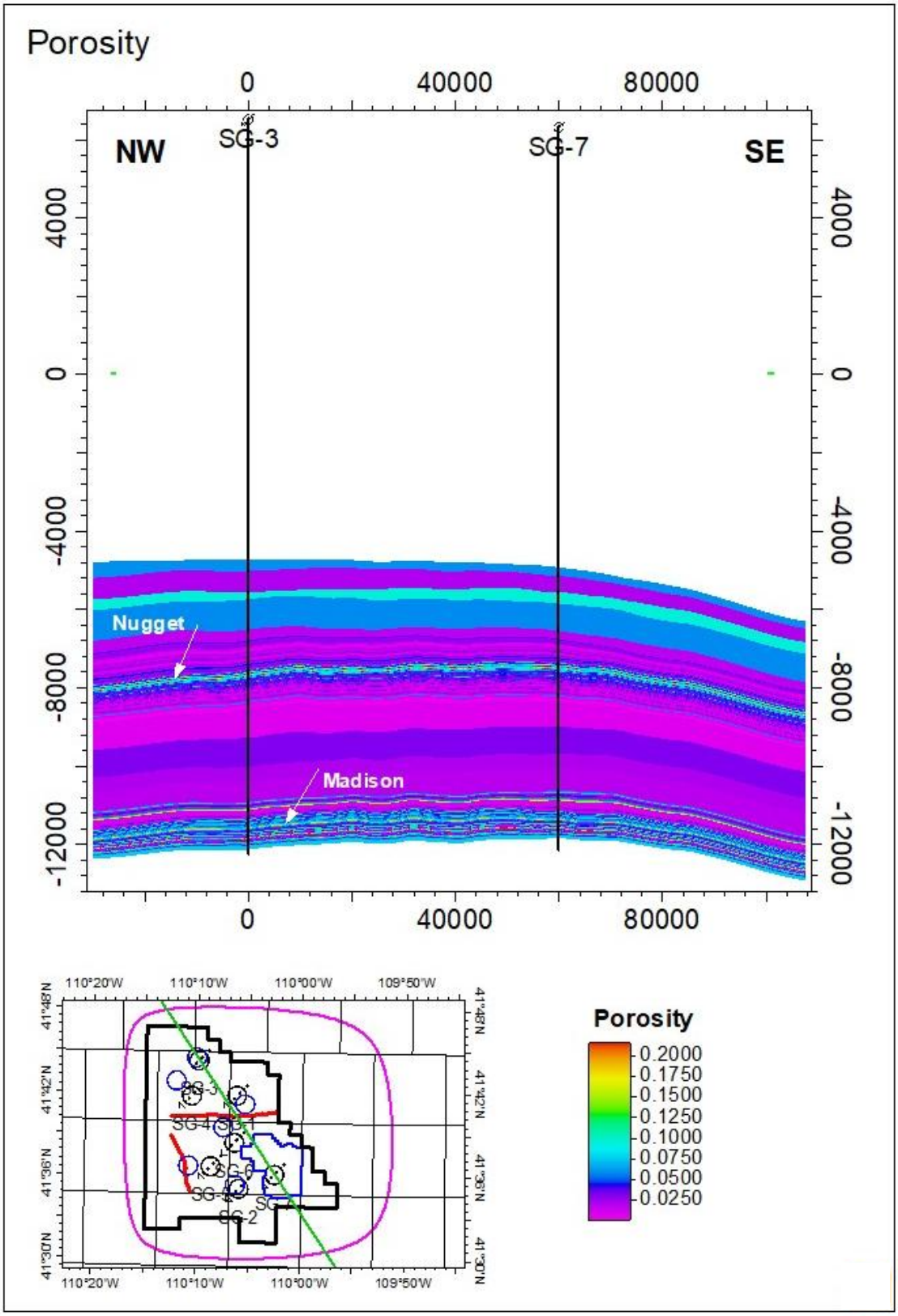


Figure A-2.11. *Porosity northwest to southeast cross section across pressure AoR.*

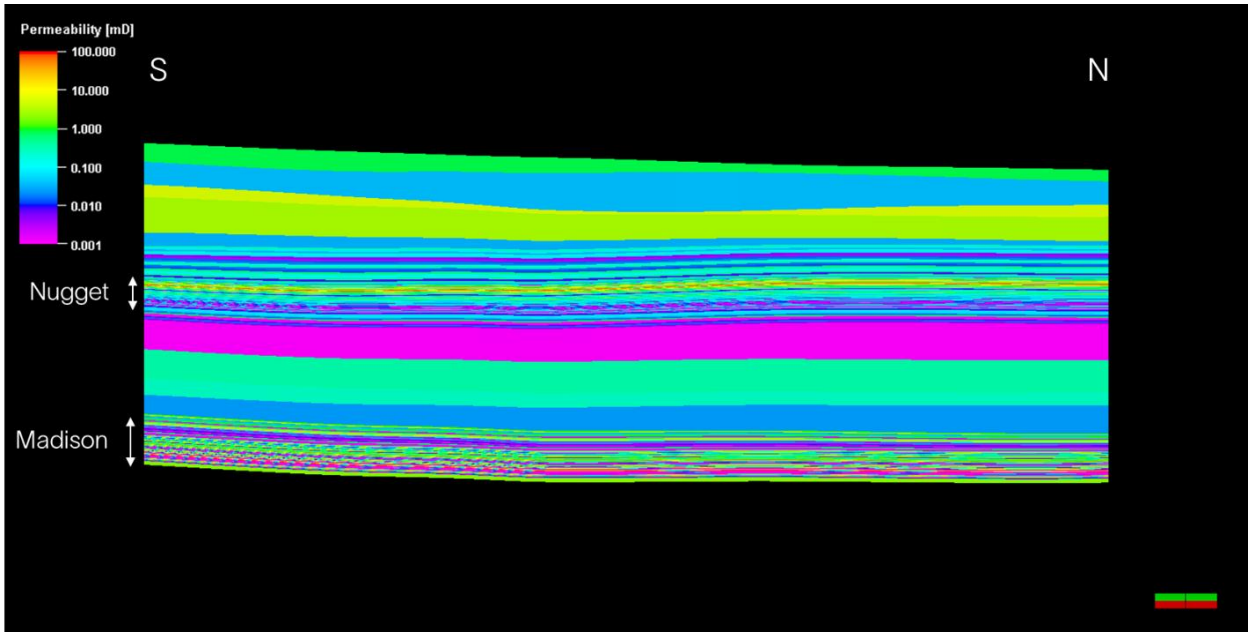


Figure A-2.12. *North-to-south cross section of permeability in dynamic model.*

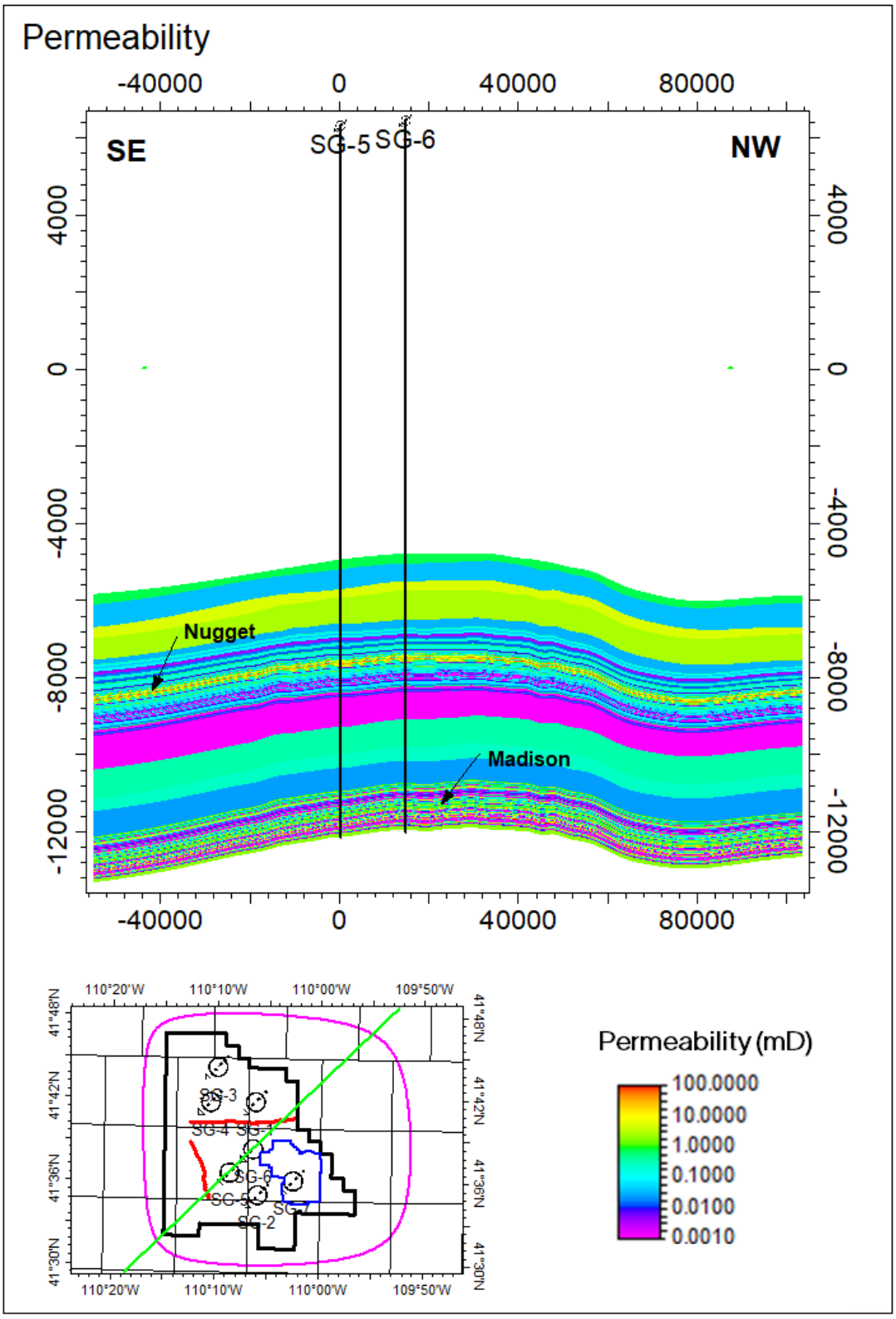


Figure A-2.13. *Permeability northeast-to-southwest cross section across pressure AoR.*

2.1.2.4 Boundary Conditions

Infinite-acting conditions were assumed at the lateral boundaries of the simulation model. This was modeled by applying a pore volume multiplier of 1,000,000 in the cells at the model perimeters to account for a near-infinite aquifer volume, as the Nugget and Madison are assumed to be laterally extensive. The Three Forks layer is the lower vertical model boundary (lower confining zone), and the 2nd Frontier is the upper vertical model boundary . They are the same as the static model. No-flow boundaries were assumed at the model's top and bottom, representing the top of the upper confining zone and the bottom of the lower confining zone, respectively.

2.1.2.5 Initial Conditions

Nugget and Madison initial reservoir pressure and temperature data were estimated from field data, as discussed in ***Form A-1, Site Characterization*** (Geomechanical Information and Confining Zone)**.** The pore pressure gradient from the top of the model, 2nd Frontier, to the base of the Mowry is 0.54 psi/ft, reflecting the over-pressured zone and its return to normal pore pressure present in the literature. For both Madison and Nugget formations the pore pressure gradient is 0.45 psi/ft. These pore pressure gradients were used to assign the initial pressure for the reservoir simulation (**Figure A-2.14**). A local geothermal gradient of 1.217 ^{o}F/100 feet was calculated from a linear interpolation of the bottomhole temperature of the Bruff Unit 1 well and an assumed average surface temperature of 60°F (**Figure A-2.15**). As previously discussed in ***2.1.2.1 Computational Modeling Processes*** both the Nugget and Madison reservoirs are determined to be saline aquifers.

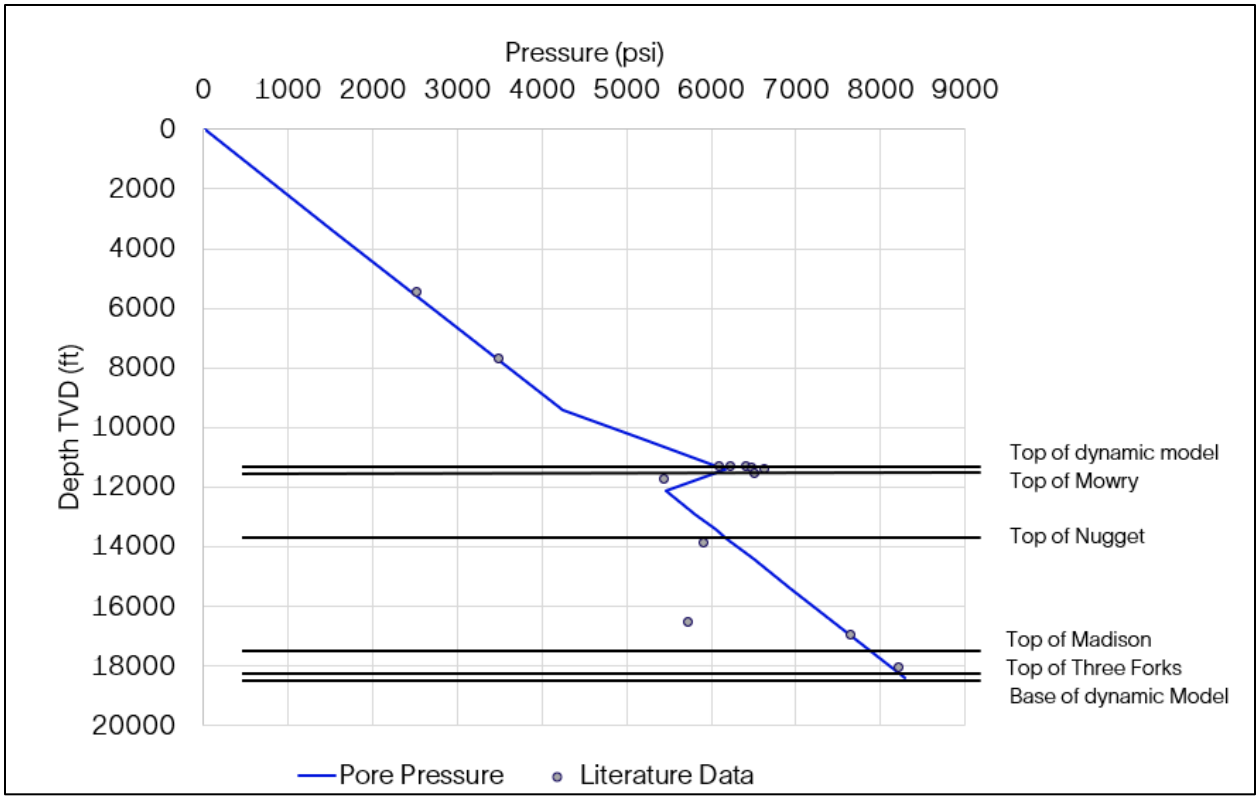


Figure A-2.14. *Pressure variation with depth with literature data from Table A-1.19.*

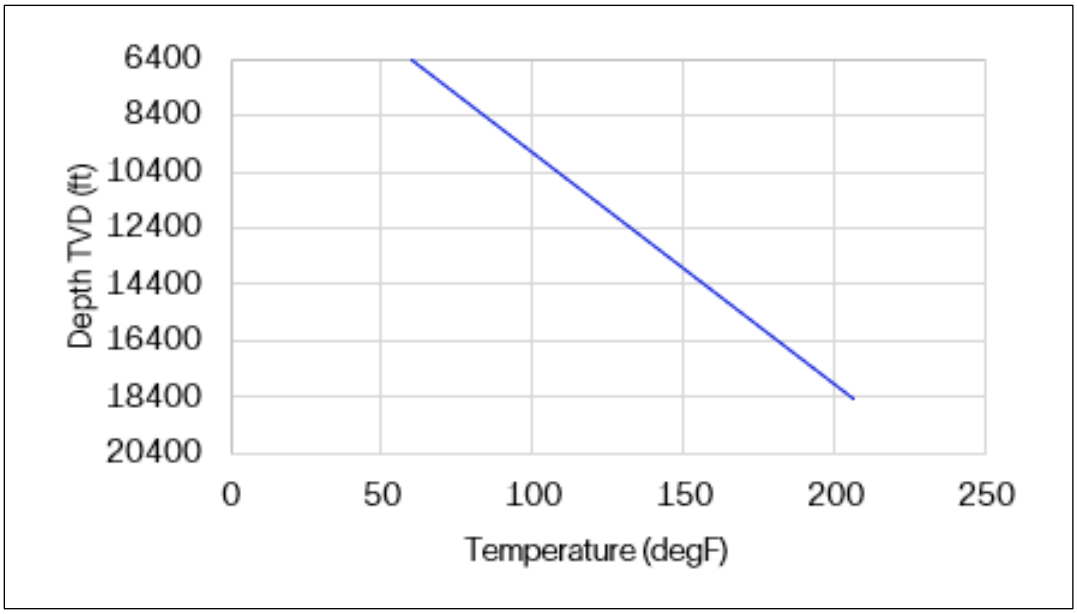


Figure A-2.15. *Temperature variation with depth considering an elevation of 6,435 feet above sea-level.*

2.1.2.5.1 Injection Well Assumptions

The dynamic model includes CO_2 injection from a combined ten injector wells to simulate the cumulative effect of CO_2 injection in the Nugget and Madison reservoirs across the PSG. This is inclusive of three CO_2 injectors in the Sweetwater Carbon Storage (SCS) Hub and the additional seven injectors in PSG. A fracture gradient of 0.72 psi/ft was assigned to the Nugget saline formation, while 0.78 psi/ft was assigned to the Madison saline formation (***Form A-1, Site Characterization, Geomechanical Information and Confining Zone***). CO_2 injection rate is constrained by the maximum allowable bottomhole pressure (BHP) of 90% of the fracture gradient, resulting in 0.64 psi/ft and 0.70 psi/ft for the Nugget and Madison, respectively. Proposed Nugget perforations are shown in are shown in **Figure A-2.16** and **Figure A-2.17** and Madison perforations are shown in **Figure A-2.18** and **Figure A-2.19.**

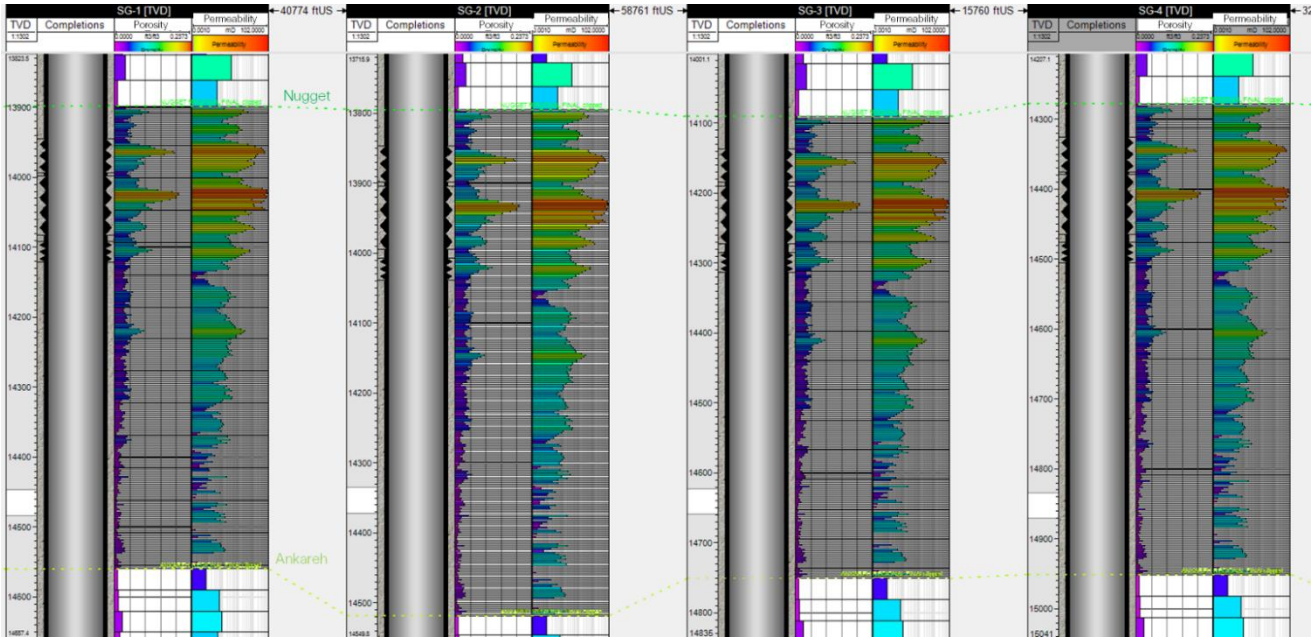


Figure A-2.16. *Wells SG-1, SG-2, SG-3, and SG-4 logs showing proposed Nugget perforations, porosity, and permeability.*

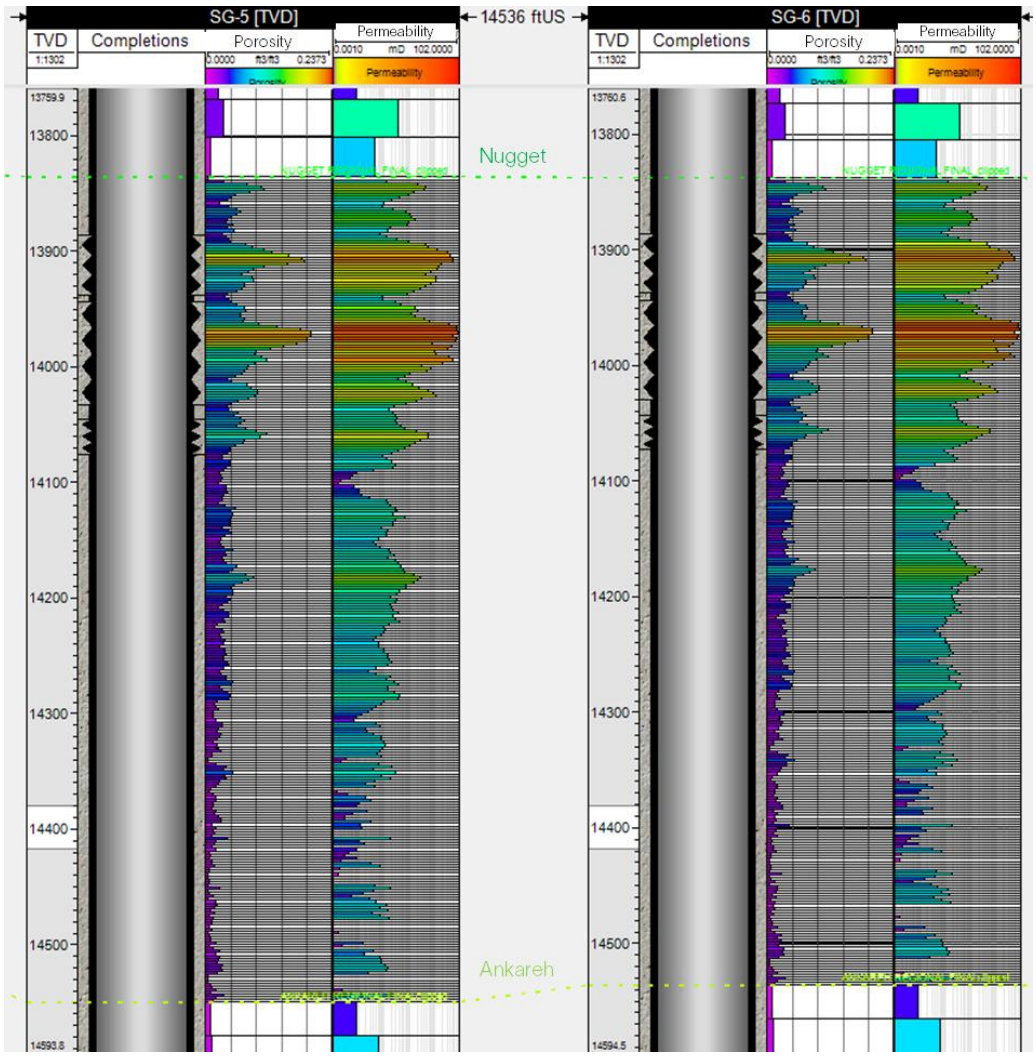


Figure A-2.17. *Wells SG-5 and SG-6 logs showing proposed Nugget perforations, porosity, and permeability*.

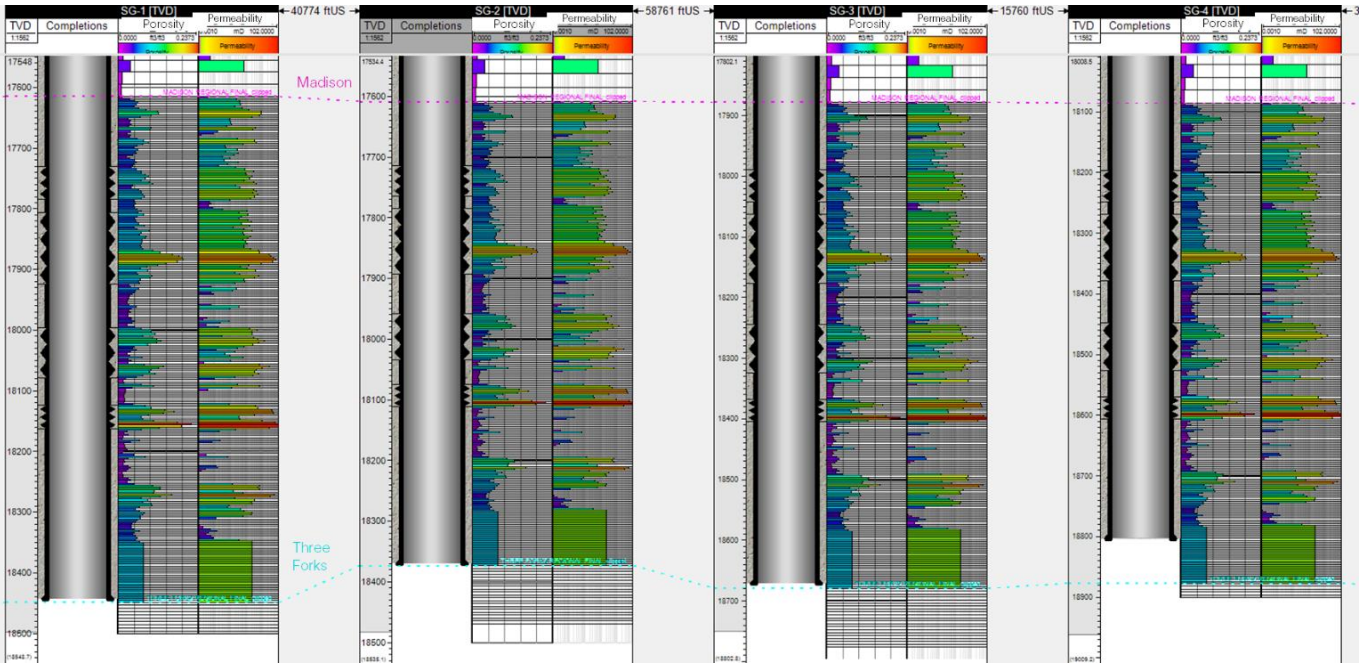


Figure A-2.18. *Wells SG-1, SG-2, SG-3, and SG-4 logs showing proposed Madison perforations, porosity, and permeability.*

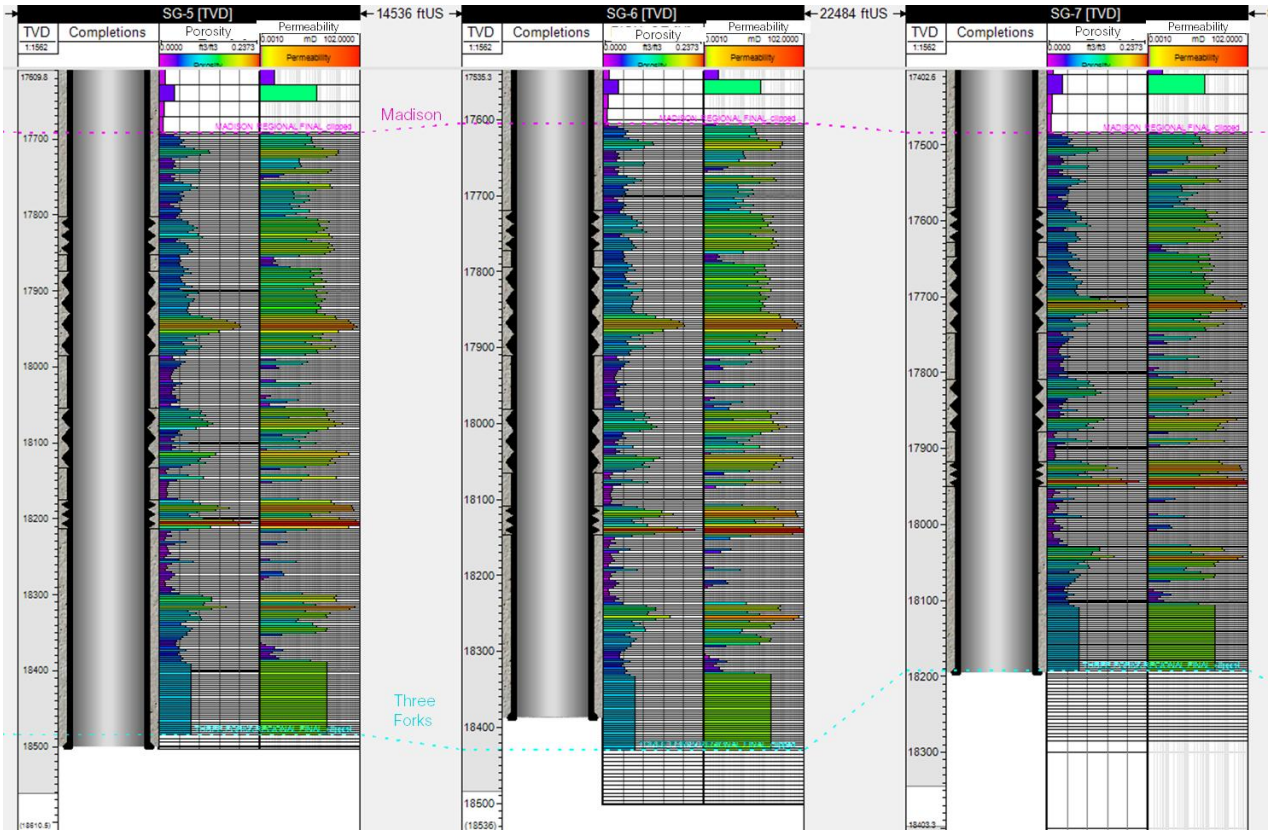


Figure A-2.19. *Wells SG-5, SG-6, and SG-7 logs showing proposed Madison perforations, porosity, and permeability.*

2.1.2.5.2 CO_2 Injection Scenario

There are a total of 10 wells in this study: 7 wells in the PSG and 3 wells in the SCS Hub. The three SCS Hub injection wells (Frontier J 1-15, Frontier LCS 1-23, Frontier AN 1-26) from previously submitted permits are included in the simulation to account for their impact in the region. The 7 wells in the PSG (SG-1, SG-2, SG-3, SG-4, SG-5, SG-6, SG-7) are perforated in the Madison with each injecting at a target rate of 500,000 metric tons per year for 20 years. The SCS Hub wells injection into the Nugget starts at the same time as the PSG wells injection into the Madison. PSG Well SG-7 is in the middle of the SCS Hub injector wells; therefore, to avoid CO_2 plume interaction, it does not inject into the Nugget formation. At the completion of the PSG Madison injection, all the perforations will be squeezed. Six of these PSG wells (SG-1, SG-2, SG-3, SG-4, SG-5, SG-6) are then perforated in the Nugget with each injecting at a target rate of 500,000 metric tons per year for 20 years. A 50-year shut-in period is simulated at the end of Nugget injection for all wells. The target injection rate is not reached due to the BHP constraint **Figure A-2.20** shows the injection scenario for this project.



Figure A-2.20. *CO_2 injection scenario timeline of PSG wells and SCS Hub wells.*

2.1.3 Computational Model Results

2.1.3.1 Simulated Injectivity

CO_2 injection was modeled as one 20-year injection period into the Nugget and another separate 20-year injection period into the Madison for PSG wells. SCS Hub wells, which only penetrate the Nugget, are also injecting CO_2 for 20 years, honoring its injection timeline stated in the previously submitted permit. The figures in this section show two distinct trends for the PSG wells. The first 20 years, from 2025 to 2045, display results related to the injection into the Madison, while the subsequent 20 years, from 2045 to 2065, display results related to the injection into the Nugget. The SCS Hub wells inject from 2025 to 2045 according to the SCS Hub permit, and their plumes are also plotted in the maps for reference. However, this permit does not discuss the results of the SCS Hub wells. It is important to note that well SG-7 only injects into the Madison since it is located in the middle of the SCS Hub wells, which are already planned to inject into the Nugget. The BHP constraint applied is 90% of the fracture pressure calculated at the halfway point of the perforation interval for each reservoir (**Table A-2.7** and **Table A-2.8**). Injection into the reservoirs is limited by the BHP constraint. Therefore, each well's maximum BHP value is the same as its individual BHP constraint. **Figure A-2.21** shows BHP over time.

Table A-2.7. Madison Bottomhole Pressure Constraint and Fracture Pressure at Injection Site		
Well	**BHP Constraint (psi)**	**Fracture Pressure (psi)**
SG-1	12,623	14,026
SG-2	12,600	14,000
SG-3	12,799	14,221
SG-4	12,943	14,381
SG-5	12,666	14,073
SG-6	12,614	14,015
SG-7	12,497	13,885

Table A-2.8. Nugget Bottomhole Pressure Constraint and Fracture Pressure at Injection Site		
Well	**BHP Constraint (psi)**	**Fracture Pressure (psi)**
SG-1	9,033	10,036
SG-2	8,974	9,971
SG-3	9,156	10,174
SG-4	9,279	10,310
SG-5	8,999	9,999
SG-6	8,999	9,999
SG-7	N/A	N/A

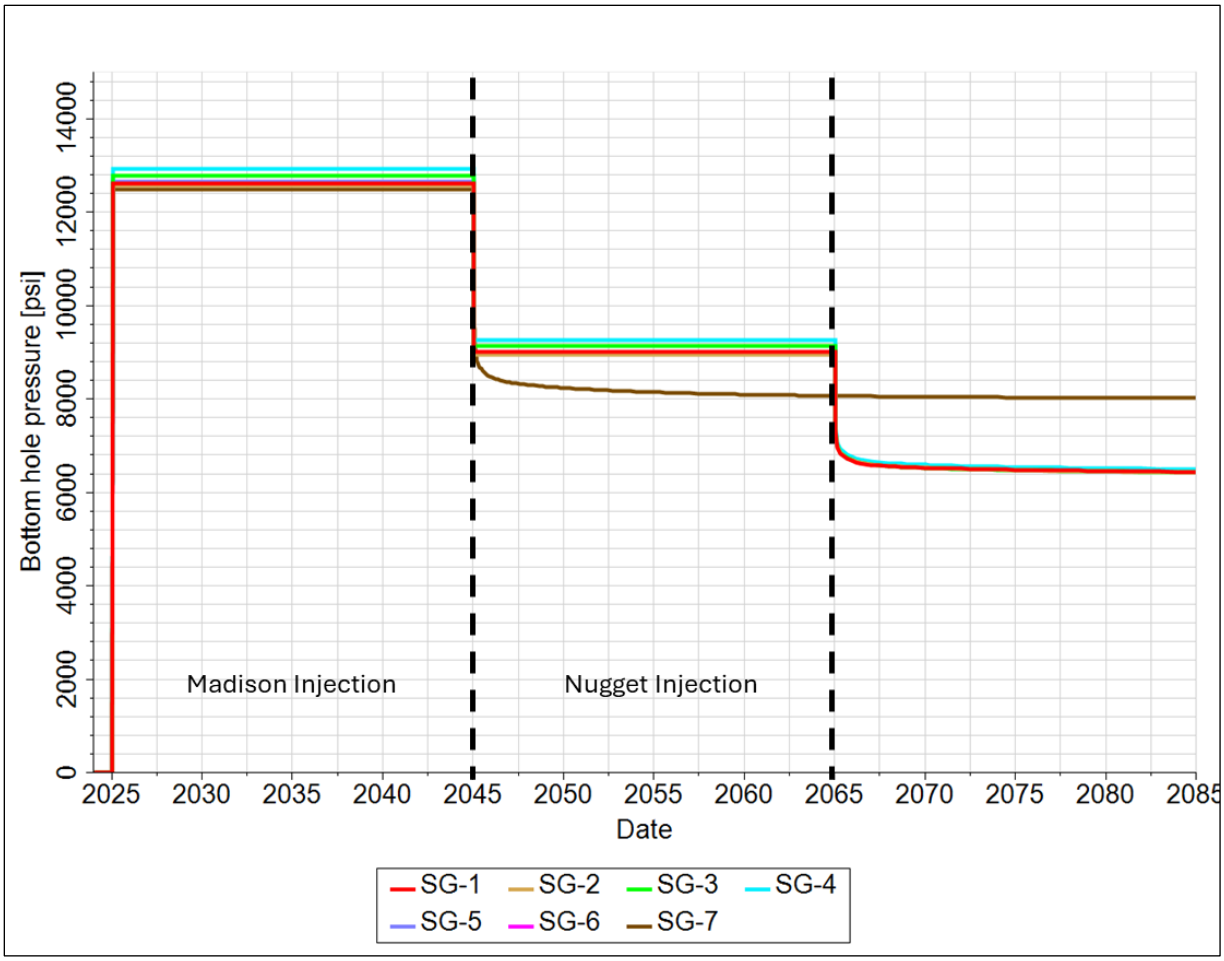


Figure A-2.21. *BHP over time. Well SG-7 only injects into the Madison.*

The average well CO_2 injection rate was approximately 320,000 metric tons per year per well into the Madison and approximately 230,000 metric tons per year per well into the Nugget (**Table A-2.9**). Individual well injection rates are listed in **Table A-2.9**. The simulation results show that injectivity decreases over time as all wells are BHP-constrained.

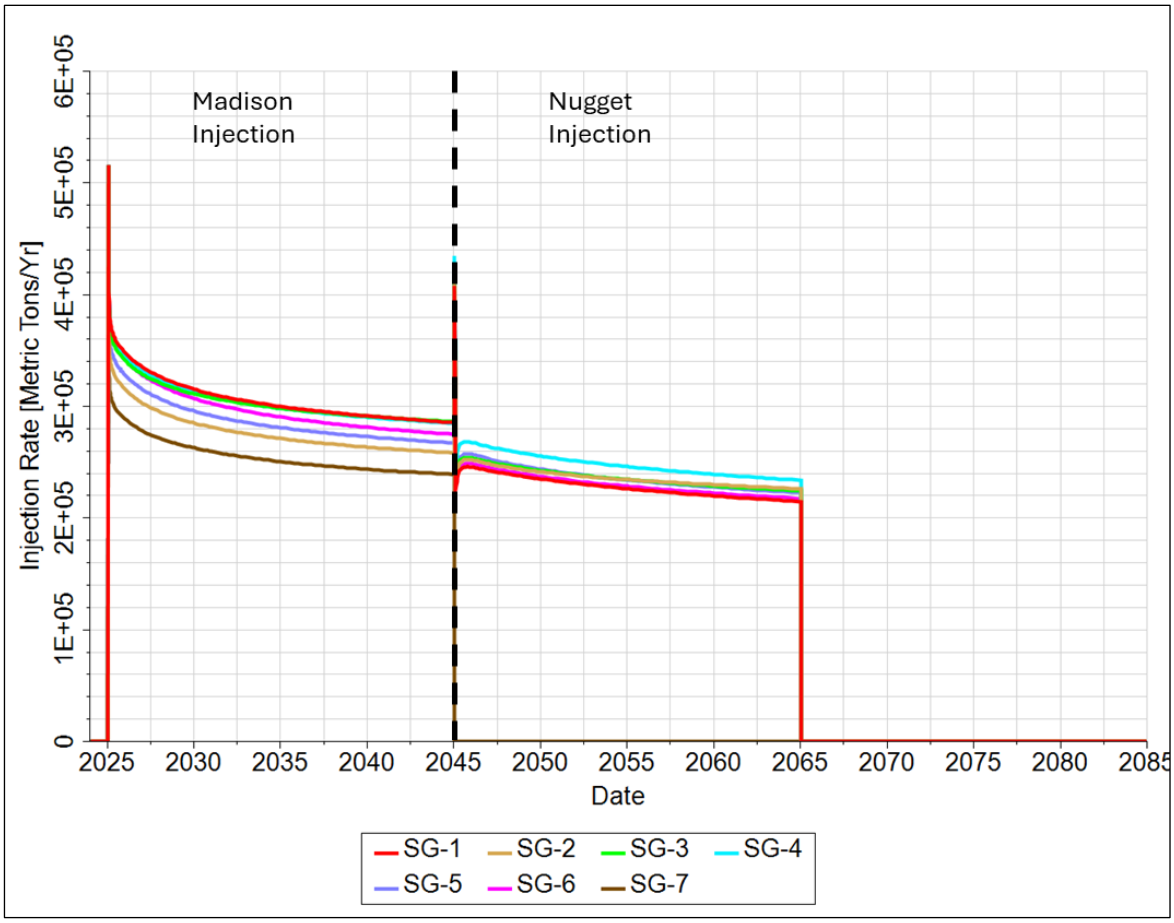


***Figure A-2.22**. Individual well injection rate over time.*

Table A-2.9. Average Injection Rate (Metric Tons/Yr)		
PSG Well	**Madison**	**Nugget**
SG-1	335,178	222,217
SG-2	303,696	230,999
SG-3	331,628	231,334
SG-4	333,332	242,897
SG-5	315,486	231,569
SG-6	327,205	224,602
SG-7	278,854	NA
Average	324,420	230,603

The Madison reservoir pressure at the injection site prior to injection is 8,970 psi, with a maximum reservoir pressure of 10,861 psi occurring at the end of injection period (**Figure A-2.23**). **Figure A-2.24** shows the Madison's pressure differential and the injection site's critical pressure. At 70 years post-injection, the reservoir returns to its initial pressure.

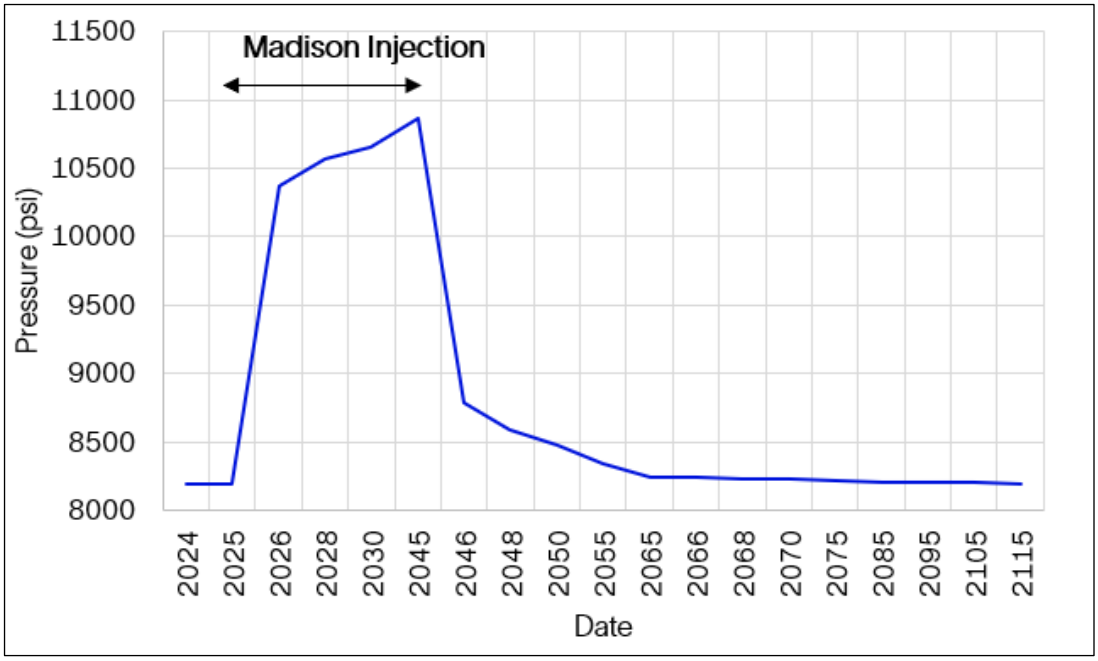


Figure A-2.23. *Madison reservoir pressure over time.*

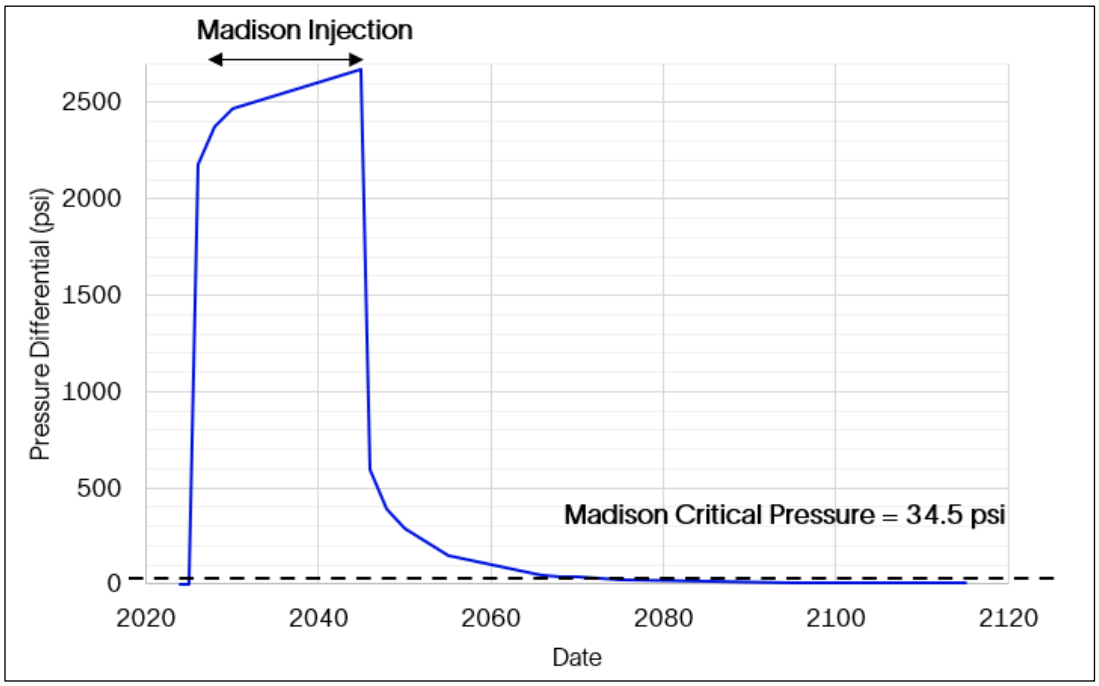


Figure A-2.24. *Madison reservoir pressure differential over time.*

Nugget reservoir pressure at the injection site prior to injection is 6,313 psi, with a maximum reservoir pressure of 7,870 psi occurring at the end of injection period (**Figure A-2.25**). **Figure A-2.26** shows the pressure differential for the Nugget and the critical pressure at the injection site. Reservoir pressure does not return to its initial pressure 50 years after injection.

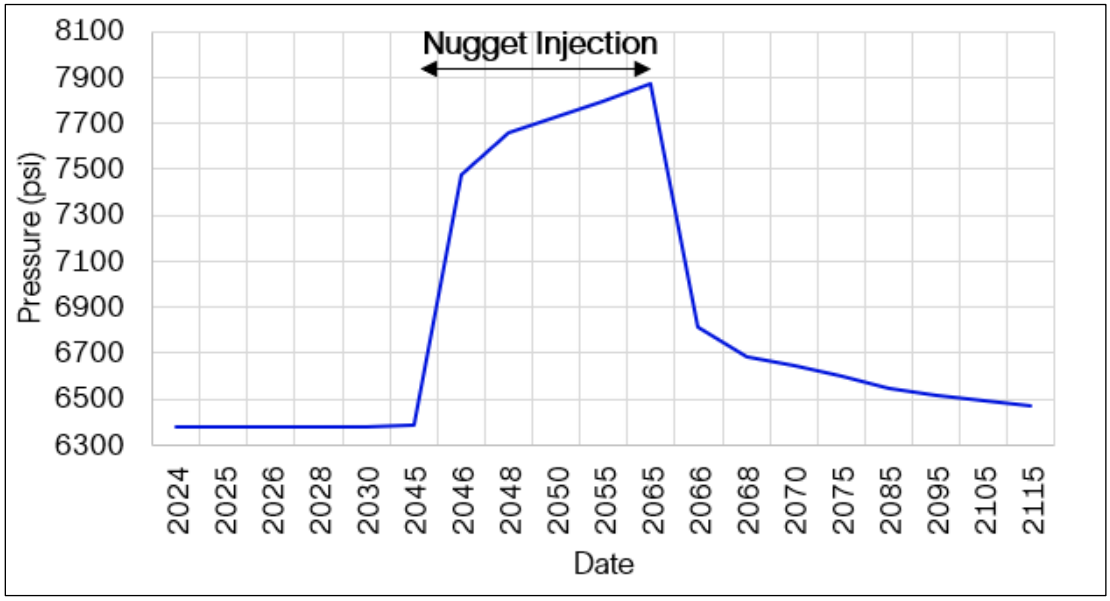


Figure A-2.25. *Nugget reservoir pressure over time.*

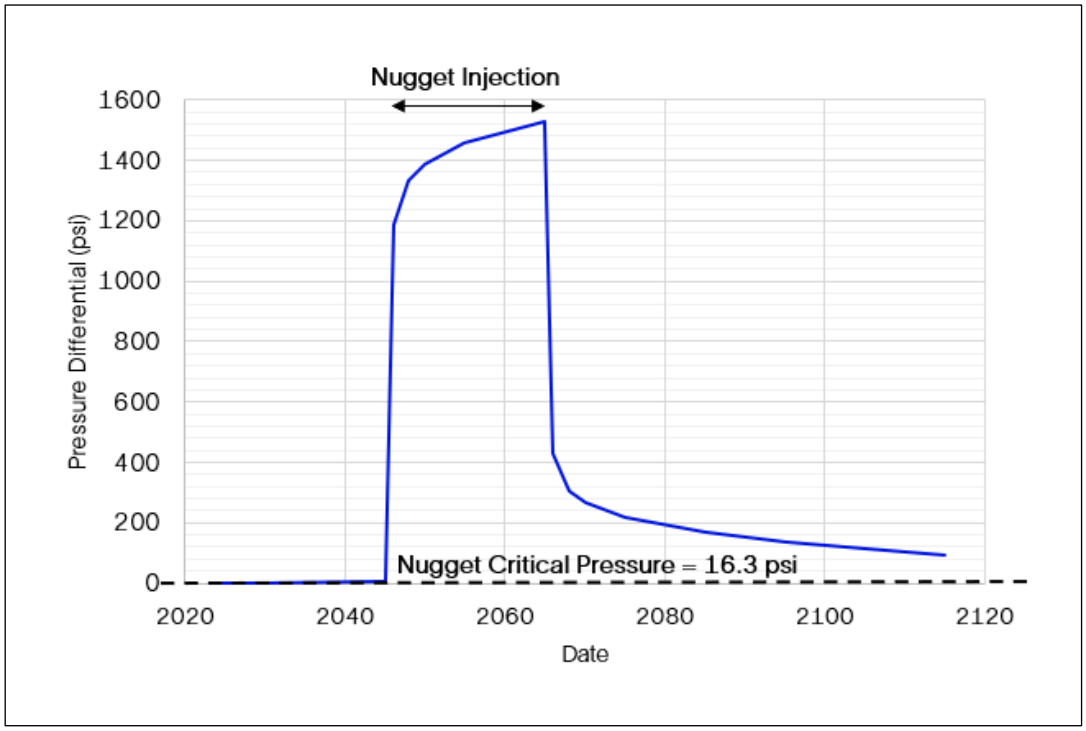
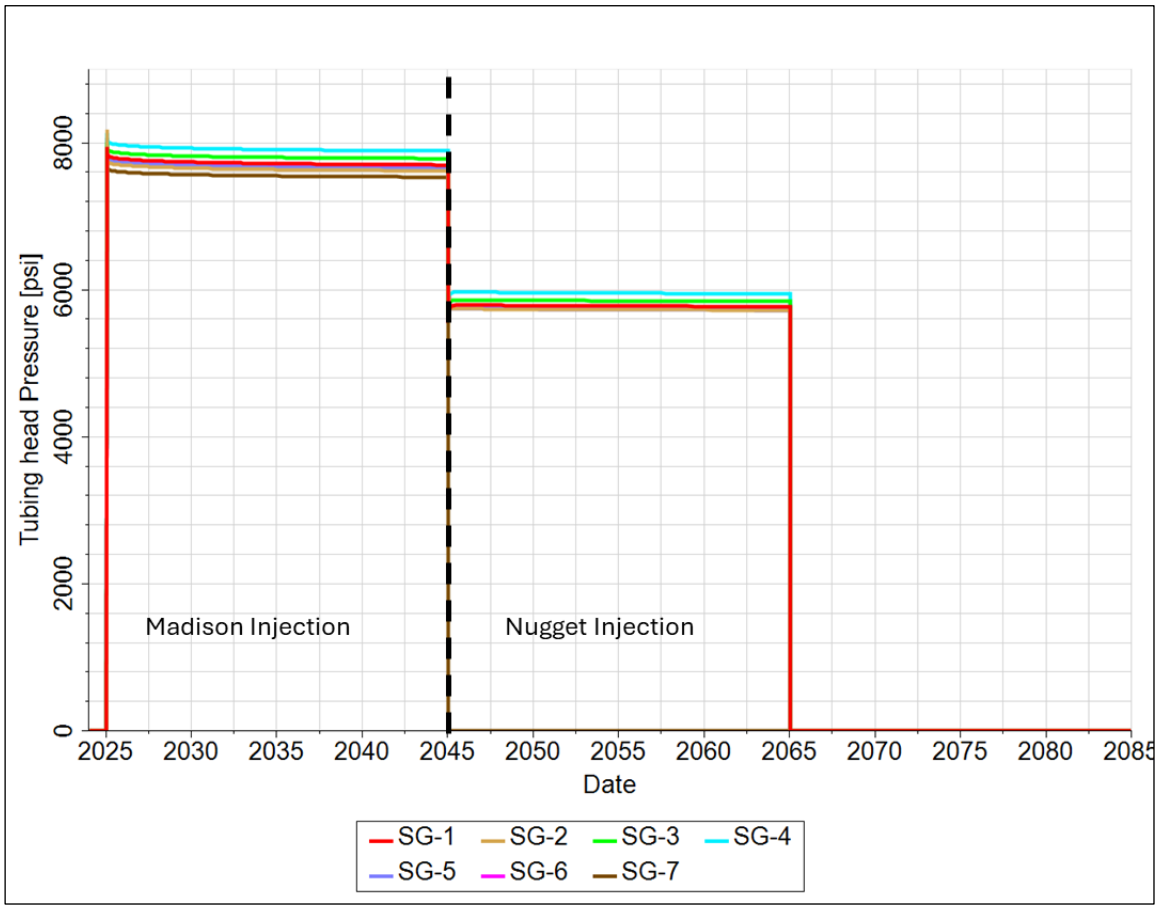


Figure A-2.26. *Nugget reservoir pressure differential over time.*

Maximum surface injection pressure from the simulation is 8,023 psi for the Madison and 5,981 psi for the Nugget (**Figure A-2.27**). The Madison average of the maximum surface injection pressure for all PSG wells from the simulation is 7,827 psi, and the maximum surface injection pressure is 8,023 psi. Well SG-7 is shut-in after injecting into the Madison and does not inject into the Nugget to avoid interference with the SCS Hub injection. The Nugget average of the maximum surface injection pressure for all PSG wells from the simulation is 5,828 psi, and the maximum surface injection pressure is 5,981 psi. These values are also listed in **Table A-2.10**.



Tubing head pressure was simulated by applying vertical flow performance tables with Intersect.

Figure A-2.27. *Tubing head pressure over time.*

Table A-2.10. Maximum and Average Maximum Tubing Head Pressure (THP) for PSG Wells		
	Madison	**Nugget**
PSG Maximum THP (psi)	8,023	5,981
PSG Average Maximum THP (psi)	7,826	5,828

Simulation results for all seven PSG wells resulted in a cumulative injection volume of 69 million metric tons of CO_2; approximately 41 million metric tons into the Madison, followed by 28 million metric tons into the Nugget. Simulation results are shown in **Figure A-2.28**.

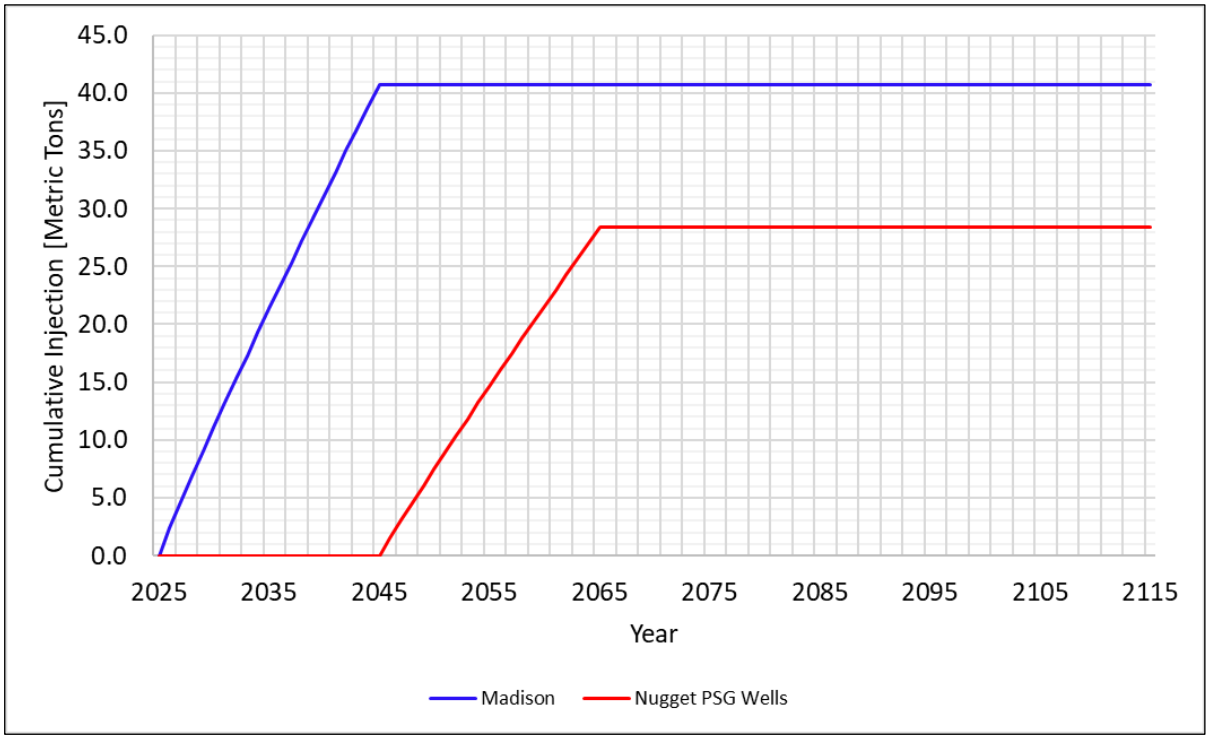


Figure A-2.28. *Cumulative injection over time.*

This Project CO_2 storage capacity was simulated combining the PSG and SCS Hub wells, because the SCS Hub wells are located within the area of interest, and therefore have been included in this study. At the end of the simulation time frame (50 years post-injection for Nugget, 70 years post-injection for Madison), the trapping mechanism in the field is distributed as follows: 13% through dissolution in the aqueous phase, 47% as immobile (residually trapped) CO_2 vapor and 40%) mobile CO_2 vapor trapped via stratigraphic layering (**Figure A-2.29**).

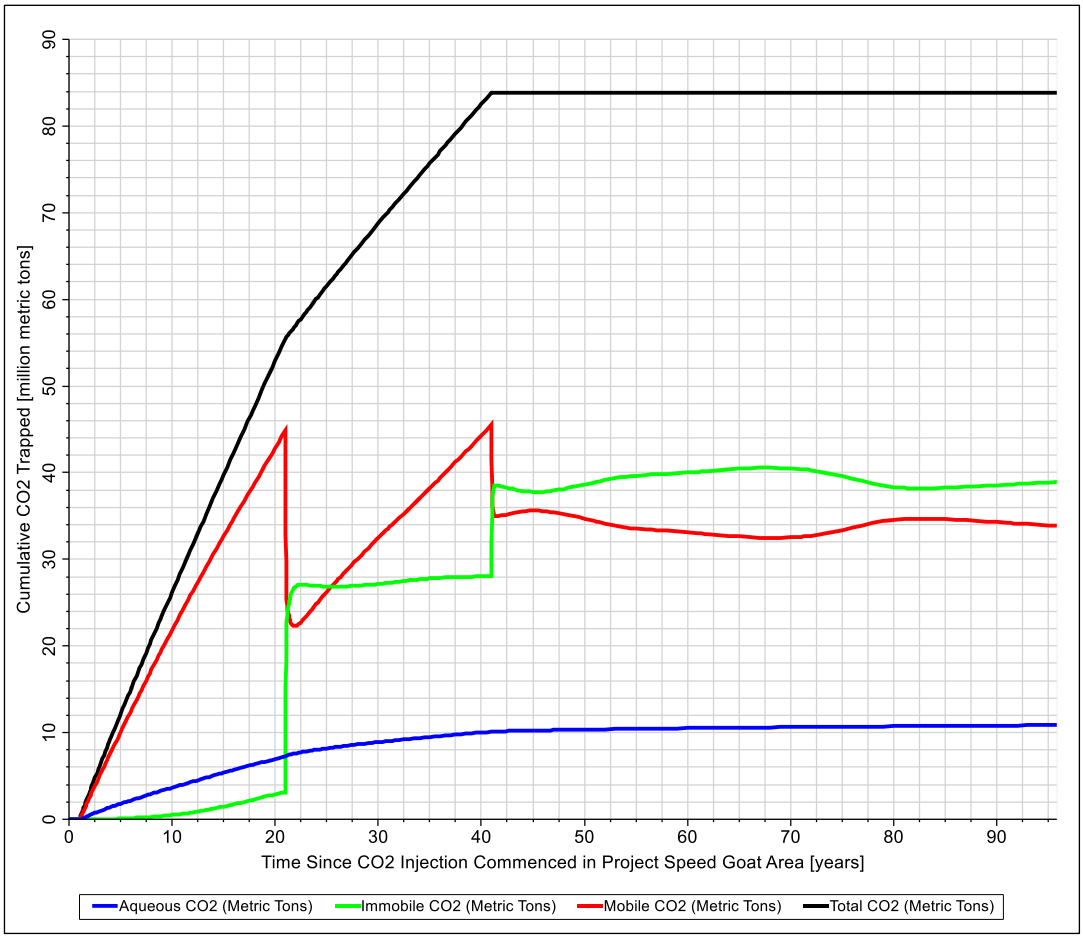


Figure A-2.29. *Field aqueous, mobile vapor and immobile vapor trapping mechanisms over time.*

2.1.3.2 CO_2 Plume and Associated Pressure Front AoRs

This section presents the CO_2 plumes and pressure front results for the Nugget and the Madison. First, a cross-section of the CO_2 plumes will be discussed, followed by an aerial extent of the CO_2 plume figures and the pressure front maps. The CO_2 plumes grow radially for both reservoirs and stabilize one-year post-injection, while the pressure front changes over time. The final AoR is the Madison pressure-based AoR at its injection cessation.

A vertical cross-section of the Nugget and Madison CO_2 plumes (gas saturation >2%) at plume stabilization is illustrated in **Figure A-2.30**. Note the CO_2 plume tends to grow radially during the injection period and accumulates under the Twin Creek, the Nugget upper confining zone, and under the Amsden, the Madison upper confining zone. The Nugget plumes at SG-7 are resultant of the CO_2 injected into the nearby SCS Hub wells.

CO_2 plumes and pressure front growth over the 20-year injection period for the Nugget are shown in **Figure A-2.30** and **Figure A-2.31.** The Madison CO_2 and pressure front are shown in **Figure A-2.32** and **Figure A-2.33.**

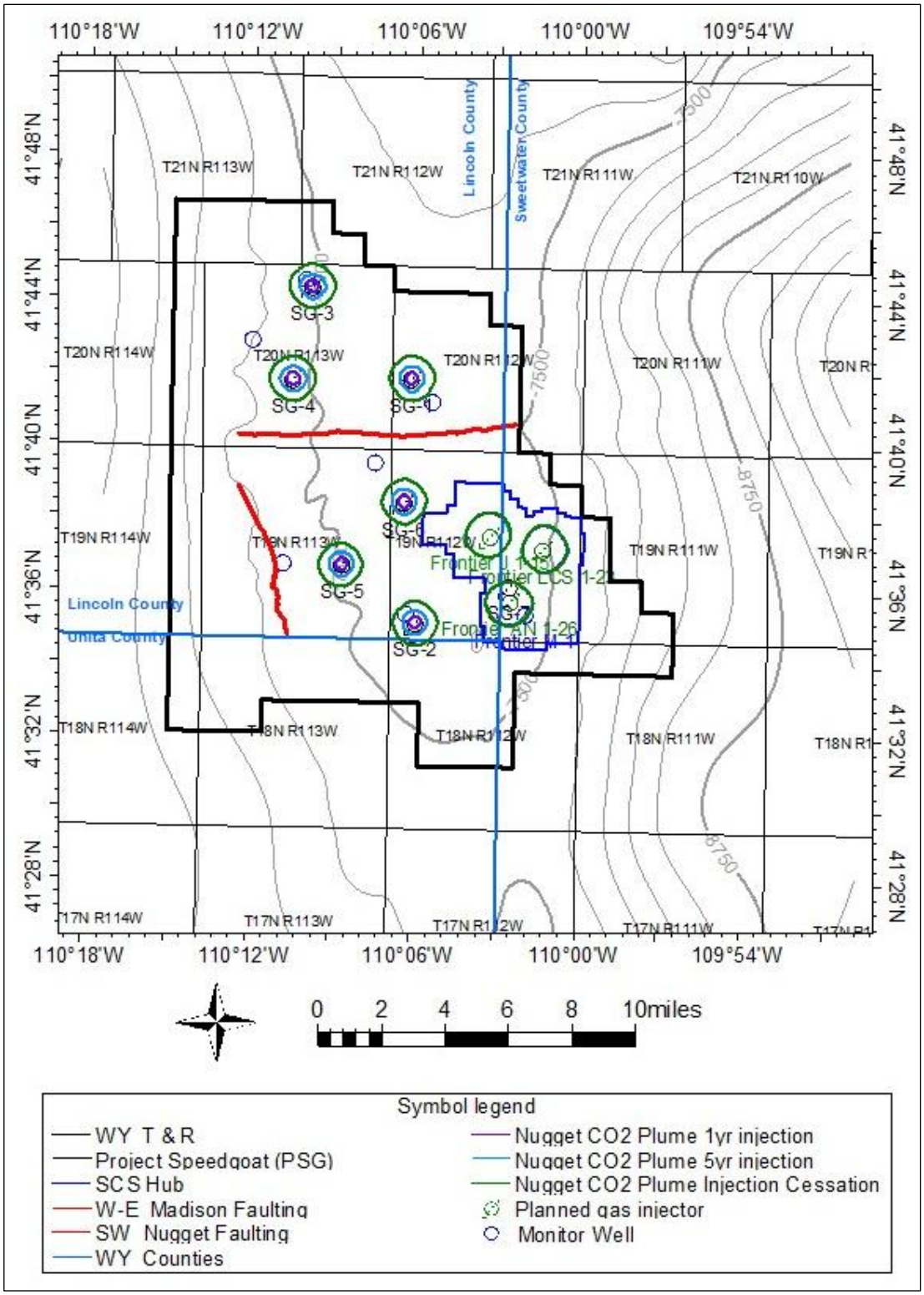


Figure A-2.30. *Nugget CO_2 plumes of PSG wells at 1- , 5-year of injection, and at injection cessation. SCS Hub Nugget CO_2 plumes are also present. Nugget structural contour interval is 250 feet.*

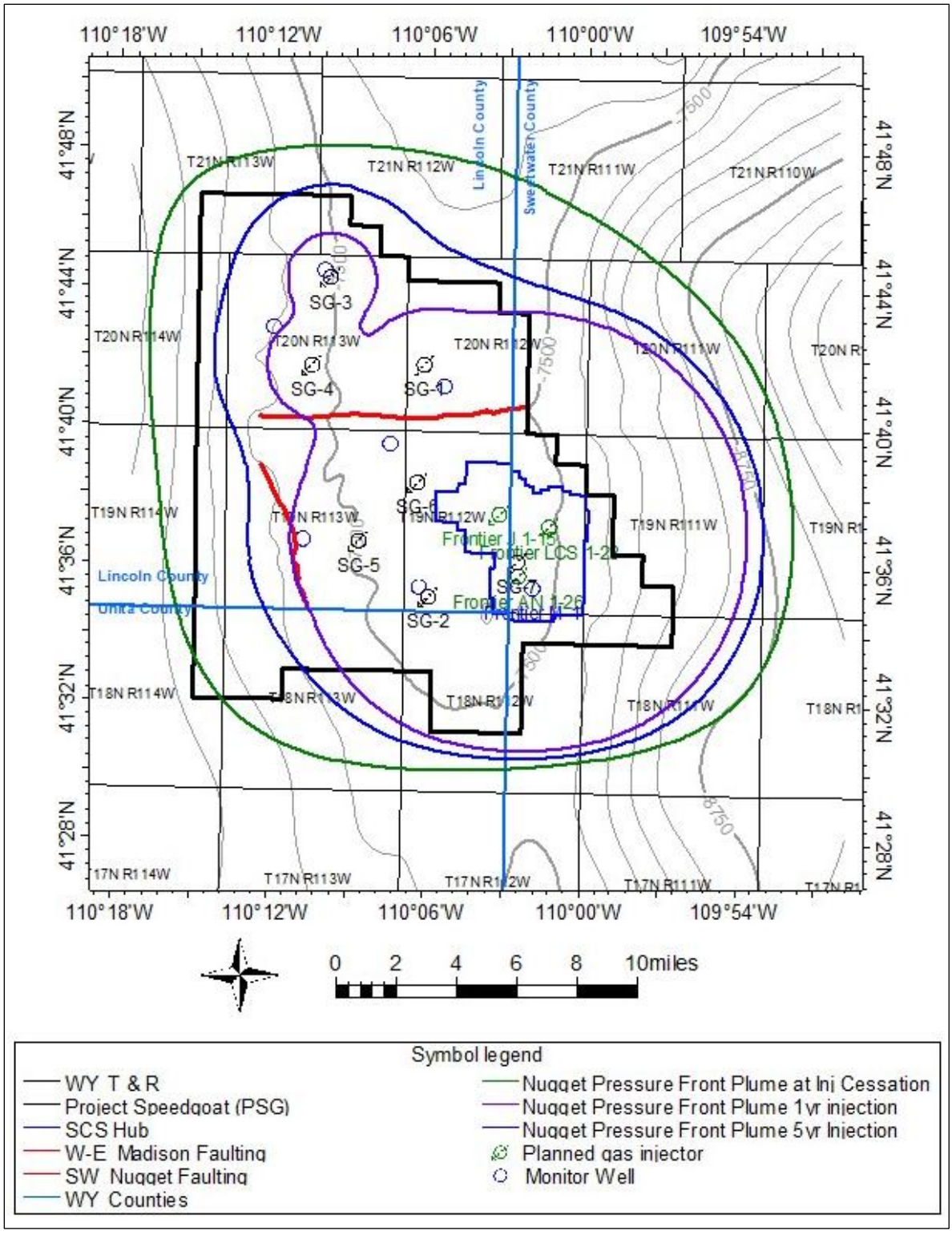


Figure A-2.31. *Nugget pressure front at 1-, 5-year of injection and at injection cessation. Nugget structural contour interval is 250 feet.*

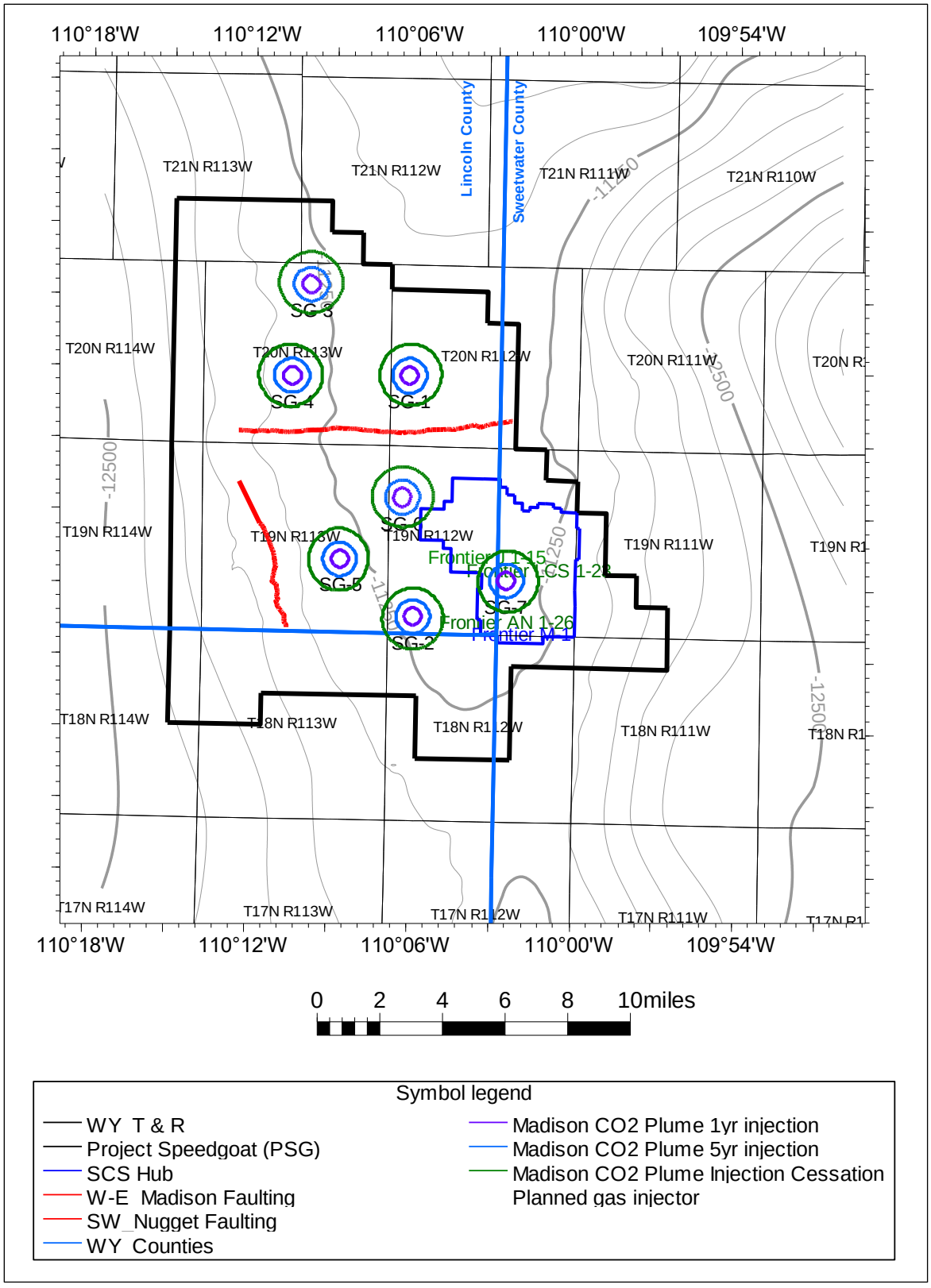


Figure A-2.32. *Madison CO_2 plumes at 1-, 5-year of injection and at injection cessation. Madison structural contour interval is 250 feet.*

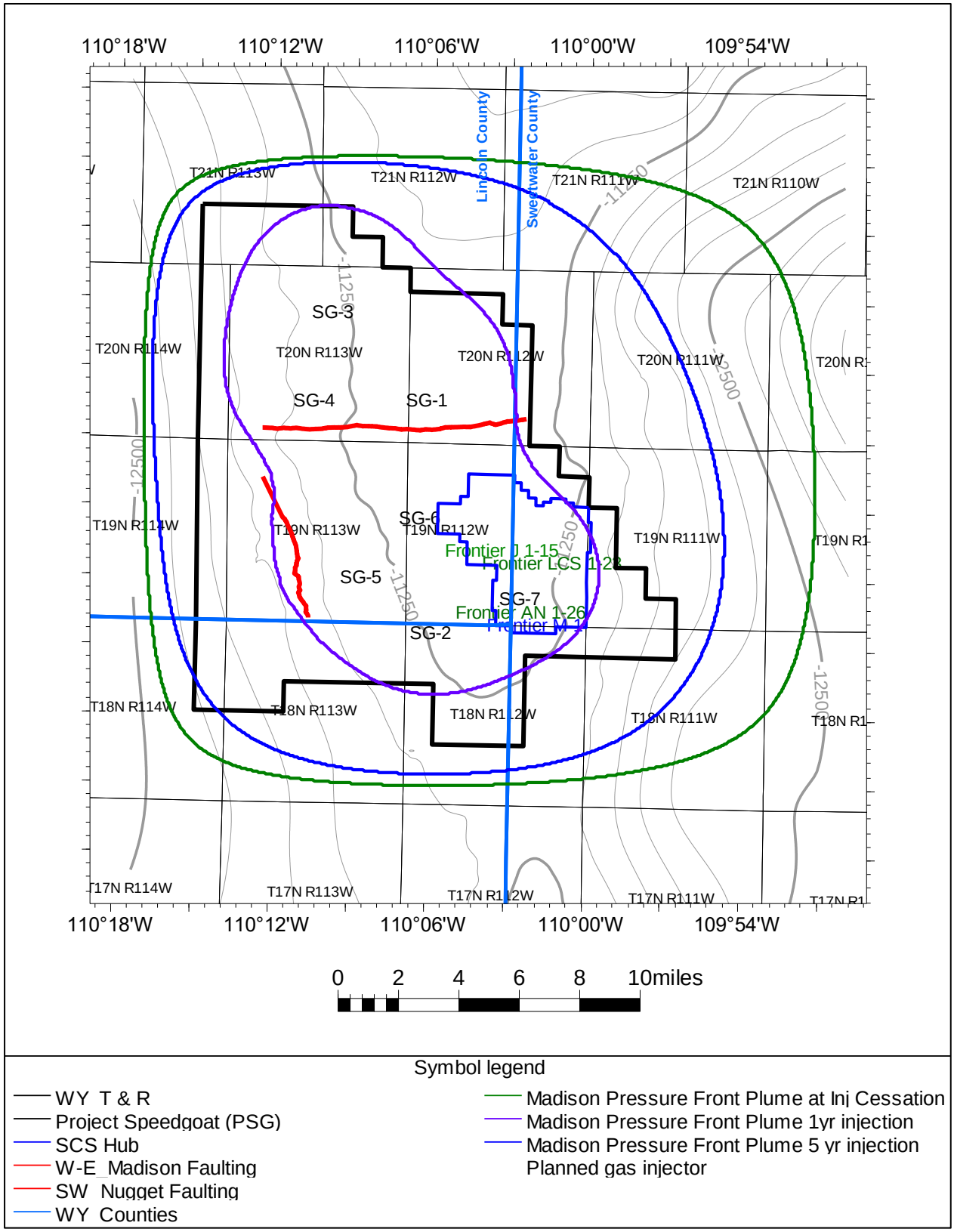


***Figure A-2.33**. Madison pressure front plumes at 1-, 5-year of injection and at injection cessation. Madison structural contour interval is 250 feet.*

Figure A-2.35 presents the CO_2 plume 1 year, 20 years, and 50 years post-injection for the Nugget based on modeling results. The results show no significant difference in the plume size after the 1-year post-injection period, demonstrating plume stability.

The Nugget pressure front at 1 year, 20 years, 50 years, and 100 years post-injection based on simulation results is shown on **Figure A-2.36**. The results show that the pressure front decreases starting at 50 years post-injection, indicating that pressure is being dissipated over time. A pressure front is still observed in the Nugget at 100 years post-injection (**Figure A-2.37**). Therefore, the pressure does not fully dissipate within the simulation time scale.

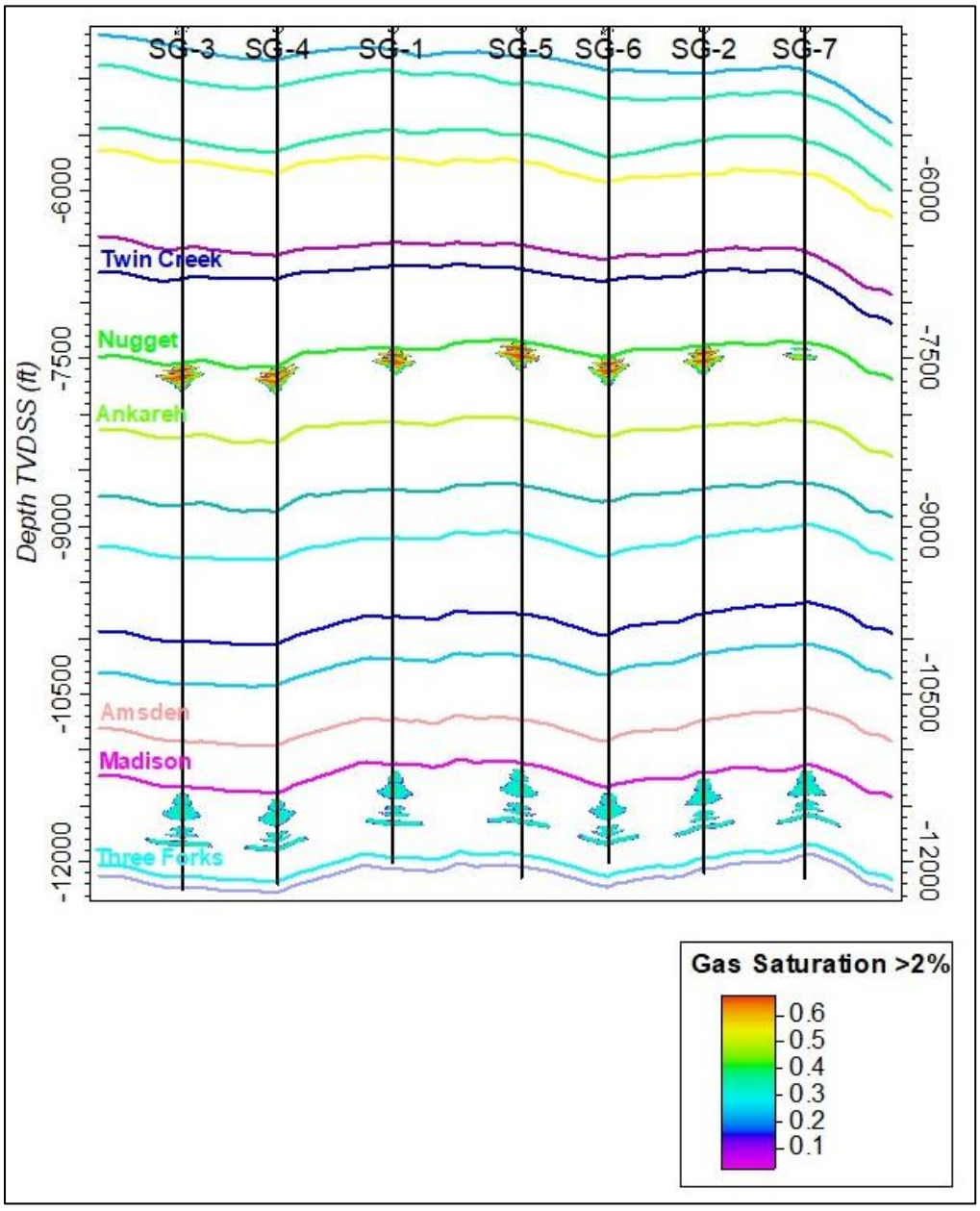


***Figure A-2.34**. Madison and Nugget CO_2 plume cross section at plume stabilization.*

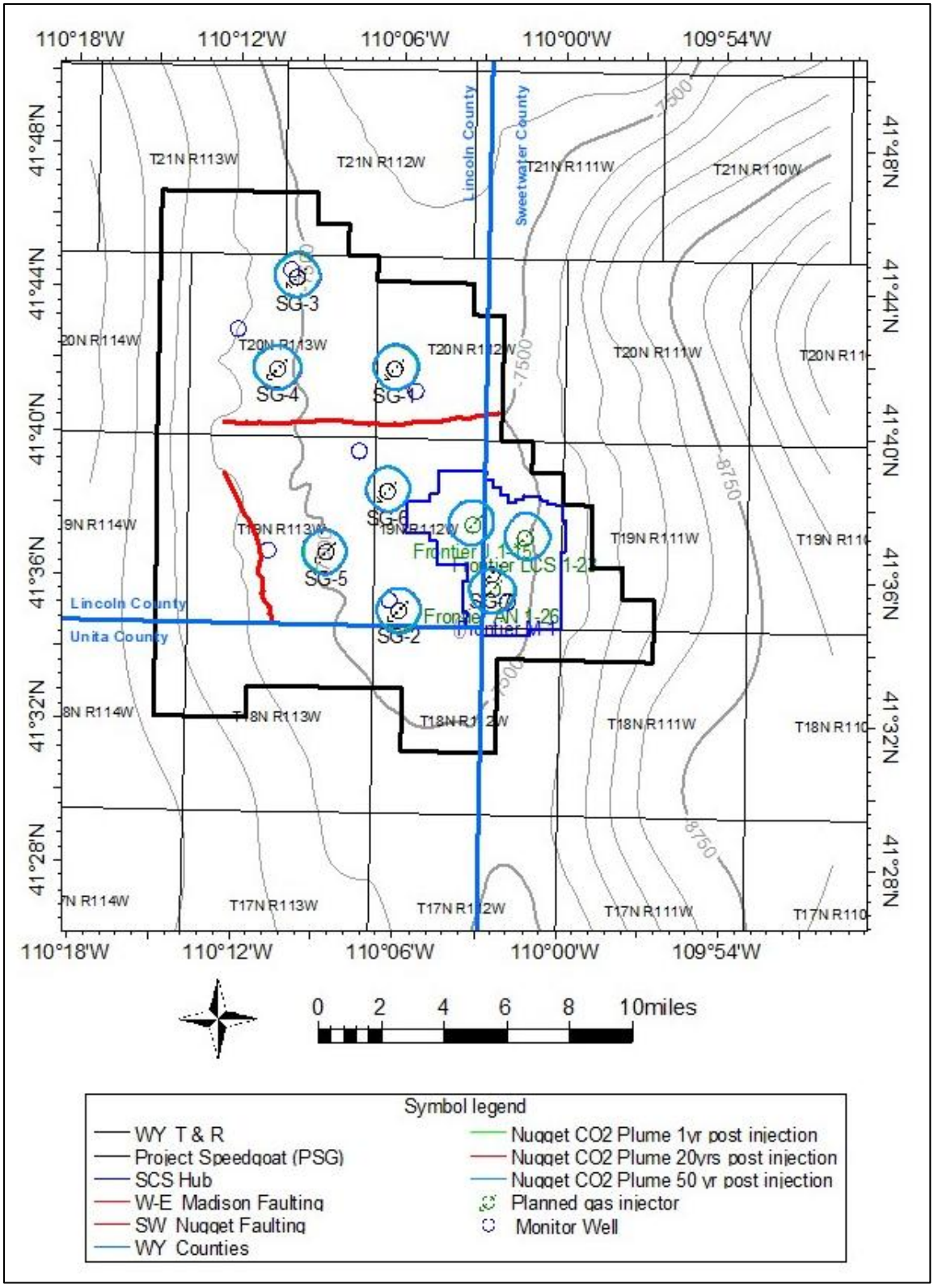


***Figure A-2.35**. Nugget CO_2 plumes at 1 year, 20 years, and 50 years post injection. Note the CO_2 plumes are the same size and directly overlap each other. Nugget structural contour interval is 250 feet.*

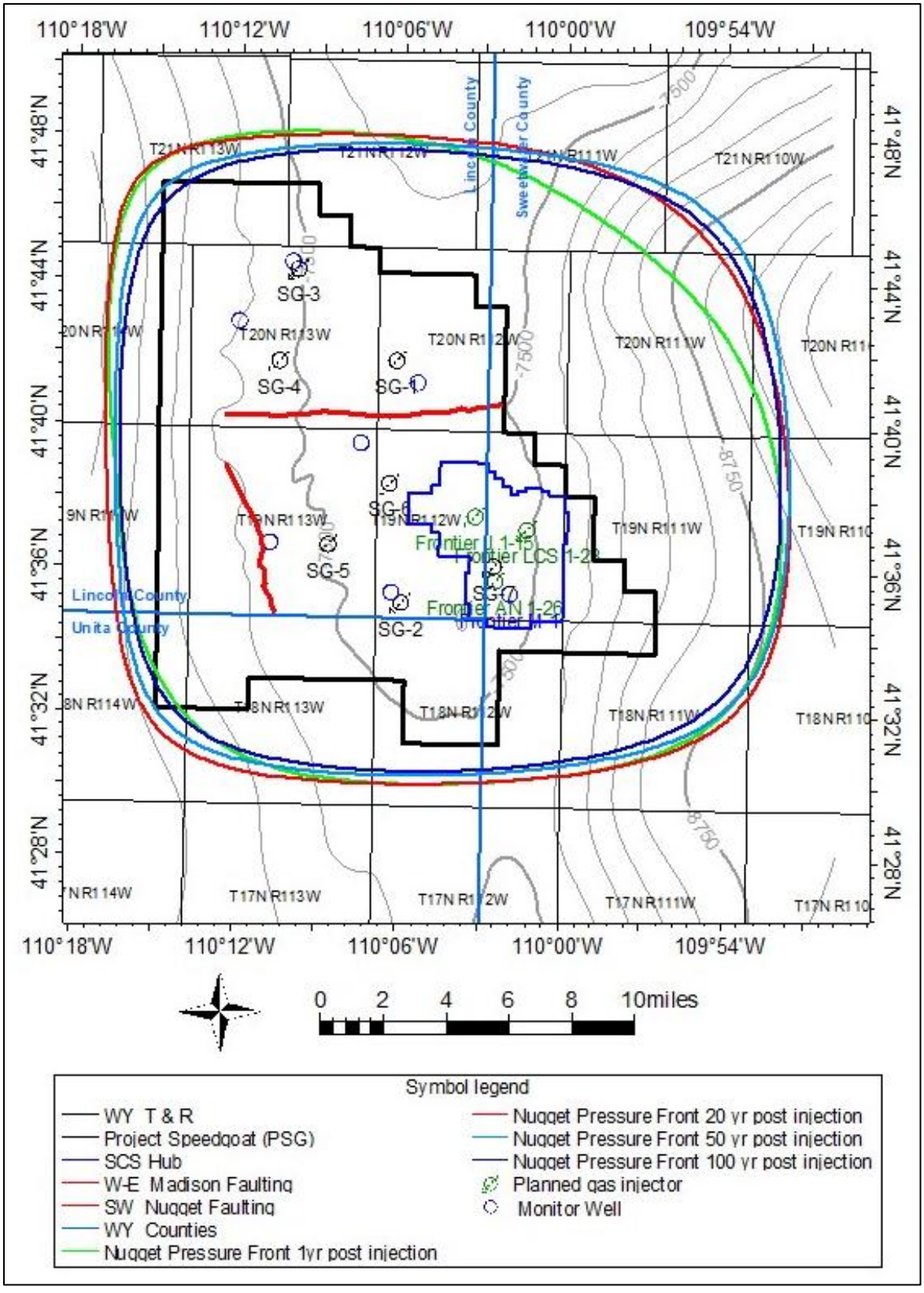


Figure A-2.36*. Nugget pressure front at 1 year, 20 years, 50 years, and 100 years post injection. Nugget structural contour interval is 250 feet.*

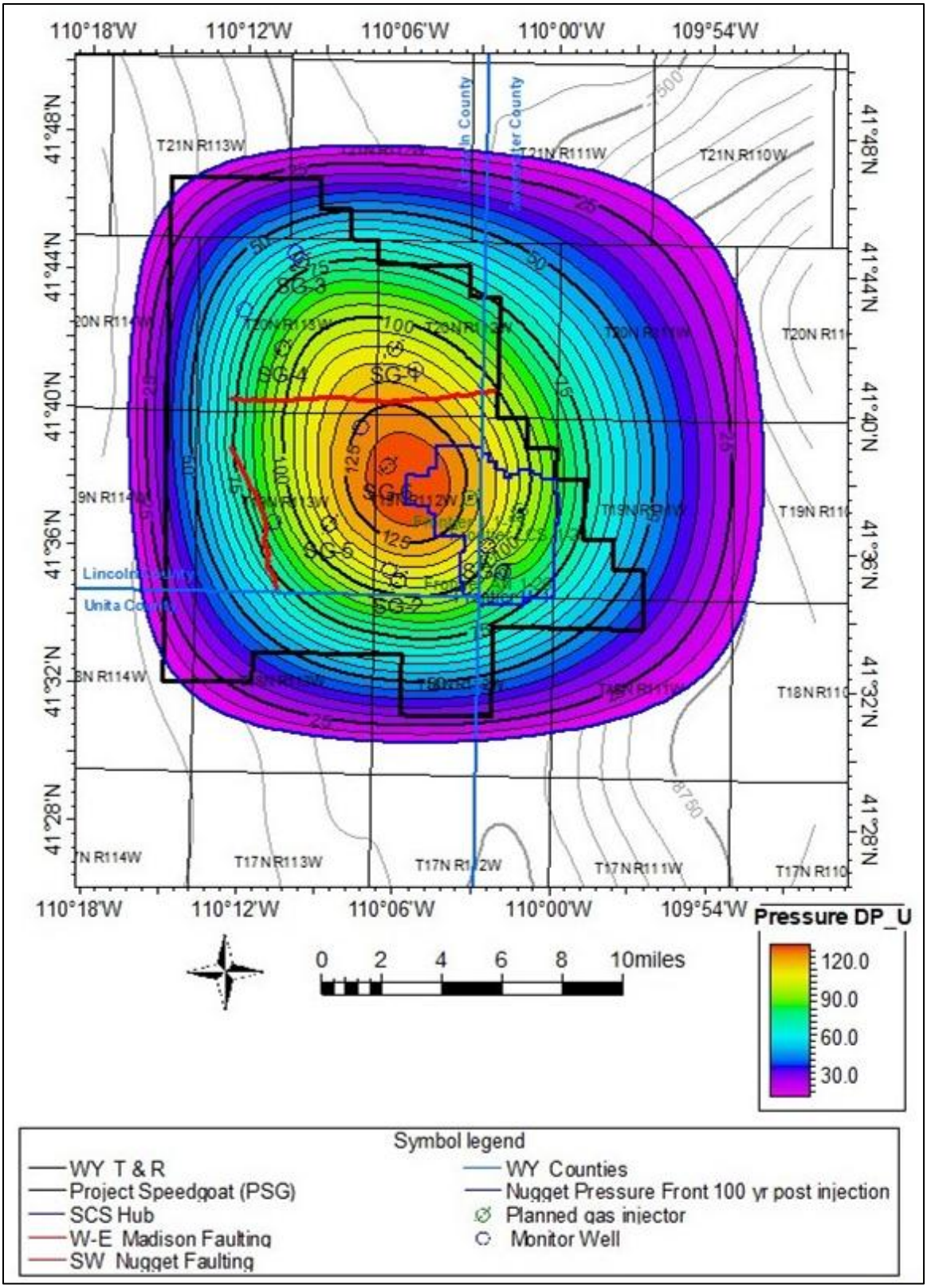


Figure A-2.37. *Nugget pressure front at 100 years post injection; pressure contour interval is 5 psi; structural contour interval is 250 feet.*

The modeling results for the Madison CO_2 plumes are presented in **Figure A-2.38** for the 1 year, 20 years, and 50 years post-injection dates. The results show no significant difference in the plume size after the 1-year post-injection period, demonstrating plume stability. **Figure A-2.39** illustrates the simulated pressure fronts for the Madison at 1 year, 20 years, and 50 years post-injection. Over time, the pressure front begins to decrease, resulting in a pressure front fully dissipated at 70 years post-injection

For comparison, the largest CO_2 plumes in the Nugget, the largest CO_2 plumes in the Madison, the largest pressure front in the Nugget, and the largest pressure front in the Madison are plotted in **Figure A-2.40**. Because the pressure front delineated by the area where the pressure increase is greater than the critical pressure in the field is greater than the CO_2 plume boundary, the PSG AoR is determined by pressure. The final AoR is from the Madison interval, encompassing approximately 22 miles at its maximum extent, shown in **Figure A-2.41**.

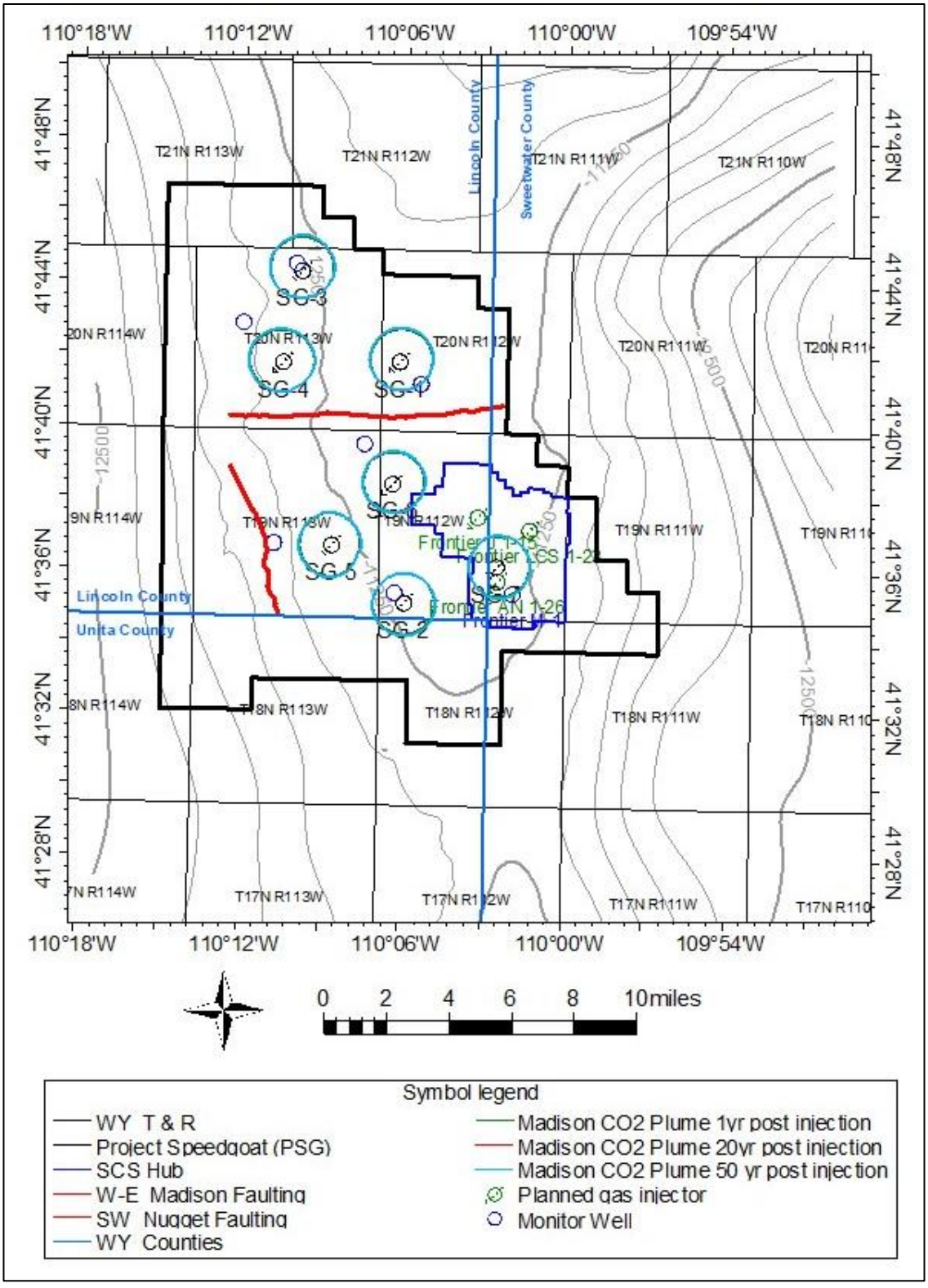


Figure A-2.38. *Madison CO_2 plumes at 1 year, 20 years, and 50 years post injection. Note that the CO_2 plumes are the same size and directly overlap each other. Madison structural contour interval is 250 feet.*

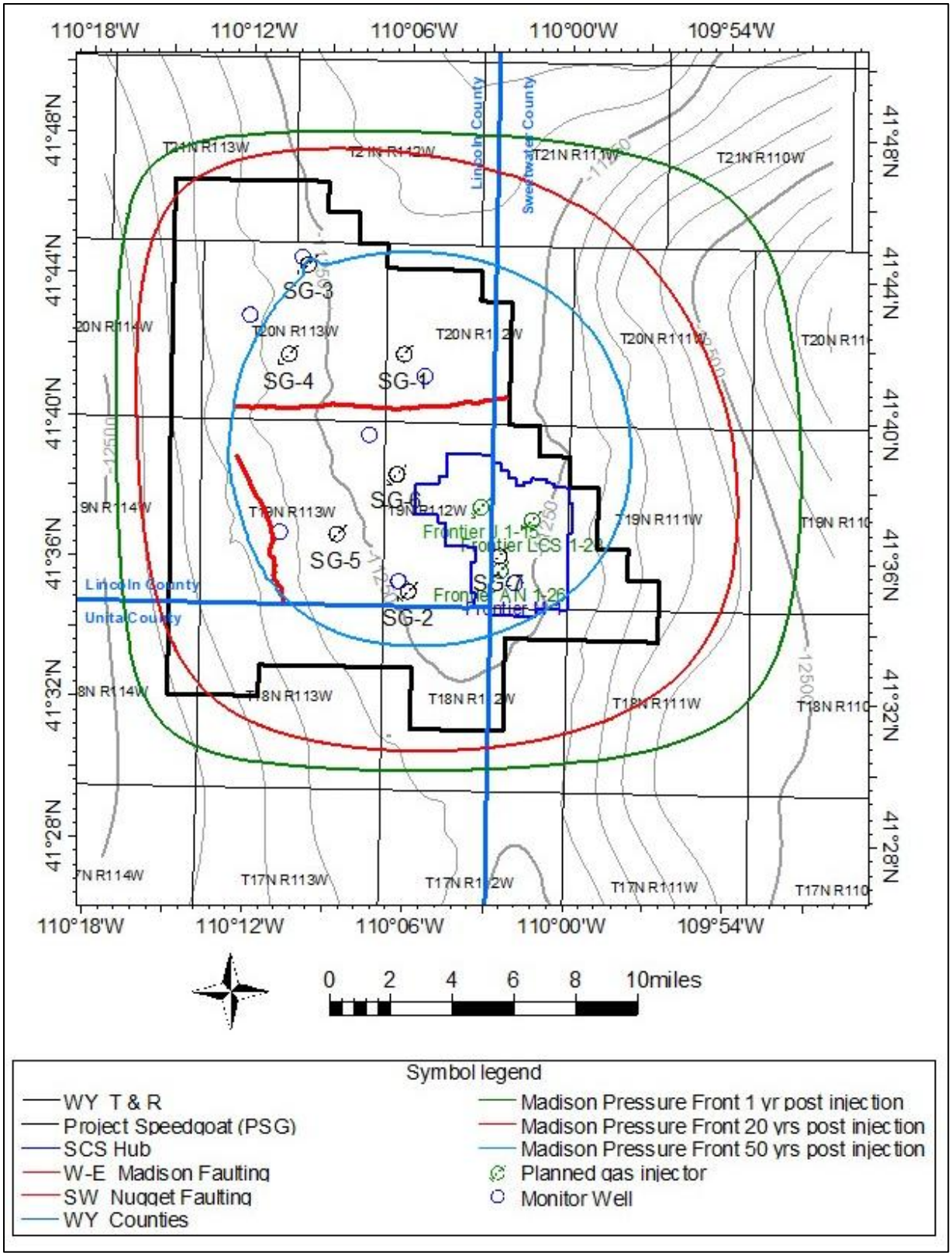


***Figure A-2.39**. Madison pressure front at 1 year, 20 years, and 50 years, and 100 years post injection; Madison structural contour interval is 250 feet.*

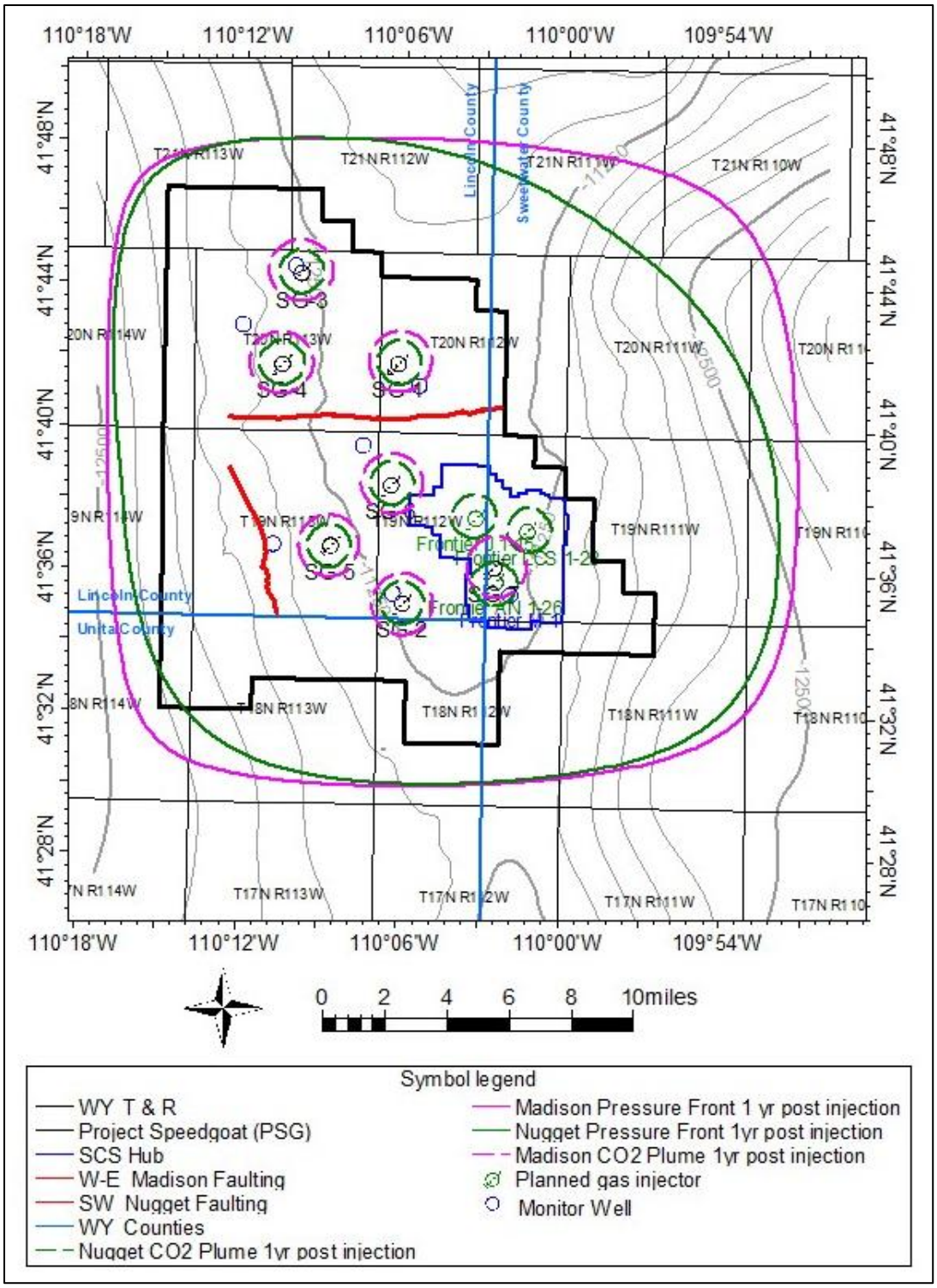


***Figure A-2.40**. Largest CO_2 plumes in the Nugget, largest CO_2 plumes in the Madison, largest pressure front in the Nugget and largest pressure front) in the Madison. Madison structural contour interval is 250 feet.*

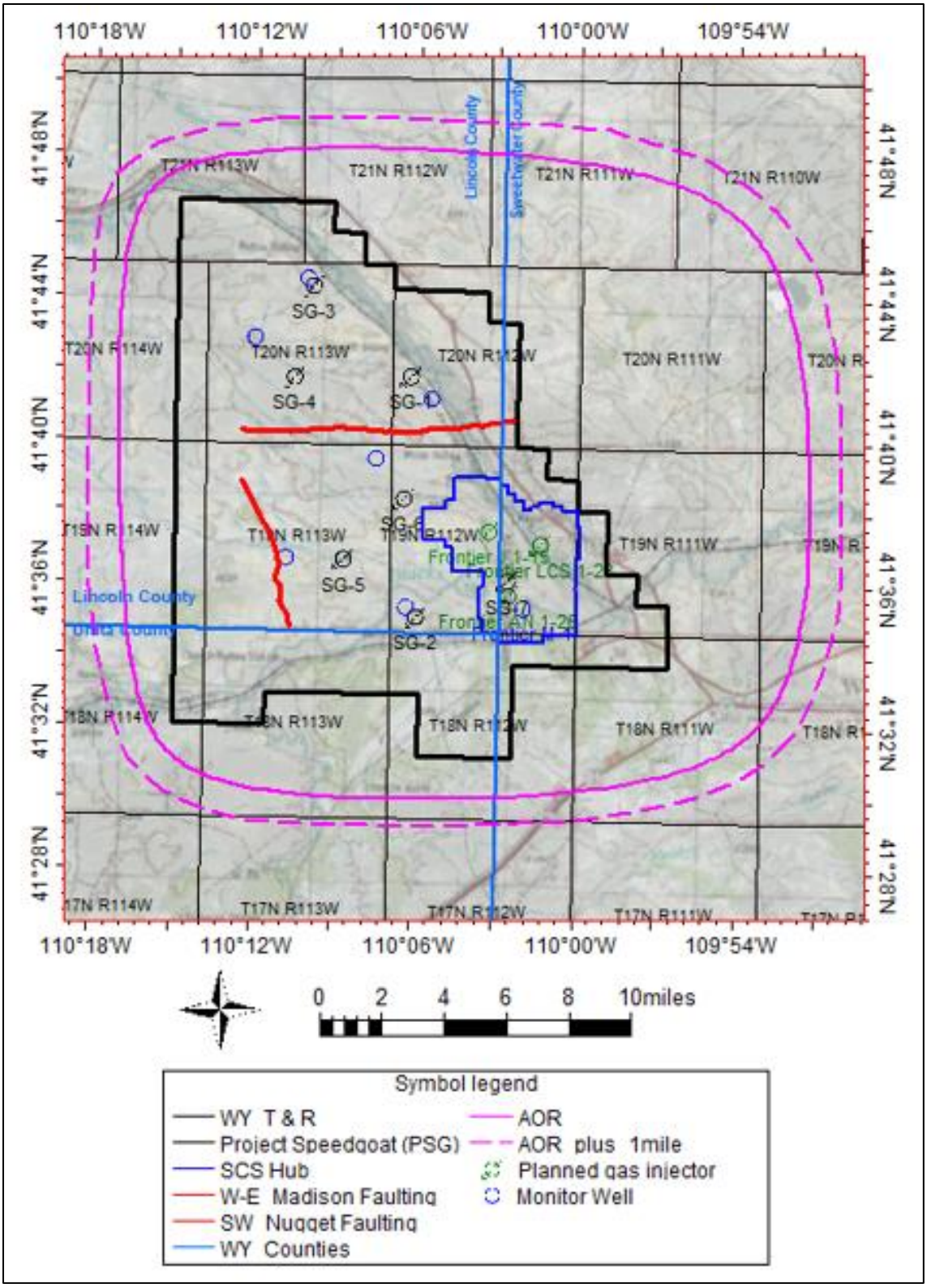


Figure A-2.41. *Delineated PSG AoR and AoR plus 1-mile boundaries.*

2.1.3.3 Model Uncertainties and AoR Re-evaluation

A sensitivity analysis is performed to address the limited petrophysical and engineering data available for the Nugget and Madison Formations within the PSG area. Key uncertain parameters identified are porosity, permeability, vertical permeability, imbibition critical gas saturation, maximum gas relative permeability, and fault transmissibility. Moreover, AoR re-evaluations will be conducted upon completion of history matching to compare the observed and simulated AoR. This is further covered in section ***2.1.4 Model Calibration and Validation***.

2.1.4 Model Calibration and Validation

Since no injection has occurred in the vicinity, including the SCS Hub, there is no analog or history matching to be performed. The current PSG model was calibrated using publicly available data, such as relative permeability curves, pore pressure gradient, and temperature gradient. Therefore, published literature provides reasonable estimates for dynamic simulation based on the current understanding of the reservoir. Still, the model will be recalibrated following the acquisition and analysis of site-specific data. For AoR re-evaluations, history matching will be performed to compare the observed and simulated AoR, and hence help evaluate the assumptions and accuracy of simulation over time.

2.1.4.1 Sensitivity Analysis

The uncertainty within this model was addressed through a sensitivity analysis. Single variable sensitivity analysis was used to examine how one variable affects the overall result of the conceptual layer cake model while keeping all other inputs consistent for comparison. The petrophysical and engineering parameters used in the sensitivity analysis and their range are listed in **Table A-2.11** and included:

- Porosity
- Permeability
- Vertical permeability
- Imbibition critical gas saturation
- Maximum gas relative permeability
- Fault transmissibility

These parameters were selected because they are most likely to affect the growth and size of the CO_2 plumes and pressure front. A discussion of each of the parameters, their uncertainty range, and their effect on the CO_2 plumes and pressure front follows. It should be noted that the largest plumes in sensitivity analysis were within the bounds of the PSG lease area. For all sensitivity parameters, the pressure front was greater than the CO_2 plumes. Since the PSG AoR is the Madison pressure-based AoR at injection cessation, the effects of sensitivity on PSG AoR are represented by the Madison AoR, for all parameters.

Table A-2.11. Computational Simulation Sensitivity Parameters			
Parameters	**Base Case**	**Low Case**	**High Case**
Porosity Multiplier	NA	-25%	+25%
Por/Perm Transform	Nugget: log10(Permeability) = 3.832552 * log10(Effective Porosity) + 4.916317 Madison: log10(Permeability) = + 4.558733 * log10(Effective Porosity) + 5.210628		
kv/kh Ratio	0.1	0.01	0.80
Imbibition Critical Gas Saturation	Nugget: 0.51 Madison: 0.22	Nugget: 0.55 Madison: 0.25	Nugget: 0.57 Madison: 0.30
Nugget Max Gas Relative Permeability	0.08	0.01	0.20
Madison Max Gas Relative Permeability	0.05	0.01	0.20
Fault Transmissibility Multiplier	1	0	0.5

Porosity Multiplier and Permeability Transform

A porosity multiplier of +/- 25% was selected to account for uncertainty in the logging tool measurement and the interpretation. The logging tool measurement uncertainty was defined as per SLB tool specifications. Interpretation uncertainty is qualitative and is based on the amount of log curve editing (due to washouts and other borehole issues) that may affect the accuracy of the log measurement. In general, the Bruff 1 density logs needed a moderate degree of editing. Permeability was calculated based on a transform from porosity during the petrophysical evaluation. Based on the petrophysical log evaluation of the Bruff 1 the Nugget and Madison each have a unique porosity-permeability transform.

Porosity controls the storage space, while permeability controls the flow of the CO_2 through the Nugget and Madison. Since the permeability calculation depends on porosity, their combined effect on the CO_2 plume and pressure front were analyzed. The sensitivity indicates that the porosity multiplier and permeability transform combined have a moderate impact on the CO_2 plume and high impact on the pressure front which determines the size of the AoR.

As modeled when porosity and permeability decrease in the Nugget and Madison, the CO_2 plumes become smaller in both formations. Conversely, when the porosity and permeability increase in both formations, the CO_2 plumes in the Nugget become larger, while in the Madison it remains about the same size as the base case (**Figure A-2.42** and **Figure A-2.43**).

As modeled when Nugget and Madison porosity and permeability decrease, the Nugget AoR becomes smaller. Conversely when the porosity and permeability increases in both formations, the AoR defined by critical pressure becomes larger for the Nugget and smaller for the Madison.(**Figure A-2.44 and Figure A-2.45**). The decrease in the pressure front in the Madison is due to increased porosity and subsequent change in permeability results from a more favorable reservoir that can more quickly dissipate the pressure.

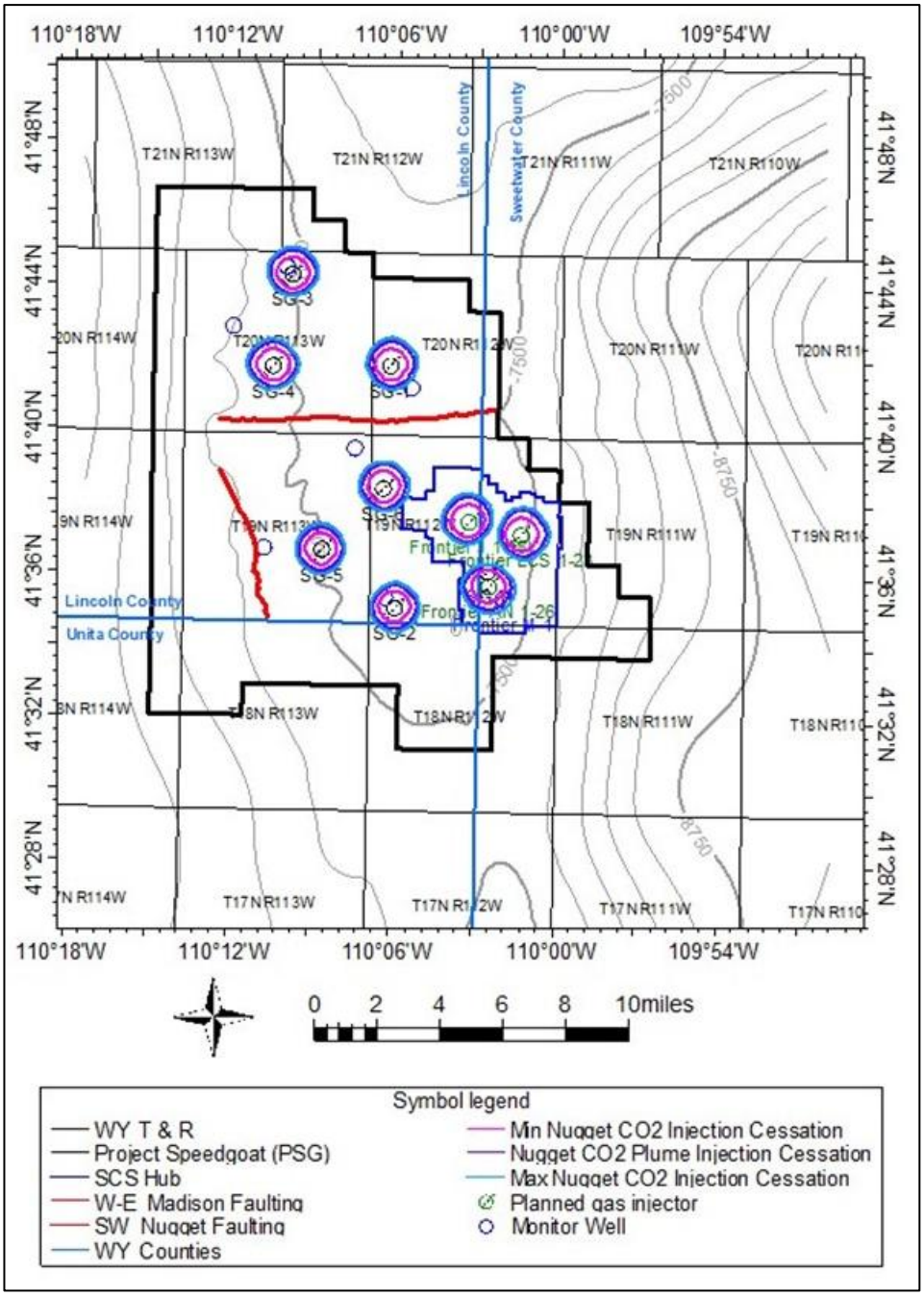


Figure A-2.42. *Nugget CO_2 plume results for porosity multiplier and permeability transform sensitivity. Nugget structural contour interval is 250 feet.*

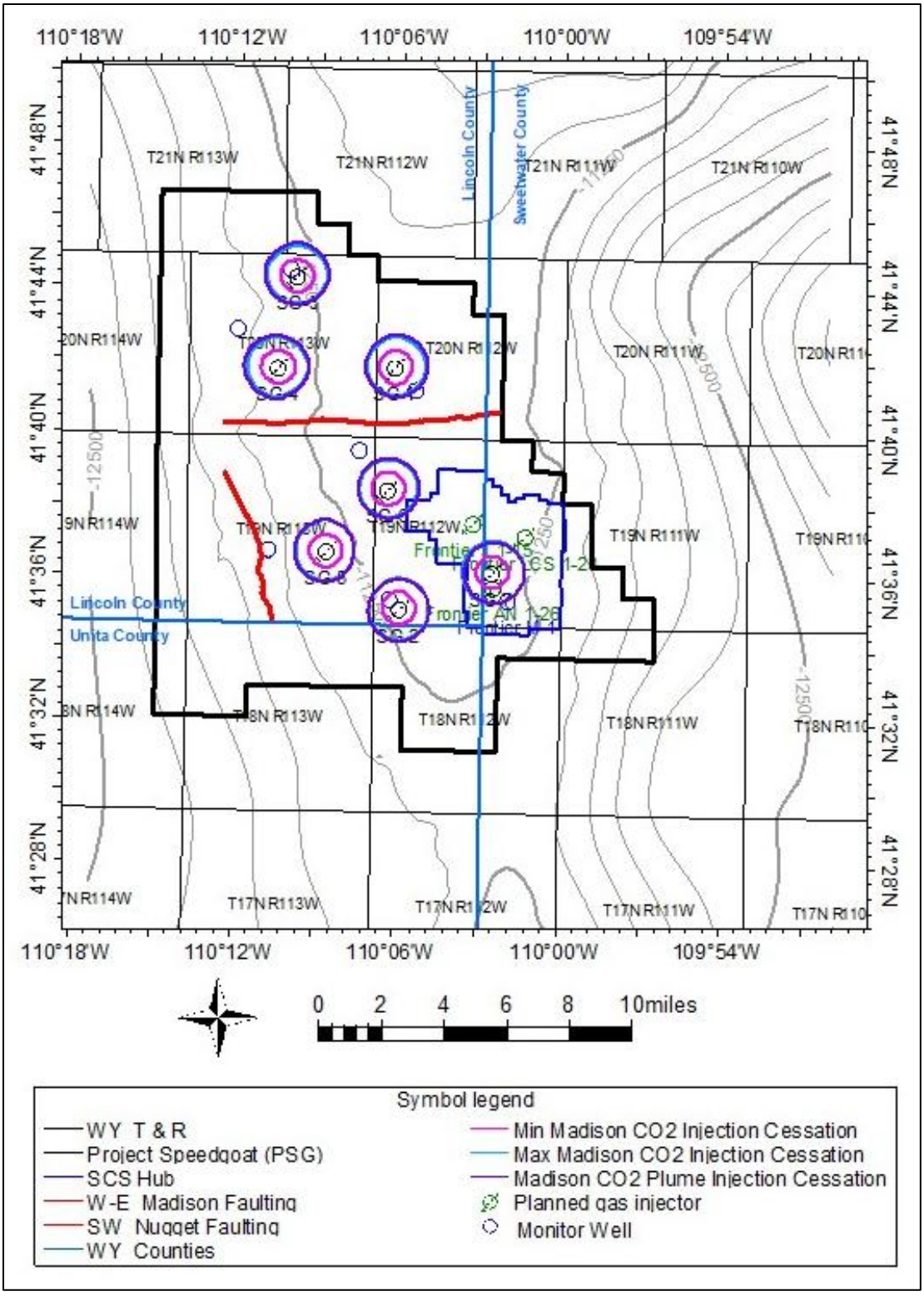


Figure A-2.43. *Madison CO_2 plume results for porosity multiplier and permeability transform sensitivity. Madison structural contour interval is 250 feet.*

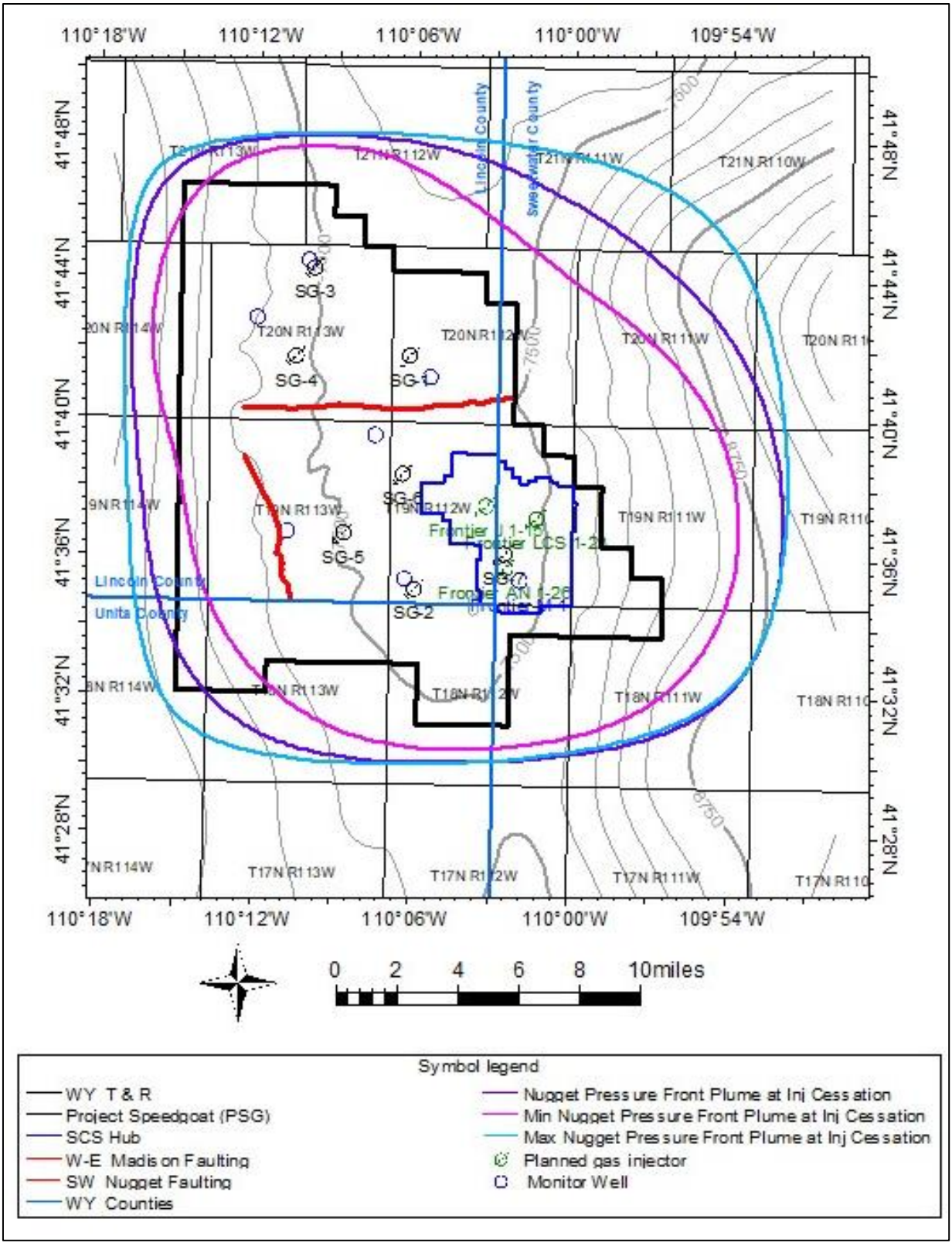


Figure A-2.44. *Nugget pressure plume results for porosity multiplier and permeability transform sensitivity. Nugget structural contour interval is 250 feet.*

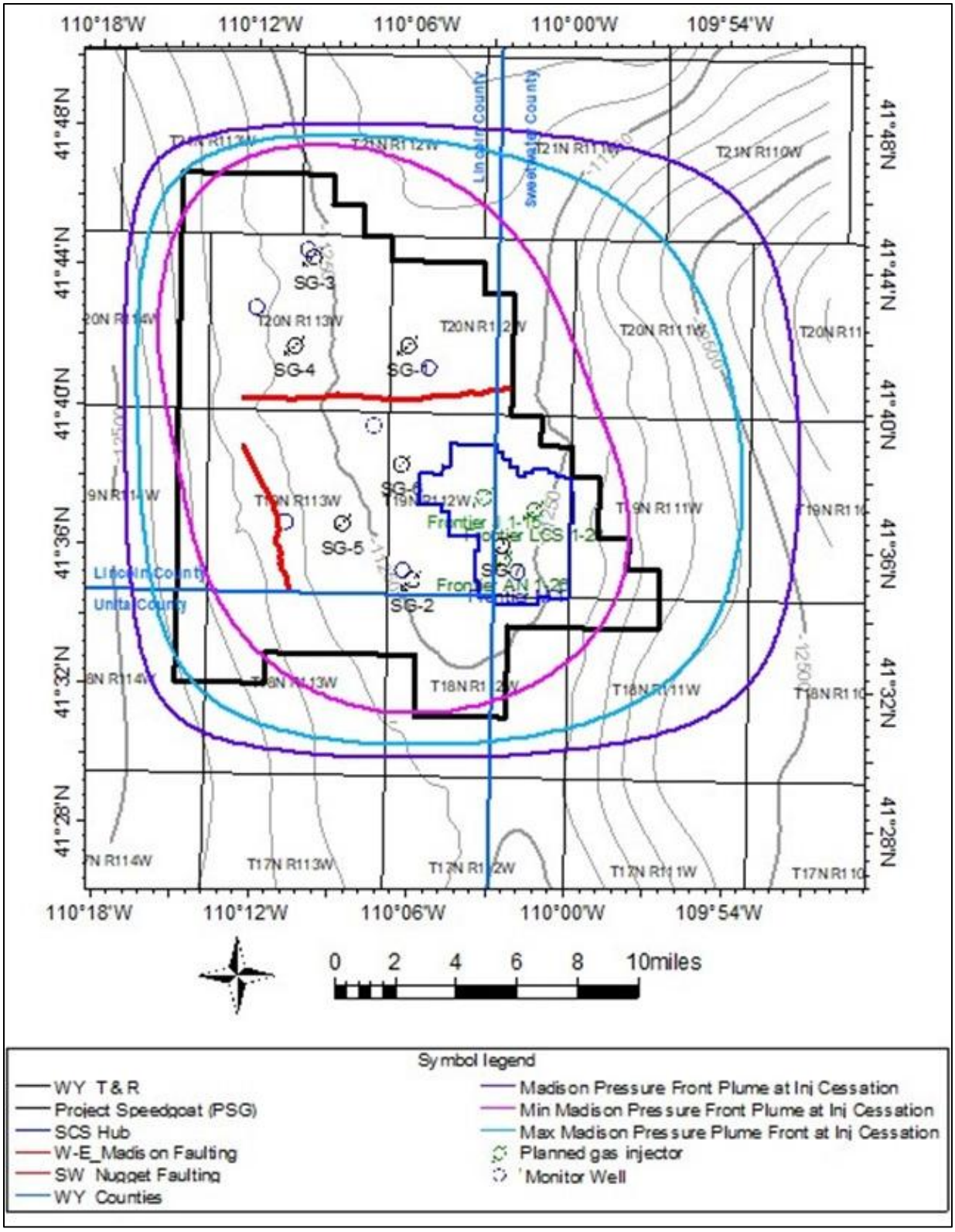


Figure A-2.45. *Madison pressure front and AoR results for porosity multiplier and permeability transform sensitivity. Madison structural interval is 250 feet.*

kv/kh Ratio

The parameter k_v/k_h ratio was modified to address possible changes in lamination, affecting vertical conductivity of the formation. Thus, a minimum value of 0.01 was considered to simulate a highly laminated reservoir, while 0.8 was considered for fewer laminations within a reservoir. These values ensure that a wide range of lamination possibilities can be evaluated. The kv/kh ratio has a low impact on CO_2 plume and a moderate impact on pressure front AoR plume development.

Nugget kv/kh ratio values of 0.01 and 0.8 did not have a significant impact on the CO_2 plume size (**Figure A-2.46**) and are approximately the same size as the base case. As the Nugget kv/kh ratio is decreased from 0.1 to 0.01, the Nugget pressure front increases. This is because the pressure preferentially dissipates laterally because of the vertical lithology constraints of a more laminated reservoir. In contrast, as the Nugget kv/kh ratio is increased from 0.1 to 0.8, Nugget pressure front decreases as the pressure can dissipate more vertically because of fewer laminations (**Figure A-2.47**).

Madison kv/kh values of 0.1 and 0.8 had no significant impact on CO_2 plume size (**Figure A-2.48**), and the plumes are approximately the same size as the base case. As the Madison kv/kh is decreased to represent more laminations, the Madison AoR pressure front increases. However, as Madison kv/kh is increased to represent fewer laminations, Madison AoR pressure front decreases. This indicates that a more laminated reservoir exhibits less vertical pressure dissipation, resulting in an increase in lateral pressure dissipation (**Figure A-2.49**).

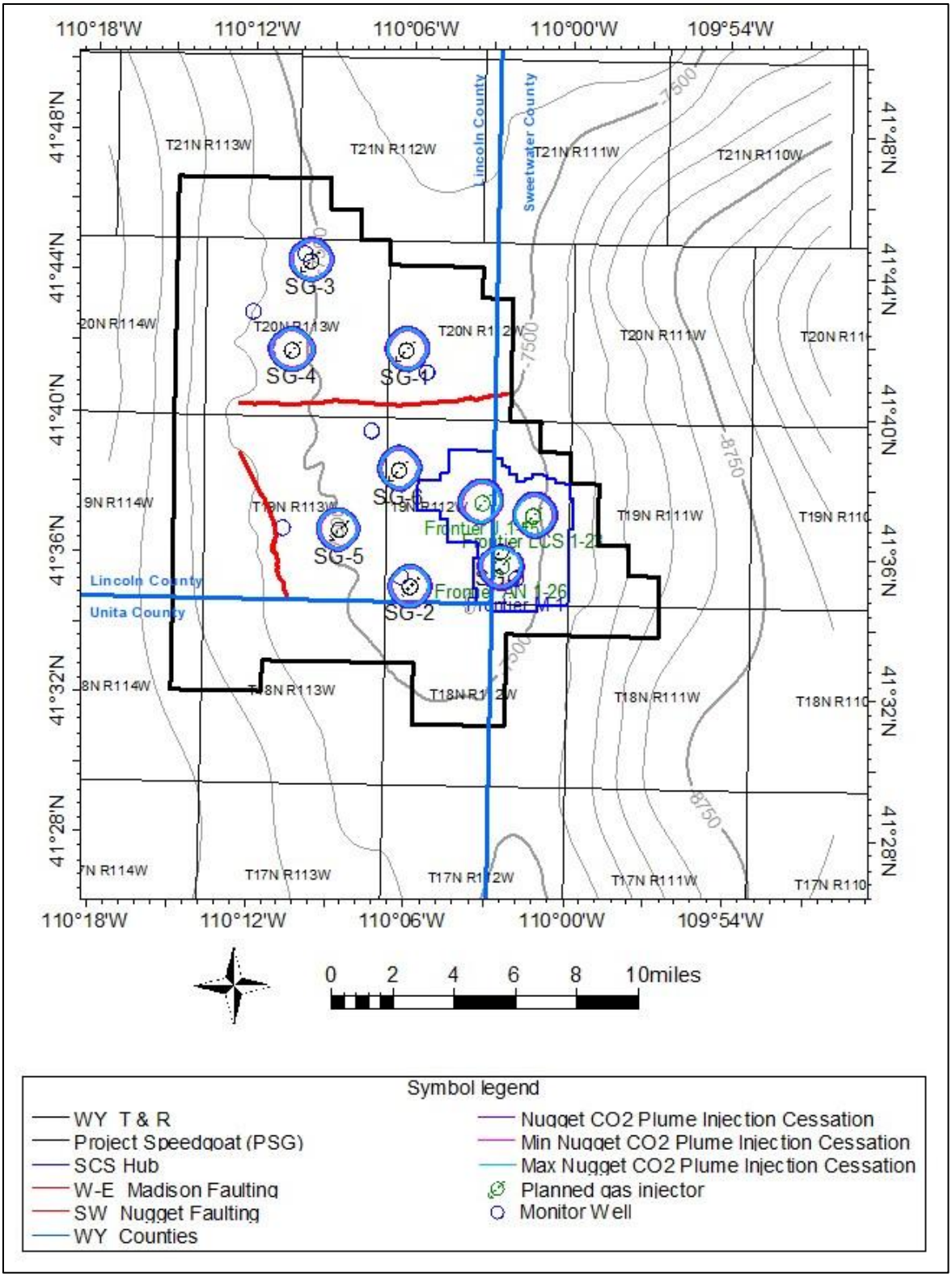


Figure A-2.46. *Nugget CO_2 plume results for kv/kh ratio sensitivity. Nugget structural contour interval is 250 feet.*

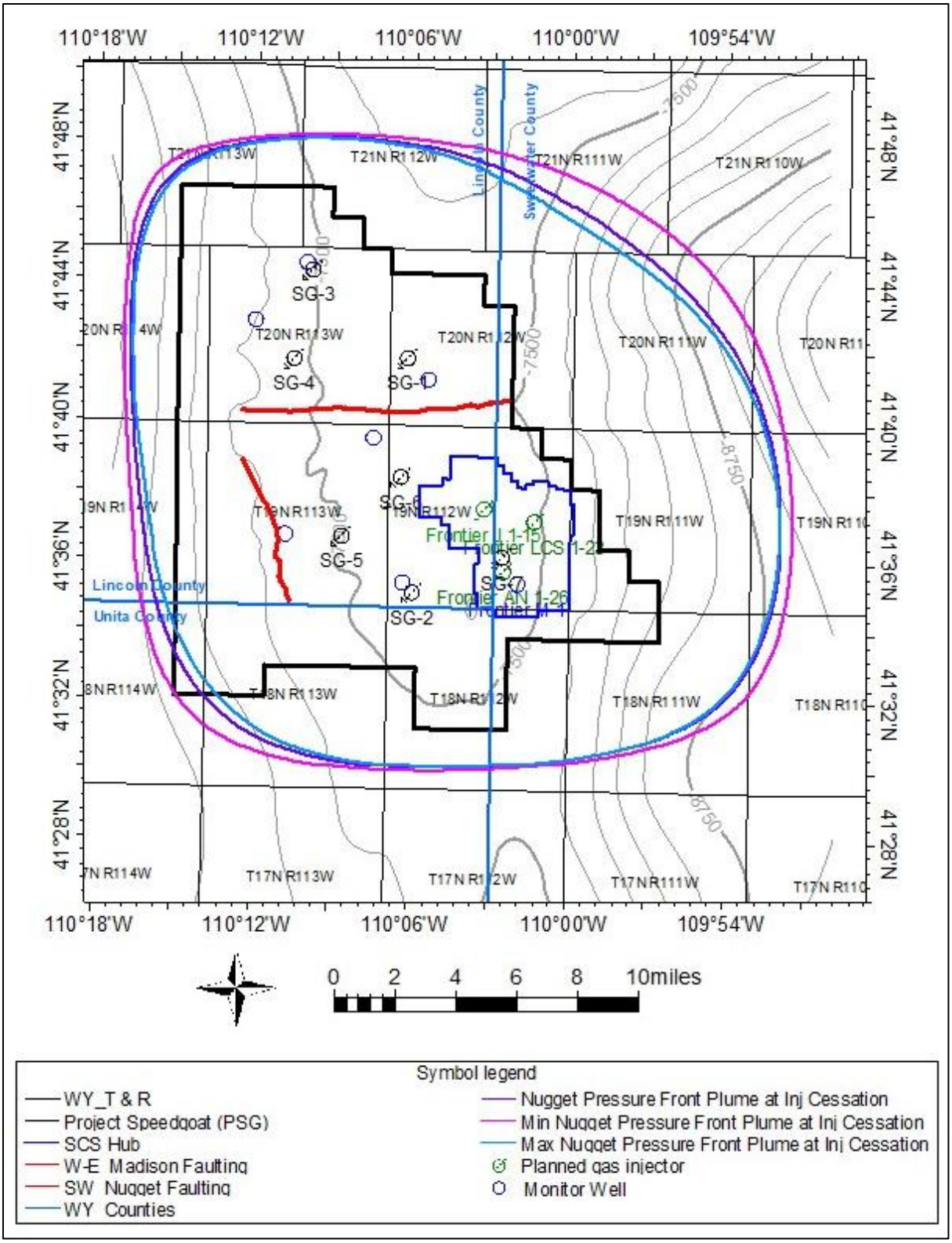


Figure A-2.47. *Nugget pressure front results for kv/kh ratio sensitivity. Nugget structural contour interval is 250 feet.*

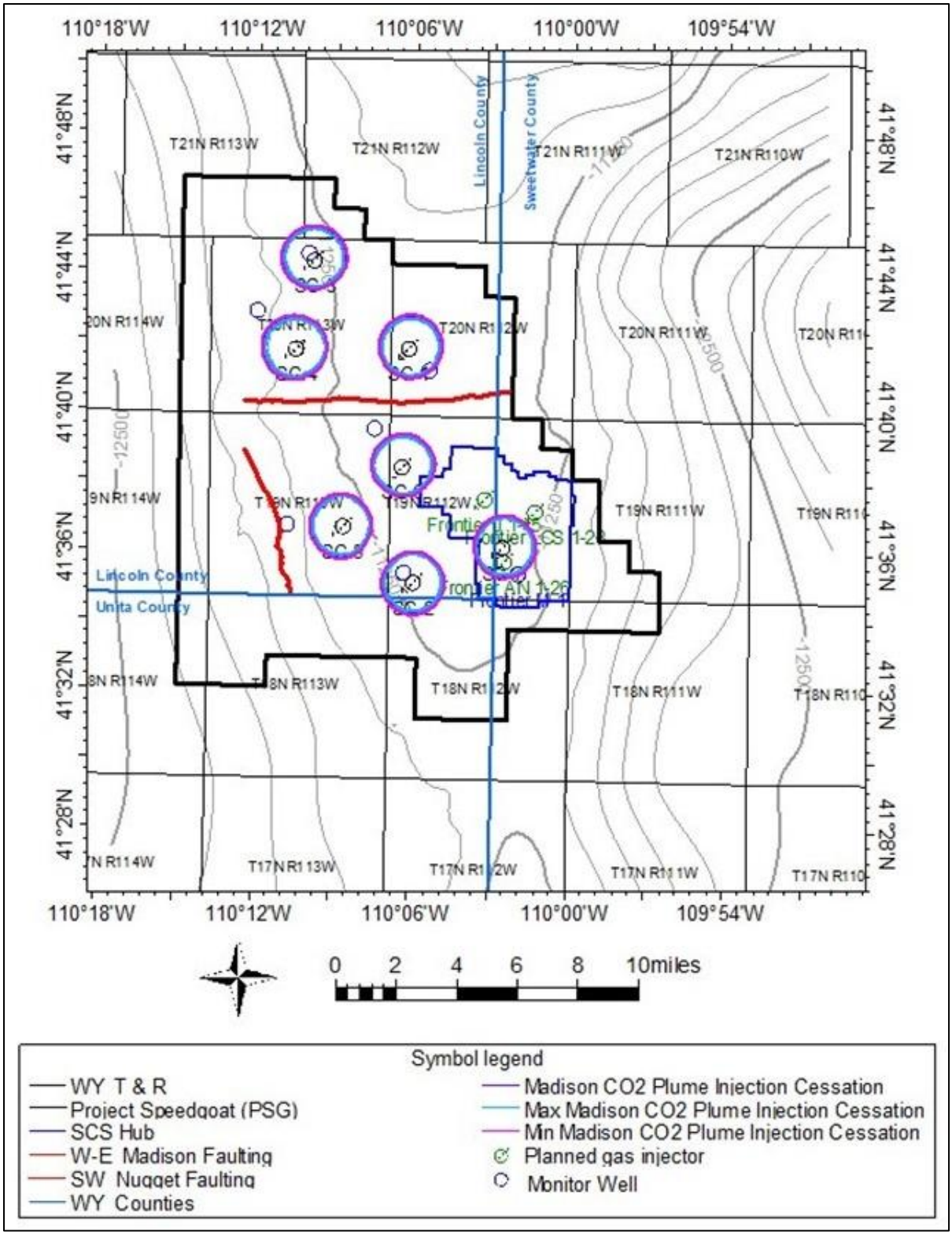


***Figure A-2.48**. Madison CO_2 plume results for kv/kh ratio sensitivity; Madison structural contour interval is 250 feet.*

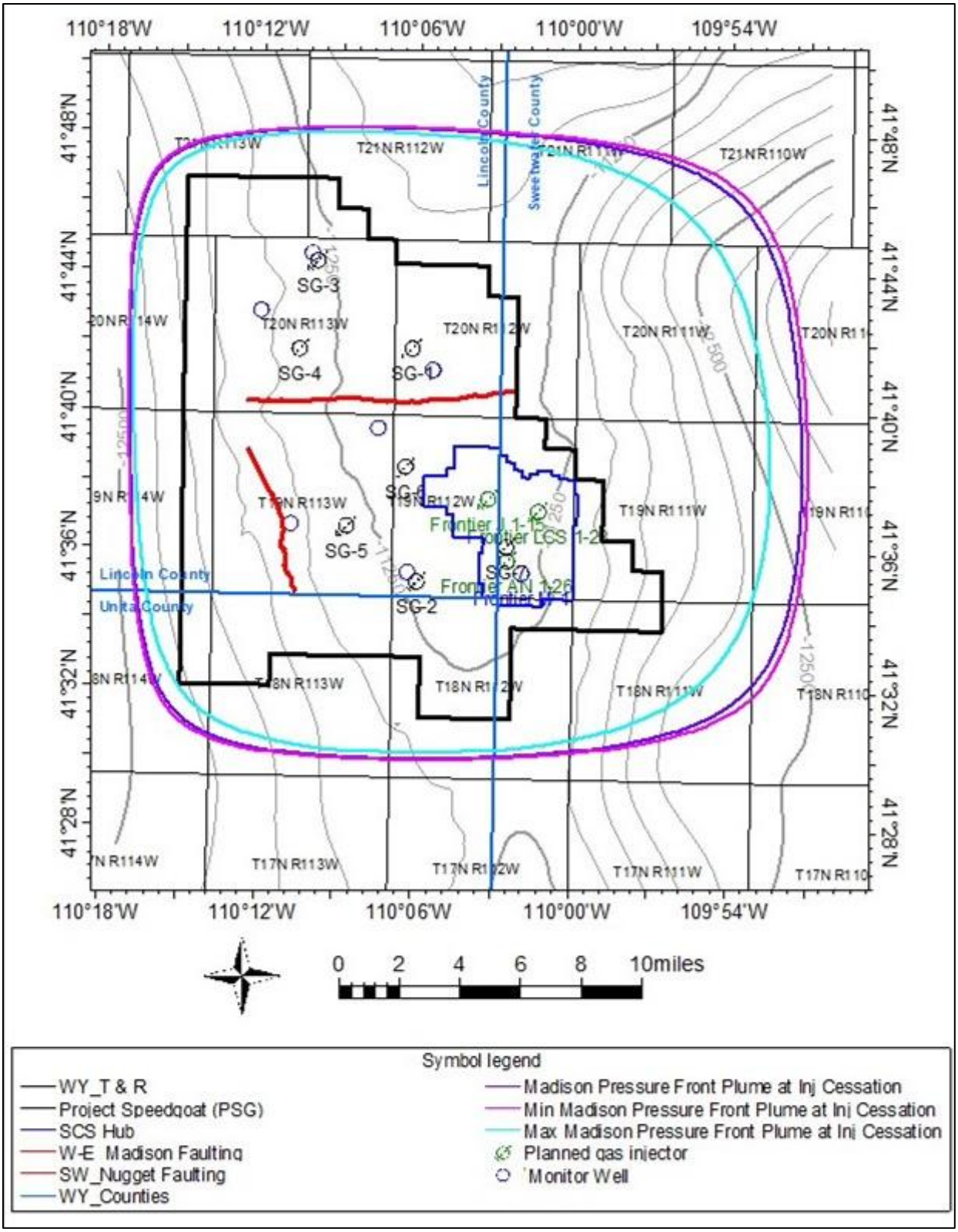


Figure A-2.49*. Madison pressure front and AoR results for kv/kh ratio sensitivity. Madison structural contour interval is 250 feet.*

Imbibition Critical Gas Saturation

Critical gas saturation for imbibition ($Sgcr_{imb}$) was obtained from the Nugget relative permeability curves (Li et al., 2016) and Madison analog relative permeability curves (Bennion and Bachu, 2015).

Decreasing the imbibition critical gas saturation causes a smaller volume of CO_2 to remain trapped in the rock pores; while increasing it causes a higher volume of CO_2 to remain trapped in the pore space. The results indicate that $Sgcr_{imb}$ has a low impact on the CO_2 plumes and pressure front AoR plume.

Nugget $Sgcr_{imb}$ values of 0.51, 0.55, and 0.57 resulted in similar CO_2 plume sizes (**Figure A-2.50**). Low and high case CO_2 plumes overlap each other. The Nugget pressure front for the different $Sgcr_{imb}$ values remained approximately the same size (**Figure A-2.51**).

The Madison $Sgcr_{imb}$ values used were 0.22, 0.25, and 0.30, and the CO_2 plumes remained approximately the same size (**Figure A-2.52**). The Madison $Sgcr_{imb}$ AoR pressure front did not change significantly (**Figure A-2.53**).

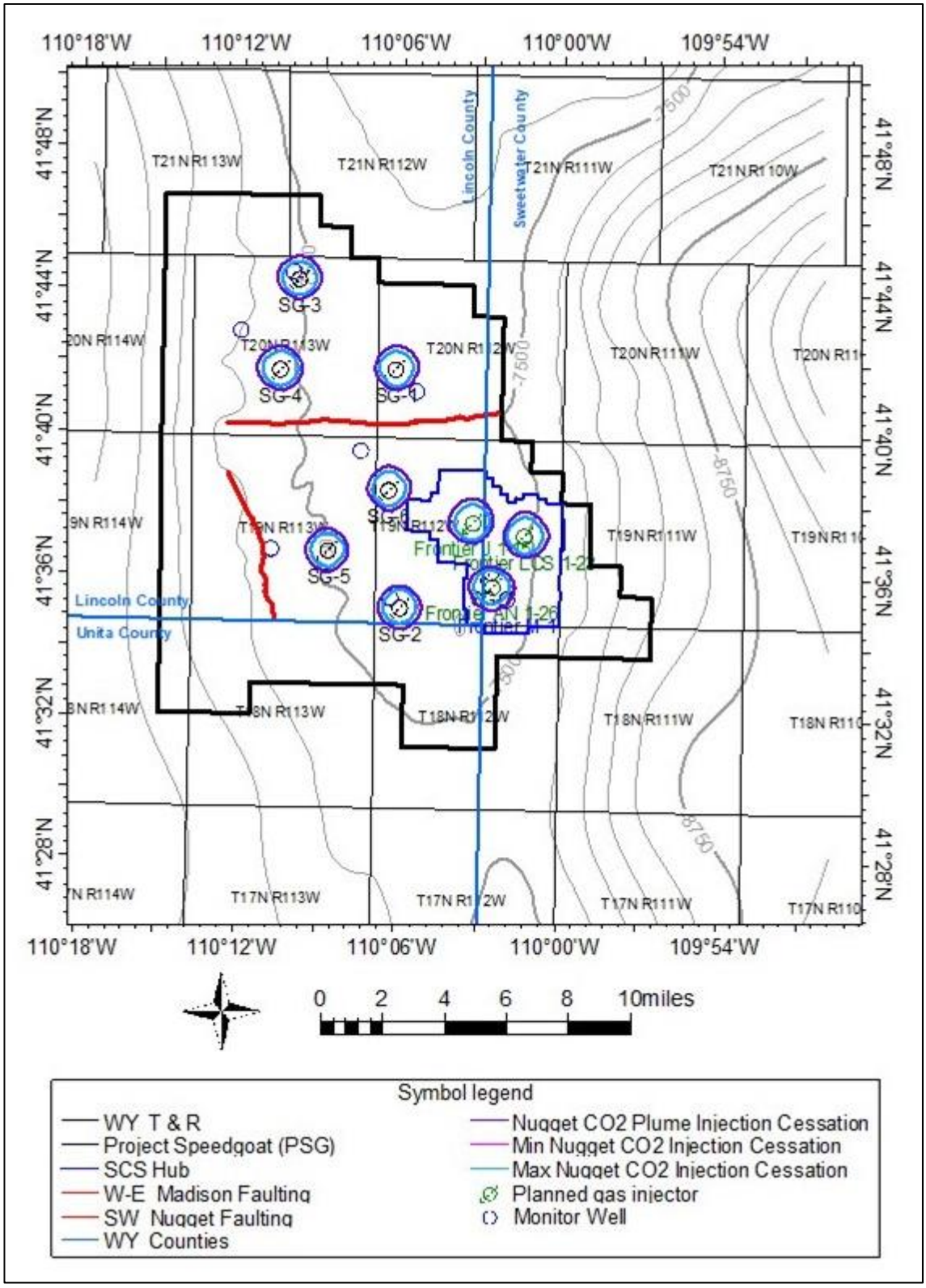


Figure A-2.50. *Nugget CO_2 plume results for imbibition critical gas saturation sensitivity. Nugget structural contour interval is 250 feet.*

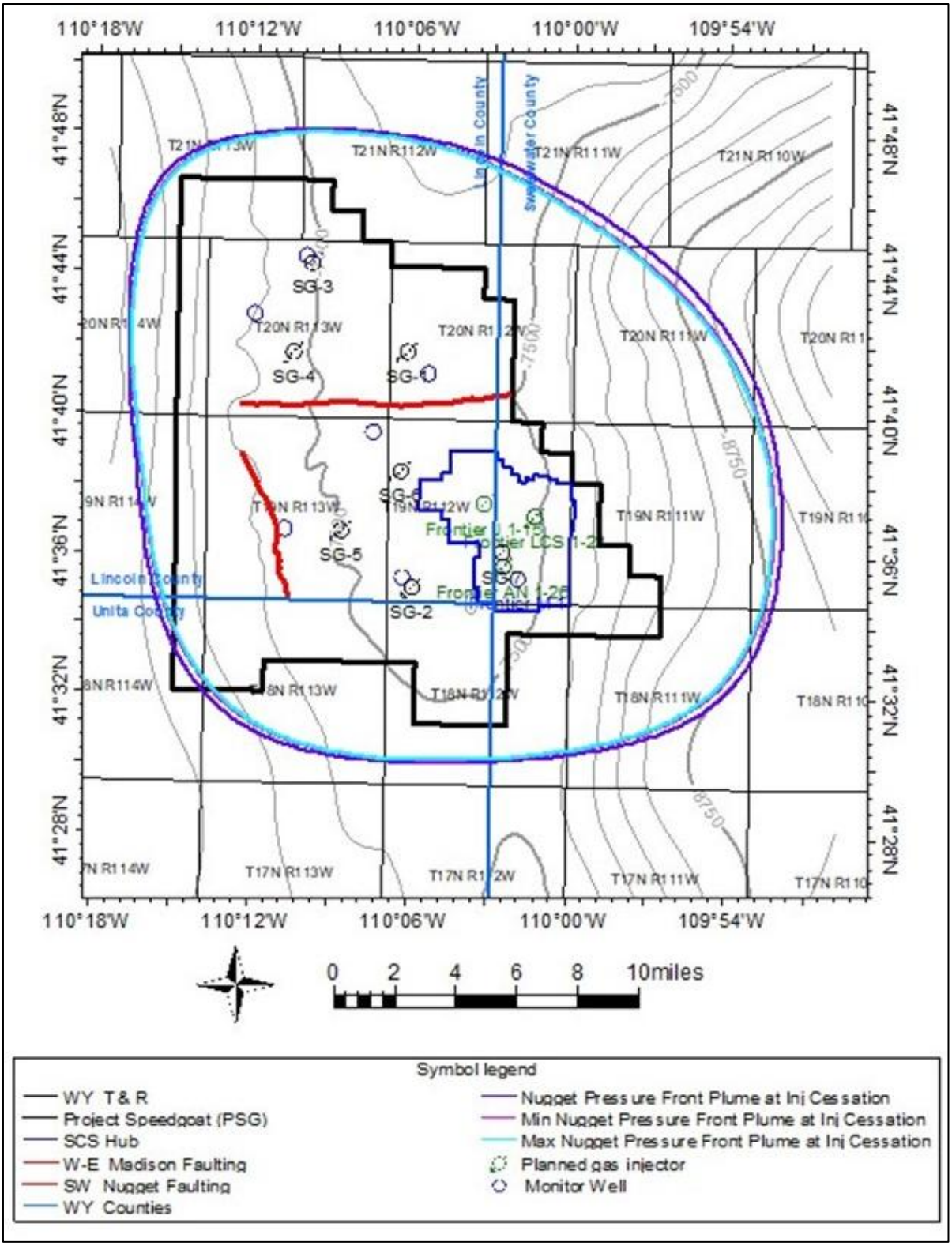


Figure A-2.51. *Nugget pressure front results for imbibition critical gas saturation sensitivity. Note: Nugget structural contour interval is 250 feet.*

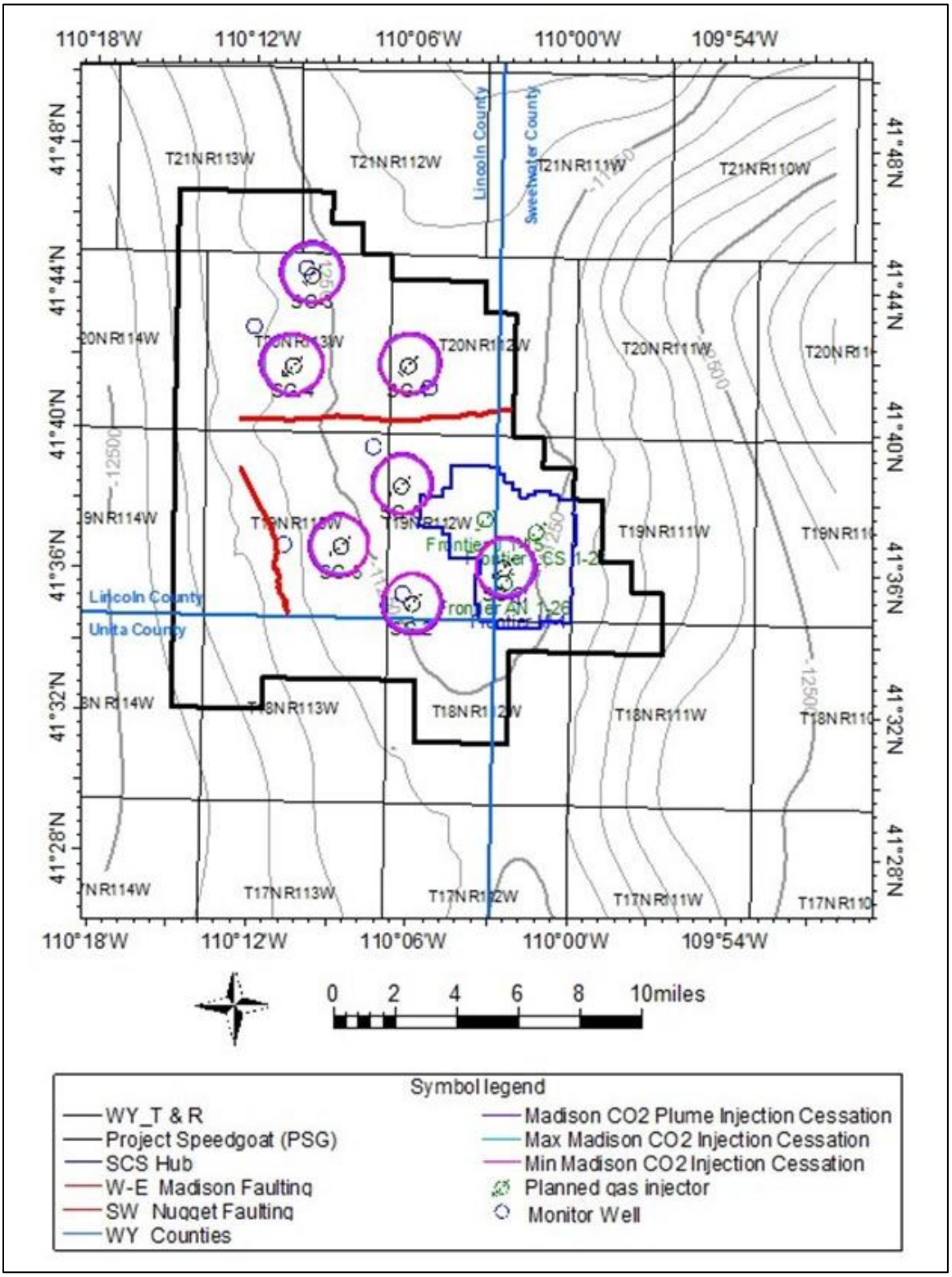


Figure A-2.52. *Madison CO_2 plume results for imbibition critical gas saturation sensitivity. Madison structural contour interval is 250 feet.*

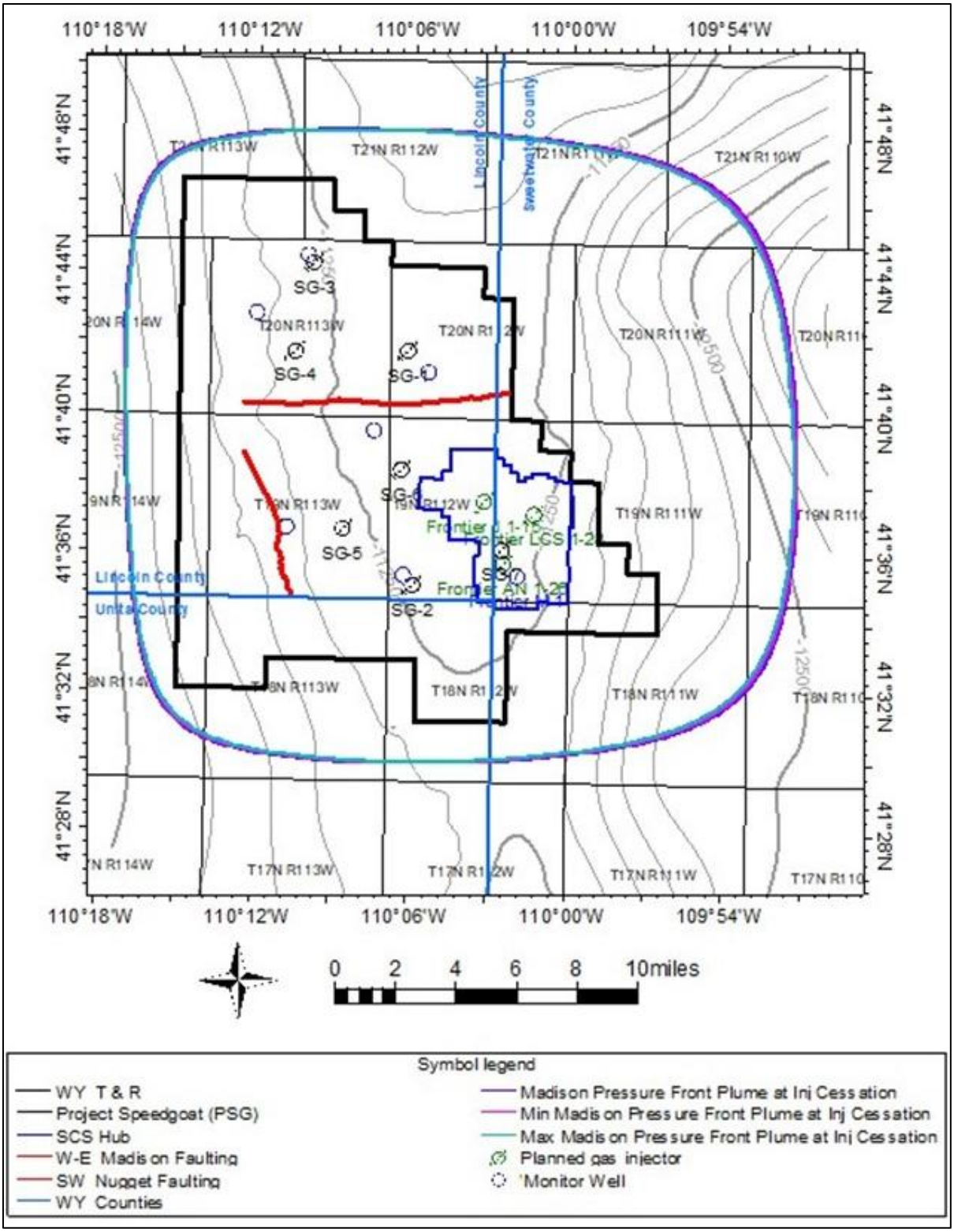


Figure A-2.53. *Madison pressure front and AoR results for imbibition critical gas saturation sensitivity. Madison structural contour interval is 250 feet.*

Nugget Maximum Gas Relative Permeability

The Nugget maximum gas relative permeability (krg_{max}) values were 0.08, 0.01, and 0.20. Scaling these values alters the Nugget porous medium's gas-water flow and allows for a higher or lower CO_2 permeability within the pore space. Nugget maximum gas relative permeability moderately impacts the CO_2 plume and pressure-based AoR development.

As Nugget krg_{max} decreases, CO_2 plume size decreases, while as Nugget krg_{max} increases, CO_2 plume sizes slightly increase (**Figure A-2.54**). As Nugget krg_{max} decreases, the AoR defined by the pressure front becomes smaller, and as Nugget krg_{max} increases, the AoR defined by the pressure front becomes larger (**Figure A-2.55**).

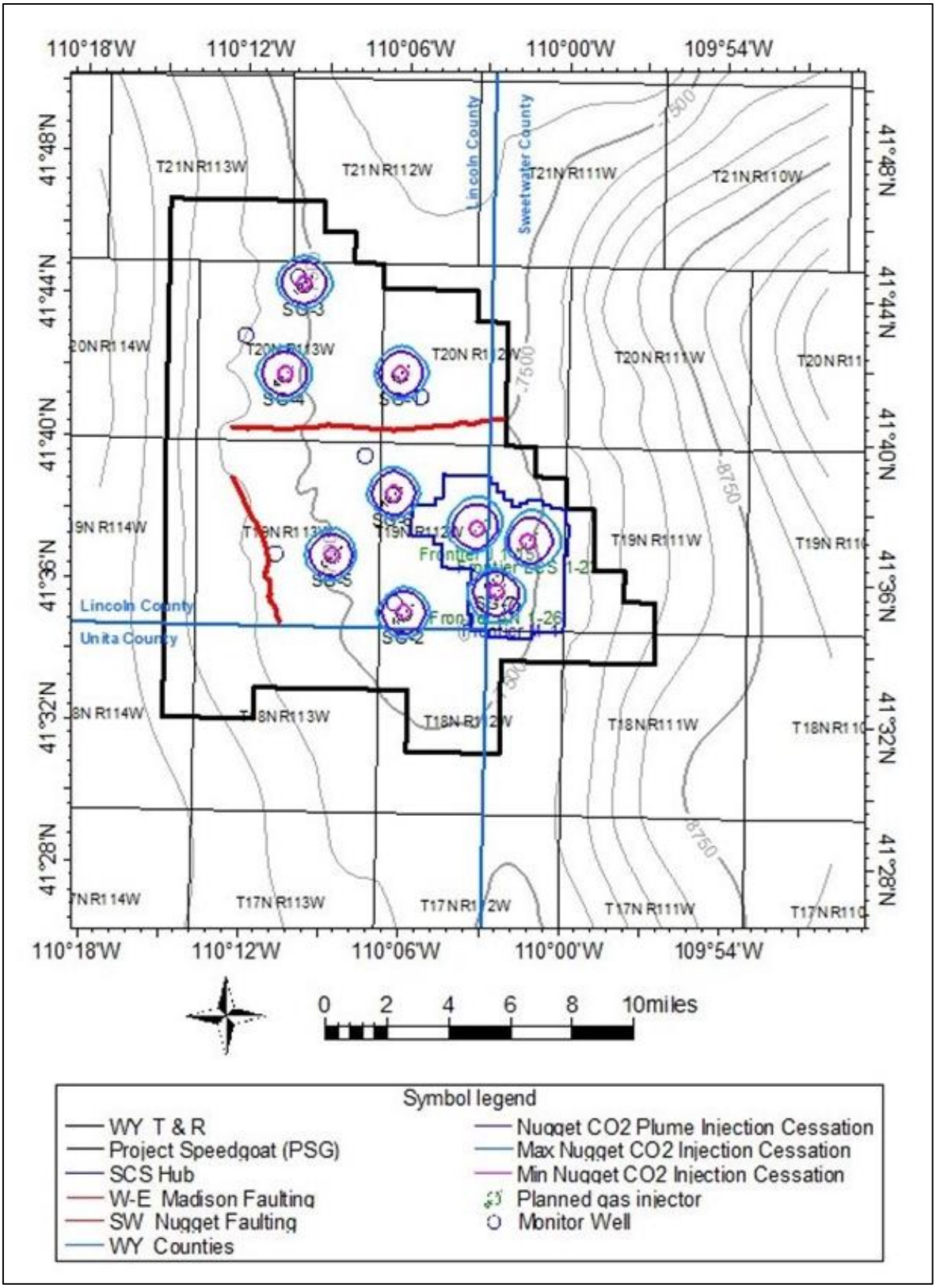


Figure A-2.54. *Nugget CO_2 plume results for Nugget maximum gas relative permeability sensitivity. Nugget structural contour interval is 250 feet.*

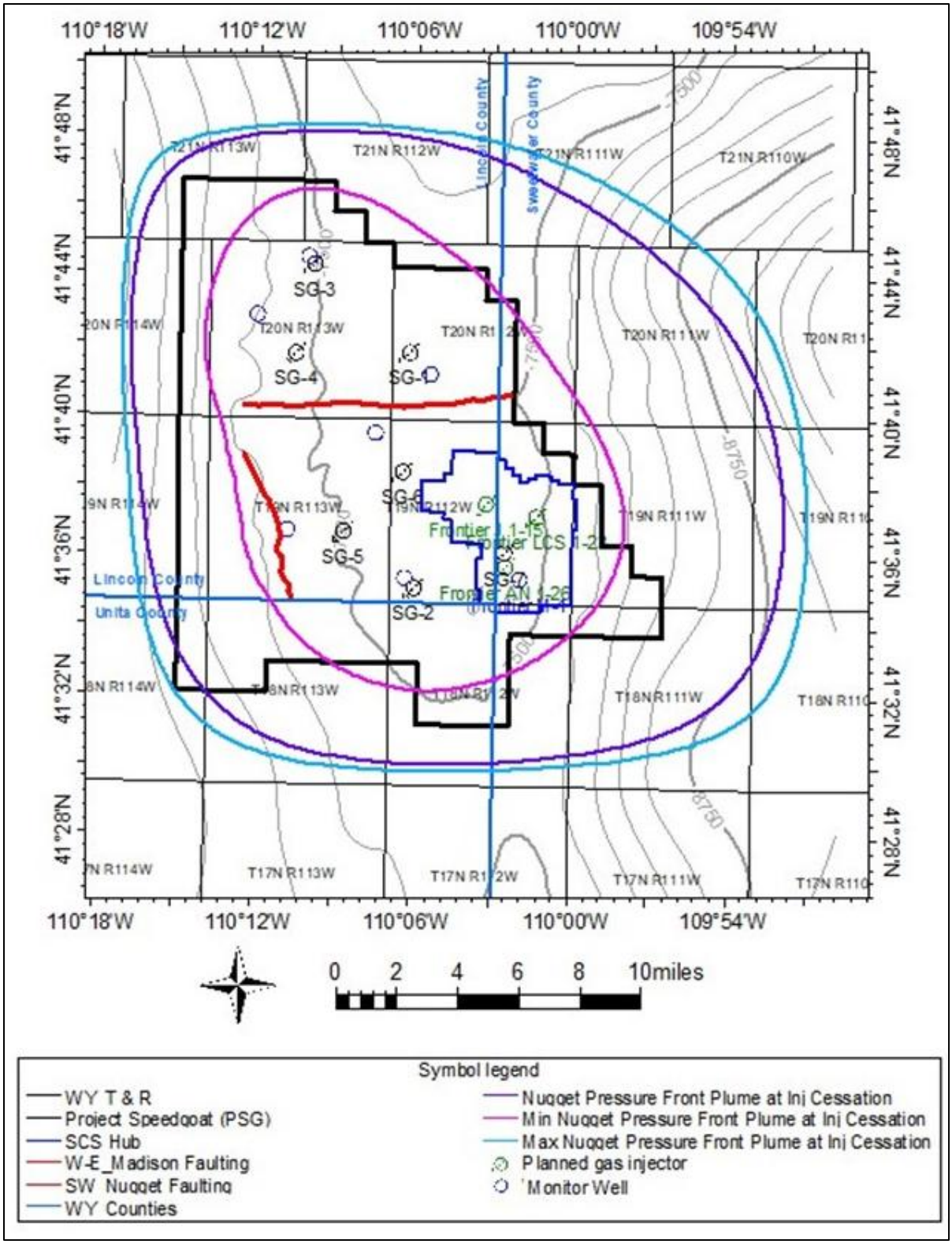


Figure A-2.55. *Nugget pressure front and AoR results for Nugget maximum gas relative permeability sensitivity. Nugget structural contour interval is 250 feet.*

Madison Maximum Gas Relative Permeability

Similarly, scaling the Madison maximum gas relative permeability (krg_{max}) values alter the gas-water flow within the Madison porous medium and allows for either a higher or lower CO_2 permeability within the pore space. The Madison maximum gas relative permeabilities were 0.05, 0.01, and 0.20. The Madison maximum gas relative permeability has a high impact on the CO_2 plume and pressure-based AoR development.

As Madison krg_{max} decreases, CO_2 plume size decreases, and as Madison krg_{max} increases, CO_2 plume size increases (**Figure A-2.56**). As Madison krg_{max} decreases, AoR pressure front becomes smaller, and as Madison krg_{max} increases, Madison AoR pressure front becomes larger (**Figure A-2.57**).

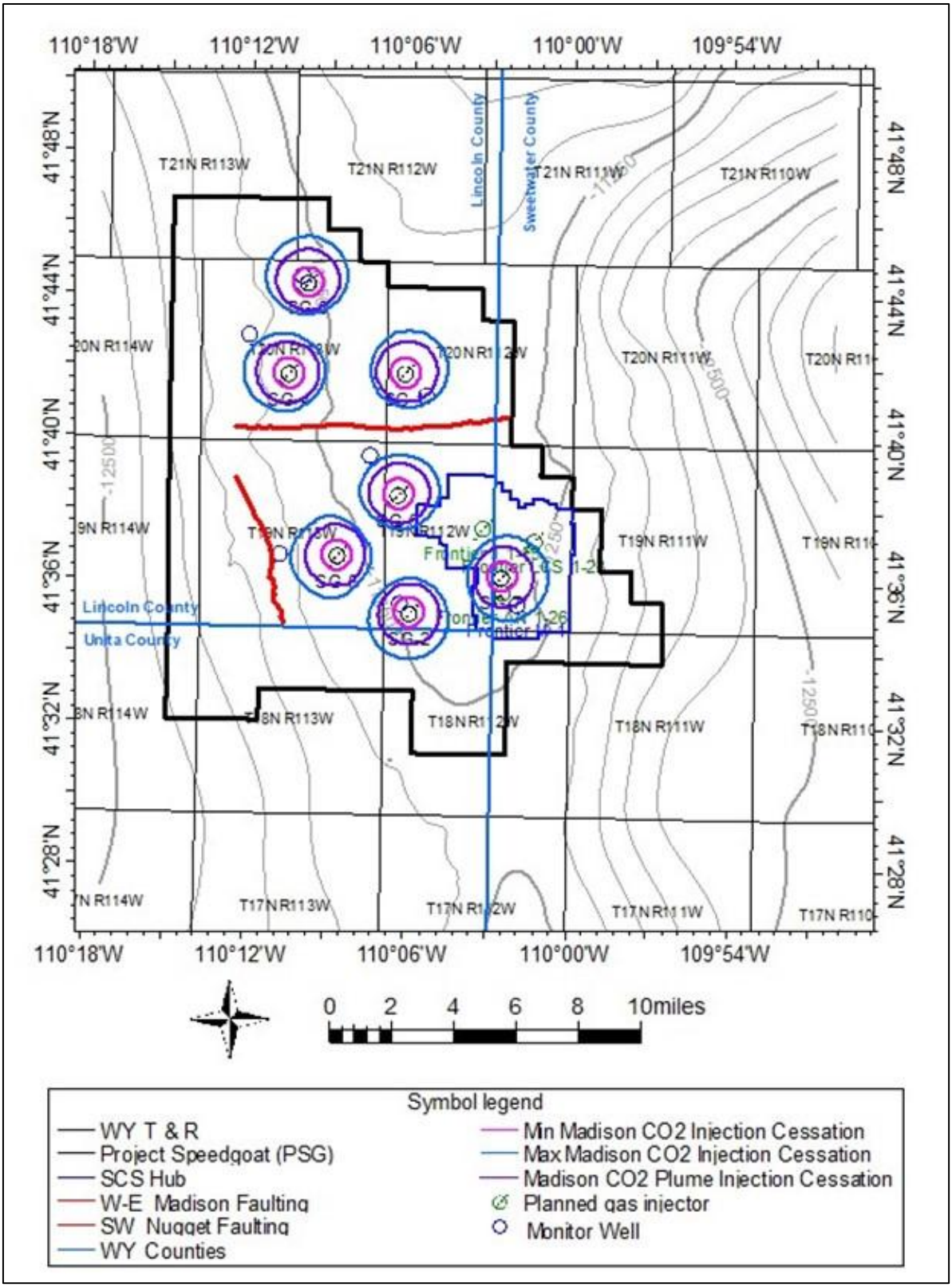


Figure A-2.56. *Madison CO_2 plume results for Madison maximum gas relative permeability sensitivity. Madison structural contour interval is 250 feet.*

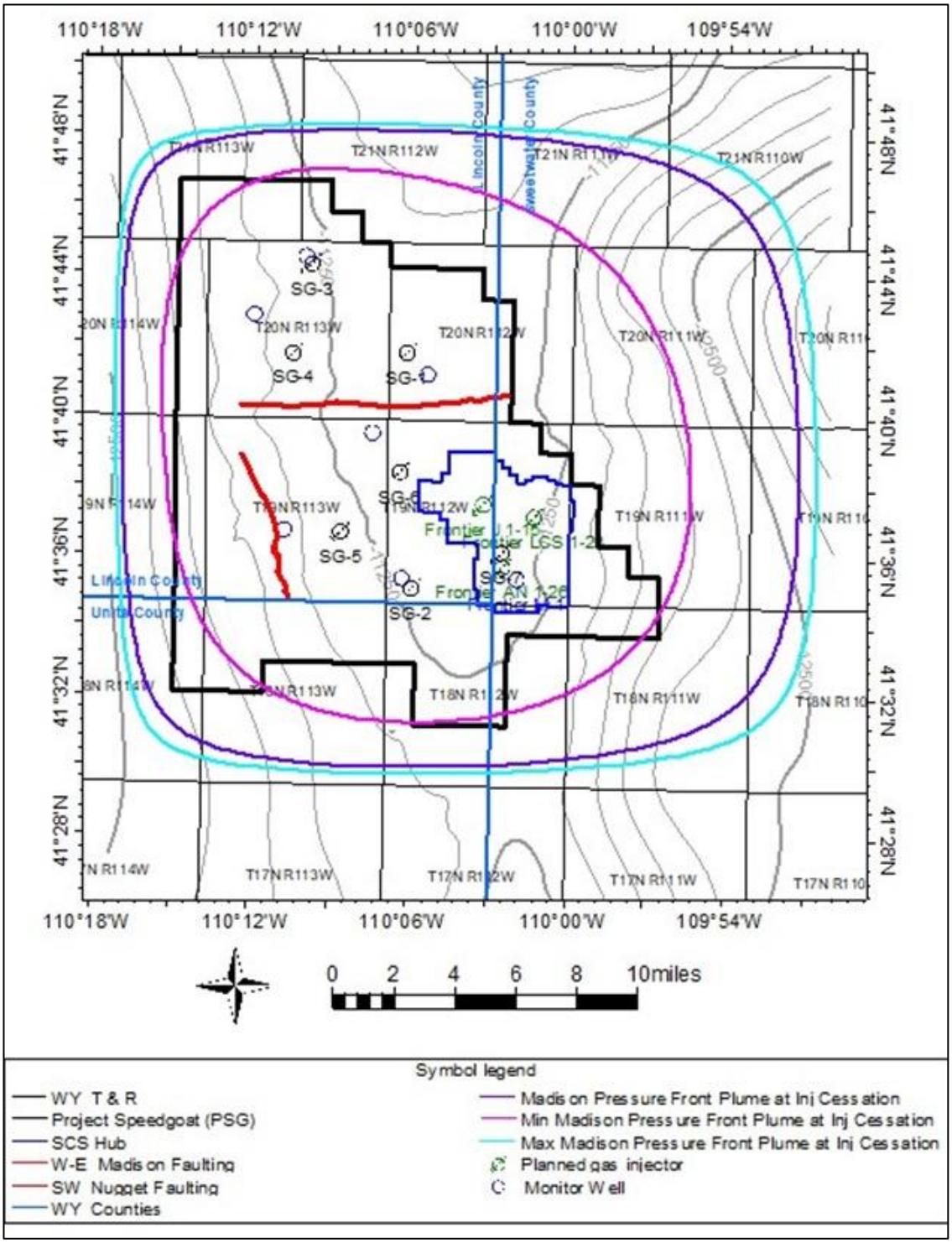


Figure A-2.57. *Madison pressure front and AoR results for Madison maximum gas relative permeability sensitivity. Madison structural contour interval is 250 feet.*

Fault Transmissibility Multiplier

Three scenarios were examined to observe the impact of pressure and CO_2 flow with respect to the faults:

- The fault is not a barrier; horizontal fluid flow across the fault (transmissibility multiplier is 1). This is the base case.
- The fault is a total barrier; no horizontal fluid flow across the faults (transmissibility multiplier is 0).
- The fault is a partial barrier; limited fluid flow horizontally across the fault (transmissibility multiplier equals 0.5).

The sensitivity indicates that the fault transmissibility multiplier has minimal impact on the CO_2 plume development and a moderate impact on the pressure front AoR plume development.

Nugget CO_2 plumes are not significantly affected by the fault transmissibility multiplier because none of the plumes intersect a fault. Results are shown in **Figure A-2.58**. Note that the CO_2 plumes for the base case and partially barrier scenarios are approximately the same size.

The no horizontal flow scenario resulted in a Nugget pressure front decreasing slightly to the southwest, where the fault acts as a barrier to pressure propagation. When the fault is partially open horizontally, the pressure front is approximately the same size as the base case (**Figure A-2.59**).

Madison CO_2 plumes are not significantly affected by the fault transmissibility multiplier and are approximately the same size (**Figure A-2.60**). Fault transmissibility multiplier has minimal impact on the Madison AoR, with only a slight increase in size to the southwest where the fault acts as a barrier to pressure propagation (**Figure A-2.61**). The pressure fronts are approximately the same size.

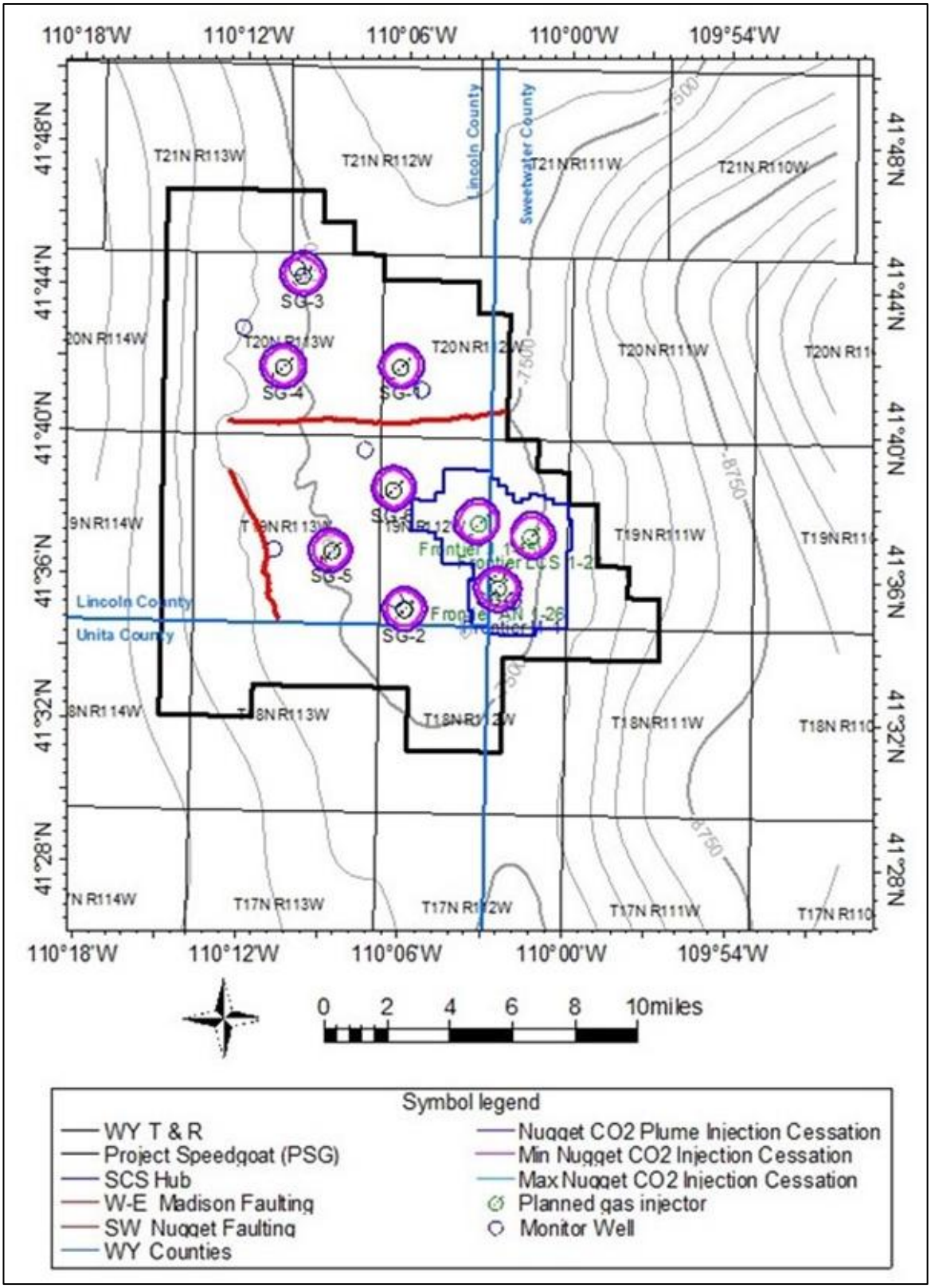


Figure A-2.58. *Nugget CO_2 plume results for fault transmissibility multiplier sensitivity. Nugget structural contour interval is 250 feet.*

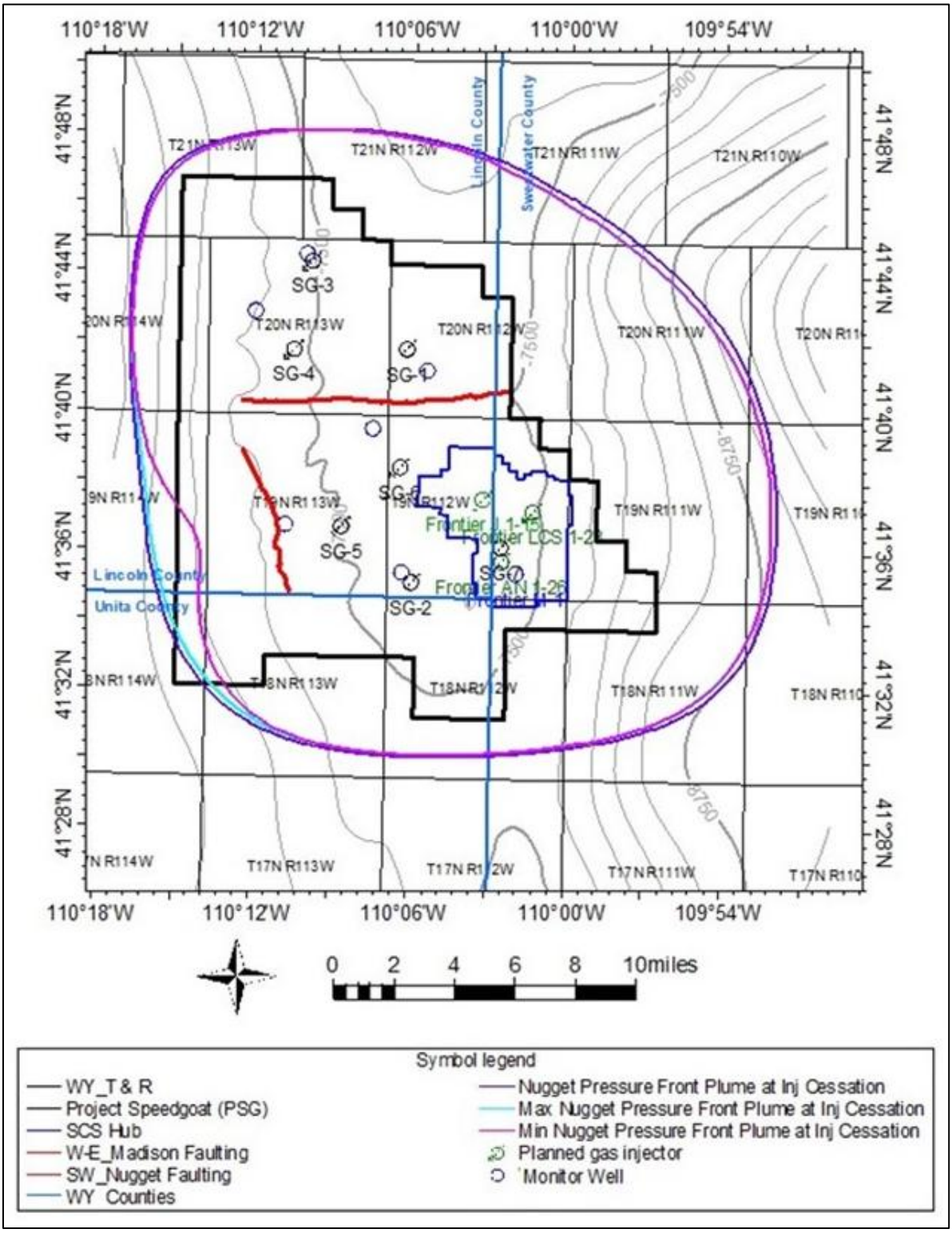


Figure A-2.59. *Nugget pressure front results for fault transmissibility multiplier sensitivity. Nugget structural contour interval is 250 feet.*

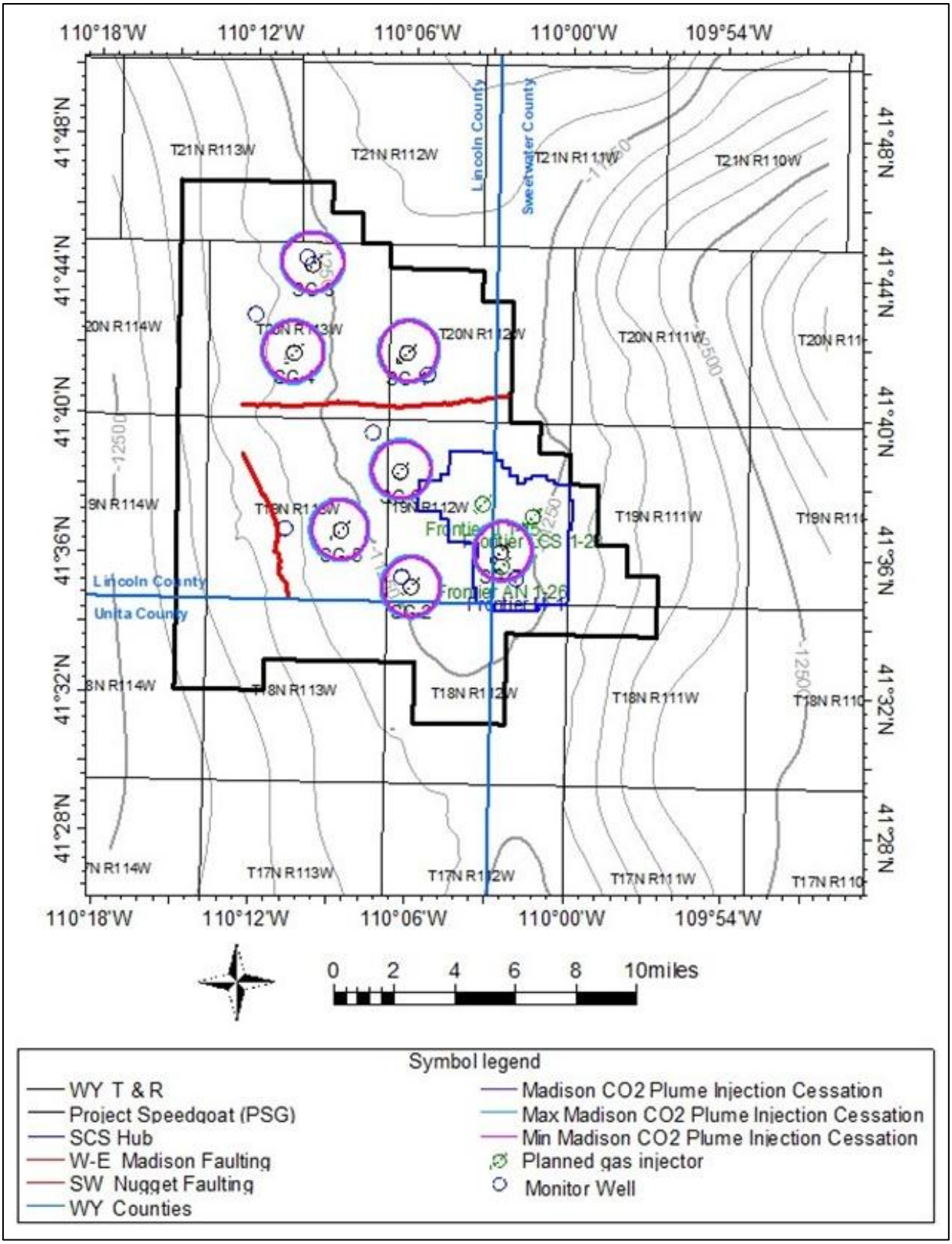


Figure A-2.60. *Madison CO_2 plume results for fault transmissibility multiplier sensitivity Madison structural contour interval is 250 feet.*

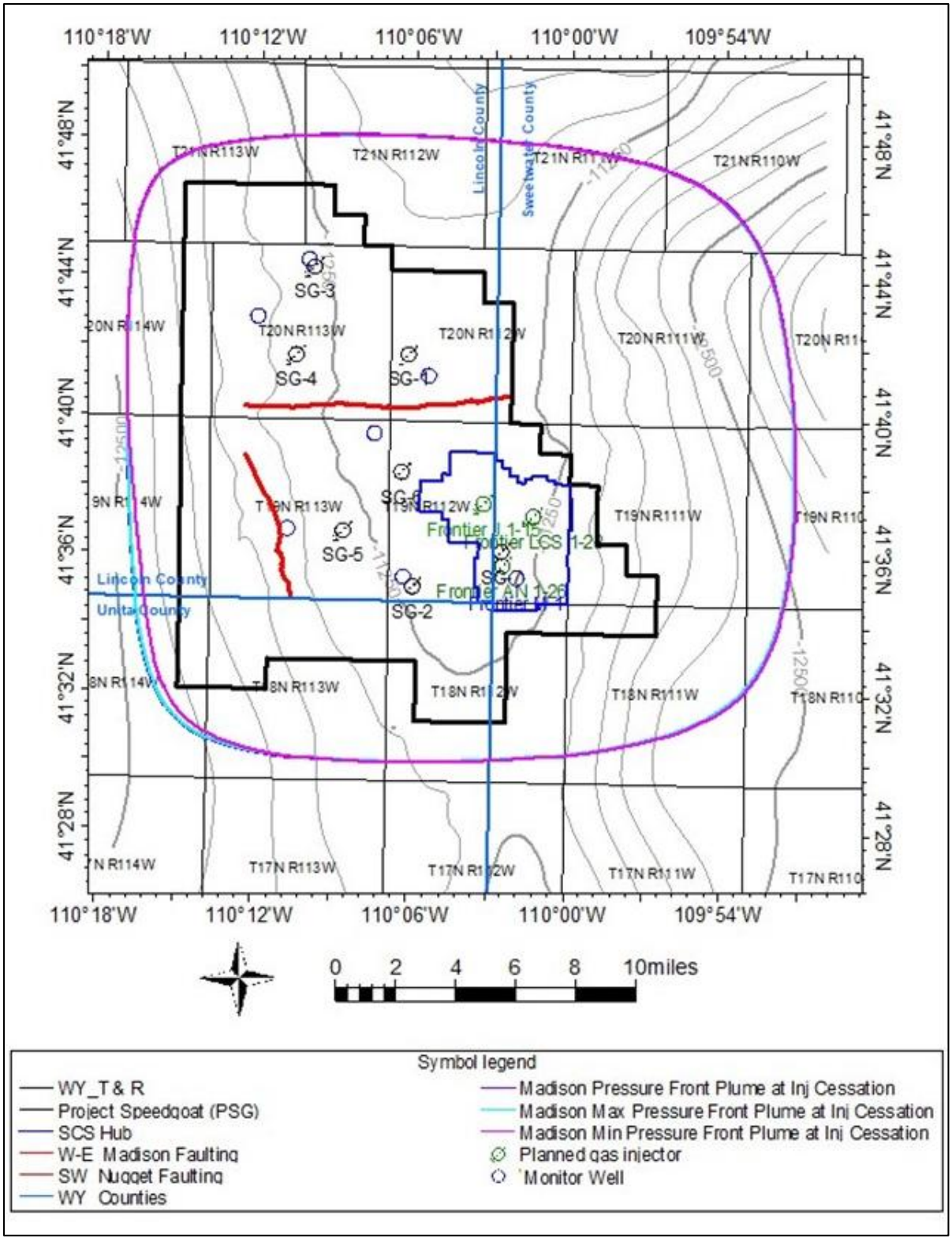


Figure A-2.61. *Madison pressure front and AoR results for fault transmissibility multiplier sensitivity. Note: Madison structural contour interval is 250 feet.*

Summary – Sensitivity Analysis

The sensitivity analysis of the conceptual layer cake model showed that the CO_2 plumes remained inside the PSG lease boundary for all sensitivity cases considered. Changes to the porosity multiplier, permeability transform, and the maximum gas relative permeability had the most impact on the CO_2 plume size. CO_2 plume sizes were minimally affected by kv/kh ratio, imbibition critical gas saturation, and fault transmissibility,

The AoR, which is determined by the Madison pressure front was most impacted by the maximum gas relative permeability, porosity multiplier, and permeability transform. Imbibition critical gas saturation and the fault transmissibility multiplier had a minimal effect on the AoR.

2.1.5 AoR Delineation

The simulated AoRs (CO_2 plume- and pressure-based) were delineated using reservoir dynamic modeling. The simulated AoR encompassed the larger extent of either the CO_2 plume-based or pressure-based AoR. The CO_2 plume-based AoR is the CO_2 plume front with a gas saturation greater than or equal to 0.02 (or 2%). The pressure front was delineated using the minimum pressure necessary to reverse the flow direction between the lowermost USDW and the injection zone, therefore causing fluid flow from the injection zone into the formation matrix of the USDW. Based on existing data and modeling, at this time, the modeled PSG AoR is the Madison AoR delineated by the critical pressure of 34.5 psi after 20 years of injection.

2.1.5.1 Critical Pressure Calculation

The EPA 816-R-13-005 (2013) guidance method was used to calculate critical pressure (ΔPc). Since there are no site-specific fluid pressure and density measurements available and the estimated initial reservoir pressure is close to hydrostatic conditions, the method developed and published by Nicot et al. (2008) and Bandilla et al. (2012) was used to calculate each reservoir's critical pressure. The equation is as below:

$$\mathrm{DPc} = \frac{1}{2} \,.\, g.\mathbf{x}.\,(Zu - Zi)^2$$

where g = acceleration due to gravity (m/s^2)

z_u = elevation of the lowermost USDW (ft)

z_i = elevation of the injection zone (ft)

x = linear density gradient (coefficient, kg/m^4) defined as

$$x = \frac{\rho_i - \rho_u}{z_U - z_i}$$

and where,

ρ_i = fluid density of the injection zone (kg/m^3) and

ρ_u = fluid density of the lowermost USDW (kg/m^3)

The lowermost USDW for PSG is assumed to be the Dakota Formation at 6,000 feet true vertical depth subsea (TVDSS), based on water analyses from the Wyoming Oil and Gas

Conservation Commission (WOGCC) database. Since there are no site-specific fluid pressure and density measurements available, for the simulated Nugget fluid density of 1,041 kg/m^3 and elevation difference of 1,817 feet, the ΔPc is approximately 16.3 psi. Similarly, for the Madison, because of the lack of site-specific fluid pressure and density measurements available, for the simulated Madison fluid density of 1,028 kg/m^3 and elevation difference of 5,603 ft, the ΔPc is approximately 34.5 psi. For calculation purposes, the depths of the injection zones were taken from the depth of the middle of the reservoir perforation intervals. The input parameters applied to the EPA methodology are summarized in **Table A-2.12**.

Table A-2.12. Input Parameters Used in the EPA Methodology

Parameter	Description	Nugget Value	Madison Value	Comments
z_i	Injection_ Reference Datum (TVDSS feet)	-7,817	-11,603	Depth of middle of the perforation in the Madison
$p_{i\ brine}$	Injection_Sand_1_Brine Density (kg/m3)	1,041	1,028	Obtained from simulation
	Critical Pressure (psi)	16.3	34.5	

Note because of the absence of site-specific data, there is uncertainty in the estimation of the ΔPc, which consequently affects the pressure-based AoR. These uncertainties will be addressed once site-specific water sample(s) are acquired.

Finally, CO_2 injection and monitoring well locations were selected based on the evaluation of the static, dynamic modeling and geomechanics analysis. Monitoring wells were conservatively selected and placed near injector wells and faults for direct reservoir monitoring to track pressure and CO_2 movement. Both direct and indirect monitoring will be used throughout all phases of the Project to update the models and history-match the progression of the CO_2 plume and associated pressure front.

2.1.6 Corrective Action Evaluation

A list of all active and inactive wells in theAoR is provided in ***Appendix A-2*** (**Table A 2.2)** . In total, 1,132 oil and gas wellbores (191 are plugged and abandoned) and 87 water wells were found. Of the 1,132 oil and gas wellbores, only four were identified to penetrate the storage complex within the AoR and are listed in **Table A-2.13**. A review of public records (provided in **A*ppendix A-2)*** did not identify specific corrective actions for any of the four wells in **Table A-2.13**. Frontier Carbon Solutions Holdings, LLC (FCS) is actively collaborating with the operators to determine if confidential well histories can be accessed to confirm no corrective actions are necessary. Additionally, FCS may consider implementing monitoring wells to ensure that the CO_2 plume and the associated pressure front do not encroach upon the identified wells.

Table A-2.13. PSG AoR Wellbores that Penetrate the Storage Complex					
API	**Well Name**	**Location Twn Rng Sec Qtr Qtr**	**Operator**	**Current Status**	**Corrective Action Required**
4902320045	Bruff Unit 1	19N 112W 22 SW SW	Wexpo Co	P&A	No
4902320054	Wilson Ranch Unit 2	19N 113W 01 NE SW	Hilcorp Energy Co	Active	No
4902320106	Bruff Unit 2	19N 112W 16 SW SW	Wexpro Co	Active	No
4903705573	Bruff Unit MF01	19N 112W 22 NE SE	Hilcorp Energy Co	Active	No

2.1.7 Protection of USDWs

Based on 44 water analyses from the WOGCC, the Dakota Formation was conservatively identified as the lowest known USDW for the purposes of delineating the PSG AoR (***Form A-8, Underground Source of Drinking Water Analysis Plan***). The Dakota is a deep aquifer system and a known gas production zone within the PSG area. Most of the analyses indicate that the Dakota at 12,000 feet in depth has TDS values less than 10,000 ppm. Because site-specific discrete samples were not available, log-based salinity calculations were made to estimate the Dakota TDS values. These industry-accepted calculations (Rwa Method and Pickett Plot) estimated the Dakota to have a TDS of less than 10,000 ppm. The actual TDS will be determined by future sampling and testing.

The primary protection against fluid migration from the Nugget injection zone into the Dakota is the Twin Creek upper confining zone. At PSG, the Twin Creek is 550 feet thick, and its top is nearly 900 feet below the base of the Dakota. It comprises interbedded shale, siltstone, and fine sandstone (Lynds, 2013). The average effective porosity and permeability for the entire Twin Creek is 1.9% and 0.14 mD, respectively, based on petrophysical analysis of 10 wells in and around PSG – regional data base (**Table A-2.14**). The Twin Creek, however, also contains several regionally extensive shales. These shales have nano Darcy permeability and 1% effective porosity. It is important to remember that this average permeability value is the arithmetic mean of the calculated horizontal permeability and that the average vertical permeability will be significantly lower than this. If the geometric mean of the vertical permeability is considered, which better accounts for the impact of low permeability sub-zones within the confining zone on any potential fluid flow, the average would be estimated to be orders of magnitude lower than this stated value. Overlying the Twin Creek are interbedded siltstones, shale and fine-grained sandstones of the Sundance, which would provide a secondary seal. The Ankareh serves as the lower confining zone to the Nugget. It consists of interbedded mudstone, siltstone, gypsum, and very fine-grained sandstone. At PSG, this formation is 550 feet thick and has an average effective porosity of 0.9% and a permeability of 0.1 mD.

For the Madison, the initial upper confinement is provided by the interbedded shales, sandstones, anhydrites, dolostone and limestone of the Amsden (Campbell-Stone, et al. , 2011), which is 500 feet thick at PSG. Based on the petrophysical evaluation, the average effective porosity and permeability for the entire Amsden are 0.9% and 0.18 mD, respectively. The significant Madison CO_2 accumulation on the LaBarge platform further supports the Amsden as a competent seal (Lynds, 2013). The Phosphoria above the Amsden consists of interbedded shale and tight carbonate (average effective porosity: 0.5% and permeability: 0.029 mD) and is a secondary seal to upward migration of CO_2 from the Madison. This unit has an average thickness of 350 feet at PSG. When considering the quoted permeability values here for the Amsden and Phosphoria, it is again important to remember that the average permeability values reported here are the arithmetic mean of the calculated horizontal permeabilities and that the average vertical permeability will be significantly lower than this. Additionally, if the geometric mean of the vertical permeability is considered, which better accounts for the impact that low permeability zones in the confining zone have on any potential for fluid flow, the average would be estimated to be orders of magnitude lower than the values stated above. The Three Forks is the lower confining zone for the Madison. This formation is not penetrated at PSG and its lithology, thickness and petrophysical properties are estimated from penetrations on the northern Moxa Arch. The Three Forks consists of tight marine siltstone and limestone with an average effective porosity and permeability of 0.3% and 0.01 mD respectively. Its thickness is estimated to be 100 feet.

Although there is faulting at PSG, it is not anticipated to be a risk to confinement in either the Nugget or Madison. This is because the injection well locations were intentionally selected to be far from the faults. The dynamic modeling also confirms that the CO_2 plumes will not interact with any of the faults and the increased pressure will pose no risk of fault slippage.

Table A-2.14. Lithology, Thickness and Petrophysical Properties of the Upper and Lower Confining Zones for the Nugget and Madison Injection Zones				
	Frontier		Madison	
Confining Zone Properties	**Upper Confining Zone**	**Lower Confining Zone**	**Upper Confining Zone**	**Lower Confining Zone**
Formation Name	Twin Creek Limestone	Ankareh	Amsden	Three Forks
Lithology	Limestone, shaley limestone, chert, limey gypsum	Mudstone, siltstone, gypsum, sandstone	Shale, dolomite, sandstone, chert	Siltstone and limestone
Thickness, feet	550	600	500	~100
Porosity, %	1.9	0.9	0.9	0.3
Permeability, mD	0.14	0.1	0.18	0.01

2.2 Area of Review and Corrective Action

2.2.1 Corrective Action Plan

As noted in ***Section 2.1.6 Corrective Action Evaluation***, no corrective action plans were identified to be required at this time. FCS is actively collaborating with the operators to determine if confidential well histories can be accessed to confirm no corrective actions are necessary. FCS will incorporate the four wells identified into the near-surface monitoring plan and proactively observe any potential changes from baseline data that is acquired. Additionally, FCS may consider implementing reservoir monitoring wells to ensure that the CO_2 plume and the associated pressure front do not encroach upon the identified wells. Well schematics are provided in ***Appendix A-2***.

2.3 Reevaluation of the AoR and Corrective Action Plan

The AoR will be reevaluated every two years as required per Wyoming Water Quality Rules (WWQR) Chapter 24 Section 13(c). The AoR evaluation frequency during the Post-Injection Site Care (PISC) period will not exceed five years until site closure is confirmed and approved by the Administrator.

Throughout the Project's operational phase, pressure results will be reviewed monthly to identify any potential deviations from expected conditions, and the reservoir flow model will be history-matched against the observed parameters. Summary findings from the AoR reevaluation cycle will be submitted to the Administrator, demonstrating that no change to the AoR and Corrective Action plan is needed.

If testing and monitoring data suggest a significant change in the size or shape of the actual CO_2 plume as compared to the predicted model is occurring, or there are deviations from modeled

predictions such that the actual plume or pressure front may extend vertically or horizontally beyond the modeled plume and pressure front, FCS will initiate an unscheduled AoR reevaluation. Summary findings will be provided to the Administrator, and if deemed necessary, a request to approve the amended AoR and Corrective Action plan per WWQR Chapter 24 Section 13(c) will be submitted.

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APPENDIX A-2

AREA OF REVIEW

TABLES

Table A-2.1 Investigated and Identified Surface and Subsurface Features in the PSG AoR ... 1

Table A-2.2 PSG Area of Review Oil and Gas Well Information ... 2

Table A-2.3 Seismic Horizons Used for Structural Framework ... 48

Table A-2.4 Static Model Zones and Layers ... 48

Table A-2.5 Parameters for Temperatures 99-300°C, 1-600 bar, Spycher and Pruess (2010), temperature in Kelvin ... 49

Table A-2.6 Model Parameters for Multiphase Fluid Modeling of Geologic Sequestration ... 50

Table A-2.7 Madison Bottomhole Pressure Constraint and Fracture Pressure at Injection Site ... 52

Table A-2.8 Nugget Bottomhole Pressure Constraint and Fracture Pressure at Injection Site ... 52

Table A-2.9 Average Injection Rate (Metric Tons/Yr) ... 52

Table A-2.10 Maximum and Average Maximum Tubing Head Pressure (THP) for PSG Wells ... 53

Table A-2.11 Computational Simulation Sensitivity Parameters ... 53

Table A-2.12 Input Parameters Used in the EPA Methodology ... 53

Table A-2.13 PSG AoR Wellbores that Penetrate the Storage Complex ... 54

Table A-2.14 Lithology, Thickness and Petrophysical Properties of the Upper and Lower Confining Zones for the Nugget and Madison Injection Zones ... 54

FIGURES

Figure A-2. 1 Map showing the PSG AoR, CO_2 plumes at cessation, stabilized CO_2 plumes at 1-year post-injection, and AoR plus a 1-mile buffer. Note that the CO_2 stabilized plumes at end of monitoring and at 1 year post-injection directly overlap as they are the same size ... 55

Figure A-2.2 Model polygons, PSG area, SCS Hub and Bruff 1 well ... 56

Figure A-2.3 Effective porosity model ... 57

Figure A-2.4 Location of PSG injector wells, monitor wells, and static and dynamic model boundaries 58
Figure A-2.5 PSG dynamic model boundaries 59
Figure A-2.6 Nugget relative permeability curves digitized from Li, et.al.(a) and a zoomed in section (b) (2016) 59
Figure A-2.7 Madison analog, sample Redwater Luc, relative permeability curves digitized from Bennion and Bachu (2010) 60
Figure A-2.8 Madison capillary curve was digitized and scaled from Akbarabadi and Piri (2015). 60
Figure A-2.9 Plot of porosity versus permeability from the dynamic model 61
Figure A-2.10 East-to-west cross section of porosity in dynamic model) 61
Figure A-2.11 Porosity northwest to southeast cross section across pressure AoR 62
Figure A-2.12 North-to-south cross section of permeability in dynamic model 63
Figure A-2.13 Permeability northeast-to-southwest cross section across pressure AoR 64
Figure A-2.14 Pressure variation with depth with literature data from Table A-1.19 65
Figure A-2.15 Temperature variation with depth considering an elevation of 6,435 feet above sea-level 65
Figure A-2.16 Wells SG-1, SG-2, SG-3, and SG-4 logs showing proposed Nugget perforations, porosity, and permeability 66
Figure A-2.17 Wells SG-5 and SG-6 logs showing proposed Nugget perforations, porosity, and permeability 67
Figure A-2.18 Wells SG-1, SG-2, SG-3, and SG-4 logs showing proposed Madison perforations, porosity, and permeability 68
Figure A-2.19 Wells SG-5, SG-6, and SG-7 logs showing proposed Madison perforations, porosity, and permeability 68
Figure A-2.20 CO_2 injection scenario timeline of PSG wells and SCS Hub wells 69
Figure A-2.21 BHP over time. Well SG-7 only injects into the Madison 69
Figure A-2.22 Individual well injection rate over time 70
Figure A-2.23 Madison reservoir pressure over time 71
Figure A-2.24 Madison reservoir pressure differential over time 71
Figure A-2.25 Nugget reservoir pressure over time 72

Figure A-2.26 Nugget reservoir pressure differential over time 73
Figure A-2.27 Tubing head pressure over time 73
Figure A-2.28 Cumulative injection over time 73
Figure A-2.29 Field aqueous, mobile vapor and immobile vapor trapping mechanisms over time 74
Figure A-2.30 Nugget CO_2 plumes of PSG wells at 1- , 5-year of injection, and at injection cessation. SCS Hub Nugget CO_2 plumes are also present. Nugget structural contour interval is 250 feet 75
Figure A-2.31 Nugget pressure front at 1-, 5-year of injection and at injection cessation. Nugget structural contour interval is 250 feet 76
Figure A-2.32 Madison CO_2 plumes at 1-, 5-year of injection and at injection cessation. Madison structural contour interval is 250 feet 77
Figure A-2.33 Madison pressure front plumes at 1-, 5-year of injection and at injection cessation. Madison structural contour interval is 250 feet 78
Figure A-2.34 Madison and Nugget CO2 plume cross section at plume stabilization 79
Figure A-2.35 Nugget CO_2 plumes at 1 year, 20 years, and 50 years post injection. Note the CO_2 plumes are the same size and directly overlap each other. Nugget structural contour interval is 250 feet 80
Figure A-2.36 Nugget pressure front at 1 year, 20 years, 50 years, and 100 years post injection. Nugget structural contour interval is 250 feet 81
Figure A-2.37 Nugget pressure front at 100 years post injection; pressure contour interval is 5 psi; structural contour interval is 250 feet 82
Figure A-2.38 Madison CO_2 plumes at 1 year, 20 years, and 50 years post injection. Note that the CO_2 plumes are the same size and directly overlap each other. Madison structural contour interval is 250 feet 83
Figure A-2.39 Madison pressure front at 1 year, 20 years, and 50 years, and 100 years post injection; Madison structural contour interval is 250 feet 84
Figure A-2.40 Largest CO_2 plumes in the Nugget, largest CO_2 plumes in the Madison, largest pressure front in the Nugget and largest pressure front) in the Madison. Madison structural contour interval is 250 feet 85
Figure A-2.41 Delineated PSG AoR and AoR plus 1-mile boundaries 86
Figure A-2.42 Nugget CO_2 plume results for porosity multiplier and permeability transform sensitivity. Nugget structural contour interval is 250 feet 87

Figure A-2.43 Madison CO_2 plume results for porosity multiplier and permeability transform sensitivity. Madison structural contour interval is 250 feet..... 88

Figure A-2.44 Nugget pressure plume results for porosity multiplier and permeability transform sensitivity. Nugget structural contour interval is 250 feet 89

Figure A-2.45 Madison pressure front and AoR results for porosity multiplier and permeability transform sensitivity. Madison structural interval is 250 feet 90

Figure A-2.46 Nugget CO_2 plume results for kv/kh ratio sensitivity. Nugget structural contour interval is 250 feet 91

Figure A-2.47 Nugget pressure front results for kv/kh ratio sensitivity. Nugget structural contour interval is 250 feet. 92

Figure A-2.48 Madison CO_2 plume results for kv/kh ratio sensitivity; Madison structural contour interval is 250 feet 93

Figure A-2.49 Madison pressure front and AoR results for kv/kh ratio sensitivity. Madison structural contour interval is 250 feet 94

Figure A-2.50 Nugget CO_2 plume results for imbibition critical gas saturation sensitivity. Nugget structural contour interval is 250 feet..... 95

Figure A-2.51 Nugget pressure front results for imbibition critical gas saturation sensitivity. Note: Nugget structural contour interval is 250 feet..... 96

Figure A-2.52 Madison CO_2 plume results for imbibition critical gas saturation sensitivity. Madison structural contour interval is 250 feet 97

Figure A-2.53 Madison pressure front and AoR results for imbibition critical gas saturation sensitivity. Madison structural contour interval is 250 feet 98

Figure A-2.54 Nugget CO_2 plume results for Nugget maximum gas relative permeability sensitivity. Nugget structural contour interval is 250 feet 99

Figure A-2.55 Nugget pressure front and AoR results for Nugget maximum gas relative permeability sensitivity. Nugget structural contour interval is 250 feet 100

Figure A-2.56 Madison CO_2 plume results for Madison maximum gas relative permeability sensitivity. Madison structural contour interval is 250 feet 101

Figure A-2.57 Madison pressure front and AoR results for Madison maximum gas relative permeability sensitivity. Madison structural contour interval is 250 feet 102

Figure A-2.58 Nugget CO_2 plume results for fault transmissibility multiplier sensitivity. Nugget structural contour interval is 250 feet..... 103

Figure A-2.59 Nugget pressure front results for fault transmissibility multiplier sensitivity. Nugget structural contour interval is 250 feet..... 104

Figure A-2.60 Madison CO_2 plume results for fault transmissibility multiplier sensitivity Madison structural contour interval is 250 feet 105

Figure A-2.61 Madison pressure front and AoR results for fault transmissibility multiplier sensitivity. Note: Madison structural contour interval is 250 feet..... 106

STORAGE COMPLEX WELLBORES – WELL SCHEMATICS

Bruff Unit 1 (4902320045) 107

Bruff Unit 2 (4902320106) 108

Bruff Unit MF01 (4903705573) 109

Wilson Ranch Unit 2 (4902320054) 110

STORAGE COMPLEX WELLBORES – WELL REPORTS

Bruff Unit 1 (4902320045)

Bruff Unit 2 (4902320106)

Bruff Unit MF01 (4903705573)

Wilson Ranch Unit 2 (4902320054)

TABLES

Table A-2.1. Investigated and Identified Surface and Subsurface Features in the PSG AoR			
Surface and Subsurface Features	**Investigated and Identified**	**Investigated but Not Found in AoR**	**Map**
Producing (active Wells)	✓		**Figure A.2**
Abandoned Wells	✓		**Figure A.2**
Plugged Wells or Dry Holes	✓		**Figure A.2**
Deep Stratigraphic Boreholes		✓	N/A
Subsurface Cleanup Sites		✓	N/A
Surface Bodies of Water	✓		**Figure A.2**
Other pertinent surface features, include structures intended for human occupancy.	✓		**Figure A.2**
Springs		✓	N/A
Water Wells	✓		**Figure A.2**
Mines (surface and subsurface)	✓		**Figure A.2**
Quarries	✓		**Figure A.2**
Subsurface Structures (e.g., coal mines)	✓		**Figure A.2**
Location of Proposed Wells	✓		**Figure A.2**
Location of Proposed Cathodic Protection Boreholes		✓	N/A
Any Existing Aboveground Facilities	✓		**Figure A.2**
Roads	✓		**Figure A.2**
State Boundary Lines		✓	N/A
Indian Boundary Lines		✓	N/A
Known or Suspected Faults	✓		**Figure A.2**
Other Pertinent Surface Features	✓		**Figure A.2**
All water quality management plan areas, wellhead protection areas, and source water protection areas.	✓		**Figure A.3**

Table A-2.2 – Project Speed Goat Area of Review Oil and Gas Well Information					
API	**Well Name**	**Operator**	**Latitude**	**Longitude**	**Well Status**
4902320336	LAWLER 1-30	HILCORP	41.603579	-110.11093	PRODUCING
4902321605	CHAMPLIN 290 D 2	HILCORP	41.752219	-110.090085	PRODUCING
4904120146	CHAMPLIN 357 AMOCO B 1	HILCORP	41.530497	-110.111235	PRODUCING
4902321614	WHISKEY BUTTES 40-30	OMIMEX ENERGY	41.766793	-110.157657	P & A
4902321851	WHISKEY BUTTES UNIT 224-28E	HILCORP	41.766489	-110.116327	PRODUCING
4903722707	DONLEY NCT-2	HILCORP	41.566738	-110.024891	PRODUCING
4902321608	REYNARD UNIT WELL 4	HILCORP	41.712302	-110.130417	PRODUCING
4902320326	URC ANDERSON 1-18	DIAMONDBACK	41.626754	-110.096581	P & A
4903722990	CHURCH BUTTES 2-25	DOMINION ENERGY	41.508286	-110.015702	PRODUCING
4903723047	DONLEY NCT-1 3	HILCORP	41.60268	-110.023877	PRODUCING
4904121357	CHURCH BUTTES BUFFER 9-27	HILCORP	41.51309	-110.05604	PRODUCING
4903721565	BRUFF 1	MAVERICK NATURAL RESOURCES	41.530898	-110.01557	PRODUCING
4902320366	GREEN RIVER 1	BP	41.654475	-110.072771	P & A
4902322155	HELWIG 34-8	MAVERICK NATURAL RESOURCES	41.723717	-110.085268	PRODUCING
4902322237	WHISKEY BUTTES UNIT 349-29E	HILCORP	41.772127	-110.146639	PRODUCING
4903724376	CHAMPLIN 288 E 5	BELCO ENERGY CORP.	41.743977	-110.046583	DRILLED
4904120787	KERRICK 2	BP	41.527138	-110.163354	P & A
4902322148	WILSON RANCH UNIT 7-05	HILCORP	41.662246	-110.085655	PRODUCING
4902320927	LANSDALE 28-3	DOMINION ENERGY	41.60385	-110.060998	PRODUCING
4903723259	CHAMPLIN 285 L 2	OCCIDENTAL	41.659352	-109.974939	P & A
4904120195	CHAMPLIN 358 AMOCO B 1	HILCORP	41.51613	-110.092246	PRODUCING
4902320344	WHISKEY BUTTES 30	AMOCO PROD. CO.	41.729414	-110.146901	INACTIVE COMPLETED
4903726280	KOBUS 633-23E	HILCORP	41.524533	-110.030764	PRODUCING
4903726777	SAGEBRUSH 60-26	MAVERICK NATURAL RESOURCES	41.6913	-110.02697	PRODUCING
4904121409	BRUFF UNIT 55	DOMINION ENERGY	41.5247	-110.06582	PRODUCING
4903720841	SEVEN MILE GULCH 3	OCCIDENTAL	41.768222	-109.947954	P & A
4903725933	FABIAN DITCH 5-02	HILCORP	41.653155	-110.027957	PRODUCING

Table A-2.2 – Project Speed Goat Area of Review Oil and Gas Well Information					
API	**Well Name**	**Operator**	**Latitude**	**Longitude**	**Well Status**
4904121080	OUTER BLACKS FORK 4	HILCORP	41.531234	-110.157759	P & A
4903721673	FEDERAL 1-4	CHEVRON	41.739868	-109.957024	INACTIVE COMPLETED
4902321062	CHAMPLIN 149 E 4	HILCORP	41.602497	-110.052364	PRODUCING
4902322321	FABIAN DITCH 577-09E	HILCORP	41.64892	-110.07484	PRODUCING
4902320357	MCNAMARA 1	HILCORP	41.587294	-110.049822	PRODUCING
4902321072	SEVEN MILE WASH 30-18	MAVERICK NATURAL RESOURCES	41.796011	-110.158449	PRODUCING
4903722983	BRUFF 285 FEE D-3	HILCORP	41.675496	-110.032195	PRODUCING
4904120923	BRUFF CA-1372 4A	HILCORP	41.545596	-110.101766	PRODUCING
4903724162	BRUFF FEDERAL 50-24	MAVERICK NATURAL RESOURCES	41.526854	-110.009976	PRODUCING
4904121342	LANSDALE FED 4-5	DOMINION ENERGY	41.57031	-110.06929	PRODUCING
4902321872	WHISKEY BUTTE UNIT 247-13E	HILCORP	41.792882	-110.065967	PRODUCING
4902320042	ZIEGLER 1	OIL DEVELOPMENT OF TEXAS	41.688481	-110.219506	P & A
4902322372	WHISKEY BUTTES UNIT 406-17E	HILCORP	41.79601	-110.13616	PRODUCING
4902320299	WILSON RANCH UNIT 7-1	HILCORP	41.611615	-110.103198	PRODUCING
4902321804	HAILSTONE UNIT 12	HILCORP	41.766594	-110.176408	PRODUCING
4903724004	SEVEN MILE GULCH UN 29	HILCORP	41.703483	-110.031996	P & A
4903723049	DONLEY NCT-2 4	HILCORP	41.567001	-110.033158	PRODUCING
4902320808	ULYSSES 4-13 1	OCCIDENTAL	41.624992	-110.244757	P & A
4902321866	SEVEN MILE GULCH 5-21	HILCORP	41.699775	-110.074291	PRODUCING
4903723166	BRUFF UNIT 4-6	HILCORP	41.572914	-109.985525	PRODUCING
4904120554	GRACE USA 1-6	HILCORP	41.572501	-110.108875	PRODUCING
4902320295	CHAMPLIN 149 I 1	HILCORP	41.602571	-110.091168	PRODUCING
4902320746	WHISKEY BUTTES UNIT 51	HILCORP	41.788536	-110.1001	PRODUCING
4903722978	BRUFF 149 K 3	HILCORP	41.602096	-110.005051	PRODUCING
4902321944	WHISKEY BUTTES UNIT 223-23E	HILCORP	41.783937	-110.094224	PRODUCING
4902322214	WHISKEY BUTTES UNIT 325-32E	HILCORP	41.752159	-110.139848	PRODUCING
4904120971	BRUFF UNIT 30	DOMINION ENERGY	41.522475	-110.092637	PRODUCING
4902322332	WHISKEY BUTTES UNIT 393-23E	HILCORP	41.78767	-110.09251	PRODUCING

Table A-2.2 – Project Speed Goat Area of Review Oil and Gas Well Information					
API	**Well Name**	**Operator**	**Latitude**	**Longitude**	**Well Status**
4902321869	WHISKEY BUTTES UNIT 209-24E	EOG	41.778771	-110.075292	P & A
4904121317	BRUFF UNIT 42	DOMINION ENERGY	41.527024	-110.067999	PRODUCING
4904120818	CHAMPLIN 186 AMOCO F 2	HILCORP	41.566671	-110.081706	PRODUCING
4902320735	WHISKEY BUTTES UNIT 53	HILCORP	41.773821	-110.061265	P & A
4903720865	CHAMPLIN 356 AMOCO A 1	BP	41.552146	-109.956595	P & A
4903726042	STATE OF WYOMING 36-9D	EOG	41.579254	-110.010648	P & A
4902322076	WHISKEY BUTTES UNIT 311-28E	HILCORP	41.766692	-110.131982	PRODUCING
4902322176	FABIAN DITCH 509-03E	HILCORP	41.66293	-110.047634	PRODUCING
4902321079	WHISKEY BUTTES UNIT 88	HILCORP	41.779942	-110.13838	PRODUCING
4902321375	WILSON RANCH UNIT 58	HILCORP	41.660934	-110.120195	PRODUCING
4903721369	FABIAN DITCH 2-2 505	HILCORP	41.653096	-110.034165	PRODUCING
4904120551	CHAMPLIN 357 AMOCO C 1	HILCORP	41.530639	-110.149538	PRODUCING
4903722859	BRUFF 40-24	MAVERICK NATURAL RESOURCES	41.522959	-110.014716	PRODUCING
4903724905	BRUFF FEDERAL 5-14	WAMSUTTER E&P LLC	41.541603	-110.029148	DRILLED
4903726789	ENGLEMAN 10-18	MAVERICK NATURAL RESOURCES	41.71881	-109.99399	PRODUCING
4902320284	CHAMPLIN 186 AMOCO E 1	HILCORP	41.603275	-110.120111	PRODUCING
4902321197	WHISKEY BUTTES UNIT 107	HILCORP	41.795279	-110.061191	PRODUCING
4903723467	CHAMPLIN 243 AMOCO C 1	HILCORP	41.781073	-110.042673	PRODUCING
4902321220	BRUFF UNIT 37	DOMINION ENERGY	41.612362	-110.049503	PRODUCING
4902322102	WHISKEY BUTTES UNIT 8-25	HILCORP	41.770212	-110.065916	PRODUCING
4902321159	WILSON RANCH UNIT 54	HILCORP	41.618441	-110.082343	PRODUCING
4904120859	CLIFTON 28-2	DOMINION ENERGY	41.508888	-110.064036	PRODUCING
4902320727	LANSDALE 28-2	DOMINION ENERGY	41.596896	-110.065223	PRODUCING
4902320915	CHAMPLIN 288 AMOCO E 2	HILCORP	41.740083	-110.052066	PRODUCING
4902321639	CHAMPLIN 122 F 2	HILCORP	41.701951	-110.10343	PRODUCING

Table A-2.2 – Project Speed Goat Area of Review Oil and Gas Well Information					
API	**Well Name**	**Operator**	**Latitude**	**Longitude**	**Well Status**
4902321578	HELWIG 10-8	COTERRA ENERGY	41.733297	-110.08997	P & A
4903726039	STATE OF WYOMING 24-9	HILCORP	41.606742	-110.0127	PRODUCING
4904120842	BLACKS FORK 26-1	HILCORP	41.516166	-110.148075	PRODUCING
4902321189	SEVEN MILE GULCH 30-18	BANNON ENERGY INCORPORATED	41.794939	-110.052237	P & A
4903722145	MERWIN 1-32	SAMSON RESOURCES II	41.580604	-109.976608	P & A
4902321160	WILSON RANCH UNIT 53	HILCORP	41.610374	-110.09112	PRODUCING
4903723839	CHAMPLIN 206 AMOCO F 4	BP	41.588272	-109.986294	P & A
4902320845	BRUFF 285 B-3	HILCORP	41.658906	-110.052154	PRODUCING
4903723197	KM 3-30	OCCIDENTAL	41.765283	-110.04362	P & A
4903726059	DONLEY 2-5X	CHEVRON	41.57257	-110.026647	DRILLED
4902322084	WILSON RANCH UNIT 6-05	HILCORP	41.651624	-110.082196	PRODUCING
4903726063	DONLEY 26-10	HILCORP	41.605197	-110.028225	PRODUCING
4902322140	WHISKEY BUTTES UNIT 343-29E	HILCORP	41.76366	-110.13773	PRODUCING
4903723990	CHAMPLIN 288 AMOCO B 4	OCCIDENTAL	41.726071	-110.023366	P & A
4902321992	CHAMPLIN 122 D 6-13	HILCORP	41.628742	-110.12498	PRODUCING
4903722807	SEQUOYAH W-22083 20-6	COTERRA ENERGY	41.659987	-109.985835	P & A
4903726548	KOBUS 643-27E	HILCORP	41.512543	-110.048681	PRODUCING
4904120860	LANSDALE 4-2	DOMINION ENERGY	41.566916	-110.062178	PRODUCING
4902320160	CHAMPLIN 285 AMOCO A 1	AMOCO PROD. CO.	41.682269	-110.051652	P & A
4902320323	WHISKEY BUTTES UNIT 27	BP	41.742543	-110.106991	P & A
4902321517	VERNE VALLEY 3	DIAMONDBACK	41.604342	-110.15746	P & A
4904120980	CHAMPLIN 149 AMOCO B 4	HILCORP	41.560142	-110.063554	PRODUCING
4903726685	FABIAN DITCH BORDER 523-07E	HILCORP	41.641803	-109.997859	PRODUCING
4903722914	OVERLAND TRAIL FEE 1-13	BP	41.620897	-109.901976	DRILLED
4903722943	BRUFF 326 D FEE 3	HILCORP	41.68879	-110.01199	PRODUCING
4904120968	BRUFF UNIT 32	DOMINION ENERGY	41.523412	-110.072822	PRODUCING
4902320261	WHISKEY BUTTES UNIT 18	HILCORP	41.797255	-110.068138	PRODUCING
4903723490	CHAMPLIN 326 AMOCO E 3	HILCORP	41.695842	-109.990546	PRODUCING

Table A-2.2 – Project Speed Goat Area of Review Oil and Gas Well Information					
API	**Well Name**	**Operator**	**Latitude**	**Longitude**	**Well Status**
4902320044	WILSON RANCH UNIT 1	HILCORP	41.681103	-110.122635	P & A
4903721859	1 CPC FEDERAL 1-6	HILCORP	41.571587	-109.997477	PRODUCING
4902322308	WHISKEY BUTTES UNIT 390-21E	HILCORP	41.785152	-110.122456	PRODUCING
4903722644	CHAMPLIN 206 AMOCO D 2	HILCORP	41.56644	-110.004779	PRODUCING
4903726696	CHAMPLIN 288 B6	HILCORP	41.722693	-110.036279	PRODUCING
4903725899	FABIAN DITCH 5-25	HILCORP	41.6855	-110.0058	PRODUCING
4904120590	GRACE USA 1-30X	HILCORP	41.515322	-110.111079	PRODUCING
4902321100	CHAMPLIN 243 AMOCO A 3	HILCORP	41.759084	-110.051035	INACTIVE PRODUCER
4902321864	WILSON RANCH UNIT 5-19	HILCORP	41.608422	-110.09782	PRODUCING
4902321786	WHISKEY BUTTES UNIT 206-19E	HILCORP	41.788985	-110.154344	PRODUCING
4904121082	CHAMPLIN 186 H FEE 4	HILCORP	41.573559	-110.126258	PRODUCING
4903726306	HAGOOD FEDERAL 12-5	HILCORP	41.64194	-110.01637	PRODUCING
4902320734	WHISKEY BUTTES UNIT 52	HILCORP	41.787907	-110.081029	PRODUCING
4902320302	WILSON RANCH UNIT 9	BP	41.702948	-110.107564	P & A
4902320444	CHAMPLIN 317 AMOCO B 1	BP	41.751985	-110.195343	P & A
4902321859	WHISKEY BUTTES UNIT 219-20E	HILCORP	41.780536	-110.149813	PRODUCING
4903722684	GRANGER 1-8	URBAN OIL & GAS GROUP	41.558988	-109.976398	PRODUCING
4902321068	WHISKEY BUTTES UNIT 75	HILCORP	41.797101	-110.080523	INACTIVE PRODUCER
4903722858	SAGEBRUSH 30-26	COTERRA ENERGY	41.682115	-110.023107	P & A
4903726327	FABIAN DITCH 556-25E	EOG	41.598923	-110.009756	DRILLED
4902322342	CHAMPLIN 186 G 6-31	HILCORP	41.57828	-110.10413	PRODUCING
4902321387	WHISKEY BUTTES UNIT 10-30	CHACO ENERGY COMPANY	41.773952	-110.158105	PRODUCING
4902321621	CHAMPLIN 288 C 3	HILCORP	41.740592	-110.089937	PRODUCING
4903721691	FEDERAL W-22083 1-6	MAVERICK NATURAL RESOURCES	41.652323	-109.995064	PRODUCING
4903720842	SEVEN MILE GULCH 2	BP	41.753673	-110.005539	P & A

Table A-2.2 – Project Speed Goat Area of Review Oil and Gas Well Information					
API	**Well Name**	**Operator**	**Latitude**	**Longitude**	**Well Status**
4904121447	BRUFF FEDERAL 9A-18D	HILCORP	41.54246	-110.10028	PRODUCING
4902321879	VERNE VALLEY UNIT 13	HILCORP	41.614636	-110.144083	PRODUCING
4902320188	CHAMPLIN 317 AMOCO A 1	BP	41.726227	-110.188788	P & A
4903722769	CHAMPLIN 285 H 1	HILCORP	41.61622	-109.995354	PRODUCING
4903723091	CHAMPLIN 358 C 1-A	HILCORP	41.530431	-109.996068	PRODUCING
4904121341	CHAMPLIN 357 6-19 B	HILCORP	41.526362	-110.113134	PRODUCING
4903723038	TRIPP 3	HILCORP	41.631668	-110.023706	PRODUCING
4904121420	BRUFF UNIT 56	DOMINION ENERGY	41.5212	-110.06822	PRODUCING
4902320856	CHAMPLIN 288 AMOCO C 1	HILCORP	41.745556	-110.079583	PRODUCING
4902320351	WILSON RANCH UNIT 16	HILCORP	41.659421	-110.10767	PRODUCING
4903720863	CHAMPLIN 359 AMOCO A 1	BP	41.725734	-109.957142	P & A
4903722892	MESQUITE W-24152 10-24	MAVERICK NATURAL RESOURCES	41.70389	-110.013172	PRODUCING
4902320761	WILSON RANCH UNIT 25	BP	41.66089	-110.091102	P & A
4903721750	STATE 1-16	LODESTONE OPERATING, INC	41.543803	-109.958677	INACTIVE PRODUCER
4902321587	VERNE VALLEY 6	HILCORP	41.614357	-110.143935	PRODUCING
4902321802	WHISKEY BUTTES UNIT 211-23ER	EOG	41.77832	-110.093658	P & A
4902321572	CHAMPLIN 122 D 3	HILCORP	41.632333	-110.129146	PRODUCING
4902322247	WHISKEY BUTTES UNIT 353-29E	HILCORP	41.773594	-110.134409	PRODUCING
4904120898	BRUFF UNIT 23	DOMINION ENERGY	41.530711	-110.063285	PRODUCING
4903722954	BRUFF 285 J 3	HILCORP	41.630806	-110.005591	PRODUCING
4902320290	CHAMPLIN 149 G 1	HILCORP	41.588774	-110.07187	PRODUCING
4904120928	BLACKS FORK 22-1	CHORD ENERGY	41.523115	-110.158009	P & A
4904121448	BRUFF FEDERAL 7A-18D	HILCORP	41.54242	-110.1003	PRODUCING
4902321937	FABIAN DITCH 558-27E	HILCORP	41.599055	-110.048052	PRODUCING
4902321033	EXIT CHANNEL 26-1	HILCORP	41.60346	-110.148614	PRODUCING
4903721511	GRANGER W-22082 1	DOMINION ENERGY	41.645264	-109.976474	P & A
4902320715	CHAMPLIN 122 B FEE 1	BP	41.695415	-110.099528	INACTIVE COMPLETED

Table A-2.2 – Project Speed Goat Area of Review Oil and Gas Well Information					
API	**Well Name**	**Operator**	**Latitude**	**Longitude**	**Well Status**
4902322238	WHISKEY BUTTES UNIT 354-21E	HILCORP	41.785678	-110.131079	PRODUCING
4904120920	CHAMPLIN 358 AMOCO H 2	HILCORP	41.508601	-110.123159	PRODUCING
4904121297	BLACKS FORK 2-35E	HILCORP	41.5005	-110.14346	INACTIVE PRODUCER
4902320992	ZIEGLERS WASH 3-2	HILCORP	41.661086	-110.149297	P & A
4902320932	FABIAN DITCH W-46564 3-34	OCCIDENTAL	41.675086	-110.051021	P & A
4904120939	CHMPLN 186 BANNON B 4	HILCORP	41.552426	-110.110861	PRODUCING
4903721956	FEDERAL W-23741 1-20X	MAVERICK NATURAL RESOURCES	41.69638	-109.967507	PRODUCING
4903722884	SEQUOYAH W-22083 10-6	COTERRA ENERGY	41.659735	-109.994286	P & A
4902320310	WHISKEY BUTTES 26	AMCO DRLG	41.74229	-110.08796	INACTIVE COMPLETED
4902322131	WILSON RANCH UNIT 6-19	HILCORP	41.614067	-110.105566	PRODUCING
4903726760	FABIAN DITCH 6-25	HILCORP	41.69173	-110.01554	PRODUCING
4902320620	WHISKEY BUTTES UNIT 1-8	HILCORP	41.726028	-110.089853	PRODUCING
4904121446	BRUFF FEDERAL 10A-18D	HILCORP	41.54238	-110.10033	PRODUCING
4902321833	WHISKEY BUTTES UNIT 5-26	HILCORP	41.768043	-110.093485	PRODUCING
4903723063	TRIPP 4	HILCORP	41.623466	-110.034879	PRODUCING
4902320787	WILSON RANCH UNIT 30	HILCORP	41.662071	-110.130476	PRODUCING
4903721632	CHAMPLIN 326 AMOCO E 1	HILCORP	41.695875	-109.986989	P & A
4903722962	BRUFF 149 F-3	HILCORP	41.580547	-110.033969	PRODUCING
4903723239	GRANGER UNIT 2	HILCORP	41.551868	-109.976212	PRODUCING
4903722956	BRUFF 149 H-3	HILCORP	41.574315	-110.043999	PRODUCING
4902322445	LAWLER FEDERAL 6-32D	HILCORP	41.586887	-110.087033	PRODUCING
4903721663	FEDERAL 1-26	COTERRA ENERGY	41.6822	-110.032688	P & A
4902321193	CHAMPLIN 122 AMOCO H 2	BP	41.697155	-110.149229	P & A
4902320281	#504 FABIAN DITCH 1-34	HILCORP	41.667876	-110.05208	PRODUCING
4902320349	WILSON RANCH UNIT 14	HILCORP	41.68454	-110.08784	PRODUCING

Table A-2.2 – Project Speed Goat Area of Review Oil and Gas Well Information					
API	**Well Name**	**Operator**	**Latitude**	**Longitude**	**Well Status**
4903727593	FABIAN DITCH 8-25	HILCORP	41.69146	-110.01001	PRODUCING
4902320191	WILSON RANCH UNIT 4	BP	41.656503	-110.16547	P & A
4902322059	WHISKEY BUTTES 285-19E	HILCORP	41.78504	-110.162692	PRODUCING
4904120922	CHAMPLIN 358 AMOCO B 3	HILCORP	41.51049	-110.09115	PRODUCING
4903723040	WYO U NCT-1 3	HILCORP	41.617265	-110.005031	PRODUCING
4904121024	OUTER BLACKS FORK 1	CHORD ENERGY	41.539335	-110.184608	P & A
4902321832	SEVEN MILE GULCH 5-22	HILCORP	41.700464	-110.046951	INACTIVE PRODUCER
4904120514	GOVT 1-12	HILCORP	41.55195	-110.128889	P & A
4903722945	CHURCH BUTTES 3-27	HILCORP	41.516056	-110.043836	PRODUCING
4902321030	CHAMPLIN 186 AMOCO E 2	HILCORP	41.5976	-110.12163	PRODUCING
4903723170	CHAMPLIN 285 M 1	HILCORP	41.623648	-109.975072	PRODUCING
4903724529	CHAMPLIN 243 B 4	HILCORP	41.773552	-110.032294	PRODUCING
4903723157	BERT 1-32	HILCORP	41.75867	-110.032081	PRODUCING
4902321661	CHAMPLIN 122 D 5	HILCORP	41.628211	-110.124365	PRODUCING
4903725656	FABIAN DITCH FEDERAL 4-32	HILCORP	41.674653	-109.976929	PRODUCING
4902321585	MILLER 4	HILCORP	41.696707	-110.080842	PRODUCING
4902320266	CHAMPLIN 285 AMOCO B 1	HILCORP	41.653191	-110.052042	PRODUCING
4902320603	ZIEGLER'S WASH 1-14	MARATHON	41.626576	-110.146292	P & A
4903725898	SEVEN MILE GULCH 5-23	HILCORP	41.699874	-110.02392	PRODUCING
4904121303	KOBUS 604-03E	HILCORP	41.56994	-110.0485	PRODUCING
4904120245	BERKLEY 1	HILCORP	41.530978	-110.129212	PRODUCING
4904120834	BRUFF UNIT 12	DOMINION ENERGY	41.55246	-110.082285	PRODUCING
4903723205	BRUFF UNIT 3-18	OCCIDENTAL	41.542959	-109.990779	P & A
4902321814	WHISKEY BUTTES UNIT 6-25	OCCIDENTAL	41.7698	-110.062377	P & A
4902321089	CHAMPLIN 122 AMOCO F 1	HILCORP	41.69669	-110.09869	PRODUCING
4903723121	WAGON SPOKE 20-14	HILCORP	41.718871	-110.023363	PRODUCING
4903721338	CHAMPLIN 206 AMOCO C 1	HILCORP	41.545475	-110.014928	INACTIVE PRODUCER
4904121365	BRUFF UNIT 48	DOMINION ENERGY	41.52728	-110.07679	PRODUCING
4902321702	SEVEN MILE GULCH 27	HILCORP	41.697566	-110.061449	PRODUCING

Table A-2.2 – Project Speed Goat Area of Review Oil and Gas Well Information					
API	**Well Name**	**Operator**	**Latitude**	**Longitude**	**Well Status**
4903722952	CLIFTON 34-3	DOMINION ENERGY	41.501086	-110.043993	PRODUCING
4902320732	WHISKEY BUTTES UNIT 48	HILCORP	41.787737	-110.118519	PRODUCING
4904120977	CHAMPLIN 357 AMOCO C 3	HILCORP	41.53086	-110.139735	PRODUCING
4902322023	WHISKEY BUTTES UNIT 7-35	HILCORP	41.755825	-110.085265	PRODUCING
4904121461	CHURCH BUTTES BUFFER 22-33D	HILCORP	41.50237	-110.06733	PRODUCING
4903722814	TRUMPETER UNIT 1	HILCORP	41.756106	-110.015499	PRODUCING
4903727670	BRUFF 41-13	HILCORP	41.63239	-110.00282	PRODUCING
4902322094	WHISKEY BUTTES 318-19E	HILCORP	41.791021	-110.162713	PRODUCING
4902320324	SEVEN MILE STATE 9	BP	41.71383	-110.068903	P & A
4904120196	CHAMPLIN 186 AMOCO F 1	HILCORP	41.573629	-110.091501	INACTIVE PRODUCER
4903724412	CHAMPLIN 243 A 5	HILCORP	41.756037	-110.046223	PRODUCING
4902320368	WHISKEY BUTTES UNIT 40	HILCORP	41.76847	-110.067591	PRODUCING
4902321210	ZIEGLER'S WASH 12-30	HILCORP	41.690078	-110.099606	P & A
4904120483	SAMPSON FEDERAL 1-14	HILCORP	41.5377	-110.148633	PRODUCING
4902322274	WHISKEY BUTTES UNIT 292-33E	HILCORP	41.75878	-110.11976	PRODUCING
4904120227	CHURCH BUTTES BUFFER 1-33	HILCORP	41.50175	-110.07225	P & A
4903726018	DONLEY 02-08	EOG	41.564021	-110.028373	DRILLED
4902320602	ZIEGLER'S WASH 1-30	HILCORP	41.684587	-110.102538	PRODUCING
4903724317	CHAMPLIN 285 H 4	HILCORP	41.610007	-109.986017	PRODUCING
4903727294	LANSDALE FED 10-7	DOMINION ENERGY	41.562493	-110.054507	PRODUCING
4902322106	WILSON RANCH UNIT 7-01	HILCORP	41.657805	-110.125078	PRODUCING
4902321776	WHISKEY BUTTES UNIT 203-21E	HILCORP	41.781586	-110.115261	PRODUCING
4902321148	CHAMPLIN 122 AMOCO G 1	HILCORP	41.66876	-110.139931	P & A
4903726230	KOBUS 601-01ED	HILCORP	41.56372	-110.01048	PRODUCING
4902322246	WHISKEY BUTTES UNIT 352-29E	HILCORP	41.776706	-110.142573	PRODUCING
4902320045	BRUFF UNIT 1	DOMINION ENERGY	41.608233	-110.055088	P & A

Table A-2.2 – Project Speed Goat Area of Review Oil and Gas Well Information					
API	**Well Name**	**Operator**	**Latitude**	**Longitude**	**Well Status**
4903727597	BRUFF FEDERAL 60-24	MAVERICK NATURAL RESOURCES	41.53281	-110.01091	PRODUCING
4903722739	FABIAN DITCH 502 2-34	HILCORP	41.674531	-110.04191	PRODUCING
4902320700	WILSON RANCH UNIT 22	HILCORP	41.718496	-110.080892	PRODUCING
4903723557	BRUFF UNIT 36	DOMINION ENERGY	41.617182	-110.033124	PRODUCING
4902321603	REYNARD UNIT WELL 17	HILCORP	41.753457	-110.165475	PRODUCING
4903723147	CHAMPLIN 288 AMOCO B 3	OCCIDENTAL	41.731877	-110.032552	P & A
4904121323	KOBUS 617-09E	HILCORP	41.56213	-110.07564	PRODUCING
4902320301	WILSON RANCH UNIT 8	HILCORP	41.640705	-110.083792	PRODUCING
4902322364	WHISKEY BUTTES 401-07E	HILCORP	41.72857	-110.09925	PRODUCING
4904120888	LANSDALE 10-4	DOMINION ENERGY	41.551993	-110.05373	PRODUCING
4902321457	VERNE VALLEY UNIT 1	HILCORP	41.625768	-110.163814	PRODUCING
4902320718	OPAL 30-18	MAVERICK NATURAL RESOURCES	41.711641	-110.099923	P & A
4904120821	CHAMPLIN 149 B 2	HILCORP	41.552957	-110.062323	PRODUCING
4902320443	WHISKEY BUTTES UNIT 44	BP	41.754106	-110.107006	P & A
4902320849	WILSON RANCH UNIT 33	HILCORP	41.64058	-110.09007	PRODUCING
4902321347	REYNARD UNIT 1	HILCORP	41.713004	-110.138448	PRODUCING
4902322265	WHISKEY BUTTES UNIT 360-17E	HILCORP	41.799021	-110.13897	PRODUCING
4904120380	STATE OF WYOMING 1-W	BP	41.501247	-110.130359	P & A
4903722691	DONLEY NCT 1 2	HILCORP	41.595431	-110.023981	PRODUCING
4903725932	WYO U NCT-1 1-5	HILCORP	41.615066	-110.010084	PRODUCING
4904121106	GRACE USA 1-30 # 5	HILCORP	41.509999	-110.103009	PRODUCING
4904120216	LANSDALE 10-1	DOMINION ENERGY	41.561919	-110.053487	PRODUCING
4903721900	CHAMPLIN 355 AMOCO B 1	AMOCO PROD. CO.	41.517581	-109.976682	INACTIVE COMPLETED
4902321902	WHISKEY BUTTES UNIT 238-13E	HILCORP	41.799444	-110.074024	PRODUCING
4904120548	CHAMPLIN 358 AMOCO H 1	HILCORP	41.516249	-110.129556	PRODUCING
4904120855	BRUFF UNIT 20	DOMINION ENERGY	41.523273	-110.062817	INACTIVE PRODUCER

Table A-2.2 – Project Speed Goat Area of Review Oil and Gas Well Information					
API	**Well Name**	**Operator**	**Latitude**	**Longitude**	**Well Status**
4904121386	CLIFTON FEDERAL 28-6	DOMINION ENERGY	41.50997	-110.06861	P & A
4902320841	CHAMPLIN 122 AMOCO D 2	HILCORP	41.632816	-110.120242	PRODUCING
4903726017	DONLEY 2-7	CHEVRON	41.568881	-110.021389	DRILLED
4902321247	WILSON RANCH UNIT 55	OCCIDENTAL	41.680165	-110.084184	P & A
4902322125	WHISKEY BUTTES 322-32E	HILCORP	41.75473	-110.136013	PRODUCING
4902320536	SEVEN MILE GULCH UNIT 16	AMOCO PROD. CO.	41.698668	-110.049367	INACTIVE COMPLETED
4902320371	WHISKEY BUTTES UNIT 37	HILCORP	41.75429	-110.1257	PRODUCING
4902321903	WHISKEY BUTTES UNIT 255-33E	HILCORP	41.762125	-110.124325	PRODUCING
4903723023	CHRISTMANN 70-9196 2-36	HILCORP	41.674761	-110.003928	PRODUCING
4902321871	WHISKEY BUTTES UNIT 237-13E	HILCORP	41.80113	-110.06553	PRODUCING
4903723013	HAGOOD 12-3	DOMINION ENERGY	41.646252	-110.004578	PRODUCING
4903725779	CHRISTMANN STATE 5-36	HILCORP	41.671167	-110.008755	PRODUCING
4903723319	CHAMPLIN 285 AMOCO E 3	HILCORP	41.675199	-109.994192	PRODUCING
4903723098	SAGEBRUSH 40-26	MAVERICK NATURAL RESOURCES	41.682201	-110.031972	PRODUCING
4903723048	DONLEY NCT-1 W010326 4	HILCORP	41.595696	-110.033768	PRODUCING
4903723075	FABIAN DITCH 3-2	HILCORP	41.660332	-110.034219	PRODUCING
4902320881	ZIEGLERS WASH 1-2	HILCORP	41.661436	-110.139672	PRODUCING
4903722995	BRUFF FEDERAL 4-26	HILCORP	41.515639	-110.024569	PRODUCING
4903722689	BRUFF FEDERAL 2-6	HILCORP	41.565751	-109.98636	PRODUCING
4902322052	WHISKEY BUTTES UNIT 7-25	HILCORP	41.771064	-110.073808	PRODUCING
4903726726	SAGEBRUSH BORDER 432-31E	HILCORP	41.670904	-109.997842	PRODUCING
4902320312	SEVEN MILE GULCH 10	AMOCO PROD. CO.	41.782728	-110.048178	INACTIVE COMPLETED
4904120214	CHAMPLIN 358 AMOCO G 1	HILCORP	41.501817	-110.111552	PRODUCING
4903722856	CHAMPLIN 288 B 1	BP	41.732792	-110.023439	P & A
4902320742	SEVEN MILE 17	HILCORP	41.71874	-110.061247	PRODUCING

Table A-2.2 – Project Speed Goat Area of Review Oil and Gas Well Information					
API	**Well Name**	**Operator**	**Latitude**	**Longitude**	**Well Status**
4903723838	CHAMPLIN 206 AMOCO E 4	OCCIDENTAL	41.559181	-109.985351	P & A
4903727006	FABIAN DITCH 580-13E	HILCORP	41.622	-110.01729	PRODUCING
4902322150	WILSON RANCH UNIT C 6-17	HILCORP	41.63516	-110.08446	PRODUCING
4903727243	LANSDALE FED 10-6	DOMINION ENERGY	41.55691	-110.04579	PRODUCING
4902322073	WHISKEY BUTTES UNIT 312-20E	HILCORP	41.788912	-110.143418	PRODUCING
4902320755	ZIEGLER'S WASH 1-26	MARATHON	41.690221	-110.148736	INACTIVE COMPLETED
4902322025	WILSON RANCH UNIT 443-32E	HILCORP	41.674476	-110.085948	PRODUCING
4904121366	CLIFTON FEDERAL 28-7	DOMINION ENERGY	41.51161	-110.07395	PRODUCING
4904120978	CHAMPLIN 149 AMOCO B 3	HILCORP	41.552478	-110.072274	PRODUCING
4902320462	HAMS FORK 1-43	CHACO ENERGY COMPANY	41.752517	-110.17672	PRODUCING
4904120904	BRUFF UNIT 26	DOMINION ENERGY	41.523353	-110.052799	PRODUCING
4903727332	FABIAN DITCH 568-13E	HILCORP	41.63398	-110.01723	PRODUCING
4902320880	ZIEGLERS WASH 2-2	HILCORP	41.653786	-110.139545	PRODUCING
4903723149	CHMPLN 206 BANNON E 3	HILCORP	41.551887	-109.995455	PRODUCING
4903721336	CHAMPLIN 206 AMOCO E 1	HILCORP	41.559049	-109.99506	PRODUCING
4902320852	SEVEN MILE UNIT 22	HILCORP	41.711391	-110.069218	PRODUCING
4903721342	CHAMPLIN 326 AMOCO D 1	HILCORP	41.682054	-110.013426	P & A
4903722831	SEVEN MILE GULCH UN 18	HILCORP	41.697205	-110.030764	PRODUCING
4902321784	HELWIG 10-8R	MAVERICK NATURAL RESOURCES	41.73288	-110.08916	PRODUCING
4903721322	CHAMPLIN 149 J 1	HILCORP	41.646258	-110.033139	PRODUCING
4903723468	CHAMPLIN 326 AMOCO F 1	BP	41.739647	-110.012551	P & A
4903723204	SPEAR POINT 20-34	BANNON ENERGY INCORPORATED	41.758866	-109.983067	INACTIVE COMPLETED
4903724276	LANSBERRY 2-30	HILCORP	41.594576	-109.995845	PRODUCING
4904120529	VERNE 1-2	SAMSON RESOURCES II	41.564846	-110.140645	P & A

Table A-2.2 – Project Speed Goat Area of Review Oil and Gas Well Information					
API	**Well Name**	**Operator**	**Latitude**	**Longitude**	**Well Status**
4902322152	WHISKEY BUTTES UNIT 336-21E	HILCORP	41.79093	-110.11516	PRODUCING
4902321657	ROCKY CROSSING USA 3-24	HILCORP	41.610262	-110.128971	PRODUCING
4904121327	OBF 4-20	OCCIDENTAL	41.53324	-110.21068	P & A
4902321128	ANDERSON 4-3	MAVERICK NATURAL RESOURCES	41.740768	-110.061139	P & A
4903722917	MESQUITE W-24152 30-24	MAVERICK NATURAL RESOURCES	41.696962	-110.003307	PRODUCING
4902322351	WHISKEY BUTTES UNIT 398-19E	HILCORP	41.7802	-110.15486	PRODUCING
4902322365	OPAL 70-18	MAVERICK NATURAL RESOURCES	41.71616	-110.09675	PRODUCING
4902321495	REYNARD UNIT 5	HILCORP	41.698277	-110.13896	PRODUCING
4902320739	BALCRON HELLWIG 31-8	MAVERICK NATURAL RESOURCES	41.733506	-110.080638	PRODUCING
4902320774	WHISKEY BUTTES UNIT 60	HILCORP	41.788629	-110.138537	PRODUCING
4903726043	STATE OF WYOMING 36-10	HILCORP	41.584337	-110.002779	PRODUCING
4902321167	CHAMPLIN 149 AMOCO C 3	HILCORP	41.643841	-110.06389	PRODUCING
4903722706	STATE OF WYOMING U 2	HILCORP	41.580188	-110.004781	PRODUCING
4902321829	BRUFF 5-33	HILCORP	41.671698	-110.061808	PRODUCING
4902322061	FABIAN DITCH 559-27E	HILCORP	41.598653	-110.055905	PRODUCING
4903721187	BRUFF UNIT 10	DOMINION ENERGY	41.618977	-110.021378	P & A
4903723167	BRUFF UNIT 4-18	HILCORP	41.537496	-109.996572	PRODUCING
4902320377	WILSON RANCH UNIT 19	HILCORP	41.669669	-110.123419	PRODUCING
4902321591	CHAMPLIN 186 AMOCO E 3	HILCORP	41.60423	-110.128083	PRODUCING
4902320332	WILSON RANCH UNIT 15	HILCORP	41.669981	-110.0892	PRODUCING
4902320810	WILSON RANCH UNIT 31	HILCORP	41.675436	-110.091232	PRODUCING
4902321429	REYNARD UNIT 3	HILCORP	41.724259	-110.141357	PRODUCING
4902321422	SEVEN MILE GULCH 28	BP	41.719712	-110.072793	P & A
4903726644	KOBUS 625-13E	HILCORP	41.54122	-110.01798	PRODUCING
4902321440	CHAMPLIN 288 AMOCO C 2	HILCORP	41.740051	-110.080402	PRODUCING

Table A-2.2 – Project Speed Goat Area of Review Oil and Gas Well Information					
API	**Well Name**	**Operator**	**Latitude**	**Longitude**	**Well Status**
4903721933	CHAMPLIN 149 F 1	HILCORP	41.588251	-110.033573	PRODUCING
4903722940	SEQUOYAH 30-6	MAVERICK NATURAL RESOURCES	41.652475	-109.98584	PRODUCING
4903722563	STATE OF WYOMING AH 1	URBAN OIL & GAS GROUP	41.795856	-110.012725	PRODUCING
4903725997	CHAMPLIN 206 F 5	HILCORP	41.584597	-109.992003	PRODUCING
4902321672	MOXTOP WELL 6-1	HILCORP	41.740101	-110.098894	PRODUCING
4903723070	BRUFF 1-18	HILCORP	41.545229	-109.9952	PRODUCING
4902322053	WILSON RANCH UNIT 6-17	HILCORP	41.710187	-110.084878	PRODUCING
4902320322	WHISKEY BUTTES UNIT 41	HILCORP	41.768509	-110.087674	PRODUCING
4902322043	CHAMPLIN 243 A 7-31	OCCIDENTAL	41.755631	-110.046618	P & A
4903726372	CHAMPLIN BORDER 35-5	HILCORP	41.59041	-110.029461	PRODUCING
4903721907	R & BATES W-56336 1-18	HILCORP	41.631208	-109.995021	PRODUCING
4903722976	BRUFF 149 J 3	HILCORP	41.646163	-110.024297	PRODUCING
4903721662	FEDERAL 1-20	DEVON	41.69638	-109.967324	P & A
4903723290	CHAMPLIN 149 K 4	HILCORP	41.596416	-110.014345	PRODUCING
4903721967	PIPELINE CROSSING 1-20	OCCIDENTAL	41.530316	-109.97634	P & A
4903721546	DONLEY NCT-2 1	HILCORP	41.574558	-110.033709	PRODUCING
4902322307	WHISKEY BUTTES UNIT 357-32E	HILCORP	41.75575	-110.14203	PRODUCING
4903722836	MESQUITE W-24152 20-24	COTERRA ENERGY	41.70436	-110.004236	P & A
4903722881	KOBUS 2	HILCORP	41.551774	-110.00547	PRODUCING
4902320786	WILSON RANCH UNIT 27	HILCORP	41.632032	-110.090231	PRODUCING
4903723453	CHAMPLIN 326 AMOCO G 1	BP	41.713827	-109.969653	P & A
4902320825	BRUFF 149 E 2	HILCORP	41.59556	-110.052059	PRODUCING
4902320946	MOUNTAIN FUEL 10-4	DOMINION ENERGY	41.641135	-110.05148	PRODUCING
4903722915	HAGOOD 12-2	DOMINION ENERGY	41.638612	-110.003596	PRODUCING
4902321597	VERNE VALLEY 4	HILCORP	41.611262	-110.141267	PRODUCING
4904121389	CLIFTON FEDERAL 34-8	DOMINION ENERGY	41.50336	-110.04886	PRODUCING
4902320502	WILSON RANCH UNIT 21	HILCORP	41.669595	-110.103616	PRODUCING
4903727359	KOBUS 50-12	MAVERICK NATURAL RESOURCES	41.55469	-110.01057	PRODUCING

Table A-2.2 – Project Speed Goat Area of Review Oil and Gas Well Information					
API	**Well Name**	**Operator**	**Latitude**	**Longitude**	**Well Status**
4902320159	WHISKEY BUTTES UNIT 4	HILCORP	41.766784	-110.14809	PRODUCING
4903723257	CHAMPLIN 326 D 4	HILCORP	41.681968	-110.00385	P & A
4904121092	CHAMPLIN 357 C 4	OCCIDENTAL	41.521969	-110.148634	P & A
4903726689	FABIAN DITCH BORDER 501-01E	HILCORP	41.656822	-110.008972	PRODUCING
4902322335	CHAMPLIN 288C 8-05	HILCORP	41.737558	-110.076335	PRODUCING
4902321989	WHISKEY BALLERINA 309-34E	HILCORP	41.755908	-110.104613	PRODUCING
4902321491	VERNE VALLEY UNIT 2	HILCORP	41.618329	-110.139986	PRODUCING
4903727046	KOBUS 610-11E	HILCORP	41.549911	-110.037025	PRODUCING
4903723312	CHAMPLIN 288 AMOCO A 4	HILCORP	41.71151	-110.04114	PRODUCING
4902320843	BRUFF 285 FEE C-3	HILCORP	41.668355	-110.062382	PRODUCING
4902321553	CHAMPLIN 290 B 3 R	MAVERICK NATURAL RESOURCES	41.781289	-110.15808	P & A
4903723263	SEVEN MILE GULCH UN 24	HILCORP	41.696849	-110.043143	PRODUCING
4903727633	EAST TRUMPETER 85-2	MAVERICK NATURAL RESOURCES	41.73786	-110.03522	PRODUCING
4902322141	WHISKEY BUTTES UNIT 321-32E	HILCORP	41.75965	-110.14329	PRODUCING
4903724601	CHAMPLIN 243 B 3	OCCIDENTAL	41.773688	-110.032013	DRILLED
4902322123	WHISKEY BUTTES 324-19E	HILCORP	41.789533	-110.158903	PRODUCING
4903722887	SAGUARO 20-12	URBAN OIL & GAS GROUP	41.732688	-110.013006	P & A
4904120081	BRUFF UNIT 4	DOMINION ENERGY	41.542943	-110.089419	PRODUCING
4904121320	KOBUS 606-03E	HILCORP	41.56447	-110.04858	PRODUCING
4903722977	BRUFF 149 J 4	HILCORP	41.639298	-110.032957	PRODUCING
4903720848	LACOY-FEDERAL 1	DAVIS OIL COMPANY	41.73892	-109.881271	P & A
4902321600	REYNARD UNIT 13	HILCORP	41.759653	-110.167298	PRODUCING
4902321406	WILSON RANCH UNIT 12-2	HILCORP	41.639318	-110.121959	INACTIVE PRODUCER
4902322270	WHISKEY BUTTES UNIT 364-17E	HILCORP	41.796395	-110.14147	PRODUCING
4903722957	BRUFF 285 I-3	HILCORP	41.64564	-109.9957	PRODUCING
4903722866	CHAMPLIN 206 AMOCO E 2	HILCORP	41.551543	-109.986628	PRODUCING
4902321043	CHAMPLIN 149 L 4	BP	41.630983	-110.053042	P & A

Table A-2.2 – Project Speed Goat Area of Review Oil and Gas Well Information					
API	**Well Name**	**Operator**	**Latitude**	**Longitude**	**Well Status**
4902321904	WHISKEY BUTTES UNIT 248-14E	HILCORP	41.799881	-110.08545	PRODUCING
4902322304	WHISKEY BUTTES UNIT 383-19E	HILCORP	41.783749	-110.155581	PRODUCING
4904120969	BRUFF UNIT 33	DOMINION ENERGY	41.537658	-110.091493	PRODUCING
4904121261	OUTER BLACKS FORK 1-27	HILCORP	41.517425	-110.155929	PRODUCING
4902321391	CHAMPLIN 285 AMOCO C 4	HILCORP	41.676311	-110.0793	PRODUCING
4903722979	BRUFF 206 B-3	HILCORP	41.559981	-110.024401	PRODUCING
4904120174	CLIFTON 28-1	DOMINION ENERGY	41.514347	-110.070436	PRODUCING
4902321178	CHAMPLIN 290 AMOCO C 1	BP	41.795892	-110.177066	INACTIVE COMPLETED
4902322444	LAWLER FEDERAL 5-32D	HILCORP	41.586891	-110.086979	PRODUCING
4903721471	A M TRIPP 1	HILCORP	41.634478	-110.031391	PRODUCING
4904120476	CHAMPLIN 186 AMOCO B 1-1	HILCORP	41.560137	-110.110692	PRODUCING
4902320286	WHISKEY BUTTES UNIT 12	HILCORP	41.782807	-110.107684	PRODUCING
4902320883	FABIAN DITCH FEE 3-28	VERDUN OIL COMPANY	41.682537	-110.07113	P & A
4902322104	WHISKEY BUTTES UNIT 8-27	HILCORP	41.770394	-110.104635	PRODUCING
4902321080	WHISKEY BUTTES UNIT 86	HILCORP	41.789139	-110.070076	PRODUCING
4903721339	CHAMPLIN 206 F FEE 1	HILCORP	41.587837	-109.995432	PRODUCING
4903722755	SAGEBRUSH 42-26	COTERRA ENERGY	41.689326	-110.023007	P & A
4903726663	FABIAN DITCH 502-01E	HILCORP	41.650846	-110.009217	PRODUCING
4902320287	WHISKEY BUTTES UNIT 23	BP	41.782786	-110.067765	P & A
4904121318	BRUFF UNIT 43	DOMINION ENERGY	41.547187	-110.095229	PRODUCING
4903723248	CHMPLN 206 BANNON I 1	HILCORP	41.566722	-109.976019	PRODUCING
4902321782	WHISKEY BUTTES UNIT 205-13E	HILCORP	41.79351	-110.074114	PRODUCING
4902321282	WILSON RANCH UNIT 59	HILCORP	41.658563	-110.098717	PRODUCING
4903723073	BRUFF 4-14	HILCORP	41.538318	-110.034089	PRODUCING
4903723882	EAST TRUMPETER 80-2	MAVERICK NATURAL RESOURCES	41.736643	-110.027485	INACTIVE PRODUCER
4902320821	BRUFF 149 G-4	HILCORP	41.581618	-110.071613	INACTIVE PRODUCER

Table A-2.2 – Project Speed Goat Area of Review Oil and Gas Well Information					
API	**Well Name**	**Operator**	**Latitude**	**Longitude**	**Well Status**
4902322086	SEVEN MILE GULCH 7-21	HILCORP	41.700634	-110.066221	PRODUCING
4904120139	BRUFF A 1	HILCORP	41.545728	-110.11078	PRODUCING
4902321658	ROCKY CROSSING USA 1-24	HILCORP	41.617434	-110.129344	PRODUCING
4903726863	BRUFF FEDERAL 5-14	HILCORP	41.539921	-110.030122	PRODUCING
4903722968	WAGON SPOKE 10-14	HILCORP	41.718444	-110.032348	PRODUCING
4903723318	CHAMPLIN 285 AMOCO E 4	OCCIDENTAL	41.667356	-109.986622	P & A
4903723881	EAST TRUMPETER 30-2	MAVERICK NATURAL RESOURCES	41.741232	-110.024042	PRODUCING
4902320938	WILSON RANCH UNIT 39	HILCORP	41.653698	-110.104153	PRODUCING
4902321452	CHAMPLIN 285 A AMOCO 5	OCCIDENTAL	41.689082	-110.051147	P & A
4903726356	SAGEBRUSH 43-26	MAVERICK NATURAL RESOURCES	41.68574	-110.02233	PRODUCING
4904120870	CHURCH BUTTES 4-27	HILCORP	41.509499	-110.055561	PRODUCING
4902320767	UPRC AMOCO 290 B 1	HILCORP	41.781965	-110.166852	PRODUCING
4903722898	CHESTERFIELD STATE 1	BP	41.718578	-109.958273	P & A
4902321539	ZIEGLERS WASH 11-30	HILCORP	41.690136	-110.11036	PRODUCING
4902321743	WHISKEY BUTTES UNIT 116	HILCORP	41.752576	-110.080447	PRODUCING
4902320269	CHAMPLIN 285 AMOCO C 1	HILCORP	41.670516	-110.067909	PRODUCING
4903723083	CHRISTMANN 70-9196 3-36	HILCORP	41.67525	-110.014144	PRODUCING
4904121347	LANSDALE FED 4-8	DOMINION ENERGY	41.5707	-110.06123	PRODUCING
4902321002	ALTROGGE 3-18	HILCORP	41.631699	-110.110998	PRODUCING
4902321181	CHAMPLIN 288 AMOCO G 1	BP	41.697586	-110.188141	P & A
4902321058	WHISKEY BUTTES UNIT 81	HILCORP	41.787961	-110.111092	PRODUCING
4903723072	MCNAMARA 3	HILCORP	41.58853	-110.041498	PRODUCING
4902320185	CHAMPLIN 285 AMOCO A 1	OCCIDENTAL	41.682361	-110.051653	P & A
4903726647	KOBUS 609-11E	HILCORP	41.55613	-110.02201	PRODUCING

Table A-2.2 – Project Speed Goat Area of Review Oil and Gas Well Information					
API	**Well Name**	**Operator**	**Latitude**	**Longitude**	**Well Status**
4902321170	WHISKEY BUTTES UNIT 99	HILCORP	41.787882	-110.148703	PRODUCING
4902321014	KM 1-30	HILCORP	41.773226	-110.05066	PRODUCING
4902321507	HELWIG 30-8	MAVERICK NATURAL RESOURCES	41.726158	-110.080195	INACTIVE PRODUCER
4904120822	CHAMPLIN 186 B 2	HILCORP	41.552459	-110.101765	PRODUCING
4903726662	SAGEBRUSH 436-35E	EOG	41.67109	-110.02006	P & A
4903722916	BRUFF UNIT 21	DOMINION ENERGY	41.522948	-110.04341	PRODUCING
4903726276	KOBUS 621-13E	HILCORP	41.541275	-110.009889	PRODUCING
4903726535	KOBUS 631-15E	HILCORP	41.54749	-110.0483	PRODUCING
4902322440	ALTROGGE FEDERAL 5-18D	HILCORP	41.625484	-110.108099	PRODUCING
4902320294	CHAMPLIN 186 G 1	HILCORP	41.588644	-110.110518	PRODUCING
4902321360	WHISKEY BUTTES UNIT 111	HILCORP	41.773998	-110.069161	P & A
4903722980	BRUFF 149 F-4	HILCORP	41.58723	-110.023987	PRODUCING
4903723310	CHAMPLIN 285 AMOCO I 4	HILCORP	41.638701	-109.986601	PRODUCING
4903722750	BRUFF 2-24	COTERRA ENERGY	41.523185	-110.004944	P & A
4903723444	KM 2-30	HILCORP	41.773722	-110.040987	PRODUCING
4902320763	CHAMPLIN 122 AMOCO D 1	BP	41.624513	-110.119491	P & A
4903721788	FEDERAL 2-26	HILCORP	41.514215	-110.030957	PRODUCING
4902322336	WHISKEY BUTTES 387-19E	HILCORP	41.7791	-110.16956	PRODUCING
4904120941	CHAMPLIN 358 AMOCO H 3	HILCORP	41.516704	-110.120147	PRODUCING
4902320785	CHAMPLIN 149 C 2	HILCORP	41.639284	-110.062371	PRODUCING
4902320415	CHAMPLIN 262 AMOCO C 1	REDWOOD ENERGY USA LTD	41.697646	-110.255429	P & A
4903722137	CHAMPLIN 285 AMOCO K 1	AMOCO PROD. CO.	41.616761	-109.995834	INACTIVE COMPLETED
4902320759	CHAMPLIN 288 A 2	HILCORP	41.711418	-110.051621	INJECTING
4902322211	WHISKEY BUTTES UNIT 328-02E	HILCORP	41.746527	-110.135142	PRODUCING
4904120365	CLIFTON 34-1	DOMINION ENERGY	41.502626	-110.054206	PRODUCING
4902321190	CHAMPLIN 288 AMOCO F 1	BP	41.727495	-110.149685	INACTIVE COMPLETED
4902322174	WHISKEY BUTTES UNIT 296-17E	HILCORP	41.799495	-110.14336	PRODUCING
4904121311	CHAMPLIN 186 B 5-07	HILCORP	41.55026	-110.098697	PRODUCING
4902321817	WHISKEY BUTTES UNIT 5-25	HILCORP	41.76461	-110.06735	PRODUCING

Table A-2.2 – Project Speed Goat Area of Review Oil and Gas Well Information					
API	**Well Name**	**Operator**	**Latitude**	**Longitude**	**Well Status**
4903723036	CHAMPLIN 243 AMOCO A 1	OCCIDENTAL	41.759517	-110.04148	P & A
4903721991	FEDERAL 14	MAVERICK NATURAL RESOURCES	41.713773	-109.989925	PRODUCING
4904120937	CHAMPLIN 186 AMOCO H 2	HILCORP	41.566904	-110.119983	PRODUCING
4902320773	WILSON RANCH UNIT 29	HILCORP	41.617637	-110.091062	PRODUCING
4904121308	CHAMPLIN 357 B 5-19	HILCORP	41.52716	-110.10591	PRODUCING
4902320749	WHISKEY BUTTES UNIT 54	HILCORP	41.758929	-110.061073	PRODUCING
4902321243	WILSON RANCH UNIT 56	BP	41.631957	-110.080861	P & A
4902321573	VERNE VALLEY 5	HILCORP	41.611162	-110.148021	PRODUCING
4902321977	WHISKEY BUTTES UNIT 253-28E	HILCORP	41.77259	-110.125129	PRODUCING
4902322143	WILSON RANCH UNIT 7-19	HILCORP	41.620031	-110.097573	PRODUCING
4902321882	WHISKEY BUTTES UNIT 241-21E	HILCORP	41.779783	-110.132773	PRODUCING
4902322334	CHAMPLIN 122D 7-13	HILCORP	41.628214	-110.11773	PRODUCING
4902322096	WHISKEY BUTTES UNIT 317-15E	HILCORP	41.799364	-110.10466	PRODUCING
4902322146	WHISKEY BUTTES UNIT 341-21E	HILCORP	41.784354	-110.11725	PRODUCING
4902321645	CHAMPLIN 288 C 5	HILCORP	41.743714	-110.085324	PRODUCING
4902321056	MFS STATE LAND 36-2	DOMINION ENERGY	41.578862	-110.118823	PRODUCING
4903726274	FABIAN DITCH 500-01E	HILCORP	41.656822	-110.008972	PRODUCING
4903721964	CHURCH BUTTES 1-25	DOMINION ENERGY	41.516031	-110.014958	PRODUCING
4903723116	ENGLEMAN 40-18	MAVERICK NATURAL RESOURCES	41.711008	-109.994921	PRODUCING
4903722692	MCNAMARA 2	CHEVRON	41.581108	-110.043311	P & A
4902322135	WHISKEY BUTTES UNIT 334-15E	HILCORP	41.799364	-110.10466	PRODUCING
4902322050	CHAMPLIN 288 C 7	HILCORP	41.742767	-110.085117	PRODUCING
4902321819	WILSON RANCH UNIT 5-17	HILCORP	41.713993	-110.082498	PRODUCING
4902322014	WHISKEY BUTTES UNIT 291-32E	HILCORP	41.756044	-110.143304	PRODUCING

Table A-2.2 – Project Speed Goat Area of Review Oil and Gas Well Information					
API	**Well Name**	**Operator**	**Latitude**	**Longitude**	**Well Status**
4902322439	ALTROGGE FEDERAL 4-18D	HILCORP	41.625442	-110.108084	PRODUCING
4902321118	WHISKEY BUTTES UNIT 89	HILCORP	41.772597	-110.119233	PRODUCING
4903723476	SAGEBRUSH 50-26	MAVERICK NATURAL RESOURCES	41.68559	-110.028444	INACTIVE PRODUCER
4902320731	OPAL 20-18	MAVERICK NATURAL RESOURCES	41.718928	-110.09909	INACTIVE PRODUCER
4903721495	CHAMPLIN 285 J 1	HILCORP	41.631557	-110.013997	PRODUCING
4902321091	WHISKEY BUTTES UNIT 96	HILCORP	41.759418	-110.080432	PRODUCING
4903722055	CHAMPLIN 149 E 1	BP	41.59555	-110.043128	P & A
4902322280	FABIAN DITCH 10-28	URBAN OIL & GAS GROUP	41.686148	-110.065766	PRODUCING
4903726064	MCNAMARA 34-5A	CHEVRON	41.58281	-110.049324	DRILLED
4903723342	COLNAGO 1-28	OCCIDENTAL	41.766909	-110.013412	INACTIVE COMPLETED
4902320679	CHAMPLIN 285 AMOCO C 2	HILCORP	41.675193	-110.06298	PRODUCING
4904120930	SAMPSON 2-14	HILCORP	41.545447	-110.138471	PRODUCING
4902305018	FEDERAL 1	CHEVRON	41.604981	-110.098373	P & A
4903722005	CHAMPLIN 149 K 1	HILCORP	41.599896	-110.016038	PRODUCING
4902320316	WHISKEY BUTTES UNIT 33	HILCORP	41.783552	-110.144997	PRODUCING
4903724377	CHAMPLIN 288 B 5	HILCORP	41.729272	-110.027471	PRODUCING
4904120123	BRUFF UNIT 8	DOMINION ENERGY	41.55795	-110.08883	P & A
4904120899	BRUFF UNIT 24	DOMINION ENERGY	41.538873	-110.071751	PRODUCING
4902321907	WHISKEY BUTTES UNIT 243-22E	HILCORP	41.791091	-110.104967	PRODUCING
4904121410	BRUFF UNIT 54	DOMINION ENERGY	41.53285	-110.06875	PRODUCING
4902320993	CHAMPLIN 149 I 3	HILCORP	41.603478	-110.081043	PRODUCING
4904120956	GRACE USA 1-30 UNIT 3	HILCORP	41.508284	-110.112033	PRODUCING
4902322223	WHISKEY BUTTES UNIT 289-29E	HILCORP	41.763947	-110.141843	PRODUCING
4902320242	WHISKEY BUTTES UNIT 9	HILCORP	41.783158	-110.126376	PRODUCING
4902321731	REYNARD UNIT 12	HILCORP	41.739133	-110.15866	INACTIVE PRODUCER
4904120840	CHAMPLIN 186 I 2	HILCORP	41.544724	-110.120045	PRODUCING
4902322093	SEVEN MILE WASH 100-18E	MAVERICK NATURAL RESOURCES	41.799524	-110.162839	PRODUCING
4902321201	WHISKEY BUTTES UNIT 106	BP	41.796363	-110.138306	P & A

Table A-2.2 – Project Speed Goat Area of Review Oil and Gas Well Information					
API	**Well Name**	**Operator**	**Latitude**	**Longitude**	**Well Status**
4904121304	CHAMPLIN 358 BANNON 5	HILCORP	41.51271	-110.11732	P & A
4902321997	WILSON RANCH UNIT 6-07	HILCORP	41.643102	-110.105564	PRODUCING
4902320800	CIG 1-10	HILCORP	41.72545	-110.04976	PRODUCING
4902321067	WHISKEY BUTTES UNIT 94	HILCORP	41.751524	-110.059012	PRODUCING
4902321256	CHAMPLIN 243 AMOCO C 3	OCCIDENTAL	41.787714	-110.05211	P & A
4903724836	READING & BATES FED 1-18 4	HILCORP	41.62389	-109.99444	PRODUCING
4902322255	WHISKEY BUTTES UNIT 356-21E	HILCORP	41.779383	-110.128549	PRODUCING
4903723000	BRUFF 3-6	HILCORP	41.56507	-109.995063	PRODUCING
4904120141	CHAMPLIN 149 AMOCO B 1	HILCORP	41.557902	-110.070838	PRODUCING
4903722963	BRUFF 206 C-3	HILCORP	41.537462	-110.01422	PRODUCING
4902320754	WHISKEY BUTTES UNIT 62	HILCORP	41.774003	-110.09982	PRODUCING
4902320675	CHAMPLIN 149 AMOCO G 2	HILCORP	41.581608	-110.062808	PRODUCING
4903721353	BRUFF 1-14 551	HILCORP	41.545027	-110.033901	INACTIVE PRODUCER
4903721281	CHAMPLIN 206 AMOCO B 1	HILCORP	41.559542	-110.033846	PRODUCING
4903726651	KOBUS 622-13E	HILCORP	41.541275	-110.009889	PRODUCING
4902321041	SEVEN MILE GULCH 25	HILCORP	41.712503	-110.059402	PRODUCING
4903723120	WAGON SPOKE 14-14	HILCORP	41.711024	-110.032739	PRODUCING
4904120943	CHMPLN 186 BANNON F 4	HILCORP	41.567015	-110.091787	PRODUCING
4902321390	WILSON RANCH UNIT 60	OCCIDENTAL	41.653808	-110.109864	P & A
4902320370	WILSON RANCH UNIT 12	AMCO DRLG	41.61859	-110.16814	INACTIVE COMPLETED
4902321120	WILSON RANCH UNIT 38	OCCIDENTAL	41.668101	-110.080376	P & A
4903721479	CPC UDC 1-23	HILCORP	41.527823	-110.03376	PRODUCING
4903726521	CHAMPLIN BORDER 35-06	HILCORP	41.58457	-110.03717	PRODUCING
4903722989	BRUFF 149 L 3	HILCORP	41.631252	-110.045214	PRODUCING
4902320836	WILSON RANCH UNIT 32	HILCORP	41.646819	-110.120335	PRODUCING
4904120222	CHAMPLIN 358 AMOCO F 1	HILCORP	41.543455	-110.050422	PRODUCING
4904121363	KOBUS 645-15E	HILCORP	41.541635	-110.056644	PRODUCING

Table A-2.2 – Project Speed Goat Area of Review Oil and Gas Well Information					
API	**Well Name**	**Operator**	**Latitude**	**Longitude**	**Well Status**
4902320778	WHISKEY BUTTES UNIT 61	HILCORP	41.774174	-110.081143	PRODUCING
4902320319	LANSDALE 28-1	DOMINION ENERGY	41.602336	-110.071179	PRODUCING
4904121387	CLIFTON FEDERAL 28-5	DOMINION ENERGY	41.51283	-110.06382	PRODUCING
4903723150	CHAMPLIN 206 F 3	HILCORP	41.580448	-109.994867	PRODUCING
4902321385	CHAMPLIN 186 AMOCO J 1	HILCORP	41.61787	-110.11018	PRODUCING
4902321421	WHISKEY BUTTES UNIT 30-30	CHACO ENERGY COMPANY	41.770348	-110.166009	PRODUCING
4902320940	FABIAN DITCH FEE 5-28	URBAN OIL & GAS GROUP	41.689488	-110.071465	PRODUCING
4904120205	LANSDALE 4-1	DOMINION ENERGY	41.57395	-110.07263	PRODUCING
4903723291	CHAMPLIN 285 AMOCO J 4	HILCORP	41.624339	-110.014081	PRODUCING
4902321059	WHISKEY BUTTES UNIT 77	HILCORP	41.780324	-110.098281	PRODUCING
4904121449	BRUFF FEDERAL 6A-18D	HILCORP	41.5425	-110.10026	PRODUCING
4902321622	CHAMPLIN 288 A 5	OCCIDENTAL	41.714974	-110.046841	P & A
4902321835	WHISKEY BUTTES UNIT 213-20E	HILCORP	41.785105	-110.135587	PRODUCING
4902320686	CHAMPLIN 149 I 2	HILCORP	41.595448	-110.081021	PRODUCING
4903723163	READING & BATES 1-18 3	OCCIDENTAL	41.631259	-109.986456	P & A
4903723044	BRUFF 2-18	OCCIDENTAL	41.53689	-109.985955	P & A
4903726046	TRIPP 14-5	CHEVRON	41.630919	-110.026257	DRILLED
4903724833	WAGON SPOKE FEDERAL 5-14	OCCIDENTAL	41.714818	-110.02755	DRILLED
4902320207	WILSON RANCH UNIT 5	HILCORP	41.612126	-110.084327	PRODUCING
4904121411	BRUFF UNIT 53	DOMINION ENERGY	41.54111	-110.06481	PRODUCING
4903727323	KOBUS 85-12	MAVERICK NATURAL RESOURCES	41.54994	-110.01784	PRODUCING
4902321915	WHISKEY BUTTE UNIT 265-29E	HILCORP	41.770537	-110.134902	PRODUCING
4902321095	GREEN RIVER 4	HILCORP	41.654086	-110.058383	PRODUCING
4903721477	STATE OF WYOMING U 1	HILCORP	41.609635	-110.004248	P & A
4903726326	KOBUS 607-11E	HILCORP	41.5559	-110.02866	PRODUCING
4904120913	CLIFTON 28-3	DOMINION ENERGY	41.517102	-110.064953	PRODUCING
4902320194	BRUFF UNIT 3	DOMINION ENERGY	41.634055	-110.059207	PRODUCING
4903722183	CHAMPLIN 149 L 1	HILCORP	41.624268	-110.042523	PRODUCING
4902320878	WILSON RANCH UNIT 37	HILCORP	41.711041	-110.079833	PRODUCING

Table A-2.2 – Project Speed Goat Area of Review Oil and Gas Well Information					
API	**Well Name**	**Operator**	**Latitude**	**Longitude**	**Well Status**
4903722855	PIPELINE CROSSING 2-20	MARATHON	41.521568	-109.968605	DRILLED
4904121425	BRUFF UNIT 63	DOMINION ENERGY	41.54784	-110.08243	PRODUCING
4903723096	EAST TRUMPETER 40-2	MAVERICK NATURAL RESOURCES	41.740519	-110.032036	PRODUCING
4902322172	WHISKEY BUTTES UNIT 290-29E	HILCORP	41.76423	-110.15142	PRODUCING
4902322097	WHISKEY BUTTES UNIT 319-23E	HILCORP	41.785075	-110.079111	PRODUCING
4903722930	CHAMPLIN 326 AMOCO F 1	BP	41.713827	-109.969653	P & A
4903726724	SAGEBRUSH BORDER 406-19E	HILCORP	41.700051	-109.997583	PRODUCING
4902320275	WILSON RANCH UNIT 6	OCCIDENTAL	41.626651	-110.083854	P & A
4902321048	WILSON RANCH UNIT 44	HILCORP	41.654235	-110.129943	PRODUCING
4903722654	CHAMPLIN 358 AMOCO F 2	HILCORP	41.538322	-110.042866	PRODUCING
4904120082	BRUFF UNIT 5	DOMINION ENERGY	41.528473	-110.069818	P & A
4904121463	CHURCH BUTTES BUFFER 23-33D	HILCORP	41.50241	-110.06731	PRODUCING
4902320809	LAWLER 30-2	HILCORP	41.593867	-110.100783	PRODUCING
4902321015	CHAMPLIN 149 D 3	HILCORP	41.61063	-110.07188	PRODUCING
4902320271	WHISKEY BUTTES UNIT 22	HILCORP	41.76867	-110.126364	PRODUCING
4903727135	CHURCH BUTTES BUFFER 7-23	HILCORP	41.526771	-110.023071	PRODUCING
4902322183	CHAMPLIN 288 A6-15	HILCORP	41.720713	-110.046871	PRODUCING
4904120981	CHAMPLIN 358 AMOCO F 4	HILCORP	41.538175	-110.054047	PRODUCING
4902321182	CHAMPLIN 401 AMOCO D 1	BP	41.596181	-110.158158	INACTIVE COMPLETED
4902320303	WILSON RANCH UNIT 13	HILCORP	41.655796	-110.083056	PRODUCING
4902322279	FABIAN DITCH 8-28	URBAN OIL & GAS GROUP	41.680141	-110.06568	PRODUCING
4902320500	WILSON RANCH UNIT 20	AMOCO PROD. CO.	41.69522	-110.092778	INACTIVE COMPLETED
4902321894	WHISKEY BUTTES UNIT 264-15E	HILCORP	41.799137	-110.101768	PRODUCING
4904120119	BRUFF UNIT 6	DOMINION ENERGY	41.543387	-110.07024	P & A
4904120942	CHAMPLIN 358 AMOCO B 4	HILCORP	41.516688	-110.082078	PRODUCING

Table A-2.2 – Project Speed Goat Area of Review Oil and Gas Well Information					
API	**Well Name**	**Operator**	**Latitude**	**Longitude**	**Well Status**
4902321134	BANNON USA 40-24	BANNON ENERGY INCORPORATED	41.696665	-110.12036	P & A
4904120500	GRACE USA 1-30	TENNECO OIL	41.516224	-110.110641	P & A
4904121093	CHAMPLIN 358 H 4	OCCIDENTAL	41.50833	-110.12944	P & A
4902321212	WHISKEY BUTTES UNIT 98	BP	41.759366	-110.070001	P & A
4904120979	CHAMPLIN 149 AMOCO H 4	HILCORP	41.567132	-110.05259	PRODUCING
4903721366	CHAMPLIN 206 AMOCO D 1	HILCORP	41.573828	-110.014451	PRODUCING
4902320855	WILSON RANCH UNIT 12-1	HILCORP	41.640826	-110.128813	PRODUCING
4902322072	SEVEN MILE GULCH 6-21	HILCORP	41.700634	-110.066221	PRODUCING
4904120535	BRUFF 2-14	SAMSON RESOURCES II	41.545395	-110.138607	INACTIVE COMPLETED
4902321097	WILSON RANCH UNIT 50	HILCORP	41.661079	-110.09072	PRODUCING
4902320059	FEDERAL 14-14	PACIFIC ENTERPRISES OIL CO.USA	41.794226	-110.208257	P & A
4902321044	WHISKEY BUTTES UNIT 73	HILCORP	41.781835	-110.080076	PRODUCING
4902321934	FABIAN DITCH 561-33E	HILCORP	41.584787	-110.067352	PRODUCING
4902320213	SIREN 13-19 1	OCCIDENTAL	41.617495	-110.226508	P & A
4903723039	STATE OF WYOMING U 4	HILCORP	41.581033	-110.014859	PRODUCING
4904121307	CHAMPLIN 186 F 5-05	HILCORP	41.57717	-110.09505	PRODUCING
4902321073	WHISKEY BUTTES UNIT 78	HILCORP	41.774146	-110.138507	PRODUCING
4903726038	STATE OF WYOMING 24-6D	HILCORP	41.61542	-110.016579	PRODUCING
4902320300	CHAMPLIN 401 AMOCO B 1	BP	41.588932	-110.139022	P & A
4902320383	CHAMPLIN 149 AMOCO L 1	AMOCO PROD. CO.	41.623955	-110.042705	INACTIVE COMPLETED
4902321244	WHISKEY BUTTES UNIT 110	HILCORP	41.781088	-110.068233	PRODUCING
4904120919	BRUFF UNIT 28	DOMINION ENERGY	41.557893	-110.082231	PRODUCING
4902321057	WHISKEY BUTTES UNIT 93	HILCORP	41.766619	-110.081196	PRODUCING
4902321873	WHISKEY BUTTE UNIT 249-17E	HILCORP	41.793251	-110.151331	PRODUCING
4903722835	A M TRIPP NCT-1 2	HILCORP	41.624958	-110.023063	PRODUCING
4903725561	BRUFF UNIT 39	DOMINION ENERGY	41.612654	-110.028498	PRODUCING

Table A-2.2 – Project Speed Goat Area of Review Oil and Gas Well Information					
API	**Well Name**	**Operator**	**Latitude**	**Longitude**	**Well Status**
4903723907	EAST TRUMPETER 30-32	MAVERICK NATURAL RESOURCES	41.75145	-110.023126	PRODUCING
4904120336	CHAMPLIN 228 AMOCO B 1	HILCORP	41.501776	-110.148899	INACTIVE PRODUCER
4904120947	CHMPLN 186 BANNON F 3	HILCORP	41.57337	-110.08338	PRODUCING
4902321027	CHAMPLIN 122 AMOCO D 2	BANNON ENERGY INCORPORATED	41.632336	-110.129138	DRILLED
4903724602	CHAMPLIN 206 I 4	OCCIDENTAL	41.566282	-109.966804	DRILLED
4902321659	WILSON RANCH FED 12-4	HILCORP	41.64692	-110.129332	PRODUCING
4902322002	WILSON RANCH UNIT 441-32E	HILCORP	41.665918	-110.085843	PRODUCING
4902321126	WILSON RANCH UNIT 51	HILCORP	41.64498	-110.082033	PRODUCING
4902320683	CHAMPLIN 149 L 2	HILCORP	41.622055	-110.052089	PRODUCING
4903722834	WYO U NCT-1 2	HILCORP	41.617096	-110.014359	PRODUCING
4902305017	UPRR 31-25	SHELL	41.605128	-110.122482	P & A
4902321119	WILSON RANCH UNIT 40	HILCORP	41.676649	-110.091857	PRODUCING
4903722942	BRUFF 206 D-3	HILCORP	41.57414	-110.00348	PRODUCING
4903727242	LANSDALE FED 10-5	DOMINION ENERGY	41.5569	-110.04588	PRODUCING
4902321988	WILSON RANCH UNIT 5-01	HILCORP	41.657805	-110.125078	PRODUCING
4902320792	CHAMPLIN 285 AMOCO A 3	HILCORP	41.682904	-110.052625	P & A
4904120197	CHAMPLIN 149 AMOCO H 1	HILCORP	41.574644	-110.053049	PRODUCING
4903725916	SEVEN MILE GULCH 6-22	HILCORP	41.700322	-110.042679	PRODUCING
4903724455	CHAMPLIN 285 L 2X	HILCORP	41.658973	-109.974939	PRODUCING
4902322276	WHISKEY BUTTES UNIT 351-29E	HILCORP	41.77719	-110.15038	PRODUCING
4903723258	CHAMPLIN 285 A 4	HILCORP	41.682026	-110.04285	P & A
4904120914	CLIFTON 28-4	DOMINION ENERGY	41.507469	-110.071507	PRODUCING
4903726060	DONLEY 26-7	EOG	41.59982	-110.037122	DRILLED
4903723313	CHAMPLIN 243 AMOCO A 4	OCCIDENTAL	41.752057	-110.041668	P & A
4903722918	SAGEBRUSH 10-26	MAVERICK NATURAL RESOURCES	41.689451	-110.032637	INACTIVE PRODUCER
4903728834	BRUFF 43-13D	HILCORP	41.63241	-110.00277	PRODUCING
4903723094	CHAMPLIN 288 AMOCO E 1	HILCORP	41.745106	-110.042569	PRODUCING

Table A-2.2 – Project Speed Goat Area of Review Oil and Gas Well Information					
API	**Well Name**	**Operator**	**Latitude**	**Longitude**	**Well Status**
4904121314	KOBUS 641-27E	HILCORP	41.512543	-110.048681	PRODUCING
4902321054	WHISKEY BUTTES UNIT 91	HILCORP	41.766562	-110.061101	PRODUCING
4902321093	SEVEN MILE WASH 40-18	COTERRA ENERGY	41.795608	-110.1674	INACTIVE COMPLETED
4902322305	WHISKEY BUTTES UNIT 389-21E	HILCORP	41.791368	-110.121628	PRODUCING
4903723287	CIG 4-10	HILCORP	41.72575	-110.04037	PRODUCING
4903722973	LANSDALE 10-3	DOMINION ENERGY	41.556372	-110.045815	PRODUCING
4904120890	BRUFF 3A	HILCORP	41.539603	-110.10546	PRODUCING
4902321619	CHAMPLIN 288 C 4	HILCORP	41.746443	-110.089896	PRODUCING
4903723115	ENGLEMAN 30-18	COTERRA ENERGY	41.711119	-109.986056	INACTIVE COMPLETED
4904121322	KOBUS 630-15E	HILCORP	41.54749	-110.05609	PRODUCING
4902320729	FABIAN DITCH 2-28	URBAN OIL & GAS GROUP	41.689197	-110.06225	PRODUCING
4903723064	WYO U NCT-2 4	HILCORP	41.608634	-110.016811	PRODUCING
4904120954	GRACE USA 1-6 4	HILCORP	41.566916	-110.110157	PRODUCING
4902320984	LAWLER 30-3	HILCORP	41.603684	-110.101854	PRODUCING
4903721937	CHAMPLIN 253 AMOCO C-1	AMOCO PROD. CO.	41.645005	-109.957773	INACTIVE COMPLETED
4904121095	CHAMPLIN 186 I 4	HILCORP	41.544874	-110.130129	PRODUCING
4903726279	SEVEN MILE GULCH UN 6-23	HILCORP	41.700307	-110.027731	PRODUCING
4904120972	STATE OF WYOMING 2	HILCORP	41.501429	-110.119837	PRODUCING
4903723066	CHAMPLIN 206 G 1	HILCORP	41.6023	-109.976595	PRODUCING
4902320762	WILSON RANCH UNIT 26	HILCORP	41.646715	-110.110615	PRODUCING
4903721106	SEVEN MILE GULCH UN 4	HILCORP	41.698294	-110.030763	P & A
4902320358	WHISKEY BUTTES UNIT 39	HILCORP	41.753921	-110.068037	PRODUCING
4903722138	CHAMPLIN 285 L 1	HILCORP	41.652173	-109.977113	PRODUCING
4903720628	AQUADUCT UNIT 1	SHENANDOAH OIL CORP	41.567223	-109.930682	P & A
4902322447	LAWLER FEDERAL 8-32D	HILCORP	41.58688	-110.08714	PRODUCING
4902321935	WILSON RANCH UNIT 442-32E	HILCORP	41.671526	-110.078044	PRODUCING
4902322103	WHISKEY BUTTES UNIT 5-36	HILCORP	41.755727	-110.065931	PRODUCING
4903722817	WAGON SPOKE 40-14	CROWN ENERGY PARTNERS LLC	41.710802	-110.024838	P & A
4903723556	BRUFF UNIT 38	DOMINION ENERGY	41.609938	-110.033867	PRODUCING
4904105321	GOVT 1-W	RAWSON	41.547215	-110.079987	P & A

Table A-2.2 – Project Speed Goat Area of Review Oil and Gas Well Information					
API	**Well Name**	**Operator**	**Latitude**	**Longitude**	**Well Status**
4902321583	CHAMPLIN 186 G 4	HILCORP	41.58912	-110.10091	PRODUCING
4903723068	BRUFF UNIT 27	DOMINION ENERGY	41.530448	-110.042535	PRODUCING
4902320728	BRUFF UNIT 14	DOMINION ENERGY	41.624636	-110.06217	PRODUCING
4902321990	WILSON RANCH UNIT 5-05	HILCORP	41.65137	-110.09423	PRODUCING
4903722740	CHAMPLIN 285 E 2	HILCORP	41.674666	-109.986921	PRODUCING
4903726512	CHAMPLIN 206 E 5-07	HILCORP	41.554756	-109.991164	PRODUCING
4902321140	WILSON RANCH UNIT 48	HILCORP	41.638587	-110.112713	PRODUCING
4902320947	WHISKEY BUTTES UNIT 64	BP	41.750514	-110.060371	P & A
4903723071	BRUFF 3-14	HILCORP	41.544979	-110.023464	PRODUCING
4902321005	MILLER 2	HILCORP	41.706015	-110.085571	PRODUCING
4903723046	FABIAN DITCH W-46992 4-34	HILCORP	41.667797	-110.042537	PRODUCING
4902322226	WHISKEY BUTTES UNIT 284-17E	HILCORP	41.799849	-110.134695	PRODUCING
4904120907	CHAMPLIN 358 AMOCO B 2	HILCORP	41.50888	-110.08259	PRODUCING
4904120945	BRUFF 5A	HILCORP	41.537421	-110.110715	PRODUCING
4903720138	WYOMING 1	CHEVRON	41.604481	-110.021491	P & A
4902320584	MILLER 1	HILCORP	41.701023	-110.078607	PRODUCING
4902320864	LAWLER 3-32	HILCORP	41.588388	-110.082704	PRODUCING
4903722645	CHAMPLIN 285 AMOCO B 2	HILCORP	41.660673	-110.042596	PRODUCING
4902321084	CHAMPLIN 288 E 3	OCCIDENTAL	41.74655	-110.05023	P & A
4902320882	MCNAMARA 1-4	HILCORP	41.581143	-110.052573	PRODUCING
4902320350	WILSON RANCH UNIT 17	AMOCO PROD. CO.	41.640685	-110.122708	INACTIVE COMPLETED
4902322271	WHISKEY BUTTES UNIT 281-17E	HILCORP	41.793097	-110.135492	PRODUCING
4903722993	BRUFF 206 B-4	HILCORP	41.552276	-110.033897	PRODUCING
4902321186	WHISKEY BUTTES UNIT 100	OCCIDENTAL	41.775349	-110.146323	P & A
4903721781	EAST TRUMPETER 13	COTERRA ENERGY	41.74194	-110.028175	P & A
4903726637	KOBUS 611-11E	HILCORP	41.549911	-110.029642	PRODUCING
4902321925	WHISKEY BUTTES UNIT 240-20E	HILCORP	41.779574	-110.144021	PRODUCING
4903724362	CHAMPLIN 285 H 2	HILCORP	41.609036	-109.993296	PRODUCING
4902321881	WHISKEY BUTTES UNIT 244-23E	HILCORP	41.786751	-110.086325	PRODUCING
4903722877	CHAMPLIN 326 A 1	BP	41.718449	-110.003194	P & A
4903722844	PIPELINE CROSSING 1-30	MARATHON	41.515337	-109.995001	DRILLED

Table A-2.2 – Project Speed Goat Area of Review Oil and Gas Well Information					
API	**Well Name**	**Operator**	**Latitude**	**Longitude**	**Well Status**
4902321787	WHISKEY BUTTES UNIT 204-33E	HILCORP	41.759264	-110.126681	PRODUCING
4902321910	WHISKEY BUTTES UNIT 254-29E	HILCORP	41.771512	-110.143396	PRODUCING
4903723041	WYO NCT-2 3	HILCORP	41.588522	-110.004306	PRODUCING
4903726803	CHAMPLIN 206 F 6-31	HILCORP	41.584266	-109.990662	PRODUCING
4904121312	CHAMPLIN 186 F 6-05	HILCORP	41.56906	-110.08463	PRODUCING
4903722946	CHURCH BUTTES UNIT 4-23	HILCORP	41.522883	-110.034548	P & A
4902322057	WHISKEY BUTTES UNIT 298-17E	HILCORP	41.799495	-110.14336	PRODUCING
4902322107	WILSON RANCH UNIT 552-20E	HILCORP	41.619964	-110.086673	PRODUCING
4903726048	TRIPP 14-7	HILCORP	41.62901	-110.01963	PRODUCING
4903723183	BERT 2-32	OCCIDENTAL	41.751951	-110.031928	P & A
4902322353	WHISKEY BUTTES 397-07E	HILCORP	41.733688	-110.099289	PRODUCING
4902321656	ROCKY CROSSING USA 4-24	OCCIDENTAL	41.617585	-110.120455	P & A
4904121258	OUTER BLACKS FORK 13-29	OVINTIV	41.512775	-110.202055	DRILLED
4902320783	WHISKEY BUTTES UNIT 1-18	BP	41.795377	-110.168228	P & A
4902321742	CHAMPLIN 290 D-1W	HILCORP	41.759278	-110.090198	PRODUCING
4902321164	CHAMPLIN 401 AMOCO C 1	BP	41.611162	-110.148021	INACTIVE COMPLETED
4904121390	CLIFTON FEDERAL 28-8	DOMINION ENERGY	41.51825	-110.07422	PRODUCING
4902321860	WHISKEY BUTTES UNIT 222-24E	HILCORP	41.784527	-110.073206	PRODUCING
4903726687	SAGEBRUSH 440-35E	HILCORP	41.66528	-110.02789	PRODUCING
4903721386	SEVEN MILE GULCH UNIT 11	AMOCO PROD. CO.	41.797071	-110.029407	INACTIVE COMPLETED
4904121343	LANSDALE FED 4-7	DOMINION ENERGY	41.57026	-110.07577	PRODUCING
4902320325	LAWLER 1-32	HILCORP	41.586745	-110.088915	PRODUCING
4903726368	CHAMPLIN BORDER 3-07	EOG	41.576527	-110.047474	DRILLED
4902322199	WILSON RANCH UNIT 449-31E	HILCORP	41.671364	-110.103099	PRODUCING
4903726752	CHAMPLIN 288 E 6	HILCORP	41.7439	-110.03713	P & A
4902321654	VERNE VALLEY 8	HILCORP	41.588762	-110.190749	PRODUCING

Table A-2.2 – Project Speed Goat Area of Review Oil and Gas Well Information					
API	**Well Name**	**Operator**	**Latitude**	**Longitude**	**Well Status**
4903722958	CHURCH BUTTES 119	DOMINION ENERGY	41.50207	-110.02469	PRODUCING
4904120963	GRACE USA 1-30 4	HILCORP	41.515351	-110.100586	PRODUCING
4903723563	BRUFF UNIT 35	DOMINION ENERGY	41.617341	-110.042849	PRODUCING
4902320309	WHISKEY BUTTES UNIT 32	HILCORP	41.797887	-110.145521	PRODUCING
4902321064	WILSON RANCH UNIT 46	HILCORP	41.646616	-110.10009	PRODUCING
4902321246	CHAMPLIN 243 AMOCO C 2	OCCIDENTAL	41.780453	-110.052161	P & A
4902320307	WILSON RANCH UNIT 11	BP	41.62686	-110.12257	INACTIVE COMPLETED
4902320848	SEVEN MILE GULCH UN 21	HILCORP	41.697085	-110.070273	PRODUCING
4902322215	WHISKEY BUTTES 342-19E	HILCORP	41.786241	-110.162861	PRODUCING
4902321024	WILSON RANCH UNIT 42	HILCORP	41.61719	-110.100554	P & A
4903725914	WYOMING NCT 2-5	HILCORP	41.587081	-110.009226	PRODUCING
4902321049	WILSON RANCH UNIT 47	HILCORP	41.689824	-110.091135	PRODUCING
4903722967	BRUFF 32-24	MAVERICK NATURAL RESOURCES	41.529975	-110.007478	PRODUCING
4902322063	WHISKEY BUTTES UNIT 288-29E	HILCORP	41.767615	-110.137551	PRODUCING
4903726231	KOBUS 600-01E	HILCORP	41.57071	-110.00988	PRODUCING
4904121310	CHAMPLIN 358 B 6-29	HILCORP	41.50605	-110.08786	PRODUCING
4902322347	WHISKEY BUTTES UNIT 391-21E	HILCORP	41.788904	-110.122607	PRODUCING
4902321825	BRUFF 5-31	HILCORP	41.586235	-110.101048	PRODUCING
4904120869	CHURCH BUTTES 3-33	HILCORP	41.501171	-110.06375	PRODUCING
4902320736	CHAMPLIN 122 AMOCO C 1	HILCORP	41.6476	-110.138828	PRODUCING
4903726787	SEQUOYAH 12-6	MAVERICK NATURAL RESOURCES	41.656546	-109.997383	PRODUCING
4902320944	ANDERSON 4-1A	ALPHA ENERGY	41.745391	-110.061045	PRODUCING
4904120934	CHMPLN 358 BANNON G 3	HILCORP	41.5018	-110.10134	PRODUCING
4904120915	BERKELEY 2	HILCORP	41.529348	-110.119754	PRODUCING
4903723274	CHAMPLIN 149 E 3	HILCORP	41.602515	-110.042697	PRODUCING
4903722849	MOUNTAIN FUEL 10-2	DOMINION ENERGY	41.63983	-110.04272	PRODUCING

Table A-2.2 – Project Speed Goat Area of Review Oil and Gas Well Information					
API	**Well Name**	**Operator**	**Latitude**	**Longitude**	**Well Status**
4902321008	LAWLER 30-4	HILCORP	41.594325	-110.108113	PRODUCING
4903721693	SEVEN MILE GULCH 5	HILCORP	41.696522	-110.013341	PRODUCING
4903725756	BRUFF 5-6	OCCIDENTAL	41.569612	-109.991419	DRILLED
4903728865	CHURCH BUTTES BUFFER 21-23D	HILCORP	41.5312	-110.02722	PRODUCING
4904120897	LANSDALE 4-4	DOMINION ENERGY	41.56712	-110.072593	PRODUCING
4902320291	CHAMPLIN 149 AMOCO D 1	HILCORP	41.615629	-110.069666	PRODUCING
4902321099	WILSON RANCH UNIT 43	HILCORP	41.667027	-110.09968	INACTIVE PRODUCER
4902321085	CIG 3-10	HILCORP	41.73315	-110.0508	PRODUCING
4904120938	CHMPLN 186 BANNON I 3	HILCORP	41.537944	-110.120041	PRODUCING
4902320279	WILSON RANCH UNIT 7	BP	41.611698	-110.103197	P & A
4903726701	FABIAN DITCH 556-25ED	EOG	41.59796	-110.01151	P & A
4902322368	WHISKEY BUTTES UNIT 407-33E	HILCORP	41.75951	-110.13281	PRODUCING
4902321096	WILSON RANCH UNIT 48	BP	41.639842	-110.110785	INACTIVE COMPLETED
4902320054	WILSON RANCH UNIT 2	HILCORP	41.655907	-110.122732	PRODUCING
4902322264	WHISKEY BUTTES UNIT 361-17E	HILCORP	41.794834	-110.147756	PRODUCING
4902320851	CHAMPLIN 288 AMOCO D 2	BANNON ENERGY INCORPORATED	41.725852	-110.070619	DRILLED
4903722141	STRANGE 1-10	TENNECO OIL	41.7249	-110.04127	INACTIVE COMPLETED
4902320289	WHISKEY BUTTES UNIT 20	HILCORP	41.79764	-110.126385	PRODUCING
4902321616	CHAMPLIN 186 E 4	HILCORP	41.596213	-110.129634	PRODUCING
4902322024	WHISKEY BUTTES UNIT 6-35	HILCORP	41.755825	-110.085265	PRODUCING
4903722848	YELLOW POINT UNIT 40-23	OVINTIV	41.780715	-109.966667	P & A
4902321896	WHISKEY BUTTES UNIT 251-17E	HILCORP	41.793297	-110.14316	PRODUCING
4902322239	WHISKEY BUTTES UNIT 350-29E	HILCORP	41.77291	-110.15126	PRODUCING
4902322319	WHISKEY BUTTES 386-19E	HILCORP	41.77967	-110.16256	PRODUCING
4903722843	SAGUARO 40-12	MAVERICK NATURAL RESOURCES	41.725336	-110.012644	P & A
4903722757	CHAMPLIN 149 H 2	HILCORP	41.567172	-110.042862	PRODUCING

Table A-2.2 – Project Speed Goat Area of Review Oil and Gas Well Information					
API	**Well Name**	**Operator**	**Latitude**	**Longitude**	**Well Status**
4904120191	CHAMPLIN 186 AMOCO B 1	BP	41.56	-110.11071	P & A
4903726765	CHAMPLIN 149 J 6	HILCORP	41.636	-110.02705	PRODUCING
4902320200	CHAMPLIN 361 AMOCO A 1	BP	41.668556	-110.22661	P & A
4904121364	BRUFF UNIT WELL 51	DOMINION ENERGY	41.52703	-110.06033	PRODUCING
4902321430	REYNARD UNIT 2	HILCORP	41.712535	-110.121879	PRODUCING
4903721356	SEVEN MILE GULCH UN 7	HILCORP	41.71224	-110.011303	PRODUCING
4902321818	WHISKEY BUTTES UNIT 5-27	HILCORP	41.775643	-110.104096	P & A
4903726019	DONLEY 02-09	EOG	41.56901	-110.037612	DRILLED
4902321857	WHISKEY BUTTES UNIT 216-22E	HILCORP	41.779533	-110.103721	PRODUCING
4902322203	WHISKEY BUTTES UNIT 262-34E	HILCORP	41.761257	-110.101992	PRODUCING
4904121316	BRUFF UNIT WELL 41	DOMINION ENERGY	41.546526	-110.075704	PRODUCING
4902320305	SEVEN MILE GULCH UN 8	HILCORP	41.698835	-110.067954	PRODUCING
4902321078	WHISKEY BUTTES UNIT 79	BP	41.773479	-110.130006	P & A
4903725946	BRUFF 5-18	HILCORP	41.626899	-109.989729	PRODUCING
4903722905	CIG 2-10	HILCORP	41.73264	-110.0406	PRODUCING
4903726040	STATE OF WYOMING 36-7	HILCORP	41.590836	-110.009575	PRODUCING
4902321811	SEVEN MILE GULCH 5-16	OCCIDENTAL	41.709944	-110.064895	P & A
4903721337	CHAMPLIN 358 AMOCO C 1	BP	41.530565	-109.995217	P & A
4904120837	BRUFF UNIT 13	DOMINION ENERGY	41.537921	-110.063119	PRODUCING
4902321227	WHISKEY BUTTES UNIT 108	HILCORP	41.788842	-110.061757	PRODUCING
4903724134	KOBUS 4	MAVERICK NATURAL RESOURCES	41.552455	-110.014033	PRODUCING
4903726041	STATE OF WYOMING 36-8	CHEVRON	41.587913	-110.002464	DRILLED
4904121464	CHURCH BUTTES BUFFER 33-33D	OCCIDENTAL	41.50245	-110.0673	P & A
4903727295	MOUNTAIN FUEL 10-5	DOMINION ENERGY	41.63686	-110.03998	PRODUCING
4902320714	CHAMPLIN 122 AMOCO A 1	HILCORP	41.68976	-110.07957	PRODUCING
4902321281	WHISKEY BUTTES UNIT 114	HILCORP	41.773748	-110.08968	PRODUCING

Table A-2.2 – Project Speed Goat Area of Review Oil and Gas Well Information					
API	**Well Name**	**Operator**	**Latitude**	**Longitude**	**Well Status**
4903722984	BRUFF 285 D-4	HILCORP	41.667653	-110.02325	PRODUCING
4902322359	WHISKEY BUTTES UNIT 400-21E	HILCORP	41.79147	-110.13266	PRODUCING
4902321828	BRUFF 5-29	HILCORP	41.6851	-110.081652	PRODUCING
4903728867	CHURCH BUTTES BUFFER 32-23D	HILCORP	41.53112	-110.02724	PRODUCING
4902321808	WILSON RANCH UNIT 4-17	HILCORP	41.72028	-110.08468	PRODUCING
4902320942	LANSDALE 28-4	DOMINION ENERGY	41.593808	-110.074733	PRODUCING
4904120902	LANSDALE 4-3	DOMINION ENERGY	41.574133	-110.063991	PRODUCING
4902321849	WHISKEY BUTTE UNIT 221-16E	HILCORP	41.802195	-110.128485	PRODUCING
4904121350	CHURCH BUTTES BUFFER 8-27	HILCORP	41.507828	-110.049311	PRODUCING
4903722825	LANSDALE 10-2	DOMINION ENERGY	41.553114	-110.042736	PRODUCING
4903722642	CHAMPLIN 285 F 2	HILCORP	41.659731	-110.004676	PRODUCING
4902321103	CHAMPLIN 288 AMOCO A 3	HILCORP	41.71867	-110.05084	PRODUCING
4903722880	READING 1-18 2	HILCORP	41.624011	-109.986039	PRODUCING
4904120889	BRUFF UNIT 22	DOMINION ENERGY	41.552861	-110.092613	PRODUCING
4903721674	FEDERAL 1-14	CHEVRON	41.711381	-109.908912	INACTIVE COMPLETED
4902320844	CHAMPLIN 243 AMOCO A 2	HILCORP	41.752079	-110.051445	PRODUCING
4902322085	WILSON RANCH UNIT 7-07	HILCORP	41.643102	-110.105564	PRODUCING
4904121328	BRUFF UNIT 614-09E	HILCORP	41.556572	-110.075126	PRODUCING
4902320701	SEVEN MILE GULCH UN 15	HILCORP	41.70421	-110.06003	PRODUCING
4902320846	WILSON RANCH UNIT 35	HILCORP	41.624896	-110.090995	PRODUCING
4902320795	KM 4-30 1	HILCORP	41.76633	-110.051683	PRODUCING
4904120916	GRACE USA 1-6 2	HILCORP	41.566934	-110.10158	PRODUCING
4902321816	WILSON RANCH UNIT 4-19	HILCORP	41.616118	-110.108146	PRODUCING
4902320333	WHISKEY BUTTES 29	AMOCO PROD. CO.	41.742841	-110.147161	INACTIVE COMPLETED
4904121362	BRUFF UNIT 50	DOMINION ENERGY	41.52315	-110.08709	PRODUCING
4903722703	CHAMPLIN 149 F 2	HILCORP	41.581055	-110.025839	PRODUCING
4902321982	WHISKEY BUTTES UNIT 250-16E	HILCORP	41.799804	-110.1156	PRODUCING
4902320292	CHAMPLIN 149 C 1	HILCORP	41.646508	-110.070948	PRODUCING
4902321042	WHISKEY BUTTES UNIT 66	HILCORP	41.79494	-110.10015	PRODUCING

Table A-2.2 – Project Speed Goat Area of Review Oil and Gas Well Information					
API	**Well Name**	**Operator**	**Latitude**	**Longitude**	**Well Status**
4902322253	WHISKEY BUTTES UNIT 329-01E	HILCORP	41.74816	-110.13016	PRODUCING
4902320343	WHISKEY BUTTES 28	AMOCO PROD. CO.	41.743345	-110.12784	INACTIVE COMPLETED
4902322354	WILSON RANCH 8-19	HILCORP	41.6188	-110.10498	PRODUCING
4902321929	CHAMPLIN 288 C 6	HILCORP	41.737496	-110.086698	PRODUCING
4902321106	WILSON RANCH UNIT 41	HILCORP	41.675542	-110.100621	PRODUCING
4903726684	FABIAN DITCH 536-13E	HILCORP	41.633841	-110.009333	PRODUCING
4903726769	SAGEBRUSH 41-26	MAVERICK NATURAL RESOURCES	41.69125	-110.01931	PRODUCING
4902321098	WILSON RANCH UNIT 49	BP	41.66104	-110.091414	P & A
4902322149	WHISKEY BUTTES UNIT 335-21E	HILCORP	41.792053	-110.128214	PRODUCING
4902322208	FABIAN DITCH 549-21E	HILCORP	41.607797	-110.067237	PRODUCING
4902321053	WHISKEY BUTTES UNIT 92	HILCORP	41.767172	-110.099791	PRODUCING
4902321586	CHAMPLIN 122 D 4	HILCORP	41.625612	-110.129736	PRODUCING
4902321177	CHAMPLIN 401 AMOCO B 2	BP	41.588942	-110.148524	P & A
4903721616	FEDERAL 1-10	GULF ENERGY CORPORATION	41.726671	-109.93588	P & A
4903721627	CHAMPLIN 285 AMOCO I 1	HILCORP	41.638406	-109.995621	PRODUCING
4903722829	CHAMPLIN 359 AMOCO B 1	BP	41.739848	-109.928689	INACTIVE COMPLETED
4902321794	SEVEN MILE GULCH 28	HILCORP	41.72176	-110.06958	PRODUCING
4904120917	GOVT 1-12	HILCORP	41.5599	-110.119353	INACTIVE PRODUCER
4902322373	WHISKEY BUTTES UNIT 405-15E	HILCORP	41.79742	-110.11337	PRODUCING
4903727008	KOBUS 649-11E	HILCORP	41.561637	-110.036578	PRODUCING
4903726275	FABIAN DITCH 508-03E	HILCORP	41.657002	-110.04751	PRODUCING
4903726016	DONLEY 02-06	EOG	41.576776	-110.028307	DRILLED
4904121109	OUTER BLACKS FORK 6	HILCORP	41.563231	-110.150778	PRODUCING
4903721512	GRANGER W-21413 2	DOMINION ENERGY	41.682443	-109.957618	P & A
4902321880	VERNE VALLEY UNIT 14	HILCORP	41.615192	-110.152894	PRODUCING

Table A-2.2 – Project Speed Goat Area of Review Oil and Gas Well Information					
API	**Well Name**	**Operator**	**Latitude**	**Longitude**	**Well Status**
4904120056	CHAMPLIN 228 AMOCO A 1	BP	41.506979	-110.194419	P & A
4902322009	CHAMPLIN 243 A 6-31	HILCORP	41.755631	-110.046618	PRODUCING
4904121309	CHAMPLIN 186 I 5-13	HILCORP	41.54176	-110.12431	PRODUCING
4902321028	USA AMOCO/BANNON 1	BANNON ENERGY INCORPORATED	41.610273	-110.128721	DRILLED
4903722306	PIPELINE FEDERAL 1-28	UNITED NATURAL RESOURCES	41.515353	-109.956981	INACTIVE COMPLETED
4902322204	WHISKEY BUTTES UNIT 282-16E	HILCORP	41.79982	-110.12342	PRODUCING
4902320365	WHISKEY BUTTES UNIT 43	MARATHON	41.728011	-110.083638	INACTIVE COMPLETED
4902321521	CHAMPLIN 290 B 3	COTERRA ENERGY	41.781259	-110.158242	P & A
4902321682	WILSON RANCH UNIT 63	BP	41.719323	-110.0902	P & A
4904120820	CHAMPLIN 357 AMOCO C 2	HILCORP	41.522927	-110.138501	PRODUCING
4904120213	BUFFER CPC UDC 1-27	HILCORP	41.515949	-110.05533	PRODUCING
4903723164	READING & BATES 1-18 4	BANNON ENERGY INCORPORATED	41.62411	-109.995254	DRILLED
4903720393	GRANGER UNIT 1	OCCIDENTAL	41.640159	-109.970005	P & A
4903723277	UPRC AMOCO SWD 1	HILCORP	41.691318	-110.039135	INJECTING
4904121083	CHAMPLIN 358 B 5	OCCIDENTAL	41.51251	-110.086894	P & A
4903721550	STATE 1-36	OCCIDENTAL	41.667581	-110.013556	P & A
4902322446	LAWLER FEDERAL 7-32D	HILCORP	41.58688	-110.087086	PRODUCING
4904120354	CHAMPLIN 186 AMOCO H 1	HILCORP	41.566919	-110.130014	PRODUCING
4902321876	WHISKEY BUTTE UNIT 266-33E	HILCORP	41.762389	-110.130606	PRODUCING
4902321867	MCNAMERA 34-9	HILCORP	41.584667	-110.048064	PRODUCING
4903728866	CHURCH BUTTES BUFFER 31-23D	HILCORP	41.53128	-110.0272	PRODUCING
4902322277	WHISKEY BUTTES UNIT 287-29E	HILCORP	41.77011	-110.15026	PRODUCING
4903722944	CHURCH BUTTES 3-23	HILCORP	41.53074	-110.02448	PRODUCING
4904120918	PANDO 32-3	DOMINION ENERGY	41.501753	-110.081509	PRODUCING
4902321179	CHAMPLIN 122 AMOCO H 1	BP	41.698277	-110.13896	P & A
4902320369	SEVEN MILE GULCH UN 12	HILCORP	41.727288	-110.068356	PRODUCING

Table A-2.2 – Project Speed Goat Area of Review Oil and Gas Well Information					
API	**Well Name**	**Operator**	**Latitude**	**Longitude**	**Well Status**
4902320318	WHISKEY BUTTES UNIT 35	HILCORP	41.753823	-110.145708	PRODUCING
4903722883	CHAMPLIN 288 AMOCO B 2	HILCORP	41.729263	-110.02747	PRODUCING
4902320642	FABIAN DITCH 2-28	VERDUN OIL COMPANY	41.68154	-110.06979	INACTIVE COMPLETED
4902321996	WHISKEY BUTTES UNIT 308-33E	HILCORP	41.750117	-110.123931	PRODUCING
4903723043	FABIAN DITCH 4-2	HILCORP	41.653517	-110.023973	PRODUCING
4903721226	CHAMPLIN 285 AMOCO D 1	HILCORP	41.667715	-110.032498	PRODUCING
4903721912	HAY FEDERAL 1-20	GRAYSON MILL OPERATING LLC	41.616262	-109.976507	P & A
4903726859	FABIAN DITCH 506-01E	HILCORP	41.65687	-110.016958	PRODUCING
4902322441	ALTROGGE FEDERAL 6-18D	HILCORP	41.625403	-110.108076	PRODUCING
4903724095	SEVEN MILE WASH UPRC 1-1	HILCORP	41.739647	-110.012551	PRODUCING
4904121054	OUTER BLACKS FORK 3	CHORD ENERGY	41.516209	-110.139194	P & A
4902321584	MILLER 3	HILCORP	41.696734	-110.080765	PRODUCING
4902321681	SEVEN MILE GULCH 26	HILCORP	41.704025	-110.070472	PRODUCING
4903722994	BRUFF 285 B-4	HILCORP	41.653005	-110.042904	PRODUCING
4902320498	CHAMPLIN 361 AMOCO B 1	AMOCO PROD. CO.	41.73399	-110.227243	INACTIVE COMPLETED
4902320252	CHRISTMAN ETAL 1	URBAN OIL & GAS GROUP	41.71725	-110.108186	INACTIVE PRODUCER
4902321086	WHISKEY BUTTES UNIT 87	HILCORP	41.794851	-110.119546	PRODUCING
4902321082	CHAMPLIN 149 C 4	HILCORP	41.63974	-110.071667	PRODUCING
4903721505	FABIAN DITCH 503 3-32	HILCORP	41.667205	-109.976913	PRODUCING
4904121102	OUTER BLACKS FORK UN 7	HILCORP	41.537378	-110.157691	PRODUCING
4903722641	CHAMPLIN 285 AMOCO D 2	HILCORP	41.675389	-110.022644	PRODUCING
4902322124	WHISKEY BUTTE UNIT 252-23E	HILCORP	41.77881	-110.08529	PRODUCING
4902322001	WILSON RANCH UNIT 5-08	HILCORP	41.643037	-110.086091	PRODUCING
4903727064	LANSDALE FED 10-8	DOMINION ENERGY	41.55114	-110.04789	PRODUCING
4902321087	WHISKEY BUTTES UNIT 83	HILCORP	41.788726	-110.130562	PRODUCING
4903722961	BRUFF 358 F-3	HILCORP	41.545086	-110.043641	PRODUCING

Table A-2.2 – Project Speed Goat Area of Review Oil and Gas Well Information					
API	**Well Name**	**Operator**	**Latitude**	**Longitude**	**Well Status**
4902320320	MOUNTAIN FUEL 10-1	DOMINION ENERGY	41.646823	-110.052642	PRODUCING
4902322133	WHISKEY BUTTES UNIT 211-23E	HILCORP	41.77889	-110.09392	PRODUCING
4903724300	CHAMPLIN 206 I 2	HILCORP	41.573435	-109.97656	INACTIVE PRODUCER
4902321815	WILSON RANCH 5-20	HILCORP	41.703806	-110.081441	PRODUCING
4903722724	BRUFF 552 2-14	HILCORP	41.537714	-110.023958	PRODUCING
4904121302	KOBUS 618-09E	HILCORP	41.555504	-110.059474	INACTIVE PRODUCER
4902320201	WHISKEY BUTTES UNIT 5	HILCORP	41.797109	-110.093074	INACTIVE PRODUCER
4902320939	FABIAN DITCH FEE 4-28	URBAN OIL & GAS GROUP	41.682789	-110.062131	PRODUCING
4902321843	WHISKEY BUTTES UNIT 218-34E	HILCORP	41.762614	-110.097801	PRODUCING
4903722960	BRUFF 26-3	HILCORP	41.509632	-110.034429	P & A
4902321824	BRUFF 4-29	HILCORP	41.689044	-110.08425	PRODUCING
4902320296	FLYING W 1	C & K PETROLEUM INC	41.773505	-110.193788	P & A
4902320847	WILSON RANCH UNIT 34	HILCORP	41.653956	-110.090812	PRODUCING
4903726856	FABIAN DITCH 7-25	HILCORP	41.685571	-110.0086	PRODUCING
4903722673	CHAMPLIN 285 AMOCO I 2	HILCORP	41.64607	-109.986824	PRODUCING
4904120935	CHMPLN 357 BANNON B 4	HILCORP	41.52347	-110.110944	P & A
4902321899	WHISKEY BUTTES UNIT 236-13E	HILCORP	41.797713	-110.058041	PRODUCING
4903724247	STRANGE FEDERAL 2-30	HILCORP	41.689129	-109.994623	PRODUCING
4902320776	USA 1-24 1	BP	41.610495	-110.120062	P & A
4902322075	WHISKEY BUTTES UNIT 314-28E	HILCORP	41.76911	-110.12019	PRODUCING
4902321538	ZIEGLERS WASH 22-14	CHEVRON	41.625795	-110.139875	P & A
4903723027	HAGOOD W-28886 12-4	DOMINION ENERGY	41.637828	-110.01456	PRODUCING
4903720772	CHAMPLIN 253 AMOCO A 1	BP	41.69819	-109.950418	P & A
4904121061	BERKLEY FEDERAL 3	HILCORP	41.522325	-110.131792	PRODUCING
4902321396	EXIT CHANNEL 26-2	HILCORP	41.605037	-110.141034	PRODUCING
4903726065	MCNAMARA 34-6	HILCORP	41.59096	-110.04623	PRODUCING

Table A-2.2 – Project Speed Goat Area of Review Oil and Gas Well Information					
API	**Well Name**	**Operator**	**Latitude**	**Longitude**	**Well Status**
4903721545	STATE OF WYOMING U 1	HILCORP	41.588096	-110.01433	PRODUCING
4904120940	CHMPLN 186 BANNON B 3	HILCORP	41.559168	-110.102364	PRODUCING
4903722810	SEVEN MILE 19	COTERRA ENERGY	41.696281	-110.012783	DRILLED
4903723114	ENGLEMAN 10-18	COTERRA ENERGY	41.718218	-109.995031	INACTIVE COMPLETED
4902321116	GREEN RIVER 3	HILCORP	41.661094	-110.071389	PRODUCING
4902322361	WILSON RANCH UNIT 8-07	HILCORP	41.63764	-110.10607	INACTIVE PRODUCER
4902322010	WHISKEY BUTTES UNIT 5-35	HILCORP	41.755825	-110.085265	PRODUCING
4903721340	CHAMPLIN 285 F 1	HILCORP	41.653302	-110.013843	PRODUCING
4902321366	EXIT CHANNEL 22-1	HILCORP	41.610702	-110.158158	PRODUCING
4902321394	WHISKEY BUTTES UNIT 116	BP	41.767137	-110.119675	P & A
4902321777	WHISKEY BUTTES UNIT 201-15E	HILCORP	41.794405	-110.097268	PRODUCING
4903722672	CHAMPLIN 285 J 2	HILCORP	41.62446	-110.004216	PRODUCING
4902322248	WHISKEY BUTTES UNIT 355-21E	HILCORP	41.78266	-110.13124	PRODUCING
4902321567	REYNARD UNIT 11	HILCORP	41.759351	-110.157094	PRODUCING
4903721959	CHURCH BUTTES 32	DOMINION ENERGY	41.502009	-110.03367	PRODUCING
4903721341	CHAMPLIN 285 AMOCO E 1	HILCORP	41.667363	-109.995268	P & A
4902320308	WHISKEY BUTTES UNIT 25	HILCORP	41.768583	-110.107021	PRODUCING
4904120033	VERNE UNIT 1	HILCORP	41.553959	-110.145928	PRODUCING
4903722988	MOUNTAIN FUEL 10-3	DOMINION ENERGY	41.646828	-110.042501	PRODUCING
4903723074	DONLEY NCT-2 3	HILCORP	41.572586	-110.025128	PRODUCING
4904120170	BRUFF UNIT 9	DOMINION ENERGY	41.52877	-110.050934	PRODUCING
4904121417	BRUFF UNIT 52	DOMINION ENERGY	41.54703	-110.0603	PRODUCING
4902321962	HELWIG FEDERAL 40-8	HILCORP	41.729709	-110.085188	PRODUCING
4904120892	BRUFF 25	DOMINION ENERGY	41.543163	-110.080559	PRODUCING
4902321893	WHISKEY BUTTES UNIT 245-23E	HILCORP	41.791095	-110.093379	PRODUCING
4904120927	BLACKS FORK 26-2	HILCORP	41.50747	-110.13968	PRODUCING
4902320297	WILSON RANCH UNIT 10	HILCORP	41.641826	-110.102971	PRODUCING
4902320850	CHAMPLIN 288 AMOCO D 1	HILCORP	41.733258	-110.061099	PRODUCING

Table A-2.2 – Project Speed Goat Area of Review Oil and Gas Well Information					
API	**Well Name**	**Operator**	**Latitude**	**Longitude**	**Well Status**
4903722651	CHAMPLIN AMOCO 149 J 2	HILCORP	41.639863	-110.023661	PRODUCING
4902320247	STATE 36-1	DOMINION ENERGY	41.588926	-110.120064	PRODUCING
4902322235	WHISKEY BUTTES UNIT 332-33E	HILCORP	41.75641	-110.131938	PRODUCING
4902320788	WILSON RANCH UNIT 28	BP	41.618192	-110.110915	INACTIVE COMPLETED
4902321739	REYNARD UNIT 11-1	HILCORP	41.741348	-110.124732	PRODUCING
4902321374	EXIT CHANNEL 22-2	HILCORP	41.615271	-110.159536	PRODUCING
4902320148	DRY MUDDY CRK UNIT 2	BP	41.627357	-110.281107	P & A
4904121275	CHURCH BUTTES BUFFER 5-27	HILCORP	41.51216	-110.049274	PRODUCING
4902321928	CHAMPLIN 288 E 5	HILCORP	41.743488	-110.055275	PRODUCING
4902321069	WHISKEY BUTTES UNIT 74	HILCORP	41.781701	-110.120179	PRODUCING
4903722897	CHAMPLIN 288 A 1	HILCORP	41.71855	-110.04129	PRODUCING
4903722699	CHAMPLIN 206 F 2	HILCORP	41.580702	-109.986882	PRODUCING
4903725915	WYOMING NCT 2-6	HILCORP	41.589639	-110.014451	PRODUCING
4902321381	WHISKEY BUTTES UNIT 121	HILCORP	41.774812	-110.109714	PRODUCING
4903722878	CHAMPLIN 326 AMOCO E 2	HILCORP	41.704157	-109.994556	PRODUCING
4902320806	GREEN RIVER 2	HILCORP	41.659448	-110.062898	PRODUCING
4902320262	WHISKEY BUTTES UNIT 19	HILCORP	41.797314	-110.10705	PRODUCING
4902320933	CHAMPLIN 186 G 3	HILCORP	41.581869	-110.109831	PRODUCING
4902322087	WHISKEY BUTTES UNIT 283-17E	HILCORP	41.799131	-110.151571	PRODUCING
4902322173	FABIAN DITCH 562-33E	HILCORP	41.584128	-110.074703	PRODUCING
4904121289	BERKLEY FEDERAL 4	HILCORP	41.525502	-110.132671	PRODUCING
4903705573	BRUFF UNIT MF01	HILCORP	41.611855	-110.039798	PRODUCING
4902321930	WILSON RANCH UNIT 5-07	HILCORP	41.637333	-110.099435	PRODUCING
4903723106	CHAMPLIN 243 AMOCO B 1	HILCORP	41.76678	-110.032583	PRODUCING
4903723176	CHAMPLIN 285 H 3	HILCORP	41.616302	-109.987874	PRODUCING
4902320425	USA-AMOCO Y-1	AMOCO PROD. CO.	41.712429	-110.264674	INACTIVE COMPLETED
4902322326	WHISKEY BUTTES UNIT 382-16E	HILCORP	41.79683	-110.13205	PRODUCING

Table A-2.2 – Project Speed Goat Area of Review Oil and Gas Well Information					
API	**Well Name**	**Operator**	**Latitude**	**Longitude**	**Well Status**
4902321066	WHISKEY BUTTES UNIT 72	HILCORP	41.78919	-110.089933	INACTIVE PRODUCER
4903722647	CHURCH BUTTES 2-27	HILCORP	41.50835	-110.04324	PRODUCING
4902320306	SEVEN MILE GULCH 6	AMCO DRLG	41.71326	-110.04923	P & A
4903722700	CHAMPLIN 206 B 2	HILCORP	41.552196	-110.024867	PRODUCING
4902320313	WHISKEY BUTTES UNIT 24	HILCORP	41.728433	-110.106277	PRODUCING
4902320803	LAWLER 2-32	HILCORP	41.58227	-110.083986	PRODUCING
4904120520	CHAMPLIN 186 AMOCO I 1	HILCORP	41.538496	-110.129602	PRODUCING
4902322266	WHISKEY BUTTES UNIT 359-17E	HILCORP	41.801689	-110.142188	PRODUCING
4902322322	WHISKEY BUTTES UNIT 380-15E	HILCORP	41.79277	-110.09721	PRODUCING
4902320804	MILLER 2	DOMINION ENERGY	41.695324	-110.092743	INACTIVE COMPLETED
4903726214	CHURCH BUTTES BUFFER 5-23	OCCIDENTAL	41.526452	-110.028485	DRILLED
4902320386	FABIAN DITCH 1-28	URBAN OIL & GAS GROUP	41.682815	-110.070554	PRODUCING
4902321877	BRUFF 21-15	HILCORP	41.633463	-110.050394	PRODUCING
4902320744	SEVEN MILE GULCH UN 20	HILCORP	41.6968	-110.051062	PRODUCING
4904121104	PORTER HOLLOW FED 12-4	HILCORP	41.5525	-110.11972	PRODUCING
4902322011	WHISKEY BUTTES UNIT 6-27	HILCORP	41.770394	-110.104635	PRODUCING
4903723273	CHAMPLIN 206 AMOCO C 4	HILCORP	41.545305	-110.004623	PRODUCING
4902321673	MOXTOP WELL 6-2	HILCORP	41.7455	-110.099192	PRODUCING
4904120911	BRUFF UNIT 29	DOMINION ENERGY	41.54408	-110.063486	PRODUCING
4904120124	BRUFF 7	DOMINION ENERGY	41.528597	-110.089711	PRODUCING
4902321401	STRANGE USA 2-22	HILCORP	41.704709	-110.050411	P & A
4904120970	BRUFF 31	DOMINION ENERGY	41.531278	-110.079925	PRODUCING
4903721482	DONLEY NCT-1	HILCORP	41.600504	-110.030553	PRODUCING
4904120861	BRUFF 19	DOMINION ENERGY	41.523583	-110.08061	PRODUCING
4903723311	MANDALAY 10-22	OVINTIV	41.788362	-109.993428	INACTIVE COMPLETED
4904121321	KOBUS 616-09E	HILCORP	41.56207	-110.06766	PRODUCING
4902321936	FABIAN DITCH 531-09E	HILCORP	41.642424	-110.067477	PRODUCING
4903722833	SEVEN MILE GULCH 19	HILCORP	41.698252	-110.013432	PRODUCING

Table A-2.2 – Project Speed Goat Area of Review Oil and Gas Well Information					
API	**Well Name**	**Operator**	**Latitude**	**Longitude**	**Well Status**
4903722854	SEVEN MILE GULCH UN 16	HILCORP	41.703331	-110.02357	P & A
4904121305	CHAMPLIN 357 C 5-23	HILCORP	41.527044	-110.144026	INACTIVE PRODUCER
4903721855	HAGOOD 12-1	DOMINION ENERGY	41.646218	-110.0137	PRODUCING
4903722307	PENNZOIL FEDERAL 1-30	GRAYSON MILL OPERATING LLC	41.681894	-109.995758	P & A
4904120696	BRUFF A 2	CONOCOPHILLIPS	41.544675	-110.110817	P & A
4902320819	BRUFF 149 G-3	HILCORP	41.588352	-110.062524	PRODUCING
4902322033	WHISKEY BUTTES UNIT 7-27	HILCORP	41.770394	-110.104635	PRODUCING
4904121085	CHAMPLIN 186 H 3 X	HILCORP	41.574669	-110.119834	INACTIVE PRODUCER
4903722867	CHAMPLIN 285 G FEE 1	BP	41.630656	-109.976453	P & A
4902322139	WHISKEY BUTTES UNIT 344-29E	HILCORP	41.770528	-110.14332	PRODUCING
4903722716	FABIAN DITCH 501 1-2	HILCORP	41.660109	-110.023287	PRODUCING
4902320345	WILSON RANCH 18	AMOCO PROD. CO.	41.712431	-110.121939	INACTIVE COMPLETED
4903728869	CHURCH BUTTES BUFFER 41-23D	HILCORP	41.53124	-110.02721	PRODUCING
4902320705	WILSON RANCH UNIT 23	HILCORP	41.648183	-110.090567	PRODUCING
4902320685	CHAMPLIN 149 AMOCO D 2	HILCORP	41.61011	-110.062331	P & A
4903722982	BRUFF 285 F-4	HILCORP	41.653287	-110.003317	PRODUCING
4903760044	CORE HOLE 1	DIAMOND ALKALI	41.555795	-110.009627	P & A
4903722748	CHAMPLIN 206 C 2	HILCORP	41.537632	-110.005064	PRODUCING
4902321149	WILSON RANCH UNIT 52	HILCORP	41.67493	-110.128019	PRODUCING
4903728868	CHURCH BUTTES BUFFER 42-23D	HILCORP	41.53116	-110.02723	PRODUCING
4903723126	CHRISTMANN 70-9196 4-36	HILCORP	41.667771	-110.003255	PRODUCING
4902321257	WHISKEY BUTTES UNIT 109	OCCIDENTAL	41.779724	-110.058498	P & A
4902321981	WHISKEY BUTTES UNIT 261-28E	HILCORP	41.777211	-110.115855	PRODUCING
4902322088	FABIAN DITCH 533-09E	HILCORP	41.642899	-110.074841	PRODUCING
4903723249	EAST TRUMPETER 31-2	ALPHA ENERGY	41.744565	-110.026455	PRODUCING
4903720773	SEVEN MILE GULCH UN 1	BP	41.768751	-110.024975	P & A

Table A-2.2 – Project Speed Goat Area of Review Oil and Gas Well Information					
API	**Well Name**	**Operator**	**Latitude**	**Longitude**	**Well Status**
4902321034	USA AMOCO/BANNON 2	HILCORP	41.610495	-110.120062	PRODUCING
4902322281	FABIAN DITCH 7-28	URBAN OIL & GAS GROUP	41.686893	-110.073708	PRODUCING
4902321522	CHAMPLIN 288 D-3	HILCORP	41.72651	-110.06027	PRODUCING
4902321932	BRUFF 539-16E	DOMINION ENERGY	41.628306	-110.066994	PRODUCING
4903727589	BRUFF FEDERAL 90-24	MAVERICK NATURAL RESOURCES	41.52685	-110.01667	PRODUCING
4904120949	GRACE USA 1-30 UNIT 2	BANNON ENERGY INCORPORATED	41.510091	-110.102939	P & A
4902321133	BRUFF UNIT 34	DOMINION ENERGY	41.631688	-110.071523	PRODUCING
4903723280	CHAMPLIN 288 E 4	HILCORP	41.740267	-110.041819	PRODUCING
4903723113	EAST TRUMPETER 10-2	MAVERICK NATURAL RESOURCES	41.746128	-110.032884	INACTIVE PRODUCER
4903723256	SEVEN MILE GULCH UN 23	HILCORP	41.696344	-110.022163	PRODUCING
4904120965	SAMPSON 3-14	HILCORP	41.537647	-110.138842	PRODUCING
4902320988	EXIT CHANNEL 34-1	HILCORP	41.581135	-110.160627	PRODUCING
4904120863	BRUFF UNIT 18	DOMINION ENERGY	41.536429	-110.081031	PRODUCING
4904120249	PANDO 32-1	DOMINION ENERGY	41.502236	-110.092563	PRODUCING
4903722646	CHURCH BUTTES 2-23	HILCORP	41.522915	-110.024113	PRODUCING
4904121424	BRUFF UNIT 71	DOMINION ENERGY	41.52122	-110.05953	PRODUCING
4904121319	KOBUS 605-03E	HILCORP	41.57033	-110.048317	PRODUCING
4902320837	WILSON RANCH UNIT 10-1	BANNON ENERGY INCORPORATED	41.64759	-110.15859	P & A
4902321518	CHAMPLIN 288 D 4	HILCORP	41.73335	-110.07013	PRODUCING
4903722151	STRANGE 1-22	HILCORP	41.703521	-110.042827	PRODUCING
4902321222	RLP 1	BP	41.580833	-110.062004	P & A
4903722947	FEDERAL 1-26-R	COTERRA ENERGY	41.68274	-110.032595	P & A
4902321388	WILSON RANCH 63	BP	41.719323	-110.090197	DRILLED
4903721916	LANSBERRY 1-30	HILCORP	41.60186	-109.995309	PRODUCING
4903722635	CHURCH BUTTES UNIT 51	DOMINION ENERGY	41.508807	-110.024634	P & A
4903722640	CHAMPLIN 285 AMOCO A 2	HILCORP	41.689152	-110.042605	PRODUCING
4903723174	KOBUS 3	MAVERICK NATURAL RESOURCES	41.558119	-110.002634	PRODUCING
4904121280	BRUFF 5-1	HILCORP	41.570691	-110.118605	PRODUCING

Table A-2.2 – Project Speed Goat Area of Review Oil and Gas Well Information					
API	**Well Name**	**Operator**	**Latitude**	**Longitude**	**Well Status**
4902321570	EXIT CHANNEL FEDERAL 26-4	DIAMONDBACK	41.598058	-110.138411	P & A
4903722879	REDFEATHER W-101072 44-8	GENERAL ATLANTIC RESOURCES	41.725771	-109.971332	P & A
4902321081	CHAMPLIN 149 D 4	HILCORP	41.617374	-110.061762	PRODUCING
4902321836	WHISKEY BUTTES UNIT 212-14E	HILCORP	41.79376	-110.086613	PRODUCING
4904120811	CHAMPLIN 357 B 2	HILCORP	41.522901	-110.101555	PRODUCING
4902320367	WHISKEY BUTTES UNIT 38	BP	41.75464	-110.08771	INACTIVE COMPLETED
4902320106	BRUFF UNIT 2	DOMINION ENERGY	41.623175	-110.073555	PRODUCING
4902322083	CHAMPLIN 288 D 5-09	HILCORP	41.729649	-110.065934	PRODUCING
4903722955	BRUFF 206 D-4	HILCORP	41.566875	-110.014993	PRODUCING
4902320753	WILSON RANCH UNIT 24	BP	41.676018	-110.110589	P & A
4902321911	WHISKEY BUTTES UNIT 242-21E	HILCORP	41.778896	-110.123943	PRODUCING
4904121105	PORTER HOLLOW FED 12-3	HILCORP	41.55935	-110.129148	PRODUCING
4902321968	CIG 5-10	HILCORP	41.72968	-110.04612	PRODUCING
4902322325	WHISKEY BUTTES 381-16E	HILCORP	41.79472	-110.12452	PRODUCING
4902321006	CHAMPLIN 149 I 4	HILCORP	41.595615	-110.091308	PRODUCING
4903726273	SAGEBRUSH 433-35E	HILCORP	41.671297	-110.028029	PRODUCING
4903722981	BRUFF 285 F-3	HILCORP	41.66091	-110.013283	PRODUCING
4902320449	ANDERSON 1-18	ANDERSON OIL	41.796243	-110.048951	P & A
4902322074	WHISKEY BUTTES UNIT 313-23E	HILCORP	41.784798	-110.085291	PRODUCING
4902322245	WHISKEY BUTTES UNIT 348-29E	HILCORP	41.767333	-110.143222	PRODUCING
4903721526	KOBUS 1	HILCORP	41.559827	-110.014967	PRODUCING
4903722752	CHAMPLIN 149 K 2	HILCORP	41.595249	-110.004849	PRODUCING
4904120955	GRACE USA 1-6 3	HILCORP	41.574388	-110.100631	PRODUCING
4902320794	WILSON RANCH UNIT 24-1A	HILCORP	41.676	-110.110038	PRODUCING
4902320288	WHISKEY BUTTES UNIT 16	HILCORP	41.783199	-110.087145	PRODUCING
4902320865	LAWLER 4-32	HILCORP	41.58006	-110.09029	PRODUCING
4902321775	WHISKEY BUTTES UNIT 202-21E	HILCORP	41.787087	-110.12649	PRODUCING
4902321389	WILSON RANCH UNIT 62	HILCORP	41.610965	-110.109743	PRODUCING
4902321837	WHISKEY BUTTES UNIT 214-28E	HILCORP	41.775704	-110.129071	PRODUCING

Table A-2.2 – Project Speed Goat Area of Review Oil and Gas Well Information					
API	**Well Name**	**Operator**	**Latitude**	**Longitude**	**Well Status**
4902320154	WILSON RANCH UNIT 3	HILCORP	41.711627	-110.090168	PRODUCING
4903723112	AQUILLA FED W-23741 10-20	MAVERICK NATURAL RESOURCES	41.703896	-109.976653	INACTIVE COMPLETED
4902320811	ALTROGGE 2-18 1	OCCIDENTAL	41.631834	-110.100996	P & A
4904120936	CHMPLN 357 BANNON B 3	HILCORP	41.530671	-110.101848	PRODUCING
4902320756	CHAMPLIN 186 G 2	HILCORP	41.581881	-110.100316	PRODUCING
4903723477	SEVEN MILE GULCH 40-18	BANNON ENERGY INCORPORATED	41.794933	-110.041657	DRILLED
4902322138	WHISKEY BUTTES UNIT 340-13E	HILCORP	41.799182	-110.065906	PRODUCING
4903722753	CHAMPLIN 326 D 2	HILCORP	41.689622	-110.004451	PRODUCING
4903727138	CHURCH BUTTES BUFFER 6-23	HILCORP	41.531633	-110.030073	PRODUCING

Table A-2.2 – Project Speed Goat Area of Review Water Well Information					
Permit Number	**Well Name**	**Company**	**Latitude**	**Longitude**	**Well Status**
P20173.0P	WASATCH #1	PETERNAL BROS.	41.698870	-110.087950	ACTIVE
P18397.0P	TRIPP #1	N/A	41.622520	-110.021360	ACTIVE
P18398.0P	TRIPP #2	N/A	41.622520	-110.021360	ACTIVE
P5713.0P	JUSTIS #1	N/A	41.615330	-110.030930	ACTIVE
P4760.0W	GRANGER WELL #1	N/A	41.596880	-109.983860	ACTIVE
P4761.0W	GRANGER WELL #2	N/A	41.596880	-109.983860	ACTIVE
P16083.0W	TAYLOR #1	N/A	41.593270	-109.983830	ACTIVE
P21928.0W	JUSTIS #2	N/A	41.618880	-110.021380	ACTIVE
P25659.0W	FRANCES #1	N/A	41.750690	-110.237350	ACTIVE
P23636.0W	TG OBS #8	GENESIS ALKALI WYOMING LP	41.744330	-109.878920	ACTIVE
P23731.0W	TG OBS 14	GENESIS ALKALI WYOMING LP	41.722740	-109.869170	ACTIVE
P26028.0W	LEE #1	N/A	41.600480	-109.983870	ACTIVE
P26152.0W	WESTVACO #1	UNION PACIFIC RAILROAD COMPANY	41.621660	-109.858880	ACTIVE

Table A-2.2 – Project Speed Goat Area of Review Water Well Information					
Permit Number	**Well Name**	**Company**	**Latitude**	**Longitude**	**Well Status**
P26995.0W	THORNOCK #1	N/A	41.596880	-109.983860	ACTIVE
P28226.0W	BLASI #1	N/A	41.596880	-109.983860	ACTIVE
P34077.0W	TG-EP-1	GENESIS ALKALI WYOMING LP	41.680010	-109.902140	ACTIVE
P34078.0W	TG-EP-2	GENESIS ALKALI WYOMING LP	41.687260	-109.902150	ACTIVE
P34235.0W	BLASI #2	N/A	41.596880	-109.983860	ACTIVE
P39512.0W	CHAMPLIN 253 AMOCO A WELL #1	Amoco Production Co.	41.698150	-109.950470	ACTIVE
P39514.0W	WILSON RANCH UNIT WELL #4	Amoco Production Co.	41.656010	-110.165990	ACTIVE
P51018.0W	AMOCO WATER WELL NO. 1	BP AMERICA PRODUCTION COMPANY	41.564431	-109.978839	ACTIVE
CR UW15/021	AMOCO WATER WELL NO. 1	BP AMERICA PRODUCTION COMPANY	41.564356	-109.980211	ACTIVE
P52082.0W	LANSBERRY #1	N/A	41.600520	-109.993540	ACTIVE
P54115.0W	TG,3-31-2010	GENESIS ALKALI WYOMING LP	41.668500	-109.883110	ACTIVE
P54116.0W	TG,4-31-2010	GENESIS ALKALI WYOMING LP	41.668500	-109.883110	ACTIVE
P55342.0W	TG-0W 32	GENESIS ALKALI WYOMING LP	41.726410	-109.869170	ACTIVE
P55343.0W	TG-0W 37	GENESIS ALKALI WYOMING LP	41.744330	-109.878920	ACTIVE
P56863.0W	TG 0W-68	GENESIS ALKALI WYOMING LP	41.697180	-109.873970	ACTIVE
P58675.0W	CLUSTER SITE 16 WELL #76	GENESIS ALKALI WYOMING LP	41.687260	-109.902150	ACTIVE
P58675.1W	CLUSTER SITE 16 WELL #76	FMC WYOMING CORP	41.687260	-109.902150	ACTIVE
P58676.0W	CLUSTER SITE 15 WELL #73	GENESIS ALKALI WYOMING LP	41.680010	-109.902140	ACTIVE
P58066.0W	TG-0W 94	GENESIS ALKALI WYOMING LP	41.676340	-109.897290	ACTIVE
P61247.0W	SEVEN MILE GULCH UNIT WELL #2	UINTA DEVELOPMENT COMPANY	41.753730	-110.005550	ACTIVE
P61356.0W	TG OW 86	GENESIS ALKALI WYOMING LP	41.680010	-109.902140	ACTIVE
P61357.0W	TG OW 87	GENESIS ALKALI WYOMING LP	41.687260	-109.902150	ACTIVE
P66672.0W	K & R MILLER #1	N/A	41.790570	-110.232530	ACTIVE
P66946.0W	KAML #1	N/A	41.790590	-110.247050	ACTIVE

Table A-2.2 – Project Speed Goat Area of Review Water Well Information					
Permit Number	**Well Name**	**Company**	**Latitude**	**Longitude**	**Well Status**
P67142.0W	R & L MILLER #2	N/A	41.790570	-110.237370	ACTIVE
P69985.0W	LONG #1	N/A	41.786950	-110.242210	ACTIVE
P70936.0W	MW1	Amoco Production Co.	41.557210	-109.978870	ACTIVE
P70937.0W	MW2	Amoco Production Co.	41.557210	-109.978870	ACTIVE
P70938.0W	MW3	Amoco Production Co.	41.557210	-109.978870	ACTIVE
P70939.0W	MW4	Amoco Production Co.	41.557210	-109.978870	ACTIVE
P70940.0W	MW5	Amoco Production Co.	41.557210	-109.978870	ACTIVE
P70941.0W	MW6	Amoco Production Co.	41.557210	-109.978870	ACTIVE
P70997.0W	OW 117 SITE 133	GENESIS ALKALI WYOMING LP	41.711920	-109.864330	ACTIVE
P70998.0W	OW 116 SITE 132	GENESIS ALKALI WYOMING LP	41.709000	-109.892440	ACTIVE
P71005.0W	OW 109 SITE 127	GENESIS ALKALI WYOMING LP	41.730180	-109.883220	ACTIVE
P71012.0W	OW 102 SITE 121	GENESIS ALKALI WYOMING LP	41.749950	-109.904370	ACTIVE
P72957.0W	CALHOUN #2	N/A	41.786940	-110.232530	ACTIVE
P74391.0W	OW 125 SITE #139	GENESIS ALKALI WYOMING LP	41.676320	-109.902130	ACTIVE
P75431.0W	LINE #1	N/A	41.783330	-110.242210	ACTIVE
P78219.0W	NANCY #1	N/A	41.790590	-110.247050	ACTIVE
P79919.0W	SUSIE #1	N/A	41.789269	-110.248506	ACTIVE
P81135.0W	SEARS WELL #1	FLYING W LAND AND LIVESTOCK INC.	41.780560	-110.203460	ACTIVE
P83747.0W	PACHECO #1	N/A	41.790580	-110.242210	ACTIVE
P84361.0W	THORNOCK #2	N/A	41.790580	-110.242210	ACTIVE
P92403.0W	OW 122R	GENESIS ALKALI WYOMING LP	41.726500	-109.878810	ACTIVE
P92404.0W	OW 125	GENESIS ALKALI WYOMING LP	41.722740	-109.869170	ACTIVE
P94941.0W	3093GR-1	Wyo State Dept. of Transportation	41.596880	-109.983860	ACTIVE
P94942.0W	3093GR-2	Wyo State Dept. of Transportation	41.596880	-109.983860	ACTIVE
P94943.0W	3093GR-3	Wyo State Dept. of Transportation	41.596880	-109.983860	ACTIVE
P94944.0W	3093GR-4	Wyo State Dept. of Transportation	41.596880	-109.983860	ACTIVE
P101076.0W	OW-133	GENESIS ALKALI WYOMING LP	41.747090	-109.878920	ACTIVE
P101077.0W	OW-134	GENESIS ALKALI WYOMING LP	41.744330	-109.878920	ACTIVE
P101078.0W	OW-135	GENESIS ALKALI WYOMING LP	41.744330	-109.878920	ACTIVE

Table A-2.2 – Project Speed Goat Area of Review Water Well Information					
Permit Number	**Well Name**	**Company**	**Latitude**	**Longitude**	**Well Status**
P101079.0W	OW-136	GENESIS ALKALI WYOMING LP	41.744280	-109.883230	ACTIVE
P101080.0W	OW-137	GENESIS ALKALI WYOMING LP	41.744280	-109.883230	ACTIVE
P101081.0W	OW-138	GENESIS ALKALI WYOMING LP	41.744370	-109.878900	ACTIVE
P101082.0W	OW-139	GENESIS ALKALI WYOMING LP	41.747090	-109.883270	ACTIVE
P101083.0W	OW-140	GENESIS ALKALI WYOMING LP	41.747110	-109.878940	ACTIVE
P101084.0W	OW-141	GENESIS ALKALI WYOMING LP	41.747110	-109.878940	ACTIVE
P104644.0W	TG-OW-143	GENESIS ALKALI WYOMING LP	41.621600	-109.887730	ACTIVE
P104673.0W	TG-OW-145	GENESIS ALKALI WYOMING LP	41.628790	-109.902170	ACTIVE
P112777.0W	OW 146	GENESIS ALKALI WYOMING LP	41.749481	-109.904375	ACTIVE
P112778.0W	OW 147	GENESIS ALKALI WYOMING LP	41.749910	-109.889830	ACTIVE
P112779.0W	OW 148	GENESIS ALKALI WYOMING LP	41.749910	-109.889830	ACTIVE
P112782.0W	OW 151	GENESIS ALKALI WYOMING LP	41.734370	-109.907030	ACTIVE
P112784.0W	OW 153	GENESIS ALKALI WYOMING LP	41.726450	-109.874000	ACTIVE
P112785.0W	OW 154	GENESIS ALKALI WYOMING LP	41.711870	-109.869160	ACTIVE
P112789.0W	OW 159	GENESIS ALKALI WYOMING LP	41.708140	-109.878770	ACTIVE
P118593.0W	MW-4 (SEVEN MILE GULCH)	Amoco Production Co.	41.771900	-110.024760	ACTIVE
P121639.0W	OW 160	GENESIS ALKALI LLC	41.749910	-109.889830	ACTIVE
P147480.0W	4282/MW1	Wyo State Dept. of Environmental Quality	41.528290	-109.955040	ACTIVE
P197597.0W	FMC GRANGER MINE EXTRACTION WELL	GENESIS ALKALI WYOMING LP	41.652610	-109.927220	ACTIVE
P204696.0W	ALTA LAND #1	ALTA LAND & CATTLE LLC	41.749633	-110.147317	ACTIVE
P211765.0W	HOT WATER FACILITY #1	HILCORP ENERGY COMPANY	41.678283	-110.067239	ACTIVE

Table A-2.3. Seismic Horizons Used for Structural Framework
2nd Frontier
Morrison
Nugget
Woodside
Phosphoria
Madison

Table A-2.4. Static Model Zones and Layers			
Zone	**Average Thickness (feet)**	**Number Layers**	**Average Layer Thickness (feet)**
2nd Frontier	264	1	210
Mowry	522	1	472
Dakota	267	1	253
Morrison	703	1	703
Entrada	184	1	208
Twin Creek	654	20	32
Nugget	674	300	2.3
Ankareh	534	20	27
Thaynes	439	1	416
Woodside	701	1	703
Phosphoria	378	1	369
Weber	586	1	588
Amsden	451	20	21
Madison	841	280	2.7
Three Forks	96	20	5

Table A-2.5. Parameters for Temperatures 99-300°C, 1-600 bar, Spycher and Pruess (2010), temperature in Kelvin	
Correction or Value	**Unit**
$\log(K^o_{H2O}) = -2.1077 + 2.8127x10^{-2}T_k - 8.4298x10^{-5}T_k^2 + 1.4969x10^{-7}T_k^3 - 1.1812x10^{-10}T_k^4$	bar
$\log(K^o_{CO2}) = 1.668 + 3.992x10^{-3}T_k - 1.156x10^{-5}T_k^2 + 1.593x10^{-9}T_k^3$	bar/mol
$\bar{V}_{H2O} = 18.1 + 3.137x10^{-2}T_k$	cm^3/mol
$\bar{V}_{CO2} = 32.6 + 3.413x10^{-2}T_k$	cm^3/mol
$P^o = -1.9906x10^{-1} + 2.0471x10^{-3}T_k + 1.0152x10^{-4}T_k^2 - 1.4234x10^{-6}T_k^3 + 1.4168x10^{-8}T_k^4$	bar

Table A-2.6. Model Parameters for Multiphase Fluid Modeling of Geologic Sequestration			
Parameter	**Description**	**Dimensions**	**Variable Used**
Hydrogeologic Properties			
Intrinsic Permeability	The measurement of the permeability, or ability to flow or transmit fluids through a rock, conducted when a single fluid, or phase, is present in the rock	L^2	KNIT_GEO_QE _arithmetic
Porosity	The relative volume of void space within a formation. Controls the volume of carbon dioxide that may be stored.	Dimensionless	PIGN_QE
Capillary Pressure	The pressure difference across the interface of two immiscible fluids (e.g., carbon dioxide and water).	M/LT2	psi
Relative Permeability	Relative permeability is the ratio of effective permeability of a particular fluid at a particular saturation to absolute permeability of that fluid at total saturation.	Dimensionless	Krw/Krg
Fluid Pressure	Force acting on a unit area, measure of the potential energy per volume of fluid.	M/LT2	psi
Temperature	Measure of the internal energy of a fluid.	Temperature	ºF
Formation Compressibility	Measure of the change in aquifer volume with a change in fluid pressure.	LT2/M	1/psi
Water Saturation	The percent of system void space occupied by aqueous fluids.	Dimensionless	100%
Carbon Dioxide Saturation	The percent of system void space occupied by carbon dioxide.	Dimensionless	0%
Storativity	The volume of fluid released from storage per unit decline in head per unit area of the formation.	Dimensionless	N/A
Fluid Properties			
Viscosity	Measure of a fluid's internal resistance to flow.	M/LT	cP
Density	The mass of a fluid per unit volume.	M/L^3	lb/ft^3
Composition	Molecular makeup, by volume or mass, of a fluid. Measurement of salinity, concentration of trace compounds.	M/L^3	ppm, mg/L, lb/gal
Fluid Compressibility	The change in volume of a fluid from a unit change in pressure.	LT^2/M	1/psi
Chemical Properties			
Aqueous Diffusion Coefficient	The rate of chemical transport due to a concentration gradient.	L^2/T	Ft^2/d
Aqueous Solubility	The maximum concentration of a chemical (e.g., carbon dioxide dissolved in the aqueous phase.	M/L^3	K-values

Table A-2.6. Model Parameters for Multiphase Fluid Modeling of Geologic Sequestration			
Parameter	**Description**	**Dimensions**	**Variable Used**
Solubility in Carbon Dioxide	The maximum concentration of a chemical (e.g., water) dissolved in separate-phase carbon dioxide.	M/L^3	N/A
Fluid injection and withdrawal rates			
Injection Rates	Injection rates at each well.	L^3/T	Mscf/d
Withdrawal Rates	Any fluid withdrawal rates within model domain.	L^3/T	N/A
Boundary Conditions	Fluid pressures and/or flow rates at the edges of the model domain.	Varies	N/A
Initial Conditions	Fluid pressures and/or flow rates within the domain at the beginning of the model run.	Varies	Pressure, temperature, salinity
System Orientation and Simulation Controls			
Model Extent (domain)	The lateral extent of the model in all directions.	L	ft
Number of Model Layers	Model vertical discretization.	Dimensionless	N/A
Layer Thickness	Vertical extent of each model layer.	L	ft
Grid Cell Size	Lateral size of each model cell.	L^2	ft
Model Timeframe	The complete duration of the model run.	T	141 years
Time Step Size	The duration of each temporal interval during the model timeframe.	T	367

Table A-2.7. Madison Bottomhole Pressure Constraint and Fracture Pressure at Injection Site		
Well	**BHP Constraint (psi)**	**Fracture Pressure (psi)**
SG-1	12,623	14,026
SG-2	12,600	14,000
SG-3	12,799	14,221
SG-4	12,943	14,381
SG-5	12,666	14,073
SG-6	12,614	14,015
SG-7	12,497	13,885

Table A-2.8. Nugget Bottomhole Pressure Constraint and Fracture Pressure at Injection Site		
Well	**BHP Constraint (psi)**	**Fracture Pressure (psi)**
SG-1	9,033	10,036
SG-2	8,974	9,971
SG-3	9,156	10,174
SG-4	9,279	10,310
SG-5	8,999	9,999
SG-6	8,999	9,999
SG-7	N/A	N/A

Table A-2.9. Average Injection Rate (Metric Tons/Yr)		
PSG Well	**Madison**	**Nugget**
SG-1	335,178	222,217
SG-2	303,696	230,999
SG-3	331,628	231,334
SG-4	333,332	242,897
SG-5	315,486	231,569
SG-6	327,205	224,602
SG-7	278,854	NA
Average	324,420	230,603

Table A-2.10. Maximum and Average Maximum Tubing Head Pressure (THP) for PSG Wells		
	Madison	**Nugget**
PSG Maximum THP (psi)	8,023	5,981
PSG Average Maximum THP (psi)	7,826	5,828

Table A-2.11. Computational Simulation Sensitivity Parameters			
Parameters	**Base Case**	**Low Case**	**High Case**
Porosity Multiplier	NA	-25%	+25%
Por/Perm Transform	Nugget: log10(Permeability) = 3.832552 * log10(Effective Porosity) + 4.916317 Madison: log10(Permeability) = + 4.558733 * log10(Effective Porosity) + 5.210628		
kv/kh Ratio	0.1	0.01	0.80
Imbibition Critical Gas Saturation	Nugget: 0.51 Madison: 0.22	Nugget: 0.55 Madison: 0.25	Nugget: 0.57 Madison: 0.30
Nugget Max Gas Relative Permeability	0.08	0.01	0.20
Madison Max Gas Relative Permeability	0.05	0.01	0.20
Fault Transmissibility Multiplier	1	0	0.5

Table A-2.12. Input Parameters Used in the EPA Methodology				
Parameter	**Description**	**Nugget Value**	**Madison Value**	**Comments**
z_i	Injection_ Reference Datum (TVDSS feet)	-7,817	-11,603	Depth of middle of the perforation in the Madison
$p_{i\ brine}$	Injection_Sand_1_Brine Density (kg/m3)	1,041	1,028	Obtained from simulation
	Critical Pressure (psi)	16.3	34.5	

Table A-2.13. PSG AoR Wellbores that Penetrate the Storage Complex					
API	**Well Name**	**Location Twn Rng Sec Qtr Qtr**	**Operator**	**Current Status**	**Corrective Action Required**
4902320045	Bruff Unit 1	19N 112W 22 SW SW	Wexpo Co	P&A	No
4902320054	Wilson Ranch Unit 2	19N 113W 01 NE SW	Hilcorp Energy Co	Active	No
4902320106	Bruff Unit 2	19N 112W 16 SW SW	Wexpro Co	Active	No
4903705573	Bruff Unit MF01	19N 112W 22 NE SE	Hilcorp Energy Co	Active	No

Table A-2.14. Lithology, Thickness and Petrophysical Properties of the Upper and Lower Confining Zones for the Nugget and Madison Injection Zones				
	Frontier		**Madison**	
Confining Zone Properties	**Upper Confining Zone**	**Lower Confining Zone**	**Upper Confining Zone**	**Lower Confining Zone**
Formation Name	Twin Creek Limestone	Ankareh	Amsden	Three Forks
Lithology	Limestone, shaley limestone, chert, limey gypsum	Mudstone, siltstone, gypsum, sandstone	Shale, dolomite, sandstone, chert	Siltstone and limestone
Thickness, feet	550	600	500	~100
Porosity, %	1.9	0.9	0.9	0.3
Permeability, mD	0.14	0.1	0.18	0.01

FIGURES

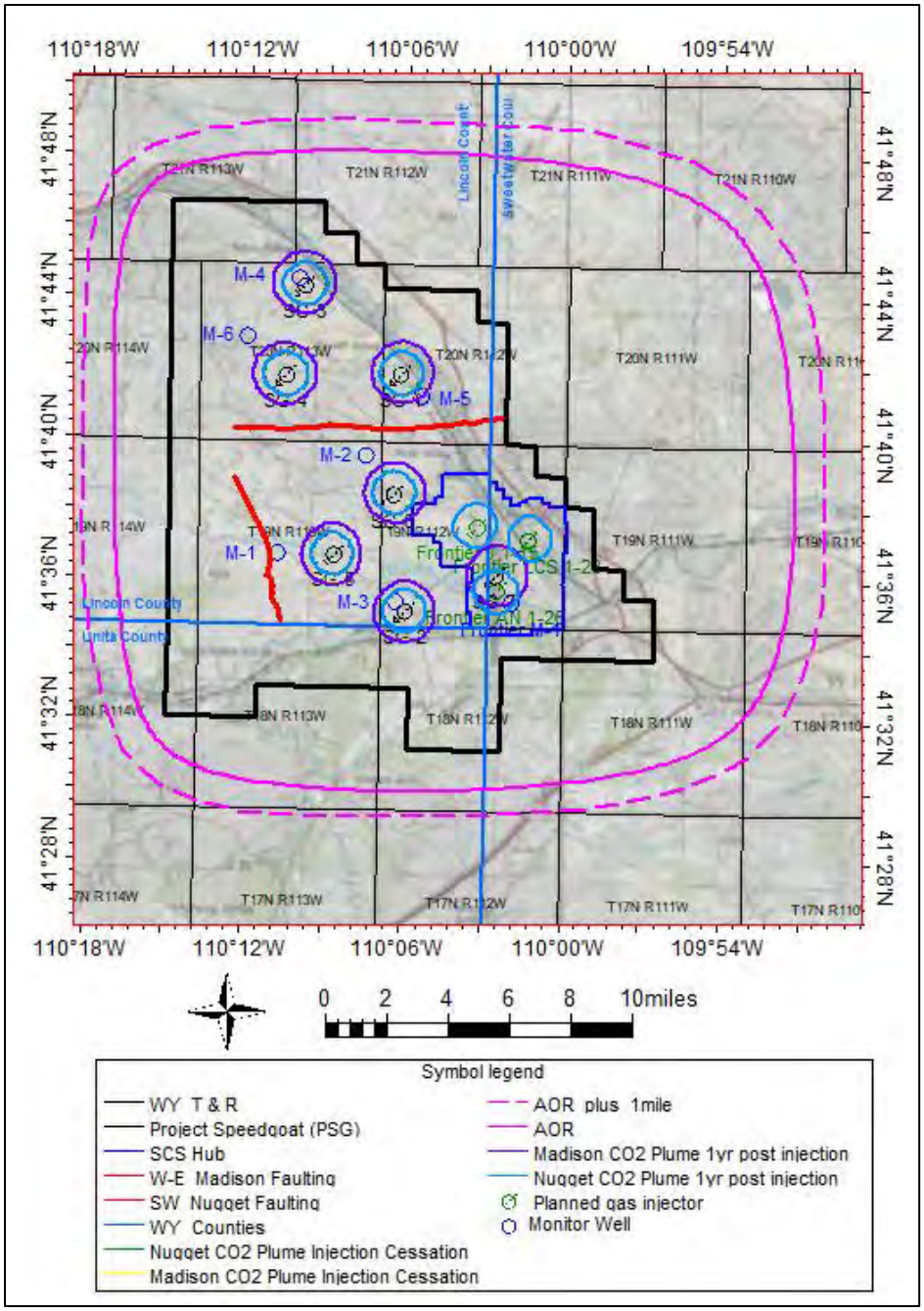


Figure A-2.1. *Map showing the PSG AoR, CO_2 plumes at cessation, stabilized CO_2 plumes at 1-year post-injection, and AoR plus 1-mile buffer. Note that the CO_2 stabilized plumes at end of monitoring and at 1 year post-injection directly overlap as they are the same size.*

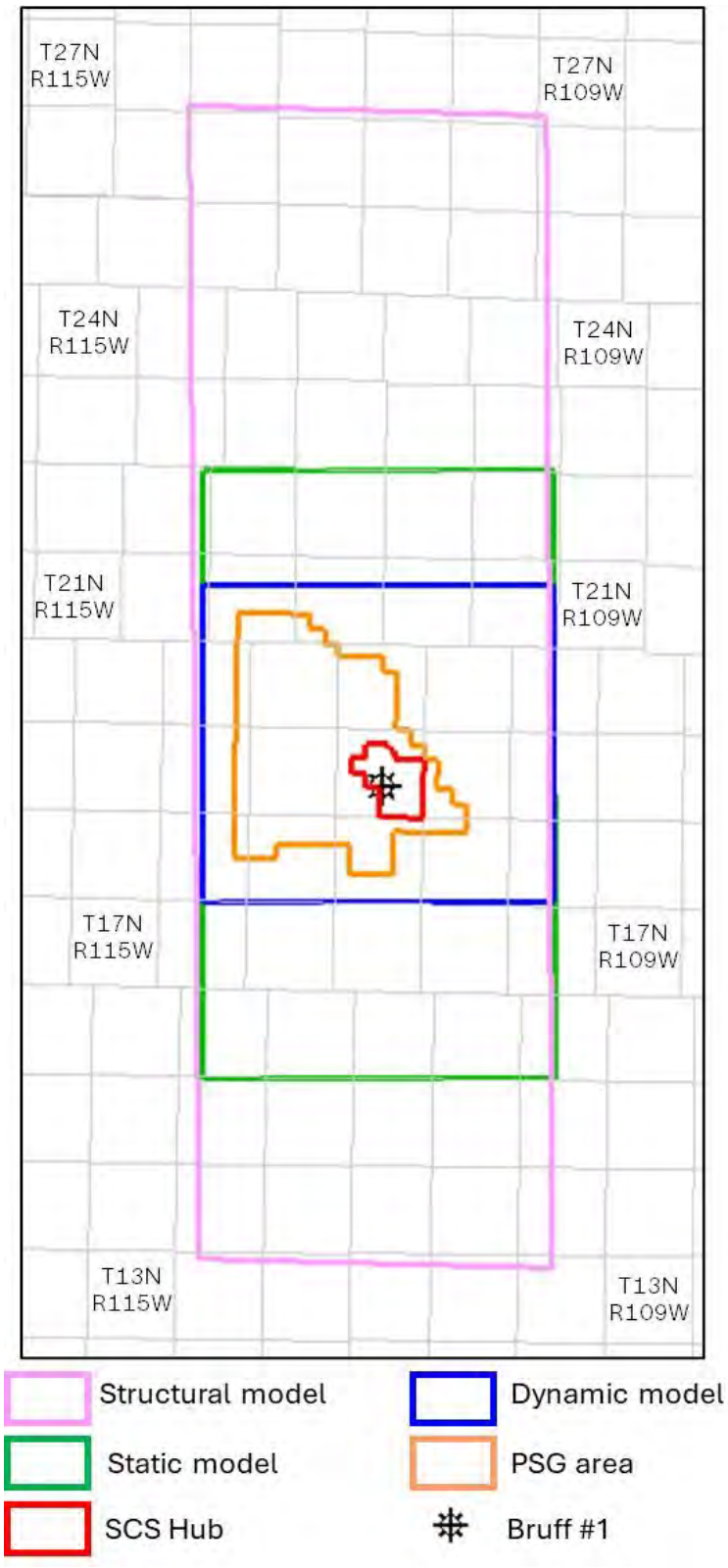


Figure A-2.2. *Model polygons, PSG area, SCS Hub and Bruff 1 well.*

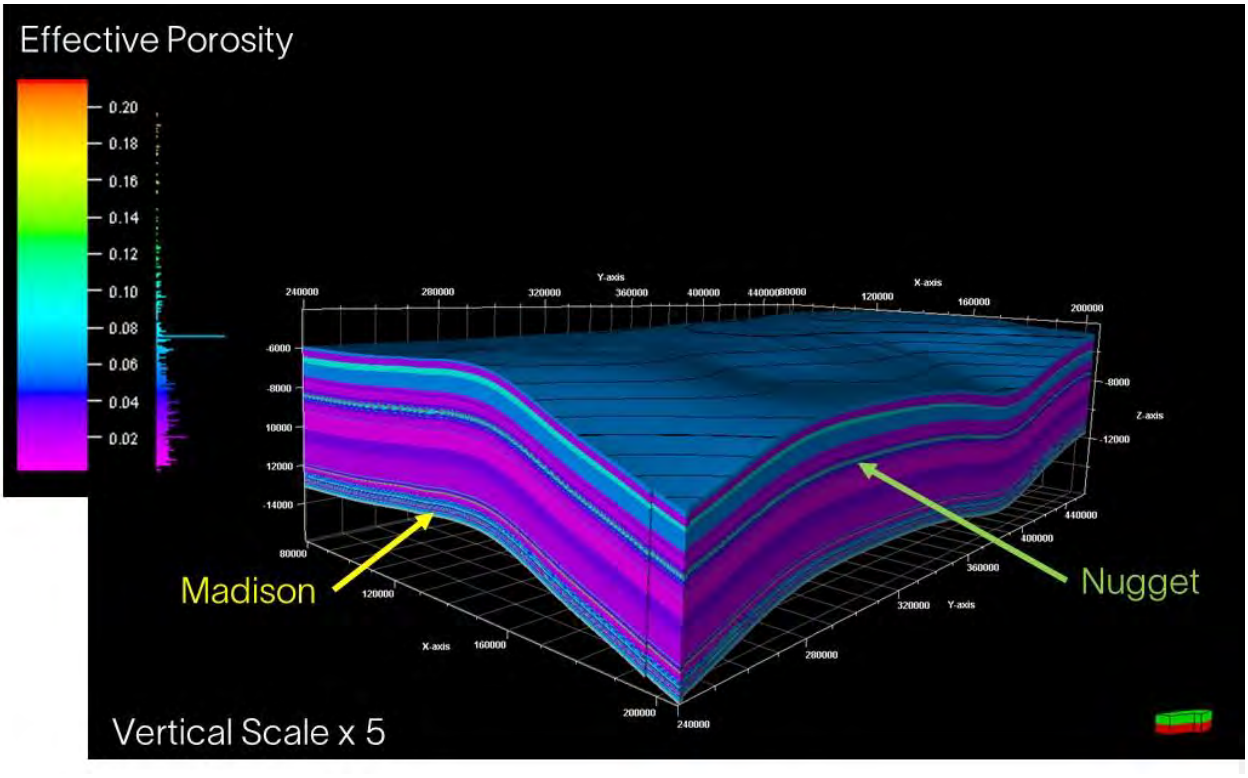


Figure A-2.3. *Effective porosity model.*

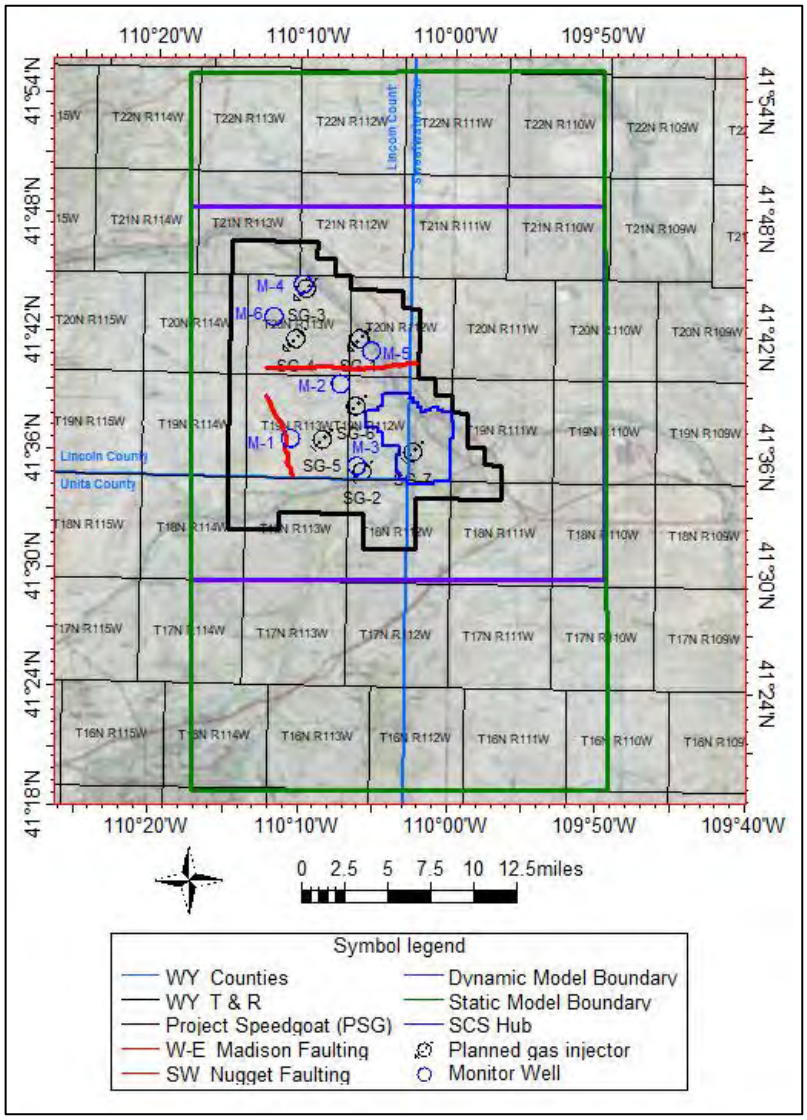


Figure A-2.4. *Location of PSG injector wells, monitor wells, and static and dynamic model boundaries.*

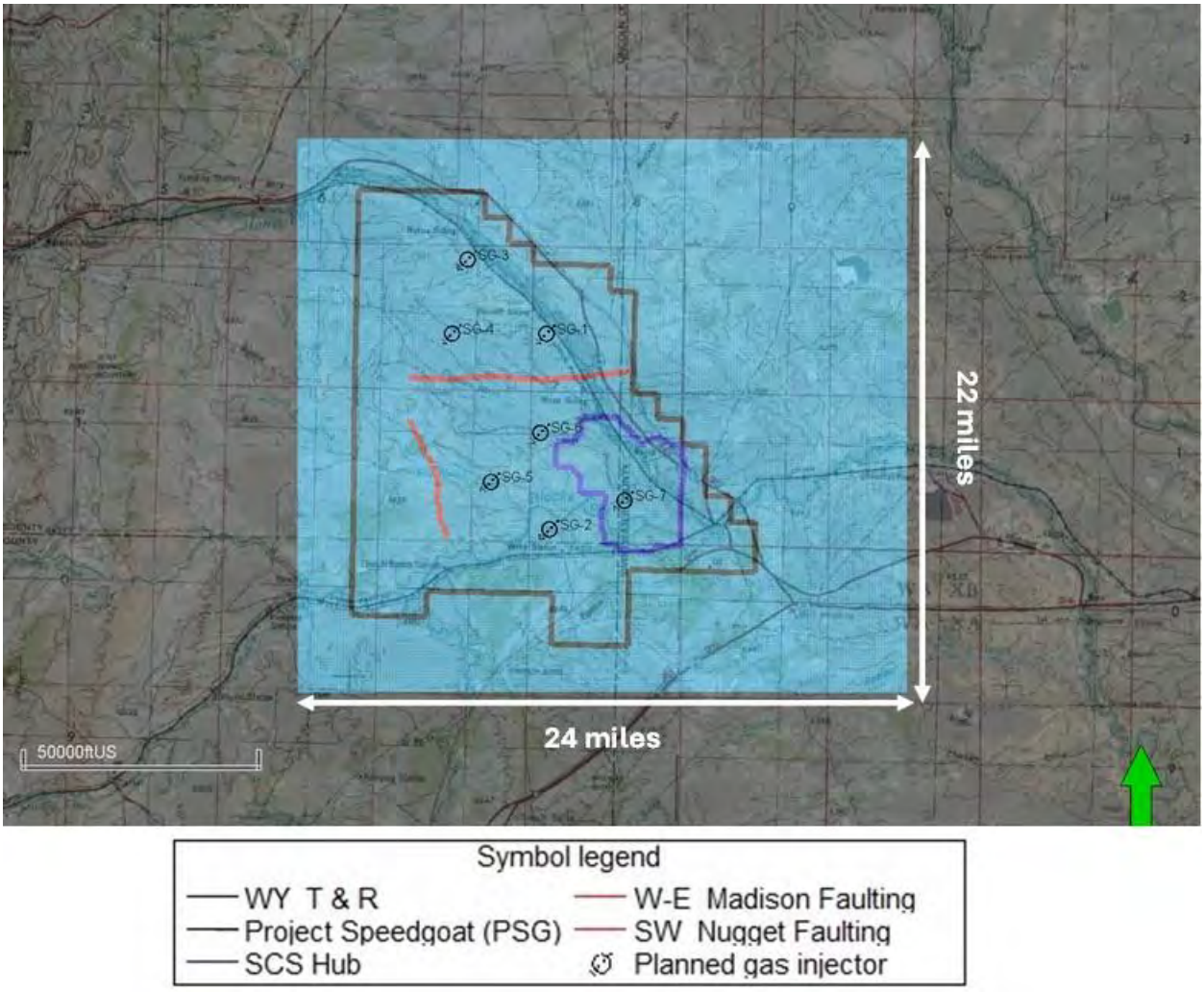


Figure A-2.5. *PSG dynamic model boundaries.*

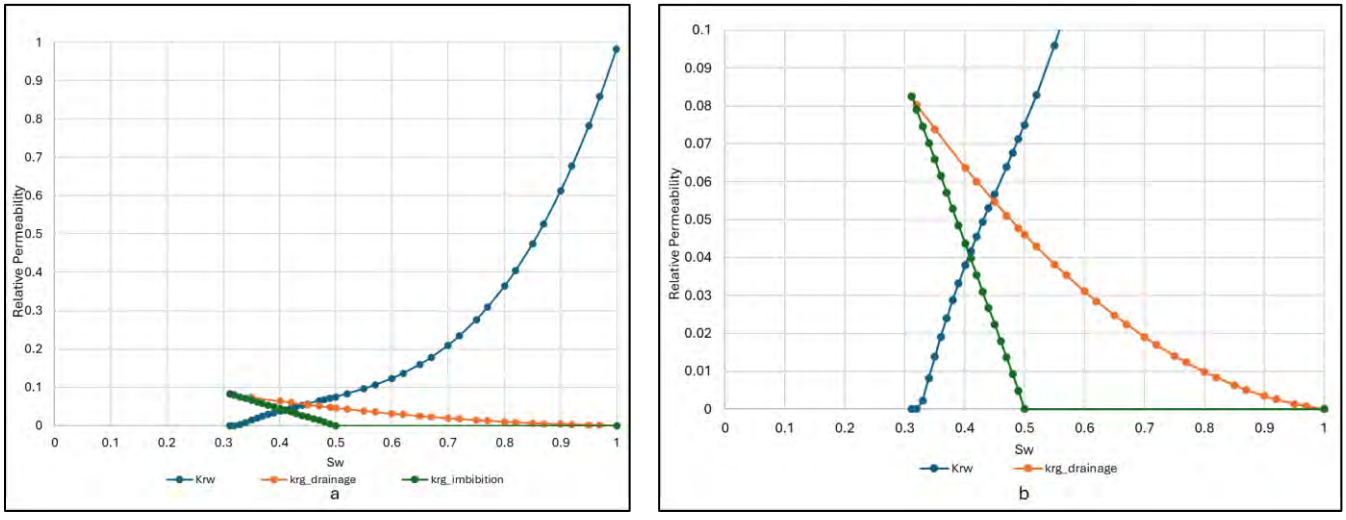


Figure A-2.6. *Nugget relative permeability curves digitized from Li, et al. (a) and a zoomed in section (b) (2016).*

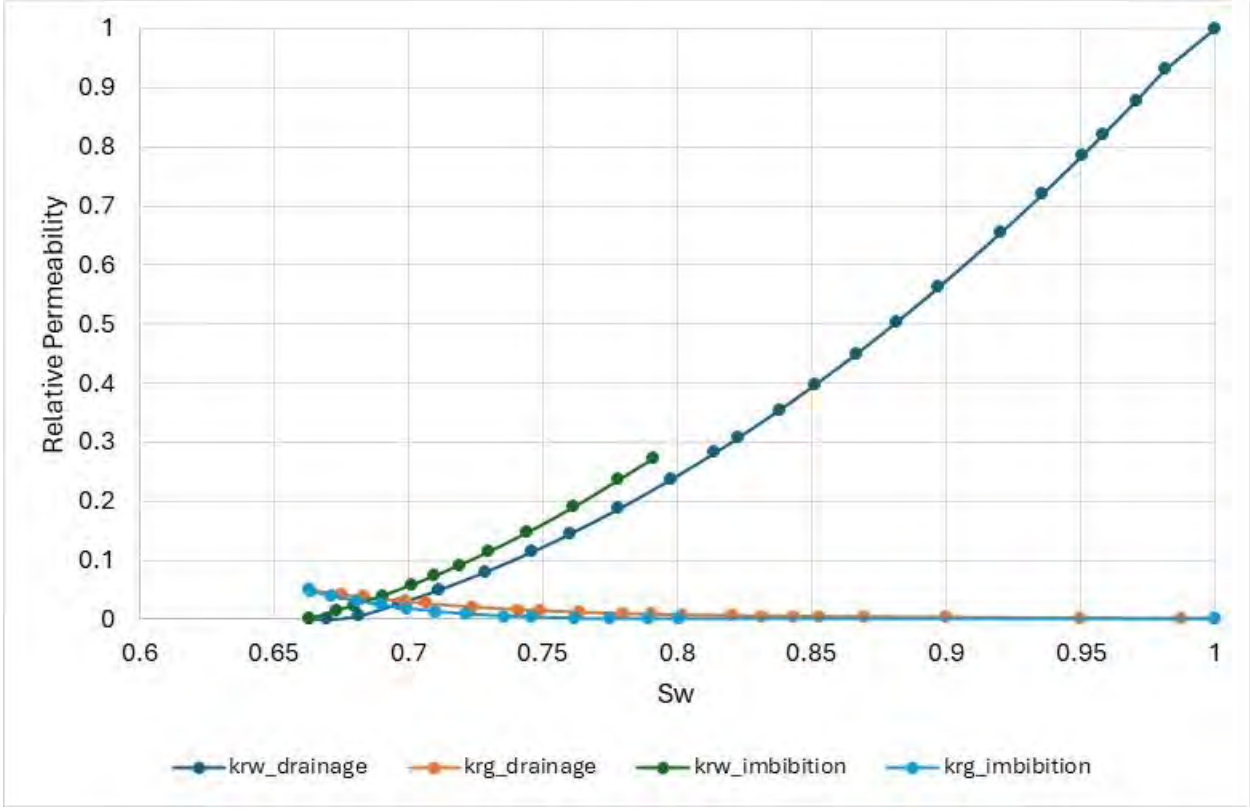


Figure A-2.7. *Madison analog, sample Redwater Luc, relative permeability curves digitized from Bennion and Bachu (2010).*

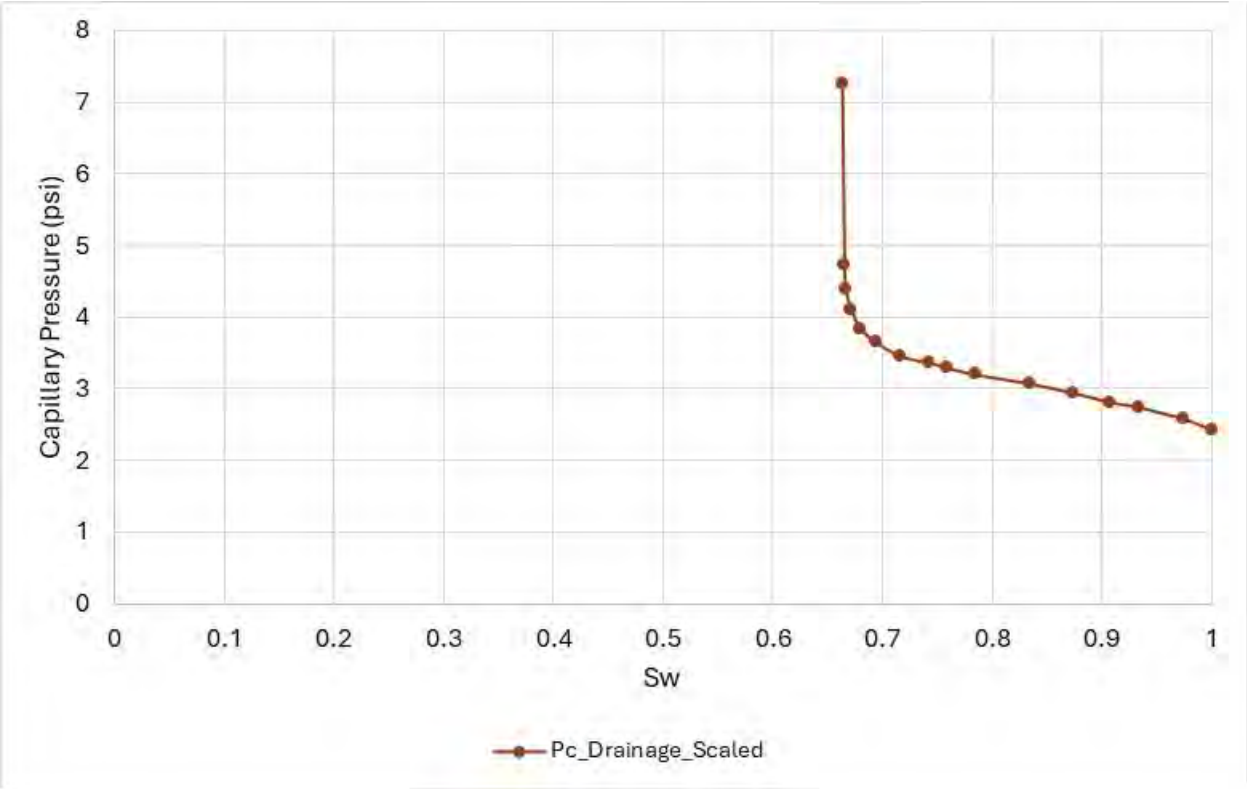


Figure A-2.8. *Madison capillary curve was digitized and scaled from Akbarabadi and Piri (2015).*

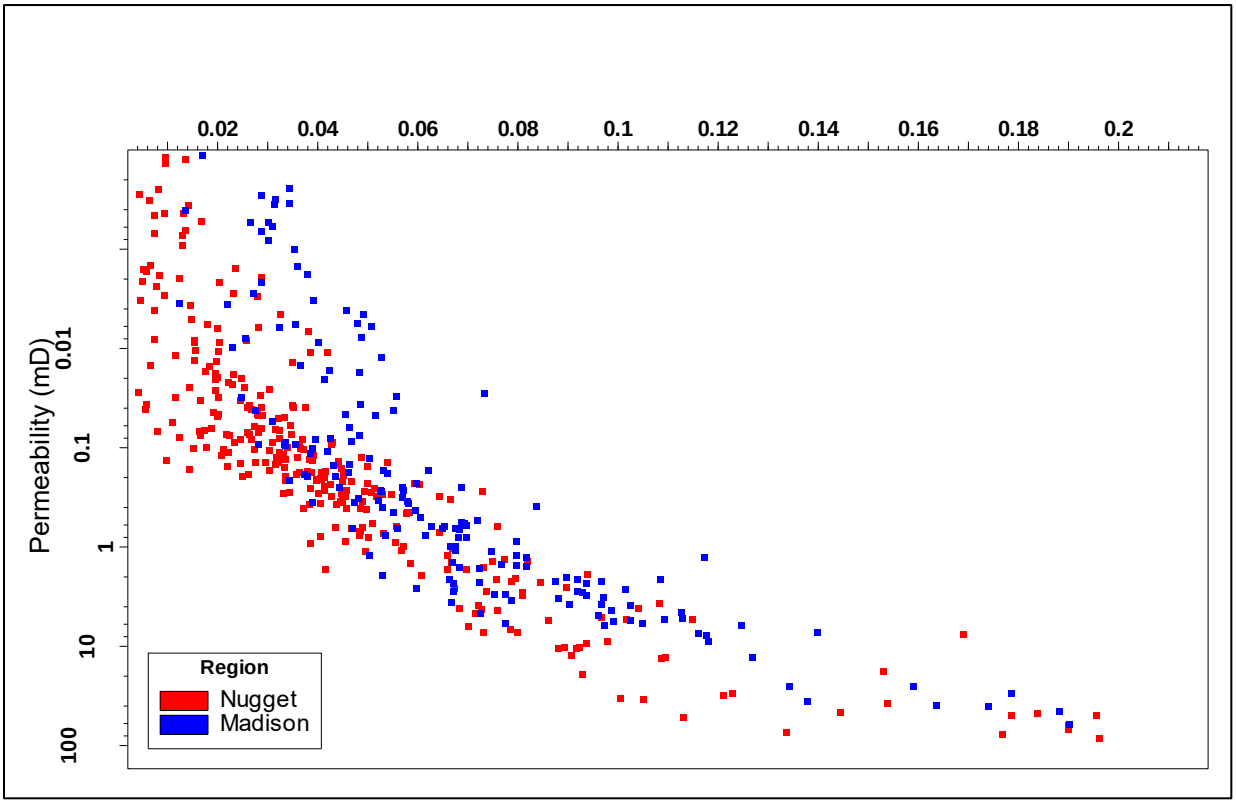


Figure A-2.9. *Plot of porosity versus permeability from the dynamic model.*

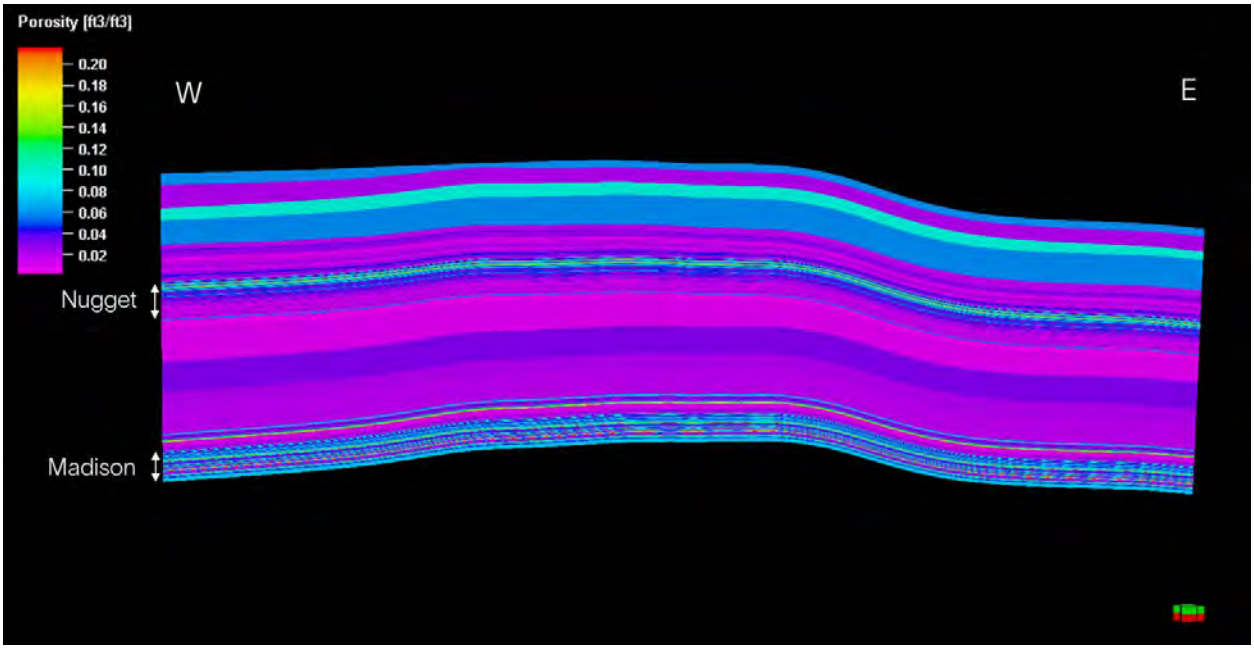


Figure A-2.10. *East-to-west cross section of porosity in dynamic model.*

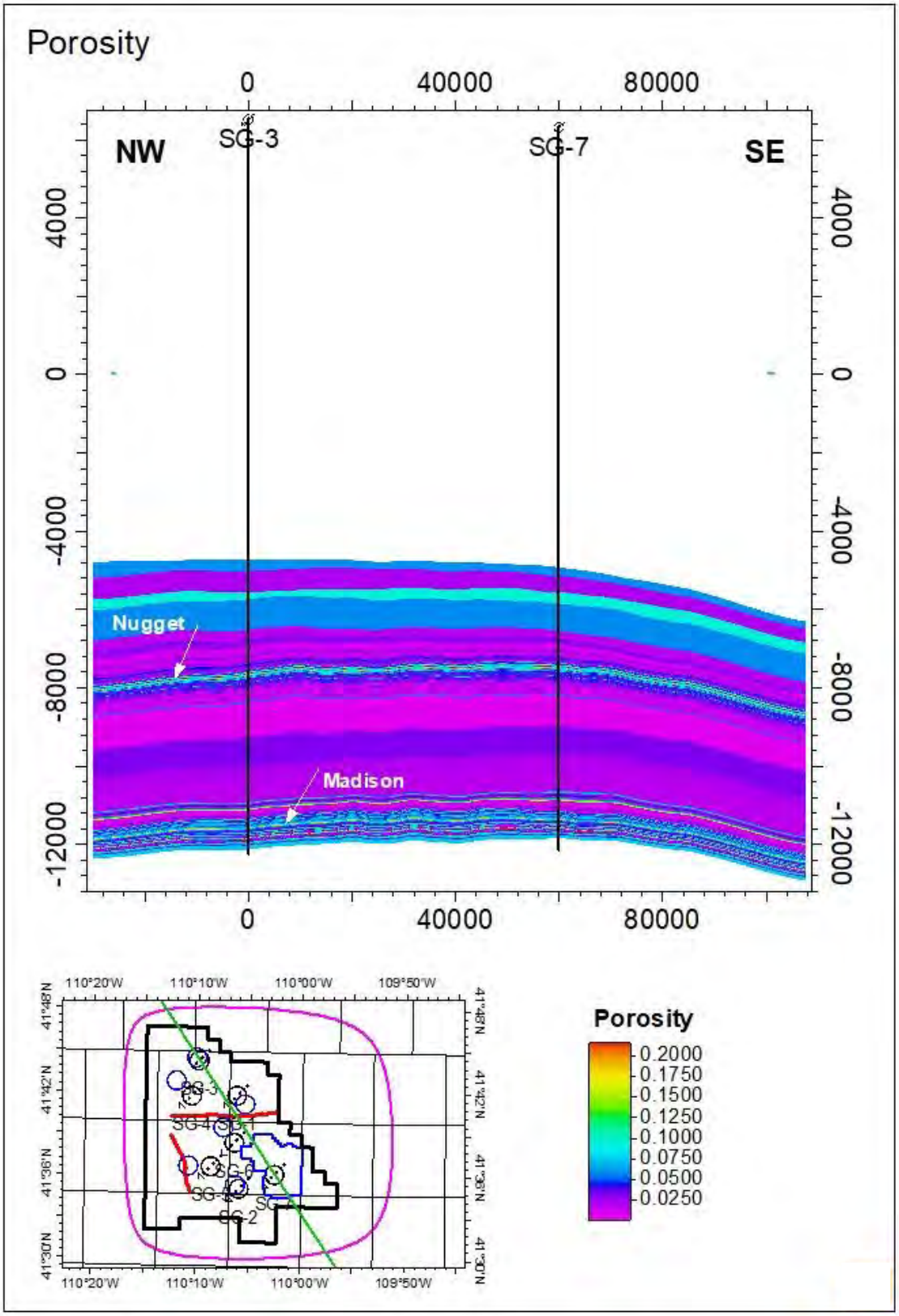


Figure A-2.11. *Porosity northwest to southeast cross section across pressure AoR.*

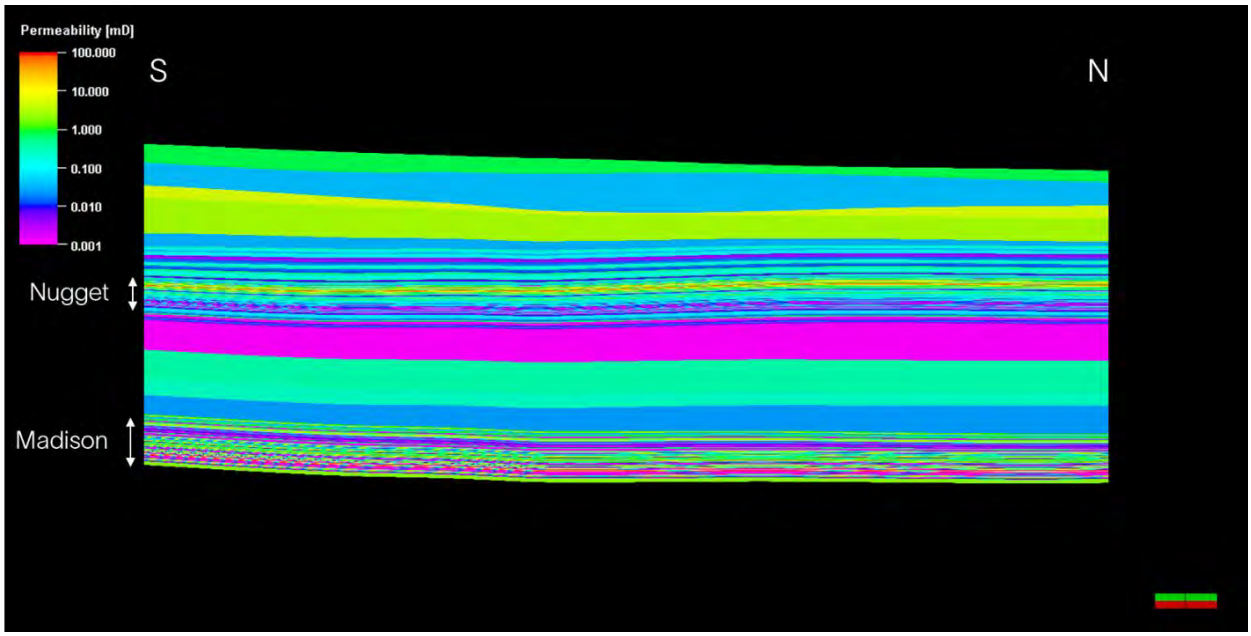


Figure A-2.12. *North-to-south cross section of permeability in dynamic model.*

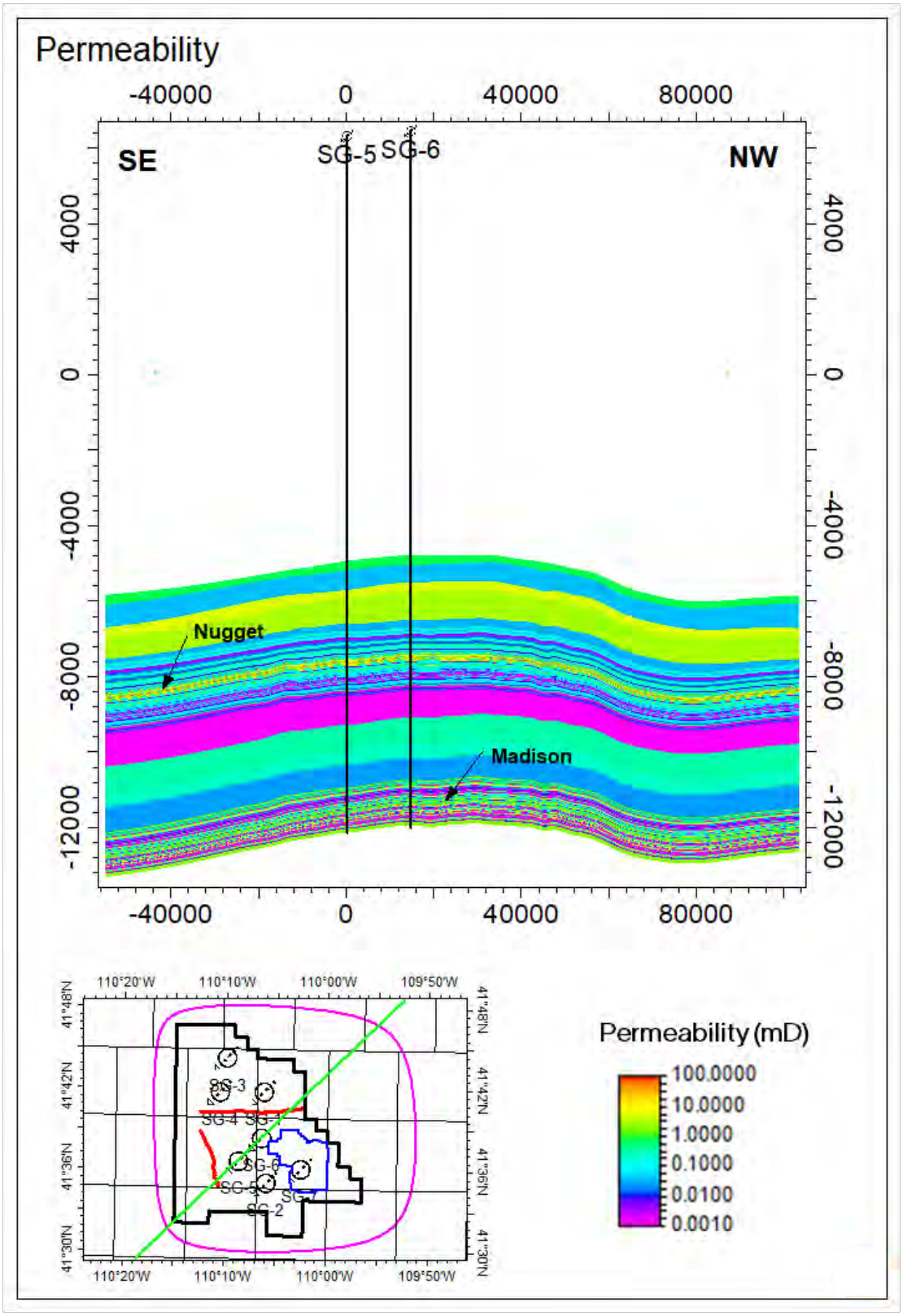


Figure A-2.13. *Permeability northeast-to-southwest cross section across pressure AoR.*

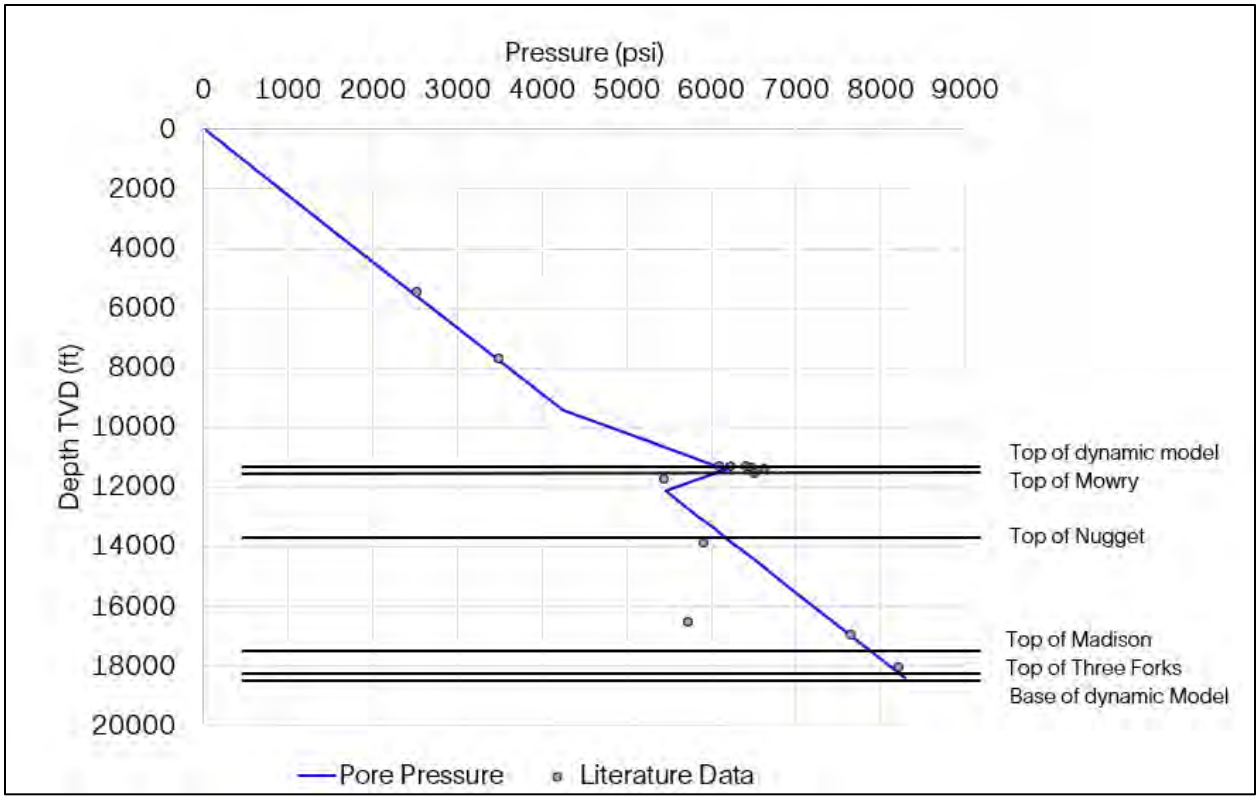


Figure A-2.14. *Pressure variation with depth with literature data from Table A-1.19.*

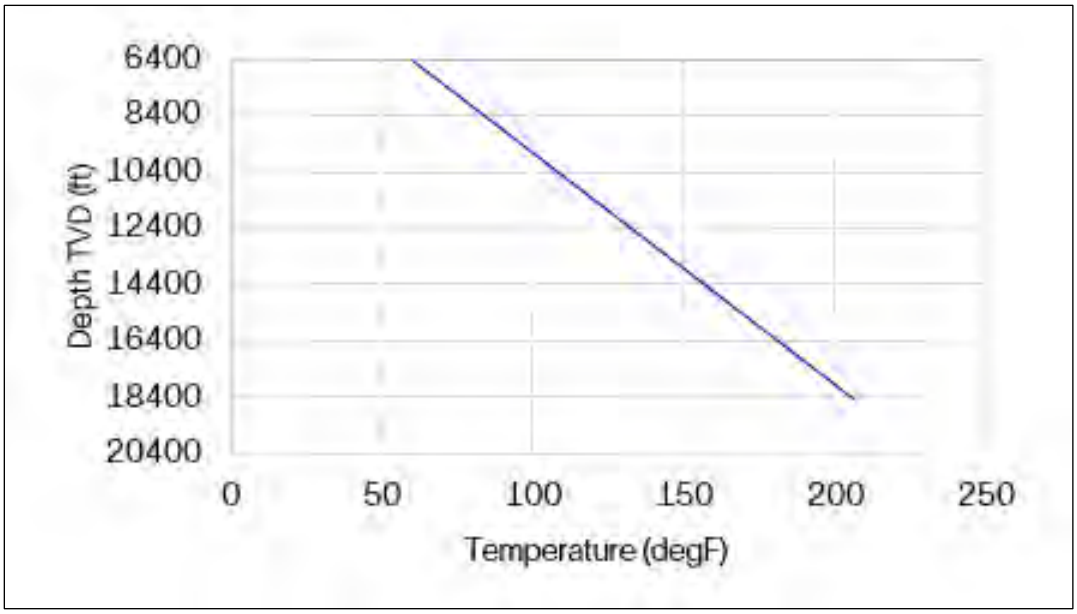


Figure A-2.15. *Temperature variation with depth considering an elevation of 6,435 feet above sea-level.*

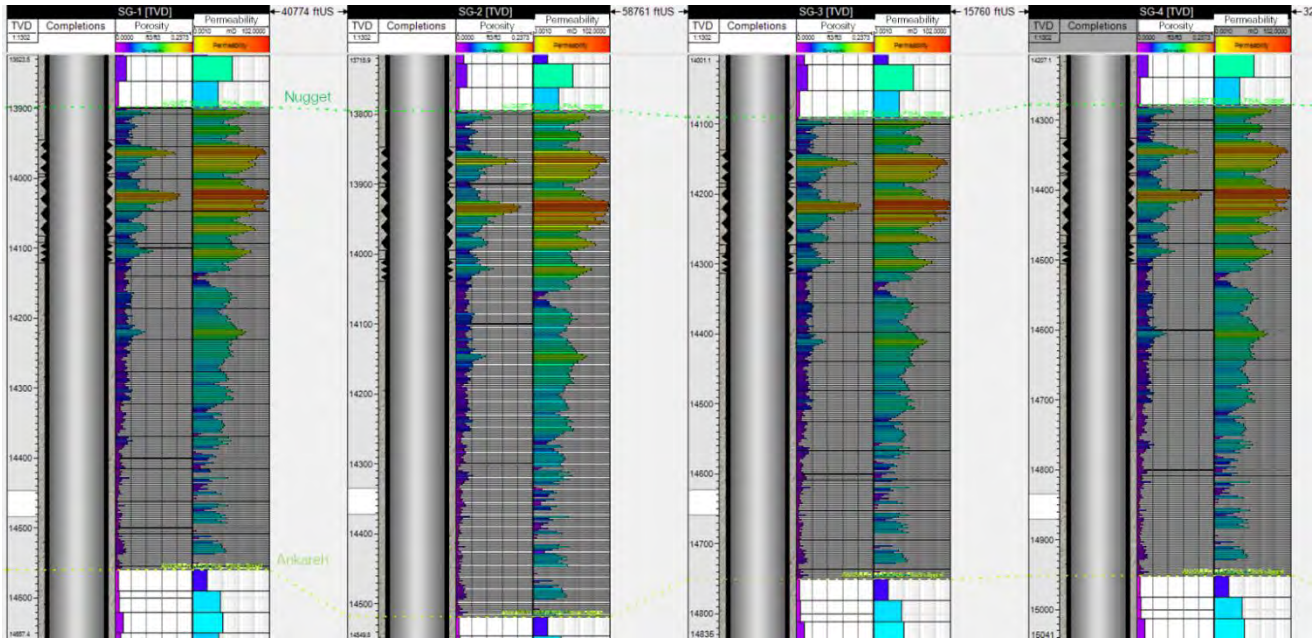


Figure A-2.16. *Wells SG-1, SG-2, SG-3, and SG-4 logs showing proposed Nugget perforations, porosity, and permeability.*

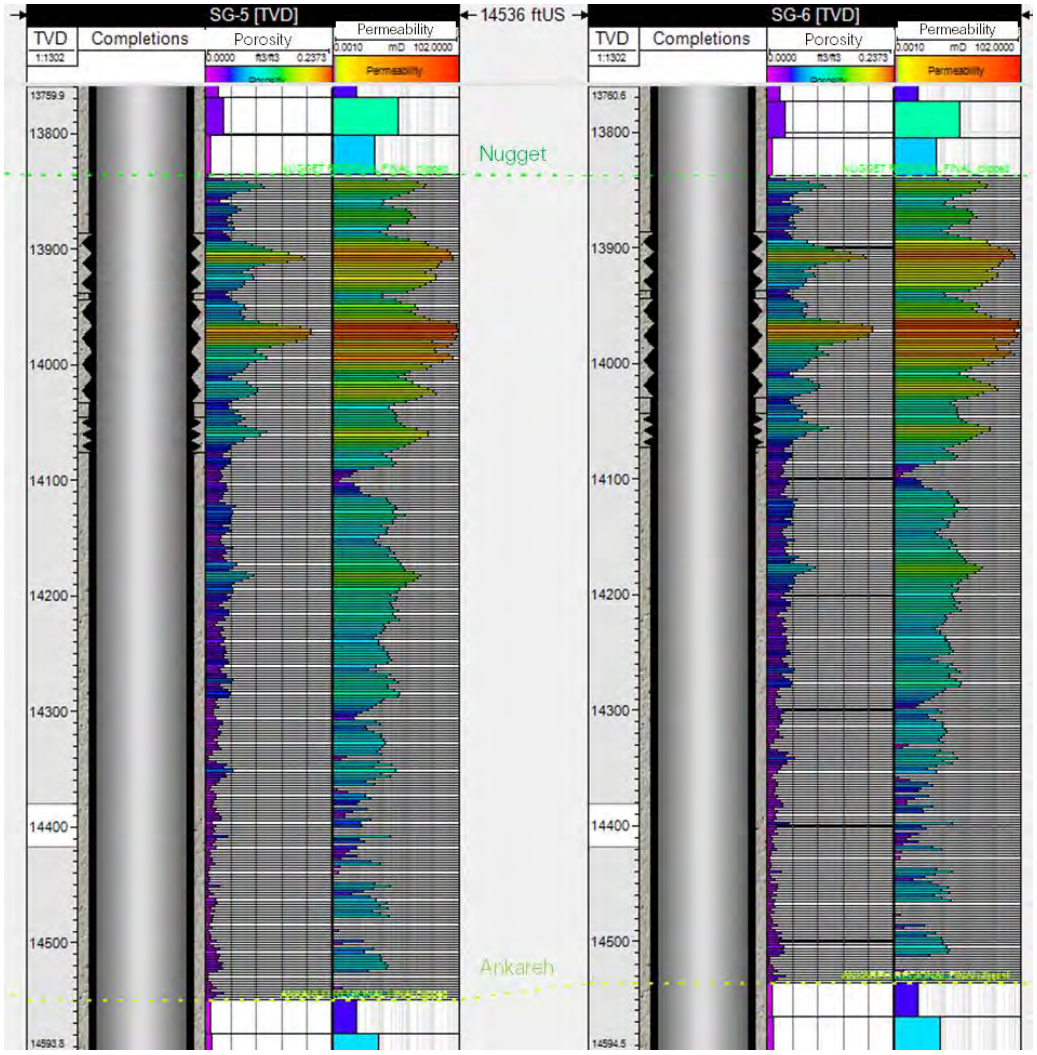


Figure A-2.17. *Wells SG-5 and SG-6 logs showing proposed Nugget perforations, porosity, and permeability*.

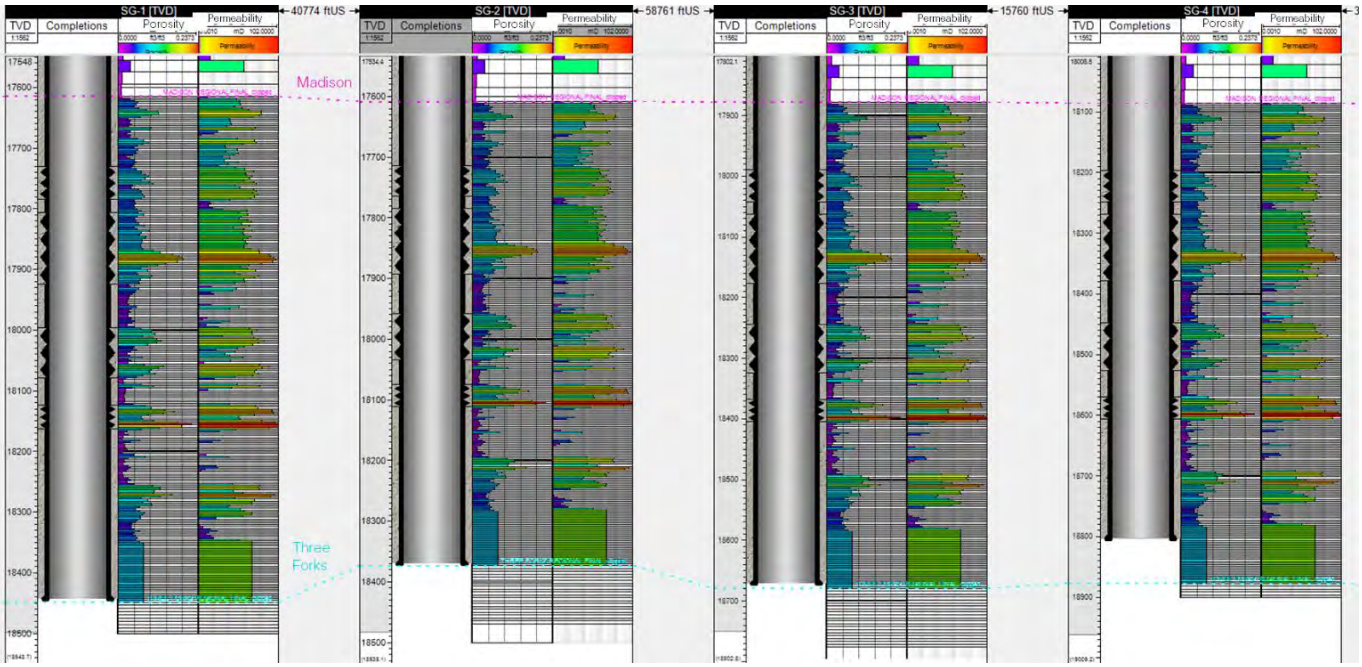


Figure A-2.18. *Wells SG-1, SG-2, SG-3, and SG-4 logs showing proposed Madison perforations, porosity, and permeability.*

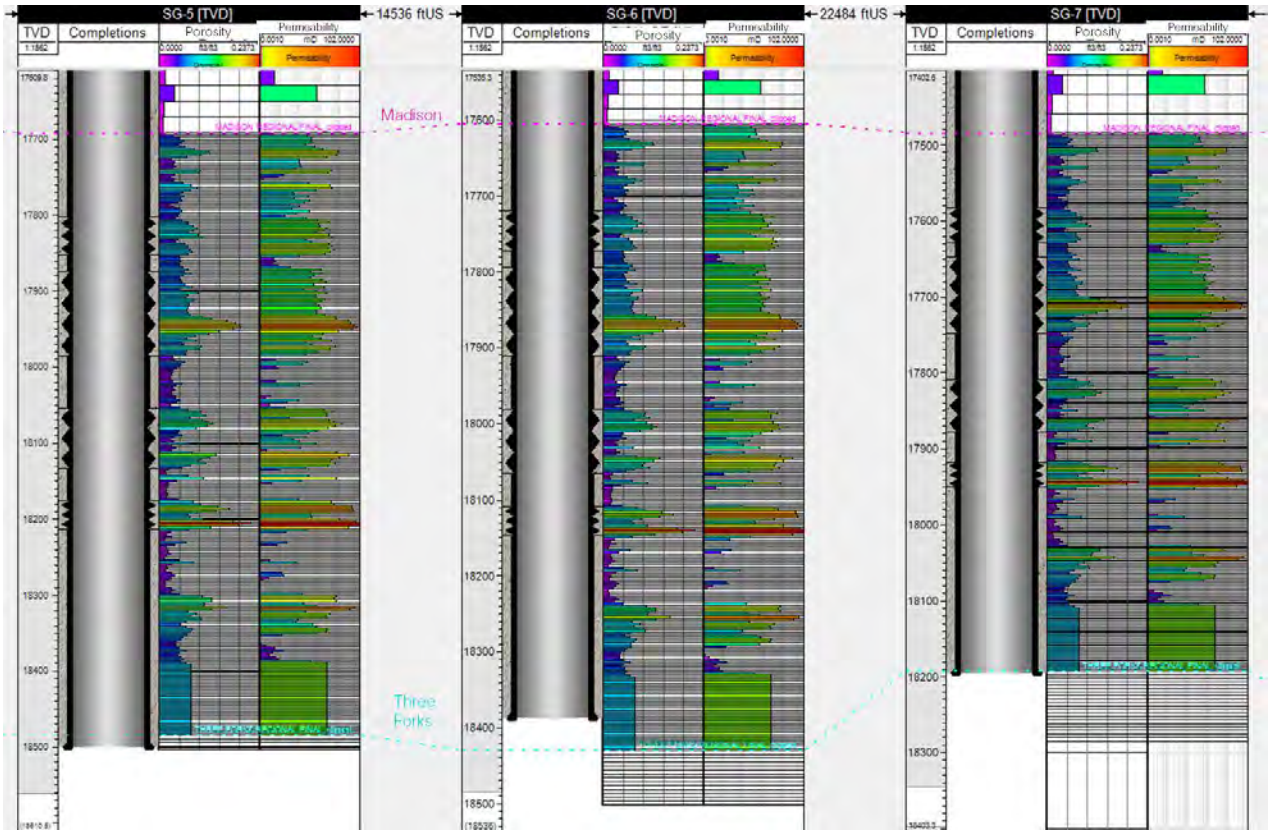


Figure A-2.19. *Wells SG-5, SG-6, and SG-7 logs showing proposed Madison perforations, porosity, and permeability.*

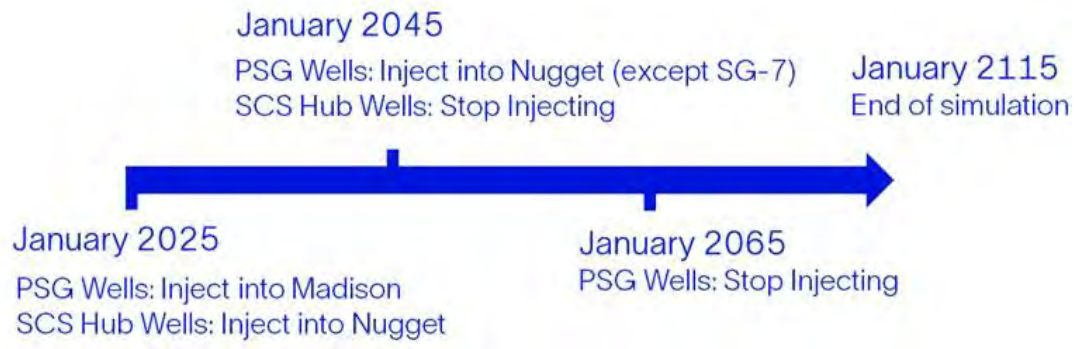


Figure A-2.20. *CO_2 injection scenario timeline of PSG wells and SCS Hub wells.*

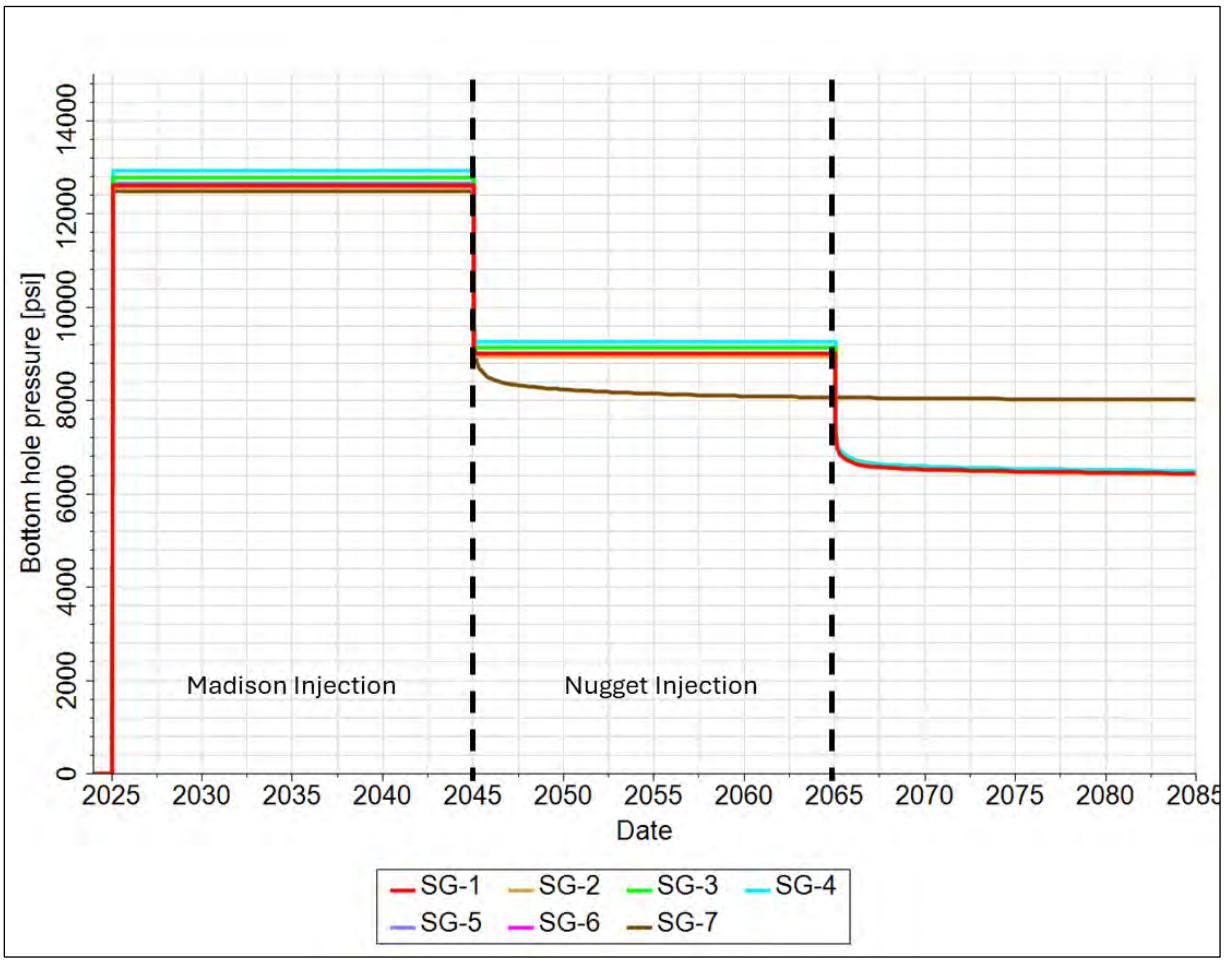


Figure A-2.21. *BHP over time. Well SG-7 only injects into the Madison.*

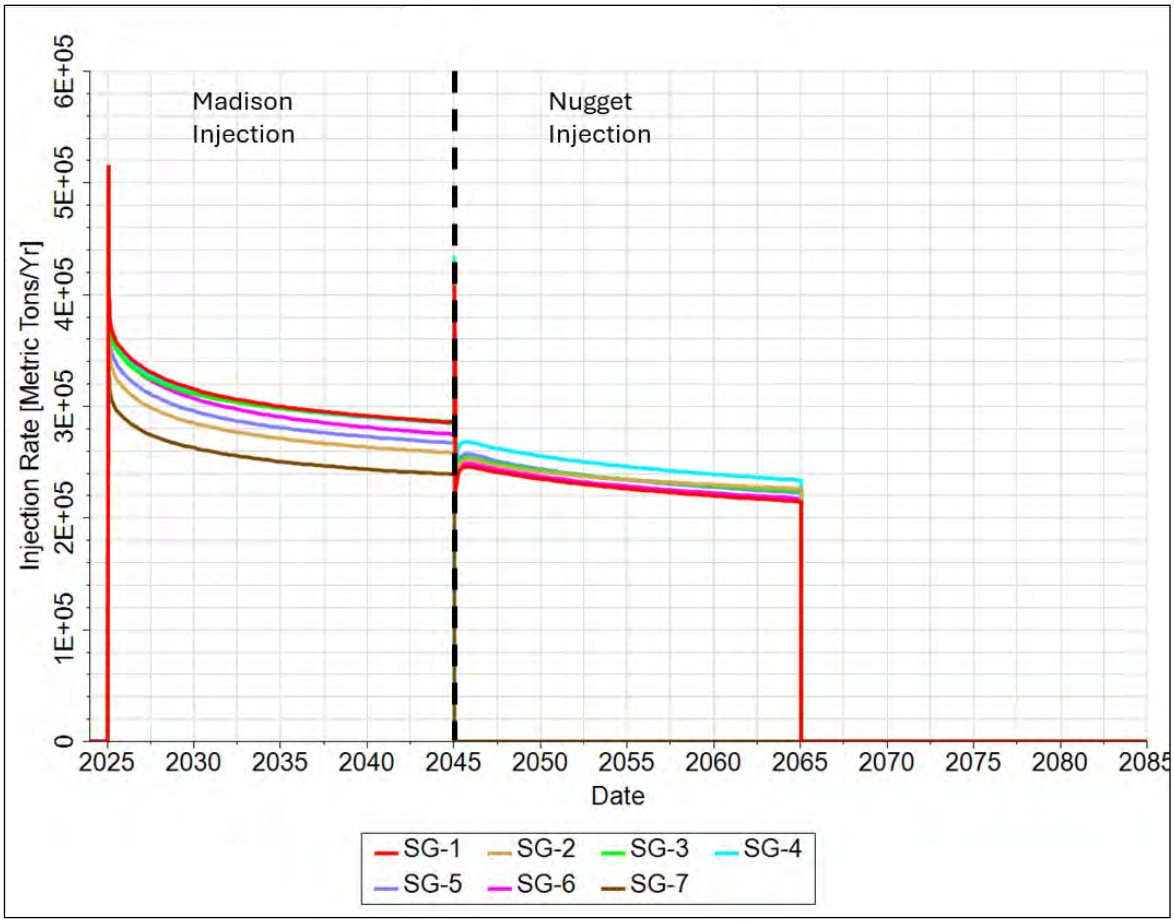


***Figure A-2.22**. Individual well injection rate over time.*

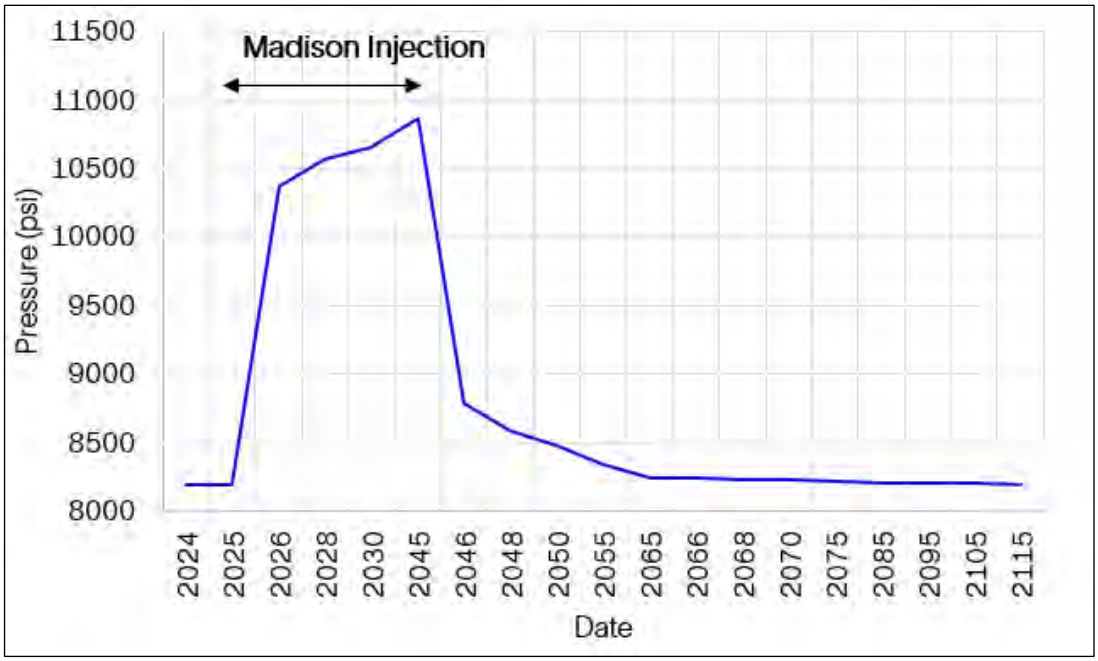


Figure A-2.23. *Madison reservoir pressure over time.*

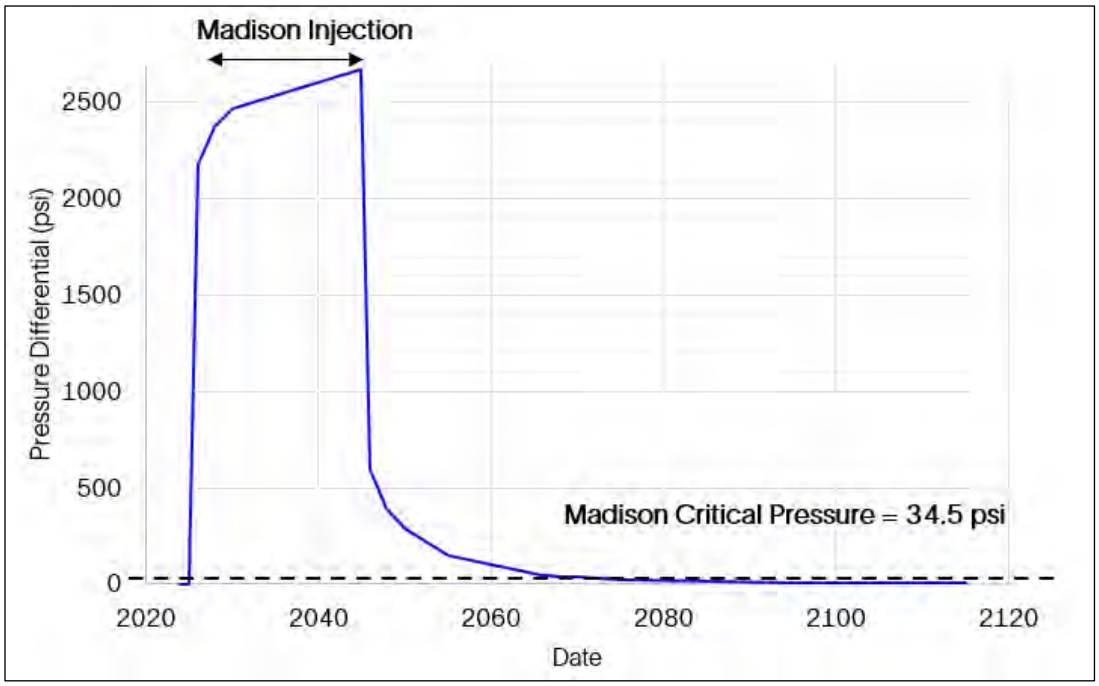


Figure A-2.24. *Madison reservoir pressure differential over time.*

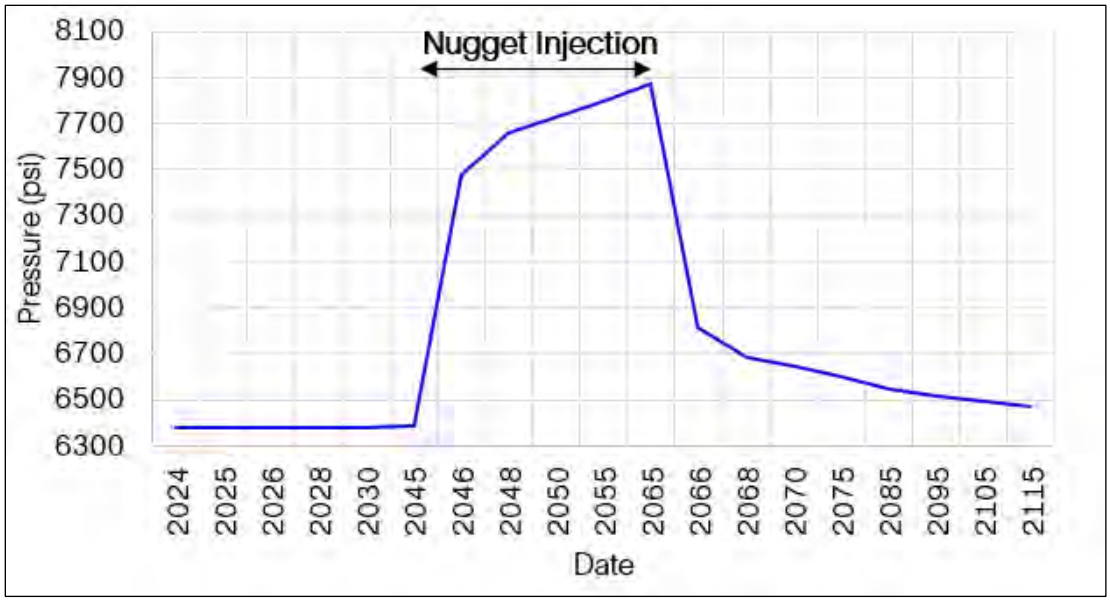


Figure A-2.25. *Nugget reservoir pressure over time.*

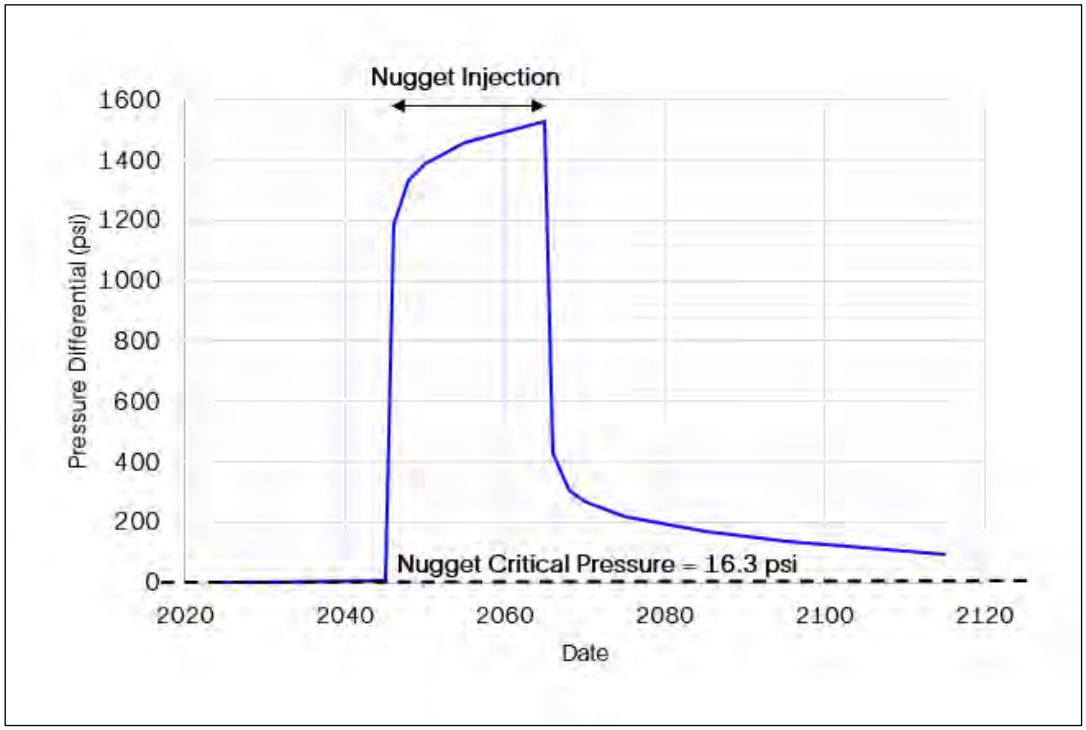
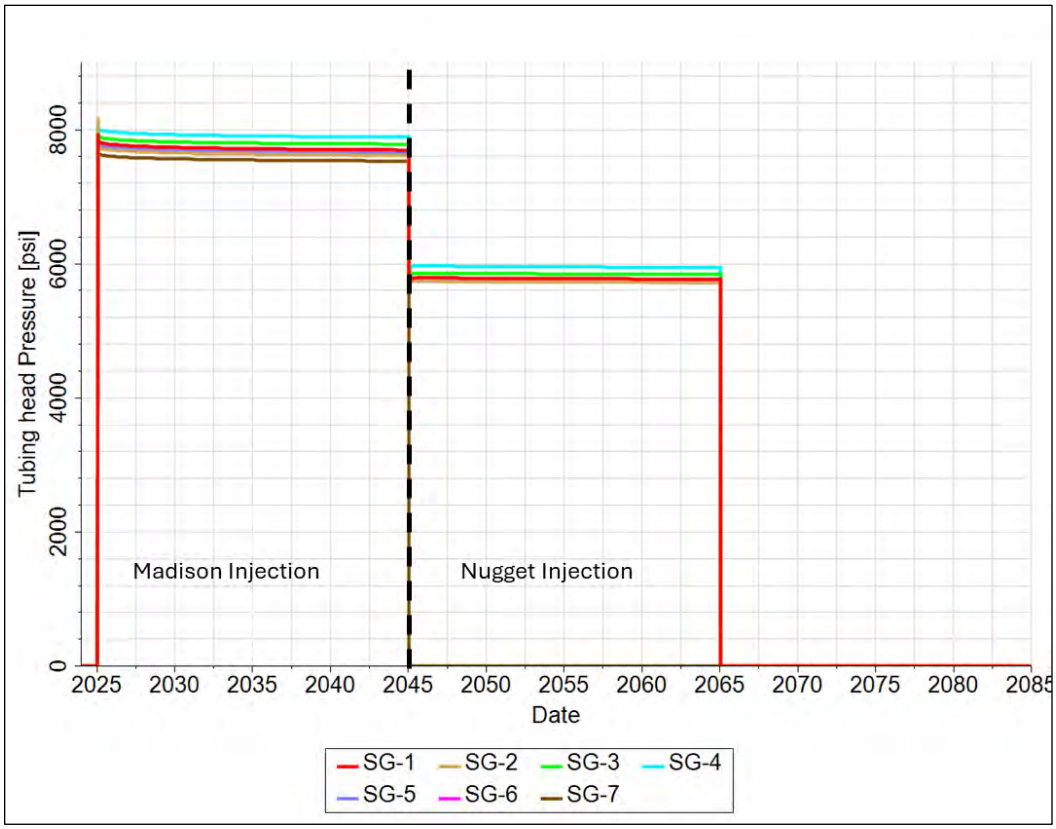


Figure A-2.26. *Nugget reservoir pressure differential over time.*



Tubing head pressure was simulated by applying vertical flow performance tables with Intersect.

Figure A-2.27. *Tubing head pressure over time.*

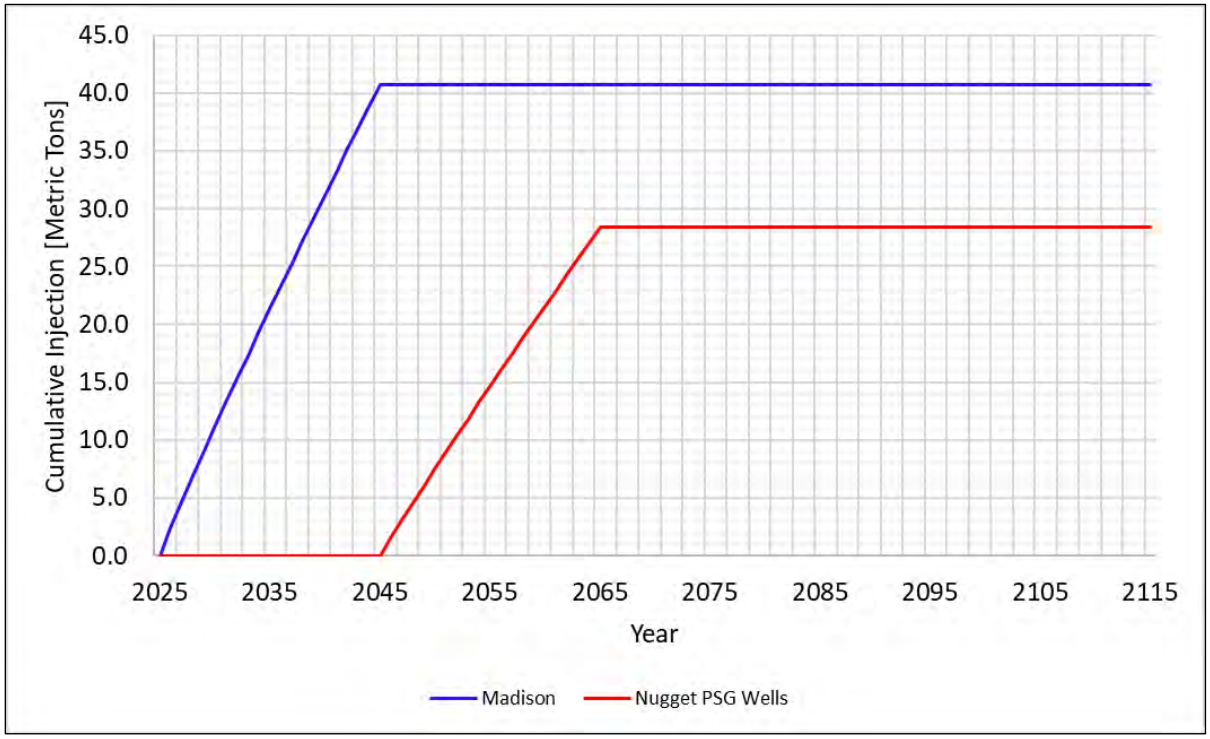


Figure A-2.28. *Cumulative injection over time*

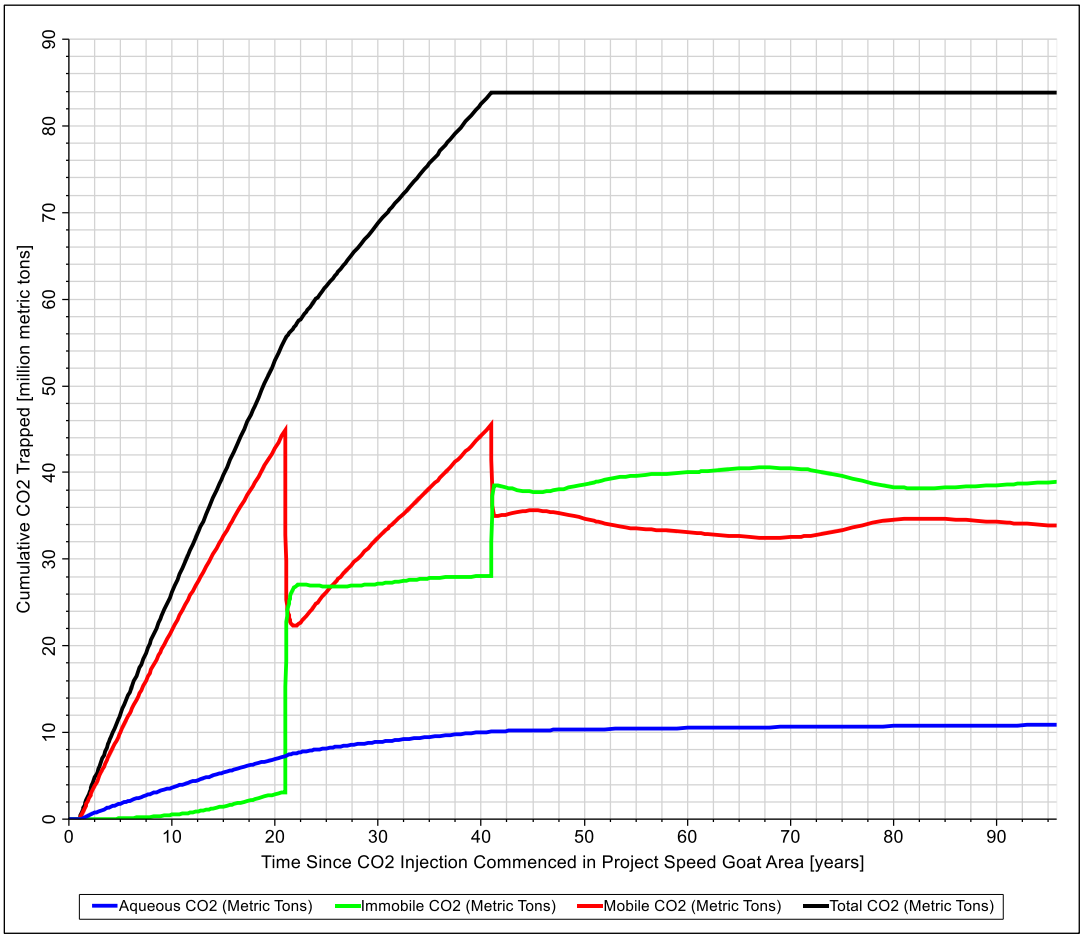


Figure A-2.29. *Field aqueous, mobile vapor and immobile vapor trapping mechanisms over time.*

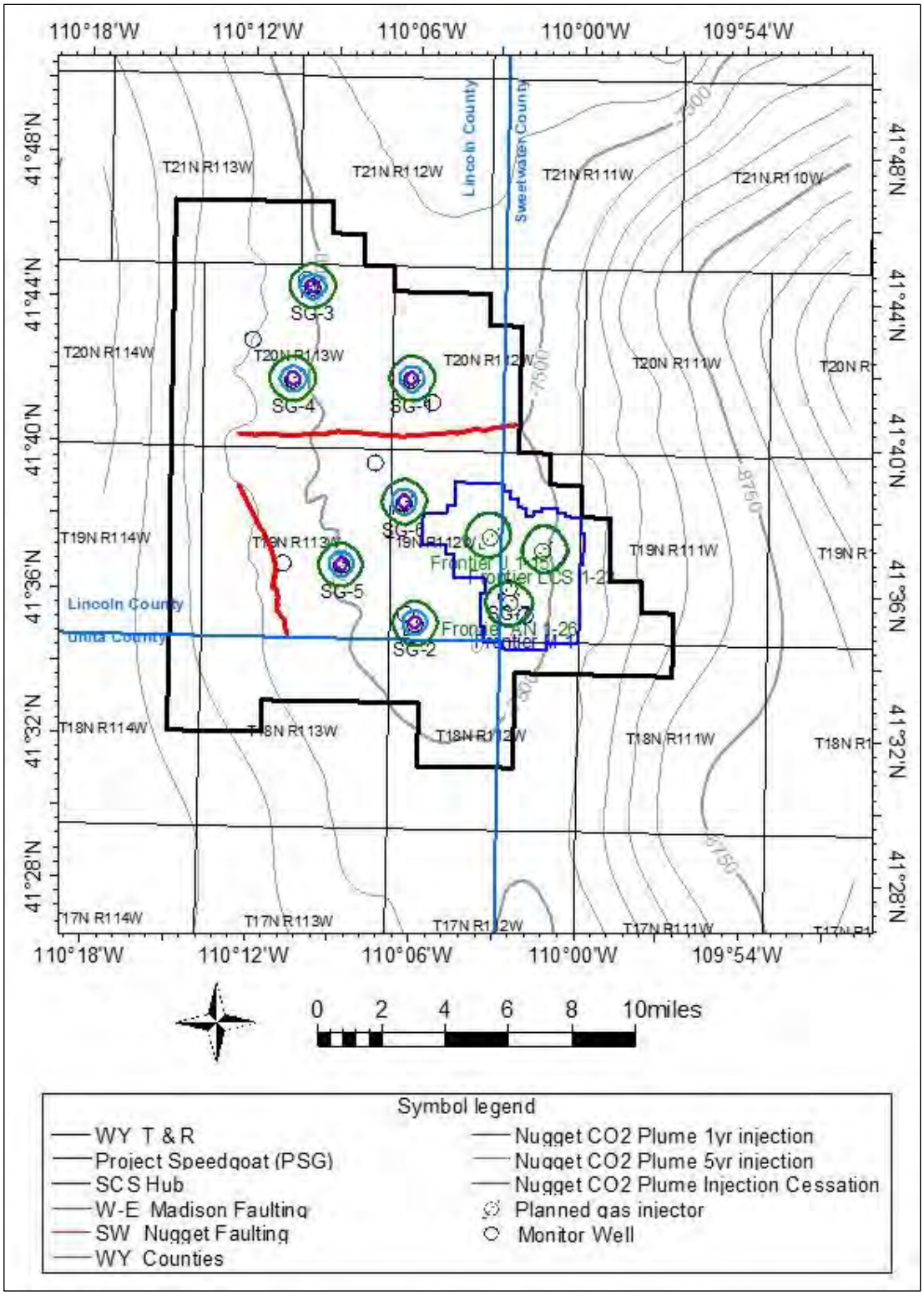


Figure A-2.30. *Nugget CO_2 plumes of PSG wells at 1- , 5-year of injection, and at injection cessation. SCS Hub Nugget CO_2 plumes are also present. Nugget structural contour interval is 250 feet.*

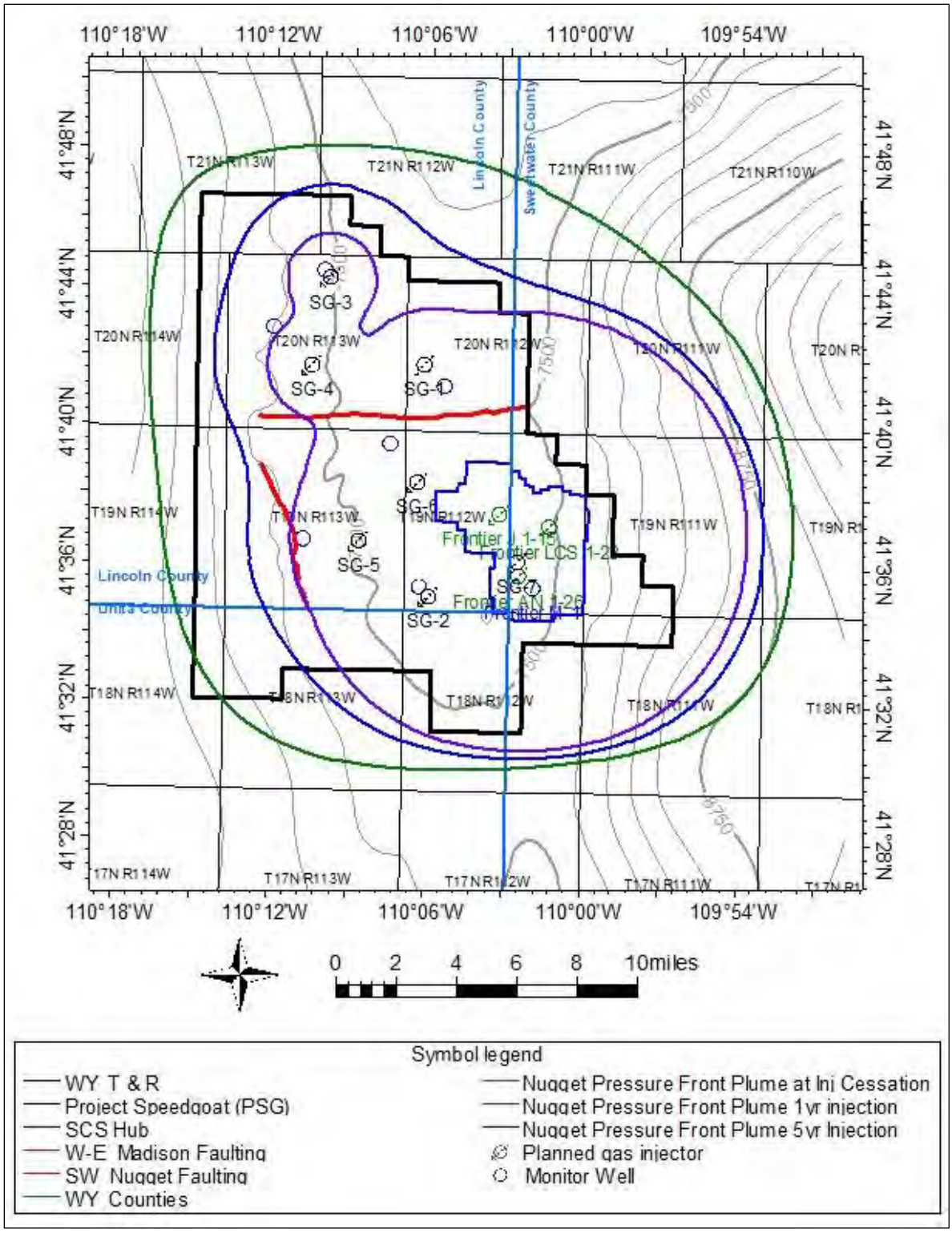


Figure A-2.31. *Nugget pressure front at 1-, 5-year of injection and at injection cessation. Nugget structural contour interval is 250 feet.*

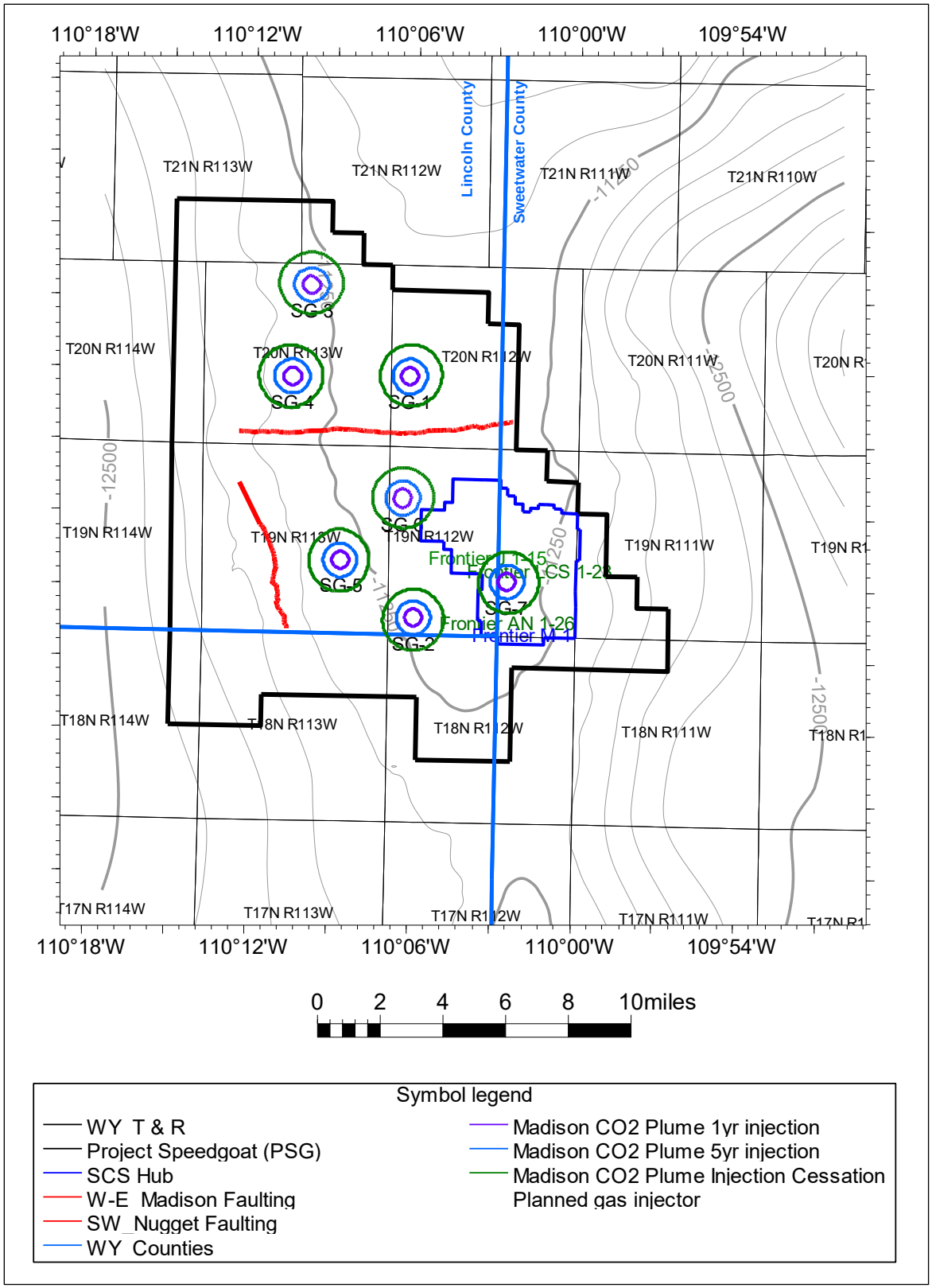


Figure A-2.32. *Madison CO_2 plumes at 1-, 5-year of injection and at injection cessation. Madison structural contour interval is 250 feet.*

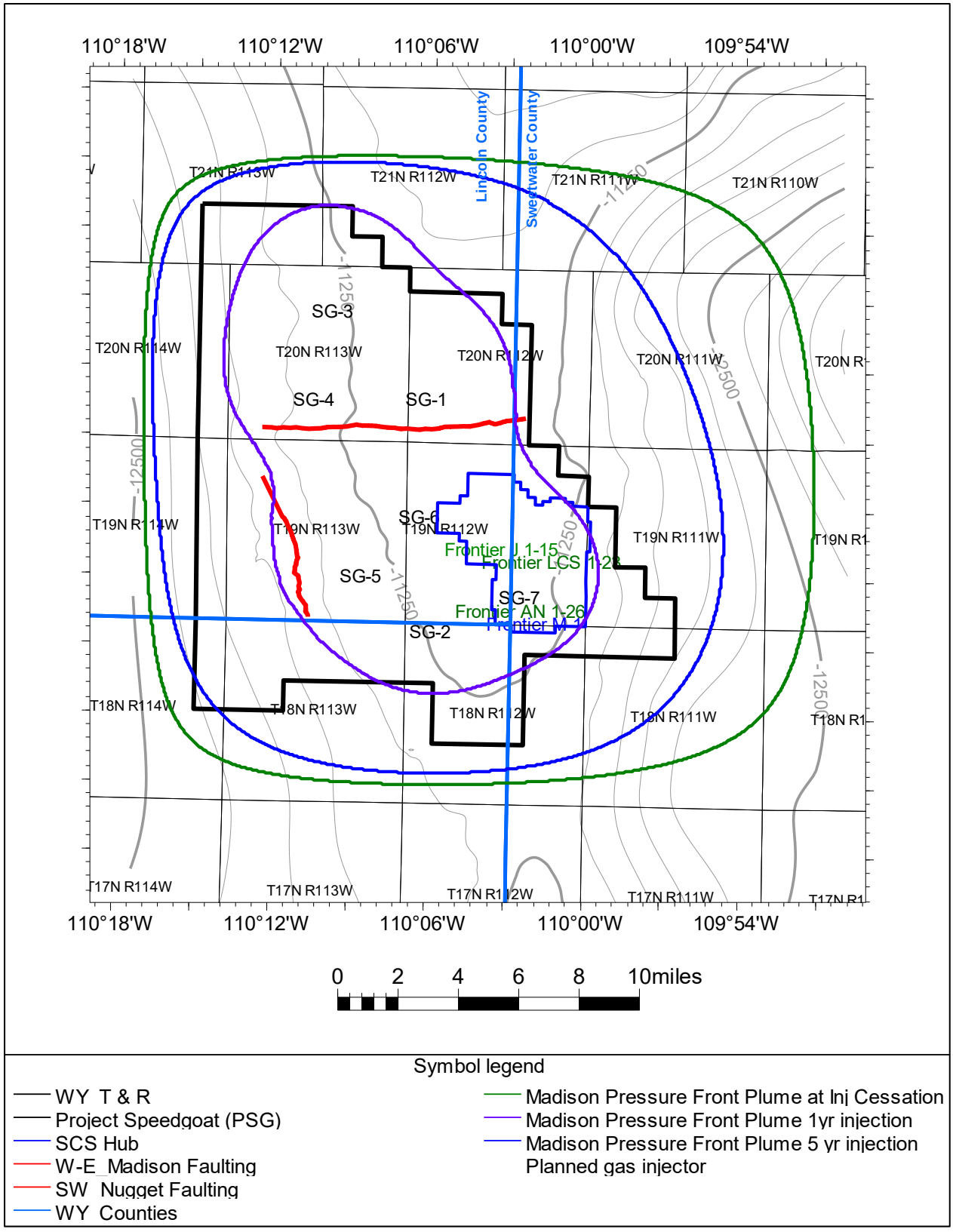


Figure A-2.33*. Madison pressure front plumes at 1-, 5-year of injection and at injection cessation. Madison structural contour interval is 250 feet.*

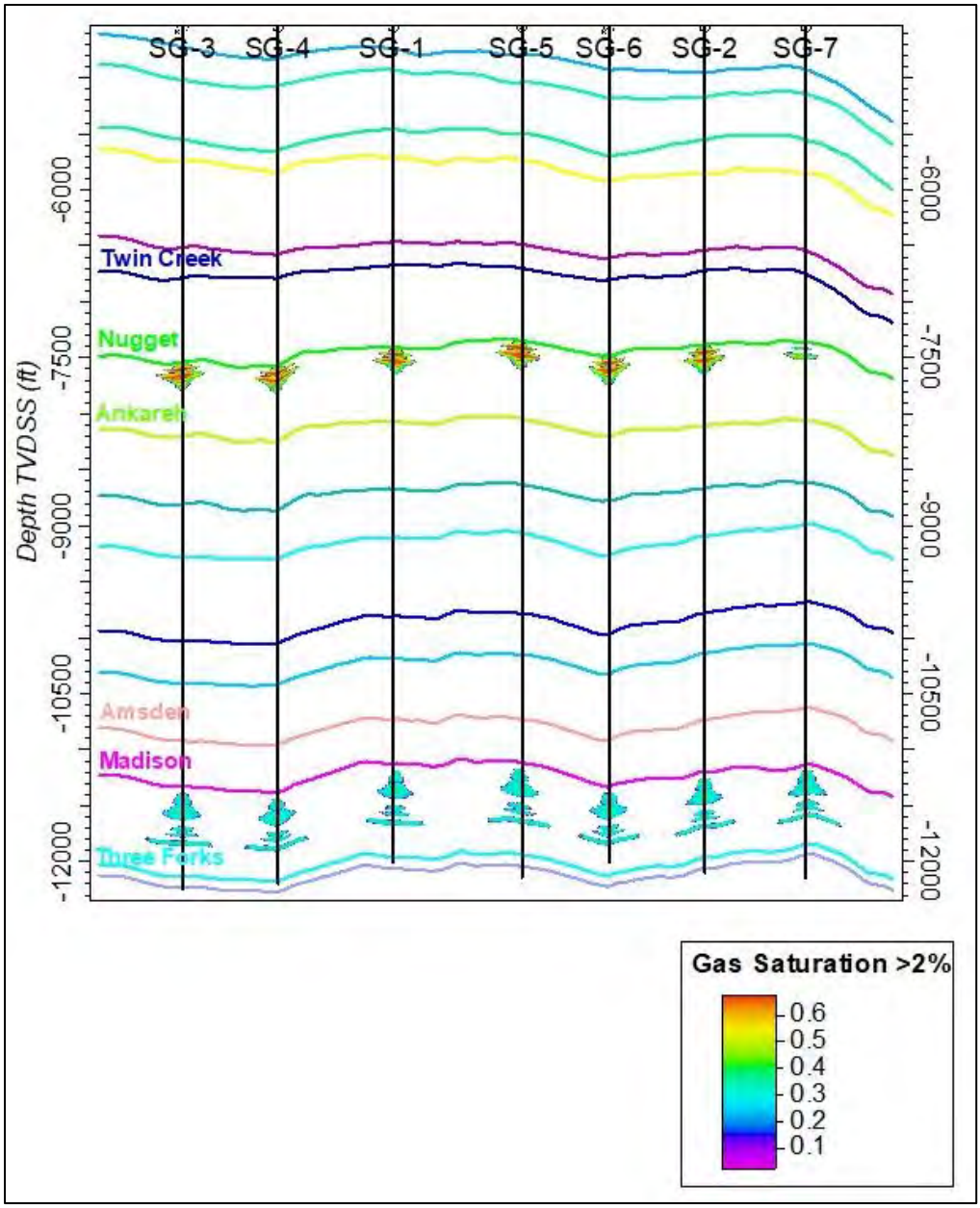


Figure A-2.34. *Madison and Nugget CO_2 plume cross section at plume stabilization.*

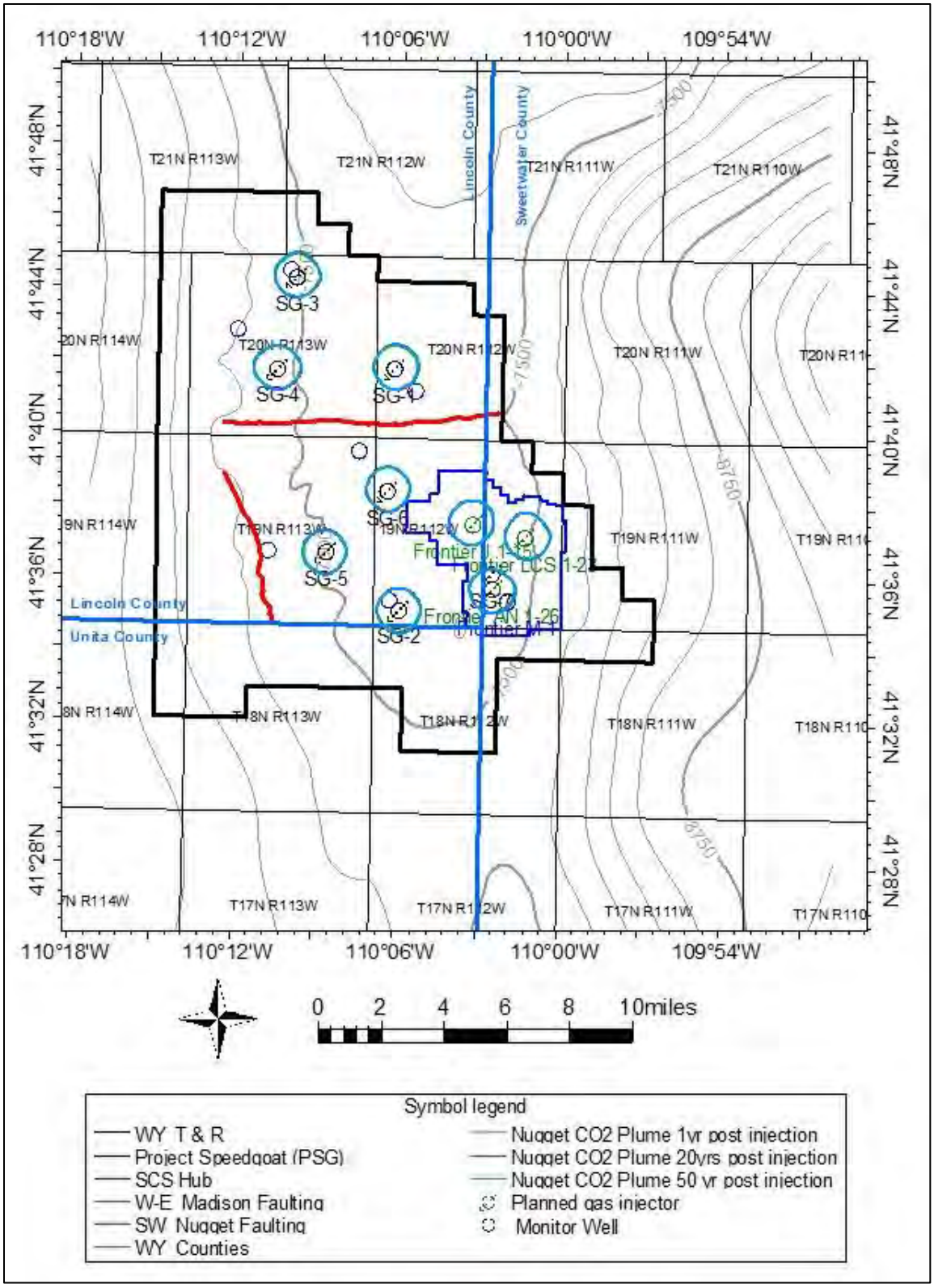


Figure A-2.35. *Nugget CO_2 plumes at 1 year, 20 years, and 50 years post injection. Note the CO_2 plumes are the same size and directly overlap each other. Nugget structural contour interval is 250 feet.*

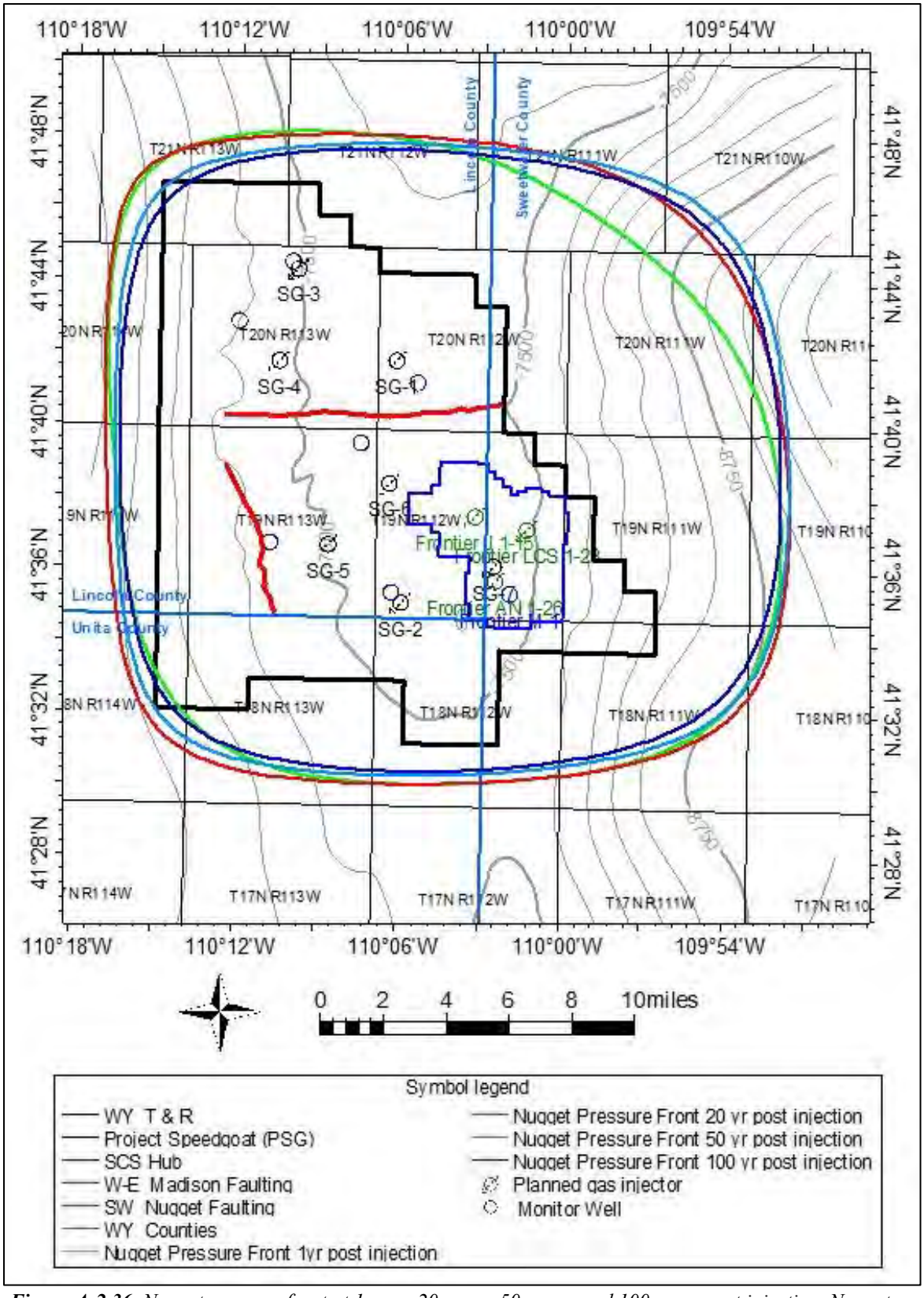


***Figure A-2.36**. Nugget pressure front at 1 year, 20 years, 50 years, and 100 years post injection. Nugget structural contour interval is 250 feet.*

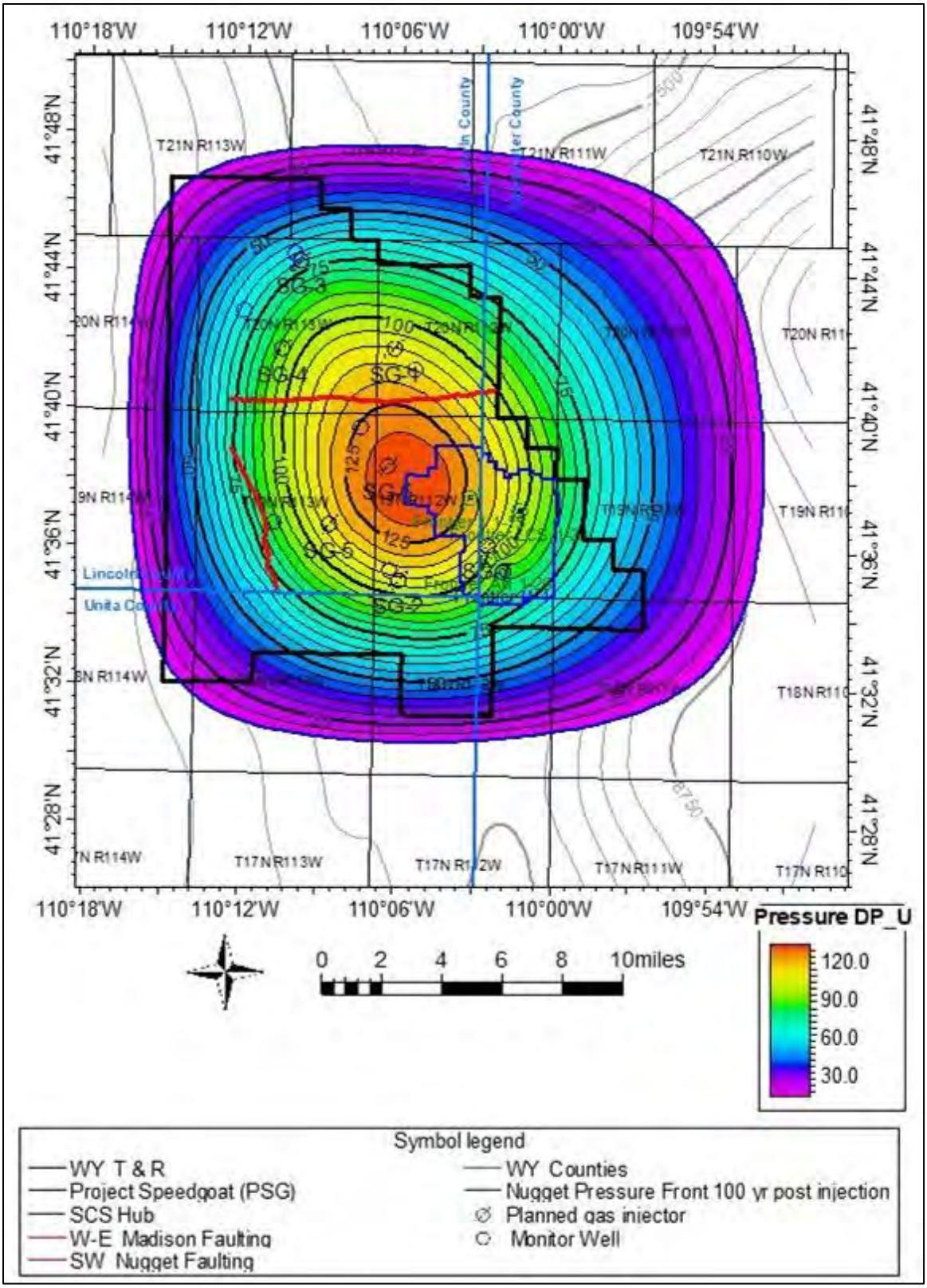


Figure A-2.37. *Nugget pressure front at 100 years post injection; pressure contour interval is 5 psi; structural contour interval is 250 feet.*

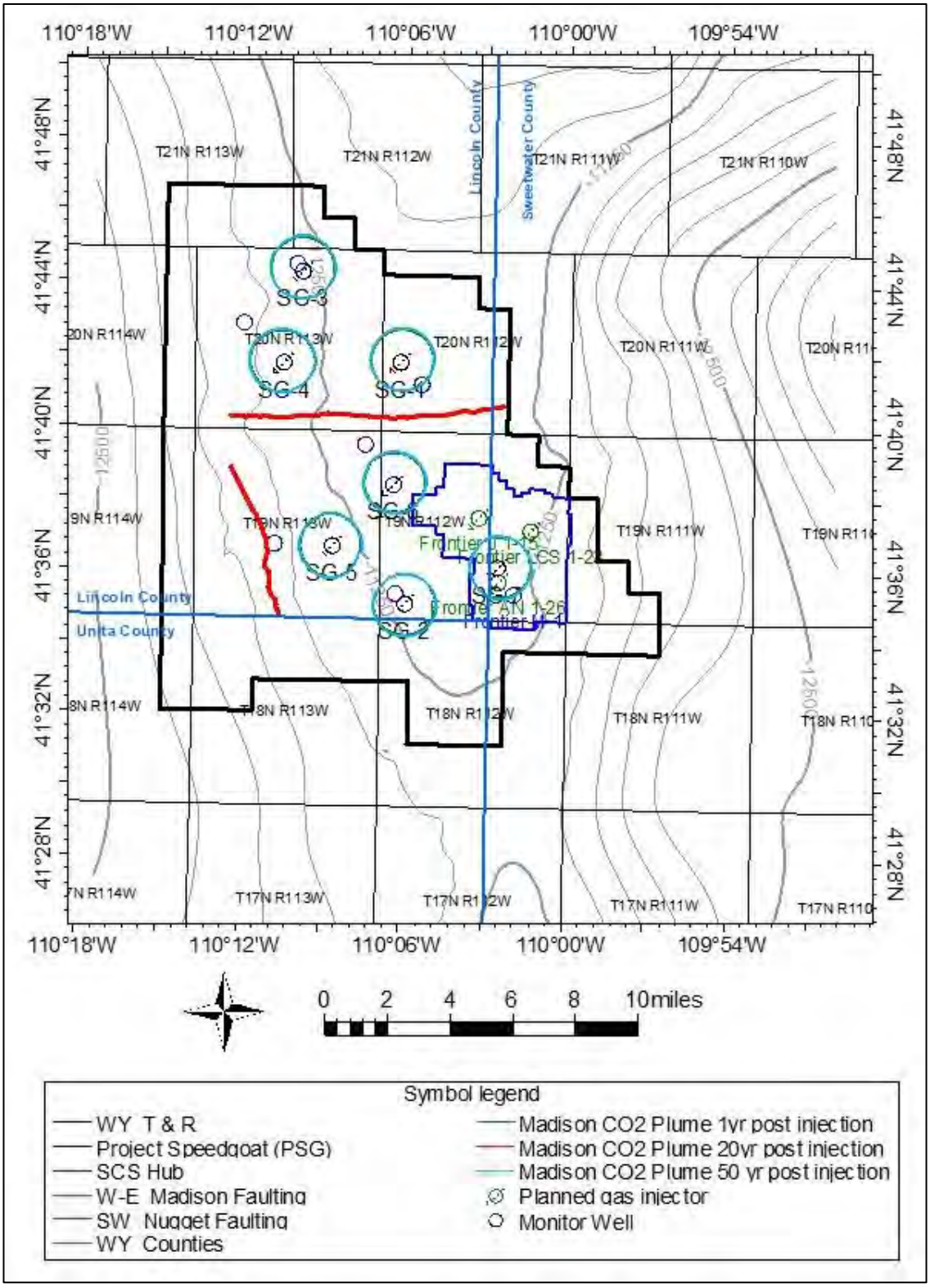


Figure A-2.38. *Madison CO_2 plumes at 1 year, 20 years, and 50 years post injection. Note that the CO_2 plumes are the same size and directly overlap each other. Madison structural contour interval is 250 feet.*

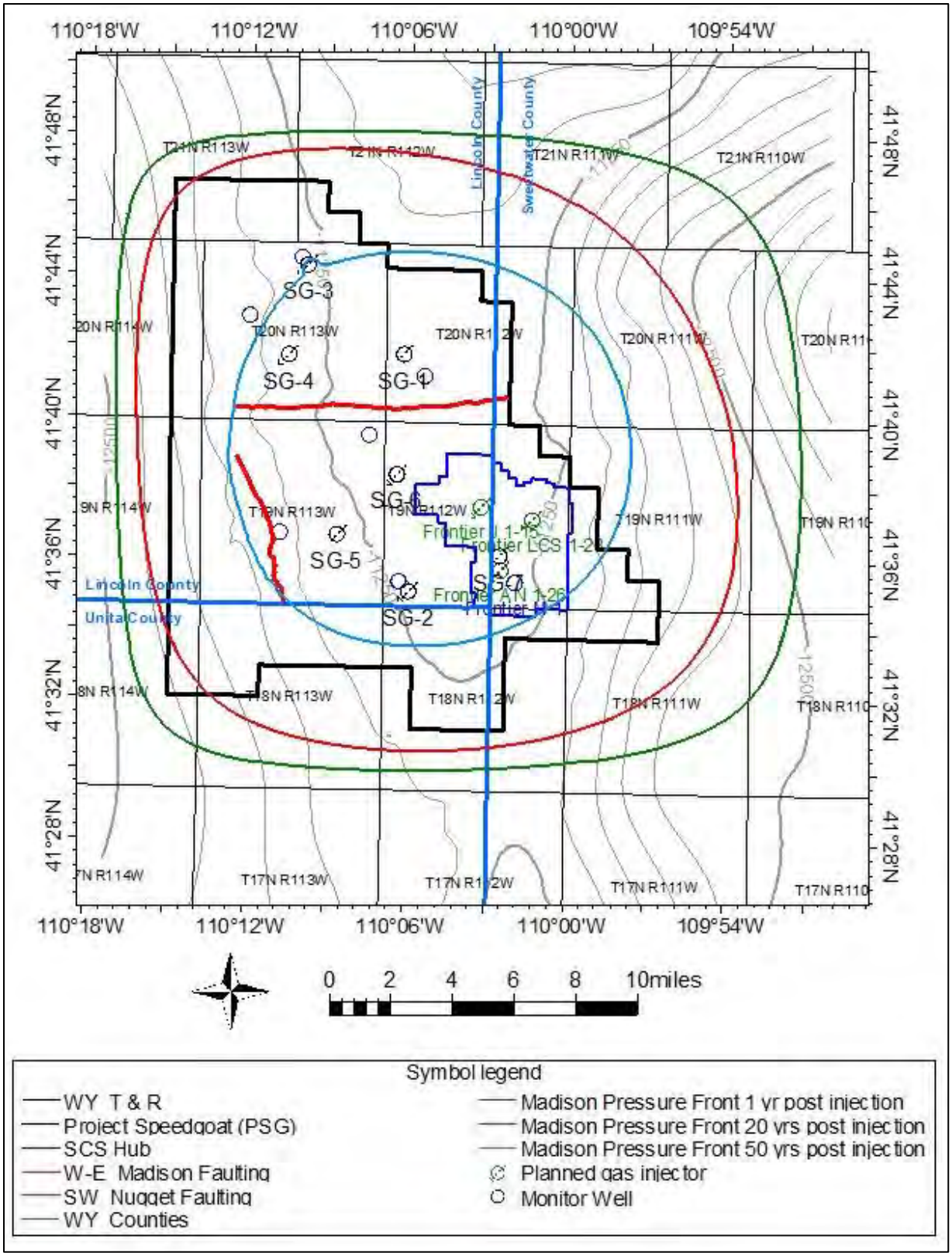


***Figure A-2.39**. Madison pressure front at 1 year, 20 years, and 50 years, and 100 years post injection; Madison structural contour interval is 250 feet.*

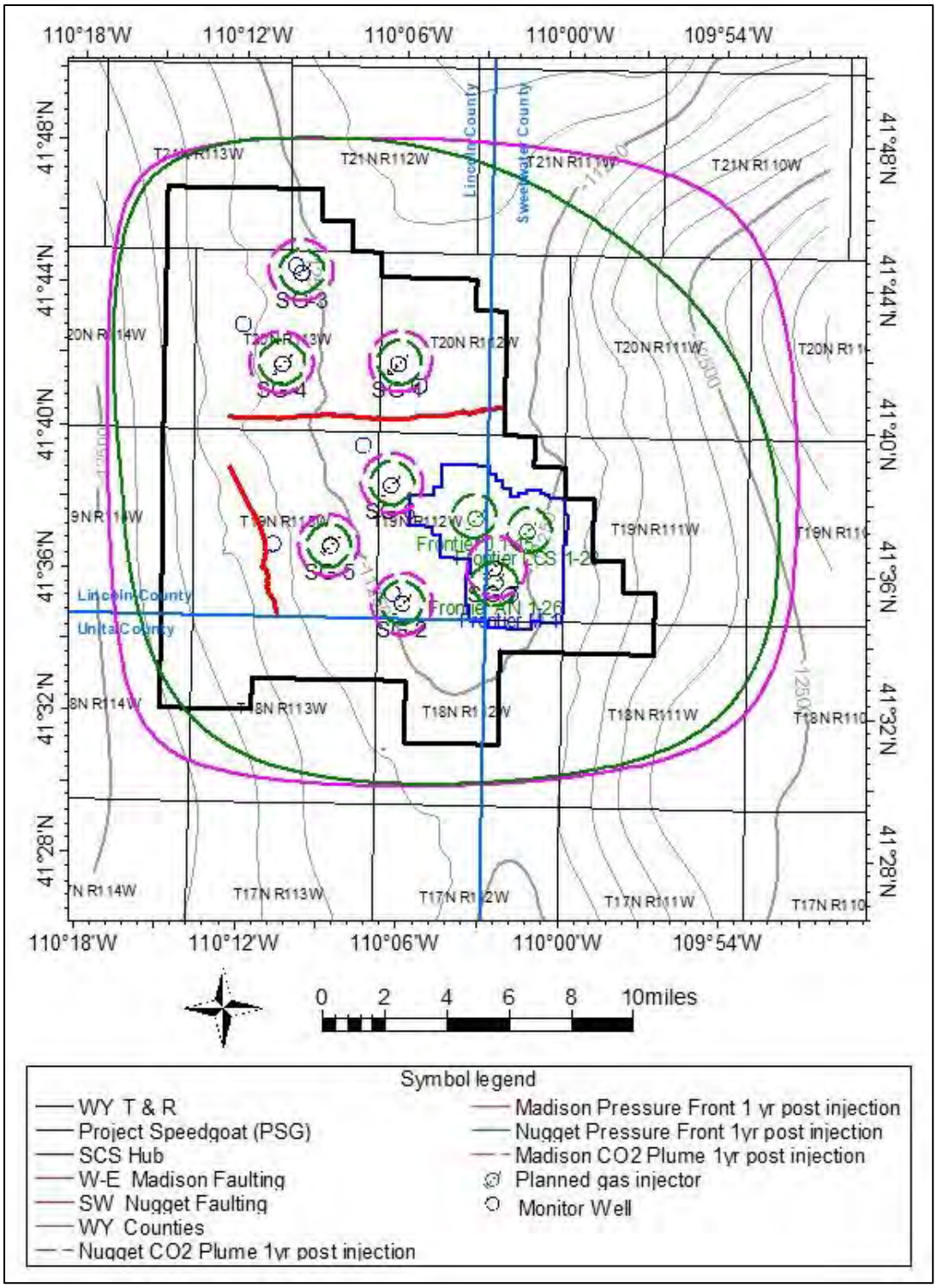


Figure A-2.40. *Largest CO_2 plumes in the Nugget, largest CO_2 plumes in the Madison, largest pressure front in the Nugget and largest pressure front) in the Madison. Madison structural contour interval is 250 feet.*

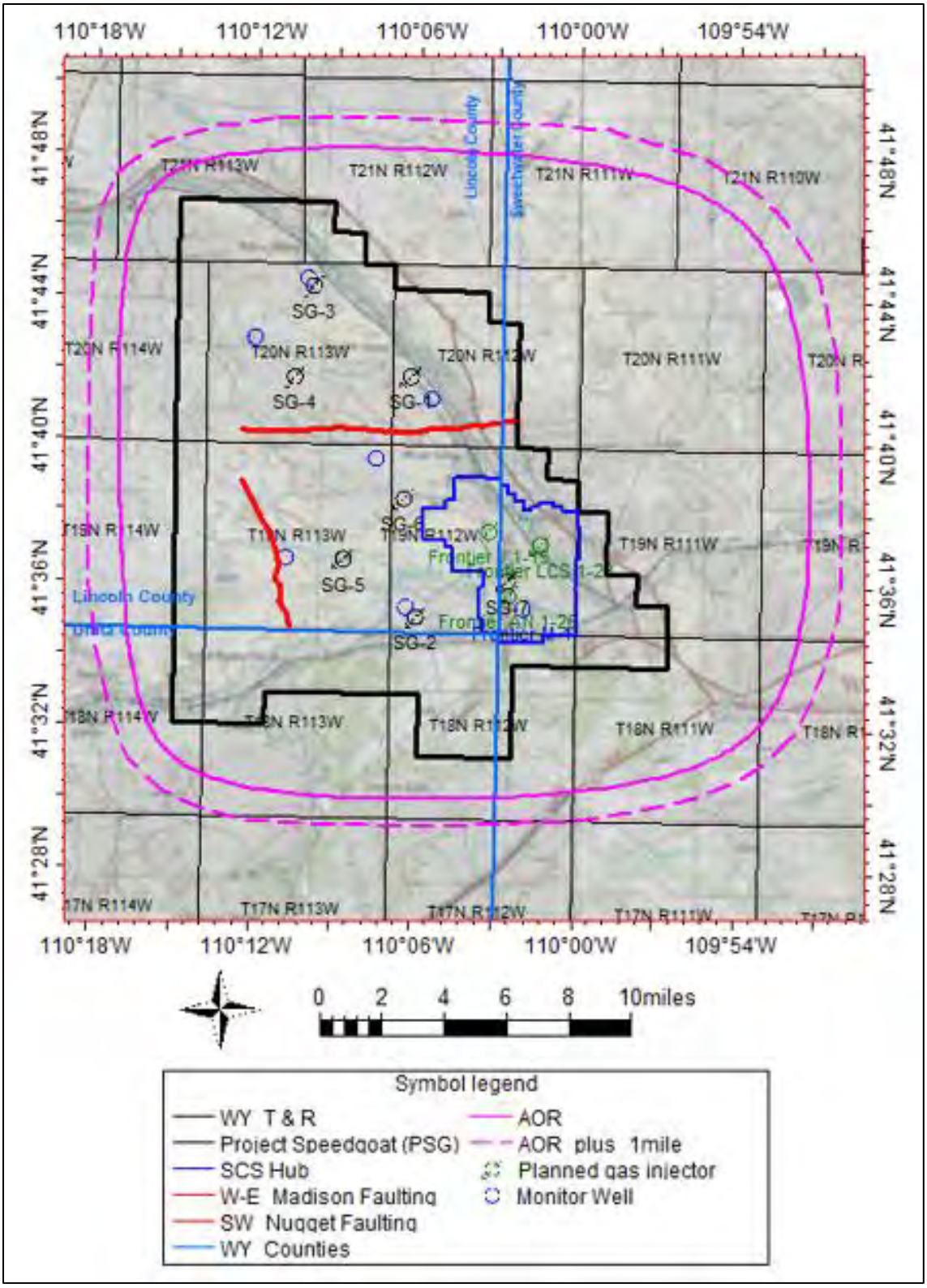


Figure A-2.41. *Delineated PSG AoR and AoR plus 1-mile boundaries.*

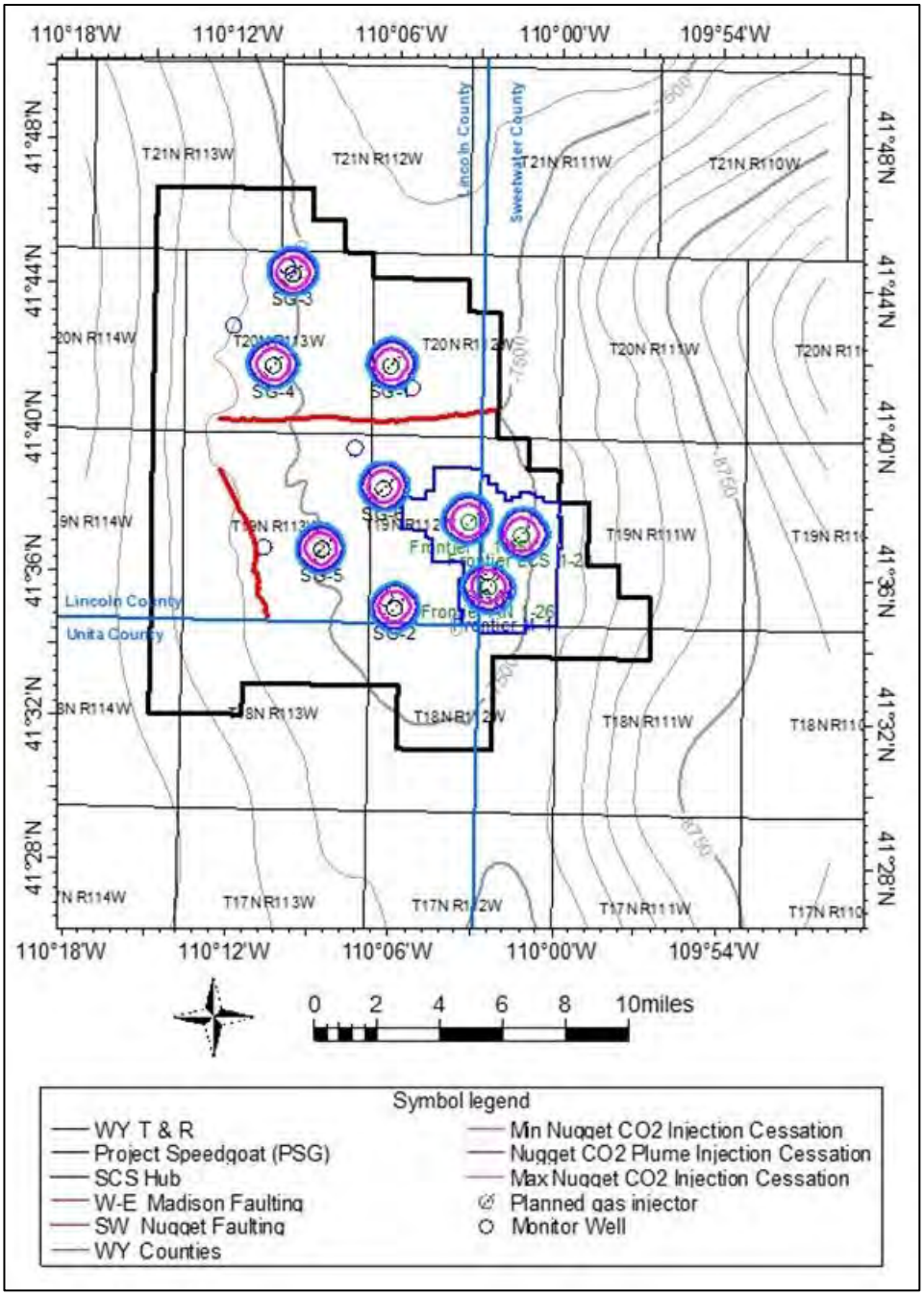


Figure A-2.42. *Nugget CO_2 plume results for porosity multiplier and permeability transform sensitivity. Nugget structural contour interval is 250 feet.*

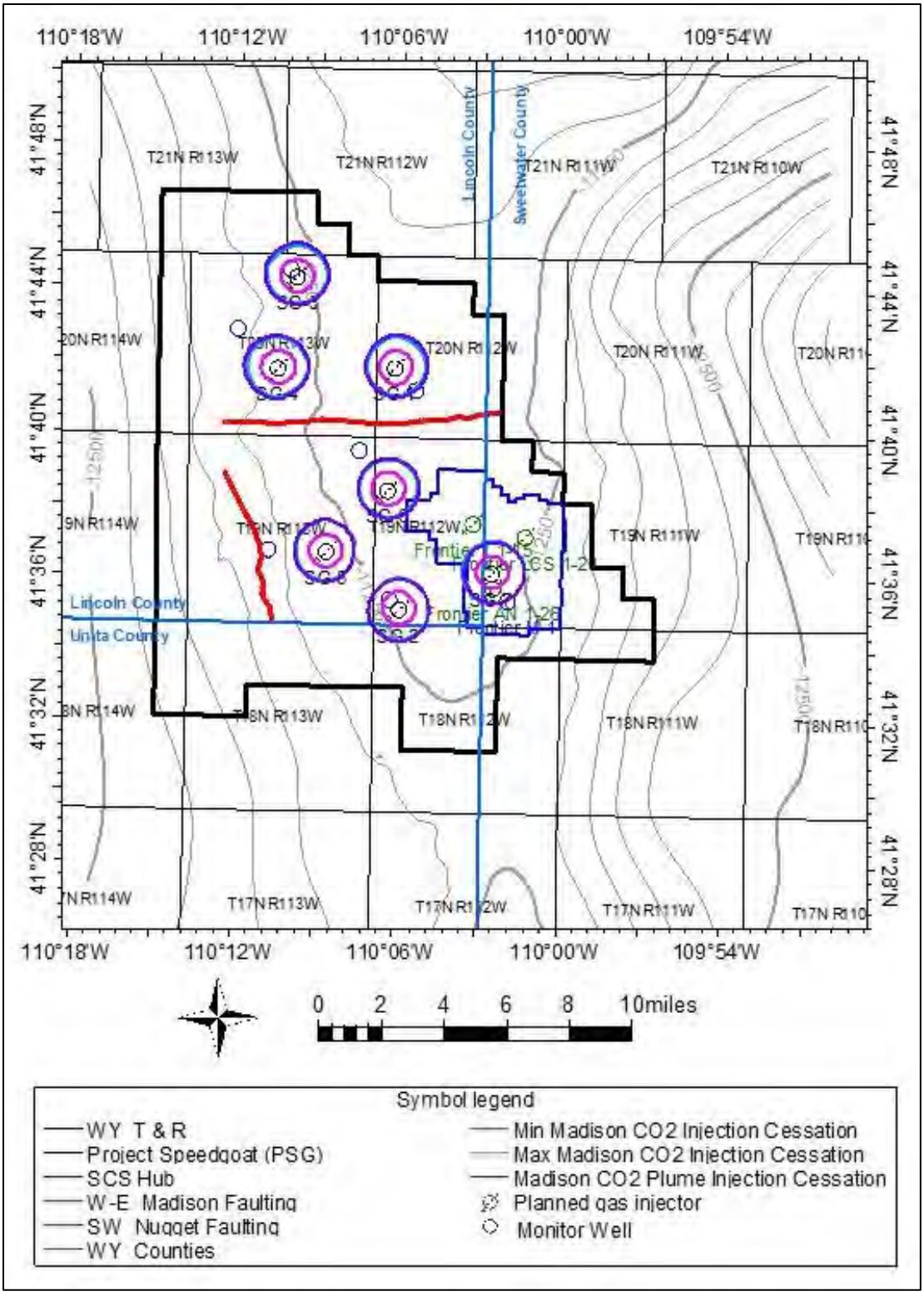


Figure A-2.43. *Madison CO_2 plume results for porosity multiplier and permeability transform sensitivity. Madison structural contour interval is 250 feet.*

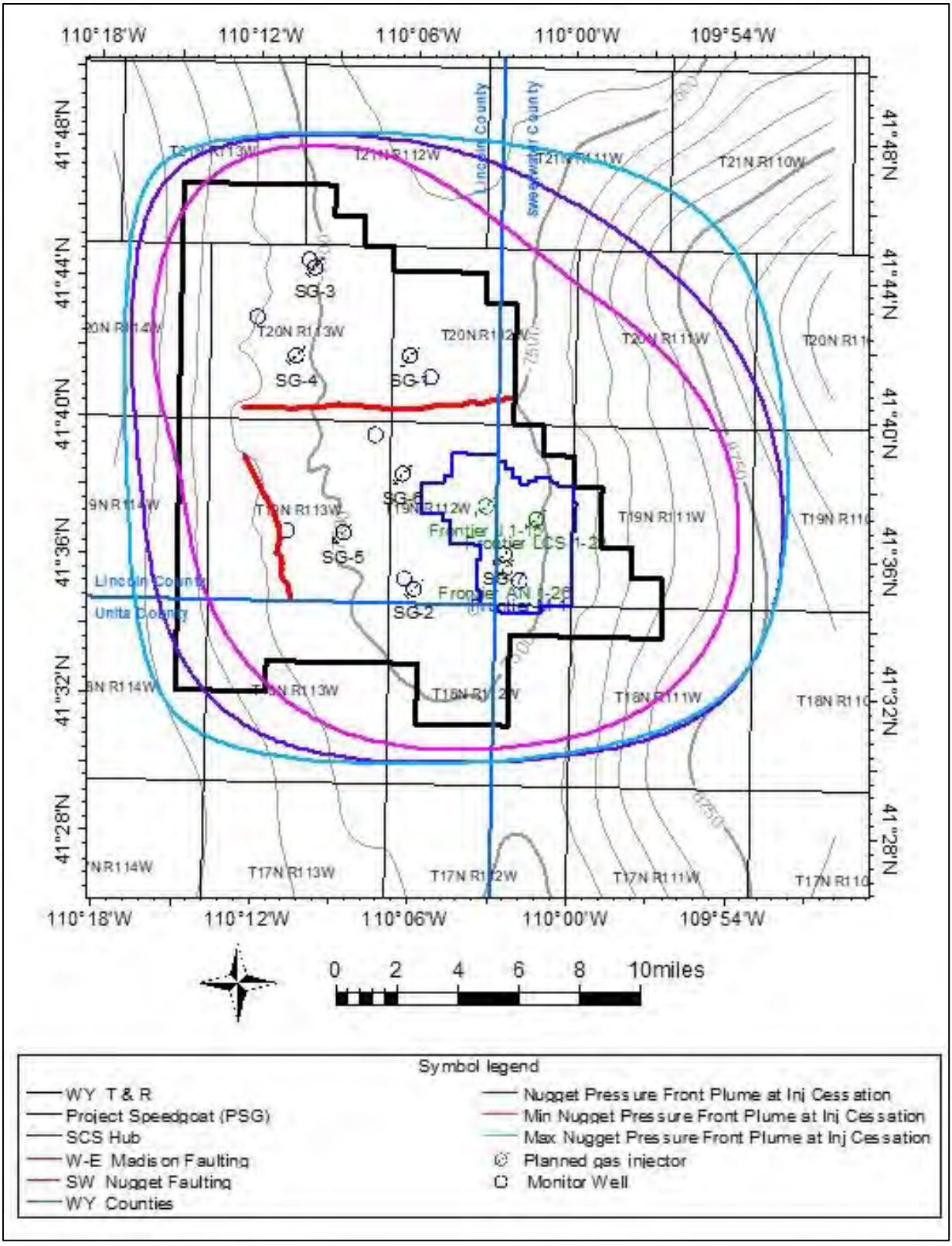


Figure A-2.44. *Nugget pressure plume results for porosity multiplier and permeability transform sensitivity. Nugget structural contour interval is 250 feet.*

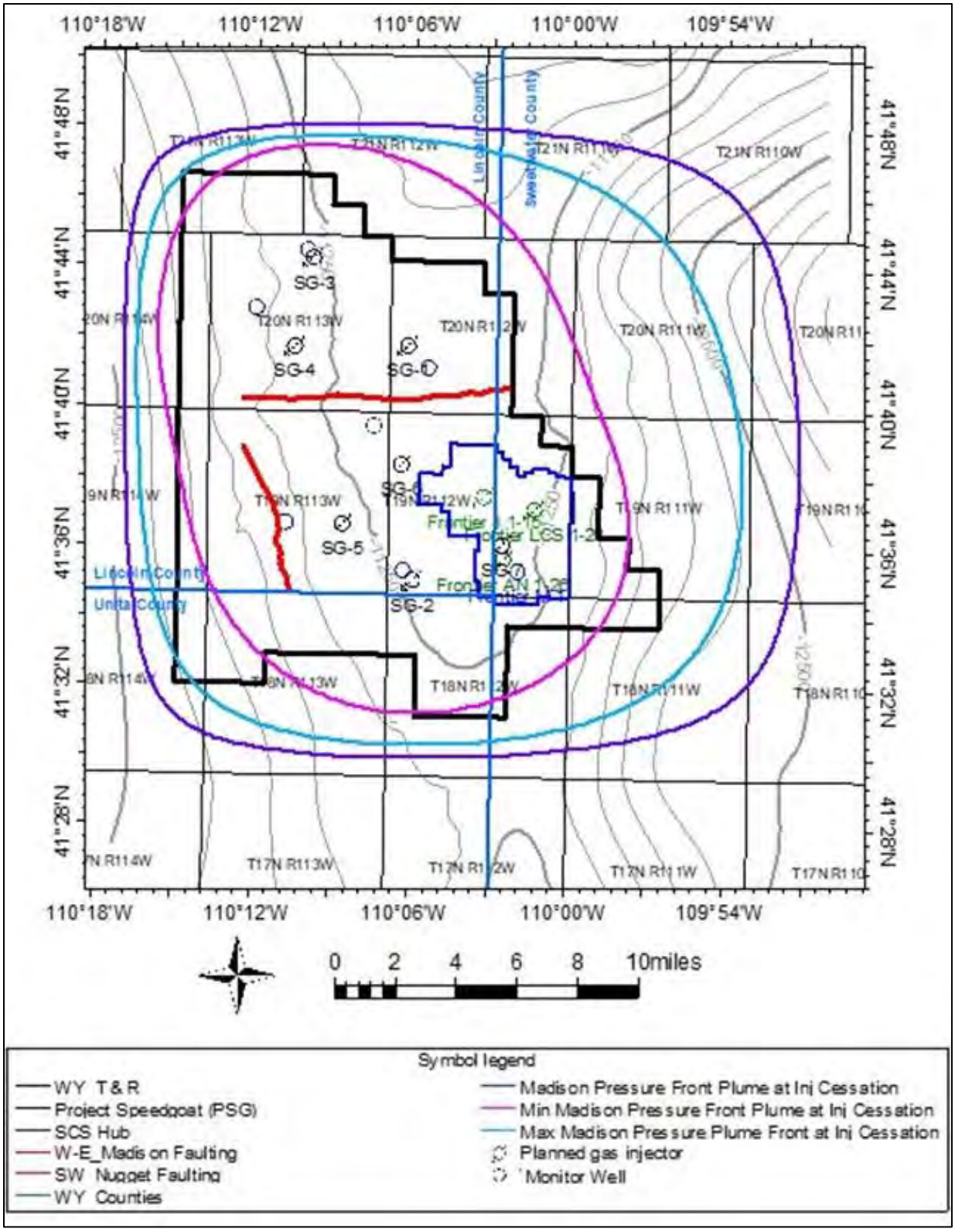


Figure A-2.45. *Madison pressure front and AoR results for porosity multiplier and permeability transform sensitivity. Madison structural interval is 250 feet.*

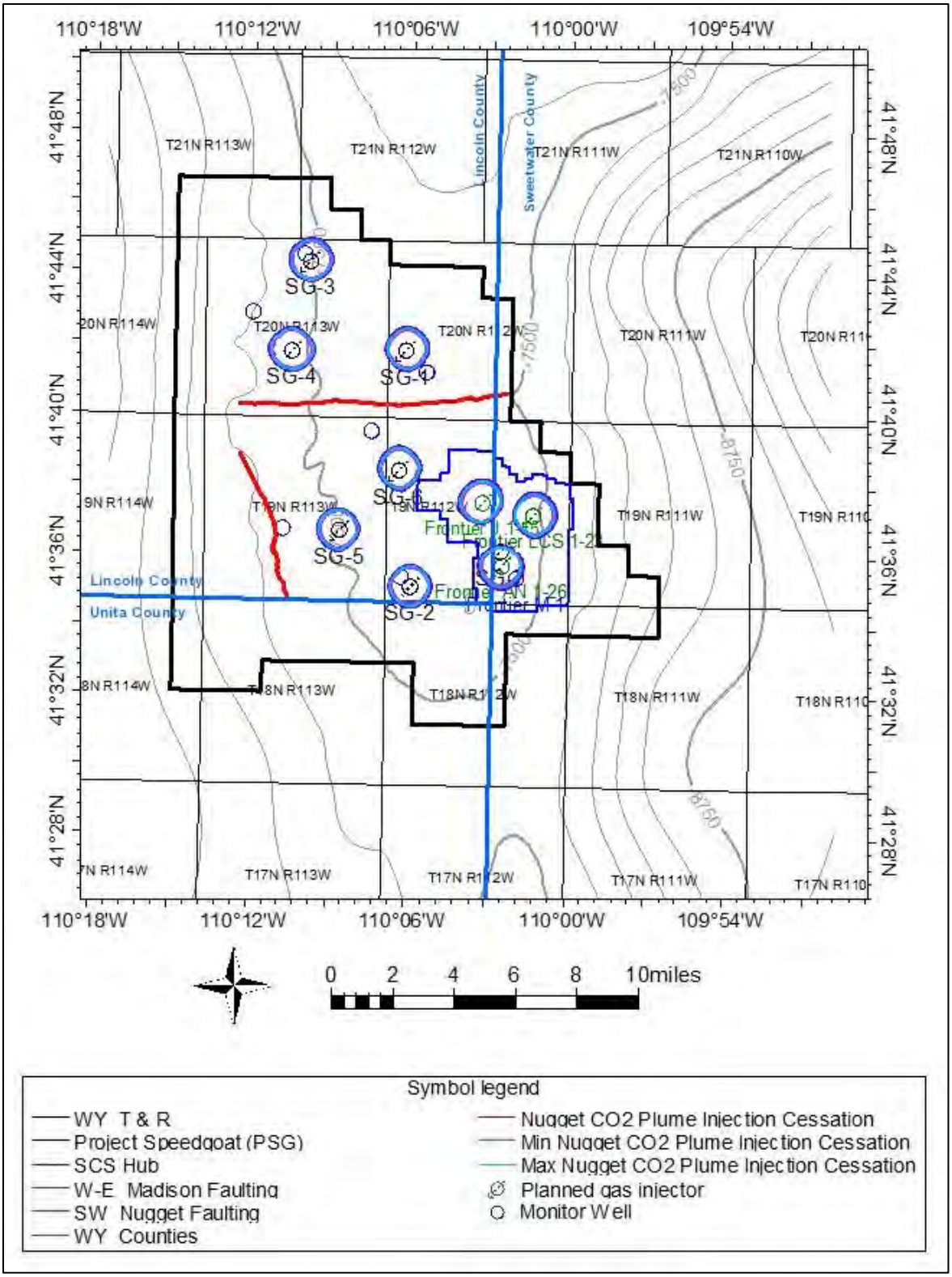


Figure A-2.46. *Nugget CO_2 plume results for kv/kh ratio sensitivity. Nugget structural contour interval is 250 feet.*

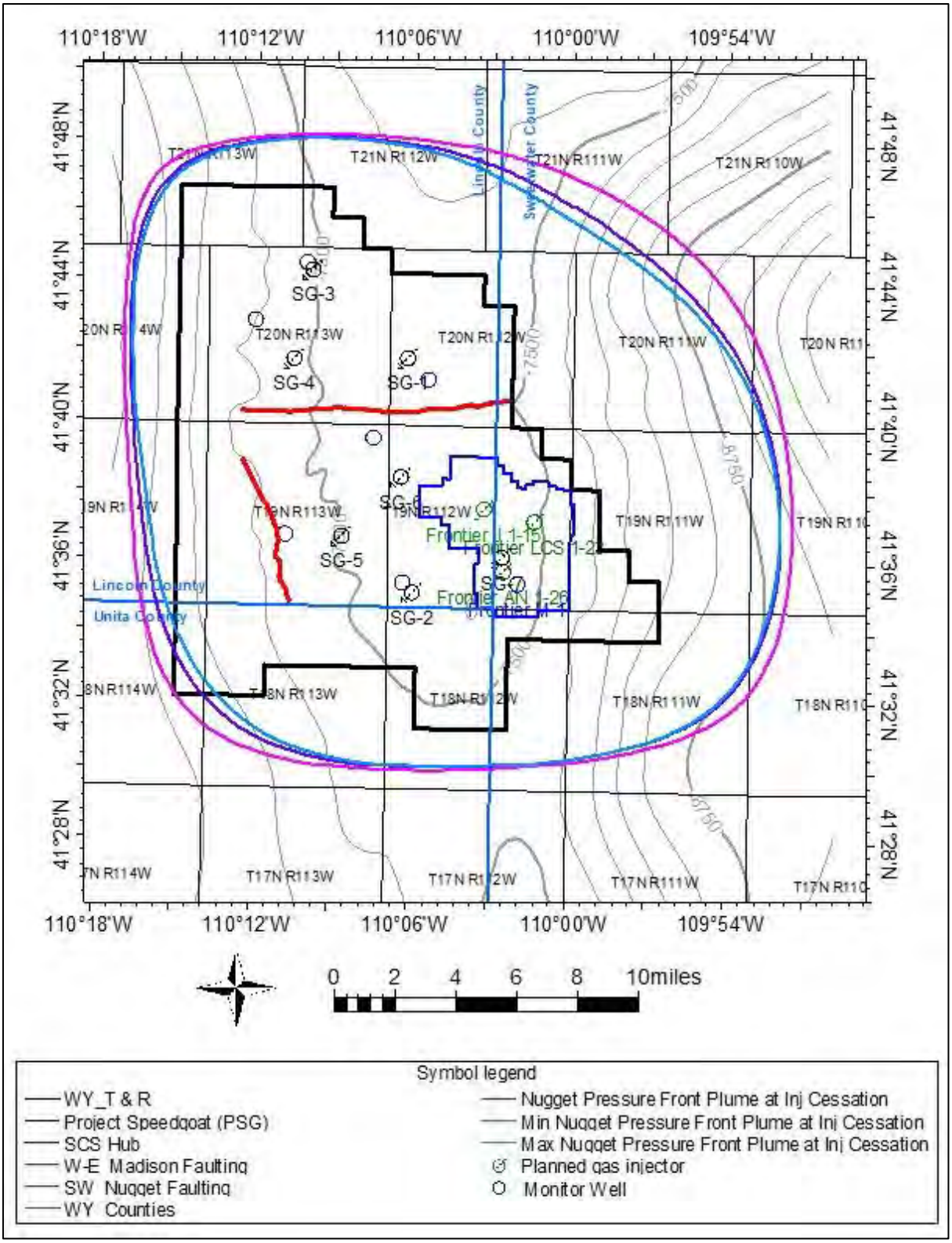


Figure A-2.47. *Nugget pressure front results for kv/kh ratio sensitivity. Nugget structural contour interval is 250 feet.*

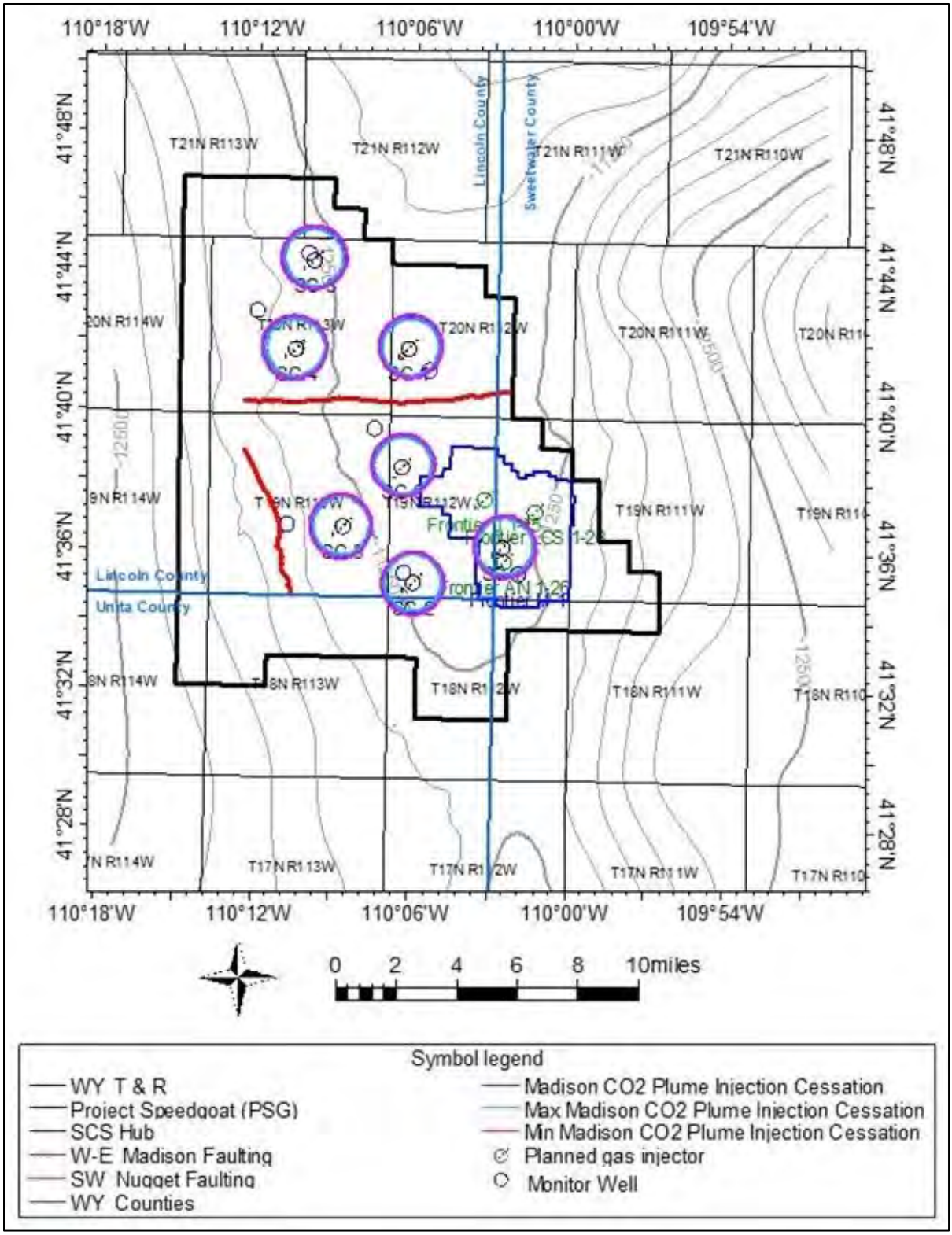


***Figure A-2.48**. Madison CO_2 plume results for kv/kh ratio sensitivity; Madison structural contour interval is 250 feet.*

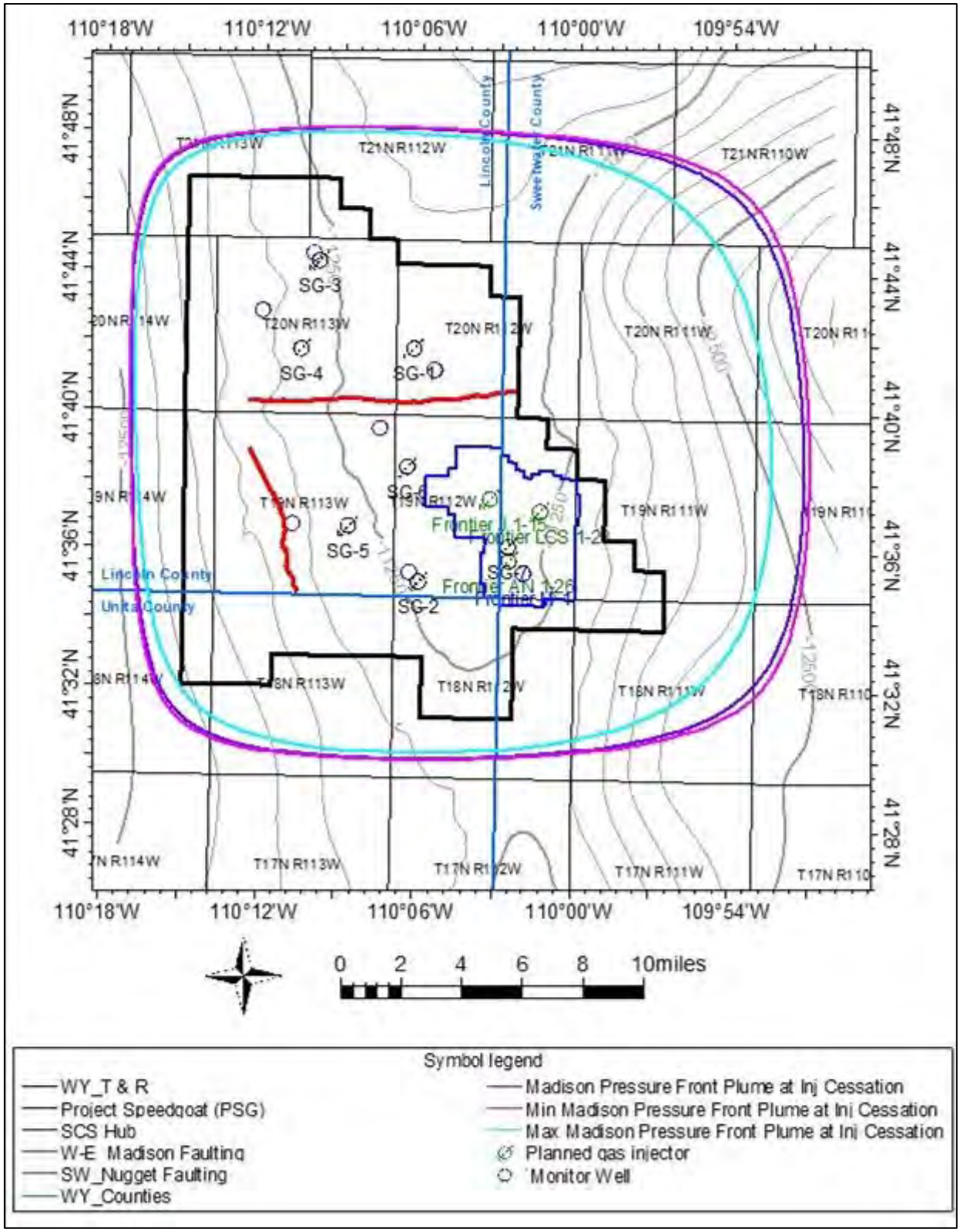


Figure A-2.49*. Madison pressure front and AoR results for kv/kh ratio sensitivity. Madison structural contour interval is 250 feet.*

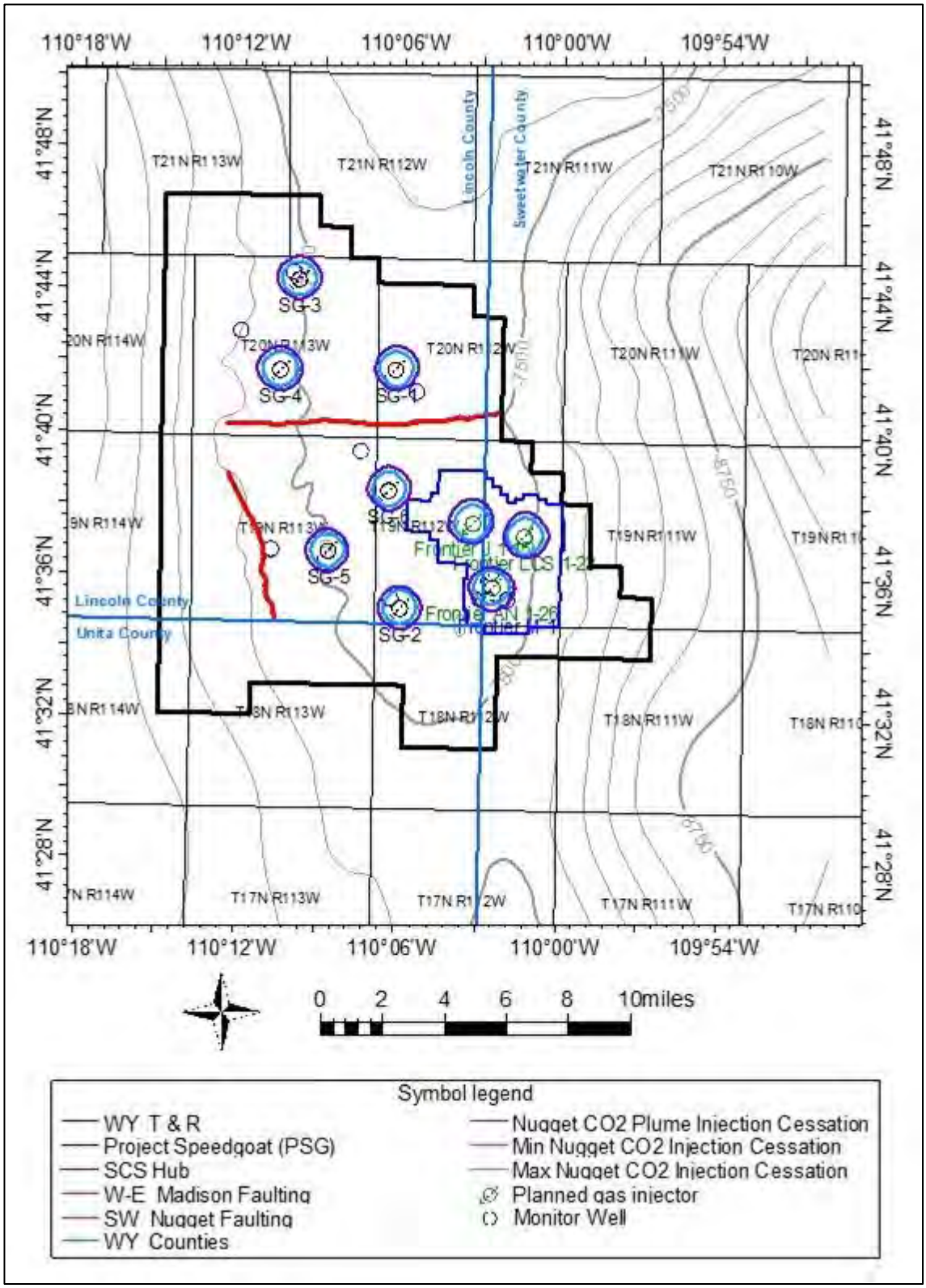


Figure A-2.50. *Nugget CO_2 plume results for imbibition critical gas saturation sensitivity. Nugget structural contour interval is 250 feet.*

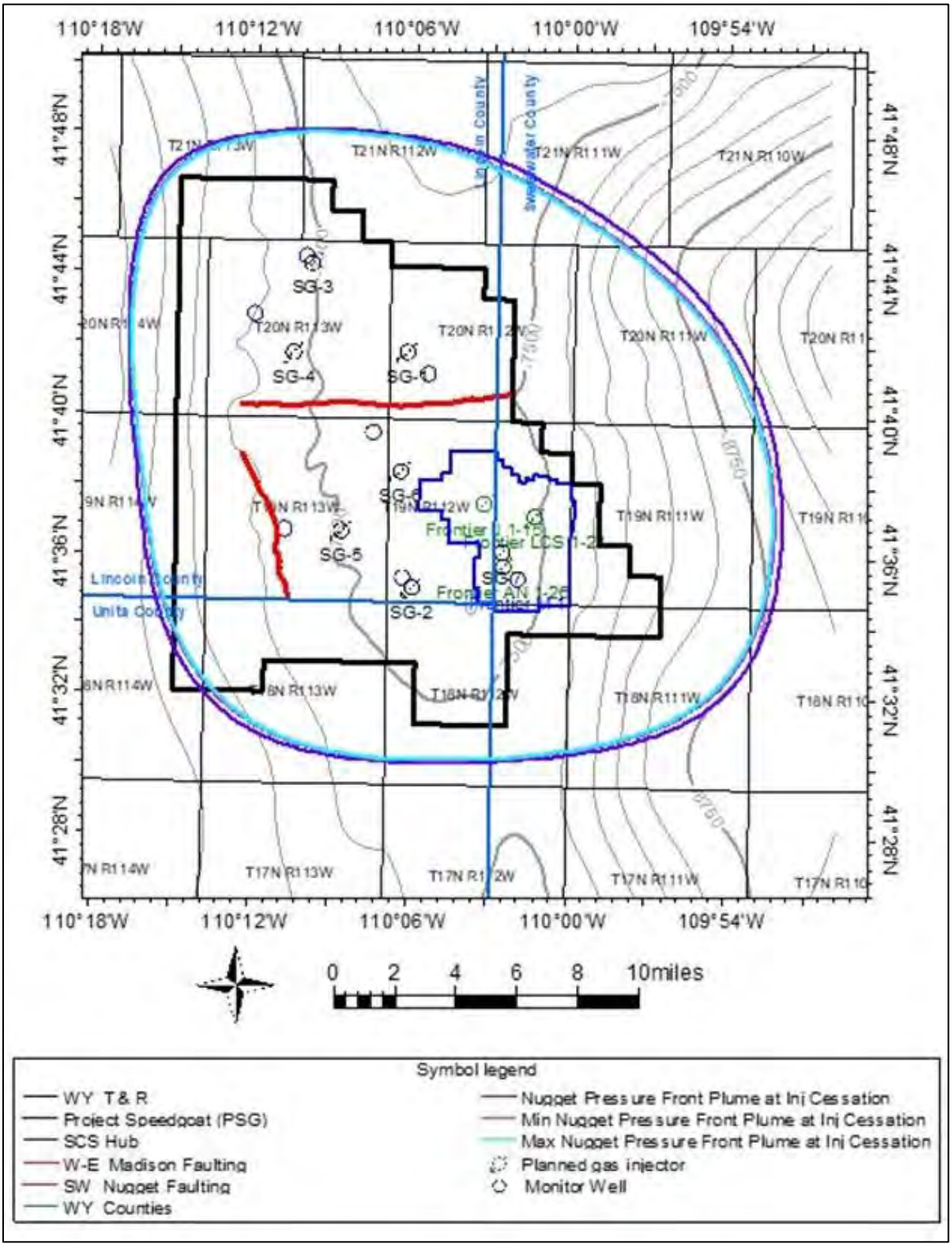


Figure A-2.51. *Nugget pressure front results for imbibition critical gas saturation sensitivity. Note: Nugget structural contour interval is 250 feet.*

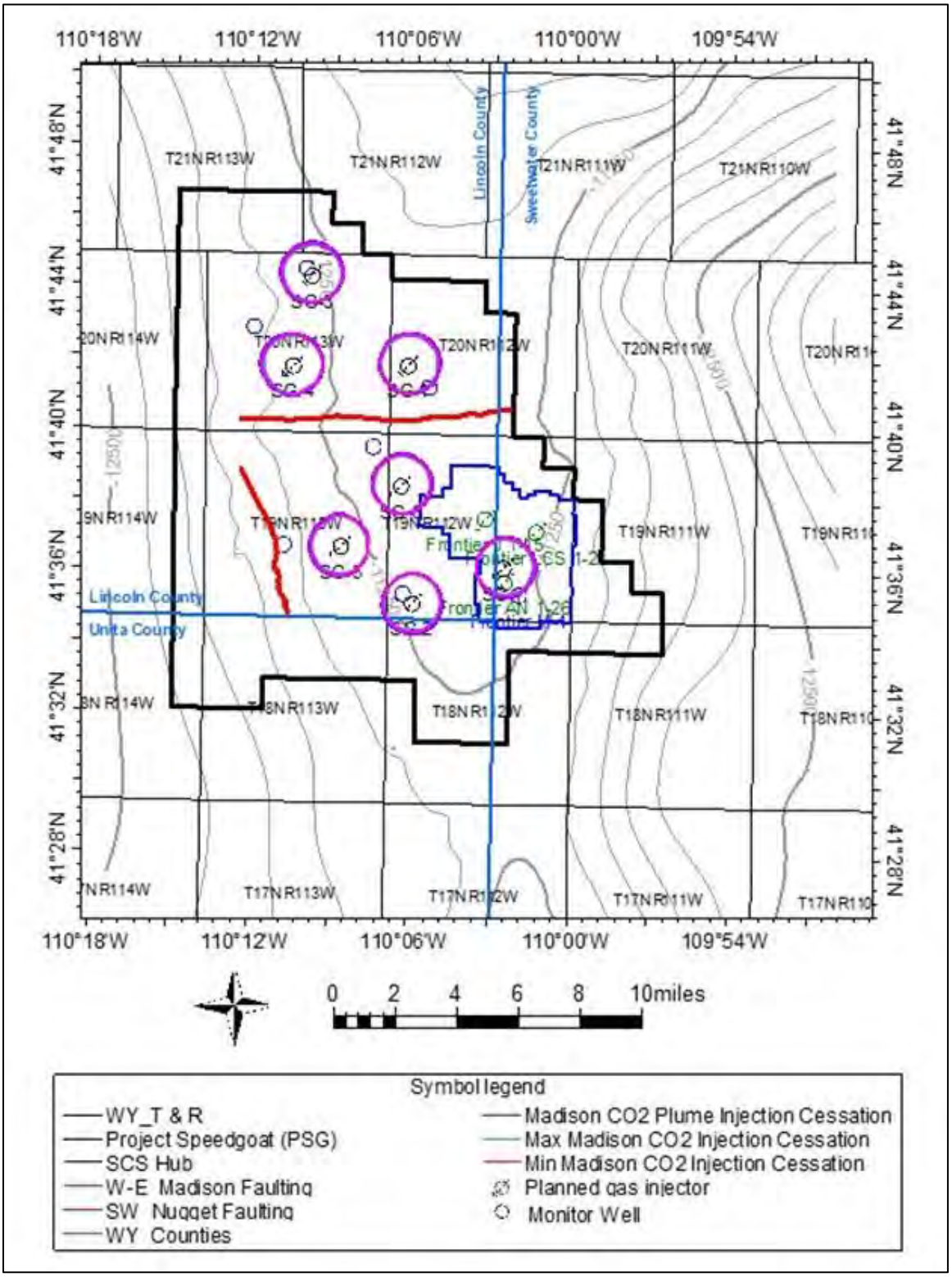


Figure A-2.52. *Madison CO_2 plume results for imbibition critical gas saturation sensitivity. Madison structural contour interval is 250 feet.*

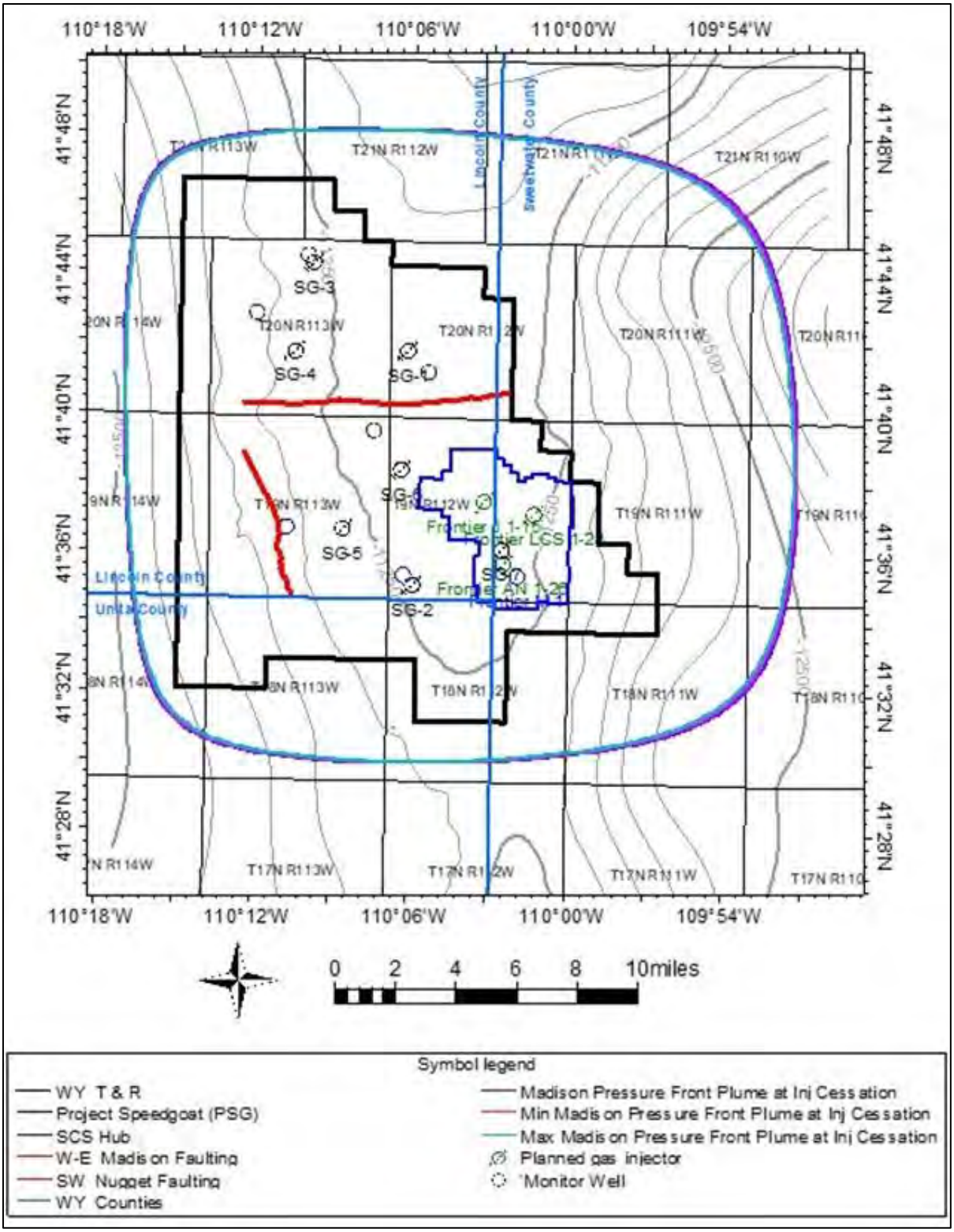


Figure A-2.53. *Madison pressure front and AoR results for imbibition critical gas saturation sensitivity. Madison structural contour interval is 250 feet.*

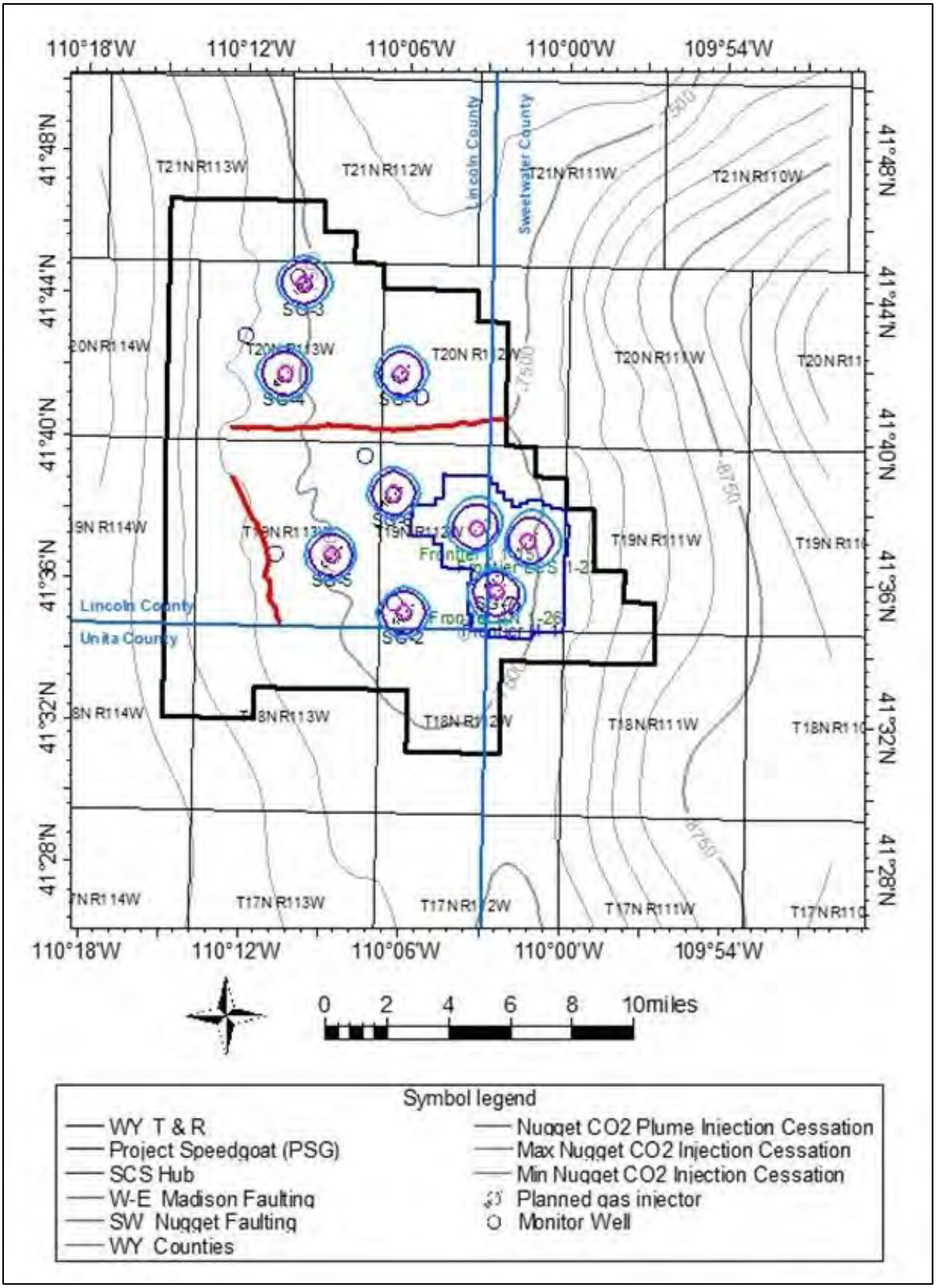


Figure A-2.54. *Nugget CO_2 plume results for Nugget maximum gas relative permeability sensitivity. Nugget structural contour interval is 250 feet.*

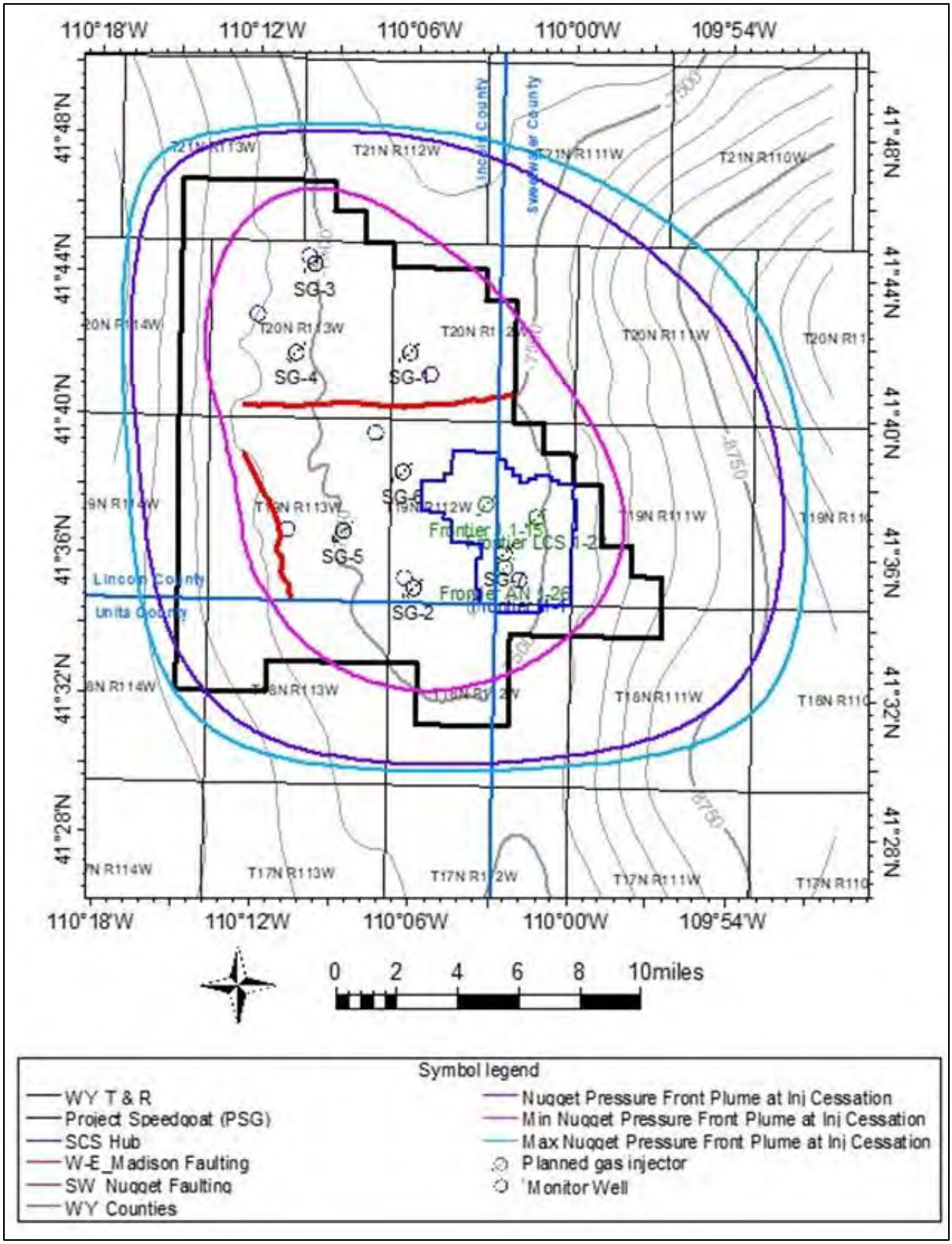


Figure A-2.55. *Nugget pressure front and AoR results for Nugget maximum gas relative permeability sensitivity. Nugget structural contour interval is 250 feet.*

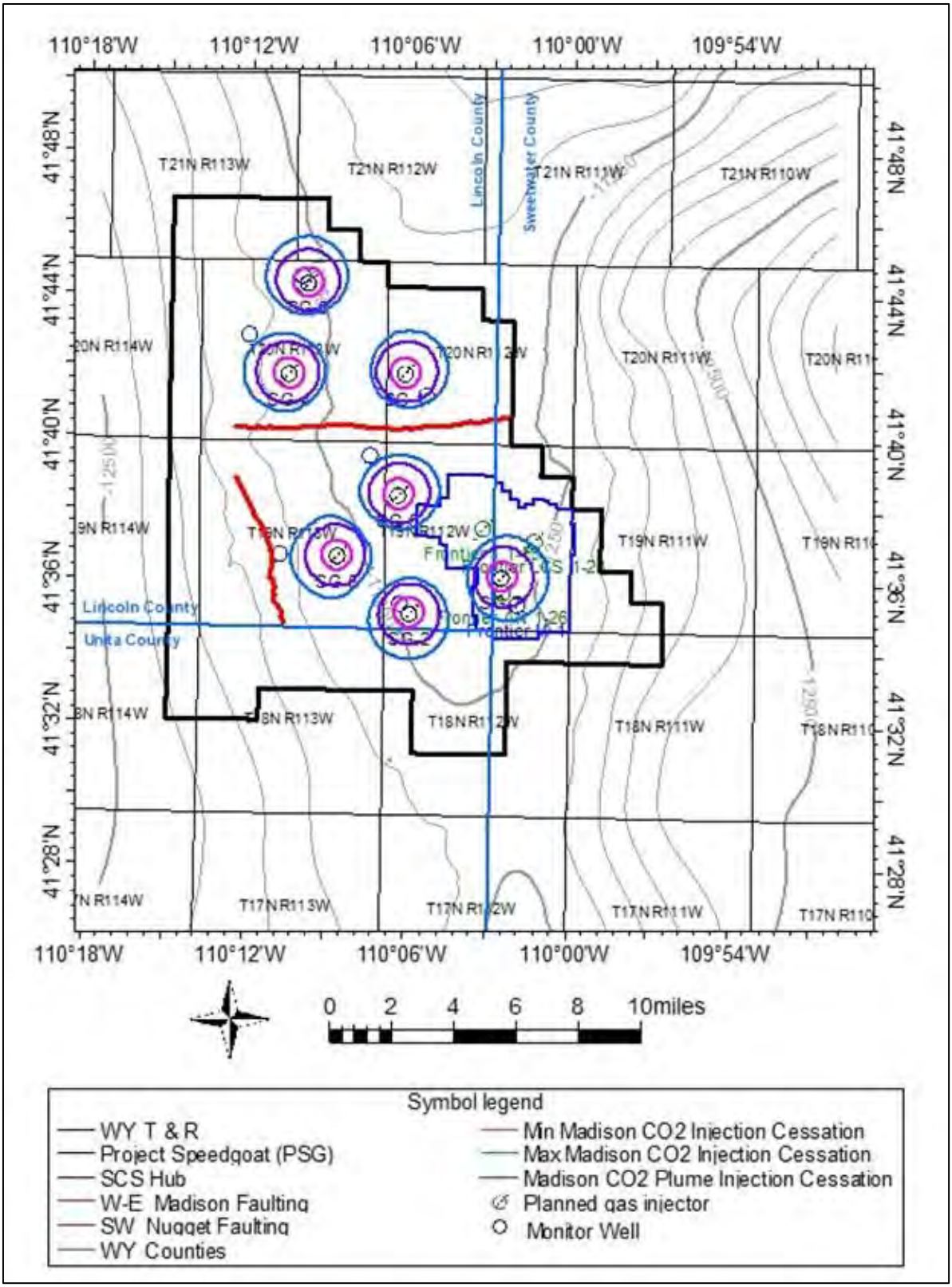


Figure A-2.56. *Madison CO_2 plume results for Madison maximum gas relative permeability sensitivity. Madison structural contour interval is 250 feet.*

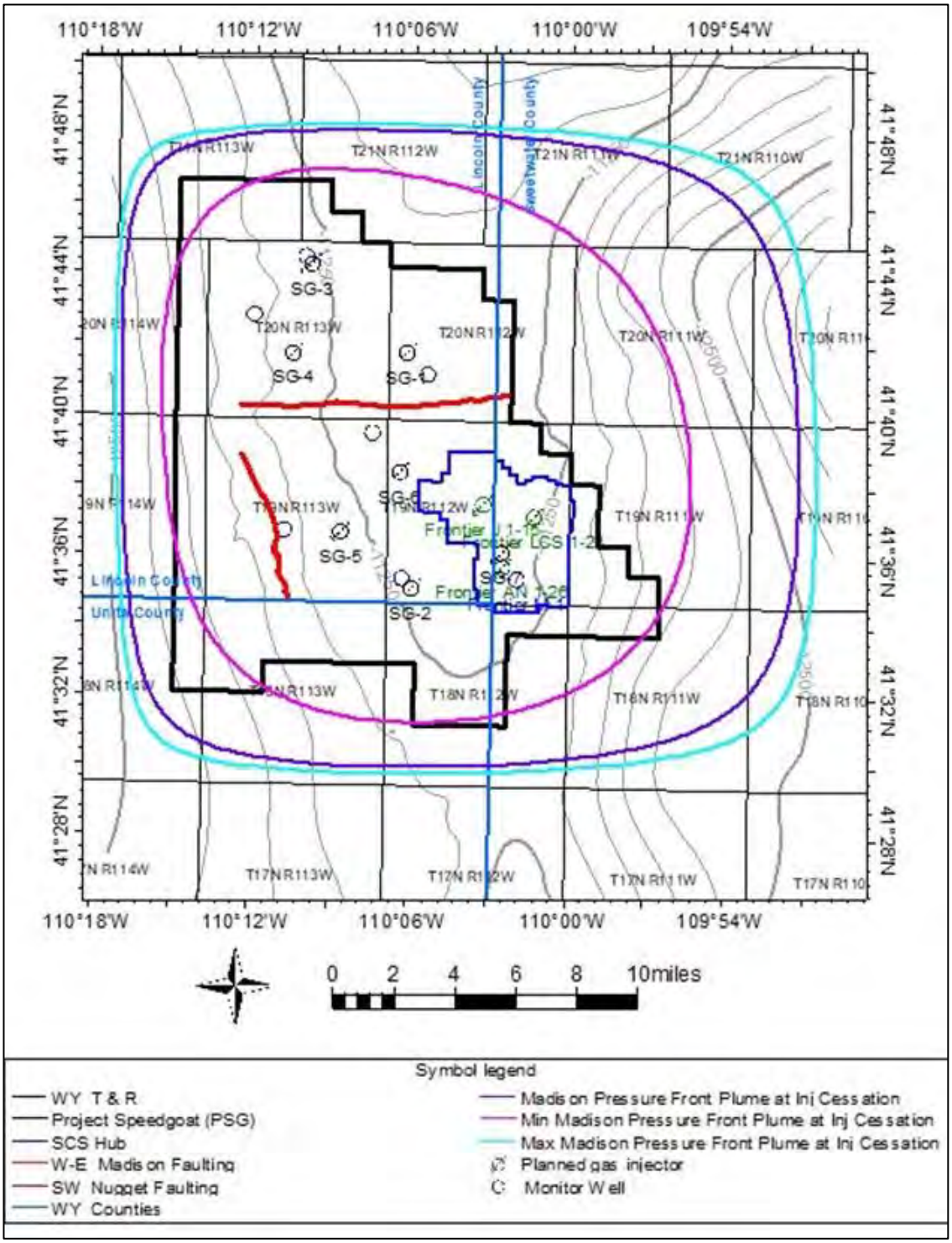


Figure A-2.57. *Madison pressure front and AoR results for Madison maximum gas relative permeability sensitivity. Madison structural contour interval is 250 feet.*

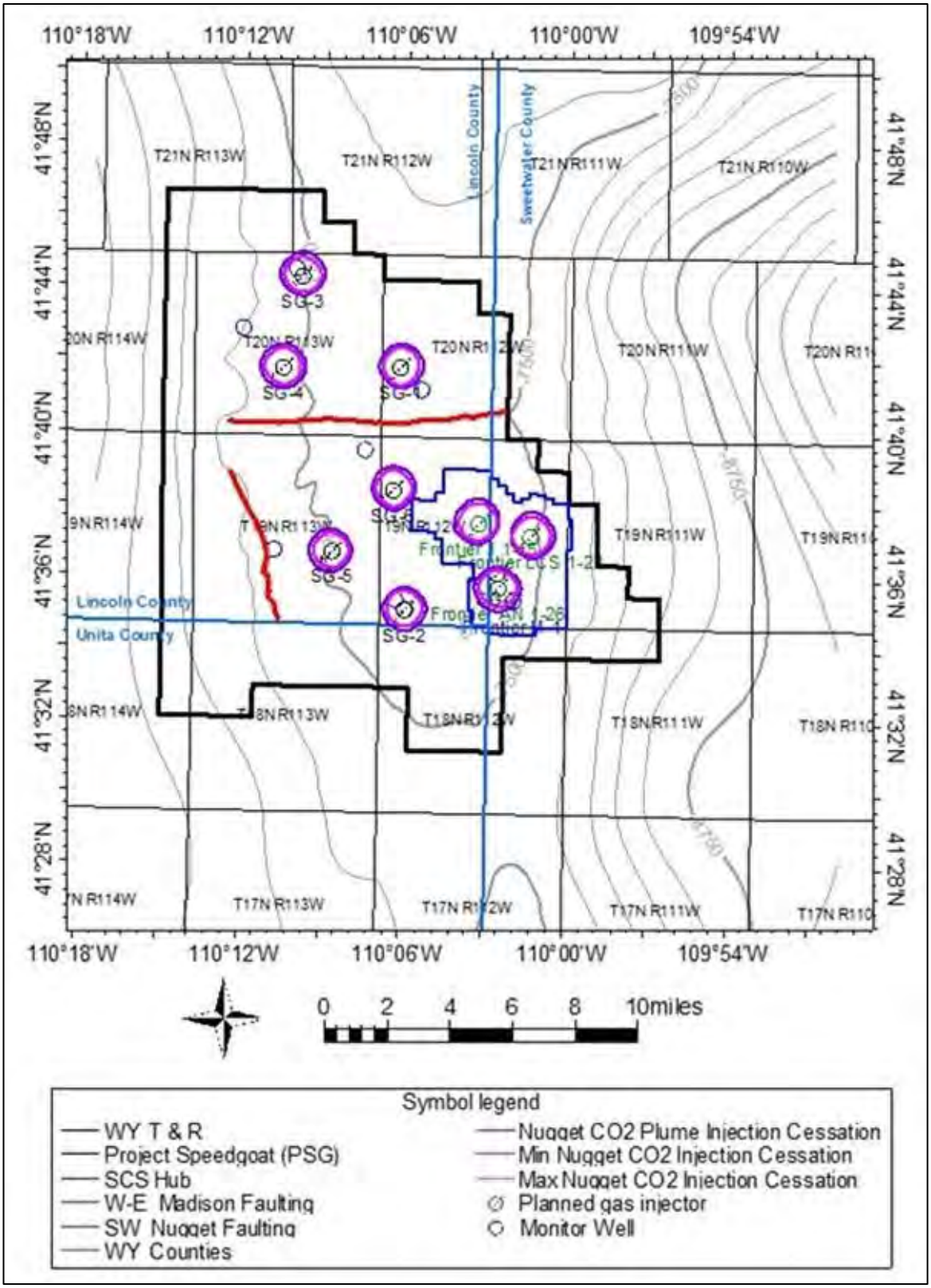


Figure A-2.58. *Nugget CO_2 plume results for fault transmissibility multiplier sensitivity. Nugget structural contour interval is 250 feet.*

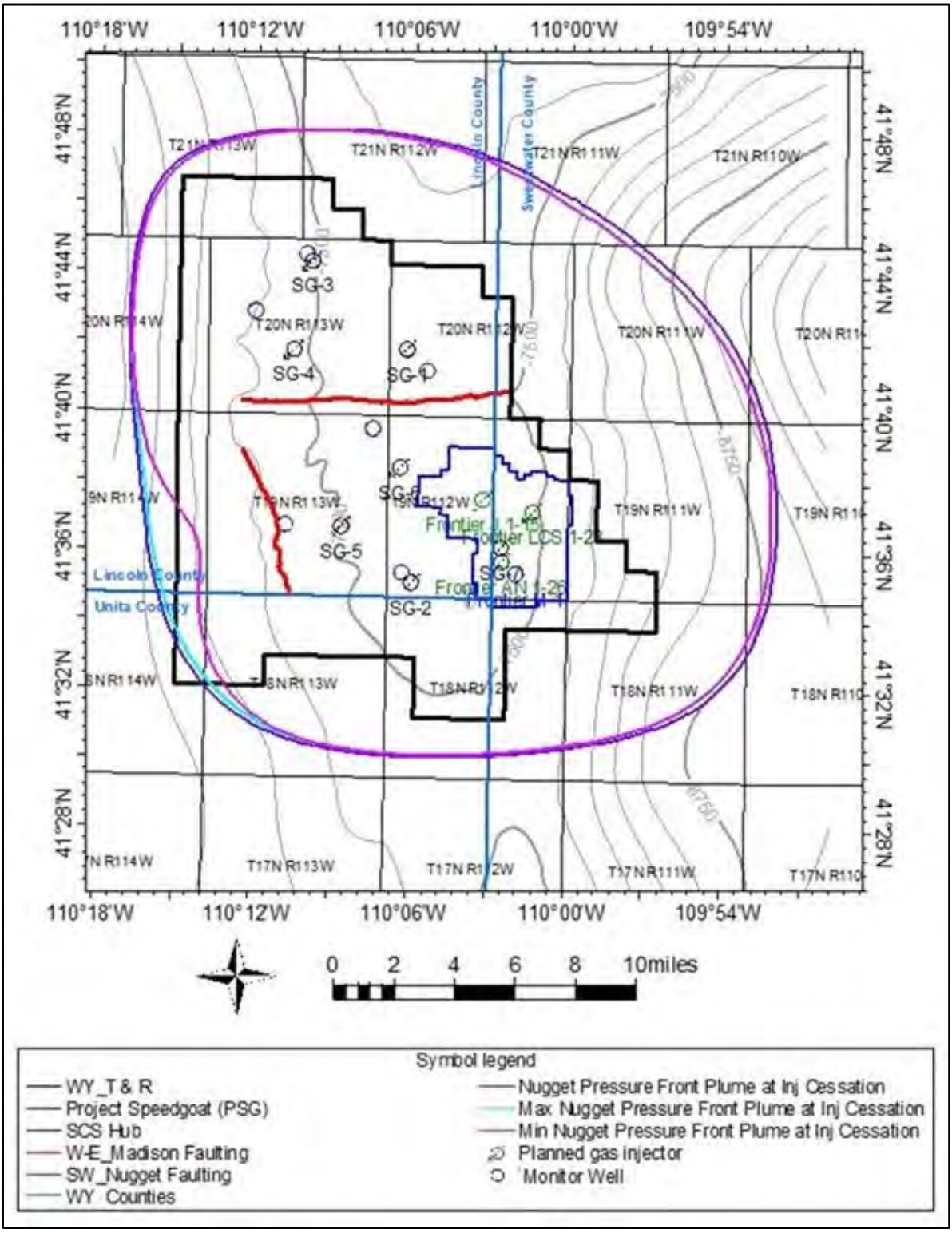


Figure A-2.59. *Nugget pressure front results for fault transmissibility multiplier sensitivity. Nugget structural contour interval is 250 feet.*

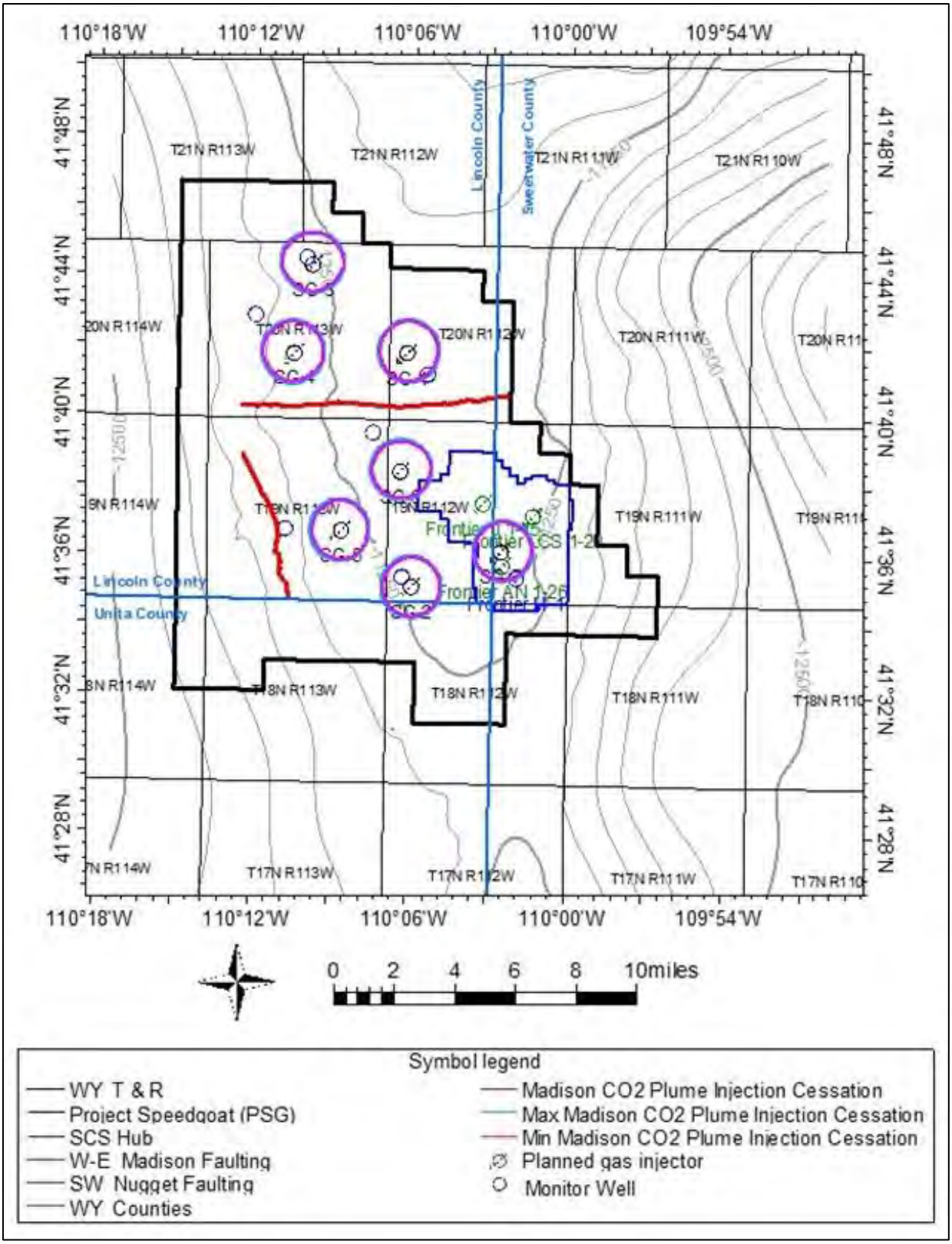


Figure A-2.60. *Madison CO_2 plume results for fault transmissibility multiplier sensitivity Madison structural contour interval is 250 feet.*

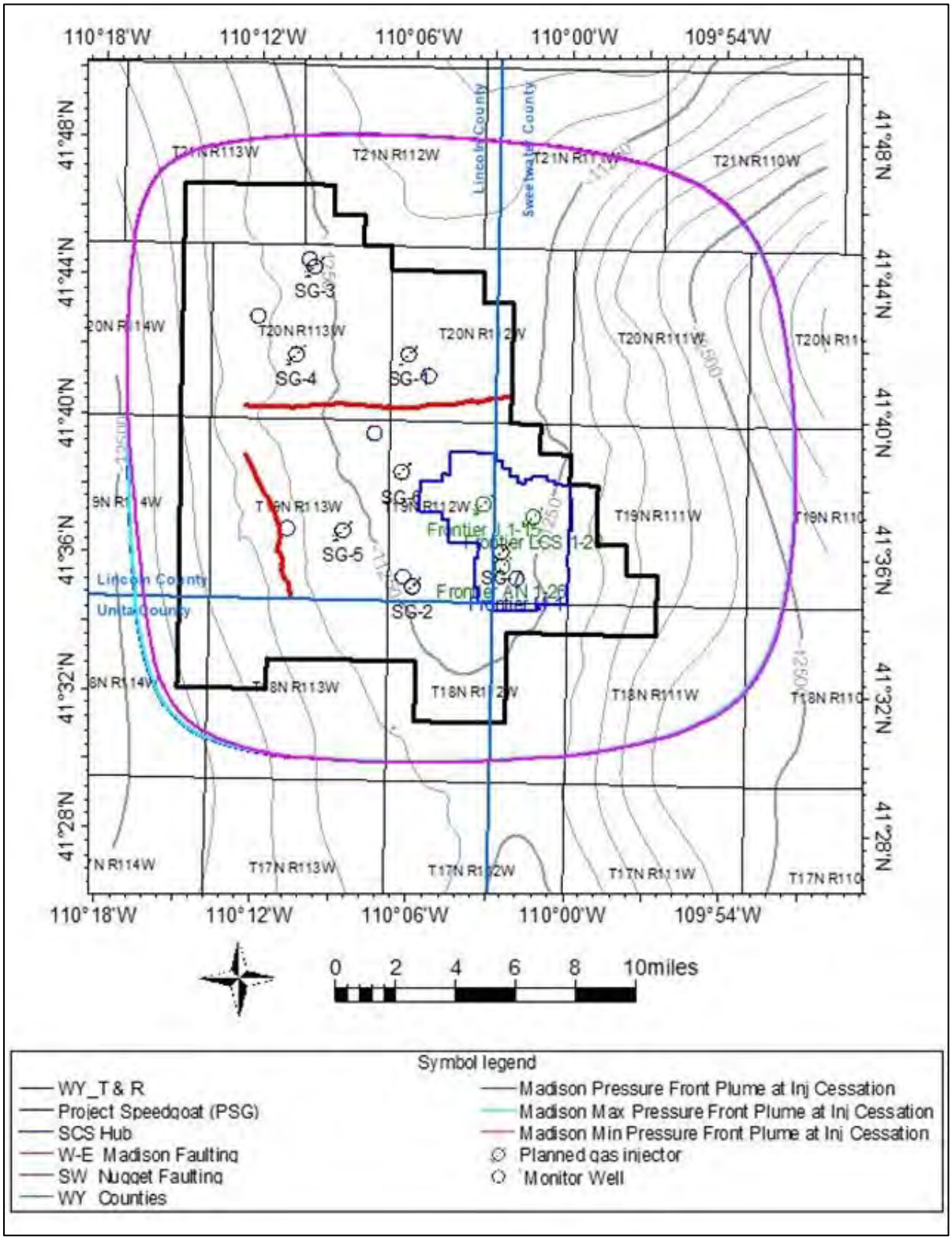


Figure A-2.61. *Madison pressure front and AoR results for fault transmissibility multiplier sensitivity. Note: Madison structural contour interval is 250 feet.*

STORAGE COMPLEX WELLBORES

WELL SCHEMATICS

BRUFF UNIT 1 (4902320045) WELL SCHEMATIC

LEASE & WELL NO. Bruff Unit No. 1
FIELD NAME Bruff Unit No. 1
LOCATION 660 FSL & 660 FWL, SWSW Sec 22 T19N R11W

SCHEMATIC REVISION 10/25/2023
COUNTY & STATE Lincoln, WY
API NO. 49-023-20045

K.B. ELEV. 6388.5
D.F. ELEV.
GROUND LEVEL 6368

CONDUCTOR CASING HOLE SIZE

SIZE WEIGHT DEPTH
GRADE

SURFACE CASING HOLE SIZE 17 1/2"

SIZE 13 3/8" WEIGHT 61.# DEPTH 2109'
GRADE K-55 SX. CMT. 2050 sx TOC @ surface
200 sx Top Job

INT CASING HOLE SIZE 12 1/4"

SIZE 9 5/8" WEIGHT 47-53.5# DEPTH 12448.73'
GRADE SOO-95 SX. CMT. 1860 sx TOC @ 9,600'

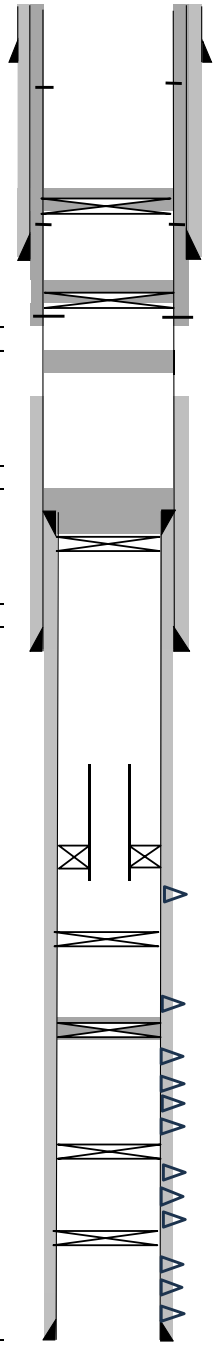
PRODUCTION LINER HOLE SIZE 8 1/2"

SIZE 7" WEIGHT 38# DEPTH 12,128 - 18,200'
GRADE SOO-90 SX. CMT. 1600 sx TOC @ 12,128

Formation Tops

Bridger	0
Green River	530
Wasatch	2005
Fort Union	4055
Mesaverde	7190
Hilliard	7710
Frontier	11278
Aspen	11500
Dakota	11900
Morrison	12348
Curtis	12852
Entrada	12958
Twin Creek	13097
Nugget	13742
Ankareh	14590
Thaynes	14990
Woodsid	15440
Phosphoria	16105
Weber	16512
Morgan	17040
Madison	

PBTD @ 17,390'
TD (4/2/1973) @ 18,208'



Pump 239 Sacks through Perfs @ 300'

Cement from 1,950 - 2,000'
Retainer @ 2,000', Perfs @ 2,240', Cement with 318 Sacks
Up 9 5/8" X 13 3/8" Annulus

Cement from 4,875 - 5,075'
Retainer @ 5,075', Perfs @ 5,125', Cement with 295 Sacks
Up 9 5/8" X 13 3/8" Annulus

90 Sacks Cement from 8,678 - 8,928'

9-5/8" TOC @ 9,600' (CBL)

98 Sacks Cement from 11,899 - 12,180'
7" TOC @ 12128' (CBL)
Baker Retrievable Bridge Plug @ 12,180'

Unable to ge below 12,208'

2 7/8" Tbg from 16,292 - 17,200'
Baker Model DB Packer @ 17,200'

17,295 - 17,345' (Morgan Perfs),
Reperfed 17,295 - 17,345' (5/16/73)
EZ Drill Squeeze Packer @ 17,390' (5/16/73)
Squeeze holes with 135 Sacks Total (5/16/73

17424 - 17498
Baker Model N Bridge Plug @ 17,544' with 35 Sacks Cement
17562 - 17590 (4/25/73)
17610 - 17622 (4/25/73)
17656 - 17674 (4/25/73)
17881 - 17906 (4/25/73)
Baker Model K Cement Retainer @ 17,863' (4/25/73)
17924 - 17928 (4/25/73)
17938 - 17950 (4/25/73)
17966 - 17970 (4/25/73)
Baker Model K Cement Retainer @ 17,990' (4/25/73)
18004 - 18008
18022 - 18026
18114 - 18128

WELL HISTORY:

7/28/1972 Spud Well
4/2/1973 TD Well
4/25/1973 Perforated
5/12/1973 Complete Well, 3 1/2" T
5/12/1973 First Production
10/10 - 10/17/1994 Well P&A'd
11/18/1994 P&A Report

BRUFF UNIT 2 (4902320106) WELL SCHEMATIC

LEASE & WELL NO. Bruff Unit No. 2
FIELD NAME Bruff
LOCATION 750' FSL 850' FWL SWSW Section 16 T19N R112W

SCHEMATIC REVISION I 11/2/2023
COUNTY & STATE Lincoln, WY
API NO. 49-023-20106

WELL HISTORY:

Spud Date	2/28/1975
Date TD	8/28/1975
Rig Release	9/21/1975
Date Completed	11/5/1975

K.B. ELEV. 6348.85
D.F. ELEV.
GROUND LEVEL 6326

CONDUCTOR CASING HOLE SIZE
SIZE WEIGHT DEPTH
GRADE

SURFACE CASING HOLE SIZE 17 1/2"
SIZE 13 3/8" WEIGHT 61.# DEPTH 2,107.00
GRADE K-55 SX. CMT. 2000 sx TOC @ Surface

INT CASING HOLE SIZE 12 1/4"
SIZE 9 5/8" WEIGHT 47-53.5 DEPTH 12,624.00
GRADE SX. CMT. 1556 sx TOC @ 9,480

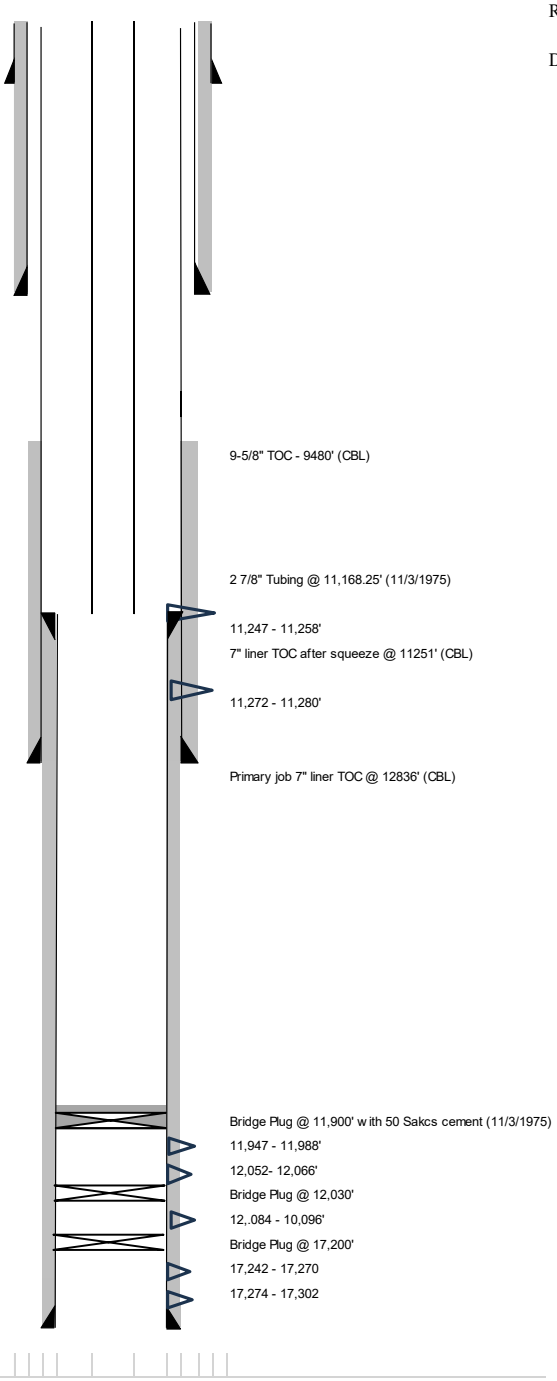
PRODUCTION LINER HOLE SIZE 8 1/2"
SIZE 7" WEIGHT DEPTH 11,251 - 17,411'
GRADE SOO-90 SX. CMT. 1950 sx TOC @ 11,251
SOO-95
AR-95

Formation Tops

	0
Tertiary/Cretaceous	7008
Hilliard	7530
2nd Frontier	11162
Mowry	11396
Dakota	11811
Morrison	12247
Preuss	12868
Twin Creek	13011
Nugget	13682
Ankareh	14574
Thaynes	14934
Woodside	15392
Phosphoria	16110
Weber	16447
Morgan	16938

This depth is weird?

PBTD @ 11708'
TD (4/2/1973) @ 17425'



BRUFF UNIT MF01 (4903705573) WELL SCHEMATIC

LEASE & WELL NO. Bruff Unit MF01
FIELD NAME Wildcat
LOCATION 1985 FSL & 464 FEL Section 22 T19N R112W

SCHEMATIC REVISION I 11/3/2023
COUNTY & STATE Sweetwater, WY
API NO. 49-037-05573

K.B. ELEV. 6388.5
D.F. ELEV.
GROUND LEVEL 6368

CONDUCTOR CASING HOLE SIZE
SIZE WEIGHT DEPTH
GRADE

SURFACE CASING HOLE SIZE
SIZE 16 " WEIGHT 65.# DEPTH 359'
GRADE K-40 SX. CMT. 250 sx TOC @

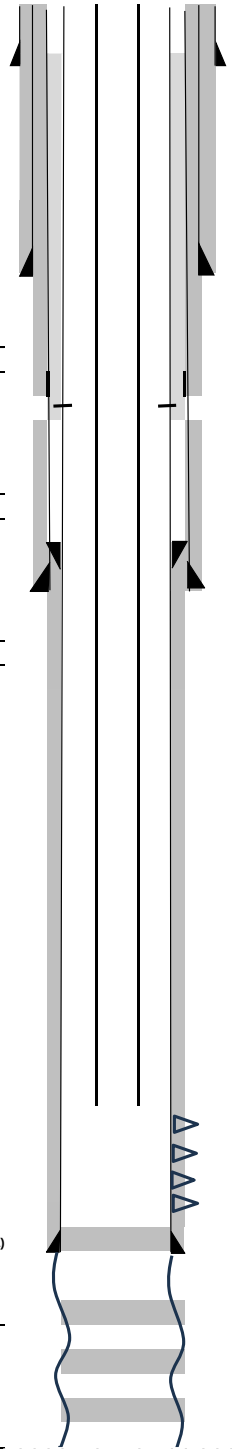
INT CASING HOLE SIZE
SIZE 10 3/4" WEIGHT 40.5 - 45.5 DEPTH 4003'
GRADE J-55 SX. CMT. 700 sx TOC @
DV Tool @ 2,084' 550 sx

PRODUCTION LINER HOLE SIZE
SIZE 5 1/2" WEIGHT 17 & 20 DEPTH 3,095 - 11,605'
GRADE SX. CMT. 500 sx TOC @

Formation Tops

WELL HISTORY:

Spud Well	5/25/1961
Rig Release	9/7/1961
Perforated	10/26/1961
HIC Repair	4/12/1994
RE-Perf	5/5/1994
Clean Out to 11,505'	5/5/1994



DV Tool @ 2,084'
Squeeze Hole in 5 1/2" @ 2153', Cemented with 425 Sacks
No returns to surface, good squeeze

5 1/2" Top @ +/- 3,095'

10 3/4" Casing 4,003' (6/5/61)

Tubing Landed @ 11,402' (5/5/94)
11,416 - 11,426' (10/26/61) Re-perf 5/5/94
11,428 - 11,433' (10/26/61) Re-perf 5/5/94
11,436 - 11,445' (10/26/61) Re-perf 5/5/94
11,447 - 11,456' (10/26/61) Re-perf 5/5/94

Casing @ 11,605' (10/31/61)

PBTD @ 12,080'
Plug 2@ 12,780 -12,880' (10/30/61)
Plug 2@ 12,780 -12,880' (10/30/61)
Plug 1 @ 13,780 - 13,880' (10/30/61)

TD (4/2/1973) @ 14,000'

WILSON RANCH UNIT 2 (4902320054) WELL SCHEMATIC

LEASE & WELL NO. Wilson Ranch Unit 2
SCHEMATIC REVISION 11/7/2023
FIELD NAME Wildcat
COUNTY & STATE Lincoln, WY
LOCATION 1975 FEL & 1969 FSL, NWSE Section 1 T19N R313W
API NO. 49-023-20054

WELL HISTORY:

Spud Well 9/10/1973
TD Date 6/23/1975

K.B. ELEV. 6494
D.F. ELEV.
GROUND LEVEL 6462

CONDUCTOR CASING HOLE SIZE

SIZE WEIGHT DEPTH
GRADE

SURFACE CASING HOLE SIZE 17 1/2"

SIZE 13 3/8" WEIGHT 48.# DEPTH 2168'
GRADE SX. CMT. 2500 sx TOC @

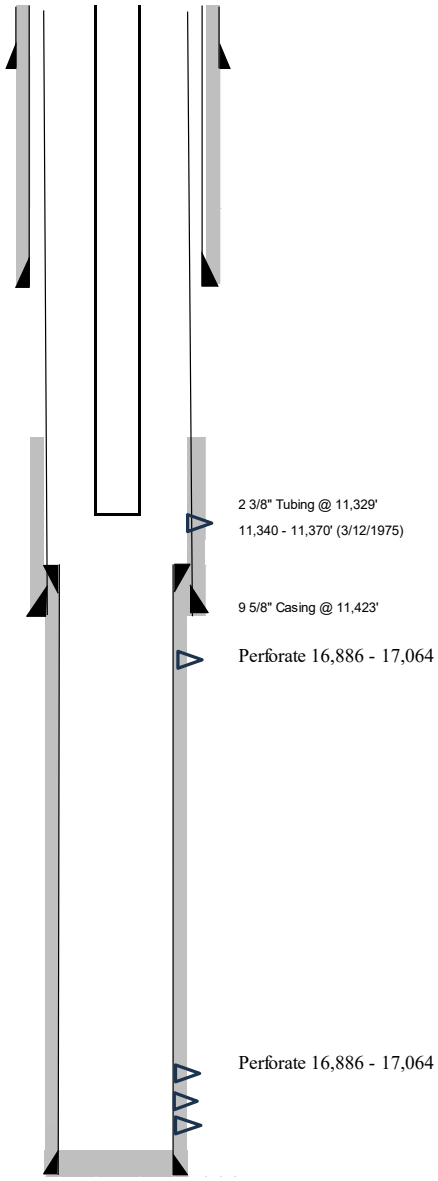
INT CASING HOLE SIZE 12 1/4"

SIZE 9 5/8" WEIGHT 42.3# DEPTH 11423'
GRADE SX. CMT. 1500 sx TOC @

PRODUCTION LINER HOLE SIZE 8 1/2"

SIZE 7" WEIGHT 20.# DEPTH 17748'
GRADE SX. CMT. 2050 sx TOC @

Formation Tops



PBTD @ 11445'

TD (6/23/1975) @ 17748'

STORAGE COMPLEX WELLBORES

WELL REPORTS

Form 9-330
(Rev. 5-63)

Confidential 1-UW

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

SUBMIT IN DUPLICATE* (See other instructions on reverse side)

Form approved.
Budget Bureau No. 42-R355.5.

POSTED

WELL COMPLETION OR RECOMPLETION REPORT AND LOG*

5. LEASE DESIGNATION AND SERIAL NO.: W-05929-A

6. IF INDIAN, ALLOTTEE OR TRIBE NAME: -

1a. TYPE OF WELL: OIL WELL ☐ GAS WELL ☒ DRY ☐ Other

b. TYPE OF COMPLETION: NEW WELL ☒ WORK OVER ☐ DEEP-EN ☐ PLUG BACK ☐ DIFF. RESVR. ☐ Other

7. UNIT AGREEMENT NAME: Bruff Unit

8. FARM OR LEASE NAME: Unit Well

2. NAME OF OPERATOR: Mountain Fuel Supply Company

9. WELL NO.: 1

3. ADDRESS OF OPERATOR: P. O. Box 1129, Rock Springs, Wyoming 82901

10. FIELD AND POOL, OR WILDCAT: Wildcat

4. LOCATION OF WELL (*Report location clearly and in accordance with any State requirements*)*
At surface: 660' FSL, 660' FWL SW SW
At top prod. interval reported below
At total depth

11. SEC., T., R., M., OR BLOCK AND SURVEY OR AREA: SW SW 22-19N-112W., 6th PM

14. PERMIT NO.: 43-20045 | DATE ISSUED: 7-18-72

12. COUNTY OR PARISH: Lincoln | 13. STATE: Wyoming

15. DATE SPUDDED	16. DATE T.D. REACHED	17. DATE COMPL. (*Ready to prod.*)	18. ELEVATIONS (DF, RKB, RT, GR, ETC.)*	19. ELEV. CASINGHEAD
7-28-72	4-2-73	5-12-73	KB 6388.50' GR 6368'	-

20. TOTAL DEPTH, MD & TVD	21. PLUG, BACK T.D., MD & TVD	22. IF MULTIPLE COMPL., HOW MANY*	23. INTERVALS DRILLED BY	ROTARY TOOLS	CABLE TOOLS
18,208'	17,390'		→	0-18,208'	

24. PRODUCING INTERVAL(S), OF THIS COMPLETION—TOP, BOTTOM, NAME (MD AND TVD)*: 17,295-17,345' Morgan

25. WAS DIRECTIONAL SURVEY MADE: No

26. TYPE ELECTRIC AND OTHER LOGS RUN: Sidewall Neutron Porosity, Comp. Formation Density, Comp. Neutron-Formation Density, DIL, BHC Sonic-Gamma Ray

27. WAS WELL CORED: Yes

28. CASING RECORD (*Report all strings set in well*)

CASING SIZE	WEIGHT, LB./FT.	DEPTH SET (MD)	HOLE SIZE	CEMENTING RECORD	AMOUNT PULLED
13-3/8	61	2,109.00	17-1/2	2250	0
9-5/8	47 & 53.5	12,448.73	12-1/4	1860	0
			8-1/2		

29. LINER RECORD

SIZE	TOP (MD)	BOTTOM (MD)	SACKS CEMENT*	SCREEN (MD)
7	12,128.80	18,200.16	1600	

30. TUBING RECORD

SIZE	DEPTH SET (MD)	PACKER SET (MD)
3-1/2	17,242.10	

31. PERFORATION RECORD (*Interval, size and number*)
18,128-18,114', 18,026-18,022', 18,008-18,004', 17,970-17,966', 17,950-17,938', 17,928-17,924', 17,906-17,881', 17,674-17,656', 17,622-17,610', 17,590-17,562', all 1 jumbo jet shot per foot (over)

32. ACID, SHOT, FRACTURE, CEMENT SQUEEZE, ETC.

DEPTH INTERVAL (MD)	AMOUNT AND KIND OF MATERIAL USED

33.* PRODUCTION

DATE FIRST PRODUCTION	PRODUCTION METHOD (*Flowing, gas lift, pumping—size and type of pump*)	WELL STATUS (*Producing or shut-in*)
5-12-73	Flowing	Shut-in

DATE OF TEST	HOURS TESTED	CHOKE SIZE	PROD'N. FOR TEST PERIOD →	OIL—BBL.	GAS—MCF.	WATER—BBL.	GAS-OIL RATIO
5/11-12/73	16-1/2	1"					3831

FLOW. TUBING PRESS.	CASING PRESSURE	CALCULATED 24-HOUR RATE →	OIL—BBL.	GAS—MCF.	WATER—BBL.	OIL GRAVITY-API (CORR.)
280	-		360	1379	0	66

34. DISPOSITION OF GAS (*Sold, used for fuel, vented, etc.*): Vented while testing

TEST WITNESSED BY:

35. LIST OF ATTACHMENTS: Logs as above, Well Completion and Well Lithology to be sent at a later date.

36. I hereby certify that the foregoing and attached information is complete and correct as determined from all available records

SIGNED B W Croft TITLE Vice President, Gas Supply Operations DATE May 30, 1973

*(See Instructions and Spaces for Additional Data on Reverse Side)

INSTRUCTIONS

General: This form is designed for submitting a complete and correct well completion report and log on all types of lands and leases to either a Federal agency or a State agency, or both, pursuant to applicable Federal and/or State laws and regulations. Any necessary special instructions concerning the use of this form and the number of copies to be submitted, particularly with regard to local, area, or regional procedures and practices, either are shown below or will be issued by, or may be obtained from, the local Federal and/or State office. See instructions on items 22 and 24, and 33, below regarding separate reports for separate completions.

If not filed prior to the time this summary record is submitted, copies of all currently available logs (drillers, geologists, sample and core analysis, all types electric, etc.), formation and pressure tests, and directional surveys, should be attached hereto, to the extent required by applicable Federal and/or State laws and regulations. All attachments should be listed on this form, see item 35.

Item 4: If there are no applicable State requirements, locations on Federal or Indian land should be described in accordance with Federal requirements. Consult local State or Federal office for specific instructions.

Item 18: Indicate which elevation is used as reference (where not otherwise shown) for depth measurements given in other spaces on this form and in any attachments.

Items 22 and 24: If this well is completed for separate production from more than one interval zone (multiple completion), so state in item 22, and in item 24 show the producing interval, or intervals, top(s), bottom(s) and name(s) (if any) for only the interval reported in item 33. Submit a separate report (page) on this form, adequately identified, for each additional interval to be separately produced, showing the additional data pertinent to such interval.

Item 29: *"Sacks Cement":* Attached supplemental records for this well should show the details of any multiple stage cementing and the location of the cementing tool.

Item 33: Submit a separate completion report on this form for each interval to be separately produced. (See instruction for items 22 and 24 above.)

37. SUMMARY OF POROUS ZONES:
SHOW ALL IMPORTANT ZONES OF POROSITY AND CONTENTS THEREOF; CORED INTERVALS; AND ALL DRILL-STEM TESTS, INCLUDING DEPTH INTERVAL TESTED, CUSHION USED, TIME TOOL OPEN, FLOWING AND SHUT-IN PRESSURES, AND RECOVERIES

FORMATION	TOP	BOTTOM	DESCRIPTION, CONTENTS, ETC.
31. Perforated 17,498-17,424' with one jumbo jet shot per foot perf. 17,498-17,424' with 2 jumbo jet shots per foot perf. 17,345-17,295' with 1 jumbo jet shot per foot.			

38. GEOLOGIC MARKERS

NAME	TOP MEAS. DEPTH	TOP TRUE VERT. DEPTH
Log tops:		
Bridger	0'	
Green River	530	
Wasatch	2,005	
Fort Union	4,055	
Mesaverde	7,190	
Hilliard	7,710	
Frontier	11,278	
Aspen	11,500	
Dakota	11,900	
Morrison	12,348	
Curtis	12,852	
Entrada	12,958	
Twin Creek	13,097	
Nugget	13,742	
Ankareh	14,590	
Thaynes	14,990	
Woodside	15,440	
Phosphoria	16,105	
Weber	16,512	
Morgan	17,040	
Madison	50'	

U.S. GOVERNMENT PRINTING OFFICE: 1963—O-683636

871-233

Form 3160-4
(November 1983)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

Form approved
Budget Bureau No. 1004-0137
Expires August 31, 1985

POSTED

WELL COMPLETION OR RECOMPLETION REPORT AND LOG

5. LEASE DESIGNATION AND SERIAL NO.: W-05929-A

1a. TYPE OF WELL: OIL WELL ☐ GAS WELL ☒ DRY ☐ OTHER:

6. IF INDIAN, ALLOTTEE OR TRIBE NAME: -----

b. TYPE OF COMPLETION: NEW WELL ☐ WORK OVER ☐ DEEP-EN ☐ PLUG BACK ☐ DIFF. RESVR. ☐ OTHER: P & A

7. UNIT AGREEMENT NAME: BRUFF

8. FARM OR LEASE NAME: UNIT WELL

2. NAME OF OPERATOR: WEXPRO COMPANY

9. WELL NO.: 1

3. ADDRESS OF OPERATOR: P.O. BOX 458, ROCK SPRINGS, WY 82902

10. FIELD AND POOL, OR WILDCAT: BRUFF - MORGAN

4. LOCATION OF WELL
At surface: 660' FSL, 660' FWL, SW SW
At top prod. interval reported below
At total depth

11. SEC., T., R., M., OR BLOCK & SURVEY OR AREA: 22-19N-112W

14. PERMIT NO.	DATE ISSUED	12. COUNTY / PARISH	13. STATE
49-023-20045	7/18/72	LINCOLN	WYOMING

15. DATE SPUDDED	16. DATE TD REACHED	17. DATE COMPLETED (ready to prod.)	18. ELEVATIONS (DF, RKB, RT, GR, ETC.)	19. ELEV. CASINGHEAD
7/28/72	4/2/73	P & A	KB 6388.5 GR 6368	

20. TOTAL DEPTH, MD & TVD	21. PLUG BACK TD, MD & TVD	22. IF MULT. COMPL. HOW MANY	23. INTERVALS DRILLED BY	ROTARY TOOLS	CABLE TOOLS
18208	SURFACE		-------->	0-18208	-----

24. PRODUCING INTERVAL(S) OF THIS COMPLETION - TOP, BOTTOM, NAME, (MD AND TVD): NONE - P & A

25. WAS DIRECTIONAL SURVEY MADE: NO

26. TYPE ELECTRIC AND OTHER LOGS RUN: NONE ON P & A

27. WAS WELL CORED: YES

28. CASING RECORD (Report all strings set in well)

CASING SIZE	WEIGHT LB/FT	DEPTH SET (MD)	HOLE SIZE	CEMENTING RECORD	AMOUNT PULLED
13-3/8	61	2109.00	17-1/2	2250 SACKS	NONE
9-5/8	47 & 53.5	12448.73	12-1/4	1860 SACKS	NONE
			8-1/2		

29. LINER RECORD

SIZE	TOP (MD)	BOTTOM (MD)	SACKS CEMENT	SCREEN (MD)
7	12128.80	18200.16	1600	

30. TUBING RECORD

SIZE	DEPTH SET (MD)	PACKER SET (MD)
N/A		

31. PERFORATION RECORD (Interval, size, and number)

32. ACID, SHOT, FRACTURE, CEMENT SQUEEZE, ETC.

DEPTH INTERVAL (MD)	AMOUNT AND KIND OF MATERIAL USED
11899-12180	98 SACKS CEMENT
8678-8928	90 SACKS CEMENT
PUMPED 295 SX CEMENT BELOW RETAINER @ 5075' THRU PERFS	
@ 5125' WHILE CIRCULATING 9-5/8 X 13-3/8 ANN. SET 50' CEMENT	
PLUG ON TOP OF RETAINER FROM 4875'-5125'.	

(SEE BACK OF PAGE)

33. PRODUCTION

DATE FIRST PRODUCTION	PRODUCTION METHOD (Flowing, gas lift, pumping - size and type of pump)	WELL STATUS (Producing or shut-in)
N/A		P & A

DATE OF TEST	HOURS TESTED	CHOKE SIZE	PROD'N FOR TEST PERIOD	OIL-BBL	GAS-MCF	WATER-BBL	GAS-OIL RATIO
			-------->			---	---

FLOW. TUBING PRESS	CASING PRESSURE	CALCULATED 24 HOUR RATE	OIL-BBL	GAS-MCF	WATER-BBL	OIL GRAVITY-API (CORR.)
		-------->	---		---	-----

34. DISPOSITION OF GAS (Sold, used for fuel, vented, etc.)

TEST WITNESSED BY

35. LIST OF ATTACHMENTS

36. I hereby certify that the foregoing and attached information is complete and correct as determined from all available records.

SIGNED _____ TITLE OPERATIONS MANAGER DATE _____

37. SUMMARY OF POROUS ZONES: (Show all important zones of porosity and contents thereof: cored intervals: and all drill-stem tests, including depth interval, cushion used, time tool open, flowing and shut-in pressures, and recoveries):

FORMATION	TOP	BOTTOM	DESCRIPTION, CONTENTS, ETC.

32. (CONT.)

PUMPED 318 SACKS CEMENT BELOW RETAINER @ 2000' THRU PERFS @ 2240 WHILE CIRCULATING THE 9-5/8 X 13-3/8 ANNULUS. SET 50' CEMENT PLUG ON TOP OF RETAINER FROM 1950'-2000'.

PUMPED 239 SACKS CEMENT THRU PERFS @ 300' TO SET A SURFACE PLUG IN 9-5/8 CASING AND 9-5/8 X 13-3/8 ANNULUS.

38. GEOLOGIC MARKERS

NAME	TOP MEAS. DEPTH	TOP TRUE VERT. DEPTH
BRIDGER	surface	
GREEN RIVER	530	
WASATCH	2005	
FORT UNION	4055	
MESAVERDE	7190	
HILLIARD	7710	
FRONTIER	11278	
ASPEN	11500	
DAKOTA	11900	
MORRISON	12348	
CURTIS	12852	
ENTRADA	12958	
TWIN CREEK	13097	
NUGGET	13742	
ANKAREH	14590	
THAYNES	14990	
WOODSIDE	15440	
PHOSPHORIA	16105	
WEBER	16512	
MORGAN	17040	
MADISON	17550	

Form 3160-5
(June 1990)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

FORM APPROVED
Budget Bureau No. 1004-0135
Expires: March 31, 1993

SUNDRY NOTICES AND REPORTS ON WELLS

Do not use this form for proposals to drill or to deepen or reentry to a different reservoir.
Use "APPLICATION FOR PERMIT—" for such proposals

SUBMIT IN TRIPLICATE

5. Lease Designation and Serial No.: W-05929

6. If Indian, Allottee or Tribe Name:

7. If Unit or CA, Agreement Designation: Bruff

1. Type of Well: ☐ Oil Well ☒ Gas Well ☐ Other

8. Well Name and No.: Bruff Unit No. 1

2. Name of Operator: Wexpro Company

9. API Well No.: 49-023-20045

3. Address and Telephone No.: P.O. Box 458, Rock Springs, Wy. 82902 307/382-9791

10. Field and Pool, or Exploratory Area: Bruff

4. Location of Well (Footage, Sec., T., R., M., or Survey Description): 660' FSL, 660' FWL SW SW 22-19N-112W

11. County or Parish, State: Lincoln, Wyoming

12. CHECK APPROPRIATE BOX(s) TO INDICATE NATURE OF NOTICE, REPORT, OR OTHER DATA

TYPE OF SUBMISSION	TYPE OF ACTION	
☒ Notice of Intent	☒ Abandonment	☐ Change of Plans
☐ Subsequent Report	☐ Recompletion	☐ New Construction
☐ Final Abandonment Notice	☐ Plugging Back	☐ Non-Routine Fracturing
	☐ Casing Repair	☐ Water Shut-Off
	☐ Altering Casing	☐ Conversion to Injection
	☐ Other _____	☐ Dispose Water

(Note: Report results of multiple completion on Well Completion or Recompletion Report and Log form.)

13. Describe Proposed or Completed Operations (Clearly state all pertinent details, and give pertinent dates, including estimated date of starting any proposed work. If well is directionally drilled, give subsurface locations and measured and true vertical depths for all markers and zones pertinent to this work.)*

Wexpro Company intends to plug and abandon this well using the following procedure. MIRU workover rig. Blow well down and install BOP's. Pick up 2 7/8" tubing and trip in to 12,130'. Balanced cement plugs will then be set in the 9 5/8" casing from 12,130'-11,930'; 9000'-8800'; and 6000'-5800'. The 9 5/8" casing will be perforated from 2050-2048' and cement retainer will be set at 1850'. A 200' cement plug will be set inside the 9 5/8" casing and 9 5/8"X13 3/8" annulus by circulating cement below the retainer (27 Bbls cement). Perforate the 9 5/8" casing at 200' and set a 200' surface plug in both the 9 5/8" casing and 9 5/8X 13 3/8" annulus. Nipple down BOP's and casing spool. Cut off the casing head and install a regulation dry hole marker. Reclaim and reseed location as stipulated.

(Present Status Drawing Attached)

RECEIVED
JUN 15 1992

14. I hereby certify that the foregoing is true and correct

Signed _____ Title District Manager Date June 11, 1992

(This space for Federal or State office use)

Approved by _____ Title _____ Date _____
Conditions of approval, if any:

Title 18 U.S.C. Section 1001, makes it a crime for any person knowingly and willfully to make to any department or agency of the United States any false, fictitious or fraudulent statements or representations as to any matter within its jurisdiction.

*See Instruction on Reverse Side

Drawn by GAS 3-23-73
Revised by WAA 5-1-73
Revised by JJS 2-1-76
Revised by GB 6-11-84

Bruff Unit Well No. 1
Bruff Field
SW SW Sec. 22, T. 19 N., R. 112 W.
Lincoln County, Wyoming

Schematic-Not drawn to scale
Drilled by MFSCo. Nov. 1972

KB 6388.50'

20.50' KB

GL 6368.00'

2.50' below GL

13-3/8" O.D. casing @ 2109.00' KBM

Cmt top behind 9-5/8" csg @ 9600.00'

Top of 7" O.D. liner @ 12,128.80' KBM

Baker retrievable bridge plug @ 12,180.00' KBM

Left 980' 2-7/8" tbg in hole - could not get below 12,208.00' KBM

9-5/8" O.D. casing @ 12,448.73' KBM

Baker Model "DB" packer @ 17,200.00' KBM

Reperf 17,295'-17,320' w/2 2" Di-hone holes/ft.
17,295-17,345' 1 hole/ft.

EZ drill squeeze packer @ 17,390.00' KBM, squeeze perfs w/100 sks cement
Squeeze perfs w/35 sks cmt & disp w/14 bbls mud
17,424-17,498' 1 hole/ft.
reperf 5-5-73 w/2 holes/ft

cmt

2 sks cmt on top of BP
Baker Model N bridge plug @ 17,544.00' KBM
Set 35 sack cement plug
17,562-17,590' Madison
17,610-17,622' 1 hole/ft.
17,656-17,674'

Baker Model K cement retainer @ 17,863.00' KBM

17,881-17,906'
17,924-17,928' Madison
17,938-17,950' 1 hole/ft.
17,966-17,970'

Baker Model K cement retainer @ 17,990.00' KBM
18,004-18,008' Madison
18,022-18,026' 1 hole/ft
18,114-18,128'

PBTD @ 18,141.00' KBM

7" O.D. Liner @ 18,200.16' KBM

8-1/2" Hole
TD @ 18,208.00' KBM

13-3/8" O.D. Surface Casing

	Net
1 13-5/8" BX 5000 psi slip on flange	1.68
1 pc. 13-3/8" O.D., 61#, K-55 seal lock casing	17.11
52 jts. 13-3/8" O.D., 61#, K-55 seal lock casing	2,024.69
1 Baker float collar	1.50
1 jt. 13-3/8" O.D., 61#, K-55 seal lock casing	40.80
1 Baker float guide shoe	1.82
	2,087.60

The above casing is landed @ 2109.00' KBM or 21.40' below KB. Float collar, guide shoe & lst 17 joints of csg were spot welded, top & bottom. Cemented with 2050 sks 50-50 Pozmix treated w/1% CFR-2, 10% salt, 2% gel & 1/4# per sk flocele. Circ csg 45 mins prior to cmtg. Displaced with 314 bbls wtr. Ret 5 bbls of wtr cut cmt to surf. Max pump pressure was 800#. Bumped plugs to 1500#. Rel pressure. Float equipment held. Cmtd back side with 200 sks 50-50 Pozmix treated w/3% CaCl. Ret 5 bbls cmt. Cmt in place @ 4:15 P.M., 8-8-72.

9-5/8" O.D. Intermediate Casing

	Net
1 NSCo. 10" 5000 psi casing spool	
1 pc. 9-5/8" O.D., 47#, Soo-95 buttress thread casing	14.33
46 jts. 9-5/8" O.D., 47#, Soo-95 buttress thread casing	1,846.22
186 jts. 9-5/8" O.D., 47#, Soo-95, LT&C casing	7,589.36
71 jts. 9-5/8" O.D., 53.50#, Soo-95, LT&C casing	2,887.98
1 Larkin flapper float collar	1.10
1 jt. 9-5/8" O.D., 53.50#, Soo-95, LT&C casing	39.95
1 Larkin flapper float collar	1.10
1 jt. 9-5/8" O.D., 53.50#, Soo-95, LT&C casing	42.05
1 Larkin 9-5/8" Hi-Geyser flapper float shoe	3.64
	12,425.73

The above casing is landed @ 12,448.73' KBM or 23.00' below KB in a NSCo. 10" 5000 psi casing spool. Circ hole 1 hr. prior to cmtg with rig pump. Prior to cmtg injected 300 bbls wtr, 500 bbls packer fluid & 1000 gals mud flush. Cmtd w/1530 sks 50-50 Pozmix with 2% gel treated w/35% SSA-1, 15% salt, 1% CFR-2, & 0.4% HR-4 and 330 sks Type G cmt treated with 35% SSA-1, 10% salt, 1.5% CFR-2, & 5% HR-4. Good circ while mixing & displacing. Displaced with mud. Cement in place @ 7:30 P.M., 11-25-72. (The NSCo. 10" 5000 psi csg spool is 2.50' below grd level.

See attachment for details of 7" O.D. liner & Baker Model DB packer

Form 3160-5
(June 1990)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

FORM APPROVED
Budget Bureau No. 1004-0135
Expires: March 31, 1993

SUNDRY NOTICES AND REPORTS ON WELLS

Do not use this form for proposals to drill or to deepen or reentry to a different reservoir.
Use "APPLICATION FOR PERMIT -" for such proposals

SUBMIT IN TRIPLICATE

5. LEASE DESIGNATION AND SERIAL NO.: W-05929-A

6. IF INDIAN, ALLOTTEE OR TRIBE NAME: ----

7. IF UNIT OR CA, AGREEMENT DESIGNATION: BRUFF

1. TYPE OF WELL: [ ] OIL WELL [X] GAS WELL [ ] OTHER

8. WELL NAME AND NO.: BRUFF UNIT NO. 1

2. NAME OF OPERATOR: WEXPRO COMPANY

9. API WELL NO.: 49-023-20045

3. ADDRESS AND TELEPHONE NO.: P. O. BOX 458, ROCK SPRINGS, WY 82902 (307) 382-9791

10. FIELD AND POOL, OR EXPLORATORY AREA: BRUFF

4. LOCATION OF WELL (FOOTAGE, SEC., T., R., M., OR SURVEY DESCRIPTION)

660' FSL, 660' FWL SW SW
22-19N-112W

11. COUNTY OR PARISH, STATE: LINCOLN, WYOMING

RECEIVED
NOV 18 1994

12. CHECK APPROPRIATE BOX(S) TO INDICATE NATURE OF NOTICE, REPORT, OR OTHER DATA

TYPE OF SUBMISSION	TYPE OF ACTION	
[ ] Notice of Intent	[X] Abandonment	[ ] Change in Plans
[ ] Subsequent Report	[ ] Recompletion	[ ] New Construction
[X] Final Abandonment Notice	[ ] Plugging Back	[ ] Non-Routine Fracturing
	[ ] Casing Repair	[ ] Water Shut-Off
	[ ] Altering Casing	[ ] Conversion to Injection
	[ ] Other _____	[ ] Dispose Water

(Note: Report results of multiple completion on Well Completion or Recompletion Report and Log form.)

13. Describe Proposed or Completed Operations (Clearly state all pertinent details, and give pertinent dates, including estimated date of starting any proposed work. If well is directionally drilled, give subsurface locations and measured and true vertical depths for all markers and zones pertinent to this work.)*

From 10/10/94 through 10/17/94, this well was plugged & abandoned as follows:

A contract workover rig was moved in & rigged up 10/10/94 & utilizing a 2-7/8" work string the following plugs were set.

Plug No. 1: A 281' balanced cmt plug was set in the 9-5/8" csg on top of the retrievable bridge plug @ 12,180' from 12,180'-11,899'.

Plug No. 2: The 9-5/8" csg was perforated @ 9000' & a cmt retainer was set @ 8958'. An injection rate could not be established below the retainer so a 250' balanced cmt plug was set in the 9-5/8" csg above the retainer from 8928'-8678'.

Plug No. 3: The 9-5/8" csg was perforated @ 5125' & a cmt retainer was set @ 5075'. An injection rate was established through the retainer & a 250' cmt plug was circulated into the 9-5/8" X open hole annulus from 5125'-4875'. A 50' cmt plug was left on top of the retainer from 5075'-5025'.

Plug No. 4: The 9-5/8" csg was perforated @ 2240' & a cmt retainer was set @ 2000'. An injection rate was established through the retainer & an approximate 300' cmt plug was circulated into the 9-5/8" x 13-3/8" annulus from 2240'-1940'. A 50' cmt plug was left on top of the retainer from 2000'-1950'.

Plug No. 5: The 9-5/8" csg was perforated @ 300' & a 300' surface cmt plug was circulated into the 9-5/8" csg and 9-5/8" x 13-3/8" annulus with cmt returned to surface.

Note: A 9 ppg pozmix slurry was circulated into the well as the spacer fluid between all plugs.
After the final surface plug was set, the csg spool was removed & a regulation dry hole marker was installed. The workover rig was rigged down & moved off 10/17/94.
Location reclamation will take place when conditions allow.

14. I hereby certify that the foregoing is true and correct

Signed _____ Title OPERATIONS MANAGER Date NOVEMBER 17, 1994

(This space for Federal or State office use)

Approved by _____ Title _____ Date _____
Conditions of approval, if any:

Title 18 U.S. C. Section 1001, makes it a crime for any person knowingly and willfully to make to any department or agency of the United States any false, fictitious or fraudulent statements or representations as to any matter within its jurisdiction.

*See Instruction on Reverse Side

Form 3160-5
(November 1983)
(Formerly 9-331)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

SUBMIT IN TRIPLICATE* (Other instructions on reverse side)

Form approved.
Budget Bureau No. 1004-01
Expires August 31, 1985

SUNDRY NOTICES AND REPORTS ON WELLS

(Do not use this form for proposals to drill or to deepen or plug back to a different reservoir. Use "APPLICATION FOR PERMIT—" for such proposals.)

1. OIL WELL [X] GAS WELL [ ] OTHER	5. LEASE DESIGNATION AND SERIAL NO: W-05929-A
	6. IF INDIAN, ALLOTTEE OR TRIBE NAM: --
	7. UNIT AGREEMENT NAME: Bruff
2. NAME OF OPERATOR: Wexpro Company	8. FARM OR LEASE NAME: Unit
3. ADDRESS OF OPERATOR: P. O. Box 458, Rock Springs, Wyoming 82902	9. WELL NO.: 1
4. LOCATION OF WELL (Report location clearly and in accordance with any State requirements.* See also space 17 below.) At surface: SW SW 660' FSL, 660' FWL	10. FIELD AND POOL, OR WILDCAT: Bruff
	11. SEC., T., R., M., OR BLK. AND SURVEY OR AREA: 22-19N-112W
14. PERMIT NO.	15. ELEVATIONS (Show whether DF, RT, GR, etc.): GR 6368'
	12. COUNTY OR PARISH: Lincoln
	13. STATE: Wyoming

16. **Check Appropriate Box To Indicate Nature of Notice, Report, or Other Data**

NOTICE OF INTENTION TO:				SUBSEQUENT REPORT OF:			
TEST WATER SHUT-OFF	[ ]	PULL OR ALTER CASING	[ ]	WATER SHUT-OFF	[ ]	REPAIRING WELL	[ ]
FRACTURE TREAT	[ ]	MULTIPLE COMPLETE	[ ]	FRACTURE TREATMENT	[ ]	ALTERING CASING	[ ]
SHOOT OR ACIDIZE	[ ]	ABANDON*	[ ]	SHOOTING OR ACIDIZING	[ ]	ABANDONMENT*	[ ]
REPAIR WELL	[ ]	CHANGE PLANS	[ ]				
(Other) Recomplete			[X]	(Other)			

(NOTE: Report results of multiple completion on Well Completion or Recompletion Report and Log form.)

17. DESCRIBE PROPOSED OR COMPLETED OPERATIONS (Clearly state all pertinent details, and give pertinent dates, including estimated date of starting any proposed work. If well is directionally drilled, give subsurface locations and measured and true vertical depths for all markers and zones pertinent to this work.)*

We hereby request permission to abandon the Morgan sweet oil formation and complete in the Frontier formation as follows:

1. Leave the Baker bridge plug in the well at 12,180' KBM.
2. Run 5-1/2" O.D., 23#, L-80, LT&C casing to 12,000' KBM and cement in place with 880 sacks cement which should give a cement top at approximately 9600' with 50% excess cement.
3. Run CBL and perforate the Frontier formation at approximately 11,390' and fracture stimulate.

RECEIVED
AUG 5 1985
WYOMING OIL & GAS CONSERVATION COMMISSION

18. I hereby certify that the foregoing is true and correct

SIGNED [signature] TITLE Director, Pet. Engineering DATE August 2, 1985

(This space for Federal or State office use)

APPROVED BY _____ TITLE _____ DATE _____
CONDITIONS OF APPROVAL, IF ANY:

*See Instructions on Reverse Side

Title 18 U.S.C. Section 1001, makes it a crime for any person knowingly and willfully to make to any department or agency of the United States any false, fictitious or fraudulent statements or representations as to any matter within its jurisdiction.

Form 9-331
(May 1963)

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

SUBMIT IN TRIPLICATE* (Other instructions on reverse side)

Form approved.
Budget Bureau No. 42-R1424.

SUNDRY NOTICES AND REPORTS ON WELLS

(Do not use this form for proposals to drill or to deepen or plug back to a different reservoir. Use "APPLICATION FOR PERMIT—" for such proposals.)

5. LEASE DESIGNATION AND SERIAL NO.: W - 05929-A

6. IF INDIAN, ALLOTTEE OR TRIBE NAME: -

1. OIL WELL ☐ GAS WELL ☐ OTHER: Wildcat

7. UNIT AGREEMENT NAME: Bruff Unit

2. NAME OF OPERATOR: Mountain Fuel Supply Company

8. FARM OR LEASE NAME: Unit Well

3. ADDRESS OF OPERATOR: P. O. Box 1129, Rock Springs, Wyoming 82901

9. WELL NO.: 1

4. LOCATION OF WELL (Report location clearly and in accordance with any State requirements.* See also space 17 below.) At surface: 660' FSL, 660' FWL SW SW

10. FIELD AND POOL, OR WILDCAT: Wildcat

11. SEC., T., R., M., OR BLK. AND SURVEY OR AREA: SW SW 22-19N-112W., 6th P

14. PERMIT NO.: 20045

15. ELEVATIONS (Show whether DF, RT, GR, etc.): KB 6386.90' GR 6368'

12. COUNTY OR PARISH: Lincoln

13. STATE: Wyoming

16. Check Appropriate Box To Indicate Nature of Notice, Report, or Other Data

NOTICE OF INTENTION TO:				SUBSEQUENT REPORT OF:			
TEST WATER SHUT-OFF	☐	PULL OR ALTER CASING	☐	WATER SHUT-OFF	☐	REPAIRING WELL	☐
FRACTURE TREAT	☐	MULTIPLE COMPLETE	☐	FRACTURE TREATMENT	☐	ALTERING CASING	☐
SHOOT OR ACIDIZE	☐	ABANDON*	☐	SHOOTING OR ACIDIZING	☐	ABANDONMENT*	☐
REPAIR WELL	☐	CHANGE PLANS	☐	(Other) Supplementary history			X
(Other)				(NOTE: Report results of multiple completion on Well Completion or Recompletion Report and Log form.)			

17. DESCRIBE PROPOSED OR COMPLETED OPERATIONS (Clearly state all pertinent details, and give pertinent dates, including estimated date of starting any proposed work. If well is directionally drilled, give subsurface locations and measured and true vertical depths for all markers and zones pertinent to this work.) *

Depth 10,291', drilling.

RECEIVED
SEP 20 1972
OFFICE of
STATE OIL & GAS SUPERVISOR

18. I hereby certify that the foregoing is true and correct

SIGNED B. H. Crofts TITLE Vice President, Gas Supply Operations DATE Sept. 19, 1972

(This space for Federal or State office use)

APPROVED BY _____ TITLE _____ DATE _____

CONDITIONS OF APPROVAL, IF ANY:

*See Instructions on Reverse Side

Form 9-331
(May 1963)

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

SUBMIT IN TRIPLICATE* (Other instructions on reverse side)

Form approved.
Budget Bureau No. 42-R1424.

5. LEASE DESIGNATION AND SERIAL NO.
W - 05929-A

6. IF INDIAN, ALLOTTEE OR TRIBE NAME
-

SUNDRY NOTICES AND REPORTS ON WELLS

(Do not use this form for proposals to drill or to deepen or plug back to a different reservoir. Use "APPLICATION FOR PERMIT—" for such proposals.)

1. OIL WELL ☐ GAS WELL ☐ OTHER Wildcat

7. UNIT AGREEMENT NAME
Bruff Unit

2. NAME OF OPERATOR
Mountain Fuel Supply Company

8. FARM OR LEASE NAME
Unit Well

3. ADDRESS OF OPERATOR
P. O. Box 1129, Rock Springs, Wyoming 82901

9. WELL NO.
1

4. LOCATION OF WELL (Report location clearly and in accordance with any State requirements.* See also space 17 below.) At surface
660' FSL, 660' FWL SW SW

10. FIELD AND POOL, OR WILDCAT
Wildcat

11. SEC., T., R., M., OR BLK. AND SURVEY OR AREA
SW SW 22-19N-112W., 6th PM

14. PERMIT NO.
20045

15. ELEVATIONS (Show whether DF, RT, GR, etc.)
KB 6386.90' GR 6368'

12. COUNTY OR PARISH
Lincoln

13. STATE
Wyoming

16. Check Appropriate Box To Indicate Nature of Notice, Report, or Other Data

NOTICE OF INTENTION TO:				SUBSEQUENT REPORT OF:			
TEST WATER SHUT-OFF	☐	PULL OR ALTER CASING	☐	WATER SHUT-OFF	☐	REPAIRING WELL	☐
FRACTURE TREAT	☐	MULTIPLE COMPLETE	☐	FRACTURE TREATMENT	☐	ALTERING CASING	☐
SHOOT OR ACIDIZE	☐	ABANDON*	☐	SHOOTING OR ACIDIZING	☐	ABANDONMENT*	☐
REPAIR WELL	☐	CHANGE PLANS	☐	(Other) Supplementary history			X
(Other)			☐	(NOTE: Report results of multiple completion on Well Completion or Recompletion Report and Log form.)			

17. DESCRIBE PROPOSED OR COMPLETED OPERATIONS (Clearly state all pertinent details, and give pertinent dates, including estimated date of starting any proposed work. If well is directionally drilled, give subsurface locations and measured and true vertical depths for all markers and zones pertinent to this work.) *

Depth 11,107', drilling.

RECEIVED
OCT 31 1972
OFFICE of
STATE OIL & GAS SUPERVISOR

18. I hereby certify that the foregoing is true and correct

SIGNED B. M. Crofton TITLE Vice President, Gas Supply Operations DATE Oct. 30, 1972

(This space for Federal or State office use)

APPROVED BY _____ TITLE _____ DATE _____
CONDITIONS OF APPROVAL, IF ANY:

*See Instructions on Reverse Side

Form 9-331
(May 1963)

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

SUBMIT IN TRIPLICATE* (Other instructions on reverse side)

Form approved.
Budget Bureau No. 42-R1424.

SUNDRY NOTICES AND REPORTS ON WELLS

(Do not use this form for proposals to drill or to deepen or plug back to a different reservoir. Use "APPLICATION FOR PERMIT—" for such proposals.)

1. OIL WELL ☐ GAS WELL ☐ OTHER Wildcat

2. NAME OF OPERATOR
Mountain Fuel Supply Company

3. ADDRESS OF OPERATOR
P. O. Box 1129, Rock Springs, Wyoming 82901

4. LOCATION OF WELL (Report location clearly and in accordance with any State requirements.* See also space 17 below.)
At surface
660' FSL, 660' FWL SW SW

5. LEASE DESIGNATION AND SERIAL NO.
W - 05929-A

6. IF INDIAN, ALLOTTEE OR TRIBE NAME
-

7. UNIT AGREEMENT NAME
Bruff Unit

8. FARM OR LEASE NAME
Unit Well

9. WELL NO.
1

10. FIELD AND POOL, OR WILDCAT
Wildcat

11. SEC., T., R., M., OR BLK. AND SURVEY OR AREA
SW SW 22-19N-112W., 6th PM

14. PERMIT NO.
20045

15. ELEVATIONS (Show whether DF, RT, GR, etc.)
KB 6386.90' GR 6368'

12. COUNTY OR PARISH
Lincoln

13. STATE
Wyoming

16. Check Appropriate Box To Indicate Nature of Notice, Report, or Other Data

NOTICE OF INTENTION TO:				SUBSEQUENT REPORT OF:			
TEST WATER SHUT-OFF	☐	PULL OR ALTER CASING	☐	WATER SHUT-OFF	☐	REPAIRING WELL	☐
FRACTURE TREAT	☐	MULTIPLE COMPLETE	☐	FRACTURE TREATMENT	☐	ALTERING CASING	☐
SHOOT OR ACIDIZE	☐	ABANDON*	☐	SHOOTING OR ACIDIZING	☐	ABANDONMENT*	☐
REPAIR WELL	☐	CHANGE PLANS	☐	(Other) Supplementary history			X
(Other)				(NOTE: Report results of multiple completion on Well Completion or Recompletion Report and Log form.)			

17. DESCRIBE PROPOSED OR COMPLETED OPERATIONS (Clearly state all pertinent details, and give pertinent dates, including estimated date of starting any proposed work. If well is directionally drilled, give subsurface locations and measured and true vertical depths for all markers and zones pertinent to this work.) *

Depth 10,906', drilling.

DST #3: 10,432-10,550', Hilliard, IO ½ hour, ISI 1 hour, FO 2 hours, FSI 2½ hours, opened with fair to medium blow, reopened dead increasing to weak, no gas to surface, recovered 1500' mud.
IHP 5257, IOFP's 273-382, ISIP 491, FOFP's 491-573, FSIP 573, FHP 5257.

RECEIVED
SEP 27 1972
OFFICE of
STATE OIL & GAS SUPERVISOR

18. I hereby certify that the foregoing is true and correct

SIGNED B. H. Conley TITLE Vice President, Gas Supply Operations DATE Sept. 26, 1972

(This space for Federal or State office use)

APPROVED BY _____ TITLE _____ DATE _____
CONDITIONS OF APPROVAL, IF ANY:

*See Instructions on Reverse Side

Form 9-331
(May 1963)

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

SUBMIT IN TRIPLICATE* (Other instructions on reverse side)

Form approved.
Budget Bureau No. 42-R1424.

5. LEASE DESIGNATION AND SERIAL NO.: W - 05929-A

6. IF INDIAN, ALLOTTEE OR TRIBE NAME: -

SUNDRY NOTICES AND REPORTS ON WELLS

(Do not use this form for proposals to drill or to deepen or plug back to a different reservoir. Use "APPLICATION FOR PERMIT—" for such proposals.)

1. OIL WELL ☐ GAS WELL ☐ OTHER Wildcat

7. UNIT AGREEMENT NAME: Bruff Unit

2. NAME OF OPERATOR: Mountain Fuel Supply Company

8. FARM OR LEASE NAME: UnitWell

3. ADDRESS OF OPERATOR: P. O. Box 1129, Rock Springs, Wyoming 82901

9. WELL NO.: 1

4. LOCATION OF WELL (Report location clearly and in accordance with any State requirements.* See also space 17 below.) At surface: 660' FSL, 660' FWL SW SW

10. FIELD AND POOL, OR WILDCAT: Wildcat

11. SEC., T., R., M., OR BLK. AND SURVEY OR AREA: SW SW 22-19N-112W., 6th PM

14. PERMIT NO.: 20045

15. ELEVATIONS (Show whether DF, RT, GR, etc.): KB 6386.90' GR 6368'

12. COUNTY OR PARISH: Lincoln

13. STATE: Wyoming

16. Check Appropriate Box To Indicate Nature of Notice, Report, or Other Data

NOTICE OF INTENTION TO:				SUBSEQUENT REPORT OF:			
TEST WATER SHUT-OFF	☐	PULL OR ALTER CASING	☐	WATER SHUT-OFF	☐	REPAIRING WELL	☐
FRACTURE TREAT	☐	MULTIPLE COMPLETE	☐	FRACTURE TREATMENT	☐	ALTERING CASING	☐
SHOOT OR ACIDIZE	☐	ABANDON*	☐	SHOOTING OR ACIDIZING	☐	ABANDONMENT*	☐
REPAIR WELL	☐	CHANGE PLANS	☐	(Other) Supplementary history			X
(Other)	☐			(NOTE: Report results of multiple completion on Well Completion or Recompletion Report and Log form.)			

17. DESCRIBE PROPOSED OR COMPLETED OPERATIONS (Clearly state all pertinent details, and give pertinent dates, including estimated date of starting any proposed work. If well is directionally drilled, give subsurface locations and measured and true vertical depths for all markers and zones pertinent to this work.) *

Depth 11,618', drilling.

RECEIVED
NOV 8 1972
OFFICE of
STATE OIL & GAS SUPERVISOR

18. I hereby certify that the foregoing is true and correct

SIGNED B. H. Crouch TITLE Vice President, Gas Supply Operations DATE Nov. 6, 1972

(This space for Federal or State office use)

APPROVED BY _____ TITLE _____ DATE _____

CONDITIONS OF APPROVAL, IF ANY:

*See Instructions on Reverse Side

Form 9-331
(May 1963)

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

SUBMIT IN TRIPLICATE* (Other instructions on reverse side)

Form approved.
Budget Bureau No. 42-R1424.

5. LEASE DESIGNATION AND SERIAL NO.: W - 05929-A

6. IF INDIAN, ALLOTTEE OR TRIBE NAME: -

SUNDRY NOTICES AND REPORTS ON WELLS

(Do not use this form for proposals to drill or to deepen or plug back to a different reservoir. Use "APPLICATION FOR PERMIT—" for such proposals.)

1. OIL WELL ☐ GAS WELL ☐ OTHER: Wildcat

7. UNIT AGREEMENT NAME: Bruff Unit

2. NAME OF OPERATOR: Mountain Fuel Supply Company

8. FARM OR LEASE NAME: Unit Well

3. ADDRESS OF OPERATOR: P. O. Box 1129, Rock Springs, Wyoming 82901

9. WELL NO.: 1

4. LOCATION OF WELL (Report location clearly and in accordance with any State requirements.* See also space 17 below.) At surface: 660' FSL, 660' FWL SW SW

10. FIELD AND POOL, OR WILDCAT: Wildcat

11. SEC., T., R., M., OR BLK. AND SURVEY OR AREA: SW SW 22-19N-112W., 6th PM

14. PERMIT NO.: 20045

15. ELEVATIONS (Show whether DF, RT, GR, etc.): KB 6386.90' GR 6368'

12. COUNTY OR PARISH: Lincoln

13. STATE: Wyoming

16. Check Appropriate Box To Indicate Nature of Notice, Report, or Other Data

NOTICE OF INTENTION TO:				SUBSEQUENT REPORT OF:			
TEST WATER SHUT-OFF	☐	PULL OR ALTER CASING	☐	WATER SHUT-OFF	☐	REPAIRING WELL	☐
FRACTURE TREAT	☐	MULTIPLE COMPLETE	☐	FRACTURE TREATMENT	☐	ALTERING CASING	☐
SHOOT OR ACIDIZE	☐	ABANDON*	☐	SHOOTING OR ACIDIZING	☐	ABANDONMENT*	☐
REPAIR WELL	☐	CHANGE PLANS	☐	(Other) Supplementary history			X
(Other)			☐	(NOTE: Report results of multiple completion on Well Completion or Recompletion Report and Log form.)			

17. DESCRIBE PROPOSED OR COMPLETED OPERATIONS (Clearly state all pertinent details, and give pertinent dates, including estimated date of starting any proposed work. If well is directionally drilled, give subsurface locations and measured and true vertical depths for all markers and zones pertinent to this work.) *

Depth 11,955', drilling.

RECEIVED
NOV 14 1972
OFFICE OF
STATE OIL & GAS SUPERVISOR

18. I hereby certify that the foregoing is true and correct

SIGNED [signature] TITLE Vice President, Gas Supply Operations DATE Nov. 13, 1972

(This space for Federal or State office use)

APPROVED BY _____ TITLE _____ DATE _____

CONDITIONS OF APPROVAL, IF ANY:

*See Instructions on Reverse Side

Form 9-331
(May 1963)

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

SUBMIT IN TRIPLICATE* (Other instructions on reverse side)

Form approved.
Budget Bureau No. 42-R1424.

5. LEASE DESIGNATION AND SERIAL NO.: W - 05929-A

6. IF INDIAN, ALLOTTEE OR TRIBE NAME: -

SUNDRY NOTICES AND REPORTS ON WELLS

(Do not use this form for proposals to drill or to deepen or plug back to a different reservoir. Use "APPLICATION FOR PERMIT—" for such proposals.)

1. OIL WELL ☐ GAS WELL ☐ OTHER Wildcat

7. UNIT AGREEMENT NAME: Bruff Unit

2. NAME OF OPERATOR: Mountain Fuel Supply Company

8. FARM OR LEASE NAME: Unit Well

3. ADDRESS OF OPERATOR: P. O. Box 1129, Rock Springs, Wyoming 82901

9. WELL NO.: 1

4. LOCATION OF WELL (Report location clearly and in accordance with any State requirements.* See also space 17 below.) At surface: 660' FSL, 660' FWL SW SW

10. FIELD AND POOL, OR WILDCAT: Wildcat

11. SEC., T., R., M., OR BLK. AND SURVEY OR AREA: SW SW 22-19N-112W., 6th PM

14. PERMIT NO.: 20045

15. ELEVATIONS (Show whether DF, RT, GR, etc.): KB 6386.90' GR 6368'

12. COUNTY OR PARISH: Lincoln

13. STATE: Wyoming

16. Check Appropriate Box To Indicate Nature of Notice, Report, or Other Data

NOTICE OF INTENTION TO:				SUBSEQUENT REPORT OF:			
TEST WATER SHUT-OFF	☐	PULL OR ALTER CASING	☐	WATER SHUT-OFF	☐	REPAIRING WELL	☐
FRACTURE TREAT	☐	MULTIPLE COMPLETE	☐	FRACTURE TREATMENT	☐	ALTERING CASING	☐
SHOOT OR ACIDIZE	☐	ABANDON*	☐	SHOOTING OR ACIDIZING	☐	ABANDONMENT*	☐
REPAIR WELL	☐	CHANGE PLANS	☐	(Other) Supplementary history			X
(Other)			☐	(NOTE: Report results of multiple completion on Well Completion or Recompletion Report and Log form.)			

17. DESCRIBE PROPOSED OR COMPLETED OPERATIONS (Clearly state all pertinent details, and give pertinent dates, including estimated date of starting any proposed work. If well is directionally drilled, give subsurface locations and measured and true vertical depths for all markers and zones pertinent to this work.) *

Depth 12,500', ran 9-5/8" casing, now nippling up.

RECEIVED
NOV 30 1972
OFFICE of
OIL & GAS SUPERVISOR

18. I hereby certify that the foregoing is true and correct

SIGNED B. W. Crofts TITLE Vice President, Gas Supply Operations DATE Nov. 28, 1972

(This space for Federal or State office use)

APPROVED BY _____ TITLE _____ DATE _____

CONDITIONS OF APPROVAL, IF ANY:

*See Instructions on Reverse Side

Form 9-331
(May 1963)

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

SUBMIT IN TRIPLICATE* (Other instructions on reverse side)

Form approved.
Budget Bureau No. 42-R1424.

5. LEASE DESIGNATION AND SERIAL NO.: W - 05929-A

6. IF INDIAN, ALLOTTEE OR TRIBE NAME: -

SUNDRY NOTICES AND REPORTS ON WELLS

(Do not use this form for proposals to drill or to deepen or plug back to a different reservoir. Use "APPLICATION FOR PERMIT—" for such proposals.)

1. OIL WELL ☐ GAS WELL ☐ OTHER: Wildcat

7. UNIT AGREEMENT NAME: Bruff Unit

2. NAME OF OPERATOR: Mountain Fuel Supply Company

8. FARM OR LEASE NAME: Unit Well

3. ADDRESS OF OPERATOR: P. O. Box 1129, Rock Springs, Wyoming 82901

9. WELL NO.: 1

4. LOCATION OF WELL (Report location clearly and in accordance with any State requirements.* See also space 17 below.) At surface: 660' FSL, 660' FWL SW SW

10. FIELD AND POOL, OR WILDCAT: Wildcat

11. SEC., T., R., M., OR BLK. AND SURVEY OR AREA: SW SW 22-19N-112W., 6th PM

14. PERMIT NO.: 20045

15. ELEVATIONS (Show whether DF, RT, GR, etc.): KB 6386.90' GR 6368'

12. COUNTY OR PARISH: Lincoln

13. STATE: Wyoming

16. Check Appropriate Box To Indicate Nature of Notice, Report, or Other Data

NOTICE OF INTENTION TO:				SUBSEQUENT REPORT OF:			
TEST WATER SHUT-OFF	☐	PULL OR ALTER CASING	☐	WATER SHUT-OFF	☐	REPAIRING WELL	☐
FRACTURE TREAT	☐	MULTIPLE COMPLETE	☐	FRACTURE TREATMENT	☐	ALTERING CASING	☐
SHOOT OR ACIDIZE	☐	ABANDON*	☐	SHOOTING OR ACIDIZING	☐	ABANDONMENT*	☐
REPAIR WELL	☐	CHANGE PLANS	☐	(Other) Supplementary history			X
(Other)	☐			(NOTE: Report results of multiple completion on Well Completion or Recompletion Report and Log form.)			

17. DESCRIBE PROPOSED OR COMPLETED OPERATIONS (Clearly state all pertinent details, and give pertinent dates, including estimated date of starting any proposed work. If well is directionally drilled, give subsurface locations and measured and true vertical depths for all markers and zones pertinent to this work.) *

Depth 13,780', thawing out stand pipe and rotary hose.

RECEIVED
DEC 18 1972
U.S. GEOLOGICAL SURVEY
ROCK SPRINGS, WYOMING

18. I hereby certify that the foregoing is true and correct

SIGNED B. H. Crofts TITLE Vice President, Gas Supply Operations DATE Dec. 11, 1972

(This space for Federal or State office use)

APPROVED BY _____ TITLE _____ DATE _____

CONDITIONS OF APPROVAL, IF ANY:

*See Instructions on Reverse Side

Form 9-331
(May 1963)

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

SUBMIT IN TRIPLICATE* (Other instructions on reverse side).

Form approved.
Budget Bureau No. 42-R1424.

5. LEASE DESIGNATION AND SERIAL NO.: W - 05929-A

6. IF INDIAN, ALLOTTEE OR TRIBE NAME: -

SUNDRY NOTICES AND REPORTS ON WELLS

(Do not use this form for proposals to drill or to deepen or plug back to a different reservoir. Use "APPLICATION FOR PERMIT—" for such proposals.)

1. OIL WELL ☐ GAS WELL ☐ OTHER Wildcat

7. UNIT AGREEMENT NAME: Bruff Unit

2. NAME OF OPERATOR: Mountain Fuel Supply Company

8. FARM OR LEASE NAME: Unit Well

3. ADDRESS OF OPERATOR: P. O. Box 1129, Rock Springs, Wyoming 82901

9. WELL NO.: 1

4. LOCATION OF WELL (Report location clearly and in accordance with any State requirements.* See also space 17 below.) At surface: 660' FSL, 660' FWL SW SW

10. FIELD AND POOL, OR WILDCAT: Wildcat

11. SEC., T., R., M., OR BLK. AND SURVEY OR AREA: SW SW 22-19N-112W., 6th PM

14. PERMIT NO.: 20045

15. ELEVATIONS (Show whether DF, RT, GR, etc.): KB 6386.90' GR 6368'

12. COUNTY OR PARISH: Lincoln

13. STATE: Wyoming

16. Check Appropriate Box To Indicate Nature of Notice, Report, or Other Data

NOTICE OF INTENTION TO:				SUBSEQUENT REPORT OF:			
TEST WATER SHUT-OFF	☐	PULL OR ALTER CASING	☐	WATER SHUT-OFF	☐	REPAIRING WELL	☐
FRACTURE TREAT	☐	MULTIPLE COMPLETE	☐	FRACTURE TREATMENT	☐	ALTERING CASING	☐
SHOOT OR ACIDIZE	☐	ABANDON*	☐	SHOOTING OR ACIDIZING	☐	ABANDONMENT*	☐
REPAIR WELL	☐	CHANGE PLANS	☐	(Other) Supplementary history			X
(Other)			☐	(NOTE: Report results of multiple completion on Well Completion or Recompletion Report and Log form.)			

17. DESCRIBE PROPOSED OR COMPLETED OPERATIONS (Clearly state all pertinent details, and give pertinent dates, including estimated date of starting any proposed work. If well is directionally drilled, give subsurface locations and measured and true vertical depths for all markers and zones pertinent to this work.) *

Depth 13,892', making DST #5.

DST #4: 13,797-13,892', Nugget, mis-run, no packer seat.

Landed 12,425.73' net, 12,539.99' gross of 9-5/8"OD, 47# and 53.5#, casing at 12,448.73' KBM and set with 1860 sacks of cement.

NOTE: Since moving in a larger rig, the KB will be changed from 6386.90' to 6388.50'.

RECEIVED
DEC 13 1972
OIL & GAS SUPERVISOR

18. I hereby certify that the foregoing is true and correct

SIGNED B. W. Croft Jr. TITLE Vice President, Gas Supply Operations DATE Dec. 18, 1972

(This space for Federal or State office use)

APPROVED BY _____ TITLE _____ DATE _____

CONDITIONS OF APPROVAL, IF ANY:

*See Instructions on Reverse Side

Form 9-331
(May 1963)

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

SUBMIT IN TRIPLICATE* (Other instructions on reverse side)

Form approved.
Budget Bureau No. 42-R1424.

5. LEASE DESIGNATION AND SERIAL NO.: W - 05929-A

6. IF INDIAN, ALLOTTEE OR TRIBE NAME: -

SUNDRY NOTICES AND REPORTS ON WELLS

(Do not use this form for proposals to drill or to deepen or plug back to a different reservoir. Use "APPLICATION FOR PERMIT—" for such proposals.)

1. OIL WELL ☐ GAS WELL ☐ OTHER Wildcat

7. UNIT AGREEMENT NAME: Bruff Unit

2. NAME OF OPERATOR: Mountain Fuel Supply Company

8. FARM OR LEASE NAME: Unit Well

3. ADDRESS OF OPERATOR: P. O. Box 1129, Rock Springs, Wyoming 82901

9. WELL NO.: 1

4. LOCATION OF WELL (Report location clearly and in accordance with any State requirements.* See also space 17 below.) At surface: 660' FSL, 660' FWL SW SW

10. FIELD AND POOL, OR WILDCAT: Wildcat

11. SEC., T., R., M., OR BLK. AND SURVEY OR AREA: SW SW 22-19N-112W., 6th PM

14. PERMIT NO.: 20045

15. ELEVATIONS (Show whether DF, RT, GR, etc.): KB 6388.50' GR 6368'

12. COUNTY OR PARISH: Lincoln

13. STATE: Wyoming

16. Check Appropriate Box To Indicate Nature of Notice, Report, or Other Data

NOTICE OF INTENTION TO:				SUBSEQUENT REPORT OF:			
TEST WATER SHUT-OFF	☐	PULL OR ALTER CASING	☐	WATER SHUT-OFF	☐	REPAIRING WELL	☐
FRACTURE TREAT	☐	MULTIPLE COMPLETE	☐	FRACTURE TREATMENT	☐	ALTERING CASING	☐
SHOOT OR ACIDIZE	☐	ABANDON*	☐	SHOOTING OR ACIDIZING	☐	ABANDONMENT*	☐
REPAIR WELL	☐	CHANGE PLANS	☐	(Other) Supplementary history			X
(Other)			☐	(NOTE: Report results of multiple completion on Well Completion or Recompletion Report and Log form.)			

17. DESCRIBE PROPOSED OR COMPLETED OPERATIONS (Clearly state all pertinent details, and give pertinent dates, including estimated date of starting any proposed work. If well is directionally drilled, give subsurface locations and measured and true vertical depths for all markers and zones pertinent to this work.) *

Depth 14,342', drilling.

DST #5:; 13,845-13,892', Nugget, IO 35 minutes, ISI 2 hours, FO 4 hours, FSI 6 hours, opened strong, reopened weak increasing to strong, died in 85 minutes, no gas to surface, recovered 3188' water.
IHP 6387, IOFP's 2278-2998, ISIP 5921, FOFP's 2659-3252, FSIP 5440, FHP 6387.



18. I hereby certify that the foregoing is true and correct

SIGNED [signature] TITLE Vice President, Gas Supply Operations DATE Jan. 2, 1973

(This space for Federal or State office use)

APPROVED BY _____ TITLE _____ DATE _____

CONDITIONS OF APPROVAL, IF ANY:

*See Instructions on Reverse Side

Form 9-331
(May 1963)

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

SUBMIT IN TRIPLICATE* (Other instructions on reverse side)

Form approved.
Budget Bureau No. 42-R1424.

SUNDRY NOTICES AND REPORTS ON WELLS

(Do not use this form for proposals to drill or to deepen or plug back to a different reservoir. Use "APPLICATION FOR PERMIT—" for such proposals.)

1. OIL WELL ☐ GAS WELL ☐ OTHER Wildcat

2. NAME OF OPERATOR
Mountain Fuel Supply Company

3. ADDRESS OF OPERATOR
P. O. Box 1129, Rock Springs, Wyoming 82901

4. LOCATION OF WELL (Report location clearly and in accordance with any State requirements.* See also space 17 below.)
At surface
660' FSL, 660' FWL SW SW

5. LEASE DESIGNATION AND SERIAL NO.
W - 05929-A

6. IF INDIAN, ALLOTTEE OR TRIBE NAME
-

7. UNIT AGREEMENT NAME
Bruff Unit

8. FARM OR LEASE NAME
Unit Well

9. WELL NO.
1

10. FIELD AND POOL, OR WILDCAT
Wildcat

11. SEC., T., R., M., OR BLK. AND SURVEY OR AREA
SW SW 22-19N-112W., 6th P

14. PERMIT NO.
20045

15. ELEVATIONS (Show whether DF, RT, GR, etc.)
KB 6388.50' GR 6368'

12. COUNTY OR PARISH
Lincoln

13. STATE
Wyoming

16. Check Appropriate Box To Indicate Nature of Notice, Report, or Other Data

NOTICE OF INTENTION TO:				SUBSEQUENT REPORT OF:			
TEST WATER SHUT-OFF	☐	PULL OR ALTER CASING	☐	WATER SHUT-OFF	☐	REPAIRING WELL	☐
FRACTURE TREAT	☐	MULTIPLE COMPLETE	☐	FRACTURE TREATMENT	☐	ALTERING CASING	☐
SHOOT OR ACIDIZE	☐	ABANDON*	☐	SHOOTING OR ACIDIZING	☐	ABANDONMENT*	☐
REPAIR WELL	☐	CHANGE PLANS	☐	(Other) Supplementary history			X
(Other)				(NOTE: Report results of multiple completion on Well Completion or Recompletion Report and Log form.)			

17. DESCRIBE PROPOSED OR COMPLETED OPERATIONS (Clearly state all pertinent details, and give pertinent dates, including estimated date of starting any proposed work. If well is directionally drilled, give subsurface locations and measured and true vertical depths for all markers and zones pertinent to this work.) *

Depth 15,457', drilling.

RECEIVED
JAN 17 1973
SUPERVISOR

18. I hereby certify that the foregoing is true and correct
SIGNED B. H. Crafton TITLE Vice President, Gas Supply Operations DATE Jan. 16, 1973

(This space for Federal or State office use)

APPROVED BY _____ TITLE _____ DATE _____
CONDITIONS OF APPROVAL, IF ANY:

*See Instructions on Reverse Side

Form 9-331
(May 1963)

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

SUBMIT IN TRIPLICATE* (Other instructions on reverse side)

Form approved.
Budget Bureau No. 42-R1424.

5. LEASE DESIGNATION AND SERIAL NO.: W - 05929-A

6. IF INDIAN, ALLOTTEE OR TRIBE NAME: -

SUNDRY NOTICES AND REPORTS ON WELLS

(Do not use this form for proposals to drill or to deepen or plug back to a different reservoir. Use "APPLICATION FOR PERMIT—" for such proposals.)

1. OIL WELL ☐ GAS WELL ☐ OTHER: Wildcat

7. UNIT AGREEMENT NAME: Bruff Unit

2. NAME OF OPERATOR: Mountain Fuel Supply Company

8. FARM OR LEASE NAME: Unit Well

3. ADDRESS OF OPERATOR: P. O. Box 1129, Rock Springs, Wyoming 82901

9. WELL NO.: 1

4. LOCATION OF WELL (Report location clearly and in accordance with any State requirements.* See also space 17 below.) At surface: 660' FSL, 660' FWL SW SW

10. FIELD AND POOL, OR WILDCAT: Wildcat

11. SEC., T., R., M., OR BLK. AND SURVEY OR AREA: SW SW 22-19N-112W., 6th P

14. PERMIT NO.: 20045

15. ELEVATIONS (Show whether DF, RT, GR, etc.): KB 6388.50' GR 6368'

12. COUNTY OR PARISH: Lincoln

13. STATE: Wyoming

16. Check Appropriate Box To Indicate Nature of Notice, Report, or Other Data

NOTICE OF INTENTION TO:				SUBSEQUENT REPORT OF:			
TEST WATER SHUT-OFF	☐	PULL OR ALTER CASING	☐	WATER SHUT-OFF	☐	REPAIRING WELL	☐
FRACTURE TREAT	☐	MULTIPLE COMPLETE	☐	FRACTURE TREATMENT	☐	ALTERING CASING	☐
SHOOT OR ACIDIZE	☐	ABANDON*	☐	SHOOTING OR ACIDIZING	☐	ABANDONMENT*	☐
REPAIR WELL	☐	CHANGE PLANS	☐	(Other) Supplementary history			X
(Other)				(NOTE: Report results of multiple completion on Well Completion or Recompletion Report and Log form.)			

17. DESCRIBE PROPOSED OR COMPLETED OPERATIONS (Clearly state all pertinent details, and give pertinent dates, including estimated date of starting any proposed work. If well is directionally drilled, give subsurface locations and measured and true vertical depths for all markers and zones pertinent to this work.) *

Depth 16,289', drilling.



18. I hereby certify that the foregoing is true and correct

SIGNED B. H. Croft, Jr. TITLE Vice President, Gas Supply Operations DATE Jan. 23, 1973

(This space for Federal or State office use)

APPROVED BY _____ TITLE _____ DATE _____

CONDITIONS OF APPROVAL, IF ANY:

*See Instructions on Reverse Side

Form 9-331
(May 1963)

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

SUBMIT IN TRIPLICATE* (Other instructions on reverse side)

Form approved.
Budget Bureau No. 42-R1424.

SUNDRY NOTICES AND REPORTS ON WELLS

(Do not use this form for proposals to drill or to deepen or plug back to a different reservoir. Use "APPLICATION FOR PERMIT—" for such proposals.)

1. OIL WELL ☐ GAS WELL ☐ OTHER Wildcat

2. NAME OF OPERATOR
Mountain Fuel Supply Company

3. ADDRESS OF OPERATOR
P. O. Box 1129, Rock Springs, Wyoming 82901

4. LOCATION OF WELL (Report location clearly and in accordance with any State requirements.* See also space 17 below.)
At surface
660' FSL, 660' FWL SW SW

5. LEASE DESIGNATION AND SERIAL NO.
W - 05929-A

6. IF INDIAN, ALLOTTEE OR TRIBE NAME
-

7. UNIT AGREEMENT NAME
Bruff Unit

8. FARM OR LEASE NAME
Unit Well

9. WELL NO.
1

10. FIELD AND POOL, OR WILDCAT
Wildcat

11. SEC., T., R., M., OR BLK. AND SURVEY OR AREA
SW SW 22-19N-112W., 6th PM

14. PERMIT NO.	15. ELEVATIONS (Show whether DF, RT, GR, etc.)	12. COUNTY OR PARISH	13. STATE
20045	KB 6388.50' GR 6368'	Lincoln	Wyoming

16. Check Appropriate Box To Indicate Nature of Notice, Report, or Other Data

NOTICE OF INTENTION TO:				SUBSEQUENT REPORT OF:			
TEST WATER SHUT-OFF	☐	PULL OR ALTER CASING	☐	WATER SHUT-OFF	☐	REPAIRING WELL	☐
FRACTURE TREAT	☐	MULTIPLE COMPLETE	☐	FRACTURE TREATMENT	☐	ALTERING CASING	☐
SHOOT OR ACIDIZE	☐	ABANDON*	☐	SHOOTING OR ACIDIZING	☐	ABANDONMENT*	☐
REPAIR WELL	☐	CHANGE PLANS	☐	(Other) Supplementary history			X
(Other)				(NOTE: Report results of multiple completion on Well Completion or Recompletion Report and Log form.)			

17. DESCRIBE PROPOSED OR COMPLETED OPERATIONS (Clearly state all pertinent details, and give pertinent dates, including estimated date of starting any proposed work. If well is directionally drilled, give subsurface locations and measured and true vertical depths for all markers and zones pertinent to this work.)*

Depth 16,450', circulating for DST #7.

DST #6: 16,334-16,450', Phosphoria, mis-run.

18. I hereby certify that the foregoing is true and correct
SIGNED B. W. Crofts TITLE Vice President, Gas Supply Operations DATE Jan. 29, 1973

(This space for Federal or State office use)

APPROVED BY _____ TITLE _____ DATE _____
CONDITIONS OF APPROVAL, IF ANY:

*See Instructions on Reverse Side

Form 9-331
(May 1963)

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

SUBMIT IN TRIPLICATE* (Other instructions on reverse side)

Form approved.
Budget Bureau No. 42-R1424.

5. LEASE DESIGNATION AND SERIAL NO.: W - 05929-A

6. IF INDIAN, ALLOTTEE OR TRIBE NAME: -

SUNDRY NOTICES AND REPORTS ON WELLS

(Do not use this form for proposals to drill or to deepen or plug back to a different reservoir. Use "APPLICATION FOR PERMIT—" for such proposals.)

1. OIL WELL ☐ GAS WELL ☐ OTHER: Wildcat

7. UNIT AGREEMENT NAME: Bruff Unit

2. NAME OF OPERATOR: Mountain Fuel Supply Company

8. FARM OR LEASE NAME: Unit Well

3. ADDRESS OF OPERATOR: P. O. Box 1129, Rock Springs, Wyoming 82901

9. WELL NO.: 1

4. LOCATION OF WELL (Report location clearly and in accordance with any State requirements.* See also space 17 below.) At surface: 660' FSL, 660' FWL SW SW

10. FIELD AND POOL, OR WILDCAT: Wildcat

11. SEC., T., R., M., OR BLK. AND SURVEY OR AREA: SW SW 22-19N-112W., 6th PM

14. PERMIT NO.: 20045

15. ELEVATIONS (Show whether DF, RT, GR, etc.): KB 6388.50' GR 6368'

12. COUNTY OR PARISH: Lincoln

13. STATE: Wyoming

16. Check Appropriate Box To Indicate Nature of Notice, Report, or Other Data

NOTICE OF INTENTION TO:				SUBSEQUENT REPORT OF:			
TEST WATER SHUT-OFF	☐	PULL OR ALTER CASING	☐	WATER SHUT-OFF	☐	REPAIRING WELL	☐
FRACTURE TREAT	☐	MULTIPLE COMPLETE	☐	FRACTURE TREATMENT	☐	ALTERING CASING	☐
SHOOT OR ACIDIZE	☐	ABANDON*	☐	SHOOTING OR ACIDIZING	☐	ABANDONMENT*	☐
REPAIR WELL	☐	CHANGE PLANS	☐	(Other) Supplementary history			X
(Other)				(NOTE: Report results of multiple completion on Well Completion or Recompletion Report and Log form.)			

17. DESCRIBE PROPOSED OR COMPLETED OPERATIONS (Clearly state all pertinent details, and give pertinent dates, including estimated date of starting any proposed work. If well is directionally drilled, give subsurface locations and measured and true vertical depths for all markers and zones pertinent to this work.) *

Depth 16,507', fishing.

DST #7: 16,358-16,450', Phosphoria, IO ½ hour, ISI 2 hours, FO 4 hours, FSI 6 hours, opened with very weak blow on both openings, no gas, recovered 100' mud.
IHP 7665, IOFP's 1901-1901, ISIP 2282, FOFP's 1869-1838, FSIP 2155, FHP 7665.

RECEIVED
FEB - 7 1973

18. I hereby certify that the foregoing is true and correct

SIGNED B. H. Crofts TITLE Vice President, Gas Supply Operations DATE Feb. 5, 1973

(This space for Federal or State office use)

APPROVED BY _____ TITLE _____ DATE _____

CONDITIONS OF APPROVAL, IF ANY:

*See Instructions on Reverse Side

Form 9-331
(May 1963)

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

SUBMIT IN TRIPLICATE* (Other instructions on reverse side)

Form approved.
Budget Bureau No. 42-R1424.

5. LEASE DESIGNATION AND SERIAL NO.: W - 05929-A

6. IF INDIAN, ALLOTTEE OR TRIBE NAME: -

SUNDRY NOTICES AND REPORTS ON WELLS

(Do not use this form for proposals to drill or to deepen or plug back to a different reservoir. Use "APPLICATION FOR PERMIT—" for such proposals.)

1. OIL WELL ☐ GAS WELL ☐ OTHER: Wildcat

7. UNIT AGREEMENT NAME: Bruff Unit

2. NAME OF OPERATOR: Mountain Fuel Supply Company

8. FARM OR LEASE NAME: Unit Well

3. ADDRESS OF OPERATOR: P. O. Box 1129, Rock Springs, Wyoming 82901

9. WELL NO.: 1

4. LOCATION OF WELL (Report location clearly and in accordance with any State requirements.* See also space 17 below.) At surface: 660' FSL, 660' FWL SW SW

10. FIELD AND POOL, OR WILDCAT: Wildcat

11. SEC., T., R., M., OR BLK. AND SURVEY OR AREA: SW SW 22-19N-112W., 6th PM

14. PERMIT NO.: 20045

15. ELEVATIONS (Show whether DF, RT, GR, etc.): KB 6388.50' GR 6368'

12. COUNTY OR PARISH: Lincoln

13. STATE: Wyoming

16. Check Appropriate Box To Indicate Nature of Notice, Report, or Other Data

NOTICE OF INTENTION TO:				SUBSEQUENT REPORT OF:			
TEST WATER SHUT-OFF	☐	PULL OR ALTER CASING	☐	WATER SHUT-OFF	☐	REPAIRING WELL	☐
FRACTURE TREAT	☐	MULTIPLE COMPLETE	☐	FRACTURE TREATMENT	☐	ALTERING CASING	☐
SHOOT OR ACIDIZE	☐	ABANDON*	☐	SHOOTING OR ACIDIZING	☐	ABANDONMENT*	☐
REPAIR WELL	☐	CHANGE PLANS	☐	(Other) Supplementary history			X
(Other)				(NOTE: Report results of multiple completion on Well Completion or Recompletion Report and Log form.)			

17. DESCRIBE PROPOSED OR COMPLETED OPERATIONS (Clearly state all pertinent details, and give pertinent dates, including estimated date of starting any proposed work. If well is directionally drilled, give subsurface locations and measured and true vertical depths for all markers and zones pertinent to this work.) *

Depth 16,974', recovered fish, preparing to make DST #11.

DST #8: 16,515-16,572', Weber, IO ½ hour, ISI 2 hours, FO 4 hours, FSI 6 hours, opened weak, reopened dead, no gas, recovered 130' gas cut mud. IHP 7858, IOFP's 2123-2155, ISIP 5671, FOFP's 2187-2219, FSIP 5221, FHP 7858.

DST #9: 16,572-16,635', Weber, IO ½ hour, ISI 2 hours, FO 4 hours, FSI 6 hours, opened with weak blow, reopened dead, no gas, no recovery (circulating sub open), IHP 7826, IOFP's 2123-2155, ISIP 4321, FOFP's 2187-2187, FSIP 5929, FHP 7793.

DST #10: 16,924-16,974', Weber, mis-run, packers failed.

RECEIVED
MAR 6 - 1973

18. I hereby certify that the foregoing is true and correct

SIGNED B. H. Crofts TITLE Vice President, Gas Supply Operations DATE March 5, 1973

(This space for Federal or State office use)

APPROVED BY _____ TITLE _____ DATE _____

CONDITIONS OF APPROVAL, IF ANY:

*See Instructions on Reverse Side

Form 9-331
(May 1963)

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

SUBMIT IN TRIPLICATE* (Other instructions on reverse side)

Form approved.
Budget Bureau No. 42-R1424.

5. LEASE DESIGNATION AND SERIAL NO.: W - 05929-A

6. IF INDIAN, ALLOTTEE OR TRIBE NAME: -

SUNDRY NOTICES AND REPORTS ON WELLS

(Do not use this form for proposals to drill or to deepen or plug back to a different reservoir. Use "APPLICATION FOR PERMIT—" for such proposals.)

1. OIL WELL ☐ GAS WELL ☐ OTHER: Wildcat

7. UNIT AGREEMENT NAME: Bruff Unit

2. NAME OF OPERATOR: Mountain Fuel Supply Company

8. FARM OR LEASE NAME: Unit Well

3. ADDRESS OF OPERATOR: P. O. Box 1129, Rock Springs, Wyoming 82901

9. WELL NO.: 1

4. LOCATION OF WELL (Report location clearly and in accordance with any State requirements.* See also space 17 below.) At surface: 660' FSL, 660' FWL SW SW

10. FIELD AND POOL, OR WILDCAT: Wildcat

11. SEC., T., R., M., OR BLK. AND SURVEY OR AREA: SW SW 22-19N-112W., 6th PM

14. PERMIT NO.: 20045

15. ELEVATIONS (Show whether DF, RT, GR, etc.): KB 6388.50' GR 6368'

12. COUNTY OR PARISH: Lincoln

13. STATE: Wyoming

16. Check Appropriate Box To Indicate Nature of Notice, Report, or Other Data

NOTICE OF INTENTION TO:				SUBSEQUENT REPORT OF:			
TEST WATER SHUT-OFF	☐	PULL OR ALTER CASING	☐	WATER SHUT-OFF	☐	REPAIRING WELL	☐
FRACTURE TREAT	☐	MULTIPLE COMPLETE	☐	FRACTURE TREATMENT	☐	ALTERING CASING	☐
SHOOT OR ACIDIZE	☐	ABANDON*	☐	SHOOTING OR ACIDIZING	☐	ABANDONMENT*	☐
REPAIR WELL	☐	CHANGE PLANS	☐	(Other) Supplementary history			X
(Other)				(NOTE: Report results of multiple completion on Well Completion or Recompletion Report and Log form.)			

17. DESCRIBE PROPOSED OR COMPLETED OPERATIONS (Clearly state all pertinent details, and give pertinent dates, including estimated date of starting any proposed work. If well is directionally drilled, give subsurface locations and measured and true vertical depths for all markers and zones pertinent to this work.) *

Depth 17,371', circulating.

DST #11: 16,909-16,974', Weber, IO ½ hour, ISI 2 hours, FO 4 hours, FSI 6 hours, opened very weak decreasing, no gas, reopened dead, no gas, no recovery, IHP 8051, IOFP's 2092-2155, ISIP 7600, FOFP's 2155-2282, FSIP 7408, FHP 7858.

RECEIVED
MAR 22 1973
STATE OIL & GAS SUPERVISOR

18. I hereby certify that the foregoing is true and correct

SIGNED: L. W. Crofts TITLE: Vice President, Gas Supply Operations DATE: March 20, 1973

(This space for Federal or State office use)

APPROVED BY _____ TITLE _____ DATE _____

CONDITIONS OF APPROVAL, IF ANY:

*See Instructions on Reverse Side

Form 9-331
(May 1963)

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

SUBMIT IN TRIPLICATE* (Other instructions on reverse side)

Form approved.
Budget Bureau No. 42-R1424.

SUNDRY NOTICES AND REPORTS ON WELLS

(Do not use this form for proposals to drill or to deepen or plug back to a different reservoir. Use "APPLICATION FOR PERMIT—" for such proposals.)

1. OIL WELL ☐ GAS WELL ☐ OTHER Wildcat

2. NAME OF OPERATOR
Mountain Fuel Supply Company

3. ADDRESS OF OPERATOR
P. O. Box 1129, Rock Springs, Wyoming 82901

4. LOCATION OF WELL (Report location clearly and in accordance with any State requirements.* See also space 17 below.)
At surface
660' FSL, 660' FWL SW SW

5. LEASE DESIGNATION AND SERIAL NO.
W - 05929-A

6. IF INDIAN, ALLOTTEE OR TRIBE NAME

7. UNIT AGREEMENT NAME
Bruff Unit

8. FARM OR LEASE NAME
Unit Well

9. WELL NO.
1

10. FIELD AND POOL, OR WILDCAT
Wildcat

11. SEC., T., R., M., OR BLK. AND SURVEY OR AREA
SW SW 22-19N-112W., 6th PM

12. COUNTY OR PARISH: Lincoln

13. STATE: Wyoming

14. PERMIT NO.
20045

15. ELEVATIONS (Show whether DF, RT, GR, etc.)
KB 6388.50' GR 6368'

16. Check Appropriate Box To Indicate Nature of Notice, Report, or Other Data

NOTICE OF INTENTION TO:				SUBSEQUENT REPORT OF:			
TEST WATER SHUT-OFF	☐	PULL OR ALTER CASING	☐	WATER SHUT-OFF	☐	REPAIRING WELL	☐
FRACTURE TREAT	☐	MULTIPLE COMPLETE	☐	FRACTURE TREATMENT	☐	ALTERING CASING	☐
SHOOT OR ACIDIZE	☐	ABANDON*	☐	SHOOTING OR ACIDIZING	☐	ABANDONMENT*	☐
REPAIR WELL	☐	CHANGE PLANS	☐	(Other) Supplementary history			X
(Other)	☐			(NOTE: Report results of multiple completion on Well Completion or Recompletion Report and Log form.)			

17. DESCRIBE PROPOSED OR COMPLETED OPERATIONS (Clearly state all pertinent details, and give pertinent dates, including estimated date of starting any proposed work. If well is directionally drilled, give subsurface locations and measured and true vertical depths for all markers and zones pertinent to this work.) *

Depth 17,704', tripping.

18. I hereby certify that the foregoing is true and correct

SIGNED B. W. Crockett TITLE Vice President, Gas Supply Operations DATE March 28, 1973

(This space for Federal or State office use)

APPROVED BY _____ TITLE _____ DATE _____

CONDITIONS OF APPROVAL, IF ANY:

*See Instructions on Reverse Side

Form 9-331
(May 1963)

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

SUBMIT IN TRIPLICATE* (Other instructions on reverse side)

Form approved.
Budget Bureau No. 42-R1424.

SUNDRY NOTICES AND REPORTS ON WELLS

(Do not use this form for proposals to drill or to deepen or plug back to a different reservoir. Use "APPLICATION FOR PERMIT—" for such proposals.)

5. LEASE DESIGNATION AND SERIAL NO.: W - 05929-A

6. IF INDIAN, ALLOTTEE OR TRIBE NAME: -

1. OIL WELL ☐ GAS WELL ☐ OTHER: Wildcat

7. UNIT AGREEMENT NAME: Bruff Unit

2. NAME OF OPERATOR: Mountain Fuel Supply Company

8. FARM OR LEASE NAME: Unit Well

3. ADDRESS OF OPERATOR: P. O. Box 1129, Rock Springs, Wyoming 82901

9. WELL NO.: 1

4. LOCATION OF WELL (Report location clearly and in accordance with any State requirements.* See also space 17 below.) At surface: 660' FSL, 660' FWL SW SW

10. FIELD AND POOL, OR WILDCAT: Wildcat

11. SEC., T., R., M., OR BLK. AND SURVEY OR AREA: SW SW 22-19N-112W., 6th PM

14. PERMIT NO.: 20045

15. ELEVATIONS (Show whether DF, RT, GR, etc.): KB 6388.50' GR 6368'

12. COUNTY OR PARISH: Lincoln

13. STATE: Wyoming

16. Check Appropriate Box To Indicate Nature of Notice, Report, or Other Data

NOTICE OF INTENTION TO:				SUBSEQUENT REPORT OF:			
TEST WATER SHUT-OFF	☐	PULL OR ALTER CASING	☐	WATER SHUT-OFF	☐	REPAIRING WELL	☐
FRACTURE TREAT	☐	MULTIPLE COMPLETE	☐	FRACTURE TREATMENT	☐	ALTERING CASING	☐
SHOOT OR ACIDIZE	☐	ABANDON*	☐	SHOOTING OR ACIDIZING	☐	ABANDONMENT*	☐
REPAIR WELL	☐	CHANGE PLANS	☐	(Other) Supplementary history			X
(Other)				(NOTE: Report results of multiple completion on Well Completion or Recompletion Report and Log form.)			

17. DESCRIBE PROPOSED OR COMPLETED OPERATIONS (Clearly state all pertinent details, and give pertinent dates, including estimated date of starting any proposed work. If well is directionally drilled, give subsurface locations and measured and true vertical depths for all markers and zones pertinent to this work.) *

Depth 18,208', logging.



18. I hereby certify that the foregoing is true and correct

SIGNED B. W. Croft TITLE Vice President, Gas Supply Operations DATE April 3, 1973

(This space for Federal or State office use)

APPROVED BY _____ TITLE _____ DATE _____

CONDITIONS OF APPROVAL, IF ANY:

*See Instructions on Reverse Side

Form 9-331
(May 1963)

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

SUBMIT IN TRIPLICATE* (Other instructions on reverse side)

Form approved.
Budget Bureau No. 42-R1424.

5. LEASE DESIGNATION AND SERIAL NO.: W - 05929-A

6. IF INDIAN, ALLOTTEE OR TRIBE NAME: -

SUNDRY NOTICES AND REPORTS ON WELLS

(Do not use this form for proposals to drill or to deepen or plug back to a different reservoir. Use "APPLICATION FOR PERMIT—" for such proposals.)

1. OIL WELL ☐ GAS WELL ☐ OTHER Wildcat

7. UNIT AGREEMENT NAME: Bruff Unit

2. NAME OF OPERATOR: Mountain Fuel Supply Company

8. FARM OR LEASE NAME: Unit Well

3. ADDRESS OF OPERATOR: P. O. Box 1129, Rock Springs, Wyoming 82901

9. WELL NO.: 1

4. LOCATION OF WELL (Report location clearly and in accordance with any State requirements.* See also space 17 below.) At surface

660' FSL, 660' FWL SW SW

10. FIELD AND POOL, OR WILDCAT: Wildcat

11. SEC., T., R., M., OR BLK. AND SURVEY OR AREA: SW SW 22-19N-112W., 6th PM

14. PERMIT NO.: 20045

15. ELEVATIONS (Show whether DF, RT, GR, etc.): KB 6388.50 GR 6368'

12. COUNTY OR PARISH: Lincoln

13. STATE: Wyoming

16. Check Appropriate Box To Indicate Nature of Notice, Report, or Other Data

NOTICE OF INTENTION TO:				SUBSEQUENT REPORT OF:			
TEST WATER SHUT-OFF	☐	PULL OR ALTER CASING	☐	WATER SHUT-OFF	☐	REPAIRING WELL	☐
FRACTURE TREAT	☐	MULTIPLE COMPLETE	☐	FRACTURE TREATMENT	☐	ALTERING CASING	☐
SHOOT OR ACIDIZE	☐	ABANDON*	☐	SHOOTING OR ACIDIZING	☐	ABANDONMENT*	☐
REPAIR WELL	☐	CHANGE PLANS	☐	(Other) Supplementary history			X
(Other)				(NOTE: Report results of multiple completion on Well Completion or Recompletion Report and Log form.)			

17. DESCRIBE PROPOSED OR COMPLETED OPERATIONS (Clearly state all pertinent details, and give pertinent dates, including estimated date of starting any proposed work. If well is directionally drilled, give subsurface locations and measured and true vertical depths for all markers and zones pertinent to this work.) *

TD 18,208', logged, ran 7" liner, now drilling cement.

CONFIDENTIAL

RECEIVED
APR 10 1973
OFFICE OF
STATE OIL & GAS SUPERVISOR

18. I hereby certify that the foregoing is true and correct

SIGNED B. W. Crafton TITLE Vice President, Gas Supply Operations DATE April 9, 1973

(This space for Federal or State office use)

APPROVED BY _____ TITLE _____ DATE _____

CONDITIONS OF APPROVAL, IF ANY:

*See Instructions on Reverse Side

Form 9-331
(May 1963)

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

SUBMIT IN TRIPLICATE* (Other instructions on reverse side)

CONFIDENTIAL

Form approved.
Budget Bureau No. 42-R1424.

5. LEASE DESIGNATION AND SERIAL NO.: W - 05929-A

6. IF INDIAN, ALLOTTEE OR TRIBE NAME: -

SUNDRY NOTICES AND REPORTS ON WELLS

(Do not use this form for proposals to drill or to deepen or plug back to a different reservoir. Use "APPLICATION FOR PERMIT—" for such proposals.)

1. OIL WELL ☐ GAS WELL ☐ OTHER Wildcat

7. UNIT AGREEMENT NAME: Bruff Unit

2. NAME OF OPERATOR: Mountain Fuel Supply Company

8. FARM OR LEASE NAME: Unit Well

3. ADDRESS OF OPERATOR: P. O. Box 1129, Rock Springs, Wyoming 82901

9. WELL NO.: 1

4. LOCATION OF WELL (Report location clearly and in accordance with any State requirements.* See also space 17 below.) At surface: 660' FSL, 660' FWL SW SW

10. FIELD AND POOL, OR WILDCAT: Wildcat

11. SEC., T., R., M., OR BLK. AND SURVEY OR AREA: SW SW 22-19N-112W., 6th P

14. PERMIT NO.: 20045

15. ELEVATIONS (Show whether DF, RT, GR, etc.): KB 6388.50' GR 6368'

12. COUNTY OR PARISH: Lincoln

13. STATE: Wyoming

16. Check Appropriate Box To Indicate Nature of Notice, Report, or Other Data

NOTICE OF INTENTION TO:				SUBSEQUENT REPORT OF:			
TEST WATER SHUT-OFF	☐	PULL OR ALTER CASING	☐	WATER SHUT-OFF	☐	REPAIRING WELL	☐
FRACTURE TREAT	☐	MULTIPLE COMPLETE	☐	FRACTURE TREATMENT	☐	ALTERING CASING	☐
SHOOT OR ACIDIZE	☐	ABANDON*	☐	SHOOTING OR ACIDIZING	☐	ABANDONMENT*	☐
REPAIR WELL	☐	CHANGE PLANS	☐	(Other) Supplementary history			X
(Other)				(NOTE: Report results of multiple completion on Well Completion or Recompletion Report and Log form.)			

CONFIDENTIAL

17. DESCRIBE PROPOSED OR COMPLETED OPERATIONS (Clearly state all pertinent details, and give pertinent dates, including estimated date of starting any proposed work. If well is directionally drilled, give subsurface locations and measured and true vertical depths for all markers and zones pertinent to this work.) *

TD 18,208', PBD 17,863', going in hole with test tool.
Landed 6071.36' net, 6119.41' gross of 7"OD, 38#, Soo-90 liner at 18,200.16', top of liner at 12,128.80', and set with 1600 sacks of cement.
Perforated the following intervals with 1 jumbo jet shot per foot: 18,004-18,008', 18,022-18,026', and 18,114-18,128', made PDST #1.
PDST #1: Madison perfs 18,004-18,128' gross, IO 1 hour, ISI 2 hours, FO 242 minutes, FSI 3 hours, opened weak increase to strong, no gas, reopened strong, ½ hour 33 Mcf, 1 hour 19 Mcf, 2 hours 17 Mcf, 3½ hours 70 Mcf, recovered 17,941' gas cut water.
IHP 11,118, IOFP's 3112-5579, ISIP 8089, FOFP's 5932-8087, FSIP 8186, FHP 11,118.

Set model K cement retainer at 17,990', perforated the following intervals with 1 jumbo jet shot per foot: 17,881-17,906', 17,924-17,928', 17,938-17,950', 17,966-17,970'.
PDST #2: Madison perfs 17,881-17,970' gross, IO 1 hour, ISI 2 hours, FO 4-3/4 hours, FSI 3½ hours, opened weak, ½ hour 33 Mcf, 1 hour 51 Mcf, reopened, ½ hour 61 Mcf, water in ½ hour, gas not enough to gauge, recovered 17,804' gas cut water.
IHP 10,736, IOFP's 1427-5772, ISIP 7929, FOFP's 5836-7671, FSIP 7961, FHP 10,482.

Set model K retainer at 17,863', perforated 17,562-17,590', 17,610-17,622' and 17,656-17,674' with 1 jumbo jet shot per foot, made PDST #3.
PDST #3: Madison perfs 17,562-17,674' gross, mis-run, tool opened going in hole.

18. I hereby certify that the foregoing is true and correct

SIGNED B. W. Crockett TITLE Vice President, Gas Supply Operations DATE April 25, 1973

(This space for Federal or State office use)

APPROVED BY _____ TITLE _____ DATE _____
CONDITIONS OF APPROVAL, IF ANY:

*See Instructions on Reverse Side

Confidential

Form 9-331
(May 1963)

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

SUBMIT IN TRIPLICATE* (Other instructions on reverse side)

Form approved.
Budget Bureau No. 42-R1424.

5. LEASE DESIGNATION AND SERIAL NO.: W - 05929-A

6. IF INDIAN, ALLOTTEE OR TRIBE NAME: -

SUNDRY NOTICES AND REPORTS ON WELLS

(Do not use this form for proposals to drill or to deepen or plug back to a different reservoir. Use "APPLICATION FOR PERMIT—" for such proposals.)

1. OIL WELL ☐ GAS WELL ☐ OTHER: Wildcat

7. UNIT AGREEMENT NAME: Bruff Unit

2. NAME OF OPERATOR: Mountain Fuel Supply Company

8. FARM OR LEASE NAME: Unit Well

3. ADDRESS OF OPERATOR: P. O. Box 1129, Rock Springs, Wyoming 82901

9. WELL NO.: 1

4. LOCATION OF WELL (Report location clearly and in accordance with any State requirements.* See also space 17 below.) At surface: 660' FSL, 660' FWL SW SW

10. FIELD AND POOL, OR WILDCAT: Wildcat

11. SEC., T., R., M., OR BLK. AND SURVEY OR AREA: SW SW 22-19N-112W., 6th PM

14. PERMIT NO.: 20045

15. ELEVATIONS (Show whether DF, RT, GR, etc.): KB 6388.50' GR 6368'

12. COUNTY OR PARISH: Lincoln

13. STATE: Wyoming

16. Check Appropriate Box To Indicate Nature of Notice, Report, or Other Data

NOTICE OF INTENTION TO:				SUBSEQUENT REPORT OF:			
TEST WATER SHUT-OFF	☐	PULL OR ALTER CASING	☐	WATER SHUT-OFF	☐	REPAIRING WELL	☐
FRACTURE TREAT	☐	MULTIPLE COMPLETE	☐	FRACTURE TREATMENT	☐	ALTERING CASING	☐
SHOOT OR ACIDIZE	☐	ABANDON*	☐	SHOOTING OR ACIDIZING	☐	ABANDONMENT*	☐
REPAIR WELL	☐	CHANGE PLANS	☐	(Other) Supplementary history			X
(Other)				(NOTE: Report results of multiple completion on Well Completion or Recompletion Report and Log form.)			

17. DESCRIBE PROPOSED OR COMPLETED OPERATIONS (Clearly state all pertinent details, and give pertinent dates, including estimated date of starting any proposed work. If well is directionally drilled, give subsurface locations and measured and true vertical depths for all markers and zones pertinent to this work.)*

TD 18,208', PBD 17,529', circulating.
PDST #4: Madison perforations 17,562-17,674', IO 1 hour, ISI 2 hours, FO 277 minutes, FSI 6 hours, opened weak, gas in 22 minutes, ½ hour 36 Mcf, 1 hour 48 Mcf, reopened, 1 hour 48 Mcf, 2 hours 72 Mcf, 3 hours 86 Mcf, 4 hours 67 Mcf, recovered 1200' gas cut mud and 3700' gas cut water, 30' formation fines in bottom drill collar and test tool. IHP 10,736, IOFP's 317-603, ISIP 6446, FOFP's 793-1079, FSIP 7574, FHP 10,635.
Set model N bridge plug at 17,544', dumped 2 sacks of cement on top of plug, perforated from 17,424' to 17,498' with 1 jumbo jet shot per foot.
PDST #5: Morgan perforations 17,424-17,498', IO 1 hour, ISI 2 hours, FO 1-3/4 hours, FSI 1 hour, opened weak, reopened dead, recovered 40' dry powder, 20' mud and 40' water. IHP 10,676, ISIP 9181, FSIP 9092, FHP 10,676.
PDST #6: Morgan perfs 17,424-17,498', IO 1 hour, ISI 2 hours, opened weak, dead in ¼ hour, recovered 30' mud, IHP 10,938, IOFP's 3182-82, SIP 5629, FHP 10,327.
Perforated from 17,424' to 17,498' with 2 jumbo jet shots per foot.
PDST #7: Morgan perforations 17,424-17,498', mis-run, RTTS slips would not set.
PDST #8: Morgan perforations 17,424-17,498', IO 3 hours, ISI 2 hours, FO 4½ hours, FSI 4½ hours, opened tool and bled off nitrogen for 2 hours, gas in 2 hours, weak blow for 1 hour of non-combustible gas, reopened strong, gas at once, 1 hour 16 Mcf, 2 hours not enough to gauge, 4 hours 31 Mcf, reversed out 6475' mud cut water and 20' formation fines, IHP 10,824, IOFP's 454-636, ISIP 5472, FOFP's 909-1357, FSIP 7324, FHP 10,632.
Set 35-sack cement plug across perforations 17,424-17,498' & squeezed with 2900 psi.

18. I hereby certify that the foregoing is true and correct

SIGNED B W Croft TITLE Vice President, Gas Supply Operations DATE May 9, 1973

(This space for Federal or State office use)

APPROVED BY _____ TITLE _____ DATE _____
CONDITIONS OF APPROVAL, IF ANY:

RECEIVED
MAY 11 1973
STATE OIL & GAS CONSERVATION OFFICE OF

*See Instructions on Reverse Side

Form 9-331
(May 1963)

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

SUBMIT IN TRIPLICATE* (Other instructions on reverse side)

Form approved.
Budget Bureau No. 42-R1424.

SUNDRY NOTICES AND REPORTS ON WELLS

(Do not use this form for proposals to drill or to deepen or plug back to a different reservoir. Use "APPLICATION FOR PERMIT—" for such proposals.)

CONFIDENTIAL

5. LEASE DESIGNATION AND SERIAL NO.: W - 05929-A

6. IF INDIAN, ALLOTTEE OR TRIBE NAME: -

1. OIL WELL ☐ GAS WELL ☐ OTHER: Wildcat

7. UNIT AGREEMENT NAME: Bruff Unit

2. NAME OF OPERATOR: Mountain Fuel Supply Company

8. FARM OR LEASE NAME: Unit Well

3. ADDRESS OF OPERATOR: P. O. Box 1129, Rock Springs, Wyoming 82901

9. WELL NO.: 1

4. LOCATION OF WELL (Report location clearly and in accordance with any State requirements.* See also space 17 below.) At surface: 660' FSL, 660' FWL SW SW

10. FIELD AND POOL, OR WILDCAT: Wildcat

11. SEC., T., R., M., OR BLK. AND SURVEY OR AREA: SW SW 22-19N-112W

14. PERMIT NO.: 20045

15. ELEVATIONS (Show whether DF, RT, GR, etc.): KB 6388.50 GR 6368

12. COUNTY OR PARISH: Lincoln

13. STATE: Wyoming

16. Check Appropriate Box To Indicate Nature of Notice, Report, or Other Data

NOTICE OF INTENTION TO:				SUBSEQUENT REPORT OF:			
TEST WATER SHUT-OFF	☐	PULL OR ALTER CASING	☐	WATER SHUT-OFF	☐	REPAIRING WELL	☐
FRACTURE TREAT	☐	MULTIPLE COMPLETE	☐	FRACTURE TREATMENT	☐	ALTERING CASING	☐
SHOOT OR ACIDIZE	☐	ABANDON*	☐	SHOOTING OR ACIDIZING	☐	ABANDONMENT*	☐
REPAIR WELL	☐	CHANGE PLANS	☐	(Other) Supplementary history			X
(Other)				(NOTE: Report results of multiple completion on Well Completion or Recompletion Report and Log form.)			

17. DESCRIBE PROPOSED OR COMPLETED OPERATIONS (Clearly state all pertinent details, and give pertinent dates, including estimated date of starting any proposed work. If well is directionally drilled, give subsurface locations and measured and true vertical depths for all markers and zones pertinent to this work.)*

TD 18,208', PBD 17,390', nippling up.

Set EZ drill squeeze packer at 17,390' and squeezed perforations 17,424-17,498' with 100 sacks of cement, perforated from 17,295' to 17,345' with 1 jumbo jet shot per foot, made PDST #9, then acidized with 4000 gallons 10% acetic acid, landed 3½" tubing at 17,242.10'.

PDST #9: Morgan perforations 17,295-17,345', IO 88 minutes, ISI 287 minutes, FO 16½ hours, FSI 15 hours, opened tool and allowed to set 17 minutes before starting to bleed off nitrogen, gas in 58 minutes, 65 minutes 1348 Mcf, 87 minutes 654 Mcf, reopened strong, at end of final open well was making 1379 Mcf of gas, total of 190 barrels of oil, no water, reversed out 680' condensate.
IHP 11,016, IOFP's 1044-1330, ISIP 11,025, FOFP's 972-2017, FSIP 10,589, FHP 11,016.

CONFIDENTIAL

18. I hereby certify that the foregoing is true and correct

SIGNED BW Croft TITLE Vice President, Gas Supply Operations DATE May 16, 1973

(This space for Federal or State office use)

APPROVED BY _____ TITLE _____ DATE _____
CONDITIONS OF APPROVAL, IF ANY:

*See Instructions on Reverse Side

Form 9-331
(May 1963)

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

SUBMIT IN TRIPLICATE* (Other instructions on reverse side)

Form approved.
Budget Bureau No. 42-R1424.

5. LEASE DESIGNATION AND SERIAL NO.: W - 05929-A

6. IF INDIAN, ALLOTTEE OR TRIBE NAME: -

SUNDRY NOTICES AND REPORTS ON WELLS

(Do not use this form for proposals to drill or to deepen or plug back to a different reservoir. Use "APPLICATION FOR PERMIT—" for such proposals.)

1. OIL WELL ☐ GAS WELL ☐ OTHER Wildcat

7. UNIT AGREEMENT NAME: Bruff Unit

2. NAME OF OPERATOR: Mountain Fuel Supply Company

8. FARM OR LEASE NAME: Unit Well

3. ADDRESS OF OPERATOR: P. O. Box 1129, Rock Springs, Wyoming 82901

9. WELL NO.: 1

4. LOCATION OF WELL (Report location clearly and in accordance with any State requirements.* See also space 17 below.) At surface: 660' FSL, 660' FWL SW SW

10. FIELD AND POOL, OR WILDCAT: Wildcat

CONFIDENTIAL

11. SEC., T., R., M., OR BLK. AND SURVEY OR AREA: SW SW 22-19N-112W., 6th PM

14. PERMIT NO.: 20045

15. ELEVATIONS (Show whether DF, RT, GR, etc.): KB 6388.50' GR 6368'

12. COUNTY OR PARISH: Lincoln

13. STATE: Wyoming

16. Check Appropriate Box To Indicate Nature of Notice, Report, or Other Data

NOTICE OF INTENTION TO:				SUBSEQUENT REPORT OF:			
TEST WATER SHUT-OFF	☐	PULL OR ALTER CASING	☐	WATER SHUT-OFF	☐	REPAIRING WELL	☐
FRACTURE TREAT	☐	MULTIPLE COMPLETE	☐	FRACTURE TREATMENT	☐	ALTERING CASING	☐
SHOOT OR ACIDIZE	☐	ABANDON*	☐	SHOOTING OR ACIDIZING	☐	ABANDONMENT*	☐
REPAIR WELL	☐	CHANGE PLANS	☐	(Other) Supplementary history			X
(Other)				(NOTE: Report results of multiple completion on Well Completion or Recompletion Report and Log form.)			

17. DESCRIBE PROPOSED OR COMPLETED OPERATIONS (Clearly state all pertinent details, and give pertinent dates, including estimated date of starting any proposed work. If well is directionally drilled, give subsurface locations and measured and true vertical depths for all markers and zones pertinent to this work.) *

TD 18,208', PBD 17,390', set packer at 17,390' and squeezed perforations 17,424-17,498' with 100 sacks of cement, perforated from 17,295' to 17,345' with 1 jumbo jet shot per foot, made PDST #9.

PDST #9: Morgan perfs 17,295-17,345', IO 88 minutes, ISI 287 minutes, FO 16½ hours, FSI 15 hours, opened and allowed to set 17 minutes before starting to bleed off nitrogen, gas to surface in 58 minutes, 65 minutes 1348 Mcf, 87 minutes 654 Mcf, reopened, ½ hour 200 Mcf, 1 hour 177 Mcf, at end of test well making 1379 Mcf of gas per day, 15 barrels of oil per hour, wellhead 280 psi, sep. 180 psi, reversed out 680' condensate to pits. IHP 11,016, IOFP's 1044-1330, ISIP 11,025, FOFP's 972-2017, FSIP 10,589, FHP 11,016. Landed 3½" tubing at 17,242.10', acidized with 24,176 gallons 28% HCL, 20,160 gallons 2½% Hcl, 8000 gallons acetic and 20,160 gallons 15% pad acid emulsion, swabbed, applied drip oil squeeze using 1200 barrels drip oil, well flowing by heads, recovered an estimated 700 barrels of drip oil and 300 barrels acid water, testing.

CONFIDENTIAL

RECEIVED

18. I hereby certify that the foregoing is true and correct

SIGNED B.W. Croft TITLE Vice President, Gas Supply Operations DATE May 22, 1973

(This space for Federal or State office use)

APPROVED BY _____ TITLE _____ DATE _____

CONDITIONS OF APPROVAL, IF ANY:

*See Instructions on Reverse Side

Form 9-331
(May 1963)

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

SUBMIT IN TRIPLICATE* (Other instructions on reverse side)

Form approved.
Budget Bureau No. 42-R1424.

5. LEASE DESIGNATION AND SERIAL NO.: W - 05929-A

6. IF INDIAN, ALLOTTEE OR TRIBE NAME: -

SUNDRY NOTICES AND REPORTS ON WELLS

(Do not use this form for proposals to drill or to deepen or plug back to a different reservoir. Use "APPLICATION FOR PERMIT—" for such proposals.)

1. OIL WELL ☐ GAS WELL ☐ OTHER Wildcat

7. UNIT AGREEMENT NAME: Bruff Unit

2. NAME OF OPERATOR: Mountain Fuel Supply Company

8. FARM OR LEASE NAME: Unit Well

3. ADDRESS OF OPERATOR: P. O. Box 1129, Rock Springs, Wyoming 82901

9. WELL NO.: 1

4. LOCATION OF WELL (Report location clearly and in accordance with any State requirements.* See also space 17 below.) At surface: 660' FSL, 660' FWL SW SW

10. FIELD AND POOL, OR WILDCAT: Wildcat

11. SEC., T., R., M., OR BLK. AND SURVEY OR AREA: SW SW 22-19N-112W., 6th PM

14. PERMIT NO.: 20045

15. ELEVATIONS (Show whether DF, RT, GR, etc.): GR 6368'

12. COUNTY OR PARISH: Lincoln

13. STATE: Wyoming

16. Check Appropriate Box To Indicate Nature of Notice, Report, or Other Data

NOTICE OF INTENTION TO:				SUBSEQUENT REPORT OF:			
TEST WATER SHUT-OFF	☐	PULL OR ALTER CASING	☐	WATER SHUT-OFF	☐	REPAIRING WELL	☐
FRACTURE TREAT	☐	MULTIPLE COMPLETE	☐	FRACTURE TREATMENT	☐	ALTERING CASING	☐
SHOOT OR ACIDIZE	☐	ABANDON*	☐	SHOOTING OR ACIDIZING	☐	ABANDONMENT*	☐
REPAIR WELL	☐	CHANGE PLANS	☐	(Other) Supplementary history			X
(Other)				(NOTE: Report results of multiple completion on Well Completion or Recompletion Report and Log form.)			

17. DESCRIBE PROPOSED OR COMPLETED OPERATIONS (Clearly state all pertinent details, and give pertinent dates, including estimated date of starting any proposed work. If well is directionally drilled, give subsurface locations and measured and true vertical depths for all markers and zones pertinent to this work.) *

Depth 1547', tripping out with fish.

Spudded July 28, 1972. Twisted off, left 2 drill collars in hole, now on way out with fish, well flows a 3" stream of water when pump is shut down.

RECEIVED
AUG 1 1972
OFFICE of
STATE OIL & GAS SUPERVISOR

18. I hereby certify that the foregoing is true and correct

SIGNED B. W. Croft TITLE Vice President, Gas Supply Operations DATE July 31, 1972

(This space for Federal or State office use)

APPROVED BY _____ TITLE _____ DATE _____

CONDITIONS OF APPROVAL, IF ANY:

*See Instructions on Reverse Side

Form 9-331
(May 1963)

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

SUBMIT IN TRIPLICATE* (Other instructions on reverse side)

Form approved.
Budget Bureau No. 42-R1424.

SUNDRY NOTICES AND REPORTS ON WELLS

(Do not use this form for proposals to drill or to deepen or plug back to a different reservoir. Use "APPLICATION FOR PERMIT—" for such proposals.)

1. OIL WELL ☐ GAS WELL ☐ OTHER Wildcat

2. NAME OF OPERATOR
Mountain Fuel Supply Company

3. ADDRESS OF OPERATOR
P. O. Box 1129, Rock Springs, Wyoming 82901

4. LOCATION OF WELL (Report location clearly and in accordance with any State requirements.* See also space 17 below.)
At surface
660' FSL, 660' FWL SW SW

5. LEASE DESIGNATION AND SERIAL NO.
W - 05929-A

6. IF INDIAN, ALLOTTEE OR TRIBE NAME
-

7. UNIT AGREEMENT NAME
Bruff Unit

8. FARM OR LEASE NAME
Unit Well

9. WELL NO.
1

10. FIELD AND POOL, OR WILDCAT
Wildcat

11. SEC., T., R., M., OR BLK. AND SURVEY OR AREA
SW SW 22-19N-112W., 6th PM

14. PERMIT NO.
20045

15. ELEVATIONS (Show whether DF, RT, GR, etc.)
GR 6368'

12. COUNTY OR PARISH
Lincoln

13. STATE
Wyoming

16. Check Appropriate Box To Indicate Nature of Notice, Report, or Other Data

NOTICE OF INTENTION TO:				SUBSEQUENT REPORT OF:			
TEST WATER SHUT-OFF	☐	PULL OR ALTER CASING	☐	WATER SHUT-OFF	☐	REPAIRING WELL	☐
FRACTURE TREAT	☐	MULTIPLE COMPLETE	☐	FRACTURE TREATMENT	☐	ALTERING CASING	☐
SHOOT OR ACIDIZE	☐	ABANDON*	☐	SHOOTING OR ACIDIZING	☐	ABANDONMENT*	☐
REPAIR WELL	☐	CHANGE PLANS	☐	(Other) Supplementary history			X
(Other)				(NOTE: Report results of multiple completion on Well Completion or Recompletion Report and Log form.)			

17. DESCRIBE PROPOSED OR COMPLETED OPERATIONS (Clearly state all pertinent details, and give pertinent dates, including estimated date of starting any proposed work. If well is directionally drilled, give subsurface locations and measured and true vertical depths for all markers and zones pertinent to this work.) *

Depth 2110', ran 13-3/8" surface casing, waiting on cement.

18. I hereby certify that the foregoing is true and correct

SIGNED B. H. Crofts TITLE Vice President, Gas Supply Operations DATE August 9, 1972

(This space for Federal or State office use)

APPROVED BY _____ TITLE _____ DATE _____

CONDITIONS OF APPROVAL, IF ANY:

RECEIVED
AUG 10 1972
STATE OIL & GAS CONSERVATION COMMISSION
OFFICE

*See Instructions on Reverse Side

Form 9-331
(May 1963)

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

SUBMIT IN TRIPLICATE* (Other instructions on reverse side)

Form approved.
Budget Bureau No. 42-R1424.

SUNDRY NOTICES AND REPORTS ON WELLS

(Do not use this form for proposals to drill or to deepen or plug back to a different reservoir. Use "APPLICATION FOR PERMIT—" for such proposals.)

5. LEASE DESIGNATION AND SERIAL NO.: W - 05929-A

6. IF INDIAN, ALLOTTEE OR TRIBE NAME: -

1. OIL WELL ☐ GAS WELL ☐ OTHER: Wildcat

7. UNIT AGREEMENT NAME: Bruff Unit

2. NAME OF OPERATOR: Mountain Fuel Supply Company

8. FARM OR LEASE NAME: Unit Well

3. ADDRESS OF OPERATOR: P. O. Box 1129, Rock Springs, Wyoming 82901

9. WELL NO.: 1

4. LOCATION OF WELL (Report location clearly and in accordance with any State requirements.* See also space 17 below.) At surface

660' FSL, 660' FWL SW SW

10. FIELD AND POOL, OR WILDCAT: Wildcat

11. SEC., T., R., M., OR BLK. AND SURVEY OR AREA: SW SW 22-19N-112W., 6th PM

14. PERMIT NO.: 20045

15. ELEVATIONS (Show whether DF, RT, GR, etc.): KB 6386.90' GR 6368'

12. COUNTY OR PARISH: Lincoln

13. STATE: Wyoming

16. Check Appropriate Box To Indicate Nature of Notice, Report, or Other Data

NOTICE OF INTENTION TO:				SUBSEQUENT REPORT OF:			
TEST WATER SHUT-OFF	☐	PULL OR ALTER CASING	☐	WATER SHUT-OFF	☐	REPAIRING WELL	☐
FRACTURE TREAT	☐	MULTIPLE COMPLETE	☐	FRACTURE TREATMENT	☐	ALTERING CASING	☐
SHOOT OR ACIDIZE	☐	ABANDON*	☐	SHOOTING OR ACIDIZING	☐	ABANDONMENT*	☐
REPAIR WELL	☐	CHANGE PLANS	☐	(Other) Supplementary history			X
(Other)				(NOTE: Report results of multiple completion on Well Completion or Recompletion Report and Log form.)			

17. DESCRIBE PROPOSED OR COMPLETED OPERATIONS (Clearly state all pertinent details, and give pertinent dates, including estimated date of starting any proposed work. If well is directionally drilled, give subsurface locations and measured and true vertical depths for all markers and zones pertinent to this work.) *

Depth 5410', drilling.

Landed 13-3/8" OD casing at 2109.00' KBM.

RECEIVED
AUG 21 1972
OFFICE of
STATE OIL & GAS SUPERVISOR

18. I hereby certify that the foregoing is true and correct

SIGNED B. H. Crouch TITLE Vice President Gas Supply Operations DATE 8/18/72

(This space for Federal or State office use)

APPROVED BY _____ TITLE _____ DATE _____

CONDITIONS OF APPROVAL, IF ANY:

*See Instructions on Reverse Side

Form 9-331
(May 1963)

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

SUBMIT IN TRIPLICATE* (Other instructions on reverse side)

Form approved.
Budget Bureau No. 42-R1424.

SUNDRY NOTICES AND REPORTS ON WELLS

(Do not use this form for proposals to drill or to deepen or plug back to a different reservoir. Use "APPLICATION FOR PERMIT—" for such proposals.)

5. LEASE DESIGNATION AND SERIAL NO.: W - 05929-A

6. IF INDIAN, ALLOTTEE OR TRIBE NAME: -

1. OIL WELL ☐ GAS WELL ☐ OTHER: Wildcat

7. UNIT AGREEMENT NAME: Bruff Unit

2. NAME OF OPERATOR: Mountain Fuel Supply Company

8. FARM OR LEASE NAME: Unit Well

3. ADDRESS OF OPERATOR: P. O. Box 1129, Rock Springs, Wyoming 82901

9. WELL NO.: 1

4. LOCATION OF WELL (Report location clearly and in accordance with any State requirements.* See also space 17 below.) At surface: 660' FSL, 660' FWL SW SW

10. FIELD AND POOL, OR WILDCAT: Wildcat

11. SEC., T., R., M., OR BLK. AND SURVEY OR AREA: SW SW 22-19N-112W., 6th PM

14. PERMIT NO.: 20045

15. ELEVATIONS (Show whether DF, RT, GR, etc.): KB 6386.90' GR 6368'

12. COUNTY OR PARISH: Lincoln

13. STATE: Wyoming

16. Check Appropriate Box To Indicate Nature of Notice, Report, or Other Data

NOTICE OF INTENTION TO:				SUBSEQUENT REPORT OF:			
TEST WATER SHUT-OFF	☐	PULL OR ALTER CASING	☐	WATER SHUT-OFF	☐	REPAIRING WELL	☐
FRACTURE TREAT	☐	MULTIPLE COMPLETE	☐	FRACTURE TREATMENT	☐	ALTERING CASING	☐
SHOOT OR ACIDIZE	☐	ABANDON*	☐	SHOOTING OR ACIDIZING	☐	ABANDONMENT*	☐
REPAIR WELL	☐	CHANGE PLANS	☐	(Other) Supplementary history			x
(Other)				(NOTE: Report results of multiple completion on Well Completion or Recompletion Report and Log form.)			

17. DESCRIBE PROPOSED OR COMPLETED OPERATIONS (Clearly state all pertinent details, and give pertinent dates, including estimated date of starting any proposed work. If well is directionally drilled, give subsurface locations and measured and true vertical depths for all markers and zones pertinent to this work.)*

Depth 6135', drilling.

DST #1: 5401-5456', Fort Union, IO ½ hr., ISI 1½ hrs., FO 2 hrs., FSI 3 hrs. 45 min., opened strong, strong throughout, no gas to surface, reopened weak, very weak by end of test, no gas to surface, recovered 5185' water. IHP 2267, IOFP's 213-1151, ISIP 2498, FOFP's 1193-2456, FSIP 2541, FHHP 2267.

RECEIVED
AUG 25 1972
OFFICE of
STATE OIL & GAS SUPERVISOR

18. I hereby certify that the foregoing is true and correct

SIGNED R. N. Clark TITLE Vice President Gas Supply Operations DATE 8/24/72

(This space for Federal or State office use)

APPROVED BY _____ TITLE _____ DATE _____

CONDITIONS OF APPROVAL, IF ANY:

*See Instructions on Reverse Side

Form 9-331
(May 1963)

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

SUBMIT IN TRIPLICATE* (Other instructions on reverse side)

Form approved.
Budget Bureau No. 42-R1424.

SUNDRY NOTICES AND REPORTS ON WELLS

(Do not use this form for proposals to drill or to deepen or plug back to a different reservoir. Use "APPLICATION FOR PERMIT—" for such proposals.)

5. LEASE DESIGNATION AND SERIAL NO.: W - 05929-A

6. IF INDIAN, ALLOTTEE OR TRIBE NAME: -

1. OIL WELL ☐ GAS WELL ☐ OTHER: Wildcat

7. UNIT AGREEMENT NAME: Bruff Unit

2. NAME OF OPERATOR: Mountain Fuel Supply Company

8. FARM OR LEASE NAME: Unit Well

3. ADDRESS OF OPERATOR: P. O. Box 1129, Rock Springs, Wyoming 82901

9. WELL NO.: 1

4. LOCATION OF WELL (Report location clearly and in accordance with any State requirements.* See also space 17 below.) At surface: 660' FSL, 660' FWL SW SW

10. FIELD AND POOL, OR WILDCAT: Wildcat

11. SEC., T., R., M., OR BLK. AND SURVEY OR AREA: SW SW 22-19N-112W., 6th PM

14. PERMIT NO.: 20045

15. ELEVATIONS (Show whether DF, RT, GR, etc.): KB 6386.90' GR 6368'

12. COUNTY OR PARISH: Lincoln

13. STATE: Wyoming

16. Check Appropriate Box To Indicate Nature of Notice, Report, or Other Data

NOTICE OF INTENTION TO:				SUBSEQUENT REPORT OF:			
TEST WATER SHUT-OFF	☐	PULL OR ALTER CASING	☐	WATER SHUT-OFF	☐	REPAIRING WELL	☐
FRACTURE TREAT	☐	MULTIPLE COMPLETE	☐	FRACTURE TREATMENT	☐	ALTERING CASING	☐
SHOOT OR ACIDIZE	☐	ABANDON*	☐	SHOOTING OR ACIDIZING	☐	ABANDONMENT*	☐
REPAIR WELL	☐	CHANGE PLANS	☐	(Other) Supplementary history			X
(Other)				(NOTE: Report results of multiple completion on Well Completion or Recompletion Report and Log form.)			

17. DESCRIBE PROPOSED OR COMPLETED OPERATIONS (Clearly state all pertinent details, and give pertinent dates, including estimated date of starting any proposed work. If well is directionally drilled, give subsurface locations and measured and true vertical depths for all markers and zones pertinent to this work.) *

Depth 8104', drilling.

DST #2: 7682-7700', Mesaverde, IO ½ hour, ISI 1 hour, FO 2 hours, FSI 2½ hours, opened with weak blow on both openings, no gas to surface, recovered 270' water cut mud and 397' gas cut and mud cut water.
IHP 3832, IOFP's 20-125, ISIP 3498, FOFP's 125-312, FSIP 3457, FHP 3832.

Landed 2087.60' net, 2109.60' gross of 13-3/8"OD, 61#, K-55, seal lock thread casing at 2109.00' KBM and set with 2250 sacks of cement.

RECEIVED
SEP 7 1972
OFFICE of
STATE OIL & GAS SUPERVISOR

18. I hereby certify that the foregoing is true and correct

SIGNED B. W. Croft TITLE Vice President, Gas Supply Operations DATE Sept. 5, 1972

(This space for Federal or State office use)

APPROVED BY _____ TITLE _____ DATE _____
CONDITIONS OF APPROVAL, IF ANY:

*See Instructions on Reverse Side

Form 9-331
(May 1963)

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

SUBMIT IN TRIPLICATE* (Other instructions on reverse side)

Form approved.
Budget Bureau No. 42-R1424.

5. LEASE DESIGNATION AND SERIAL NO.: W - 05929-A

6. IF INDIAN, ALLOTTEE OR TRIBE NAME: -

SUNDRY NOTICES AND REPORTS ON WELLS

(Do not use this form for proposals to drill or to deepen or plug back to a different reservoir. Use "APPLICATION FOR PERMIT—" for such proposals.)

1. OIL WELL ☐ GAS WELL ☐ OTHER: Wildcat

7. UNIT AGREEMENT NAME: Bruff Unit

2. NAME OF OPERATOR: Mountain Fuel Supply Company

8. FARM OR LEASE NAME: Unit Well

3. ADDRESS OF OPERATOR: P. O. Box 1129, Rock Springs, Wyoming 82901

9. WELL NO.: 1

4. LOCATION OF WELL (Report location clearly and in accordance with any State requirements.* See also space 17 below.) At surface: 660' FSL, 660' FWL SW SW

10. FIELD AND POOL, OR WILDCAT: Wildcat

11. SEC., T., R., M., OR BLK. AND SURVEY OR AREA: SW SW 22-19N-112W., 6th PM

14. PERMIT NO.: 20045

15. ELEVATIONS (Show whether DF, RT, GR, etc.): KB 6386.90' GR 6368'

12. COUNTY OR PARISH: Lincoln

13. STATE: Wyoming

16. Check Appropriate Box To Indicate Nature of Notice, Report, or Other Data

NOTICE OF INTENTION TO:				SUBSEQUENT REPORT OF:			
TEST WATER SHUT-OFF	☐	PULL OR ALTER CASING	☐	WATER SHUT-OFF	☐	REPAIRING WELL	☐
FRACTURE TREAT	☐	MULTIPLE COMPLETE	☐	FRACTURE TREATMENT	☐	ALTERING CASING	☐
SHOOT OR ACIDIZE	☐	ABANDON*	☐	SHOOTING OR ACIDIZING	☐	ABANDONMENT*	☐
REPAIR WELL	☐	CHANGE PLANS	☐	(Other) Supplementary history			X
(Other)				(NOTE: Report results of multiple completion on Well Completion or Recompletion Report and Log form.)			

17. DESCRIBE PROPOSED OR COMPLETED OPERATIONS (Clearly state all pertinent details, and give pertinent dates, including estimated date of starting any proposed work. If well is directionally drilled, give subsurface locations and measured and true vertical depths for all markers and zones pertinent to this work.) *

Depth 9140', drilling.

RECEIVED
SEP 13 1972
STATE OIL & GAS SUPERVISOR

18. I hereby certify that the foregoing is true and correct

SIGNED B. W. Crofts TITLE Vice President, Gas Supply Operations DATE Sept. 12, 1972

(This space for Federal or State office use)

APPROVED BY _____ TITLE _____ DATE _____

CONDITIONS OF APPROVAL, IF ANY:

*See Instructions on Reverse Side

Form 3160-4
(November 1983)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

Form approved
Budget Bureau No. 1004-0137
Expires August 31, 1985

POSTED

WELL COMPLETION OR RECOMPLETION REPORT AND LOG

5. LEASE DESIGNATION AND SERIAL NO.: W-05929-A

1a. TYPE OF WELL: OIL WELL ☐ GAS WELL ☒ DRY ☐ OTHER:

6. IF INDIAN, ALLOTTEE OR TRIBE NAME: -----

b: TYPE OF COMPLETION: NEW WELL ☐ WORK OVER ☐ DEEP-EN ☐ PLUG BACK ☐ DIFF. RESVR. ☐ OTHER: P & A

7. UNIT AGREEMENT NAME: BRUFF

8. FARM OR LEASE NAME: UNIT WELL

2. NAME OF OPERATOR: WEXPRO COMPANY

9. WELL NO.: 1

3. ADDRESS OF OPERATOR: P.O. BOX 458, ROCK SPRINGS, WY 82902

10. FIELD AND POOL, OR WILDCAT: BRUFF - MORGAN

4. LOCATION OF WELL
At surface: 660' FSL, 660' FWL, SW SW
At top prod. interval reported below
At total depth

11. SEC., T., R., M., OR BLOCK & SURVEY OR AREA: 22-19N-112W

RECEIVED
NOV 18 1994
WYOMING OIL & GAS CONSERVATION COMMISSION

14. PERMIT NO.	DATE ISSUED	12. COUNTY / PARISH	13. STATE
49-023-20045	7/18/72	LINCOLN	WYOMING

15. DATE SPUDDED	16. DATE TD REACHED	17. DATE COMPLETED (ready to prod.)	18. ELEVATIONS (DF, RKB, RT, GR, ETC.)		19. ELEV. CASINGHEAD
7/28/72	4/2/73	P & A	KB 6388.5	GR 6368	

20. TOTAL DEPTH, MD & TVD	21. PLUG BACK TD, MD & TVD	22. IF MULT. COMPL. HOW MANY	23. INTERVALS DRILLED BY	ROTARY TOOLS	CABLE TOOLS
18208	SURFACE		-------->	0-18208	-----

24. PRODUCING INTERVAL(S) OF THIS COMPLETION - TOP, BOTTOM, NAME, (MD AND TVD): NONE - P & A

25. WAS DIRECTIONAL SURVEY MADE: NO

26. TYPE ELECTRIC AND OTHER LOGS RUN: NONE ON P & A

27. WAS WELL CORED: YES

28. CASING RECORD (Report all strings set in well)

CASING SIZE	WEIGHT LB/FT	DEPTH SET (MD)	HOLE SIZE	CEMENTING RECORD	AMOUNT PULLED
13-3/8	61	2109.00	17-1/2	2250 SACKS	NONE
9-5/8	47 & 53.5	12448.73	12-1/4	1860 SACKS	NONE
			8-1/2		

29. LINER RECORD

SIZE	TOP (MD)	BOTTOM (MD)	SACKS CEMENT	SCREEN (MD)
7	12128.80	18200.16	1600	

30. TUBING RECORD

SIZE	DEPTH SET (MD)	PACKER SET (MD)
N/A		

31. PERFORATION RECORD (Interval, size, and number)

32. ACID, SHOT, FRACTURE, CEMENT SQUEEZE, ETC.

DEPTH INTERVAL (MD)	AMOUNT AND KIND OF MATERIAL USED
11899-12180	98 SACKS CEMENT
8678-8928	90 SACKS CEMENT

PUMPED 295 SX CEMENT BELOW RETAINER @ 5075' THRU PERFS @ 5125' WHILE CIRCULATING 9-5/8 X 13-3/8 ANN. SET 50' CEMENT PLUG ON TOP OF RETAINER FROM 4875'-5125'.

(SEE BACK OF PAGE)

33. PRODUCTION

DATE FIRST PRODUCTION	PRODUCTION METHOD (Flowing, gas lift, pumping - size and type of pump)	WELL STATUS (Producing or shut-in)
N/A		P & A

DATE OF TEST	HOURS TESTED	CHOKE SIZE	PROD'N FOR TEST PERIOD -------->	OIL-BBL	GAS-MCF	WATER-BBL	GAS-OIL RATIO
						---	---

FLOW. TUBING PRESS	CASING PRESSURE	CALCULATED 24 HOUR RATE -------->	OIL-BBL	GAS-MCF	WATER-BBL	OIL GRAVITY-API (CORR.)
			---		---	-----

34. DISPOSITION OF GAS (Sold, used for fuel, vented, etc.)

TEST WITNESSED BY

35. LIST OF ATTACHMENTS

36. I hereby certify that the foregoing and attached information is complete and correct as determined from all available records.

SIGNED _____ TITLE OPERATIONS MANAGER DATE _____

37. SUMMARY OF POROUS ZONES: (Show all important zones of porosity and contents thereof: cored intervals: and all drill-stem tests, including depth interval, cushion used, time tool open, flowing and shut-in pressures, and recoveries):

FORMATION	TOP	BOTTOM	DESCRIPTION, CONTENTS, ETC.

32. (CONT.)

PUMPED 318 SACKS CEMENT BELOW RETAINER @ 2000' THRU PERFS @ 2240 WHILE CIRCULATING THE 9-5/8 X 13-3/8 ANNULUS. SET 50' CEMENT PLUG ON TOP OF RETAINER FROM 1950'-2000'.

PUMPED 239 SACKS CEMENT THRU PERFS @ 300' TO SET A SURFACE PLUG IN 9-5/8 CASING AND 9-5/8 X 13-3/8 ANNULUS.

38. GEOLOGIC MARKERS

NAME	TOP MEAS. DEPTH	TOP TRUE VERT. DEPTH
BRIDGER	surface	
GREEN RIVER	530	
WASATCH	2005	
FORT UNION	4055	
MESAVERDE	7190	
HILLIARD	7710	
FRONTIER	11278	
ASPEN	11500	
DAKOTA	11900	
MORRISON	12348	
CURTIS	12852	
ENTRADA	12958	
TWIN CREEK	13097	
NUGGET	13742	
ANKAREH	14590	
THAYNES	14990	
WOODSIDE	15440	
PHOSPHORIA	16105	
WEBER	16512	
MORGAN	17040	
MADISON	17550	

Form 9-330
(Rev. 5-63)

Confidential

1-UW

POSTED

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

SUBMIT IN DUPLICATE* (See other instructions on reverse side)

Form approved.
Budget Bureau No. 42-R355.5.

WELL COMPLETION OR RECOMPLETION REPORT AND LOG*

5. LEASE DESIGNATION AND SERIAL NO.: W-05929-A

6. IF INDIAN, ALLOTTEE OR TRIBE NAME: -

1a. TYPE OF WELL: OIL WELL ☐ GAS WELL ☒ DRY ☐ Other

b. TYPE OF COMPLETION: NEW WELL ☒ WORK OVER ☐ DEEP-EN ☐ PLUG BACK ☐ DIFF. RESVR. ☐ Other

7. UNIT AGREEMENT NAME: Bruff Unit

8. FARM OR LEASE NAME: Unit Well

2. NAME OF OPERATOR: Mountain Fuel Supply Company

9. WELL NO.: 1

3. ADDRESS OF OPERATOR: P. O. Box 1129, Rock Springs, Wyoming 82901

10. FIELD AND POOL, OR WILDCAT: Wildcat

4. LOCATION OF WELL (*Report location clearly and in accordance with any State requirements*)*
At surface: 660' FSL, 660' FWL SW SW
At top prod. interval reported below
At total depth

11. SEC., T., R., M., OR BLOCK AND SURVEY OR AREA: SW SW 22-19N-112W., 6th PM

14. PERMIT NO.: 43-20045 DATE ISSUED: 7-18-72

12. COUNTY OR PARISH: Lincoln 13. STATE: Wyoming

15. DATE SPUDDED	16. DATE T.D. REACHED	17. DATE COMPL. (*Ready to prod.*)	18. ELEVATIONS (DF, RKB, RT, GR, ETC.)*	19. ELEV. CASINGHEAD
7-28-72	4-2-73	5-12-73	KB 6388.50' GR 6368'	-

20. TOTAL DEPTH, MD & TVD	21. PLUG, BACK T.D., MD & TVD	22. IF MULTIPLE COMPL., HOW MANY*	23. INTERVALS DRILLED BY	ROTARY TOOLS	CABLE TOOLS
18,208'	17,390'		→	0-18,208'	

24. PRODUCING INTERVAL(S), OF THIS COMPLETION—TOP, BOTTOM, NAME (MD AND TVD)*: 17,295-17,345' Morgan

25. WAS DIRECTIONAL SURVEY MADE: No

26. TYPE ELECTRIC AND OTHER LOGS RUN: Sidewall Neutron Porosity, Comp. Formation Density, Comp. Neutron-Formation Density, DIL, BHC Sonic-Gamma Ray

27. WAS WELL CORED: Yes

28. CASING RECORD (*Report all strings set in well*)

CASING SIZE	WEIGHT, LB./FT.	DEPTH SET (MD)	HOLE SIZE	CEMENTING RECORD	AMOUNT PULLED
13-3/8	61	2,109.00	17-1/2	2250	0
9-5/8	47 & 53.5	12,448.73	12-1/4	1860	0
			8-1/2		

29. LINER RECORD

SIZE	TOP (MD)	BOTTOM (MD)	SACKS CEMENT*	SCREEN (MD)
7	12,128.80	18,200.16	1600	

30. TUBING RECORD

SIZE	DEPTH SET (MD)	PACKER SET (MD)
3-1/2	17,242.10	

31. PERFORATION RECORD (*Interval, size and number*)
18,128-18,114', 18,026-18,022', 18,008-18,004', 17,970-17,966', 17,950-17,938', 17,928-17,924', 17,906-17,881', 17,674-17,656', 17,622-17,610', 17,590-17,562', all 1 jumbo jet shot per foot (over)

32. ACID, SHOT, FRACTURE, CEMENT SQUEEZE, ETC.

DEPTH INTERVAL (MD)	AMOUNT AND KIND OF MATERIAL USED

33.* PRODUCTION

DATE FIRST PRODUCTION	PRODUCTION METHOD (*Flowing, gas lift, pumping—size and type of pump*)	WELL STATUS (*Producing or shut-in*)
5-12-73	Flowing	Shut-in

DATE OF TEST	HOURS TESTED	CHOKE SIZE	PROD'N. FOR TEST PERIOD →	OIL—BBL.	GAS—MCF.	WATER—BBL.	GAS-OIL RATIO
5/11-12/73	16-1/2	1"					3831

FLOW. TUBING PRESS.	CASING PRESSURE	CALCULATED 24-HOUR RATE →	OIL—BBL.	GAS—MCF.	WATER—BBL.	OIL GRAVITY-API (CORR.)
280	-		360	1379	0	66

34. DISPOSITION OF GAS (*Sold, used for fuel, vented, etc.*): Vented while testing

TEST WITNESSED BY:

35. LIST OF ATTACHMENTS: Logs as above, Well Completion and Well Lithology to be sent at a later date.

36. I hereby certify that the foregoing and attached information is complete and correct as determined from all available records

SIGNED BW Craft TITLE Vice President, Gas Supply Operations DATE May 30, 1973

*(See Instructions and Spaces for Additional Data on Reverse Side)

INSTRUCTIONS

General: This form is designed for submitting a complete and correct well completion report and log on all types of lands and leases to either a Federal agency or a State agency, or both, pursuant to applicable Federal and/or State laws and regulations. Any necessary special instructions concerning the use of this form and the number of copies to be submitted, particularly with regard to local, area, or regional procedures and practices, either are shown below or will be issued by, or may be obtained from, the local Federal and/or State office. See instructions on items 22 and 24, and 33, below regarding separate reports for separate completions.

If not filed prior to the time this summary record is submitted, copies of all currently available logs (drillers, geologists, sample and core analysis, all types electric, etc.), formation and pressure tests, and directional surveys, should be attached hereto, to the extent required by applicable Federal and/or State laws and regulations. All attachments should be listed on this form, see item 35.

Item 4: If there are no applicable State requirements, locations on Federal or Indian land should be described in accordance with Federal requirements. Consult local State or Federal office for specific instructions.

Item 18: Indicate which elevation is used as reference (where not otherwise shown) for depth measurements given in other spaces on this form and in any attachments.

Items 22 and 24: If this well is completed for separate production from more than one interval zone (multiple completion), so state in item 22, and in item 24 show the producing interval, or intervals, top(s), bottom(s) and name(s) (if any) for only the interval reported in item 33. Submit a separate report (page) on this form, adequately identified, for each additional interval to be separately produced, showing the additional data pertinent to such interval.

Item 29: *"Sacks Cement":* Attached supplemental records for this well should show the details of any multiple stage cementing and the location of the cementing tool.

Item 33: Submit a separate completion report on this form for each interval to be separately produced. (See instruction for items 22 and 24 above.)

37. SUMMARY OF POROUS ZONES:
SHOW ALL IMPORTANT ZONES OF POROSITY AND CONTENTS THEREOF; CORED INTERVALS; AND ALL DRILL-STEM TESTS, INCLUDING DEPTH INTERVAL TESTED, CUSHION USED, TIME TOOL OPEN, FLOWING AND SHUT-IN PRESSURES, AND RECOVERIES

FORMATION	TOP	BOTTOM	DESCRIPTION, CONTENTS, ETC.
31. Perforated 17,498-17,424' with one jumbo jet shot per foot. perf. 17,498-17,424' with 2 jumbo jet shots per foot perf. 17,345-17,295' with 1 jumbo jet shot per foot.			

38. GEOLOGIC MARKERS

NAME	TOP MEAS. DEPTH	TOP TRUE VERT. DEPTH
Log tops:		
Bridger	0'	
Green River	530	
Wasatch	2,005	
Fort Union	4,055	
Mesaverde	7,190	
Hilliard	7,710	
Frontier	11,278	
Aspen	11,500	
Dakota	11,900	
Morrison	12,348	
Curtis	12,852	
Entrada	12,958	
Twin Creek	13,097	
Nugget	13,742	
Ankareh	14,590	
Thaynes	14,990	
Woodside	15,440	
Phosphoria	16,105	
Weber	16,512	
Morgan	17,040	
Madison	50'	

U.S. GOVERNMENT PRINTING OFFICE: 1963—O-683636

Form 3160-5
(June 1990)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

FORM APPROVED
Budget Bureau No. 1004-0135
Expires: March 31, 1993

SUNDRY NOTICES AND REPORTS ON WELLS

Do not use this form for proposals to drill or to deepen or reentry to a different reservoir.
Use "APPLICATION FOR PERMIT—" for such proposals

SUBMIT IN TRIPLICATE

5. Lease Designation and Serial No.: W-05929

6. If Indian, Allottee or Tribe Name:

7. If Unit or CA, Agreement Designation: Bruff

1. Type of Well: ☐ Oil Well ☒ Gas Well ☐ Other

8. Well Name and No.: Bruff Unit No. 1

2. Name of Operator: Wexpro Company

9. API Well No.: 49-023-20045

3. Address and Telephone No.: P.O. Box 458, Rock Springs, Wy. 82902 307/382-9791

10. Field and Pool, or Exploratory Area: Bruff

4. Location of Well (Footage, Sec., T., R., M., or Survey Description): 660' FSL, 660' FWL SW SW 22-19N-112W

11. County or Parish, State: Lincoln, Wyoming

12. CHECK APPROPRIATE BOX(s) TO INDICATE NATURE OF NOTICE, REPORT, OR OTHER DATA

TYPE OF SUBMISSION	TYPE OF ACTION	
☒ Notice of Intent	☒ Abandonment	☐ Change of Plans
☐ Subsequent Report	☐ Recompletion	☐ New Construction
☐ Final Abandonment Notice	☐ Plugging Back	☐ Non-Routine Fracturing
	☐ Casing Repair	☐ Water Shut-Off
	☐ Altering Casing	☐ Conversion to Injection
	☐ Other _____	☐ Dispose Water

(Note: Report results of multiple completion on Well Completion or Recompletion Report and Log form.)

13. Describe Proposed or Completed Operations (Clearly state all pertinent details, and give pertinent dates, including estimated date of starting any proposed work. If well is directionally drilled, give subsurface locations and measured and true vertical depths for all markers and zones pertinent to this work.)*

Wexpro Company intends to plug and abandon this well using the following procedure. MIRU workover rig. Blow well down and install BOP's. Pick up 2 7/8" tubing and trip in to 12,130'. Balanced cement plugs will then be set in the 9 5/8" casing from 12,130'-11,930'; 9000'-8800'; and 6000'-5800'. The 9 5/8" casing will be perforated from 2050-2048' and cement retainer will be set at 1850'. A 200' cement plug will be set inside the 9 5/8" casing and 9 5/8"X13 3/8" annulus by circulating cement below the retainer (27 Bbls cement). Perforate the 9 5/8" casing at 200' and set a 200' surface plug in both the 9 5/8" casing and 9 5/8X 13 3/8" annulus. Nipple down BOP's and casing spool. Cut off the casing head and install a regulation dry hole marker. Reclaim and reseed location as stipulated.

(Present Status Drawing Attached)

RECEIVED
JUN 16 1992
WYOMING OIL
CONSERVATION COMMISSION

14. I hereby certify that the foregoing is true and correct

Signed _____ Title District Manager Date June 11, 1992

(This space for Federal or State office use)

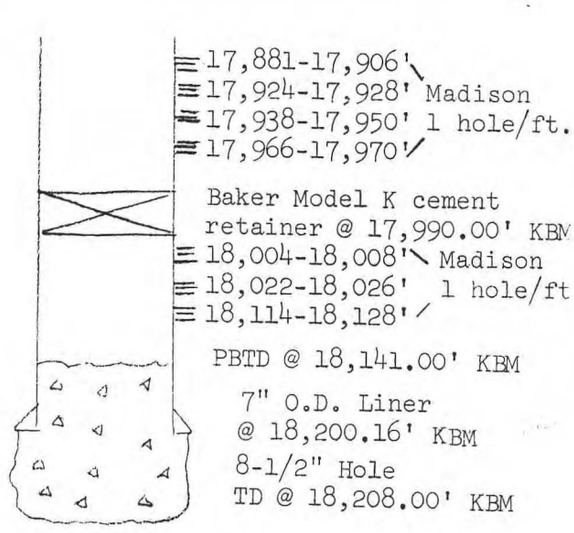
Approved by _____ Title _____ Date _____
Conditions of approval, if any:

Title 18 U.S.C. Section 1001, makes it a crime for any person knowingly and willfully to make to any department or agency of the United States any false, fictitious or fraudulent statements or representations as to any matter within its jurisdiction.

*See Instruction on Reverse Side

cmt treated with 35% SSA-1, 10% salt, 1.5% CFR-2, & 5% HR-4. Good circ while mixing & displacing. Displaced with mud. Cement in place @ 7:30 P.M., 11-25-72. (The NSCo. 10" 5000 psi csg spool is 2.50' below grd level.

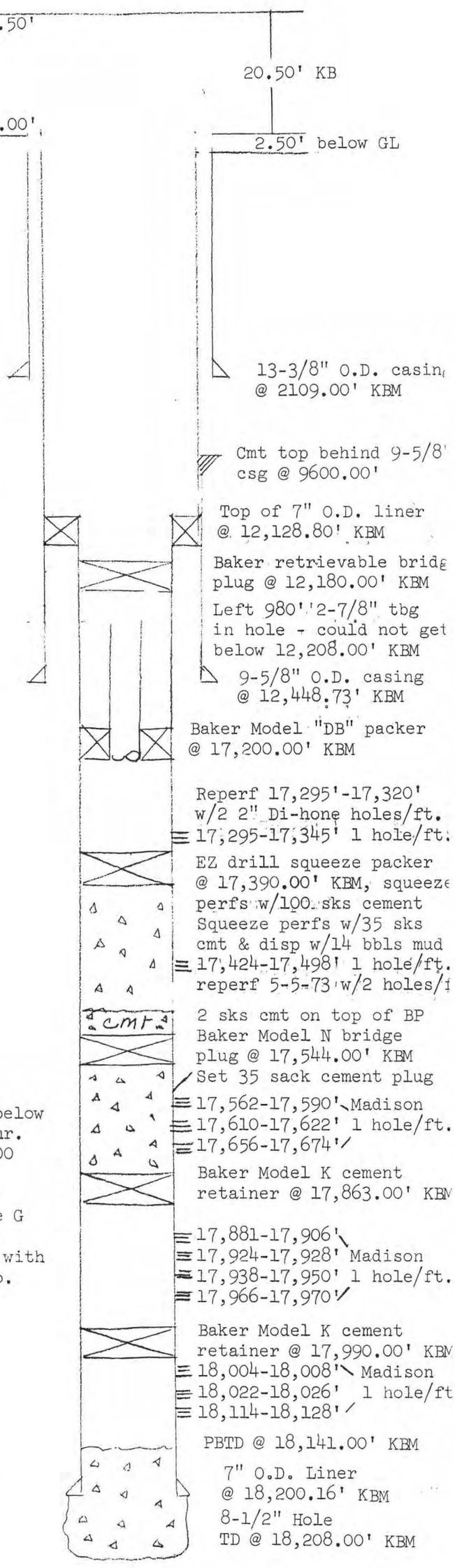
See attachment for details of 7" O.D. liner & Baker Model DB packer



Drawn by GAS 3-23-73
Revised by WAA 5-1-73
Revised by JJS 2-1-76
Revised by GB 6-11-84

Bruff Unit Well No. 1
Bruff Field
SW SW Sec. 22, T. 19 N., R. 112 W.
Lincoln County, Wyoming

Schematic-Not drawn to scale
Drilled by MFSCo. Nov. 1972



13-3/8" O.D. Surface Casing

	Net
1 13-5/8" BX 5000 psi slip on flange	1.68
1 pc. 13-3/8" O.D., 61#, K-55 seal lock casing	17.11
52 jts. 13-3/8" O.D., 61#, K-55 seal lock casing	2,024.69
1 Baker float collar	1.50
1 jt. 13-3/8" O.D., 61#, K-55 seal lock casing	40.80
1 Baker float guide shoe	1.82
	2,087.60

The above casing is landed @ 2109.00' KBM or 21.40' below KB. Float collar, guide shoe & 1st 17 joints of csg were spot welded, top & bottom. Cemented with 2050 sks 50-50 Pozmix treated w/1% CFR-2, 10% salt, 2% gel & 1/4# per sk flocele. Circ csg 45 mins prior to cmtg. Displaced with 314 bbls wtr. Ret 5 bbls of wtr cut cmt to surf. Max pump pressure was 800#. Bumped plugs to 1500#. Rel pressure. Float equipment held. Cmtd back side with 200 sks 50-50 Pozmix treated w/3% CaCl. Ret 5 bbls cmt. Cmt in place @ 4:15 P.M., 8-8-72.

9-5/8" O.D. Intermediate Casing

	Net
1 NSCo. 10" 5000 psi casing spool	
1 pc. 9-5/8" O.D., 47#, Soo-95 buttress thread casing	14.33
46 jts. 9-5/8" O.D., 47#, Soo-95 buttress thread casing	1,846.22
186 jts. 9-5/8" O.D., 47#, Soo-95, LT&C casing	7,589.36
71 jts. 9-5/8" O.D., 53.50#, Soo-95, LT&C casing	2,887.98
1 Larkin flapper float collar	1.10
1 jt. 9-5/8" O.D., 53.50#, Soo-95, LT&C casing	39.95
1 Larkin flapper float collar	1.10
1 jt. 9-5/8" O.D., 53.50#, Soo-95, LT&C casing	42.05
1 Larkin 9-5/8" Hi-Geyser flapper float shoe	3.64
	12,425.73

The above casing is landed @ 12,448.73' KBM or 23.00' below KB in a NSCo. 10" 5000 psi casing spool. Circ hole 1 hr. prior to cmtg with rig pump. Prior to cmtg injected 300 bbls wtr, 500 bbls packer fluid & 1000 gals mud flush. Cmtd w/1530 sks 50-50 Pozmix with 2% gel treated w/35% SSA-1, 15% salt, 1% CFR-2, & 0.4% HR-4 and 330 sks Type G cmt treated with 35% SSA-1, 10% salt, 1.5% CFR-2, & 5% HR-4. Good circ while mixing & displacing. Displaced with mud. Cement in place @ 7:30 P.M., 11-25-72. (The NSCo. 10" 5000 psi csg spool is 2.50' below grd level.

See attachment for details of 7" O.D. liner & Baker Model DB packer

Form 3160-5
(June 1990)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

FORM APPROVED
Budget Bureau No. 1004-0135
Expires: March 31, 1993

SUNDRY NOTICES AND REPORTS ON WELLS

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Use "APPLICATION FOR PERMIT -" for such proposals

SUBMIT IN TRIPLICATE

5. LEASE DESIGNATION AND SERIAL NO.: W-05929-A

6. IF INDIAN, ALLOTTEE OR TRIBE NAME: ----

7. IF UNIT OR CA, AGREEMENT DESIGNATION: BRUFF

1. TYPE OF WELL: [ ] OIL WELL [X] GAS WELL [ ] OTHER

8. WELL NAME AND NO.: BRUFF UNIT NO. 1

2. NAME OF OPERATOR: WEXPRO COMPANY

9. API WELL NO.: 49-023-20045

3. ADDRESS AND TELEPHONE NO.: P. O. BOX 458, ROCK SPRINGS, WY 82902 (307) 382-9791

10. FIELD AND POOL, OR EXPLORATORY AREA: BRUFF

4. LOCATION OF WELL (FOOTAGE, SEC., T., R., M., OR SURVEY DESCRIPTION)

660' FSL, 660' FWL SW SW
22-19N-112W

11. COUNTY OR PARISH, STATE: LINCOLN, WYOMING

RECEIVED
NOV 18 1994
WYOMING OIL & GAS CONSERVATION COMMISSION

12. CHECK APPROPRIATE BOX(S) TO INDICATE NATURE OF NOTICE, REPORT, OR OTHER DATA

TYPE OF SUBMISSION	TYPE OF ACTION	
[ ] Notice of Intent	[X] Abandonment	[ ] Change in Plans
	[ ] Recompletion	[ ] New Construction
[ ] Subsequent Report	[ ] Plugging Back	[ ] Non-Routine Fracturing
	[ ] Casing Repair	[ ] Water Shut-Off
[X] Final Abandonment Notice	[ ] Altering Casing	[ ] Conversion to Injection
	[ ] Other _____	[ ] Dispose Water

(Note: Report results of multiple completion on Well Completion or Recompletion Report and Log form.)

13. Describe Proposed or Completed Operations (Clearly state all pertinent details, and give pertinent dates, including estimated date of starting any proposed work. If well is directionally drilled, give subsurface locations and measured and true vertical depths for all markers and zones pertinent to this work.)*

From 10/10/94 through 10/17/94, this well was plugged & abandoned as follows:
A contract workover rig was moved in & rigged up 10/10/94 & utilizing a 2-7/8" work string the following plugs were set.

Plug No. 1: A 281' balanced cmt plug was set in the 9-5/8" csg on top of the retrievable bridge plug @ 12,180' from 12,180'-11,899'.

Plug No. 2: The 9-5/8" csg was perforated @ 9000' & a cmt retainer was set @ 8958'. An injection rate could not be established below the retainer so a 250' balanced cmt plug was set in the 9-5/8" csg above the retainer from 8928'-8678'.

Plug No. 3: The 9-5/8" csg was perforated @ 5125' & a cmt retainer was set @ 5075'. An injection rate was established through the retainer & a 250' cmt plug was circulated into the 9-5/8" X open hole annulus from 5125'-4875'. A 50' cmt plug was left on top of the retainer from 5075'-5025'.

Plug No. 4: The 9-5/8" csg was perforated @ 2240' & a cmt retainer was set @ 2000'. An injection rate was established through the retainer & an approximate 300' cmt plug was circulated into the 9-5/8" x 13-3/8" annulus from 2240'-1940'. A 50' cmt plug was left on top of the retainer from 2000'-1950'.

Plug No. 5: The 9-5/8" csg was perforated @ 300' & a 300' surface cmt plug was circulated into the 9-5/8" csg and 9-5/8" x 13-3/8" annulus with cmt returned to surface.

Note: A 9 ppg pozmix slurry was circulated into the well as the spacer fluid between all plugs.
After the final surface plug was set, the csg spool was removed & a regulation dry hole marker was installed. The workover rig was rigged down & moved off 10/17/94.
Location reclamation will take place when conditions allow.

14. I hereby certify that the foregoing is true and correct

Signed _____ Title OPERATIONS MANAGER Date NOVEMBER 17, 1994

(This space for Federal or State office use)

Approved by _____ Title _____ Date _____

Conditions of approval, if any:

Title 18 U.S. C. Section 1001, makes it a crime for any person knowingly and willfully to make to any department or agency of the United States any false, fictitious or fraudulent statements or representations as to any matter within its jurisdiction.

*See Instruction on Reverse Side

In Confidential File.

COMPLETION REPORT

Well: BRUFF UNIT #1 Date: October 5, 1973

Area: Bruff Unit Lease No: Wyoming 05929-A

[X] New Field Wildcat [ ] Development Well [ ] Shallower Pool Test

[ ] New Pool Wildcat [ ] Extension [ ] Deeper Pool Test

Location: 660 feet from South line, 660 feet from West line

SW ¼ SW ¼

Section 22, Township 19 N, Range 112 W

County: Lincoln State: Wyoming

Operator: Mountain Fuel Supply Company

Elevation: KB 6389' Gr 6368' Total Depth: Driller 18,208' Log 18,208'

Drilling Commenced: July 28, 1972 Drilling Completed: April 2, 1973

Rig Released: June 2, 1973 Well Completed: May 12, 1973

Sample Tops: (unadjusted)

						Log Tops:	
Fort Union	4032'	Stump	12,817'	Dinwoody	15,886'	Bridger	Surface
Mesaverde	7193'	Pruess	12,954'	Phosphoria	16,167'	Green Rvr	530'
Hilliard	7692'	Twin Creek	13,216'	Weber	16,543'	Wasatch	2055'
Frontier	11,341'	Nugget	13,794'	Morgan	17,108'	Fort Union	4055'
Mowry	11,496'	Ankareh	14,410'	Madison	17,629'	Mesaverde	7190'
Dakota	11,958'	Thaynes	14,810'			Hilliard	7710'
Morrison	12,188'	Woodside	15,318'			Frontier	11,278'
		Sample Cuttings:				Mowry	11,500'
						Dakota	11,900'
						Morrison	12,348'
						Stump	12,852'
						Pruess	12,958'
						Twin Ck.	13,097'
						Nugget	13,742'
						Ankareh	14,590'
						Thaynes	14,990'
						Woodside	15,440'
						Phosphoria	16,105'
						Weber	16,512'
						Morgan	17,040'
						Madison	17,550'

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Status: Shut In

Producing Formation: Morgan

Perforations: 17,295'-17,345' w/one shot/ft.

Stimulation: None

Production: 1379 Mcfgpd, 360 BOPD w/GOR of 3831:1

Plug Back Depth: 17,390'

Plugs: 17,390'

Hole Size: 17 1/2" to 2110', 12 1/4" to 12,500', 8 1/2" to TD.

Casing/Tubing: 13 3/8" landed @ 2109' w/2250 sx; 9 5/8" landed @ 12,463.23' w/1860 sx; 7" landed @ 18,200.16' w/1600 sx; 3 1/2" tubing to 17,242.10'.

Logging - Mud: 5" and 2" from 4000' to TD.

Mechanical: DIL (w/2" linear and 5" logarithmic) surface casing to TD. Integrated Sonic GR w/Caliper and Compensated Formation Density GR from 10,100'-TD, Continuous Four Arm Dipmeter from 12,463'-TD. SNP-GR from 16,000'-TD and FDC-CNL from 16,000'-

Contractor: Loffland Brothers Drilling Company

Completion Report Prepared by: J. W. Langman

Remarks:

COMPLETION REPORT (cont.)

Well: BRUFF UNIT #1

Area: Bruff Unit

Cored Intervals (recovery): #1-16,450'-16,487 Cut 37' Rec 37'; #2-16,487'-16,506 Cut 19 Rec 19; #3-16,540'-16,548' Cut 8 Rec 8; and #4-16,548'-16,561 Cut 13 Rec 11.

Tabulation of Drill Stem Tests: Open hole DST's

Formation	No.	Interval	IHP	IFP (min.)	ISIP (min.)	FFP (min.)	FSIP (min.)	FHP	Samples Caught	BHT°F	Remarks
Fort Union	1	5407-5456	2737	216-1143(30)	2509(90)	1213-2272(119)	2526(226)	2695	Water	120°	NGTS, Rec. 5185' Water - Res .054 @ 68°
Mesaverde	2	7682-7700	3820	23-104(30)	3484(66)	125-310(120)	3455(151)	3810	Water	140°	NGTS, Rec. 270' MCW, 397' Sli G&MCW - Res .6 @ 68°F
Hilliard	3	10437-10550	5279	281-399(30)	475(60)	475-590(120)	639(150)	5257	-----	192°	NGTS, Rec. 1500' mud
Nugget	4	13797-13892	6377	393-653				6305	-----		Misrun, no packer seat
Nugget	5	13845-13892	6428	2133-3013(48)	5911(123)	2462-3235(228)	5578(356)	6337	Water	220°	NGTS, Rec. 3188' water. Ran 1500' of nitrogen cushion
Phosphoria	6	16334-16450	7636					7636	-----		Misrun, Ran 6000' N_2 cushion
Phosphoria	7	16358-16450	7701	1924-1921(31)	2337(119)	1902-1886(239)	2222(361)	7701	-----	300°	NGTS, Rec. 100' mud. Ran 6000' N_2 cushion
Weber	8	16515-16572	7945	2150-2169(30)	5731(120)	2217-2261(240)	5275(360)	7854	-----	315°	NGTS, Rec. 130' GCM. Ran 6000' N_2 cushion
Weber	9	16572-16635	7877	2127-2156(31)	4344(120)	2188-2217(244)	5965(355)	7835	-----	302°	NGTS, Ran 6000' N_2 cushion
Weber	10	16924-16974	8026					7993	-----		Misrun, Ran 6000' N_2 cushion
Weber	11	16909-16974	8110	2220-2238(31)	7638(119)	2257-2382(246)	7479(364)	7929	-----	301°	NGTS, Ran N_2 cushion

COMPLETION REPORT (cont.)

Well: BRUFF UNIT #1

Area: Bruff Unit

Cored Intervals (recovery): See page 2A

Tabulation of Drill Stem Tests: Production DST's

Formation	No.	Interval Perfs:	IHP	IFP (min.)	ISIP (min.)	FFP (min.)	FSIP (min.)	FHP	Samples Caught	BHT°F	Remarks
Madison	1	18004-18128	11061	2513-5857(61)	8165(118)	6078-8116(301)	8210(120)	10987	Water	320°	GTS-H_2S NETG, Rec.17911' water - Res .0 @ 68°F.
Madison	2	18004-18128	10965	2179-5725(60)	8032(107)	5919-7049(287)	8048(251)	10481	Water	312°	GTS 20 min, non-combustible @ 69 Mcf Rec.17804' water - Res 2.0 @ 68°F.
Madison	3	17562-17674	11477	5035-4962(56)	7909(121)	4849-4978(121)	7325(62)	10322	-----	310°	NGTS, Misrun
Madison	4	17562-17674	10847	273-621(60)	6495(115)	812-1006(282)	7662(360)	9825	Water	310°	GTS 22 min, non-combustible @ 86 Mcf, Rec.1200' mud, 3700' water-Res .18 @ 68 and 30' of sand.
Morgan	5	17424-17498	10633	(60)	9269(120)	(105)	9155(60)	10633	-----	318°	NGTS, Misrun, tool plugged
Morgan	6	17424-17498	10987	3188-3188(72)	5705(113)			10317	-----	312°	NGTS, Rec.30' mud.
Morgan	7	17498-17424									Misrun
Morgan	8	17498-17424	10775	?-739(173)	5799(123)	982-1453(265)	7563(279)	10181	Water	305°	GTS 45 min, FF, non-combustible CO_2 @ 36 Mcf, Rec.6475' water - Res .185 @ 68° F.
Morgan	9	17295-17345	11052	1053-1332(93)	11104(268)	991-2009(1054)	10634(850)		G & O	300°	GTS 30 min, max. 1618 Mcf, Rec.680' GCC API gravity 66° @ 60°F. Estimated 360 BOPD.

From: Pat Brotherton

Rock Springs, Wyoming

To: T. M. Colson

July 18, 1972

Tentative Plan to Drill
Bruff Unit Well No. 1
Uinta County, Wyoming

This well will be drilled to total depth by the _____ Drilling Company. One work order has been originated for the drilling and completion of the well, namely 21060-2, Drill Bruff Unit Well No. 1, located in the SW SW Sec. 22, T. 27 N., R. 112 W., Lincoln County, Wyoming. Surface elevation is at 6368 feet. 19

1. Move in a dry hole drilling rig and drill a 24-inch conductor hole to a depth of 38 feet below ground level. Dry hole drilling rig will also dig a 6 foot diameter cellar, six feet deep. Drill mouse hole and rat hole to fit the requirements of rig.
2. Pour concrete mat to fit rig requirements.
3. Run and cement a 38-foot joint of 20-inch O.D., 52.73-pound, X-52, 0.250-inch wall thickness line pipe as conductor casing. The Rock Springs Machine Shop will bell the bottom of the conductor casing to a diameter of 23-inches and weld lugs at the top end to facilitate handling by the dry hole digger. The top of the conductor casing should be even with ground level.
4. With the line pipe on bottom and in an absolute vertical position, cement the line pipe using 2.5 cubic yards of construction concrete with 2 percent calcium chloride. This represents the theoretical requirements plus 100 percent excess for 20-inch O.D. casing in a 24-inch hole from the bottom of the hole to the bottom of the cellar. Note: Leave a minimum depth of 5-1/2-feet from surface ground level to the top of the cement in the cellar after cementing is completed.
5. Move in and rig up a contract drilling rig. Construct drilling nipple. Convert all depths to kelly bushing measurements.

6. Drill and ream a 17-1/4-inch hole to a depth of approximately 2100 feet KBM. Circulate to condition mud prior to running logs.

7. Run Schlumberger dual induction laterolog (with 2-inch linear scale) and borehole compensated integrated sonic gamma ray caliper log from bottom of conductor casing to surface casing point.

8. Run and cement approximately 2150 feet of 13-3/8-inch O.D. casing. Refer to Item No. I, General Information, for casing weight and grade. The surface casing will be run to this depth to protect the strata of trona beds. The Geological Department will pick the actual surface landing point and approval for the landing point of the casing should be obtained from the U.S.G.S. in Rock Springs. The casing will be cemented using two Halliburton pump trucks with sufficient cement in order to bring cement slurry returns to surface. Cement volume requirements will be determined from the caliper section of the sonic log. A Baker 13-3/8-inch conventional float collar and float shoe will be used as floating equipment. The casing shoe and the bottom of 17 casing collars will be welded in the Rock Springs Machine Shop. As the casing is being run, Howco-weld locking compound will be used to lock the casing collars of the first 17 joints of casing and float collar. Halliburton casing-kote bonding will be applied to the bottom joint of casing as well as to the joint of casing which will be positioned inside the 20-inch O.D. conductor casing. Circulate 400 barrels of drilling mud prior to beginning cementing operations. Capacity of the 13-3/8-inch O.D. casing is 328 barrels. Displace cement with drilling mud. Refer to the type of cement to be used under General Information, Cement Composition, Item No. I, Surface Casing.

9. After a WOC time of 30 hours, cut off the 20-inch O.D. casing at bottom of cellar. Cut off the 13-3/8-inch O.D. casing so the top of the 13-5/8-inch casing flange will be 30-inches below ground level. Install a 13-5/8-inch BX-5000 psi slip-on flange with base plate bored for 13-3/8-inch O.D. casing. Weld the casing flange to the 13-3/8-inch O.D. casing internally and externally. Pressure test the welds to 1000 psi for 5 minutes. Collapse pressure of the 13-3/8-inch O.D., 61-pound, K-55, seal lock thread casing is 1520 psi. Install a flanged 2-inch WKM valve, Figure R5008NH (5000 psi WOG, 10,000 psi test) on both sides of casing flange. Install adequate 5000 psi preventers and control manifold system. After a WOC time of 48 hours, pressure test surface casing and all preventer rams to 1500 psi for 15 minutes using rig pump and mud. The internal pressure rating for 13-3/8-inch O.D., 61-pound, K-55, seal lock thread casing is 2472 psi. After welding and testing is completed, pour enough construction concrete in cellar to bring the concrete up to the bottom external weld on the casing flange. This should leave the landing base covered with approximately 1-inch of concrete. Tamp well around the 13-3/8-inch O.D. casing and landing base.
10. Drill 12-1/4-inch hole into the Morrison formation to approximately 12,350 feet KBM. Use protector rubbers on that portion of drill pipe which will be inside the surface casing. A gel chemical mud with properties sufficient to run drill stem tests will be used. Approximately ten drill stem tests beginning at about 4000 feet are anticipated. A manned logging unit will be used from approximately 4000 feet KBM to total depth. A mud desander and desilter should be used from the bottom of the conductor casing to 9-5/8-inch O.D. casing point. The Drilling Contractor will be responsible for catching

30 foot samples from surface to 4000 feet. The mud logging unit will catch samples from 4000 feet to total depth. Anticipated formation tops are as follows:

Formation	Approximate Depth (Feet KBM)
Bridger	Surface
Green River	545
Wasatch	2,020
Fort Union	4,040
Mesaverde	7,220
Hilliard	7,755
Frontier	11,285
Aspen	11,535
Dakota	11,915
Morrison	12,335
Curtis	12,905
Entrada	13,000
Twin Creek	13,195
Nugget	13,775
Ankareh	14,543
Thaynes	15,055
Woodside	15,515
Dinwoody	16,135
Phosphoria	16,215
Weber	16,545
Morgan	17,145
Madison	17,715
Total Depth	18,300

Core if oil or gas shows are encountered in any potentially productive interval. Coring would be anticipated in the Weber, Morgan, and Madison formations.

11. After reaching a depth of approximately 12,500 feet KBM, run dual induction laterolog (with 2-inch linear scale) and integrated sonic gamma ray caliper log from surface casing to total depth. Run borehole compensated gamma ray density log and sidewall neutron log across zones of interest as indicated by the mud log, drill stem tests, or log analysis.
12. Go into hole with 12-1/4-inch bit to total depth to condition mud prior to running intermediate casing. Pull bit, standing back drill pipe and laying down drill collars. Install 9-5/8-inch casing rams in preventers.

13. Run 9-5/8-inch O.D. intermediate casing. Refer to Item No. I, General Information, for the 9-5/8-inch O.D. casing program for casing weights and grades and the respective position in the string from top to bottom. A Larkin 9-5/8-inch Hi-geyser flapper float shoe and two Larkin flapper float collars will be used as floating equipment. The shoe and shoe joint, float collars and the next 16 joints of casing will be locked together in the field at the time the casing is being run using Howco-weld. The casing collars of the bottom 17 joints will be treated with Howco-weld thread locking compound, power tightened and marked at the mill. Halliburton will determine the chemicals necessary for the cement in the laboratory. After the cement is mixed and loaded, samples will again be checked in the laboratory. Adequate water storage will be available. The water will be hauled from the City of Granger. This water will be used to check cement in laboratory. Cement volume requirements will be based on the caliper section of the sonic log and will be of sufficient quantity to bring the cement fillup behind the 9-5/8-inch O.D. casing 1000 feet above the Frontier formation. Use two Halliburton pump trucks. Circulate the capacity of 9-5/8-inch O.D. casing prior to beginning cementing operations. If possible, rotate the 9-5/8-inch O.D. casing while circulating, mixing, and displacing cement. Displace cement with mud.
14. Run Dresser Atlas cement bond log. The time interval will be determined by Dresser Atlas and Halliburton after the cement composition has been determined by Halliburton. After a WOC time of 48 hours, as determined by Halliburton, the weight of the casing will be reduced so that the neutral point will be placed at the top of the cement as determined by the bond log. The neutral point will

be determined by calculating the weight of the cemented section of casing and applying the buoyancy factor to this weight. This weight will then be subtracted from the indicator weight. The 9-5/8-inch O.D. casing will be landed in this manner. Install a 13-5/8-inch BX 5000 psi by 10-inch 5000 psi heavy duty casing spool. Pressure test slip and seal assembly to 4000 psi for 5 minutes. The minimum collapse pressure for the 9-5/8-inch O.D., 47-pound, Soo-95 casing is 7100 psi. Install a 10-inch 5000 psi by 10-inch 5000 psi spacer spool with 4-inch flanged outlets for the control manifold system, a 10-inch 5000 psi hydraulically operated blowout preventer equipped with 4-1/2-inch O.D. drill pipe rams on top and blind rams on bottom, and a 10-inch 5000 psi Hydril preventer.

15. After a WOC time of 72 hours, pressure test casing and all preventer rams to 3000 psi for 15 minutes using mud and Halliburton pump. The maximum internal pressure rating for the 9-5/8-inch O.D. buttress coupling, using hoop stress calculations, is 6800 psi.

16. Go into hole with 8-1/2-inch bit. Install one protector rubber on each joint of drill pipe which will be inside the intermediate casing. Drill and core ahead to a total depth of 18,300 feet KBM or to such other depth as the Geological Department may recommend.

17. Run dual induction laterolog (with 2-inch linear scale) and integrated sonic gamma ray caliper log from intermediate casing point to total depth. Run borehole compensated gamma ray density log and sidewall neutron log across zones of interest as indicated by the mud log, drill stem tests or log analysis.

18. Assuming commercial quantities of gas and/or oil are indicated by drill stem tests or log analysis, go into hole with 8-1/2-inch bit to total depth and

condition mud and hole. Pull drill pipe standing same in derrick and lay down drill collars. Install 7-inch rams in single gate blowout preventer.

19. Run 7-inch O.D. casing liner as follows:

(Top of String in Well)

A. Approximately 12,000 feet 5-inch O.D. drill pipe.

B. Brown Oil Tools liner setting tool with liner wiper plug attached.

C. Brown Oil Tools tie back sleeve with 8 foot extension.

D. Brown Oil Tools Type MC hydraulic set liner hanger.

E. Approximately 2500 feet 7-inch O.D., 35-pound, Soo-90 casing with Hydril triple seal threads.

F. Approximately 3460 feet 7-inch O.D., 38-pound, Soo-90 casing with Hydril triple seal threads.

G. Brown Oil Tools landing collar.

H. Brown Oil Tools catcher sub.

I. Larkin flapper float collar, Figure No. 404.

J. 1 joint 7-inch O.D., 38-pound, Soo-90 casing with Hydril triple seal threads.

K. Larkin Hi-geyser flapper float shoe, Figure No. 324.

Fill the liner and drill pipe every 3000 feet with drilling mud. After reaching total depth, circulate with rig pump 3 hours. After circulating 2-1/2 hours, drop BOT bronze ball. When ball seats in hanger, hold 1600 psi with mud pump, releasing hanger slips. Lower drill pipe and set approximately 50,000 pounds on hanger slips. Pull up into the neutral position. Increase pump pressure to 3200 psi, shearing out the catcher sub and allowing the bronze ball to seat in the catcher sub. Rotate out of hanger. Do not pull out of tie back sleeve. Cement with Class "G" cement with 40 percent SSA-1, 1.5 percent Halad-14, and 0.6 percent HR-12.

Actual cement volumes will be determined from the caliper log. Pre-flush above cement with 91 sacks Pozmix A cement with 2 percent Morflo, 1.5 percent Halad-14, and 0.6 percent HR-12. After cement has been pumped, drop drill pipe wiper plug. The drill pipe wiper plug latches into the liner wiper plug which is attached with shear pins to the bottom of the BOT liner setting tool. Displace cement with approximately 418 barrels drilling mud. Bump plug to 500 psi above last pumping pressure. Pull out of the tie back sleeve, pull 30 stands drill pipe, and reverse cement out of drill pipe. Pull out of hole, standing drill pipe in derrick. Four hundred barrels of Granger city water will be stored in a separate tank. This is to be used to mix cement for the liner and the tie back string. Each blend of cement from the bulk plant will be tested with the location mixing water prior to the job.

20. Pick up approximately 6000 feet of 3-1/2-inch O.D. drill pipe. This drill pipe will be furnished by the drilling contractor and must be capable of drilling at 18,300 feet with 11.5 ppg mud. Run a 5-3/4-inch bit and a Baker roto-vert casing scraper dressed for 7-inch O.D., 35 and 38 pound casing on 5-inch and 3-1/2-inch drill pipe. Drill out any cement left in top of liner and go to plugged back depth. Circulate mud system 3 hours. Pull out of hole and lay down 5-inch and 3-1/2-inch drill pipe.
21. Rig up Dresser Atlas and run a cement bond log and a perforating formation control log from plugged back depth to liner hanger at approximately 12,000 feet. Run a gauge ring through tie back assembly.
22. Rig up Halliburton pump truck and pressure test 9-5/8-inch O.D. casing and 7-inch liner to 5000 psi for 15 minutes. The internal yield pressure for the 9-5/8-inch O.D., 47-pound, Soo-95 casing is 8150 psi.

23. Remove blowout preventer and drilling nipple. Install a 10-inch BX 5000 psi by 7-1/16-inch BX 10,000 psi tubing head spool. Install a steel plate on the tubing spool. Release rig.

24. A tentative plan to complete the well will be issued after results of the above items have been evaluated.

GENERAL INFORMATION

I. The following casing, cement composition and tubing have been assigned to the well.

Description	Approximate Gross Measurement (feet)	Availability
Surface Casing		
13-3/8-inch O.D., 61-pound, K-55, seal lock thread casing	2,250	To be purchased

It will be necessary to sand-blast two of these joints here at the Rock Springs Machine Shop so that the casing-kote can be applied. Note: Leave enough room near the top of these joints in order that the joint may be set by slips in the rotary table.

The mud weight should not exceed 9-pounds per gallon.

Cement composition - 50-50 Pozmix, 2 percent gel, 10 percent salt, 1 percent CFR-2. Slurry weight 14.52 pounds per gallon. Slurry volume 1.26 cubic feet per sack. Compressive strength 48 hours at 70°F. 1350 psi, at 100°F. 1893 psi, at 130°F. 2758 psi.

Water for the cement will be hauled from the City of Granger and stored on location.

The 9-5/8-inch O.D. casing should be inspected on location prior to being run in the hole.

Description	Approximate Gross Measurement (feet)	Availability
9-5/8-inch O.D., 47-pound, Soo-95 buttress thread casing	2,100	To be purchased
9-5/8-inch O.D., 47-pound, Soo-95, LT&C casing	8,200	To be purchased
9-5/8-inch O.D., 53.5-pound, Soo-95, LT&C casing with special drift diameter to 8.500 I.D.	2,500	To be purchased
Total	12,800	

Mud weight should not exceed 11.5-pounds per gallon.

Cement composition - Tail-in - Class G, 35 percent SSA-1, 10 percent salt, 1.50 percent CFR-2, 5 percent HR-4. Water ratio 5.65 gallons per sack. 16.50-pound per gallon slurry weight, 1.46 cubic feet per sack slurry volume. Compressive strength 24 hours at 250°F. 5776 psi, 72 hours at 250°F. 8143 psi. Fluid loss ml/30 minutes 256.

Primary - 50-50 Pozmix, 2 percent gel, 35 percent SSA-1, 15 percent salt, 1.00 percent CFR-2, 0.4 percent HR-4. Water ratio 6.94 gallons per sack. 14.67 pound per gallon slurry weight, 1.63 cubic feet per sack slurry volume. Compressive strength 24 hours at 250°F. 2454 psi, 72 hours at 250°F. 2814 psi.

The cement will be preceded by 2000 gallons mud flush.

The 7-inch O.D. casing and tubing should be inspected on location prior to being run in the hole.

Description	Approximate Gross Measurement (feet)	Availability
7-inch O.D., 38-pound, Soo-90 Mannesman casing with Hydril triple seal threads	6,700	To be purchased

Mud weight should not exceed 11.5-pounds per gallon.

Cement composition for 7-inch O.D. liner:

Class G, 40 percent SSA-1, 1.5 percent Halad-14, 0.6 percent HR-12. Water ratio 6.83 gallons per sack. Slurry weight 15.67 pounds per gallon, slurry volume 1.62 cubic feet per sack. Thickening time 6 + hours. Compressive strength 24 hours at 325°F. 6863 psi. Fluid loss ml/30 minutes 162.

The 3-1/2-inch O.D. tubing should be inspected on location prior to being run in the hole.

Description	Approximate Gross Measurement (feet)	Availability
3-1/2-inch O.D., 15.8-pound, C-75 tubing with Hydril PH-6 threads	4,200	To be purchased
3-1/2-inch O.D., 12.95-pound, C-75 tubing with Hydril PH-6 threads	14,400	To be purchased
Total	18,600	

Mud weight should not exceed 11.5 pounds per gallon.

From: Pat Brotherton

Rock Springs, Wyoming

To: R. G. Myers

September 20, 1972

Revision on Tentative Plan to Drill
Bruff Unit Well No. 1
Uinta County, Wyoming

22-19-112.

In order to facilitate testing and logging in the Frontier and Dakota formations, it is recommended that an 8-3/4-inch hole be drilled from the top of the Frontier to the intermediate casing point. Steps 10 and 11 in the original plan to drill, dated July 18, 1972, should be disregarded. Below are revised Steps 10 and 11.

10. Drill 12-1/4-inch hole to the top of the Frontier formation. Drill an 8-3/4-inch hole from the top of the Frontier formation at approximately 11,285 feet KBM through the Frontier, Aspen, Dakota, and approximately 150 feet into the Morrison formation (approximately 12,500 feet KBM). Use protector rubbers on that portion of drill pipe which will be inside the surface casing. A gel-chemical mud with properties sufficient to run drill stem tests will be used. Approximately ten drill stem tests beginning at about 4000 feet are anticipated. A manned logging unit will be used from approximately 4000 feet KBM to total depth. A mud desander and desilter should be used from the bottom of the conductor casing to the 9-5/8-inch O.D. casing point. The Drilling Contractor will be responsible for catching 30 foot samples from surface to 4000 feet. The mud logging unit will catch samples from 4000 feet to total depth. Anticipated formation tops are as follows:

Formation	Approximate Depth (Feet KBM)
Bridger	Surface
Green River	545
Wasatch	2,020
Fort Union	4,040
Mesaverde	7,220
Hilliard	7,755
Frontier	11,285
Aspen	11,535
Dakota	11,915
Morrison	12,335

Formation	Approximate Depth (Feet KBM)
Curtis	12,905
Entrada	13,000
Twin Creek	13,195
Nugget	13,775
Ankareh	14,543
Thaynes	15,055
Woodside	15,515
Dinwoody	16,135
Phosphoria	16,215
Weber	16,545
Morgan	17,145
Madison	17,715
Total Depth	18,300

Core if oil or gas shows are encountered in any potentially productive interval. Coring would be anticipated in the Weber, Morgan, and Madison formations.

11. After reaching a depth of approximately 12,500 feet KBM in the 8-3/4-inch hole, run dual induction laterolog (with 2-inch linear scale) and integrated sonic gamma ray from bottom of surface casing to total depth. Run borehole compensated gamma ray density log and sidewall neutron over zones of interest. After the logging operations have been completed, ream the 8-3/4-inch hole, from the top of the Frontier formation to total depth, to 12-1/4-inches. Run caliper log from 1000 feet above any potentially productive zone to total depth.

Form 3160-5
(November 1983)
(Formerly 9-331)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

SUBMIT IN TRIPLICATE* (Other instructions on reverse side)

Form approved.
Budget Bureau No. 1004-01
Expires August 31, 1985

SUNDRY NOTICES AND REPORTS ON WELLS

(Do not use this form for proposals to drill or to deepen or plug back to a different reservoir. Use "APPLICATION FOR PERMIT—" for such proposals.)

1. OIL WELL [X] GAS WELL [ ] OTHER	5. LEASE DESIGNATION AND SERIAL NO: W-05929-A
	6. IF INDIAN, ALLOTTEE OR TRIBE NAM: --
	7. UNIT AGREEMENT NAME: Bruff
2. NAME OF OPERATOR: Wexpro Company	8. FARM OR LEASE NAME: Unit
3. ADDRESS OF OPERATOR: P. O. Box 458, Rock Springs, Wyoming 82902	9. WELL NO.: 1
4. LOCATION OF WELL (Report location clearly and in accordance with any State requirements.* See also space 17 below.) At surface: SW SW 660' FSL, 660' FWL	10. FIELD AND POOL, OR WILDCAT: Bruff
	11. SEC., T., R., M., OR BLK. AND SURVEY OR AREA: 22-19N-112W
14. PERMIT NO.	15. ELEVATIONS (Show whether DF, RT, GR, etc.): GR 6368'
	12. COUNTY OR PARISH: Lincoln
	13. STATE: Wyoming

16. **Check Appropriate Box To Indicate Nature of Notice, Report, or Other Data**

NOTICE OF INTENTION TO:				SUBSEQUENT REPORT OF:			
TEST WATER SHUT-OFF	[ ]	PULL OR ALTER CASING	[ ]	WATER SHUT-OFF	[ ]	REPAIRING WELL	[ ]
FRACTURE TREAT	[ ]	MULTIPLE COMPLETE	[ ]	FRACTURE TREATMENT	[ ]	ALTERING CASING	[ ]
SHOOT OR ACIDIZE	[ ]	ABANDON*	[ ]	SHOOTING OR ACIDIZING	[ ]	ABANDONMENT*	[ ]
REPAIR WELL	[ ]	CHANGE PLANS	[ ]				
(Other) Recomplete			[X]	(Other)			

(NOTE: Report results of multiple completion on Well Completion or Recompletion Report and Log form.)

17. DESCRIBE PROPOSED OR COMPLETED OPERATIONS (Clearly state all pertinent details, and give pertinent dates, including estimated date of starting any proposed work. If well is directionally drilled, give subsurface locations and measured and true vertical depths for all markers and zones pertinent to this work.)*

We hereby request permission to abandon the Morgan sweet oil formation and complete in the Frontier formation as follows:

1. Leave the Baker bridge plug in the well at 12,180' KBM.
2. Run 5-1/2" O.D., 23#, L-80, LT&C casing to 12,000' KBM and cement in place with 880 sacks cement which should give a cement top at approximately 9600' with 50% excess cement.
3. Run CBL and perforate the Frontier formation at approximately 11,390' and fracture stimulate.

RECEIVED
AUG 5 1985
WYOMING OIL & GAS CONSERVATION COMMISSION

18. I hereby certify that the foregoing is true and correct

SIGNED [signature] TITLE Director, Pet. Engineering DATE August 2, 1985

(This space for Federal or State office use)

APPROVED BY _____ TITLE _____ DATE _____
CONDITIONS OF APPROVAL, IF ANY:

*See Instructions on Reverse Side

Title 18 U.S.C. Section 1001, makes it a crime for any person knowingly and willfully to make to any department or agency of the United States any false, fictitious or fraudulent statements or representations as to any matter within its jurisdiction.

Form 9-331
(May 1963)

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

SUBMIT IN TRIPLICATE* (Other instructions on reverse side)

Form approved.
Budget Bureau No. 42-R1424.

SUNDRY NOTICES AND REPORTS ON WELLS

(Do not use this form for proposals to drill or to deepen or plug back to a different reservoir. Use "APPLICATION FOR PERMIT—" for such proposals.)

5. LEASE DESIGNATION AND SERIAL NO.: W - 05929-A

6. IF INDIAN, ALLOTTEE OR TRIBE NAME: -

1. OIL WELL ☐ GAS WELL ☐ OTHER: Wildcat

7. UNIT AGREEMENT NAME: Bruff Unit

2. NAME OF OPERATOR: Mountain Fuel Supply Company

8. FARM OR LEASE NAME: Unit Well

3. ADDRESS OF OPERATOR: P. O. Box 1129, Rock Springs, Wyoming 82901

9. WELL NO.: 1

4. LOCATION OF WELL (Report location clearly and in accordance with any State requirements.* See also space 17 below.) At surface: 660' FSL, 660' FWL SW SW

10. FIELD AND POOL, OR WILDCAT: Wildcat

11. SEC., T., R., M., OR BLK. AND SURVEY OR AREA: SW SW 22-19N-112W., 6th P

14. PERMIT NO.: 20045

15. ELEVATIONS (Show whether DF, RT, GR, etc.): KB 6386.90' GR 6368'

12. COUNTY OR PARISH: Lincoln

13. STATE: Wyoming

16. Check Appropriate Box To Indicate Nature of Notice, Report, or Other Data

NOTICE OF INTENTION TO:				SUBSEQUENT REPORT OF:			
TEST WATER SHUT-OFF	☐	PULL OR ALTER CASING	☐	WATER SHUT-OFF	☐	REPAIRING WELL	☐
FRACTURE TREAT	☐	MULTIPLE COMPLETE	☐	FRACTURE TREATMENT	☐	ALTERING CASING	☐
SHOOT OR ACIDIZE	☐	ABANDON*	☐	SHOOTING OR ACIDIZING	☐	ABANDONMENT*	☐
REPAIR WELL	☐	CHANGE PLANS	☐	(Other) Supplementary history			X
(Other)				(NOTE: Report results of multiple completion on Well Completion or Recompletion Report and Log form.)			

17. DESCRIBE PROPOSED OR COMPLETED OPERATIONS (Clearly state all pertinent details, and give pertinent dates, including estimated date of starting any proposed work. If well is directionally drilled, give subsurface locations and measured and true vertical depths for all markers and zones pertinent to this work.) *

Depth 10,291', drilling.

RECEIVED
SEP 20 1972
OFFICE of
STATE OIL & GAS SUPERVISOR

18. I hereby certify that the foregoing is true and correct

SIGNED B. H. Crofts TITLE Vice President, Gas Supply Operations DATE Sept. 19, 1972

(This space for Federal or State office use)

APPROVED BY _____ TITLE _____ DATE _____

CONDITIONS OF APPROVAL, IF ANY:

*See Instructions on Reverse Side

Form 9-331
(May 1963)

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

SUBMIT IN TRIPLICATE* (Other instructions on reverse side)

Form approved.
Budget Bureau No. 42-R1424.

5. LEASE DESIGNATION AND SERIAL NO.
W - 05929-A

6. IF INDIAN, ALLOTTEE OR TRIBE NAME
-

SUNDRY NOTICES AND REPORTS ON WELLS

(Do not use this form for proposals to drill or to deepen or plug back to a different reservoir. Use "APPLICATION FOR PERMIT—" for such proposals.)

1. OIL WELL ☐ GAS WELL ☐ OTHER Wildcat

7. UNIT AGREEMENT NAME
Bruff Unit

2. NAME OF OPERATOR
Mountain Fuel Supply Company

8. FARM OR LEASE NAME
Unit Well

3. ADDRESS OF OPERATOR
P. O. Box 1129, Rock Springs, Wyoming 82901

9. WELL NO.
1

4. LOCATION OF WELL (Report location clearly and in accordance with any State requirements.* See also space 17 below.) At surface
660' FSL, 660' FWL SW SW

10. FIELD AND POOL, OR WILDCAT
Wildcat

11. SEC., T., R., M., OR BLK. AND SURVEY OR AREA
SW SW 22-19N-112W., 6th PM

14. PERMIT NO.
20045

15. ELEVATIONS (Show whether DF, RT, GR, etc.)
KB 6386.90' GR 6368'

12. COUNTY OR PARISH
Lincoln

13. STATE
Wyoming

16. Check Appropriate Box To Indicate Nature of Notice, Report, or Other Data

NOTICE OF INTENTION TO:				SUBSEQUENT REPORT OF:			
TEST WATER SHUT-OFF	☐	PULL OR ALTER CASING	☐	WATER SHUT-OFF	☐	REPAIRING WELL	☐
FRACTURE TREAT	☐	MULTIPLE COMPLETE	☐	FRACTURE TREATMENT	☐	ALTERING CASING	☐
SHOOT OR ACIDIZE	☐	ABANDON*	☐	SHOOTING OR ACIDIZING	☐	ABANDONMENT*	☐
REPAIR WELL	☐	CHANGE PLANS	☐	(Other) Supplementary history			X
(Other)			☐	(NOTE: Report results of multiple completion on Well Completion or Recompletion Report and Log form.)			

17. DESCRIBE PROPOSED OR COMPLETED OPERATIONS (Clearly state all pertinent details, and give pertinent dates, including estimated date of starting any proposed work. If well is directionally drilled, give subsurface locations and measured and true vertical depths for all markers and zones pertinent to this work.) *

Depth 11,107', drilling.

RECEIVED
OCT 31 1972
OFFICE of
STATE OIL & GAS SUPERVISOR

18. I hereby certify that the foregoing is true and correct

SIGNED B. M. Crofton TITLE Vice President, Gas Supply Operations DATE Oct. 30, 1972

(This space for Federal or State office use)

APPROVED BY _____ TITLE _____ DATE _____
CONDITIONS OF APPROVAL, IF ANY:

*See Instructions on Reverse Side

Form 9-331
(May 1963)

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

SUBMIT IN TRIPLICATE* (Other instructions on reverse side)

Form approved.
Budget Bureau No. 42-R1424.

SUNDRY NOTICES AND REPORTS ON WELLS

(Do not use this form for proposals to drill or to deepen or plug back to a different reservoir. Use "APPLICATION FOR PERMIT—" for such proposals.)

1. OIL WELL ☐ GAS WELL ☐ OTHER Wildcat

2. NAME OF OPERATOR
Mountain Fuel Supply Company

3. ADDRESS OF OPERATOR
P. O. Box 1129, Rock Springs, Wyoming 82901

4. LOCATION OF WELL (Report location clearly and in accordance with any State requirements.* See also space 17 below.)
At surface
660' FSL, 660' FWL SW SW

5. LEASE DESIGNATION AND SERIAL NO.
W - 05929-A

6. IF INDIAN, ALLOTTEE OR TRIBE NAME
-

7. UNIT AGREEMENT NAME
Bruff Unit

8. FARM OR LEASE NAME
Unit Well

9. WELL NO.
1

10. FIELD AND POOL, OR WILDCAT
Wildcat

11. SEC., T., R., M., OR BLK. AND SURVEY OR AREA
SW SW 22-19N-112W., 6th PM

14. PERMIT NO.
20045

15. ELEVATIONS (Show whether DF, RT, GR, etc.)
KB 6386.90' GR 6368'

12. COUNTY OR PARISH
Lincoln

13. STATE
Wyoming

16. Check Appropriate Box To Indicate Nature of Notice, Report, or Other Data

NOTICE OF INTENTION TO:				SUBSEQUENT REPORT OF:			
TEST WATER SHUT-OFF	☐	PULL OR ALTER CASING	☐	WATER SHUT-OFF	☐	REPAIRING WELL	☐
FRACTURE TREAT	☐	MULTIPLE COMPLETE	☐	FRACTURE TREATMENT	☐	ALTERING CASING	☐
SHOOT OR ACIDIZE	☐	ABANDON*	☐	SHOOTING OR ACIDIZING	☐	ABANDONMENT*	☐
REPAIR WELL	☐	CHANGE PLANS	☐	(Other) Supplementary history			X
(Other)				(NOTE: Report results of multiple completion on Well Completion or Recompletion Report and Log form.)			

17. DESCRIBE PROPOSED OR COMPLETED OPERATIONS (Clearly state all pertinent details, and give pertinent dates, including estimated date of starting any proposed work. If well is directionally drilled, give subsurface locations and measured and true vertical depths for all markers and zones pertinent to this work.) *

Depth 10,906', drilling.

DST #3: 10,432-10,550', Hilliard, IO ½ hour, ISI 1 hour, FO 2 hours, FSI 2½ hours, opened with fair to medium blow, reopened dead increasing to weak, no gas to surface, recovered 1500' mud.
IHP 5257, IOFP's 273-382, ISIP 491, FOFP's 491-573, FSIP 573, FHP 5257.

RECEIVED
SEP 27 1972
OFFICE of
STATE OIL & GAS SUPERVISOR

18. I hereby certify that the foregoing is true and correct

SIGNED B. H. Conley TITLE Vice President, Gas Supply Operations DATE Sept. 26, 1972

(This space for Federal or State office use)

APPROVED BY _____ TITLE _____ DATE _____
CONDITIONS OF APPROVAL, IF ANY:

*See Instructions on Reverse Side

Form 9-331
(May 1963)

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

SUBMIT IN TRIPLICATE* (Other instructions on reverse side)

Form approved.
Budget Bureau No. 42-R1424.

5. LEASE DESIGNATION AND SERIAL NO.: W - 05929-A

6. IF INDIAN, ALLOTTEE OR TRIBE NAME: -

SUNDRY NOTICES AND REPORTS ON WELLS

(Do not use this form for proposals to drill or to deepen or plug back to a different reservoir. Use "APPLICATION FOR PERMIT—" for such proposals.)

1. OIL WELL ☐ GAS WELL ☐ OTHER Wildcat

7. UNIT AGREEMENT NAME: Bruff Unit

2. NAME OF OPERATOR: Mountain Fuel Supply Company

8. FARM OR LEASE NAME: UnitWell

3. ADDRESS OF OPERATOR: P. O. Box 1129, Rock Springs, Wyoming 82901

9. WELL NO.: 1

4. LOCATION OF WELL (Report location clearly and in accordance with any State requirements.* See also space 17 below.) At surface: 660' FSL, 660' FWL SW SW

10. FIELD AND POOL, OR WILDCAT: Wildcat

11. SEC., T., R., M., OR BLK. AND SURVEY OR AREA: SW SW 22-19N-112W., 6th PM

14. PERMIT NO.: 20045

15. ELEVATIONS (Show whether DF, RT, GR, etc.): KB 6386.90' GR 6368'

12. COUNTY OR PARISH: Lincoln

13. STATE: Wyoming

16. Check Appropriate Box To Indicate Nature of Notice, Report, or Other Data

NOTICE OF INTENTION TO:				SUBSEQUENT REPORT OF:			
TEST WATER SHUT-OFF	☐	PULL OR ALTER CASING	☐	WATER SHUT-OFF	☐	REPAIRING WELL	☐
FRACTURE TREAT	☐	MULTIPLE COMPLETE	☐	FRACTURE TREATMENT	☐	ALTERING CASING	☐
SHOOT OR ACIDIZE	☐	ABANDON*	☐	SHOOTING OR ACIDIZING	☐	ABANDONMENT*	☐
REPAIR WELL	☐	CHANGE PLANS	☐	(Other) Supplementary history			X
(Other)	☐			(NOTE: Report results of multiple completion on Well Completion or Recompletion Report and Log form.)			

17. DESCRIBE PROPOSED OR COMPLETED OPERATIONS (Clearly state all pertinent details, and give pertinent dates, including estimated date of starting any proposed work. If well is directionally drilled, give subsurface locations and measured and true vertical depths for all markers and zones pertinent to this work.) *

Depth 11,618', drilling.

RECEIVED
NOV 8 1972
OFFICE of
STATE OIL & GAS SUPERVISOR

18. I hereby certify that the foregoing is true and correct

SIGNED B. H. Crouch TITLE Vice President, Gas Supply Operations DATE Nov. 6, 1972

(This space for Federal or State office use)

APPROVED BY _____ TITLE _____ DATE _____

CONDITIONS OF APPROVAL, IF ANY:

*See Instructions on Reverse Side

Form 9-331
(May 1963)

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

SUBMIT IN TRIPLICATE* (Other instructions on reverse side)

Form approved.
Budget Bureau No. 42-R1424.

5. LEASE DESIGNATION AND SERIAL NO.: W - 05929-A

6. IF INDIAN, ALLOTTEE OR TRIBE NAME: -

SUNDRY NOTICES AND REPORTS ON WELLS

(Do not use this form for proposals to drill or to deepen or plug back to a different reservoir. Use "APPLICATION FOR PERMIT—" for such proposals.)

1. OIL WELL ☐ GAS WELL ☐ OTHER: Wildcat

7. UNIT AGREEMENT NAME: Bruff Unit

2. NAME OF OPERATOR: Mountain Fuel Supply Company

8. FARM OR LEASE NAME: Unit Well

3. ADDRESS OF OPERATOR: P. O. Box 1129, Rock Springs, Wyoming 82901

9. WELL NO.: 1

4. LOCATION OF WELL (Report location clearly and in accordance with any State requirements.* See also space 17 below.) At surface: 660' FSL, 660' FWL SW SW

10. FIELD AND POOL, OR WILDCAT: Wildcat

11. SEC., T., R., M., OR BLK. AND SURVEY OR AREA: SW SW 22-19N-112W., 6th PM

14. PERMIT NO.: 20045

15. ELEVATIONS (Show whether DF, RT, GR, etc.): KB 6386.90' GR 6368'

12. COUNTY OR PARISH: Lincoln

13. STATE: Wyoming

16. Check Appropriate Box To Indicate Nature of Notice, Report, or Other Data

NOTICE OF INTENTION TO:				SUBSEQUENT REPORT OF:			
TEST WATER SHUT-OFF	☐	PULL OR ALTER CASING	☐	WATER SHUT-OFF	☐	REPAIRING WELL	☐
FRACTURE TREAT	☐	MULTIPLE COMPLETE	☐	FRACTURE TREATMENT	☐	ALTERING CASING	☐
SHOOT OR ACIDIZE	☐	ABANDON*	☐	SHOOTING OR ACIDIZING	☐	ABANDONMENT*	☐
REPAIR WELL	☐	CHANGE PLANS	☐	(Other) Supplementary history			X
(Other)			☐	(NOTE: Report results of multiple completion on Well Completion or Recompletion Report and Log form.)			

17. DESCRIBE PROPOSED OR COMPLETED OPERATIONS (Clearly state all pertinent details, and give pertinent dates, including estimated date of starting any proposed work. If well is directionally drilled, give subsurface locations and measured and true vertical depths for all markers and zones pertinent to this work.) *

Depth 11,955', drilling.

RECEIVED
NOV 14 1972
OFFICE OF
STATE OIL & GAS SUPERVISOR

18. I hereby certify that the foregoing is true and correct

SIGNED [signature] TITLE Vice President, Gas Supply Operations DATE Nov. 13, 1972

(This space for Federal or State office use)

APPROVED BY _____ TITLE _____ DATE _____

CONDITIONS OF APPROVAL, IF ANY:

*See Instructions on Reverse Side

Form 9-331
(May 1963)

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

SUBMIT IN TRIPLICATE* (Other instructions on reverse side)

Form approved.
Budget Bureau No. 42-R1424.

5. LEASE DESIGNATION AND SERIAL NO.: W - 05929-A

6. IF INDIAN, ALLOTTEE OR TRIBE NAME: -

SUNDRY NOTICES AND REPORTS ON WELLS

(Do not use this form for proposals to drill or to deepen or plug back to a different reservoir. Use "APPLICATION FOR PERMIT—" for such proposals.)

1. OIL WELL ☐ GAS WELL ☐ OTHER Wildcat

7. UNIT AGREEMENT NAME: Bruff Unit

2. NAME OF OPERATOR: Mountain Fuel Supply Company

8. FARM OR LEASE NAME: Unit Well

3. ADDRESS OF OPERATOR: P. O. Box 1129, Rock Springs, Wyoming 82901

9. WELL NO.: 1

4. LOCATION OF WELL (Report location clearly and in accordance with any State requirements.* See also space 17 below.) At surface: 660' FSL, 660' FWL SW SW

10. FIELD AND POOL, OR WILDCAT: Wildcat

11. SEC., T., R., M., OR BLK. AND SURVEY OR AREA: SW SW 22-19N-112W., 6th PM

14. PERMIT NO.: 20045

15. ELEVATIONS (Show whether DF, RT, GR, etc.): KB 6386.90' GR 6368'

12. COUNTY OR PARISH: Lincoln

13. STATE: Wyoming

16. Check Appropriate Box To Indicate Nature of Notice, Report, or Other Data

NOTICE OF INTENTION TO:				SUBSEQUENT REPORT OF:			
TEST WATER SHUT-OFF	☐	PULL OR ALTER CASING	☐	WATER SHUT-OFF	☐	REPAIRING WELL	☐
FRACTURE TREAT	☐	MULTIPLE COMPLETE	☐	FRACTURE TREATMENT	☐	ALTERING CASING	☐
SHOOT OR ACIDIZE	☐	ABANDON*	☐	SHOOTING OR ACIDIZING	☐	ABANDONMENT*	☐
REPAIR WELL	☐	CHANGE PLANS	☐	(Other) Supplementary history			X
(Other)			☐	(NOTE: Report results of multiple completion on Well Completion or Recompletion Report and Log form.)			

17. DESCRIBE PROPOSED OR COMPLETED OPERATIONS (Clearly state all pertinent details, and give pertinent dates, including estimated date of starting any proposed work. If well is directionally drilled, give subsurface locations and measured and true vertical depths for all markers and zones pertinent to this work.) *

Depth 12,500', ran 9-5/8" casing, now nippling up.

RECEIVED
NOV 30 1972
OFFICE of
OIL & GAS SUPERVISOR

18. I hereby certify that the foregoing is true and correct

SIGNED B. W. Crofts TITLE Vice President, Gas Supply Operations DATE Nov. 28, 1972

(This space for Federal or State office use)

APPROVED BY _____ TITLE _____ DATE _____

CONDITIONS OF APPROVAL, IF ANY:

*See Instructions on Reverse Side

Form 9-331
(May 1963)

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

SUBMIT IN TRIPLICATE* (Other instructions on reverse side)

Form approved.
Budget Bureau No. 42-R1424.

5. LEASE DESIGNATION AND SERIAL NO.: W - 05929-A

6. IF INDIAN, ALLOTTEE OR TRIBE NAME: -

SUNDRY NOTICES AND REPORTS ON WELLS

(Do not use this form for proposals to drill or to deepen or plug back to a different reservoir. Use "APPLICATION FOR PERMIT—" for such proposals.)

1. OIL WELL ☐ GAS WELL ☐ OTHER: Wildcat

7. UNIT AGREEMENT NAME: Bruff Unit

2. NAME OF OPERATOR: Mountain Fuel Supply Company

8. FARM OR LEASE NAME: Unit Well

3. ADDRESS OF OPERATOR: P. O. Box 1129, Rock Springs, Wyoming 82901

9. WELL NO.: 1

4. LOCATION OF WELL (Report location clearly and in accordance with any State requirements.* See also space 17 below.) At surface: 660' FSL, 660' FWL SW SW

10. FIELD AND POOL, OR WILDCAT: Wildcat

11. SEC., T., R., M., OR BLK. AND SURVEY OR AREA: SW SW 22-19N-112W., 6th PM

14. PERMIT NO.: 20045

15. ELEVATIONS (Show whether DF, RT, GR, etc.): KB 6386.90' GR 6368'

12. COUNTY OR PARISH: Lincoln

13. STATE: Wyoming

16. Check Appropriate Box To Indicate Nature of Notice, Report, or Other Data

NOTICE OF INTENTION TO:				SUBSEQUENT REPORT OF:			
TEST WATER SHUT-OFF	☐	PULL OR ALTER CASING	☐	WATER SHUT-OFF	☐	REPAIRING WELL	☐
FRACTURE TREAT	☐	MULTIPLE COMPLETE	☐	FRACTURE TREATMENT	☐	ALTERING CASING	☐
SHOOT OR ACIDIZE	☐	ABANDON*	☐	SHOOTING OR ACIDIZING	☐	ABANDONMENT*	☐
REPAIR WELL	☐	CHANGE PLANS	☐	(Other) Supplementary history			X
(Other)	☐			(NOTE: Report results of multiple completion on Well Completion or Recompletion Report and Log form.)			

17. DESCRIBE PROPOSED OR COMPLETED OPERATIONS (Clearly state all pertinent details, and give pertinent dates, including estimated date of starting any proposed work. If well is directionally drilled, give subsurface locations and measured and true vertical depths for all markers and zones pertinent to this work.) *

Depth 13,780', thawing out stand pipe and rotary hose.

RECEIVED
DEC 18 1972
U.S. GEOLOGICAL SURVEY
ROCK SPRINGS, WYOMING

18. I hereby certify that the foregoing is true and correct

SIGNED B. H. Crofts TITLE Vice President, Gas Supply Operations DATE Dec. 11, 1972

(This space for Federal or State office use)

APPROVED BY _____ TITLE _____ DATE _____

CONDITIONS OF APPROVAL, IF ANY:

*See Instructions on Reverse Side

Form 9-331
(May 1963)

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

SUBMIT IN TRIPLICATE* (Other instructions on reverse side).

Form approved.
Budget Bureau No. 42-R1424.

5. LEASE DESIGNATION AND SERIAL NO.: W - 05929-A

6. IF INDIAN, ALLOTTEE OR TRIBE NAME: -

SUNDRY NOTICES AND REPORTS ON WELLS

(Do not use this form for proposals to drill or to deepen or plug back to a different reservoir. Use "APPLICATION FOR PERMIT—" for such proposals.)

1. OIL WELL ☐ GAS WELL ☐ OTHER Wildcat

7. UNIT AGREEMENT NAME: Bruff Unit

2. NAME OF OPERATOR: Mountain Fuel Supply Company

8. FARM OR LEASE NAME: Unit Well

3. ADDRESS OF OPERATOR: P. O. Box 1129, Rock Springs, Wyoming 82901

9. WELL NO.: 1

4. LOCATION OF WELL (Report location clearly and in accordance with any State requirements.* See also space 17 below.) At surface: 660' FSL, 660' FWL SW SW

10. FIELD AND POOL, OR WILDCAT: Wildcat

11. SEC., T., R., M., OR BLK. AND SURVEY OR AREA: SW SW 22-19N-112W., 6th PM

14. PERMIT NO.: 20045

15. ELEVATIONS (Show whether DF, RT, GR, etc.): KB 6386.90' GR 6368'

12. COUNTY OR PARISH: Lincoln

13. STATE: Wyoming

16. Check Appropriate Box To Indicate Nature of Notice, Report, or Other Data

NOTICE OF INTENTION TO:				SUBSEQUENT REPORT OF:			
TEST WATER SHUT-OFF	☐	PULL OR ALTER CASING	☐	WATER SHUT-OFF	☐	REPAIRING WELL	☐
FRACTURE TREAT	☐	MULTIPLE COMPLETE	☐	FRACTURE TREATMENT	☐	ALTERING CASING	☐
SHOOT OR ACIDIZE	☐	ABANDON*	☐	SHOOTING OR ACIDIZING	☐	ABANDONMENT*	☐
REPAIR WELL	☐	CHANGE PLANS	☐	(Other) Supplementary history			X
(Other)			☐	(NOTE: Report results of multiple completion on Well Completion or Recompletion Report and Log form.)			

17. DESCRIBE PROPOSED OR COMPLETED OPERATIONS (Clearly state all pertinent details, and give pertinent dates, including estimated date of starting any proposed work. If well is directionally drilled, give subsurface locations and measured and true vertical depths for all markers and zones pertinent to this work.) *

Depth 13,892', making DST #5.

DST #4: 13,797-13,892', Nugget, mis-run, no packer seat.

Landed 12,425.73' net, 12,539.99' gross of 9-5/8"OD, 47# and 53.5#, casing at 12,448.73' KBM and set with 1860 sacks of cement.

NOTE: Since moving in a larger rig, the KB will be changed from 6386.90' to 6388.50'.

RECEIVED
DEC 13 1972
OIL & GAS SUPERVISOR

18. I hereby certify that the foregoing is true and correct

SIGNED B. W. Croft Jr. TITLE Vice President, Gas Supply Operations DATE Dec. 18, 1972

(This space for Federal or State office use)

APPROVED BY _____ TITLE _____ DATE _____

CONDITIONS OF APPROVAL, IF ANY:

*See Instructions on Reverse Side

Form 9-331
(May 1963)

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

SUBMIT IN TRIPLICATE* (Other instructions on reverse side)

Form approved.
Budget Bureau No. 42-R1424.

5. LEASE DESIGNATION AND SERIAL NO.: W - 05929-A

6. IF INDIAN, ALLOTTEE OR TRIBE NAME: -

SUNDRY NOTICES AND REPORTS ON WELLS

(Do not use this form for proposals to drill or to deepen or plug back to a different reservoir. Use "APPLICATION FOR PERMIT—" for such proposals.)

1. OIL WELL ☐ GAS WELL ☐ OTHER Wildcat

7. UNIT AGREEMENT NAME: Bruff Unit

2. NAME OF OPERATOR: Mountain Fuel Supply Company

8. FARM OR LEASE NAME: Unit Well

3. ADDRESS OF OPERATOR: P. O. Box 1129, Rock Springs, Wyoming 82901

9. WELL NO.: 1

4. LOCATION OF WELL (Report location clearly and in accordance with any State requirements.* See also space 17 below.) At surface: 660' FSL, 660' FWL SW SW

10. FIELD AND POOL, OR WILDCAT: Wildcat

11. SEC., T., R., M., OR BLK. AND SURVEY OR AREA: SW SW 22-19N-112W., 6th PM

14. PERMIT NO.: 20045

15. ELEVATIONS (Show whether DF, RT, GR, etc.): KB 6388.50' GR 6368'

12. COUNTY OR PARISH: Lincoln

13. STATE: Wyoming

16. Check Appropriate Box To Indicate Nature of Notice, Report, or Other Data

NOTICE OF INTENTION TO:				SUBSEQUENT REPORT OF:			
TEST WATER SHUT-OFF	☐	PULL OR ALTER CASING	☐	WATER SHUT-OFF	☐	REPAIRING WELL	☐
FRACTURE TREAT	☐	MULTIPLE COMPLETE	☐	FRACTURE TREATMENT	☐	ALTERING CASING	☐
SHOOT OR ACIDIZE	☐	ABANDON*	☐	SHOOTING OR ACIDIZING	☐	ABANDONMENT*	☐
REPAIR WELL	☐	CHANGE PLANS	☐	(Other) Supplementary history			X
(Other)			☐	(NOTE: Report results of multiple completion on Well Completion or Recompletion Report and Log form.)			

17. DESCRIBE PROPOSED OR COMPLETED OPERATIONS (Clearly state all pertinent details, and give pertinent dates, including estimated date of starting any proposed work. If well is directionally drilled, give subsurface locations and measured and true vertical depths for all markers and zones pertinent to this work.) *

Depth 14,342', drilling.

DST #5:; 13,845-13,892', Nugget, IO 35 minutes, ISI 2 hours, FO 4 hours, FSI 6 hours, opened strong, reopened weak increasing to strong, died in 85 minutes, no gas to surface, recovered 3188' water.
IHP 6387, IOFP's 2278-2998, ISIP 5921, FOFP's 2659-3252, FSIP 5440, FHP 6387.



18. I hereby certify that the foregoing is true and correct

SIGNED [signature] TITLE Vice President, Gas Supply Operations DATE Jan. 2, 1973

(This space for Federal or State office use)

APPROVED BY _____ TITLE _____ DATE _____

CONDITIONS OF APPROVAL, IF ANY:

*See Instructions on Reverse Side

Form 9-331
(May 1963)

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

SUBMIT IN TRIPLICATE* (Other instructions on reverse side)

Form approved.
Budget Bureau No. 42-R1424.

SUNDRY NOTICES AND REPORTS ON WELLS

(Do not use this form for proposals to drill or to deepen or plug back to a different reservoir. Use "APPLICATION FOR PERMIT—" for such proposals.)

1. OIL WELL ☐ GAS WELL ☐ OTHER Wildcat

2. NAME OF OPERATOR
Mountain Fuel Supply Company

3. ADDRESS OF OPERATOR
P. O. Box 1129, Rock Springs, Wyoming 82901

4. LOCATION OF WELL (Report location clearly and in accordance with any State requirements.* See also space 17 below.)
At surface
660' FSL, 660' FWL SW SW

5. LEASE DESIGNATION AND SERIAL NO.
W - 05929-A

6. IF INDIAN, ALLOTTEE OR TRIBE NAME
-

7. UNIT AGREEMENT NAME
Bruff Unit

8. FARM OR LEASE NAME
Unit Well

9. WELL NO.
1

10. FIELD AND POOL, OR WILDCAT
Wildcat

11. SEC., T., R., M., OR BLK. AND SURVEY OR AREA
SW SW 22-19N-112W., 6th P

14. PERMIT NO.
20045

15. ELEVATIONS (Show whether DF, RT, GR, etc.)
KB 6388.50' GR 6368'

12. COUNTY OR PARISH
Lincoln

13. STATE
Wyoming

16. Check Appropriate Box To Indicate Nature of Notice, Report, or Other Data

NOTICE OF INTENTION TO:				SUBSEQUENT REPORT OF:			
TEST WATER SHUT-OFF	☐	PULL OR ALTER CASING	☐	WATER SHUT-OFF	☐	REPAIRING WELL	☐
FRACTURE TREAT	☐	MULTIPLE COMPLETE	☐	FRACTURE TREATMENT	☐	ALTERING CASING	☐
SHOOT OR ACIDIZE	☐	ABANDON*	☐	SHOOTING OR ACIDIZING	☐	ABANDONMENT*	☐
REPAIR WELL	☐	CHANGE PLANS	☐	(Other) Supplementary history			X
(Other)				(NOTE: Report results of multiple completion on Well Completion or Recompletion Report and Log form.)			

17. DESCRIBE PROPOSED OR COMPLETED OPERATIONS (Clearly state all pertinent details, and give pertinent dates, including estimated date of starting any proposed work. If well is directionally drilled, give subsurface locations and measured and true vertical depths for all markers and zones pertinent to this work.) *

Depth 15,457', drilling.

RECEIVED
JAN 17 1973
SUPERVISOR

18. I hereby certify that the foregoing is true and correct
SIGNED B. W. Crafton TITLE Vice President, Gas Supply Operations DATE Jan. 16, 1973

(This space for Federal or State office use)

APPROVED BY _____ TITLE _____ DATE _____
CONDITIONS OF APPROVAL, IF ANY:

*See Instructions on Reverse Side

Form 9-331
(May 1963)

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

SUBMIT IN TRIPLICATE* (Other instructions on reverse side)

Form approved.
Budget Bureau No. 42-R1424.

5. LEASE DESIGNATION AND SERIAL NO.: W - 05929-A

6. IF INDIAN, ALLOTTEE OR TRIBE NAME: -

SUNDRY NOTICES AND REPORTS ON WELLS

(Do not use this form for proposals to drill or to deepen or plug back to a different reservoir. Use "APPLICATION FOR PERMIT—" for such proposals.)

1. OIL WELL ☐ GAS WELL ☐ OTHER: Wildcat

7. UNIT AGREEMENT NAME: Bruff Unit

2. NAME OF OPERATOR: Mountain Fuel Supply Company

8. FARM OR LEASE NAME: Unit Well

3. ADDRESS OF OPERATOR: P. O. Box 1129, Rock Springs, Wyoming 82901

9. WELL NO.: 1

4. LOCATION OF WELL (Report location clearly and in accordance with any State requirements.* See also space 17 below.) At surface: 660' FSL, 660' FWL SW SW

10. FIELD AND POOL, OR WILDCAT: Wildcat

11. SEC., T., R., M., OR BLK. AND SURVEY OR AREA: SW SW 22-19N-112W., 6th P

14. PERMIT NO.: 20045

15. ELEVATIONS (Show whether DF, RT, GR, etc.): KB 6388.50' GR 6368'

12. COUNTY OR PARISH: Lincoln

13. STATE: Wyoming

16. Check Appropriate Box To Indicate Nature of Notice, Report, or Other Data

NOTICE OF INTENTION TO:				SUBSEQUENT REPORT OF:			
TEST WATER SHUT-OFF	☐	PULL OR ALTER CASING	☐	WATER SHUT-OFF	☐	REPAIRING WELL	☐
FRACTURE TREAT	☐	MULTIPLE COMPLETE	☐	FRACTURE TREATMENT	☐	ALTERING CASING	☐
SHOOT OR ACIDIZE	☐	ABANDON*	☐	SHOOTING OR ACIDIZING	☐	ABANDONMENT*	☐
REPAIR WELL	☐	CHANGE PLANS	☐	(Other) Supplementary history			X
(Other)				(NOTE: Report results of multiple completion on Well Completion or Recompletion Report and Log form.)			

17. DESCRIBE PROPOSED OR COMPLETED OPERATIONS (Clearly state all pertinent details, and give pertinent dates, including estimated date of starting any proposed work. If well is directionally drilled, give subsurface locations and measured and true vertical depths for all markers and zones pertinent to this work.) *

Depth 16,289', drilling.



18. I hereby certify that the foregoing is true and correct

SIGNED B. H. Croft, Jr. TITLE Vice President, Gas Supply Operations DATE Jan. 23, 1973

(This space for Federal or State office use)

APPROVED BY _____ TITLE _____ DATE _____

CONDITIONS OF APPROVAL, IF ANY:

*See Instructions on Reverse Side

Form 9-331
(May 1963)

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

SUBMIT IN TRIPLICATE* (Other instructions on reverse side)

Form approved.
Budget Bureau No. 42-R1424.

SUNDRY NOTICES AND REPORTS ON WELLS

(Do not use this form for proposals to drill or to deepen or plug back to a different reservoir. Use "APPLICATION FOR PERMIT—" for such proposals.)

1. OIL WELL ☐ GAS WELL ☐ OTHER Wildcat

2. NAME OF OPERATOR
Mountain Fuel Supply Company

3. ADDRESS OF OPERATOR
P. O. Box 1129, Rock Springs, Wyoming 82901

4. LOCATION OF WELL (Report location clearly and in accordance with any State requirements.* See also space 17 below.)
At surface
660' FSL, 660' FWL SW SW

5. LEASE DESIGNATION AND SERIAL NO.
W - 05929-A

6. IF INDIAN, ALLOTTEE OR TRIBE NAME
-

7. UNIT AGREEMENT NAME
Bruff Unit

8. FARM OR LEASE NAME
Unit Well

9. WELL NO.
1

10. FIELD AND POOL, OR WILDCAT
Wildcat

11. SEC., T., R., M., OR BLK. AND SURVEY OR AREA
SW SW 22-19N-112W., 6th PM

14. PERMIT NO.	15. ELEVATIONS (Show whether DF, RT, GR, etc.)	12. COUNTY OR PARISH	13. STATE
20045	KB 6388.50' GR 6368'	Lincoln	Wyoming

16. Check Appropriate Box To Indicate Nature of Notice, Report, or Other Data

NOTICE OF INTENTION TO:				SUBSEQUENT REPORT OF:			
TEST WATER SHUT-OFF	☐	PULL OR ALTER CASING	☐	WATER SHUT-OFF	☐	REPAIRING WELL	☐
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REPAIR WELL	☐	CHANGE PLANS	☐	(Other) Supplementary history			X
(Other)				(NOTE: Report results of multiple completion on Well Completion or Recompletion Report and Log form.)			

17. DESCRIBE PROPOSED OR COMPLETED OPERATIONS (Clearly state all pertinent details, and give pertinent dates, including estimated date of starting any proposed work. If well is directionally drilled, give subsurface locations and measured and true vertical depths for all markers and zones pertinent to this work.)*

Depth 16,450', circulating for DST #7.

DST #6: 16,334-16,450', Phosphoria, mis-run.

18. I hereby certify that the foregoing is true and correct
SIGNED B. W. Crofts TITLE Vice President, Gas Supply Operations DATE Jan. 29, 1973

(This space for Federal or State office use)

APPROVED BY _____ TITLE _____ DATE _____
CONDITIONS OF APPROVAL, IF ANY:

*See Instructions on Reverse Side

Form 9-331
(May 1963)

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

SUBMIT IN TRIPLICATE* (Other instructions on reverse side)

Form approved.
Budget Bureau No. 42-R1424.

5. LEASE DESIGNATION AND SERIAL NO.: W - 05929-A

6. IF INDIAN, ALLOTTEE OR TRIBE NAME: -

SUNDRY NOTICES AND REPORTS ON WELLS

(Do not use this form for proposals to drill or to deepen or plug back to a different reservoir. Use "APPLICATION FOR PERMIT—" for such proposals.)

1. OIL WELL ☐ GAS WELL ☐ OTHER: Wildcat

7. UNIT AGREEMENT NAME: Bruff Unit

2. NAME OF OPERATOR: Mountain Fuel Supply Company

8. FARM OR LEASE NAME: Unit Well

3. ADDRESS OF OPERATOR: P. O. Box 1129, Rock Springs, Wyoming 82901

9. WELL NO.: 1

4. LOCATION OF WELL (Report location clearly and in accordance with any State requirements.* See also space 17 below.) At surface: 660' FSL, 660' FWL SW SW

10. FIELD AND POOL, OR WILDCAT: Wildcat

11. SEC., T., R., M., OR BLK. AND SURVEY OR AREA: SW SW 22-19N-112W., 6th PM

14. PERMIT NO.: 20045

15. ELEVATIONS (Show whether DF, RT, GR, etc.): KB 6388.50' GR 6368'

12. COUNTY OR PARISH: Lincoln

13. STATE: Wyoming

16. Check Appropriate Box To Indicate Nature of Notice, Report, or Other Data

NOTICE OF INTENTION TO:				SUBSEQUENT REPORT OF:			
TEST WATER SHUT-OFF	☐	PULL OR ALTER CASING	☐	WATER SHUT-OFF	☐	REPAIRING WELL	☐
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SHOOT OR ACIDIZE	☐	ABANDON*	☐	SHOOTING OR ACIDIZING	☐	ABANDONMENT*	☐
REPAIR WELL	☐	CHANGE PLANS	☐	(Other) Supplementary history			X
(Other)				(NOTE: Report results of multiple completion on Well Completion or Recompletion Report and Log form.)			

17. DESCRIBE PROPOSED OR COMPLETED OPERATIONS (Clearly state all pertinent details, and give pertinent dates, including estimated date of starting any proposed work. If well is directionally drilled, give subsurface locations and measured and true vertical depths for all markers and zones pertinent to this work.) *

Depth 16,507', fishing.

DST #7: 16,358-16,450', Phosphoria, IO ½ hour, ISI 2 hours, FO 4 hours, FSI 6 hours, opened with very weak blow on both openings, no gas, recovered 100' mud.
IHP 7665, IOFP's 1901-1901, ISIP 2282, FOFP's 1869-1838, FSIP 2155, FHP 7665.

RECEIVED
FEB - 7 1973

18. I hereby certify that the foregoing is true and correct

SIGNED B. H. Crofts TITLE Vice President, Gas Supply Operations DATE Feb. 5, 1973

(This space for Federal or State office use)

APPROVED BY _____ TITLE _____ DATE _____

CONDITIONS OF APPROVAL, IF ANY:

*See Instructions on Reverse Side

Form 9-331
(May 1963)

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

SUBMIT IN TRIPLICATE* (Other instructions on reverse side)

Form approved.
Budget Bureau No. 42-R1424.

5. LEASE DESIGNATION AND SERIAL NO.: W - 05929-A

6. IF INDIAN, ALLOTTEE OR TRIBE NAME: -

SUNDRY NOTICES AND REPORTS ON WELLS

(Do not use this form for proposals to drill or to deepen or plug back to a different reservoir. Use "APPLICATION FOR PERMIT—" for such proposals.)

1. OIL WELL ☐ GAS WELL ☐ OTHER: Wildcat

7. UNIT AGREEMENT NAME: Bruff Unit

2. NAME OF OPERATOR: Mountain Fuel Supply Company

8. FARM OR LEASE NAME: Unit Well

3. ADDRESS OF OPERATOR: P. O. Box 1129, Rock Springs, Wyoming 82901

9. WELL NO.: 1

4. LOCATION OF WELL (Report location clearly and in accordance with any State requirements.* See also space 17 below.) At surface: 660' FSL, 660' FWL SW SW

10. FIELD AND POOL, OR WILDCAT: Wildcat

11. SEC., T., R., M., OR BLK. AND SURVEY OR AREA: SW SW 22-19N-112W., 6th PM

14. PERMIT NO.: 20045

15. ELEVATIONS (Show whether DF, RT, GR, etc.): KB 6388.50' GR 6368'

12. COUNTY OR PARISH: Lincoln

13. STATE: Wyoming

16. Check Appropriate Box To Indicate Nature of Notice, Report, or Other Data

NOTICE OF INTENTION TO:				SUBSEQUENT REPORT OF:			
TEST WATER SHUT-OFF	☐	PULL OR ALTER CASING	☐	WATER SHUT-OFF	☐	REPAIRING WELL	☐
FRACTURE TREAT	☐	MULTIPLE COMPLETE	☐	FRACTURE TREATMENT	☐	ALTERING CASING	☐
SHOOT OR ACIDIZE	☐	ABANDON*	☐	SHOOTING OR ACIDIZING	☐	ABANDONMENT*	☐
REPAIR WELL	☐	CHANGE PLANS	☐	(Other) Supplementary history			X
(Other)				(NOTE: Report results of multiple completion on Well Completion or Recompletion Report and Log form.)			

17. DESCRIBE PROPOSED OR COMPLETED OPERATIONS (Clearly state all pertinent details, and give pertinent dates, including estimated date of starting any proposed work. If well is directionally drilled, give subsurface locations and measured and true vertical depths for all markers and zones pertinent to this work.) *

Depth 16,974', recovered fish, preparing to make DST #11.

DST #8: 16,515-16,572', Weber, IO ½ hour, ISI 2 hours, FO 4 hours, FSI 6 hours, opened weak, reopened dead, no gas, recovered 130' gas cut mud. IHP 7858, IOFP's 2123-2155, ISIP 5671, FOFP's 2187-2219, FSIP 5221, FHP 7858.

DST #9: 16,572-16,635', Weber, IO ½ hour, ISI 2 hours, FO 4 hours, FSI 6 hours, opened with weak blow, reopened dead, no gas, no recovery (circulating sub open), IHP 7826, IOFP's 2123-2155, ISIP 4321, FOFP's 2187-2187, FSIP 5929, FHP 7793.

DST #10: 16,924-16,974', Weber, mis-run, packers failed.

RECEIVED
MAR 6 - 1973

18. I hereby certify that the foregoing is true and correct

SIGNED B. H. Crofts TITLE Vice President, Gas Supply Operations DATE March 5, 1973

(This space for Federal or State office use)

APPROVED BY _____ TITLE _____ DATE _____

CONDITIONS OF APPROVAL, IF ANY:

*See Instructions on Reverse Side

Form 9-331
(May 1963)

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

SUBMIT IN TRIPLICATE* (Other instructions on reverse side)

Form approved.
Budget Bureau No. 42-R1424.

5. LEASE DESIGNATION AND SERIAL NO.: W - 05929-A

6. IF INDIAN, ALLOTTEE OR TRIBE NAME: -

SUNDRY NOTICES AND REPORTS ON WELLS

(Do not use this form for proposals to drill or to deepen or plug back to a different reservoir. Use "APPLICATION FOR PERMIT—" for such proposals.)

1. OIL WELL ☐ GAS WELL ☐ OTHER: Wildcat

7. UNIT AGREEMENT NAME: Bruff Unit

2. NAME OF OPERATOR: Mountain Fuel Supply Company

8. FARM OR LEASE NAME: Unit Well

3. ADDRESS OF OPERATOR: P. O. Box 1129, Rock Springs, Wyoming 82901

9. WELL NO.: 1

4. LOCATION OF WELL (Report location clearly and in accordance with any State requirements.* See also space 17 below.) At surface: 660' FSL, 660' FWL SW SW

10. FIELD AND POOL, OR WILDCAT: Wildcat

11. SEC., T., R., M., OR BLK. AND SURVEY OR AREA: SW SW 22-19N-112W., 6th PM

14. PERMIT NO.: 20045

15. ELEVATIONS (Show whether DF, RT, GR, etc.): KB 6388.50' GR 6368'

12. COUNTY OR PARISH: Lincoln

13. STATE: Wyoming

16. Check Appropriate Box To Indicate Nature of Notice, Report, or Other Data

NOTICE OF INTENTION TO:				SUBSEQUENT REPORT OF:			
TEST WATER SHUT-OFF	☐	PULL OR ALTER CASING	☐	WATER SHUT-OFF	☐	REPAIRING WELL	☐
FRACTURE TREAT	☐	MULTIPLE COMPLETE	☐	FRACTURE TREATMENT	☐	ALTERING CASING	☐
SHOOT OR ACIDIZE	☐	ABANDON*	☐	SHOOTING OR ACIDIZING	☐	ABANDONMENT*	☐
REPAIR WELL	☐	CHANGE PLANS	☐	(Other) Supplementary history			X
(Other)				(NOTE: Report results of multiple completion on Well Completion or Recompletion Report and Log form.)			

17. DESCRIBE PROPOSED OR COMPLETED OPERATIONS (Clearly state all pertinent details, and give pertinent dates, including estimated date of starting any proposed work. If well is directionally drilled, give subsurface locations and measured and true vertical depths for all markers and zones pertinent to this work.) *

Depth 17,371', circulating.

DST #11: 16,909-16,974', Weber, IO ½ hour, ISI 2 hours, FO 4 hours, FSI 6 hours, opened very weak decreasing, no gas, reopened dead, no gas, no recovery, IHP 8051, IOFP's 2092-2155, ISIP 7600, FOFP's 2155-2282, FSIP 7408, FHP 7858.

RECEIVED
MAR 22 1973
STATE OIL & GAS SUPERVISOR

18. I hereby certify that the foregoing is true and correct

SIGNED: L. W. Crofts TITLE: Vice President, Gas Supply Operations DATE: March 20, 1973

(This space for Federal or State office use)

APPROVED BY _____ TITLE _____ DATE _____

CONDITIONS OF APPROVAL, IF ANY:

*See Instructions on Reverse Side

Form 9-331
(May 1963)

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

SUBMIT IN TRIPLICATE* (Other instructions on reverse side)

Form approved.
Budget Bureau No. 42-R1424.

SUNDRY NOTICES AND REPORTS ON WELLS

(Do not use this form for proposals to drill or to deepen or plug back to a different reservoir. Use "APPLICATION FOR PERMIT—" for such proposals.)

1. OIL WELL ☐ GAS WELL ☐ OTHER Wildcat

2. NAME OF OPERATOR
Mountain Fuel Supply Company

3. ADDRESS OF OPERATOR
P. O. Box 1129, Rock Springs, Wyoming 82901

4. LOCATION OF WELL (Report location clearly and in accordance with any State requirements.* See also space 17 below.)
At surface
660' FSL, 660' FWL SW SW

5. LEASE DESIGNATION AND SERIAL NO.
W - 05929-A

6. IF INDIAN, ALLOTTEE OR TRIBE NAME

7. UNIT AGREEMENT NAME
Bruff Unit

8. FARM OR LEASE NAME
Unit Well

9. WELL NO.
1

10. FIELD AND POOL, OR WILDCAT
Wildcat

11. SEC., T., R., M., OR BLK. AND SURVEY OR AREA
SW SW 22-19N-112W., 6th PM

12. COUNTY OR PARISH: Lincoln

13. STATE: Wyoming

14. PERMIT NO.
20045

15. ELEVATIONS (Show whether DF, RT, GR, etc.)
KB 6388.50' GR 6368'

16. Check Appropriate Box To Indicate Nature of Notice, Report, or Other Data

NOTICE OF INTENTION TO:				SUBSEQUENT REPORT OF:			
TEST WATER SHUT-OFF	☐	PULL OR ALTER CASING	☐	WATER SHUT-OFF	☐	REPAIRING WELL	☐
FRACTURE TREAT	☐	MULTIPLE COMPLETE	☐	FRACTURE TREATMENT	☐	ALTERING CASING	☐
SHOOT OR ACIDIZE	☐	ABANDON*	☐	SHOOTING OR ACIDIZING	☐	ABANDONMENT*	☐
REPAIR WELL	☐	CHANGE PLANS	☐	(Other) Supplementary history			X
(Other)	☐			(NOTE: Report results of multiple completion on Well Completion or Recompletion Report and Log form.)			

17. DESCRIBE PROPOSED OR COMPLETED OPERATIONS (Clearly state all pertinent details, and give pertinent dates, including estimated date of starting any proposed work. If well is directionally drilled, give subsurface locations and measured and true vertical depths for all markers and zones pertinent to this work.) *

Depth 17,704', tripping.

18. I hereby certify that the foregoing is true and correct

SIGNED B. W. Crockett TITLE Vice President, Gas Supply Operations DATE March 28, 1973

(This space for Federal or State office use)

APPROVED BY _____ TITLE _____ DATE _____

CONDITIONS OF APPROVAL, IF ANY:

*See Instructions on Reverse Side

Form 9-331
(May 1963)

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

SUBMIT IN TRIPLICATE* (Other instructions on reverse side)

Form approved.
Budget Bureau No. 42-R1424.

SUNDRY NOTICES AND REPORTS ON WELLS

(Do not use this form for proposals to drill or to deepen or plug back to a different reservoir. Use "APPLICATION FOR PERMIT—" for such proposals.)

5. LEASE DESIGNATION AND SERIAL NO.: W - 05929-A

6. IF INDIAN, ALLOTTEE OR TRIBE NAME: -

1. OIL WELL ☐ GAS WELL ☐ OTHER: Wildcat

7. UNIT AGREEMENT NAME: Bruff Unit

2. NAME OF OPERATOR: Mountain Fuel Supply Company

8. FARM OR LEASE NAME: Unit Well

3. ADDRESS OF OPERATOR: P. O. Box 1129, Rock Springs, Wyoming 82901

9. WELL NO.: 1

4. LOCATION OF WELL (Report location clearly and in accordance with any State requirements.* See also space 17 below.) At surface: 660' FSL, 660' FWL SW SW

10. FIELD AND POOL, OR WILDCAT: Wildcat

11. SEC., T., R., M., OR BLK. AND SURVEY OR AREA: SW SW 22-19N-112W., 6th PM

14. PERMIT NO.: 20045

15. ELEVATIONS (Show whether DF, RT, GR, etc.): KB 6388.50' GR 6368'

12. COUNTY OR PARISH: Lincoln

13. STATE: Wyoming

16. Check Appropriate Box To Indicate Nature of Notice, Report, or Other Data

NOTICE OF INTENTION TO:				SUBSEQUENT REPORT OF:			
TEST WATER SHUT-OFF	☐	PULL OR ALTER CASING	☐	WATER SHUT-OFF	☐	REPAIRING WELL	☐
FRACTURE TREAT	☐	MULTIPLE COMPLETE	☐	FRACTURE TREATMENT	☐	ALTERING CASING	☐
SHOOT OR ACIDIZE	☐	ABANDON*	☐	SHOOTING OR ACIDIZING	☐	ABANDONMENT*	☐
REPAIR WELL	☐	CHANGE PLANS	☐	(Other) Supplementary history			X
(Other)				(NOTE: Report results of multiple completion on Well Completion or Recompletion Report and Log form.)			

17. DESCRIBE PROPOSED OR COMPLETED OPERATIONS (Clearly state all pertinent details, and give pertinent dates, including estimated date of starting any proposed work. If well is directionally drilled, give subsurface locations and measured and true vertical depths for all markers and zones pertinent to this work.) *

Depth 18,208', logging.



18. I hereby certify that the foregoing is true and correct

SIGNED B. W. Croft TITLE Vice President, Gas Supply Operations DATE April 3, 1973

(This space for Federal or State office use)

APPROVED BY _____ TITLE _____ DATE _____

CONDITIONS OF APPROVAL, IF ANY:

*See Instructions on Reverse Side

Form 9-331
(May 1963)

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

SUBMIT IN TRIPLICATE* (Other instructions on reverse side)

Form approved.
Budget Bureau No. 42-R1424.

5. LEASE DESIGNATION AND SERIAL NO.: W - 05929-A

6. IF INDIAN, ALLOTTEE OR TRIBE NAME: -

SUNDRY NOTICES AND REPORTS ON WELLS

(Do not use this form for proposals to drill or to deepen or plug back to a different reservoir. Use "APPLICATION FOR PERMIT—" for such proposals.)

1. OIL WELL ☐ GAS WELL ☐ OTHER Wildcat

7. UNIT AGREEMENT NAME: Bruff Unit

2. NAME OF OPERATOR: Mountain Fuel Supply Company

8. FARM OR LEASE NAME: Unit Well

3. ADDRESS OF OPERATOR: P. O. Box 1129, Rock Springs, Wyoming 82901

9. WELL NO.: 1

4. LOCATION OF WELL (Report location clearly and in accordance with any State requirements.* See also space 17 below.) At surface

660' FSL, 660' FWL SW SW

10. FIELD AND POOL, OR WILDCAT: Wildcat

11. SEC., T., R., M., OR BLK. AND SURVEY OR AREA: SW SW 22-19N-112W., 6th PM

14. PERMIT NO.: 20045

15. ELEVATIONS (Show whether DF, RT, GR, etc.): KB 6388.50 GR 6368'

12. COUNTY OR PARISH: Lincoln

13. STATE: Wyoming

16. Check Appropriate Box To Indicate Nature of Notice, Report, or Other Data

NOTICE OF INTENTION TO:				SUBSEQUENT REPORT OF:			
TEST WATER SHUT-OFF	☐	PULL OR ALTER CASING	☐	WATER SHUT-OFF	☐	REPAIRING WELL	☐
FRACTURE TREAT	☐	MULTIPLE COMPLETE	☐	FRACTURE TREATMENT	☐	ALTERING CASING	☐
SHOOT OR ACIDIZE	☐	ABANDON*	☐	SHOOTING OR ACIDIZING	☐	ABANDONMENT*	☐
REPAIR WELL	☐	CHANGE PLANS	☐	(Other) Supplementary history			X
(Other)				(NOTE: Report results of multiple completion on Well Completion or Recompletion Report and Log form.)			

17. DESCRIBE PROPOSED OR COMPLETED OPERATIONS (Clearly state all pertinent details, and give pertinent dates, including estimated date of starting any proposed work. If well is directionally drilled, give subsurface locations and measured and true vertical depths for all markers and zones pertinent to this work.) *

TD 18,208', logged, ran 7" liner, now drilling cement.

CONFIDENTIAL

RECEIVED
APR 10 1973
OFFICE OF
STATE OIL & GAS SUPERVISOR

18. I hereby certify that the foregoing is true and correct

SIGNED B. W. Crafton TITLE Vice President, Gas Supply Operations DATE April 9, 1973

(This space for Federal or State office use)

APPROVED BY _____ TITLE _____ DATE _____

CONDITIONS OF APPROVAL, IF ANY:

*See Instructions on Reverse Side

Form 9-331
(May 1963)

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

SUBMIT IN TRIPLICATE* (Other instructions on reverse side)

CONFIDENTIAL

Form approved.
Budget Bureau No. 42-R1424.

5. LEASE DESIGNATION AND SERIAL NO.: W - 05929-A

6. IF INDIAN, ALLOTTEE OR TRIBE NAME: -

SUNDRY NOTICES AND REPORTS ON WELLS

(Do not use this form for proposals to drill or to deepen or plug back to a different reservoir. Use "APPLICATION FOR PERMIT—" for such proposals.)

1. OIL WELL ☐ GAS WELL ☐ OTHER Wildcat

7. UNIT AGREEMENT NAME: Bruff Unit

2. NAME OF OPERATOR: Mountain Fuel Supply Company

8. FARM OR LEASE NAME: Unit Well

3. ADDRESS OF OPERATOR: P. O. Box 1129, Rock Springs, Wyoming 82901

9. WELL NO.: 1

4. LOCATION OF WELL (Report location clearly and in accordance with any State requirements.* See also space 17 below.) At surface: 660' FSL, 660' FWL SW SW

10. FIELD AND POOL, OR WILDCAT: Wildcat

11. SEC., T., R., M., OR BLK. AND SURVEY OR AREA: SW SW 22-19N-112W., 6th P

14. PERMIT NO.: 20045

15. ELEVATIONS (Show whether DF, RT, GR, etc.): KB 6388.50' GR 6368'

12. COUNTY OR PARISH: Lincoln

13. STATE: Wyoming

16. Check Appropriate Box To Indicate Nature of Notice, Report, or Other Data

NOTICE OF INTENTION TO:				SUBSEQUENT REPORT OF:			
TEST WATER SHUT-OFF	☐	PULL OR ALTER CASING	☐	WATER SHUT-OFF	☐	REPAIRING WELL	☐
FRACTURE TREAT	☐	MULTIPLE COMPLETE	☐	FRACTURE TREATMENT	☐	ALTERING CASING	☐
SHOOT OR ACIDIZE	☐	ABANDON*	☐	SHOOTING OR ACIDIZING	☐	ABANDONMENT*	☐
REPAIR WELL	☐	CHANGE PLANS	☐	(Other) Supplementary history			X
(Other)				(NOTE: Report results of multiple completion on Well Completion or Recompletion Report and Log form.)			

CONFIDENTIAL

17. DESCRIBE PROPOSED OR COMPLETED OPERATIONS (Clearly state all pertinent details, and give pertinent dates, including estimated date of starting any proposed work. If well is directionally drilled, give subsurface locations and measured and true vertical depths for all markers and zones pertinent to this work.) *

TD 18,208', PBD 17,863', going in hole with test tool.
Landed 6071.36' net, 6119.41' gross of 7"OD, 38#, Soo-90 liner at 18,200.16', top of liner at 12,128.80', and set with 1600 sacks of cement.
Perforated the following intervals with 1 jumbo jet shot per foot: 18,004-18,008', 18,022-18,026', and 18,114-18,128', made PDST #1.
PDST #1: Madison perfs 18,004-18,128' gross, IO 1 hour, ISI 2 hours, FO 242 minutes, FSI 3 hours, opened weak increase to strong, no gas, reopened strong, ½ hour 33 Mcf, 1 hour 19 Mcf, 2 hours 17 Mcf, 3½ hours 70 Mcf, recovered 17,941' gas cut water.
IHP 11,118, IOFP's 3112-5579, ISIP 8089, FOFP's 5932-8087, FSIP 8186, FHP 11,118.

Set model K cement retainer at 17,990', perforated the following intervals with 1 jumbo jet shot per foot: 17,881-17,906', 17,924-17,928', 17,938-17,950', 17,966-17,970'.
PDST #2: Madison perfs 17,881-17,970' gross, IO 1 hour, ISI 2 hours, FO 4-3/4 hours, FSI 3½ hours, opened weak, ½ hour 33 Mcf, 1 hour 51 Mcf, reopened, ½ hour 61 Mcf, water in ½ hour, gas not enough to gauge, recovered 17,804' gas cut water.
IHP 10,736, IOFP's 1427-5772, ISIP 7929, FOFP's 5836-7671, FSIP 7961, FHP 10,482.

Set model K retainer at 17,863', perforated 17,562-17,590', 17,610-17,622' and 17,656-17,674' with 1 jumbo jet shot per foot, made PDST #3.
PDST #3: Madison perfs 17,562-17,674' gross, mis-run, tool opened going in hole.

18. I hereby certify that the foregoing is true and correct

SIGNED B. W. Crockett TITLE Vice President, Gas Supply Operations DATE April 25, 1973

(This space for Federal or State office use)

APPROVED BY _____ TITLE _____ DATE _____
CONDITIONS OF APPROVAL, IF ANY:

*See Instructions on Reverse Side

Confidential

Form 9-331
(May 1963)

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

SUBMIT IN TRIPLICATE* (Other instructions on reverse side)

Form approved.
Budget Bureau No. 42-R1424.

5. LEASE DESIGNATION AND SERIAL NO.: W - 05929-A

6. IF INDIAN, ALLOTTEE OR TRIBE NAME: -

SUNDRY NOTICES AND REPORTS ON WELLS

(Do not use this form for proposals to drill or to deepen or plug back to a different reservoir. Use "APPLICATION FOR PERMIT—" for such proposals.)

1. OIL WELL ☐ GAS WELL ☐ OTHER: Wildcat

7. UNIT AGREEMENT NAME: Bruff Unit

2. NAME OF OPERATOR: Mountain Fuel Supply Company

8. FARM OR LEASE NAME: Unit Well

3. ADDRESS OF OPERATOR: P. O. Box 1129, Rock Springs, Wyoming 82901

9. WELL NO.: 1

4. LOCATION OF WELL (Report location clearly and in accordance with any State requirements.* See also space 17 below.) At surface: 660' FSL, 660' FWL SW SW

10. FIELD AND POOL, OR WILDCAT: Wildcat

11. SEC., T., R., M., OR BLK. AND SURVEY OR AREA: SW SW 22-19N-112W., 6th PM

14. PERMIT NO.: 20045

15. ELEVATIONS (Show whether DF, RT, GR, etc.): KB 6388.50' GR 6368'

12. COUNTY OR PARISH: Lincoln

13. STATE: Wyoming

16. Check Appropriate Box To Indicate Nature of Notice, Report, or Other Data

NOTICE OF INTENTION TO:				SUBSEQUENT REPORT OF:			
TEST WATER SHUT-OFF	☐	PULL OR ALTER CASING	☐	WATER SHUT-OFF	☐	REPAIRING WELL	☐
FRACTURE TREAT	☐	MULTIPLE COMPLETE	☐	FRACTURE TREATMENT	☐	ALTERING CASING	☐
SHOOT OR ACIDIZE	☐	ABANDON*	☐	SHOOTING OR ACIDIZING	☐	ABANDONMENT*	☐
REPAIR WELL	☐	CHANGE PLANS	☐	(Other) Supplementary history			X
(Other)				(NOTE: Report results of multiple completion on Well Completion or Recompletion Report and Log form.)			

17. DESCRIBE PROPOSED OR COMPLETED OPERATIONS (Clearly state all pertinent details, and give pertinent dates, including estimated date of starting any proposed work. If well is directionally drilled, give subsurface locations and measured and true vertical depths for all markers and zones pertinent to this work.)*

TD 18,208', PBD 17,529', circulating.
PDST #4: Madison perforations 17,562-17,674', IO 1 hour, ISI 2 hours, FO 277 minutes, FSI 6 hours, opened weak, gas in 22 minutes, ½ hour 36 Mcf, 1 hour 48 Mcf, reopened, 1 hour 48 Mcf, 2 hours 72 Mcf, 3 hours 86 Mcf, 4 hours 67 Mcf, recovered 1200' gas cut mud and 3700' gas cut water, 30' formation fines in bottom drill collar and test tool. IHP 10,736, IOFP's 317-603, ISIP 6446, FOFP's 793-1079, FSIP 7574, FHP 10,635.
Set model N bridge plug at 17,544', dumped 2 sacks of cement on top of plug, perforated from 17,424' to 17,498' with 1 jumbo jet shot per foot.
PDST #5: Morgan perforations 17,424-17,498', IO 1 hour, ISI 2 hours, FO 1-3/4 hours, FSI 1 hour, opened weak, reopened dead, recovered 40' dry powder, 20' mud and 40' water. IHP 10,676, ISIP 9181, FSIP 9092, FHP 10,676.
PDST #6: Morgan perfs 17,424-17,498', IO 1 hour, ISI 2 hours, opened weak, dead in ¼ hour, recovered 30' mud, IHP 10,938, IOFP's 3182-82, SIP 5629, FHP 10,327.
Perforated from 17,424' to 17,498' with 2 jumbo jet shots per foot.
PDST #7: Morgan perforations 17,424-17,498', mis-run, RTTS slips would not set.
PDST #8: Morgan perforations 17,424-17,498', IO 3 hours, ISI 2 hours, FO 4½ hours, FSI 4½ hours, opened tool and bled off nitrogen for 2 hours, gas in 2 hours, weak blow for 1 hour of non-combustible gas, reopened strong, gas at once, 1 hour 16 Mcf, 2 hours not enough to gauge, 4 hours 31 Mcf, reversed out 6475' mud cut water and 20' formation fines, IHP 10,824, IOFP's 454-636, ISIP 5472, FOFP's 909-1357, FSIP 7324, FHP 10,632.
Set 35-sack cement plug across perforations 17,424-17,498' & squeezed with 2900 psi.

18. I hereby certify that the foregoing is true and correct

SIGNED B W Croft TITLE Vice President, Gas Supply Operations DATE May 9, 1973

(This space for Federal or State office use)

APPROVED BY _____ TITLE _____ DATE _____
CONDITIONS OF APPROVAL, IF ANY:

RECEIVED
MAY 11 1973
STATE OIL & GAS CONSERVATION OFFICE OF

*See Instructions on Reverse Side

Form 9-331
(May 1963)

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

SUBMIT IN TRIPLICATE* (Other instructions on reverse side)

Form approved.
Budget Bureau No. 42-R1424.

SUNDRY NOTICES AND REPORTS ON WELLS

(Do not use this form for proposals to drill or to deepen or plug back to a different reservoir. Use "APPLICATION FOR PERMIT—" for such proposals.)

CONFIDENTIAL

5. LEASE DESIGNATION AND SERIAL NO.: W - 05929-A

6. IF INDIAN, ALLOTTEE OR TRIBE NAME: -

1. OIL WELL ☐ GAS WELL ☐ OTHER: Wildcat

7. UNIT AGREEMENT NAME: Bruff Unit

2. NAME OF OPERATOR: Mountain Fuel Supply Company

8. FARM OR LEASE NAME: Unit Well

3. ADDRESS OF OPERATOR: P. O. Box 1129, Rock Springs, Wyoming 82901

9. WELL NO.: 1

4. LOCATION OF WELL (Report location clearly and in accordance with any State requirements.* See also space 17 below.) At surface: 660' FSL, 660' FWL SW SW

10. FIELD AND POOL, OR WILDCAT: Wildcat

11. SEC., T., R., M., OR BLK. AND SURVEY OR AREA: SW SW 22-19N-112W

14. PERMIT NO.: 20045

15. ELEVATIONS (Show whether DF, RT, GR, etc.): KB 6388.50 GR 6368

12. COUNTY OR PARISH: Lincoln

13. STATE: Wyoming

16. Check Appropriate Box To Indicate Nature of Notice, Report, or Other Data

NOTICE OF INTENTION TO:				SUBSEQUENT REPORT OF:			
TEST WATER SHUT-OFF	☐	PULL OR ALTER CASING	☐	WATER SHUT-OFF	☐	REPAIRING WELL	☐
FRACTURE TREAT	☐	MULTIPLE COMPLETE	☐	FRACTURE TREATMENT	☐	ALTERING CASING	☐
SHOOT OR ACIDIZE	☐	ABANDON*	☐	SHOOTING OR ACIDIZING	☐	ABANDONMENT*	☐
REPAIR WELL	☐	CHANGE PLANS	☐	(Other) Supplementary history			X
(Other)				(NOTE: Report results of multiple completion on Well Completion or Recompletion Report and Log form.)			

17. DESCRIBE PROPOSED OR COMPLETED OPERATIONS (Clearly state all pertinent details, and give pertinent dates, including estimated date of starting any proposed work. If well is directionally drilled, give subsurface locations and measured and true vertical depths for all markers and zones pertinent to this work.)*

TD 18,208', PBD 17,390', nippling up.

Set EZ drill squeeze packer at 17,390' and squeezed perforations 17,424-17,498' with 100 sacks of cement, perforated from 17,295' to 17,345' with 1 jumbo jet shot per foot, made PDST #9, then acidized with 4000 gallons 10% acetic acid, landed 3½" tubing at 17,242.10'.

PDST #9: Morgan perforations 17,295-17,345', IO 88 minutes, ISI 287 minutes, FO 16½ hours, FSI 15 hours, opened tool and allowed to set 17 minutes before starting to bleed off nitrogen, gas in 58 minutes, 65 minutes 1348 Mcf, 87 minutes 654 Mcf, reopened strong, at end of final open well was making 1379 Mcf of gas, total of 190 barrels of oil, no water, reversed out 680' condensate.
IHP 11,016, IOFP's 1044-1330, ISIP 11,025, FOFP's 972-2017, FSIP 10,589, FHP 11,016.

CONFIDENTIAL

18. I hereby certify that the foregoing is true and correct

SIGNED BW Croft TITLE Vice President, Gas Supply Operations DATE May 16, 1973

(This space for Federal or State office use)

APPROVED BY _____ TITLE _____ DATE _____
CONDITIONS OF APPROVAL, IF ANY:

*See Instructions on Reverse Side

Form 9-331
(May 1963)

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

SUBMIT IN TRIPLICATE* (Other instructions on reverse side)

Form approved.
Budget Bureau No. 42-R1424.

5. LEASE DESIGNATION AND SERIAL NO.: W - 05929-A

6. IF INDIAN, ALLOTTEE OR TRIBE NAME: -

SUNDRY NOTICES AND REPORTS ON WELLS

(Do not use this form for proposals to drill or to deepen or plug back to a different reservoir. Use "APPLICATION FOR PERMIT—" for such proposals.)

1. OIL WELL ☐ GAS WELL ☐ OTHER Wildcat

7. UNIT AGREEMENT NAME: Bruff Unit

2. NAME OF OPERATOR: Mountain Fuel Supply Company

8. FARM OR LEASE NAME: Unit Well

3. ADDRESS OF OPERATOR: P. O. Box 1129, Rock Springs, Wyoming 82901

9. WELL NO.: 1

4. LOCATION OF WELL (Report location clearly and in accordance with any State requirements.* See also space 17 below.) At surface: 660' FSL, 660' FWL SW SW

10. FIELD AND POOL, OR WILDCAT: Wildcat

CONFIDENTIAL

11. SEC., T., R., M., OR BLK. AND SURVEY OR AREA: SW SW 22-19N-112W., 6th PM

14. PERMIT NO.: 20045

15. ELEVATIONS (Show whether DF, RT, GR, etc.): KB 6388.50' GR 6368'

12. COUNTY OR PARISH: Lincoln

13. STATE: Wyoming

16. Check Appropriate Box To Indicate Nature of Notice, Report, or Other Data

NOTICE OF INTENTION TO:				SUBSEQUENT REPORT OF:			
TEST WATER SHUT-OFF	☐	PULL OR ALTER CASING	☐	WATER SHUT-OFF	☐	REPAIRING WELL	☐
FRACTURE TREAT	☐	MULTIPLE COMPLETE	☐	FRACTURE TREATMENT	☐	ALTERING CASING	☐
SHOOT OR ACIDIZE	☐	ABANDON*	☐	SHOOTING OR ACIDIZING	☐	ABANDONMENT*	☐
REPAIR WELL	☐	CHANGE PLANS	☐	(Other) Supplementary history			X
(Other)				(NOTE: Report results of multiple completion on Well Completion or Recompletion Report and Log form.)			

17. DESCRIBE PROPOSED OR COMPLETED OPERATIONS (Clearly state all pertinent details, and give pertinent dates, including estimated date of starting any proposed work. If well is directionally drilled, give subsurface locations and measured and true vertical depths for all markers and zones pertinent to this work.) *

TD 18,208', PBD 17,390', set packer at 17,390' and squeezed perforations 17,424-17,498' with 100 sacks of cement, perforated from 17,295' to 17,345' with 1 jumbo jet shot per foot, made PDST #9.

PDST #9: Morgan perfs 17,295-17,345', IO 88 minutes, ISI 287 minutes, FO 16½ hours, FSI 15 hours, opened and allowed to set 17 minutes before starting to bleed off nitrogen, gas to surface in 58 minutes, 65 minutes 1348 Mcf, 87 minutes 654 Mcf, reopened, ½ hour 200 Mcf, 1 hour 177 Mcf, at end of test well making 1379 Mcf of gas per day, 15 barrels of oil per hour, wellhead 280 psi, sep. 180 psi, reversed out 680' condensate to pits. IHP 11,016, IOFP's 1044-1330, ISIP 11,025, FOFP's 972-2017, FSIP 10,589, FHP 11,016. Landed 3½" tubing at 17,242.10', acidized with 24,176 gallons 28% HCL, 20,160 gallons 2½% Hcl, 8000 gallons acetic and 20,160 gallons 15% pad acid emulsion, swabbed, applied drip oil squeeze using 1200 barrels drip oil, well flowing by heads, recovered an estimated 700 barrels of drip oil and 300 barrels acid water, testing.

CONFIDENTIAL

RECEIVED

18. I hereby certify that the foregoing is true and correct

SIGNED B.W. Croft TITLE Vice President, Gas Supply Operations DATE May 22, 1973

(This space for Federal or State office use)

APPROVED BY _____ TITLE _____ DATE _____

CONDITIONS OF APPROVAL, IF ANY:

*See Instructions on Reverse Side

Form 9-331
(May 1963)

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

SUBMIT IN TRIPLICATE* (Other instructions on reverse side)

Form approved.
Budget Bureau No. 42-R1424.

5. LEASE DESIGNATION AND SERIAL NO.: W - 05929-A

6. IF INDIAN, ALLOTTEE OR TRIBE NAME: -

SUNDRY NOTICES AND REPORTS ON WELLS

(Do not use this form for proposals to drill or to deepen or plug back to a different reservoir. Use "APPLICATION FOR PERMIT—" for such proposals.)

1. OIL WELL ☐ GAS WELL ☐ OTHER Wildcat

7. UNIT AGREEMENT NAME: Bruff Unit

2. NAME OF OPERATOR: Mountain Fuel Supply Company

8. FARM OR LEASE NAME: Unit Well

3. ADDRESS OF OPERATOR: P. O. Box 1129, Rock Springs, Wyoming 82901

9. WELL NO.: 1

4. LOCATION OF WELL (Report location clearly and in accordance with any State requirements.* See also space 17 below.) At surface: 660' FSL, 660' FWL SW SW

10. FIELD AND POOL, OR WILDCAT: Wildcat

11. SEC., T., R., M., OR BLK. AND SURVEY OR AREA: SW SW 22-19N-112W., 6th PM

14. PERMIT NO.: 20045

15. ELEVATIONS (Show whether DF, RT, GR, etc.): GR 6368'

12. COUNTY OR PARISH: Lincoln

13. STATE: Wyoming

16. Check Appropriate Box To Indicate Nature of Notice, Report, or Other Data

NOTICE OF INTENTION TO:				SUBSEQUENT REPORT OF:			
TEST WATER SHUT-OFF	☐	PULL OR ALTER CASING	☐	WATER SHUT-OFF	☐	REPAIRING WELL	☐
FRACTURE TREAT	☐	MULTIPLE COMPLETE	☐	FRACTURE TREATMENT	☐	ALTERING CASING	☐
SHOOT OR ACIDIZE	☐	ABANDON*	☐	SHOOTING OR ACIDIZING	☐	ABANDONMENT*	☐
REPAIR WELL	☐	CHANGE PLANS	☐	(Other) Supplementary history			X
(Other)				(NOTE: Report results of multiple completion on Well Completion or Recompletion Report and Log form.)			

17. DESCRIBE PROPOSED OR COMPLETED OPERATIONS (Clearly state all pertinent details, and give pertinent dates, including estimated date of starting any proposed work. If well is directionally drilled, give subsurface locations and measured and true vertical depths for all markers and zones pertinent to this work.) *

Depth 1547', tripping out with fish.

Spudded July 28, 1972. Twisted off, left 2 drill collars in hole, now on way out with fish, well flows a 3" stream of water when pump is shut down.

RECEIVED
AUG 1 1972
OFFICE of
STATE OIL & GAS SUPERVISOR

18. I hereby certify that the foregoing is true and correct

SIGNED B. W. Croft TITLE Vice President, Gas Supply Operations DATE July 31, 1972

(This space for Federal or State office use)

APPROVED BY _____ TITLE _____ DATE _____

CONDITIONS OF APPROVAL, IF ANY:

*See Instructions on Reverse Side

Form 9-331
(May 1963)

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

SUBMIT IN TRIPLICATE* (Other instructions on reverse side)

Form approved.
Budget Bureau No. 42-R1424.

SUNDRY NOTICES AND REPORTS ON WELLS

(Do not use this form for proposals to drill or to deepen or plug back to a different reservoir. Use "APPLICATION FOR PERMIT—" for such proposals.)

1. OIL WELL ☐ GAS WELL ☐ OTHER Wildcat

2. NAME OF OPERATOR
Mountain Fuel Supply Company

3. ADDRESS OF OPERATOR
P. O. Box 1129, Rock Springs, Wyoming 82901

4. LOCATION OF WELL (Report location clearly and in accordance with any State requirements.* See also space 17 below.)
At surface
660' FSL, 660' FWL SW SW

5. LEASE DESIGNATION AND SERIAL NO.
W - 05929-A

6. IF INDIAN, ALLOTTEE OR TRIBE NAME
-

7. UNIT AGREEMENT NAME
Bruff Unit

8. FARM OR LEASE NAME
Unit Well

9. WELL NO.
1

10. FIELD AND POOL, OR WILDCAT
Wildcat

11. SEC., T., R., M., OR BLK. AND SURVEY OR AREA
SW SW 22-19N-112W., 6th PM

14. PERMIT NO.
20045

15. ELEVATIONS (Show whether DF, RT, GR, etc.)
GR 6368'

12. COUNTY OR PARISH
Lincoln

13. STATE
Wyoming

16. Check Appropriate Box To Indicate Nature of Notice, Report, or Other Data

NOTICE OF INTENTION TO:				SUBSEQUENT REPORT OF:			
TEST WATER SHUT-OFF	☐	PULL OR ALTER CASING	☐	WATER SHUT-OFF	☐	REPAIRING WELL	☐
FRACTURE TREAT	☐	MULTIPLE COMPLETE	☐	FRACTURE TREATMENT	☐	ALTERING CASING	☐
SHOOT OR ACIDIZE	☐	ABANDON*	☐	SHOOTING OR ACIDIZING	☐	ABANDONMENT*	☐
REPAIR WELL	☐	CHANGE PLANS	☐	(Other) Supplementary history			X
(Other)				(NOTE: Report results of multiple completion on Well Completion or Recompletion Report and Log form.)			

17. DESCRIBE PROPOSED OR COMPLETED OPERATIONS (Clearly state all pertinent details, and give pertinent dates, including estimated date of starting any proposed work. If well is directionally drilled, give subsurface locations and measured and true vertical depths for all markers and zones pertinent to this work.) *

Depth 2110', ran 13-3/8" surface casing, waiting on cement.

18. I hereby certify that the foregoing is true and correct

SIGNED B. H. Crofts TITLE Vice President, Gas Supply Operations DATE August 9, 1972

(This space for Federal or State office use)

APPROVED BY _____ TITLE _____ DATE _____

CONDITIONS OF APPROVAL, IF ANY:

RECEIVED
AUG 10 1972
STATE OIL & GAS CONSERVATION COMMISSION
OFFICE

*See Instructions on Reverse Side

Form 9-331
(May 1963)

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

SUBMIT IN TRIPLICATE* (Other instructions on reverse side)

Form approved.
Budget Bureau No. 42-R1424.

SUNDRY NOTICES AND REPORTS ON WELLS

(Do not use this form for proposals to drill or to deepen or plug back to a different reservoir. Use "APPLICATION FOR PERMIT—" for such proposals.)

5. LEASE DESIGNATION AND SERIAL NO.: W - 05929-A

6. IF INDIAN, ALLOTTEE OR TRIBE NAME: -

1. OIL WELL ☐ GAS WELL ☐ OTHER: Wildcat

7. UNIT AGREEMENT NAME: Bruff Unit

2. NAME OF OPERATOR: Mountain Fuel Supply Company

8. FARM OR LEASE NAME: Unit Well

3. ADDRESS OF OPERATOR: P. O. Box 1129, Rock Springs, Wyoming 82901

9. WELL NO.: 1

4. LOCATION OF WELL (Report location clearly and in accordance with any State requirements.* See also space 17 below.) At surface

660' FSL, 660' FWL SW SW

10. FIELD AND POOL, OR WILDCAT: Wildcat

11. SEC., T., R., M., OR BLK. AND SURVEY OR AREA: SW SW 22-19N-112W., 6th PM

14. PERMIT NO.: 20045

15. ELEVATIONS (Show whether DF, RT, GR, etc.): KB 6386.90' GR 6368'

12. COUNTY OR PARISH: Lincoln

13. STATE: Wyoming

16. Check Appropriate Box To Indicate Nature of Notice, Report, or Other Data

NOTICE OF INTENTION TO:				SUBSEQUENT REPORT OF:			
TEST WATER SHUT-OFF	☐	PULL OR ALTER CASING	☐	WATER SHUT-OFF	☐	REPAIRING WELL	☐
FRACTURE TREAT	☐	MULTIPLE COMPLETE	☐	FRACTURE TREATMENT	☐	ALTERING CASING	☐
SHOOT OR ACIDIZE	☐	ABANDON*	☐	SHOOTING OR ACIDIZING	☐	ABANDONMENT*	☐
REPAIR WELL	☐	CHANGE PLANS	☐	(Other) Supplementary history			X
(Other)				(NOTE: Report results of multiple completion on Well Completion or Recompletion Report and Log form.)			

17. DESCRIBE PROPOSED OR COMPLETED OPERATIONS (Clearly state all pertinent details, and give pertinent dates, including estimated date of starting any proposed work. If well is directionally drilled, give subsurface locations and measured and true vertical depths for all markers and zones pertinent to this work.) *

Depth 5410', drilling.

Landed 13-3/8" OD casing at 2109.00' KBM.

RECEIVED
AUG 21 1972
OFFICE of
STATE OIL & GAS SUPERVISOR

18. I hereby certify that the foregoing is true and correct

SIGNED B. H. Crouch TITLE Vice President Gas Supply Operations DATE 8/18/72

(This space for Federal or State office use)

APPROVED BY _____ TITLE _____ DATE _____

CONDITIONS OF APPROVAL, IF ANY:

*See Instructions on Reverse Side

Form 9-331
(May 1963)

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

SUBMIT IN TRIPLICATE* (Other instructions on reverse side)

Form approved.
Budget Bureau No. 42-R1424.

SUNDRY NOTICES AND REPORTS ON WELLS

(Do not use this form for proposals to drill or to deepen or plug back to a different reservoir. Use "APPLICATION FOR PERMIT—" for such proposals.)

5. LEASE DESIGNATION AND SERIAL NO.: W - 05929-A

6. IF INDIAN, ALLOTTEE OR TRIBE NAME: -

1. OIL WELL ☐ GAS WELL ☐ OTHER: Wildcat

7. UNIT AGREEMENT NAME: Bruff Unit

2. NAME OF OPERATOR: Mountain Fuel Supply Company

8. FARM OR LEASE NAME: Unit Well

3. ADDRESS OF OPERATOR: P. O. Box 1129, Rock Springs, Wyoming 82901

9. WELL NO.: 1

4. LOCATION OF WELL (Report location clearly and in accordance with any State requirements.* See also space 17 below.) At surface: 660' FSL, 660' FWL SW SW

10. FIELD AND POOL, OR WILDCAT: Wildcat

11. SEC., T., R., M., OR BLK. AND SURVEY OR AREA: SW SW 22-19N-112W., 6th PM

14. PERMIT NO.: 20045

15. ELEVATIONS (Show whether DF, RT, GR, etc.): KB 6386.90' GR 6368'

12. COUNTY OR PARISH: Lincoln

13. STATE: Wyoming

16. Check Appropriate Box To Indicate Nature of Notice, Report, or Other Data

NOTICE OF INTENTION TO:				SUBSEQUENT REPORT OF:			
TEST WATER SHUT-OFF	☐	PULL OR ALTER CASING	☐	WATER SHUT-OFF	☐	REPAIRING WELL	☐
FRACTURE TREAT	☐	MULTIPLE COMPLETE	☐	FRACTURE TREATMENT	☐	ALTERING CASING	☐
SHOOT OR ACIDIZE	☐	ABANDON*	☐	SHOOTING OR ACIDIZING	☐	ABANDONMENT*	☐
REPAIR WELL	☐	CHANGE PLANS	☐	(Other) Supplementary history			x
(Other)				(NOTE: Report results of multiple completion on Well Completion or Recompletion Report and Log form.)			

17. DESCRIBE PROPOSED OR COMPLETED OPERATIONS (Clearly state all pertinent details, and give pertinent dates, including estimated date of starting any proposed work. If well is directionally drilled, give subsurface locations and measured and true vertical depths for all markers and zones pertinent to this work.)*

Depth 6135', drilling.

DST #1: 5401-5456', Fort Union, IO ½ hr., ISI 1½ hrs., FO 2 hrs., FSI 3 hrs. 45 min., opened strong, strong throughout, no gas to surface, reopened weak, very weak by end of test, no gas to surface, recovered 5185' water. IHP 2267, IOFP's 213-1151, ISIP 2498, FOFP's 1193-2456, FSIP 2541, FHHP 2267.

RECEIVED
AUG 25 1972
OFFICE of
STATE OIL & GAS SUPERVISOR

18. I hereby certify that the foregoing is true and correct

SIGNED R. N. Clark TITLE Vice President Gas Supply Operations DATE 8/24/72

(This space for Federal or State office use)

APPROVED BY _____ TITLE _____ DATE _____

CONDITIONS OF APPROVAL, IF ANY:

*See Instructions on Reverse Side

Form 9-331
(May 1963)

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

SUBMIT IN TRIPLICATE* (Other instructions on reverse side)

Form approved.
Budget Bureau No. 42-R1424.

SUNDRY NOTICES AND REPORTS ON WELLS

(Do not use this form for proposals to drill or to deepen or plug back to a different reservoir. Use "APPLICATION FOR PERMIT—" for such proposals.)

5. LEASE DESIGNATION AND SERIAL NO.: W - 05929-A

6. IF INDIAN, ALLOTTEE OR TRIBE NAME: -

1. OIL WELL ☐ GAS WELL ☐ OTHER: Wildcat

7. UNIT AGREEMENT NAME: Bruff Unit

2. NAME OF OPERATOR: Mountain Fuel Supply Company

8. FARM OR LEASE NAME: Unit Well

3. ADDRESS OF OPERATOR: P. O. Box 1129, Rock Springs, Wyoming 82901

9. WELL NO.: 1

4. LOCATION OF WELL (Report location clearly and in accordance with any State requirements.* See also space 17 below.) At surface: 660' FSL, 660' FWL SW SW

10. FIELD AND POOL, OR WILDCAT: Wildcat

11. SEC., T., R., M., OR BLK. AND SURVEY OR AREA: SW SW 22-19N-112W., 6th PM

14. PERMIT NO.: 20045

15. ELEVATIONS (Show whether DF, RT, GR, etc.): KB 6386.90' GR 6368'

12. COUNTY OR PARISH: Lincoln

13. STATE: Wyoming

16. Check Appropriate Box To Indicate Nature of Notice, Report, or Other Data

NOTICE OF INTENTION TO:				SUBSEQUENT REPORT OF:			
TEST WATER SHUT-OFF	☐	PULL OR ALTER CASING	☐	WATER SHUT-OFF	☐	REPAIRING WELL	☐
FRACTURE TREAT	☐	MULTIPLE COMPLETE	☐	FRACTURE TREATMENT	☐	ALTERING CASING	☐
SHOOT OR ACIDIZE	☐	ABANDON*	☐	SHOOTING OR ACIDIZING	☐	ABANDONMENT*	☐
REPAIR WELL	☐	CHANGE PLANS	☐	(Other) Supplementary history			X
(Other)				(NOTE: Report results of multiple completion on Well Completion or Recompletion Report and Log form.)			

17. DESCRIBE PROPOSED OR COMPLETED OPERATIONS (Clearly state all pertinent details, and give pertinent dates, including estimated date of starting any proposed work. If well is directionally drilled, give subsurface locations and measured and true vertical depths for all markers and zones pertinent to this work.) *

Depth 8104', drilling.

DST #2: 7682-7700', Mesaverde, IO ½ hour, ISI 1 hour, FO 2 hours, FSI 2½ hours, opened with weak blow on both openings, no gas to surface, recovered 270' water cut mud and 397' gas cut and mud cut water.
IHP 3832, IOFP's 20-125, ISIP 3498, FOFP's 125-312, FSIP 3457, FHP 3832.

Landed 2087.60' net, 2109.60' gross of 13-3/8"OD, 61#, K-55, seal lock thread casing at 2109.00' KBM and set with 2250 sacks of cement.

RECEIVED
SEP 7 1972
OFFICE of
STATE OIL & GAS SUPERVISOR

18. I hereby certify that the foregoing is true and correct

SIGNED B. W. Croft TITLE Vice President, Gas Supply Operations DATE Sept. 5, 1972

(This space for Federal or State office use)

APPROVED BY _____ TITLE _____ DATE _____
CONDITIONS OF APPROVAL, IF ANY:

*See Instructions on Reverse Side

Form 9-331
(May 1963)

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

SUBMIT IN TRIPLICATE* (Other instructions on reverse side)

Form approved.
Budget Bureau No. 42-R1424.

5. LEASE DESIGNATION AND SERIAL NO.: W - 05929-A

6. IF INDIAN, ALLOTTEE OR TRIBE NAME: -

SUNDRY NOTICES AND REPORTS ON WELLS

(Do not use this form for proposals to drill or to deepen or plug back to a different reservoir. Use "APPLICATION FOR PERMIT—" for such proposals.)

1. OIL WELL ☐ GAS WELL ☐ OTHER: Wildcat

7. UNIT AGREEMENT NAME: Bruff Unit

2. NAME OF OPERATOR: Mountain Fuel Supply Company

8. FARM OR LEASE NAME: Unit Well

3. ADDRESS OF OPERATOR: P. O. Box 1129, Rock Springs, Wyoming 82901

9. WELL NO.: 1

4. LOCATION OF WELL (Report location clearly and in accordance with any State requirements.* See also space 17 below.) At surface: 660' FSL, 660' FWL SW SW

10. FIELD AND POOL, OR WILDCAT: Wildcat

11. SEC., T., R., M., OR BLK. AND SURVEY OR AREA: SW SW 22-19N-112W., 6th PM

14. PERMIT NO.: 20045

15. ELEVATIONS (Show whether DF, RT, GR, etc.): KB 6386.90' GR 6368'

12. COUNTY OR PARISH: Lincoln

13. STATE: Wyoming

16. Check Appropriate Box To Indicate Nature of Notice, Report, or Other Data

NOTICE OF INTENTION TO:				SUBSEQUENT REPORT OF:			
TEST WATER SHUT-OFF	☐	PULL OR ALTER CASING	☐	WATER SHUT-OFF	☐	REPAIRING WELL	☐
FRACTURE TREAT	☐	MULTIPLE COMPLETE	☐	FRACTURE TREATMENT	☐	ALTERING CASING	☐
SHOOT OR ACIDIZE	☐	ABANDON*	☐	SHOOTING OR ACIDIZING	☐	ABANDONMENT*	☐
REPAIR WELL	☐	CHANGE PLANS	☐	(Other) Supplementary history			X
(Other)				(NOTE: Report results of multiple completion on Well Completion or Recompletion Report and Log form.)			

17. DESCRIBE PROPOSED OR COMPLETED OPERATIONS (Clearly state all pertinent details, and give pertinent dates, including estimated date of starting any proposed work. If well is directionally drilled, give subsurface locations and measured and true vertical depths for all markers and zones pertinent to this work.) *

Depth 9140', drilling.

RECEIVED
SEP 13 1972
STATE OIL & GAS SUPERVISOR

18. I hereby certify that the foregoing is true and correct

SIGNED B. W. Crofts TITLE Vice President, Gas Supply Operations DATE Sept. 12, 1972

(This space for Federal or State office use)

APPROVED BY _____ TITLE _____ DATE _____

CONDITIONS OF APPROVAL, IF ANY:

*See Instructions on Reverse Side

Form 3160–5
(November 1983)
(Formerly 9–331)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

SUBMIT IN TRIPLICATE* (Other instructions on reverse side)

Budget Bureau No. 1004–0135
Expires August 31, 1985

SUNDRY NOTICES AND REPORTS ON WELLS

(Do not use this form for proposals to drill or to deepen or plug back to a different reservoir. Use "APPLICATION FOR PERMIT—" for such proposals.)

1. OIL WELL ☐ GAS WELL ☒ OTHER

2. NAME OF OPERATOR: Wexpro Company

3. ADDRESS OF OPERATOR: P. O. Box 458, Rock Springs, Wyoming 82902

4. LOCATION OF WELL (Report location clearly and in accordance with any State requirements.* See also space 17 below.) At surface

5. LEASE DESIGNATION AND SERIAL NO.: ST-71-11002

6. IF INDIAN, ALLOTTEE OR TRIBE NAME: -

7. UNIT AGREEMENT NAME: -

8. FARM OR LEASE NAME: Bruff Unit

9. WELL NO.: 2

10. FIELD AND POOL, OR WILDCAT: Bruff

11. SEC., T., R., M., OR BLK. AND SURVEY OR AREA: 16-19N-112W, 6th PM

12. COUNTY OR PARISH: Lincoln

13. STATE: WY

14. PERMIT NO.

15. ELEVATIONS (Show whether DF, RT, GR, etc.)

16. **Check Appropriate Box To Indicate Nature of Notice, Report, or Other Data**

NOTICE OF INTENTION TO:				SUBSEQUENT REPORT OF:			
TEST WATER SHUT-OFF	☐	PULL OR ALTER CASING	☐	WATER SHUT-OFF	☐	REPAIRING WELL	☐
FRACTURE TREAT	☐	MULTIPLE COMPLETE	☐	FRACTURE TREATMENT	☐	ALTERING CASING	☐
SHOOT OR ACIDIZE	☐	ABANDON*	☐	SHOOTING OR ACIDIZING	☐	ABANDONMENT*	☐
REPAIR WELL	☐	CHANGE PLANS	☐	(Other)			
(Other) Install Cathodic Protection	☒			(NOTE: Report results of multiple completion on Well Completion or Recompletion Report and Log form.)			

17. DESCRIBE PROPOSED OR COMPLETED OPERATIONS (Clearly state all pertinent details, and give pertinent dates, including estimated date of starting any proposed work. If well is directionally drilled, give subsurface locations and measured and true vertical depths for all markers and zones pertinent to this work.)*

We would like to drill a 10" by 250 foot deepwell anode bed to cathodically protect the well casing on Bruff Well No. 2. The anode bed will be located 200 feet from the wellhead and be connected to a thermoelectric generator positioned on location. The cable will be buried via a trencher. The cuttings from drilling will be spread out on the well location or the road way to avoid any surface disturbance. An archeological survey of the area indicated the anode bed can be positioned any direction from the wellhead. The driller will use a portable pit for mud containment.

RECEIVED
AUG 16 1985
WYOMING OIL & GAS
CONSERVATION COMMISSION

18. I hereby certify that the foregoing is true and correct

SIGNED [signature] TITLE Dir. Petroleum Engnrng. DATE 8/7/85

(This space for Federal or State office use)

APPROVED BY _____ TITLE _____ DATE _____
CONDITIONS OF APPROVAL, IF ANY:

***See Instructions on Reverse Side**

Title 18 U.S.C. Section 1001, makes it a crime for any person knowingly and willfully to make to any department or agency of the United States any false, fictitious or fraudulent statements or representations as to any matter within its jurisdiction.

Form 9-331
(May 1963)

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

SUBMIT IN TRIPLICATE* (Other instructions on reverse side)

Form approved.
Budget Bureau No. 42-R1424.

5. LEASE DESIGNATION AND SERIAL NO.: St. of Wyo. 71-11002

6. IF INDIAN, ALLOTTEE OR TRIBE NAME:

SUNDRY NOTICES AND REPORTS ON WELLS

(Do not use this form for proposals to drill or to deepen or plug back to a different reservoir. Use "APPLICATION FOR PERMIT—" for such proposals.)

1. OIL WELL ☐ GAS WELL ☒ OTHER

7. UNIT AGREEMENT NAME: Bruff Unit

2. NAME OF OPERATOR: Mountain Fuel Supply Company

8. FARM OR LEASE NAME: Unit Well

3. ADDRESS OF OPERATOR: P. O. Box 1129, Rock Springs, Wyoming 82901

9. WELL NO.: 2

4. LOCATION OF WELL (Report location clearly and in accordance with any State requirements.* See also space 17 below.) At surface: 750' FSL, 850' FWL

10. FIELD AND POOL, OR WILDCAT: Bruff

11. SEC., T., R., M., OR BLK. AND SURVEY OR AREA: SW SW 16-19N-112W

14. PERMIT NO.: 20106

15. ELEVATIONS (Show whether DF, RT, GR, etc.): KB 6348.85' GR 6326'

12. COUNTY OR PARISH: Lincoln

13. STATE: Wyoming

16. **Check Appropriate Box To Indicate Nature of Notice, Report, or Other Data**

NOTICE OF INTENTION TO:				SUBSEQUENT REPORT OF:			
TEST WATER SHUT-OFF	☐	PULL OR ALTER CASING	☐	WATER SHUT-OFF	☐	REPAIRING WELL	☐
FRACTURE TREAT	☐	MULTIPLE COMPLETE	☐	FRACTURE TREATMENT	☐	ALTERING CASING	☐
SHOOT OR ACIDIZE	☐	ABANDON*	☐	SHOOTING OR ACIDIZING	☐	ABANDONMENT*	☐
REPAIR WELL	☐	CHANGE PLANS	☐	(Other) Supplementary history			☒
(Other)				(NOTE: Report results of multiple completion on Well Completion or Recompletion Report and Log form.)			

17. DESCRIBE PROPOSED OR COMPLETED OPERATIONS (Clearly state all pertinent details, and give pertinent dates, including estimated date of starting any proposed work. If well is directionally drilled, give subsurface locations and measured and true vertical depths for all markers and zones pertinent to this work.) *

TD 17,425', PBD 11,708', Frontier perfs 11,247-11,280' gross, testing.

Set bridge plug at 11,900' and set 50-sack cement plug, perforated from 11,272' to 11,280' with 4 holes per foot and from 11,272' to 11,280' with 2 holes per foot, made PDST #5, landed 2-7/8" tubing at 11,168.25', fracked perfs using 130,000 gallons Super E fluid mixed with 138,000# 40-60 and 110,000# 20-40 mesh sand, swabbed and well began to flow, well was making 792 Mcf of gas per day through 35/64" choke with a TP of 250 psi, CP 700 when it was shut in to repair the separator.

PDST #5: Frontier perfs 11,247-11,280' gross, IO 485 minutes, SI 2425 minutes, opened weak increasing to strong, gas to surface in ¼ hour, 1 hour 395 Mcf, 3 hrs 435 Mcf, 5 hrs 435 Mcf, 8 hrs 449 Mcf, recovered 640' gas cut mud and 580' mud cut water, IHP 6987, FP's 523-1177, SIP 6756.

RECEIVED
NOV-5 1975

18. I hereby certify that the foregoing is true and correct

SIGNED R. L. Myers TITLE General Manager, Gas Supply Operations DATE November 3, 1975

(This space for Federal or State office use)

APPROVED BY _____ TITLE _____ DATE _____

CONDITIONS OF APPROVAL, IF ANY:

*See Instructions on Reverse Side

Form 9-331
(May 1963)

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

SUBMIT IN TRIPLICATE* (Other instructions on reverse side)

Form approved.
Budget Bureau No. 42-R1424.

5. LEASE DESIGNATION AND SERIAL NO.: St. of Wyo. 71-11002

6. IF INDIAN, ALLOTTEE OR TRIBE NAME:

SUNDRY NOTICES AND REPORTS ON WELLS

(Do not use this form for proposals to drill or to deepen or plug back to a different reservoir. Use "APPLICATION FOR PERMIT—" for such proposals.)

1. OIL WELL ☐ GAS WELL ☒ OTHER

7. UNIT AGREEMENT NAME: Bruff Unit

2. NAME OF OPERATOR: Mountain Fuel Supply Company

8. FARM OR LEASE NAME: Unit Well

3. ADDRESS OF OPERATOR: P. O. Box 1129, Rock Springs, Wyoming 82901

9. WELL NO.: 2

4. LOCATION OF WELL (Report location clearly and in accordance with any State requirements.* See also space 17 below.) At surface: 750' FSL, 850' FWL

10. FIELD AND POOL, OR WILDCAT: Bruff

11. SEC., T., R., M., OR BLK. AND SURVEY OR AREA: SW SW 16-19N-112W

14. PERMIT NO.: 20106

15. ELEVATIONS (Show whether DF, RT, GR, etc.): KB 6348.85' GR 6326'

12. COUNTY OR PARISH: Lincoln

13. STATE: Wyoming

16. Check Appropriate Box To Indicate Nature of Notice, Report, or Other Data

NOTICE OF INTENTION TO:				SUBSEQUENT REPORT OF:			
TEST WATER SHUT-OFF	☐	PULL OR ALTER CASING	☐	WATER SHUT-OFF	☐	REPAIRING WELL	☐
FRACTURE TREAT	☐	MULTIPLE COMPLETE	☐	FRACTURE TREATMENT	☐	ALTERING CASING	☐
SHOOT OR ACIDIZE	☐	ABANDON*	☐	SHOOTING OR ACIDIZING	☐	ABANDONMENT*	☐
REPAIR WELL	☐	CHANGE PLANS	☐	(Other) Supplementary history			X
(Other)				(NOTE: Report results of multiple completion on Well Completion or Recompletion Report and Log form.)			

17. DESCRIBE PROPOSED OR COMPLETED OPERATIONS (Clearly state all pertinent details, and give pertinent dates, including estimated date of starting any proposed work. If well is directionally drilled, give subsurface locations and measured and true vertical depths for all markers and zones pertinent to this work.) *

TD 17,425', rigged up work over unit, perforated from 11,947' to 11,988' with 1 hole per foot, made PDST #4, set brige plug at 11,900', tripped in open ended.

PDST #4: Dakota perfs 11,947-11,988', 240' water cushion, IO 338 minutes, SI 880 minutes, opened strong, gas in 20 minutes, 30 minutes 108 Mcf, 140 minutes 26 Mcf, 320 minutes 26 Mcf, recovered 610' gas cut mud and 204' mud cut water, IHP 7504, FP's 350-767, SIP 5266, FHP 5266.



18. I hereby certify that the foregoing is true and correct

SIGNED E. E. Meza TITLE General Manager, Gas Supply Operations DATE Oct. 8, 1975

(This space for Federal or State office use)

APPROVED BY _____ TITLE _____ DATE _____

CONDITIONS OF APPROVAL, IF ANY:

*See Instructions on Reverse Side

Form 9-331
(May 1963)

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

SUBMIT IN TRIPLICATE* (Other instructions on reverse side)

Form approved.
Budget Bureau No. 42-R1424.

5. LEASE DESIGNATION AND SERIAL NO.: St. of Wyo. 71-11002

6. IF INDIAN, ALLOTTEE OR TRIBE NAME:

SUNDRY NOTICES AND REPORTS ON WELLS

(Do not use this form for proposals to drill or to deepen or plug back to a different reservoir. Use "APPLICATION FOR PERMIT—" for such proposals.)

1. OIL WELL ☐ GAS WELL ☒ OTHER

7. UNIT AGREEMENT NAME: Bruff Unit

2. NAME OF OPERATOR: Mountain Fuel Supply Company

8. FARM OR LEASE NAME: Unit Well

3. ADDRESS OF OPERATOR: P. O. Box 1129, Rock Springs, Wyoming 82901

9. WELL NO.: 2

4. LOCATION OF WELL (Report location clearly and in accordance with any State requirements.* See also space 17 below.) At surface: 750' FSL, 850' FWL

10. FIELD AND POOL, OR WILDCAT: Bruff

11. SEC., T., R., M., OR BLK. AND SURVEY OR AREA: SW SW 16-19N-112W

14. PERMIT NO.: 20106

15. ELEVATIONS (Show whether DF, RT, GR, etc.): KB 6348.85' GR 6326'

12. COUNTY OR PARISH: Lincoln

13. STATE: Wyoming

16. Check Appropriate Box To Indicate Nature of Notice, Report, or Other Data

NOTICE OF INTENTION TO:				SUBSEQUENT REPORT OF:			
TEST WATER SHUT-OFF	☐	PULL OR ALTER CASING	☐	WATER SHUT-OFF	☐	REPAIRING WELL	☐
FRACTURE TREAT	☐	MULTIPLE COMPLETE	☐	FRACTURE TREATMENT	☐	ALTERING CASING	☐
SHOOT OR ACIDIZE	☐	ABANDON*	☐	SHOOTING OR ACIDIZING	☐	ABANDONMENT*	☐
REPAIR WELL	☐	CHANGE PLANS	☐	(Other) Supplementary history			☒
(Other)				(NOTE: Report results of multiple completion on Well Completion or Recompletion Report and Log form.)			

17. DESCRIBE PROPOSED OR COMPLETED OPERATIONS (Clearly state all pertinent details, and give pertinent dates, including estimated date of starting any proposed work. If well is directionally drilled, give subsurface locations and measured and true vertical depths for all markers and zones pertinent to this work.)*

TD 17,425', PBD 12,030', perforated from 17,242' to 17,270' and from 17,274' to 17,302' with 1 hole per foot, made PDST #1, set packer at 17,200', perforated from 12,052' to 12,066' and from 12,084' to 12,096' with 4 holes per foot, made PDST #2, set bridge plug at 12,030', perforated from 11,947' to 11,988' with 4 holes per foot, making PDST #3.

PDST #1: Morgan perfs 17,242-17,302' gross, IO 18 hrs, SI 11 hrs, opened weak, no gas, recovered 1000' water cushion, 875' mud and 100' water, and 3' dehydrated mud, IHP 12,000+, FP's 580-831, SIP 7421, FHP 12,000.

PDST #2: Dakota perfs 12,052-12,096' gross, IO 970 minutes, SI 2½ hrs, opened weak, gas in 7½ hrs not enough to gauge, formation water in 940 minutes, recovered 500' water cut mud and 11,988' water, IHP 7718, FP's 633-5080, SIP 6360, FHP 7680.

RECEIVED
SEP 22 1975
U.S. GEOLOGICAL SURVEY

18. I hereby certify that the foregoing is true and correct

SIGNED C. J. Myers TITLE General Manager, Gas Supply Operations DATE Sept. 18, 1975

(This space for Federal or State office use)

APPROVED BY _____ TITLE _____ DATE _____

CONDITIONS OF APPROVAL, IF ANY:

*See Instructions on Reverse Side

Form 9-331
(May 1963)

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

SUBMIT IN TRIPLICATE* (Other instructions on reverse side)

Form approved.
Budget Bureau No. 42-R1424.

SUNDRY NOTICES AND REPORTS ON WELLS

(Do not use this form for proposals to drill or to deepen or plug back to a different reservoir. Use "APPLICATION FOR PERMIT—" for such proposals.)

1. OIL WELL ☐ GAS WELL ☒ OTHER

2. NAME OF OPERATOR
Mountain Fuel Supply Company

3. ADDRESS OF OPERATOR
P. O. Box 1129, Rock Springs, Wyoming 82901

4. LOCATION OF WELL (Report location clearly and in accordance with any State requirements.* See also space 17 below.)
At surface
750' FSL, 850' FWL SW SW

5. LEASE DESIGNATION AND SERIAL NO.
St. of Wyo. 71-11002

6. IF INDIAN, ALLOTTEE OR TRIBE NAME
-

7. UNIT AGREEMENT NAME
Bruff Unit

8. FARM OR LEASE NAME
Unit Well

9. WELL NO.
2

10. FIELD AND POOL, OR WILDCAT
Bruff

11. SEC., T., R., M., OR BLK. AND SURVEY OR AREA
SW SW 16-19N-112W

14. PERMIT NO.
20106

15. ELEVATIONS (Show whether DF, RT, GR, etc.)
KB 6349.25' GR 6326'

12. COUNTY OR PARISH
Lincoln

13. STATE
Wyoming

16. Check Appropriate Box To Indicate Nature of Notice, Report, or Other Data

NOTICE OF INTENTION TO:				SUBSEQUENT REPORT OF:			
TEST WATER SHUT-OFF	☐	PULL OR ALTER CASING	☐	WATER SHUT-OFF	☐	REPAIRING WELL	☐
FRACTURE TREAT	☐	MULTIPLE COMPLETE	☐	FRACTURE TREATMENT	☐	ALTERING CASING	☐
SHOOT OR ACIDIZE	☐	ABANDON*	☐	SHOOTING OR ACIDIZING	☐	ABANDONMENT*	☐
REPAIR WELL	☐	CHANGE PLANS	☐	(Other) Supplementary history			X
(Other)				(NOTE: Report results of multiple completion on Well Completion or Recompletion Report and Log form.)			

17. DESCRIBE PROPOSED OR COMPLETED OPERATIONS (Clearly state all pertinent details, and give pertinent dates, including estimated date of starting any proposed work. If well is directionally drilled, give subsurface locations and measured and true vertical depths for all markers and zones pertinent to this work.) *

Depth 14,855', drilling.

Landed 12,598.65' net, 12,710.43' gross of 9-5/8"OD, 47# & 53.5#, triple seal casing at 12,624.00' and set with a total of 1556 sacks of cement.



18. I hereby certify that the foregoing is true and correct

SIGNED T. D. Myers TITLE General Manager, Gas Supply Operations DATE July 14, 1975

(This space for Federal or State office use)

APPROVED BY _____ TITLE _____ DATE _____
CONDITIONS OF APPROVAL, IF ANY:

*See Instructions on Reverse Side

Form 9-331
(May 1963)

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

SUBMIT IN TRIPLICATE* (Other instructions on reverse side)

Form approved.
Budget Bureau No. 42-R1424.

5. LEASE DESIGNATION AND SERIAL NO.: St. of Wyo. 71-11002

6. IF INDIAN, ALLOTTEE OR TRIBE NAME: -

SUNDRY NOTICES AND REPORTS ON WELLS

(Do not use this form for proposals to drill or to deepen or plug back to a different reservoir. Use "APPLICATION FOR PERMIT—" for such proposals.)

1. OIL WELL ☐ GAS WELL ☒ OTHER

7. UNIT AGREEMENT NAME: Bruff Unit

2. NAME OF OPERATOR: Mountain Fuel Supply Company

8. FARM OR LEASE NAME: Unit Well

3. ADDRESS OF OPERATOR: P. O. Box 1129, Rock Springs, Wyoming 82901

9. WELL NO.: 2

4. LOCATION OF WELL (Report location clearly and in accordance with any State requirements.* See also space 17 below.) At surface: 750' FSL, 850' FWL SW SW

10. FIELD AND POOL, OR WILDCAT: Bruff

11. SEC., T., R., M., OR BLK. AND SURVEY OR AREA: SW SW 16-19N-112W

14. PERMIT NO.: 20106

15. ELEVATIONS (Show whether DF, RT, GR, etc.): KB 6349.25' GR 6326'

12. COUNTY OR PARISH: Lincoln

13. STATE: Wyoming

16. Check Appropriate Box To Indicate Nature of Notice, Report, or Other Data

NOTICE OF INTENTION TO:				SUBSEQUENT REPORT OF:			
TEST WATER SHUT-OFF	☐	PULL OR ALTER CASING	☐	WATER SHUT-OFF	☐	REPAIRING WELL	☐
FRACTURE TREAT	☐	MULTIPLE COMPLETE	☐	FRACTURE TREATMENT	☐	ALTERING CASING	☐
SHOOT OR ACIDIZE	☐	ABANDON*	☐	SHOOTING OR ACIDIZING	☐	ABANDONMENT*	☐
REPAIR WELL	☐	CHANGE PLANS	☐	(Other) Supplementary history			☒
(Other)				(NOTE: Report results of multiple completion on Well Completion or Recompletion Report and Log form.)			

17. DESCRIBE PROPOSED OR COMPLETED OPERATIONS (Clearly state all pertinent details, and give pertinent dates, including estimated date of starting any proposed work. If well is directionally drilled, give subsurface locations and measured and true vertical depths for all markers and zones pertinent to this work.)*

Depth 17,390', cutting core No. 5.

RECEIVED
AUG 28 1975
GAS SUPERVISION

18. I hereby certify that the foregoing is true and correct

SIGNED R. D. Myers TITLE General Manager, Gas Supply Operations DATE Aug. 27, 1975

(This space for Federal or State office use)

APPROVED BY _____ TITLE _____ DATE _____

CONDITIONS OF APPROVAL, IF ANY:

*See Instructions on Reverse Side

Form 9-331
(May 1963)

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

SUBMIT IN TRIPLICATE* (Other instructions on reverse side)

Form approved.
Budget Bureau No. 42-R1424.

5. LEASE DESIGNATION AND SERIAL NO.: St. of Wyo. 71-11002

6. IF INDIAN, ALLOTTEE OR TRIBE NAME: -

SUNDRY NOTICES AND REPORTS ON WELLS

(Do not use this form for proposals to drill or to deepen or plug back to a different reservoir. Use "APPLICATION FOR PERMIT—" for such proposals.)

1. OIL WELL ☐ GAS WELL ☒ OTHER

7. UNIT AGREEMENT NAME: Bruff Unit

2. NAME OF OPERATOR: Mountain Fuel Supply Company

8. FARM OR LEASE NAME: Unit Well

3. ADDRESS OF OPERATOR: P. O. Box 1129, Rock Springs, Wyoming 82901

9. WELL NO.: 2

4. LOCATION OF WELL (Report location clearly and in accordance with any State requirements.* See also space 17 below.) At surface: 750' FSL, 850' FWL SW SW

10. FIELD AND POOL, OR WILDCAT: Bruff

11. SEC., T., R., M., OR BLK. AND SURVEY OR AREA: SW SW 16-19N-112W

14. PERMIT NO.: 20106

15. ELEVATIONS (Show whether DF, RT, GR, etc.): KB 6348.85' GR 6326'

12. COUNTY OR PARISH: Lincoln

13. STATE: Wyoming

16. Check Appropriate Box To Indicate Nature of Notice, Report, or Other Data

NOTICE OF INTENTION TO:				SUBSEQUENT REPORT OF:			
TEST WATER SHUT-OFF	☐	PULL OR ALTER CASING	☐	WATER SHUT-OFF	☐	REPAIRING WELL	☐
FRACTURE TREAT	☐	MULTIPLE COMPLETE	☐	FRACTURE TREATMENT	☐	ALTERING CASING	☐
SHOOT OR ACIDIZE	☐	ABANDON*	☐	SHOOTING OR ACIDIZING	☐	ABANDONMENT*	☐
REPAIR WELL	☐	CHANGE PLANS	☐	(Other) Supplementary history			X
(Other)				(NOTE: Report results of multiple completion on Well Completion or Recompletion Report and Log form.)			

17. DESCRIBE PROPOSED OR COMPLETED OPERATIONS (Clearly state all pertinent details, and give pertinent dates, including estimated date of starting any proposed work. If well is directionally drilled, give subsurface locations and measured and true vertical depths for all markers and zones pertinent to this work.) *

TD 17,425', PBD 17,374', landed 7"OD, 32# - 35# - 38#, Soo-90, Soo-95, and AR-95, 8rd thd, LT&C liner at 17,410.80', top of liner at 11,250.58', and set with 1950 sacks of cement, attempted to pressure test casing and liner, set retainer at 11,205' and squeezed with 200 sacks of cement, drilled retainer and cleaned out to top of liner, now mixing and conditioning mud.

RECEIVED SEP 10 1975

18. I hereby certify that the foregoing is true and correct

SIGNED R. L. Mays TITLE General Manager, Gas Supply Operations DATE Sept. 9, 1975

(This space for Federal or State office use)

APPROVED BY _____ TITLE _____ DATE _____

CONDITIONS OF APPROVAL, IF ANY:

*See Instructions on Reverse Side

Form 9-331
(May 1963)

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

SUBMIT IN TRIPLICATE* (Other instructions on reverse side)

Form approved.
Budget Bureau No. 42-R1424.

5. LEASE DESIGNATION AND SERIAL NO.: St. of Wyo. 71-11002

6. IF INDIAN, ALLOTTEE OR TRIBE NAME:

SUNDRY NOTICES AND REPORTS ON WELLS

(Do not use this form for proposals to drill or to deepen or plug back to a different reservoir. Use "APPLICATION FOR PERMIT—" for such proposals.)

1. OIL WELL ☐ GAS WELL ☒ OTHER

7. UNIT AGREEMENT NAME: Bruff Unit

2. NAME OF OPERATOR: Mountain Fuel Supply Company

8. FARM OR LEASE NAME: Unit Well

3. ADDRESS OF OPERATOR: P. O. Box 1129, Rock Springs, Wyoming 82901

9. WELL NO.: 2

4. LOCATION OF WELL (Report location clearly and in accordance with any State requirements.* See also space 17 below.) At surface: 750' FSL, 850' FWL

10. FIELD AND POOL, OR WILDCAT: Bruff

11. SEC., T., R., M., OR BLK. AND SURVEY OR AREA: SW SW 16-19N-112W

14. PERMIT NO.: 20106

15. ELEVATIONS (Show whether DF, RT, GR, etc.): KB 6348.85' GR 6326'

12. COUNTY OR PARISH: Lincoln

13. STATE: Wyoming

16. Check Appropriate Box To Indicate Nature of Notice, Report, or Other Data

NOTICE OF INTENTION TO:				SUBSEQUENT REPORT OF:			
TEST WATER SHUT-OFF	☐	PULL OR ALTER CASING	☐	WATER SHUT-OFF	☐	REPAIRING WELL	☐
FRACTURE TREAT	☐	MULTIPLE COMPLETE	☐	FRACTURE TREATMENT	☐	ALTERING CASING	☐
SHOOT OR ACIDIZE	☐	ABANDON*	☐	SHOOTING OR ACIDIZING	☐	ABANDONMENT*	☐
REPAIR WELL	☐	CHANGE PLANS	☐	(Other) Supplementary history			X
(Other)				(NOTE: Report results of multiple completion on Well Completion or Recompletion Report and Log form.)			

17. DESCRIBE PROPOSED OR COMPLETED OPERATIONS (Clearly state all pertinent details, and give pertinent dates, including estimated date of starting any proposed work. If well is directionally drilled, give subsurface locations and measured and true vertical depths for all markers and zones pertinent to this work.)*

TD 17,425', PBD 12,030', rig released 9-21-75, well shut in, waiting on completion tools.

PDST #3: Dakota perfs 11,947-11,988', 500' water cushion, IO 647 minutes, SI 845 minutes, opened with a strong blow, gas in 20 minutes 58 Mcf, ½ hr 63 Mcf, 1 hr 39 Mcf, 8 hrs 32 Mcf, 647 minutes 30 Mcf, recovered 500' water cushion, IHP 7697, FP's 722-777, SIP 6041.

RECEIVED
SEP 26 1975

18. I hereby certify that the foregoing is true and correct

SIGNED R. L. Myers TITLE General Manager, Gas Supply Operations DATE Sept. 24, 1975

(This space for Federal or State office use)

APPROVED BY _____ TITLE _____ DATE _____

CONDITIONS OF APPROVAL, IF ANY:

*See Instructions on Reverse Side

Form 9-331
(May 1963)

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

SUBMIT IN TRIPLICATE* (Other instructions on reverse side)

Form approved.
Budget Bureau No. 42-R1424.

SUNDRY NOTICES AND REPORTS ON WELLS

(Do not use this form for proposals to drill or to deepen or plug back to a different reservoir. Use "APPLICATION FOR PERMIT—" for such proposals.)

5. LEASE DESIGNATION AND SERIAL NO.: St. of Wyo. 71-11002

6. IF INDIAN, ALLOTTEE OR TRIBE NAME: -

1. OIL WELL ☐ GAS WELL ☒ OTHER

7. UNIT AGREEMENT NAME: Bruff Unit

2. NAME OF OPERATOR: Mountain Fuel Supply Company

8. FARM OR LEASE NAME: Unit Well

3. ADDRESS OF OPERATOR: P. O. Box 1129, Rock Springs, Wyoming 82901

9. WELL NO.: 2

4. LOCATION OF WELL (Report location clearly and in accordance with any State requirements.* See also space 17 below.) At surface

750' FSL, 850' FWL SW SW

10. FIELD AND POOL, OR WILDCAT: Bruff

11. SEC., T., R., M., OR BLK. AND SURVEY OR AREA: SW SW 16-19N-112W

14. PERMIT NO.: 20106

15. ELEVATIONS (Show whether DF, RT, GR, etc.): KB 6349.25' GR 6326'

12. COUNTY OR PARISH: Lincoln

13. STATE: Wyoming

16. Check Appropriate Box To Indicate Nature of Notice, Report, or Other Data

NOTICE OF INTENTION TO:				SUBSEQUENT REPORT OF:			
TEST WATER SHUT-OFF	☐	PULL OR ALTER CASING	☐	WATER SHUT-OFF	☐	REPAIRING WELL	☐
FRACTURE TREAT	☐	MULTIPLE COMPLETE	☐	FRACTURE TREATMENT	☐	ALTERING CASING	☐
SHOOT OR ACIDIZE	☐	ABANDON*	☐	SHOOTING OR ACIDIZING	☐	ABANDONMENT*	☐
REPAIR WELL	☐	CHANGE PLANS	☐	(Other) Supplementary history			☒
(Other)				(NOTE: Report results of multiple completion on Well Completion or Recompletion Report and Log form.)			

17. DESCRIBE PROPOSED OR COMPLETED OPERATIONS (Clearly state all pertinent details, and give pertinent dates, including estimated date of starting any proposed work. If well is directionally drilled, give subsurface locations and measured and true vertical depths for all markers and zones pertinent to this work.) *

Depth 11,290', laying down core No. 1.

RECEIVED
MAY - 2 1975
OFFICE OF
STATE OIL & GAS SUPERVISOR

18. I hereby certify that the foregoing is true and correct

SIGNED R. L. Myers TITLE General Manager, Gas Supply Operations DATE Apr. 30, 1975

(This space for Federal or State office use)

APPROVED BY _____ TITLE _____ DATE _____

CONDITIONS OF APPROVAL, IF ANY:

*See Instructions on Reverse Side

Form 9-331
(May 1963)

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

SUBMIT IN TRIPLICATE* (Other instructions on reverse side)

Form approved.
Budget Bureau No. 42-R1424.

SUNDRY NOTICES AND REPORTS ON WELLS

(Do not use this form for proposals to drill or to deepen or plug back to a different reservoir. Use "APPLICATION FOR PERMIT—" for such proposals.)

5. LEASE DESIGNATION AND SERIAL NO.: St. of Wyo, 71-11002

6. IF INDIAN, ALLOTTEE OR TRIBE NAME: -

1. OIL WELL ☐ GAS WELL ☒ OTHER

7. UNIT AGREEMENT NAME: Bruff Unit

2. NAME OF OPERATOR: Mountain Fuel Supply Company

8. FARM OR LEASE NAME: Unit Well

3. ADDRESS OF OPERATOR: P. O. Box 1129, Rock Springs, Wyoming 82901

9. WELL NO.: 2

4. LOCATION OF WELL (Report location clearly and in accordance with any State requirements.* See also space 17 below.) At surface: 750' FSL, 850' FWL SW SW

10. FIELD AND POOL, OR WILDCAT: Bruff

11. SEC., T., R., M., OR BLK. AND SURVEY OR AREA: SW SW 16-19N-112W

14. PERMIT NO.: 20106

15. ELEVATIONS (Show whether DF, RT, GR, etc.): KB 6349.25' GR 6326'

12. COUNTY OR PARISH: Lincoln

13. STATE: Wyoming

16. Check Appropriate Box To Indicate Nature of Notice, Report, or Other Data

NOTICE OF INTENTION TO:				SUBSEQUENT REPORT OF:			
TEST WATER SHUT-OFF	☐	PULL OR ALTER CASING	☐	WATER SHUT-OFF	☐	REPAIRING WELL	☐
FRACTURE TREAT	☐	MULTIPLE COMPLETE	☐	FRACTURE TREATMENT	☐	ALTERING CASING	☐
SHOOT OR ACIDIZE	☐	ABANDON*	☐	SHOOTING OR ACIDIZING	☐	ABANDONMENT*	☐
REPAIR WELL	☐	CHANGE PLANS	☐	(Other) Supplementary history			X
(Other)			☐				

(NOTE: Report results of multiple completion on Well Completion or Recompletion Report and Log form.)

17. DESCRIBE PROPOSED OR COMPLETED OPERATIONS (Clearly state all pertinent details, and give pertinent dates, including estimated date of starting any proposed work. If well is directionally drilled, give subsurface locations and measured and true vertical depths for all markers and zones pertinent to this work.) *

Depth 17,425', laying down drill pipe.

Landed 7" liner at 17,410.80' and set with 1950 sacks of cement.

RECEIVED
SEP 4 - 1975
STATE OIL & GAS SU

18. I hereby certify that the foregoing is true and correct

SIGNED R. E. Wyss TITLE General Manager, Gas Supply Operations DATE Sept. 3, 1975

(This space for Federal or State office use)

APPROVED BY _____ TITLE _____ DATE _____

CONDITIONS OF APPROVAL, IF ANY:

*See Instructions on Reverse Side

Form 9-331
(May 1963)

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

SUBMIT IN TRIPLICATE* (Other instructions on reverse side)

Form approved.
Budget Bureau No. 42-R1424.

SUNDRY NOTICES AND REPORTS ON WELLS

(Do not use this form for proposals to drill or to deepen or plug back to a different reservoir. Use "APPLICATION FOR PERMIT—" for such proposals.)

5. LEASE DESIGNATION AND SERIAL NO.: St. of Wyo. 71-11002

6. IF INDIAN, ALLOTTEE OR TRIBE NAME: -

1. OIL WELL ☐ GAS WELL ☒ OTHER

7. UNIT AGREEMENT NAME: Bruff Unit

2. NAME OF OPERATOR: Mountain Fuel Supply Company

8. FARM OR LEASE NAME: Unit Well

3. ADDRESS OF OPERATOR: P. O. Box 1129, Rock Springs, Wyoming 82901

9. WELL NO.: 2

4. LOCATION OF WELL (Report location clearly and in accordance with any State requirements.* See also space 17 below.) At surface: 750' FSL, 850' FWL SW SW

10. FIELD AND POOL, OR WILDCAT: Bruff

11. SEC., T., R., M., OR BLK. AND SURVEY OR AREA: SW SW 16-19N-112W

14. PERMIT NO.: 20106

15. ELEVATIONS (Show whether DF, RT, GR, etc.): KB 6349.25' GR 6326'

12. COUNTY OR PARISH: Lincoln

13. STATE: Wyoming

16. Check Appropriate Box To Indicate Nature of Notice, Report, or Other Data

NOTICE OF INTENTION TO:				SUBSEQUENT REPORT OF:			
TEST WATER SHUT-OFF	☐	PULL OR ALTER CASING	☐	WATER SHUT-OFF	☐	REPAIRING WELL	☐
FRACTURE TREAT	☐	MULTIPLE COMPLETE	☐	FRACTURE TREATMENT	☐	ALTERING CASING	☐
SHOOT OR ACIDIZE	☐	ABANDON*	☐	SHOOTING OR ACIDIZING	☐	ABANDONMENT*	☐
REPAIR WELL	☐	CHANGE PLANS	☐	(Other) Supplementary history			X
(Other)				(NOTE: Report results of multiple completion on Well Completion or Recompletion Report and Log form.)			

17. DESCRIBE PROPOSED OR COMPLETED OPERATIONS (Clearly state all pertinent details, and give pertinent dates, including estimated date of starting any proposed work. If well is directionally drilled, give subsurface locations and measured and true vertical depths for all markers and zones pertinent to this work.) *

Depth 17,094', tripping.

18. I hereby certify that the foregoing is true and correct

SIGNED [signature] TITLE General Manager, Gas Supply Operations DATE Aug. 19, 1975

(This space for Federal or State office use)

APPROVED BY _____ TITLE _____ DATE _____

CONDITIONS OF APPROVAL, IF ANY:

*See Instructions on Reverse Side

Form 9-331
(May 1963)

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

SUBMIT IN TRIPLICATE* (Other instructions on reverse side)

Form approved.
Budget Bureau No. 42 R1424.

5. LEASE DESIGNATION AND SERIAL NO.: St. of Wyo. 71-11002

6. IF INDIAN, ALLOTTEE OR TRIBE NAME: -

SUNDRY NOTICES AND REPORTS ON WELLS

(Do not use this form for proposals to drill or to deepen or plug back to a different reservoir. Use "APPLICATION FOR PERMIT—" for such proposals.)

1. OIL WELL ☐ GAS WELL ☒ OTHER

7. UNIT AGREEMENT NAME: Bruff Unit

2. NAME OF OPERATOR: Mountain Fuel Supply Company

8. FARM OR LEASE NAME: Unit Well

3. ADDRESS OF OPERATOR: P. O. Box 1129, Rock Springs, Wyoming 82901

9. WELL NO.: 2

4. LOCATION OF WELL (Report location clearly and in accordance with any State requirements.* See also space 17 below.) At surface: 750' FSL, 850' FWL SW SW

10. FIELD AND POOL, OR WILDCAT: Bruff

11. SEC., T., R., M., OR BLK. AND SURVEY OR AREA: SW SW 16-19N-112W

14. PERMIT NO.: 20106

15. ELEVATIONS (Show whether DF, RT, GR, etc.): KB 6349.25' GR 6326'

12. COUNTY OR PARISH: Lincoln

13. STATE: Wyoming

16. Check Appropriate Box To Indicate Nature of Notice, Report, or Other Data

NOTICE OF INTENTION TO:				SUBSEQUENT REPORT OF:			
TEST WATER SHUT-OFF	☐	PULL OR ALTER CASING	☐	WATER SHUT-OFF	☐	REPAIRING WELL	☐
FRACTURE TREAT	☐	MULTIPLE COMPLETE	☐	FRACTURE TREATMENT	☐	ALTERING CASING	☐
SHOOT OR ACIDIZE	☐	ABANDON*	☐	SHOOTING OR ACIDIZING	☐	ABANDONMENT*	☐
REPAIR WELL	☐	CHANGE PLANS	☐	(Other) Supplementary history			X
(Other)			☐	(NOTE: Report results of multiple completion on Well Completion or Recompletion Report and Log form.)			

17. DESCRIBE PROPOSED OR COMPLETED OPERATIONS (Clearly state all pertinent details, and give pertinent dates, including estimated date of starting any proposed work. If well is directionally drilled, give subsurface locations and measured and true vertical depths for all markers and zones pertinent to this work.)*

Depth 16,852', recovered fish, drilling.

RECEIVED
AUG 14 1975
STATE OIL & GAS

18. I hereby certify that the foregoing is true and correct

SIGNED [signature] TITLE General Manager, Gas Supply Operations DATE Aug. 13, 1975

(This space for Federal or State office use)

APPROVED BY _____ TITLE _____ DATE _____

CONDITIONS OF APPROVAL, IF ANY:

*See Instructions on Reverse Side

Form 9-331
(May 1963)

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

SUBMIT IN TRIPLICATE* (Other instructions on reverse side)

Form approved.
Budget Bureau No. 42-R1424.

SUNDRY NOTICES AND REPORTS ON WELLS

(Do not use this form for proposals to drill or to deepen or plug back to a different reservoir. Use "APPLICATION FOR PERMIT—" for such proposals.)

5. LEASE DESIGNATION AND SERIAL NO.: St. of Wyo. 71-11002

6. IF INDIAN, ALLOTTEE OR TRIBE NAME: -

1. OIL WELL ☐ GAS WELL ☒ OTHER

7. UNIT AGREEMENT NAME: Bruff Unit

2. NAME OF OPERATOR: Mountain Fuel Supply Company

8. FARM OR LEASE NAME: Unit Well

3. ADDRESS OF OPERATOR: P. O. Box 1129, Rock Springs, Wyoming 82901

9. WELL NO.: 2

4. LOCATION OF WELL (Report location clearly and in accordance with any State requirements.* See also space 17 below.) At surface: 750' FSL, 850' FWL SW SW

10. FIELD AND POOL, OR WILDCAT: Bruff

11. SEC., T., R., M., OR BLK. AND SURVEY OR AREA: SW SW 16-19N-112W

14. PERMIT NO.: 20106

15. ELEVATIONS (Show whether DF, RT, GR, etc.): KB 6349.25' GR 6326'

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13. STATE: Wyoming

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FRACTURE TREAT	☐	MULTIPLE COMPLETE	☐	FRACTURE TREATMENT	☐	ALTERING CASING	☐
SHOOT OR ACIDIZE	☐	ABANDON*	☐	SHOOTING OR ACIDIZING	☐	ABANDONMENT*	☐
REPAIR WELL	☐	CHANGE PLANS	☐	(Other) Supplementary history			X
(Other)			☐	(NOTE: Report results of multiple completion on Well Completion or Recompletion Report and Log form.)			

17. DESCRIBE PROPOSED OR COMPLETED OPERATIONS (Clearly state all pertinent details, and give pertinent dates, including estimated date of starting any proposed work. If well is directionally drilled, give subsurface locations and measured and true vertical depths for all markers and zones pertinent to this work.) *

Depth 16,555', while tripping out jars parted leaving 101½' of fish in hole, now tripping in with overshot.

RECEIVED
AUG - 7 1975
GAS SUPERVISOR

18. I hereby certify that the foregoing is true and correct

SIGNED [signature] TITLE General Manager, Gas Supply Operations DATE Aug. 6, 1975

(This space for Federal or State office use)

APPROVED BY _____ TITLE _____ DATE _____

CONDITIONS OF APPROVAL, IF ANY:

*See Instructions on Reverse Side

Form 9-331
(May 1963)

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

SUBMIT IN TRIPLICATE* (Other instructions on reverse side)

Form approved.
Budget Bureau No. 42-R1424.

SUNDRY NOTICES AND REPORTS ON WELLS

(Do not use this form for proposals to drill or to deepen or plug back to a different reservoir. Use "APPLICATION FOR PERMIT—" for such proposals.)

5. LEASE DESIGNATION AND SERIAL NO.: St. of Wyo. 71-11002

6. IF INDIAN, ALLOTTEE OR TRIBE NAME: -

1. OIL WELL ☐ GAS WELL ☒ OTHER

7. UNIT AGREEMENT NAME: Bruff Unit

2. NAME OF OPERATOR: Mountain Fuel Supply Company

8. FARM OR LEASE NAME: Unit Well

3. ADDRESS OF OPERATOR: P. O. Box 1129, Rock Springs, Wyoming 82901

9. WELL NO.: 2

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10. FIELD AND POOL, OR WILDCAT: Bruff

11. SEC., T., R., M., OR BLK. AND SURVEY OR AREA: SW SW 16-19N-112W

14. PERMIT NO.: 20106

15. ELEVATIONS (Show whether DF, RT, GR, etc.): KB 6349.25' GR 6326'

12. COUNTY OR PARISH: Lincoln

13. STATE: Wyoming

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TEST WATER SHUT-OFF	☐	PULL OR ALTER CASING	☐	WATER SHUT-OFF	☐	REPAIRING WELL	☐
FRACTURE TREAT	☐	MULTIPLE COMPLETE	☐	FRACTURE TREATMENT	☐	ALTERING CASING	☐
SHOOT OR ACIDIZE	☐	ABANDON*	☐	SHOOTING OR ACIDIZING	☐	ABANDONMENT*	☐
REPAIR WELL	☐	CHANGE PLANS	☐	(Other) Supplementary history			X
(Other)				(NOTE: Report results of multiple completion on Well Completion or Recompletion Report and Log form.)			

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Depth 15,794', drilling.

18. I hereby certify that the foregoing is true and correct

SIGNED T. G. Hyde, 3rd TITLE General Manager, Gas Supply Operations DATE July 23, 1975

(This space for Federal or State office use)

APPROVED BY _____ TITLE _____ DATE _____

CONDITIONS OF APPROVAL, IF ANY:

RECEIVED
JUL 25 1975
OFFICE of
OIL & GAS SUPERVISOR

*See Instructions on Reverse Side

Form 9-331
(May 1963)

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

SUBMIT IN TRIPLICATE* (Other instructions on reverse side)

Form approved.
Budget Bureau No. 42-R1424.

SUNDRY NOTICES AND REPORTS ON WELLS

(Do not use this form for proposals to drill or to deepen or plug back to a different reservoir. Use "APPLICATION FOR PERMIT—" for such proposals.)

1. OIL WELL ☐ GAS WELL ☒ OTHER

2. NAME OF OPERATOR: Mountain Fuel Supply Company

3. ADDRESS OF OPERATOR: P. O. Box 1129, Rock Springs, Wyoming 82901

4. LOCATION OF WELL (Report location clearly and in accordance with any State requirements.* See also space 17 below.) At surface: 750' FSL, 850' FWL SW SW

5. LEASE DESIGNATION AND SERIAL NO.: St. of Wyo. 71-11002

6. IF INDIAN, ALLOTTEE OR TRIBE NAME: -

7. UNIT AGREEMENT NAME: Bruff Unit

8. FARM OR LEASE NAME: Unit Well

9. WELL NO.: 2

10. FIELD AND POOL, OR WILDCAT: Bruff

11. SEC., T., R., M., OR BLK. AND SURVEY OR AREA: SW SW 16-19N-112W

14. PERMIT NO.: 20106

15. ELEVATIONS (Show whether DF, RT, GR, etc.): KB 6349.25' GR 6326'

12. COUNTY OR PARISH: Lincoln

13. STATE: Wyoming

16. Check Appropriate Box To Indicate Nature of Notice, Report, or Other Data

NOTICE OF INTENTION TO:				SUBSEQUENT REPORT OF:			
TEST WATER SHUT-OFF	☐	PULL OR ALTER CASING	☐	WATER SHUT-OFF	☐	REPAIRING WELL	☐
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SHOOT OR ACIDIZE	☐	ABANDON*	☐	SHOOTING OR ACIDIZING	☐	ABANDONMENT*	☐
REPAIR WELL	☐	CHANGE PLANS	☐	(Other) Supplementary history			X
(Other)				(NOTE: Report results of multiple completion on Well Completion or Recompletion Report and Log form.)			

17. DESCRIBE PROPOSED OR COMPLETED OPERATIONS (Clearly state all pertinent details, and give pertinent dates, including estimated date of starting any proposed work. If well is directionally drilled, give subsurface locations and measured and true vertical depths for all markers and zones pertinent to this work.) *

Depth 13,109', recovered fish, ran and cemented 9-5/8" intermediate casing, drilling.

RECEIVED
JUN 26 1975
U.S. GEOLOGICAL SURVEY

18. I hereby certify that the foregoing is true and correct

SIGNED R. D. Myers TITLE General Manager, Gas Supply Operations DATE June 24, 1975

(This space for Federal or State office use)

APPROVED BY _____ TITLE _____ DATE _____

CONDITIONS OF APPROVAL, IF ANY:

*See Instructions on Reverse Side

Form 9-331
(May 1963)

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

SUBMIT IN TRIPLICATE* (Other instructions on reverse side)

Form approved.
Budget Bureau No. 42-R1424.

SUNDRY NOTICES AND REPORTS ON WELLS

(Do not use this form for proposals to drill or to deepen or plug back to a different reservoir. Use "APPLICATION FOR PERMIT—" for such proposals.)

5. LEASE DESIGNATION AND SERIAL NO.: St. of Wyo 71-11002

6. IF INDIAN, ALLOTTEE OR TRIBE NAME: -

1. OIL WELL ☐ GAS WELL ☒ OTHER

7. UNIT AGREEMENT NAME: Bruff Unit

2. NAME OF OPERATOR: Mountain Fuel Supply Company

8. FARM OR LEASE NAME: Unit Well

3. ADDRESS OF OPERATOR: P. O. Box 1129, Rock Springs, Wyoming 82901

9. WELL NO.: 2

4. LOCATION OF WELL (Report location clearly and in accordance with any State requirements.* See also space 17 below.) At surface: 750' FSL, 850' FWL SW SW

10. FIELD AND POOL, OR WILDCAT: Bruff

11. SEC., T., R., M., OR BLK. AND SURVEY OR AREA: SW SW 16-19N-112W

14. PERMIT NO.: 20106

15. ELEVATIONS (Show whether DF, RT, GR, etc.): KB 6349.25' GR 6326'

12. COUNTY OR PARISH: Lincoln

13. STATE: Wyoming

16. Check Appropriate Box To Indicate Nature of Notice, Report, or Other Data

NOTICE OF INTENTION TO:				SUBSEQUENT REPORT OF:			
TEST WATER SHUT-OFF	☐	PULL OR ALTER CASING	☐	WATER SHUT-OFF	☐	REPAIRING WELL	☐
FRACTURE TREAT	☐	MULTIPLE COMPLETE	☐	FRACTURE TREATMENT	☐	ALTERING CASING	☐
SHOOT OR ACIDIZE	☐	ABANDON*	☐	SHOOTING OR ACIDIZING	☐	ABANDONMENT*	☐
REPAIR WELL	☐	CHANGE PLANS	☐	(Other) Supplementary history			X
(Other)				(NOTE: Report results of multiple completion on Well Completion or Recompletion Report and Log form.)			

17. DESCRIBE PROPOSED OR COMPLETED OPERATIONS (Clearly state all pertinent details, and give pertinent dates, including estimated date of starting any proposed work. If well is directionally drilled, give subsurface locations and measured and true vertical depths for all markers and zones pertinent to this work.)*

Depth 12,232', fishing with magnet for bit.

RECEIVED
JUN - 6 1975

18. I hereby certify that the foregoing is true and correct

SIGNED R. L. Moore TITLE General Manager, Gas Supply Operations DATE June 4, 1975

(This space for Federal or State office use)

APPROVED BY _____ TITLE _____ DATE _____

CONDITIONS OF APPROVAL, IF ANY:

*See Instructions on Reverse Side

Form 9-331
(May 1963)

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

SUBMIT IN TRIPLICATE* (Other instructions on reverse side)

Form approved.
Budget Bureau No. 42-R1424.

SUNDRY NOTICES AND REPORTS ON WELLS

(Do not use this form for proposals to drill or to deepen or plug back to a different reservoir. Use "APPLICATION FOR PERMIT—" for such proposals.)

1. OIL WELL ☐ GAS WELL ☒ OTHER

2. NAME OF OPERATOR
Mountain Fuel Supply Company

3. ADDRESS OF OPERATOR
P. O. Box 1129, Rock Springs, Wyoming 82901

4. LOCATION OF WELL (Report location clearly and in accordance with any State requirements.* See also space 17 below.)
At surface

750' FSL, 850' FWL SW SW

5. LEASE DESIGNATION AND SERIAL NO.
St. of Wyo 71-11002

6. IF INDIAN, ALLOTTEE OR TRIBE NAME
-

7. UNIT AGREEMENT NAME
Bruff Unit

8. FARM OR LEASE NAME
Unit Well

9. WELL NO.
2

10. FIELD AND POOL, OR WILDCAT
Bruff

11. SEC., T., R., M., OR BLK. AND SURVEY OR AREA
SW SW 16-19N-112W

12. COUNTY OR PARISH
Lincoln

13. STATE
Wyoming

14. PERMIT NO.
20106

15. ELEVATIONS (Show whether DF, RT, GR, etc.)
KB 6349.25' GR 6326'

16. Check Appropriate Box To Indicate Nature of Notice, Report, or Other Data

NOTICE OF INTENTION TO:				SUBSEQUENT REPORT OF:			
TEST WATER SHUT-OFF	☐	PULL OR ALTER CASING	☐	WATER SHUT-OFF	☐	REPAIRING WELL	☐
FRACTURE TREAT	☐	MULTIPLE COMPLETE	☐	FRACTURE TREATMENT	☐	ALTERING CASING	☐
SHOOT OR ACIDIZE	☐	ABANDON*	☐	SHOOTING OR ACIDIZING	☐	ABANDONMENT*	☐
REPAIR WELL	☐	CHANGE PLANS	☐	(Other) Supplementary history			☒
(Other)				(NOTE: Report results of multiple completion on Well Completion or Recompletion Report and Log form.)			

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Depth 10,470', drilling.

RECEIVED
APR 23 1975
U.S. GEOLOGICAL SURVEY
CASPER, WYOMING

18. I hereby certify that the foregoing is true and correct

SIGNED J. L. Myers TITLE General Manager, Gas Supply Operations DATE April 21, 1975

(This space for Federal or State office use)

APPROVED BY _____ TITLE _____ DATE _____
CONDITIONS OF APPROVAL, IF ANY:

*See Instructions on Reverse Side

Form 9-331
(May 1963)

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

SUBMIT IN TRIPLICATE* (Other instructions on reverse side)

Form approved.
Budget Bureau No. 42-R1424.

SUNDRY NOTICES AND REPORTS ON WELLS

(Do not use this form for proposals to drill or to deepen or plug back to a different reservoir. Use "APPLICATION FOR PERMIT—" for such proposals.)

5. LEASE DESIGNATION AND SERIAL NO.: St. of Wyo. 71-11002

6. IF INDIAN, ALLOTTEE OR TRIBE NAME:

1. OIL WELL ☐ GAS WELL ☒ OTHER

7. UNIT AGREEMENT NAME: Bruff Unit

2. NAME OF OPERATOR: Mountain Fuel Supply Company

8. FARM OR LEASE NAME: Unit Well

3. ADDRESS OF OPERATOR: P. O. Box 1129, Rock Springs, Wyoming 82901

9. WELL NO.: 2

4. LOCATION OF WELL (Report location clearly and in accordance with any State requirements.* See also space 17 below.) At surface: 750' FSL, 850' FWL SW SW

10. FIELD AND POOL, OR WILDCAT: Bruff

11. SEC., T., R., M., OR BLK. AND SURVEY OR AREA: SW SW 16-19N-112W

14. PERMIT NO.: 20106

15. ELEVATIONS (Show whether DF, RT, GR, etc.): KB 6349.25' GR 6326'

12. COUNTY OR PARISH: Lincoln

13. STATE: Wyoming

16. Check Appropriate Box To Indicate Nature of Notice, Report, or Other Data

NOTICE OF INTENTION TO:				SUBSEQUENT REPORT OF:			
TEST WATER SHUT-OFF	☐	PULL OR ALTER CASING	☐	WATER SHUT-OFF	☐	REPAIRING WELL	☐
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(Other)				(NOTE: Report results of multiple completion on Well Completion or Recompletion Report and Log form.)			

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Depth 7645', drilling.

APR - 7 1975

18. I hereby certify that the foregoing is true and correct

SIGNED R. L. Myers TITLE General Manager, Gas Supply Operations DATE April 3, 1975

(This space for Federal or State office use)

APPROVED BY _____ TITLE _____ DATE _____

CONDITIONS OF APPROVAL, IF ANY:

*See Instructions on Reverse Side

Form 9-331
(May 1963)

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

SUBMIT IN TRIPLICATE* (Other instructions on reverse side)

Form approved.
Budget Bureau No. 42-R1424.

SUNDRY NOTICES AND REPORTS ON WELLS

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5. LEASE DESIGNATION AND SERIAL NO.: St. of Wyo. 71-11002

6. IF INDIAN, ALLOTTEE OR TRIBE NAME: —

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7. UNIT AGREEMENT NAME: Bruff Unit

2. NAME OF OPERATOR: Mountain Fuel Supply Company

8. FARM OR LEASE NAME: Unit Well

3. ADDRESS OF OPERATOR: P. O. Box 1129, Rock Springs, Wyoming 82901

9. WELL NO.: 2

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11. SEC., T., R., M., OR BLK. AND SURVEY OR AREA: SW SW 16-19N-112W

14. PERMIT NO.: 20106

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12. COUNTY OR PARISH: Lincoln

13. STATE: Wyoming

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17. DESCRIBE PROPOSED OR COMPLETED OPERATIONS (Clearly state all pertinent details, and give pertinent dates, including estimated date of starting any proposed work. If well is directionally drilled, give subsurface locations and measured and true vertical depths for all markers and zones pertinent to this work.) *

Depth 4052', drilling.

Landed 2081.64' net, 2097.30' gross of 13-3/8"OD, 61#, K-55, 8rd thd, ST&C casing at 2107.39' and set with 2000 sacks of cement.

18. I hereby certify that the foregoing is true and correct

SIGNED R. L. Myers TITLE General Manager, Gas Supply Operations DATE March 18, 1975

(This space for Federal or State office use)

APPROVED BY _____ TITLE _____ DATE _____

CONDITIONS OF APPROVAL, IF ANY:

*See Instructions on Reverse Side

Form 9-331
(May 1963)

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

SUBMIT IN TRIPLICATE* (Other instructions on reverse side)

Form approved.
Budget Bureau No. 42-R1424.

SUNDRY NOTICES AND REPORTS ON WELLS

(Do not use this form for proposals to drill or to deepen or plug back to a different reservoir. Use "APPLICATION FOR PERMIT—" for such proposals.)

1. OIL WELL ☐ GAS WELL ☒ OTHER

2. NAME OF OPERATOR
Mountain Fuel Supply Company

3. ADDRESS OF OPERATOR
P. O. Box 1129, Rock Springs, Wyoming 82901

4. LOCATION OF WELL (Report location clearly and in accordance with any State requirements.* See also space 17 below.)
At surface
750' FSL, 850' FWL SW SW

5. LEASE DESIGNATION AND SERIAL NO.
St. of Wyo. 71-11002

6. IF INDIAN, ALLOTTEE OR TRIBE NAME
—

7. UNIT AGREEMENT NAME
Bruff Unit

8. FARM OR LEASE NAME
Unit Well

9. WELL NO.
2

10. FIELD AND POOL, OR WILDCAT
Bruff

11. SEC., T., R., M., OR BLK. AND SURVEY OR AREA
SW SW 16-19N-112W

14. PERMIT NO.
20106

15. ELEVATIONS (Show whether DF, RT, GR, etc.)
GR 6326'

12. COUNTY OR PARISH
Lincoln

13. STATE
Wyoming

16. Check Appropriate Box To Indicate Nature of Notice, Report, or Other Data

NOTICE OF INTENTION TO:				SUBSEQUENT REPORT OF:			
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SHOOT OR ACIDIZE	☐	ABANDON*	☐	SHOOTING OR ACIDIZING	☐	ABANDONMENT*	☐
REPAIR WELL	☐	CHANGE PLANS	☐	(Other) Supplementary history			X
(Other)				(NOTE: Report results of multiple completion on Well Completion or Recompletion Report and Log form.)			

17. DESCRIBE PROPOSED OR COMPLETED OPERATIONS (Clearly state all pertinent details, and give pertinent dates, including estimated date of starting any proposed work. If well is directionally drilled, give subsurface locations and measured and true vertical depths for all markers and zones pertinent to this work.) *

Depth 2150', waiting on cement.

Spudded February 28, 1975, landed 13-3/8" surface casing at 2106.05' and set with 2000 sacks of cement.

18. I hereby certify that the foregoing is true and correct

SIGNED R. L. Myers TITLE General Manager, Gas Supply Operations DATE Mar. 11, 1975

(This space for Federal or State office use)

APPROVED BY _____ TITLE _____ DATE _____
CONDITIONS OF APPROVAL, IF ANY:

*See Instructions on Reverse Side

COMPLETION REPORT

Well: Bruff Unit Well No. 2 Date: April 19, 1976

Area: Bruff Lease No: Wyoming 71-11002

/_/ New Field Wildcat /X/ Development Well /_/ Shallower Pool Test

/_/ New Pool Wildcat /_/ Extension /_/ Deeper Pool Test

Location: 750 feet from south line, 850 feet from west line, SW ¼ SW ¼

Section 16, Township 19 North, Range 112 West

County: Lincoln State: Wyoming

Operator: Mountain Fuel Supply Company

Elevation: KB 6349' GR 6326' Total Depth: Driller 17,425' Log 17,420'

Drilling Commenced: February 28, 1976 Drilling Completed: August 28, 1975

Rig Released: September 21, 1975 Well Completed: November 5, 1975

Sample Tops: (unadjusted)

Frontier	11,238'	(-4889)
Mowry	11,402'	(-5053)
Dakota	11,811'	(-5462)
Morrison	12,252'	(-5903)
Stump	12,770'	(-6421)
Preuss	12,878'	(-6529)
Twin Creek	13,016'	(-6667)
Nugget	13,662'	(-7313)
Ankareh	14,340'	(-7991)
Thaynes	14,886'	(-8535)
Woodside	15,270'	(-8921)
Phosphoria	16,106'	(-9757)
Weber	16,452'	(-10,103)
Morgan	16,972'	(-10,623)

Log Tops:

Mesaverde	7,008'	(- 659)
Hilliard	7,530'	(-1,181)
Frontier	11,162'	(-4,813)
Mowry	11,396'	(-5,047)
Dakota	11,811'	(-5,462)
Morrison	12,247'	(-5,898)
Stump	12,773'	(-6,424)
Preuss	12,868'	(-6,519)
Twin Creek	13,011'	(-6,662)
Nugget	13,682'	(-7,333)
Ankareh	14,574'	(-8,225)
Thaynes	14,934'	(-8,585)
Woodside	15,392'	(-9,043)
Phosphoria	16,055'	(-9,706)
Weber	16,447'	(-10,098)
Morgan	16,988'	(-10,639)

Sample Cuttings: 30-foot samples from surface to 1900'; 10-foot samples from 1900' to TD; 10-foot samples from 10,500' to TD caught by Dolco Geo-Engineering. 1 dry cut to Mountain Fuel (Salt Lake); 1 wet cut to Amstrat (Casper); 1 wet cut to Amoco (Denver)

Status: Gas well

Producing Formation; Frontier Formation (11,247-11,258 and 11,272-11,280')

Perforations: 17,274-17,302'; 17,242-17,270'; 12,084-12,096'; 12,052-12,066'; 11,947-11,988'; 11,272-11,280'; 11,247-11,258'

Stimulation: 130,000 gallons of Super Emulsifrac

Production: 1276 MCFGPD

Plug Back Depth: 11,708' KBM

Plugs: Bridge plugs set @ 12,030' & 11,900'

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COMPLETION REPORT (cont.)

Well: Bruff Unit Well No. 2

Area: Bruff

Cored Intervals (recovery):

#1 11,230-11,290' (Frontier) cut 60', rec 11'
#2 11,305-11,346' (Frontier) cut 41', rec 41'
#3 17,250-17,288' (Morgan) cut 38', rec 38'
#4 17,288-17,348' (Morgan) cut 60', rec 60'
#5 17,348-17,408' (Morgan) cut 60', rec 60'
#6 17,408-17,425' (Morgan) cut 17', rec 17'

Tabulation of Drill Stem Tests:

	No.	Interval	IHP	IFP (min.)	ISIP (min.)	FFP (min.)	FSIP (min.)	FHP	Samples Caught	Remarks
rontier	DST 1	11,244-11,290	-	-	-	-	-	-	--	MISRUN, no packer seat.
rontier	DST 2	11,256-11,346	6536	232-208 (28)	6439 (92)	264-207 (119)	6437 (229)	6540	--	GTS in 15 min: max 435 Mcf; rec 315' sli GC
akota	DST 3	11,892-11,988	7171	-	-	-	-	7171	--	MISRUN, opened w/strong blow for 2 min then packers failed.
lorgan	PDST 1	17,188-17,375	12,132	571-704 (1074)	7447 (653)	-	-	12,119	--	NGTS; rec 875' M, 100' SW and 3' sand.
akota	PDST 2A	11,988-17,200	7704	-	-	-	-	7704	--	MISRUN.
akota	PDST 2B	11,988-17,200	7736	606-5108 (968)	6380 (151)	-	-	7680	--	GTS in 450 min, TSTG; rec 11,960' GCW.
akota	PDST 3	11,893-12,030	7664	531-764 (646)	5884* (884)	-	-	-	--	GTS in 20 min: max 63.3 Mcf; unable to calculate test due to insuff buildup closur
akota	PDST 4	11,886-12,030	7529	511-792 (336)	5324 (882)	-	-	7584	--	GTS in 20 min: max 58 Mcf; rec 610' GCM and 204' MCSW.
rontier	PDST 5	11,215-11,708	6967	513-1196 (480)	6762 (2430)	-	-	6967	--	GTS in 15 min: max 449 Mcf; rec 640' DR FL w/sli GC and 580' GC & MC FM FL; chart time expired before 72 hour clock.

STATE OIL & GAS SURVEY
JUN 4 - 1976

Form 9-330
(Rev. 5-63)

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

SUBMIT IN DUPLICATE* (See other instructions on reverse side)

Form approved.
Budget Bureau No. 42-R355.5.

WELL COMPLETION OR RECOMPLETION REPORT AND LOG*

5. LEASE DESIGNATION AND SERIAL NO.: St. of Wyo. 71-11002

6. IF INDIAN, ALLOTTEE OR TRIBE NAME:

7. UNIT AGREEMENT NAME: Bruff Unit

8. FARM OR LEASE NAME: Unit Well

9. WELL NO.: 2

10. FIELD AND POOL, OR WILDCAT: Bruff

11. SEC., T., R., M., OR BLOCK AND SURVEY OR AREA: SW SW 16-19N-112W

1a. TYPE OF WELL: OIL WELL ☐ GAS WELL ☒ DRY ☐ Other

b. TYPE OF COMPLETION: NEW WELL ☒ WORK OVER ☐ DEEP-EN ☐ PLUG BACK ☐ DIFF. RESVR. ☐ Other

2. NAME OF OPERATOR: Mountain Fuel Supply Company

3. ADDRESS OF OPERATOR: P. O. Box 1129, Rock Springs, Wyoming 82901

4. LOCATION OF WELL (Report location clearly and in accordance with any State requirements)*
At surface: 750' FSL, 850' FWL SW SW
At top prod. interval reported below
At total depth

API No.: 49-023-20106

14. PERMIT NO.: 20106 | DATE ISSUED: 10-8-74

12. COUNTY OR PARISH: Lincoln | 13. STATE: Wyoming

15. DATE SPUDDED	16. DATE T.D. REACHED	17. DATE COMPL. (Ready to prod.)	18. ELEVATIONS (DF, RKB, RT, GR, ETC.)*	19. ELEV. CASINGHEAD
2-28-75	8-28-75	11-5-75	KB 6348.85' GR 6326'	

20. TOTAL DEPTH, MD & TVD	21. PLUG, BACK T.D., MD & TVD	22. IF MULTIPLE COMPL., HOW MANY*	23. INTERVALS DRILLED BY	ROTARY TOOLS	CABLE TOOLS
17,425'	11,708'		→	0-17,425	

24. PRODUCING INTERVAL(S), OF THIS COMPLETION—TOP, BOTTOM, NAME (MD AND TVD)*: 11,247-11,258' and 11,272-11,280' Frontier

25. WAS DIRECTIONAL SURVEY MADE: No

26. TYPE ELECTRIC AND OTHER LOGS RUN: BHC Sonic, Comp. Neutron Formation Density, Laterolog, Caliper, DIL

27. WAS WELL CORED: Yes

28. CASING RECORD (Report all strings set in well)

CASING SIZE	WEIGHT, LB./FT.	DEPTH SET (MD)	HOLE SIZE	CEMENTING RECORD	AMOUNT PULLED
13-3/8	61	2,107.39	17-1/2	2000	0
9-5/8	47 & 53.5	12,624.00	12-1/4	1556	0

RECEIVED NOV 14 1975 OIL & GAS CONSERVATION COMMISSION CASPER, WYOMING

29. LINER RECORD

SIZE	TOP (MD)	BOTTOM (MD)	SACKS CEMENT*	SCREEN (MD)
7	11,250.58	17,410.80	1950	

30. TUBING RECORD

SIZE	DEPTH SET (MD)	PACKER SET (MD)
2-7/8	11,168.25	11,168

31. PERFORATION RECORD (Interval, size and number)
17,242-17,270' & 17,274-17,302', jet, 1/ft
12,052-12,066' & 12,084-12,096', jet, 4/ft
11,947-11,988', jet, 4 holes per foot
11,947-11,988', jet, 1 hole per foot
11,247-11,258' w/2/ft; 11,272-11,280' w/4/ft

32. ACID, SHOT, FRACTURE, CEMENT SQUEEZE, ETC.

DEPTH INTERVAL (MD)	AMOUNT AND KIND OF MATERIAL USED
11,247-11,280'	130,000 gals Super E
	138,000# 40-60 mesh sand
	110,000# 20-40 mesh sand

33.* PRODUCTION

DATE FIRST PRODUCTION	PRODUCTION METHOD (Flowing, gas lift, pumping—size and type of pump)	WELL STATUS (Producing or shut-in)
Shut in	Flowing	Shut in

DATE OF TEST	HOURS TESTED	CHOKE SIZE	PROD'N. FOR TEST PERIOD →	OIL—BBL.	GAS—MCF.	WATER—BBL.	GAS-OIL RATIO
11/3-5/75	42	21/64"					

FLOW. TUBING PRESS.	CASING PRESSURE	CALCULATED 24-HOUR RATE →	OIL—BBL.	GAS—MCF.	WATER—BBL.	OIL GRAVITY-API (CORR.)
450	700		-	1276	-	

34. DISPOSITION OF GAS (Sold, used for fuel, vented, etc.): Vented while testing

TEST WITNESSED BY:

35. LIST OF ATTACHMENTS: Logs as above, well completion to be sent at a later date

36. I hereby certify that the foregoing and attached information is complete and correct as determined from all available records

SIGNED: [signature] TITLE: General Manager, Gas Supply Operations DATE: Nov. 12, 1975

*(See Instructions and Spaces for Additional Data on Reverse Side)

INSTRUCTIONS

General: This form is designed for submitting a complete and correct well completion report and log on all types of lands and leases to either a Federal agency or a State agency or both, pursuant to applicable Federal and/or State laws and regulations. Any necessary special instructions concerning the use of this form and the number of copies to be submitted, particularly with regard to local, area, or regional procedures and practices, either are shown below or will be issued by, or may be obtained from, the local Federal and/or State office. See instructions on items 22 and 24, and 33, below regarding separate reports for separate completions.

If not filed prior to the time this summary record is submitted, copies of all currently available logs (drillers, geologists, sample and core analysis, all types electric, etc.), formation and pressure tests, and directional surveys, should be attached hereto, to the extent required by applicable Federal and/or State laws and regulations. All attachments should be listed on this form, see item 35.

Item 4: If there are no applicable State requirements, locations on Federal or Indian land should be described in accordance with Federal requirements. Consult local State or Federal office for specific instructions.

Item 18: Indicate which elevation is used as reference (where not otherwise shown) for depth measurements given in other spaces on this form and in any attachments.

Items 22 and 24: If this well is completed for separate production from more than one interval zone (multiple completion), so state in item 22, and in item 24 show the producing interval, or intervals, top(s), bottom(s) and name(s) (if any) for only the interval reported in item 33. Submit a separate report (page) on this form, adequately identified, for each additional interval to be separately produced, showing the additional data pertinent to such interval.

Item 29: *"Sacks Cement":* Attached supplemental records for this well should show the details of any multiple stage cementing and the location of the cementing tool.

Item 33: Submit a separate completion report on this form for each interval to be separately produced. (See instruction for items 22 and 24 above.)

37. SUMMARY OF POROUS ZONES:
SHOW ALL IMPORTANT ZONES OF POROSITY AND CONTENTS THEREOF; CORED INTERVALS; AND ALL DRILL-STEM TESTS, INCLUDING DEPTH INTERVAL TESTED, CUSHION USED, TIME TOOL OPEN, FLOWING AND SHUT-IN PRESSURES, AND RECOVERIES

FORMATION	TOP	BOTTOM	DESCRIPTION, CONTENTS, ETC.

38. GEOLOGIC MARKERS

NAME	TOP	
	MEAS. DEPTH	TRUE VERT. DEPTH
Log tops:		
Tertiary/ Cretaceous	7,008'	
Hilliard	7,530	
2nd Frontier	11,162	
Mowry	11,396	
Dakota	11,811	
Morrison	12,247	
Preuss	12,868	
Twin Creek	13,011	
Nugget	13,682	
Ankareh	14,574	
Thaynes	14,934	
Woodside	15,392	
Phosphoria	16,110	
Weber	16,447	
Morgan	16,938'	

U.S. GOVERNMENT PRINTING OFFICE: 1963—O-683636

GPO 870-401

Form 9-331a
(Feb. 1951)

Budget Bureau No. 42-R358.4.
Approval expires 12-31-60.

Land Office Cheyenne
Lease No. W-05929-A
Unit Moxa



(SUBMIT IN TRIPLICATE)

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

SUNDRY NOTICES AND REPORTS ON WELLS

NOTICE OF INTENTION TO DRILL		SUBSEQUENT REPORT OF WATER SHUT-OFF	
NOTICE OF INTENTION TO CHANGE PLANS		SUBSEQUENT REPORT OF SHOOTING OR ACIDIZING	
NOTICE OF INTENTION TO TEST WATER SHUT-OFF		SUBSEQUENT REPORT OF ALTERING CASING	
NOTICE OF INTENTION TO RE-DRILL OR REPAIR WELL		SUBSEQUENT REPORT OF RE-DRILLING OR REPAIR	
NOTICE OF INTENTION TO SHOOT OR ACIDIZE		SUBSEQUENT REPORT OF ABANDONMENT	
NOTICE OF INTENTION TO PULL OR ALTER CASING		SUPPLEMENTARY WELL HISTORY	X
NOTICE OF INTENTION TO ABANDON WELL		Intermediate Casing	

(INDICATE ABOVE BY CHECK MARK NATURE OF REPORT, NOTICE, OR OTHER DATA)

June 15, 1961

Well No. 1 is located 1985' ft. from {N/S} line and 464 ft. from {E/W} line of sec. 22

SE Sec. 22 (¼ Sec. and Sec. No.) 19N (Twp.) 112W (Range) 6th PM (Meridian)

Wildcat (Field) Sweetwater (County or Subdivision) Wyoming (State or Territory)

The elevation of the ~~derrick floor~~ KB above sea level is 6435 ft.

DETAILS OF WORK

(State names of and expected depths to objective sands; show sizes, weights, and lengths of proposed casings; indicate mudding jobs, cementing points, and all other important proposed work)

Drilled out cement plug at 8:30 PM 5/27/61. Drilled 13-3/4" hole to 3993' Ran Schlumberger Induction-Electric Survey, Micro-log, Sonic and Gamma Ray to 3975'. Ran 10-3/4" 40.5# & 45.5# J-55 8RD ST&C casing and landed at 4003' (Apparent discrepancy in the threads off tally) with Howco cement float shoe on bottom, float collar at 3972' and DV collar and cement basket at 2084', centrailizers at 2103' and 2041', centralizer and cement basket at 1863' and cement basket at 1619'. Cemented first stage with 700 sxs 50% Pozmix. Plug down 9:45 AM 6/5/61. Cemented second stage with 550 sxs 50% Pozmix. Plug down 2:30 PM 5/6/61. WOC 36 hours.

I understand that this plan of work must receive approval in writing by the Geological Survey before operations may be commenced.

Company TEXACO Inc.

Address PO Drawer 740

Casper, Wyoming

By Signed: WALTER RAND

USGS (2) SMS (2) OBH WR EHM

Title District Superintendent

U. S. GOVERNMENT PRINTING OFFICE: 1958 O -463339

Conoco (2) ~~SMx~~ UPRR (3)

Form 9-331a
(Feb. 1951)

Budget Bureau No. 42-R358.4.
Approval expires 12-31-60.

Land Office Cheyenne
Lease No. W-05929-A
Unit Moxa

	Sec. 22		

U. S. GEOLOGICAL SURVEY
RECEIVED
OCT 26 1961
ROCK SPRINGS, WYOMING

(SUBMIT IN TRIPLICATE)

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

SUNDRY NOTICES AND REPORTS ON WELLS

NOTICE OF INTENTION TO DRILL		SUBSEQUENT REPORT OF WATER SHUT-OFF	
NOTICE OF INTENTION TO CHANGE PLANS		SUBSEQUENT REPORT OF SHOOTING OR ACIDIZING	
NOTICE OF INTENTION TO TEST WATER SHUT-OFF		SUBSEQUENT REPORT OF ALTERING CASING	
NOTICE OF INTENTION TO RE-DRILL OR REPAIR WELL		SUBSEQUENT REPORT OF RE-DRILLING OR REPAIR	
NOTICE OF INTENTION TO SHOOT OR ACIDIZE		SUBSEQUENT REPORT OF ABANDONMENT	
NOTICE OF INTENTION TO PULL OR ALTER CASING		SUPPLEMENTARY WELL HISTORY	
NOTICE OF INTENTION TO ABANDON WELL		Subsequent Report of Running Casing	X

(INDICATE ABOVE BY CHECK MARK NATURE OF REPORT, NOTICE, OR OTHER DATA)

October 26, 19 61

Well No. 1 is located 1985 ft. from {N/S} line and 464 ft. from {E/W} line of sec. 22

SE Sec. 22 (¼ Sec. and Sec. No.) | 19N (Twp.) | 112W (Range) | 6th PM (Meridian)

Wildcat (Field) | Sweetwater (County or Subdivision) | Wyoming (State or Territory)

(9)

The elevation of the ~~derrick floor~~ KB above sea level is 643 ft.

DETAILS OF WORK

(State names of and expected depths to objective sands; show sizes, weights, and lengths of proposed casings; indicate mudding jobs, cementing points, and all other important proposed work)

9-inch hole was drilled to 14,000' total depth. Plugged back to 12,080' as follows: Plug No. 1 13,880-13780'; Plug No. 2 12,880-12,780' and Plug No. 3 12,180-12,080', each consisting of 50 sacks Pozmix with .3% HR4 retarder. Set casing with shoe set at 11,605', float collar at 11,515', scratchers: one 5' above shoe and one every 10' up to 11,235', centralizers: one 5' above shoe, one at 60' above shoe, one every 85' to 10,477' cemented with 500 sacks Pozmix with .3% HR4 retarder. Maximum pressure 1600 psi, Final pressure 1000 psi. Good circulation of cement. WOC 36 hours, tested 30 min. at 2500 lbs. pressure held.

Approved OCT 30 1961
(ORIG. SGD.) C. P. CLIFFORD
District Engineer

I understand that this plan of work must receive approval in writing by the Geological Survey before operations may be commenced.

Company TEXACO Inc.

Address P. O. Drawer 740

Casper, Wyoming

By Signed: [illegible]

Title District Superintendent

USGS (2) SMS (2) RW WR HMM
Conoco (2) UPRR (3)

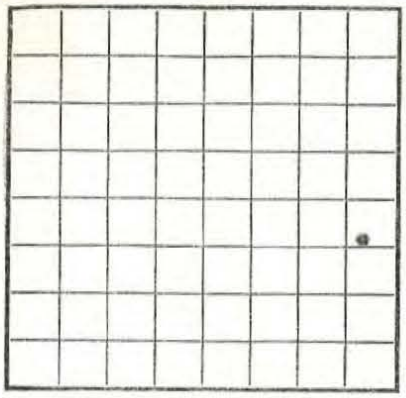
U. S. GOVERNMENT PRINTING OFFICE: 1958 O - 463339

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Budget Bureau No. 42-R355.4.
Approval expires 12-31-60.

U. S. Land Office Cheyenne
Serial Number W-0592[illegible]
Lease or Permit to Prospect Moxa

POSTED



LOCATE WELL CORRECTLY

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

37-05573

LOG OF OIL OR GAS WELL

Company TEXACO Inc. Address PO Drawer 740, Casper, Wyoming

Lessor or Tract Moxa Unit Field Wildcat State Wyoming

Well No. 1 Sec. 22 T. 19N R. 112W Meridian 6th PM County Sweetwater

Location 1985 ft. {N./S.} of S Line and 464 ft. {E./W.} of E Line of Sec. 22 Elevation 6435' KB
(Derrick floor relative to sea level)

The information given herewith is a complete and correct record of the well and all work done thereon so far as can be determined from all available records.

Signed [illegible]

Date December 19, 1961 Title District Superintendent

The summary on this page is for the condition of the well at above date.

Commenced drilling May 25, 1961 Finished drilling September 7, 1961

OIL OR GAS SANDS OR ZONES

(Denote gas by G)

No. 1, from 11,416 to 11426 G No. 4, from 11,447 to 11,456 G

No. 2, from 11,428 to 11,433 G No. 5, from ____ to ____

No. 3, from 11,436 to 11,445 G No. 6, from ____ to ____

IMPORTANT WATER SANDS

No. 1, from ____ to ____ No. 3, from ____ to ____

No. 2, from ____ to ____ No. 4, from ____ to ____

CASING RECORD

Size casing	Weight per foot	Threads per inch	Make	Amount	Kind of shoe	Cut and pulled from	Perforated From—	Perforated To—	Purpose
16"	65#	8RD	H-40	350'	Guide				Surface
10-3/4	40.5	8RD	J-55	3992'	Guide				Intermediate
5½	17	8RD	P-110	1505	Float				Production
5½	20	8RD	N-80	3410	Float Collar				"
5½	17	8RD	N-80	3805					"

MUDDING AND CEMENTING RECORD

Size casing	Where set	Number sacks of cement	Method used	Mud gravity	Amount of mud used
16"	349'	250 Reg.	Halliburton		
10-3/4	~~XXXX~~ 3992'	~~700 Pozmix 50%~~ 550 Pozmix 50%	~~Halliburton~~ Halliburton		
5½	11,805	500 Pozmix	Halliburton		

(w/ .3% HR4 retarder in cement)

PLUGS AND ADAPTERS

Heaving plug—Material ____ Length ____ Depth set ____

Adapters—Material ____ Size ____

FOLD | MARK

Size	Shell used	Explosive used	Quantity	Date	Depth shot	Depth cleaned out

TOOLS USED

Rotary tools were used from 0 feet to 14,007 feet, and from ..... feet to ..... feet

Cable tools were used from ..... feet to ..... feet, and from ..... feet to ..... feet

DATES

Shut in - Lack of Market

..... , 19..... Put to producing September 28, , 19 61

Accepted Test 10/24/61

The production for the first 24 hours was ..... barrels of fluid of which ..... % was oil; ..... % emulsion; ..... % water; and ..... % sediment.

Gravity, °Bé. .....

If gas well, cu. ft. per 24 hours 1,34 MMCF Gallons gasoline per 1,000 cu. ft. of gas .....

Rock pressure, lbs. per sq. in. .....

EMPLOYEES

P. L. Fry, Driller J. Kordash, Driller

H. W. Pinkel, Driller J. B. Firestone, Driller

FORMATION RECORD

FROM—	TO—	TOTAL FEET	FORMATION
0	485	485	Shale
485	1177	692	Shale & Sand
1177	1443	266	Shale
1443	1604	161	Shale & Sand
1604	1665	61	Sand
1665	3130	1465	Shale & Sand
3130	3942	812	Shale
3942	3993	51	Shale & Sand
3993	4400	407	Shale
4400	5861	1461	Shale & Sand
5861	5967	106	Shale
5967	6207	240	Shale & Sand
6207	6253	46	Shale
6253	6962	709	Shale & Sand
6962	7111	149	Shale
7111	7784	673	Shale & Sand
7784	7812	28	Sand
7812	7875	63	Shale & Sand
7875	8079	204	Sand
8079	8347	268	Shale
8347	8875	528	Shale & Sand
8875	9093	218	Shale
9093	9240	147	Shale & Sand
9240	9495	255	Shale
9495	9983	488	Shale & Sand
9983	10196	213	Shale

[OVER]

FORMATION RECORD—Continued

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FORM PO-214 SHEET 2 (8-49) 50M

LOG OF WELL

SHEET No. 2

RECEIVED JAN ... OFFICE OF ... MINERALS ... SUPERVISOR

District Casper Owner Joint Farm Moxa Unit Well No. 1

FORMATION		AMOUNT	COLOR	HARD OR SOFT	DEPTH CORES TAKEN	REMARKS
10196 - 10357		161				Shale & Sand
10357 - 10530		173				Shale
10530 - 10566		36				Sand
10566 - 10898		332				Shale & Sand
10898 - 11055		157				Shale
11055 - 11167		112				Shale & Sand
11167 - 11316		149				Shale
11316 - 11420		104				Shale & Sand
11420 - 11473		53				Sand
11473 - 11665		192				Shale & Sand
11665 - 11692		27				Sand
11692 - 11697		5				Shale & Sand
11697 - 11715		18				Shale
11715 - 11804		89				Shale & Sand
11804 - 11815		11				Shale
11815 - 11989		174				Shale & Sand
11989 - 12014		25				Sand
12014 - 12072		58				Shale
12072 - 12081		9				Shale & Sand
12081 - 12164		83				Shale
12164 - 12168		4				Shale & Sand
12168 - 12190		22				Shale
12190 - 12333		143				Shale & Sand
12333 - 12353		20				Sand
12353 - 12443		90				Shale & Sand
12443 - 12643		200				Shale
12643 - 12768		125				Shale & Sand
12768 - 12785		17				Sand
12785 - 12790		5				Shale & Sand
12790 - 12835		45				Shale , Sand & Siltstone
12835 - 12865		30				Shale, Sand & Chert
12865 - 12897		32				Sand & Chert
12897 - 12942		45				Sand
12942 - 12993		49				Shale & Sand
12993 - 13054		61				Sand & Imbedded Chert
13054 - 13101		47				Sand, Shale & Imbedded Chert
13101 - 13183		82				Sand
13183 - 13228		45				Shale & Sand
13228 - 13251		23				Sand
13251 - 13307		56				Shale & Limestone
13307 - 13362		55				Shale & Sand
13362 - 13432		70				Sand
13432 - 13654		222				Shale & Sand
13654 - 13683		29				Lime, Shale & Sand
13683 - 13712		29				Shale & Sand
13712 - 13778		66				Lime & Shale
13778 - 13818		40				Siltstone
13818 - 13831		13				Sand
13831 - 13876		45				Sand & Quartzite
13876 - 13952		76				Sand
13952 - 13985		33				Shale & Sand
13985 - 14000		15				Sand

ELECTRIC LOG - FORMATION TOPS

Bridger & Green River	Surface	Fawn Creek	13230
Wasatch	2056		
Hilliard	7790	Nugget	13803
Frontier	11207	Total Depth	14007
Frontier SS	11416		
Aspen	11572		
Bear River	11953		
Gannet	12260		
Stump	12917		
Preuss	~~13032~~		
~~Fin Creek~~	~~13230~~		

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GEOLOGICAL DATA AND DRILLING AND COMPLETION PROCEDURE

FORMATION OR DATE	TOP-DEPTH INTERVAL	REMARKS OR DESCRIPTION AND RESULTS OF WORK

DEVIATION SURVEYS

243	1/2	305-365	1/4	455	1/2
610	1/4	750 - 1470	3/4	1580	1/4
1757	1/2	2006	3/4	2190	1/2
2626	1/4	2844 - 3152	1/2	3462	1-1/2
3680 - 4210	3/4	4708 - 4875	1/2	5166	3/4
5578	1-1/4	5797	1	6281	1-1/4
6985 - 7537	1-1/2	7706 - 8190	1-3/4	8533 - 8782	2
9093	1	9495	1-1/4	9805	2-1/4
10,053	2-1/2	10,376	1-3/4	10,566	1
10,806	2	11,041	1-1/2	11,280	2-1/4
11,471	1-1/2	11,607	3/4	11,725-11,757	1
11,985	1-1/4	12,168	1/2	12,330	1-1/4
12,526	1/2	13,036	1-3/4	13,818	3/4

DST No. 1

Zone: 6220-6281. Packer set at 6216-6220'. Tool shut in for 30 minutes initial shut in. Tool opened for 1 hour with no blow. Tool shut in for 30 minutes final shut in. Recovered 60' of drilling mud.

IHSP	3000#	FFP	22-36#
ISP	2592#	FSIP	1958#
IFP	22-25#	FHSP	2987#

DST NO. 2

RUn #1 Zone: 7756-7812'. Packer would not hold

Run #2 Zone: 7735-7812'. Dual packers set at 7731' and 7735'. Tool opened 5 minutes with fair blow. Tool shut in for 30 minutes initial shut in. Tool opened for 1 hour. Fair to good blow through out test. Shut in for 20 minutes final shut in. Recovered 1200' of gas cut water cushion, 550' of gas cut drilling mud and 1940' of gas cut salt water.

IHSP	3631#	FFP	728-1755#
ISIP	3531#	FSIP	3252#
IFP	612-759#	FHSP	3631#

DST No. 3

Zone: 10,521-10,566'. Dual packers set at 10,516 and 10,521. Tool opened for 8 minutes with faint blow. Tool shut in for 30 minutes initial shut in. Toool opened for 1 hour, no blow. Closed tool for 15 minutes final shut in. Recovered 3600' of water cushion and 10' of drilling mud. No indication of water, oil or gas.

IHSP	5196#	FFP	1648-1650#
ISIP	2024#	FSIP	1754#
IFP	1648-1650#	FHSP	5196#

DST No. 4

Run No. 1 - Zone tested: 11410-11471'. Dual packers set at 11,405 and 11,410'. Tool shut in for 30 minutes initial shut in. Tool opened for 3 to 4 minutes when packer failed. 5000' water cushion.

IHSP	6932#
ISIP	6673#
FHSP	6932#

Run No. 2 - Zone Tested: 11,398-11473'. Dual packers set at 11,393 and 11,398'. Ran Howco hydraulic adjustable choke, 1/8" x 3/4", above perforations on bottom. Omitted initial shut in. Tool opened with weak blow which increased to fair blow. Tool opened for about 12 minutes when packer failed. Top choke 1/4". 5000' water cushion.

IHSP	7011#
FHSP	7011#
IFP	2376#
Temp. 205°	

DST No. 5

Zone tested 12,097-12,210'. Dual packers set at 12,091' and 12,097'.

BEST COPY AVAILABLE

GEOLOGICAL DATA AND DRILLING AND COMPLETION PROCEDURE

FORMATION OR DATE	TOP-DEPTH INTERVAL	REMARKS OR DESCRIPTION AND RESULTS OF WORK
		Tool shut in for 30 minutes shut in. Packers fail. IHSP 7168# FHSP 7168# Temp 200°
		Ran McCullough Gamma Ray Correlation Log from 11,493-10,997'. Perforated intervals 11,416-11,426', 11,428-11,433', 11,436-11,445', 11,447-11,456' IES measurements with two jet shots per foot. Set packer at 11,341' and displaced tubing with 500 gals. breakdown acid followed by 200 gal. #2 diesel oil spacer. Broke down formation with 5500 gals. Dowell #2 oil Petro-gel containing 1/20# per gal. Mark II Adomite and 50 gals. Preflow. Breakdown pressure 8500 psi. Fraced with 33,000 gals. #2 diesel oil Petro-gel containing 1/20# per gal. Mark II Adomite, Y-3 high temp gel breaker and 1040# 12-20 mesh walnut shells. Treating pressure 8900 psi. Did not change throughout job. Pressure dropped to 5200 psi immediately after injection was stopped. Average injection rate 7 BPM. Well tested 1.340 MMCFD. Completed as a gas well in the Frontier sand on 10/24/61 and shut in due to lack of market.
EHM/GAS	1/9/62	
USGS (2)	SMS (2) RW-DCB-EHM	
UPRR (3)	Conoco (2)	

RECEIVED JAN 1962 OFFICE OF MINERAL SUPERVISOR

WELL Moxa Unit No. 1 FIELD Wildcat AREA

Form 9-331a
(Feb. 1951)

Budget Bureau No. 42-R358.4.
Approval expires 12-31-60.

Land Office Cheyenne
Lease No. W-05929-A
Unit Moxa

Sec. 22

U. S. GEOLOGICAL SURVEY
RECEIVED
OCT 30 1961
ROCK SPRINGS, WYOMING

(SUBMIT IN TRIPLICATE)

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

SUNDRY NOTICES AND REPORTS ON WELLS

NOTICE OF INTENTION TO DRILL		SUBSEQUENT REPORT OF WATER SHUT-OFF	
NOTICE OF INTENTION TO CHANGE PLANS		SUBSEQUENT REPORT OF SHOOTING OR ACIDIZING	
NOTICE OF INTENTION TO TEST WATER SHUT-OFF		SUBSEQUENT REPORT OF ALTERING CASING	
NOTICE OF INTENTION TO RE-DRILL OR REPAIR WELL		SUBSEQUENT REPORT OF RE-DRILLING OR REPAIR	
NOTICE OF INTENTION TO SHOOT OR ACIDIZE		SUBSEQUENT REPORT OF ABANDONMENT	
NOTICE OF INTENTION TO PULL OR ALTER CASING		SUPPLEMENTARY WELL HISTORY	
NOTICE OF INTENTION TO ABANDON WELL		Subsequent Report of Perforating & Fracing	X

(INDICATE ABOVE BY CHECK MARK NATURE OF REPORT, NOTICE, OR OTHER DATA)

October 26, 1961

Well No. 1 is located 1985 ft. from {N/S} line and 464 ft. from {E/W} line of sec. 22

SE Sec. 22 (¼ Sec. and Sec. No.) | 19N (Twp.) | 112W (Range) | 6th PM (Meridian)

Wildcat (Field) | Sweetwater (County or Subdivision) | Wyoming (State or Territory)

The elevation of the ~~derrick floor~~ KB above sea level is 6435 ft.

DETAILS OF WORK

(State names of and expected depths to objective sands; show sizes, weights, and lengths of proposed casings; indicate mudding jobs, cementing points, and all other important proposed work)

Ran McCullough Gamma Ray Correlation Log from 11,493-10,997'. Perforated intervals 11,416-11,426', 11,428-11,433', 11,436-11,445', 11,447-11,456' with two jet shots per foot. Set Packer at 11,341' and displaced tubing with 500 gals. breakdown acid followed by 200 gal. #2 diesel oil spacer. Broke down formation with 5500 gals. Dowell #2 diesel oil Petrogel containing 1/20# per gal. Mark II Adomite and 50 gals. Freflo. Breakdown pressure 8500 psi. Fraced with 33,000 gals. #2 diesel oil Petrogel containing 1/20# per gal. Mark II Adomite, Y-3 high temp gel breaker and 1040# 12-20 mesh walnut shells. Treating pressure 8900 psi. Did not change throughout job. Pressure dropped to 5200 psi immediately after injection was stopped. Average injection rate 7 BPM. Well tested 1,500 MCFPD.

I understand that this plan of work must receive approval in writing by the Geological Survey before operations may be commenced.

Company TEXACO Inc.

Address P. O. Drawer 740

Casper, Wyoming

USGS (2) SMS (2) RW WR HHM
Conoco (2) UPHR (3)

Approved OCT 30 1961
(ORIG. SGD.) C. P. CLIFFORD
District Engineer

By

Title District Superintendent

U. S. GOVERNMENT PRINTING OFFICE: 1958 O - 463339

FORM 3160-5
(June 1990)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

FORM APPROVED
Budget Bureau No. 1004-0135
Expires: March 31, 1993

SUNDRY NOTICES AND REPORTS ON WELLS

Do not use this form for proposals to drill or to deepen or reenter a different reservoir.
Use "APPLICATION FOR PERMIT -" for such proposals

SUBMIT IN TRIPLICATE

5. Lease Designation and Serial No.: WYW05929A
6. If Indian, Allottee or Tribe Name:
7. If Unit or CA, Agreement Designation: Moxa Unit

1. Type of Well: [ ] Oil Well [X] Gas Well [ ] Other
8. Well Name and No.: Moxa Unit #1
9. API Well No.: 4903705573
2. Name of Operator: Texaco Exploration & Production Inc.
10. Field and Pool, or Exploratory Area: Bruff - Frontier
3. Address and Telephone No.: P. O. Box 1629, Rock Springs, WY 82902 (307) 352-5100
11. County or Parish, State: Sweetwater, Wyoming
4. Location of Well (Footage, Sec., T., R., M., or Survey Description): Sec. 22, T19N-R112W, NE SE, 1985' FSL & 464' FEL

12. CHECK APPROPRIATE BOX(es) TO INDICATE NATURE OF NOTICE, REPORT, OR OTHER DATA

TYPE OF SUBMISSION	TYPE OF ACTION	
[ ] Notice of Intent	[ ] Abandonment	[ ] Change of Plans
[X] Subsequent Report	[ ] Recompletion	[ ] New Construction
[ ] Final Abandonment Notice	[ ] Plugging Back	[ ] Non-Routine Fracturing
	[X] Casing Repair	[ ] Water Shut-Off
	[ ] Altering Casing	[ ] Conversion to Injection
	[ ] Other _____	[ ] Dispose Water

(Note: Report results of multiple completion on Well Completion or Recompletion Report and Log form.)

RECEIVED
JUL 01 1994
WYOMING OIL & GAS CONSERVATION COMMISSION

13. Describe Proposed or Completed Operations (Clearly state all pertinent details, and give pertinent dates, including estimated date of starting any proposed work. If well is directionally drilled, give subsurface locations and measured and true vertical depths for all markers and zones pertinent to this work.)*

Texaco Exploration and Production Inc. repaired a casing leak and perforated additional Frontier pay using the following procedure. Work commenced on 4/12/94:
MIRUSU. NUBOP. Latched onto tbg to pull packer. Packer would not come free. RU wireline & RIH & cut tbg. RD wireline and lay down tbg. Fish for packer, & TOOH w/packer. TIH with RBP & packer. Find casing leak in 5-1/2" casing between 2098' and 2129'. Pressured casing to 2500# and bled to 2000# in 5 min. TOOH w/pkr. RU wireline & TIH to 2153'. Shot two squeeze holes on 190 degree phasing. RD wireline. Circ down 5-1/2" csg & up 10-3/4" x 5-1/2" annulus at 4 BPM @ 800 PSI until annulus was displaced. TIH w/plastic cement retainer & set @ 2038' KB. Mixed and pumped 425 sx light cmt & 100 sx Class G at 4 BPM & 1400 PSI. No cement to surface. TOOH w/tbg. WOC. Drill through retainer and hard cement. Tested csg to 2000# - held 5 min. TIH w/scraper to 2500'. TOOH. TIH w/retrieving tool to fish RBP. Washed sand off RBP &

14. I hereby certify that the foregoing is true and correct
Signed B. D. S. Title Acting Area Manager Date 06/30/94

(This space for Federal or State office use)
Approved by _____ Title _____ Date _____
Conditions of approval, if any:

Title 18 U.S.C. Section 1001, makes it a crime for any person knowingly and willfully to make to any department or agency of the United States andy false, fictitious or fraudulent statements or representations as to any mater within its jurisdiction.

***See Instructions on Reverse Side**

TOOH w/RBP. PU bit & scraper & TIH. Tag fill at 11,415'. Clean out to 11,500. Circ hole clean. RU wireline unit. RIH with GR-CCL from 11,500' to 10,200'. Perforate 11416'-11456' w/2 JSPF. RD wireline. TIH w/packer and started hydrotesting tbg to 9500 PSI. RD floor. NDBOP. Landed tree & set pkr @ 11363' KB. RU frac equip. Frac well with 151,000 gal fluid & 244,000# sand. ISIP 4300 PSI. 15 min - 4115 PSI. RDMO frac equip. Open well - blew down to flat tank. No fluid recovered. ND tree. NUBOP. Release pkr and TOOH w/tbg. Laid down 5 jts & tbg was pulling wet. Hooked up rig pump, reset pkr & tried pumping down tbg. Went to 5000# and wouldn't move. Released pkr. RU wireline. RIH w/1 shot gun and tagged up at 10954'. Perforated tbg w/1 shot at 10940'. POOH. RD wireline unit. Last 5 jts tbg full of sand. TIH w/tbg and tagged sane at 11445'. Pump 30 bbls water & circ sand out to 11,505' KB. Land tbg @ 11402' KB. NDBOP. NU tree. Swab well. Well started flowing after 14 swab runs.

5/5/94 24 hrs on 48/64 choke 1759 MCF, 16.5 BW, 0 BO.

Form 9-331a
(Feb. 1951)

Budget Bureau No. 42-R358.4.
Approval expires 12-31-60.

Land Office Cheyenne
Lease No. W-05929-A
Unit Nova

(SUBMIT IN TRIPLICATE)

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

SUNDRY NOTICES AND REPORTS ON WELLS

NOTICE OF INTENTION TO DRILL		SUBSEQUENT REPORT OF WATER SHUT-OFF	
NOTICE OF INTENTION TO CHANGE PLANS		SUBSEQUENT REPORT OF SHOOTING OR ACIDIZING	
NOTICE OF INTENTION TO TEST WATER SHUT-OFF		SUBSEQUENT REPORT OF ALTERING CASING	
NOTICE OF INTENTION TO RE-DRILL OR REPAIR WELL		SUBSEQUENT REPORT OF RE-DRILLING OR REPAIR	
NOTICE OF INTENTION TO SHOOT OR ACIDIZE		SUBSEQUENT REPORT OF ABANDONMENT	
NOTICE OF INTENTION TO PULL OR ALTER CASING		SUPPLEMENTARY WELL HISTORY	X
NOTICE OF INTENTION TO ABANDON WELL		Drill Stem Test #2	X

(INDICATE ABOVE BY CHECK MARK NATURE OF REPORT, NOTICE, OR OTHER DATA)

July 7, 1961

Well No. 1 is located 1985 ft. from ~~[N]~~ [S] line and 464 ft. from [E] ~~[W]~~ line of sec. 22

NE Sec. 22 (¼ Sec. and Sec. No.) 19N (Twp.) 112W (Range) 6th PM (Meridian)

Wildcat (Field) Sweetwater (County or Subdivision) Wyoming (State or Territory)

The elevation of the KB derrick floor above sea level is 6431 ft.

DETAILS OF WORK

(State names of and expected depths to objective sands; show sizes, weights, and lengths of proposed casings; indicate mudding jobs, cementing points, and all other important proposed work)

Run #1 Zone: 7756'-7812'. Packer would not hold

Run #2 Zone: 7735'-7812', Dual packers set at 7731' and 7735'. Tool opened 5 minutes with fair blow. Tool shut in for 30 minutes initial shut in. Tool opened for 1 hour. Fair to good blow through out test. Shut in for 20 minutes final shut in. Recovered 1200' of gas cut water cushion, 550' gas cut drilling mud and 1940' gas cut salt water.

HISP	3631#	FHIP	3259#
ISIP	3631#	HISP	3631#
IFP	612-759#		
FFP	728-1755#		

JUL 1 1961

I understand that this plan of work must receive approval in writing by the Geological Survey before operations may be commenced.

Company TEXACO Inc.

Address PO Drawer 790

Casper, Wyoming

By Walter Reed

Title District Superintendent

USGS (2) WSB (2) RW MR HIM
Conoco (2) Utah (3)

U. S. GOVERNMENT PRINTING OFFICE: 1958 O -463339

Form 9-331a
(Feb. 1951)

	Sec.	22	
			•

(SUBMIT IN TRIPLICATE)

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

Budget Bureau No. 42-R358.4.
Approval expires 12-31-60.

Land Office Cheyenne
Lease No. W-05929-A
Unit Moxa

SUNDRY NOTICES AND REPORTS ON WELLS

NOTICE OF INTENTION TO DRILL		SUBSEQUENT REPORT OF WATER SHUT-OFF	
NOTICE OF INTENTION TO CHANGE PLANS		SUBSEQUENT REPORT OF SHOOTING OR ACIDIZING	
NOTICE OF INTENTION TO TEST WATER SHUT-OFF		SUBSEQUENT REPORT OF ALTERING CASING	
NOTICE OF INTENTION TO RE-DRILL OR REPAIR WELL		SUBSEQUENT REPORT OF RE-DRILLING OR REPAIR	
NOTICE OF INTENTION TO SHOOT OR ACIDIZE		SUBSEQUENT REPORT OF ABANDONMENT	
NOTICE OF INTENTION TO PULL OR ALTER CASING		SUPPLEMENTARY WELL HISTORY	X
NOTICE OF INTENTION TO ABANDON WELL		Drill Stem Test No. 1	X

(INDICATE ABOVE BY CHECK MARK NATURE OF REPORT, NOTICE, OR OTHER DATA)

July 7, 1961

Well No. 1 is located 1985 ft. from {N/S} line and 464 ft. from {E/W} line of sec. 22

SE Sec. 22 (¼ Sec. and Sec. No.) 19N (Twp.) 112W (Range) 6th PM (Meridian)

Wildcat (Field) Sweetwater (County or Subdivision) Wyoming (State or Territory)

The elevation of the ~~derrick floor~~ KB above sea level is 6435 ft.

DETAILS OF WORK

(State names of and expected depths to objective sands; show sizes, weights, and lengths of proposed casings; indicate mudding jobs, cementing points, and all other important proposed work)

Zone: 6220'-6281'. Packer dual set at 6216' and 6220'. Tool shut in for 30 minutes initial shut in. Tool opened for 1 hour with no blow. Tool shut in for 30 minutes final shut in. Recovered 60' of drilling mud.

IHSP	3000#
ISP	2592#
IFP	22-25#
FFP	22-36#
FSIP	1958#
FHSP	2987#

Approved JUL 19 1961
(OIL AND GAS OPERATIONS)
District Engineer

I understand that this plan of work must receive approval in writing by the Geological Survey before operations may be commenced.

Company TEXACO Inc.

Address P O Drawer 740

Casper, Wyoming

By [signature]

Title District Superintendent

USGS (2) SMS (2) RW WR EHM
Conoco (2) UPRR (3)

U. S. GOVERNMENT PRINTING OFFICE: 1958 O -463339

Form 9-331a
(Feb. 1951)

Budget Bureau No. 42-R358.4.
Approval expires 12-31-60.

Land Office Cheyenne
Lease No. W-05929-A
Unit Moxa

	Sec. 22		

(SUBMIT IN TRIPLICATE)

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

U. S. GEOLOGICAL SURVEY
RECEIVED
JUL 28 1961
CASPER, WYOMING

SUNDRY NOTICES AND REPORTS ON WELLS

NOTICE OF INTENTION TO DRILL		SUBSEQUENT REPORT OF WATER SHUT-OFF	
NOTICE OF INTENTION TO CHANGE PLANS		SUBSEQUENT REPORT OF SHOOTING OR ACIDIZING	
NOTICE OF INTENTION TO TEST WATER SHUT-OFF		SUBSEQUENT REPORT OF ALTERING CASING	
NOTICE OF INTENTION TO RE-DRILL OR REPAIR WELL		SUBSEQUENT REPORT OF RE-DRILLING OR REPAIR	
NOTICE OF INTENTION TO SHOOT OR ACIDIZE		SUBSEQUENT REPORT OF ABANDONMENT	
NOTICE OF INTENTION TO PULL OR ALTER CASING		SUPPLEMENTARY WELL HISTORY	X
NOTICE OF INTENTION TO ABANDON WELL		Drill Stem Test #3	X

(INDICATE ABOVE BY CHECK MARK NATURE OF REPORT, NOTICE, OR OTHER DATA)

July 7, 19 61

Well No. 1 is located 1985 ft. from {N/S} line and 464 ft. from {E/W} line of sec. 22

SE Sec. 22 (¼ Sec. and Sec. No.) | 19N (Twp.) | 112W (Range) | 6th PM (Meridian)

Wildcat (Field) | Sweetwater (County or Subdivision) | Wyoming (State or Territory)

The elevation of the ~~derrick floor~~ KB above sea level is 6435 ft.

DETAILS OF WORK

(State names of and expected depths to objective sands; show sizes, weights, and lengths of proposed casings; indicate mudding jobs, cementing points, and all other important proposed work)

Zone: 10,521-10,566'. Dual packers set at 10,516' and 10,521'. Tool opened for 8 minutes with faint blow. Tool shut in for 30 minutes initial shut in. Tool opened for 1 hour, no blow. Closed tool for 15 minutes final shut in. Recovered 3600' of water cushion and 10' of drilling mud. No indication of water, oil or gas.

IHSP	5196#
ISIP	2024#
IFP	1648-1650#
FFP	1648-1650#
FSIP	1754#
FHSP	5196#

JUL 28 1961

I understand that this plan of work must receive approval in writing by the Geological Survey before operations may be commenced.

Company TEXACO Inc.

Address P. O. Drawer 740

Casper, Wyoming

By Walter Hand

Title District Superintendent

USGS (2) SMS (2) RW WR RHM
Conoco (2) UPRR (3)

U. S. GOVERNMENT PRINTING OFFICE: 1958 O -463339

Form 9-331a
(Feb. 1951)

Budget Bureau No. 42-R358.4.
Approval expires 12-31-60.

Land Office Cheyenne
Lease No. W-05929-A
Unit Moxa

Sec. 22			

U. S. GEOLOGICAL SURVEY
RECEIVED
AUG 25 1961
ROCK SPRINGS, WYOMING

(SUBMIT IN TRIPLICATE)

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

SUNDRY NOTICES AND REPORTS ON WELLS

NOTICE OF INTENTION TO DRILL		SUBSEQUENT REPORT OF WATER SHUT-OFF	
NOTICE OF INTENTION TO CHANGE PLANS		SUBSEQUENT REPORT OF SHOOTING OR ACIDIZING	
NOTICE OF INTENTION TO TEST WATER SHUT-OFF		SUBSEQUENT REPORT OF ALTERING CASING	
NOTICE OF INTENTION TO RE-DRILL OR REPAIR WELL		SUBSEQUENT REPORT OF RE-DRILLING OR REPAIR	
NOTICE OF INTENTION TO SHOOT OR ACIDIZE		SUBSEQUENT REPORT OF ABANDONMENT	
NOTICE OF INTENTION TO PULL OR ALTER CASING		SUPPLEMENTARY WELL HISTORY	
NOTICE OF INTENTION TO ABANDON WELL		Drill Stem Test #5	X

(INDICATE ABOVE BY CHECK MARK NATURE OF REPORT, NOTICE, OR OTHER DATA)

August 18, 1961

Well No. 1 is located 1985 ft. from ~~N~~ S line and 464 ft. from E ~~W~~ line of sec. 22

SE Sec. 22 (¼ Sec. and Sec. No.) 19N (Twp.) 112W (Range) 6th PM (Meridian)

Wildcat (Field) Sweetwater (County or Subdivision) Wyoming (State or Territory)

The elevation of the ~~derrick floor~~ KB above sea level is 6435 ft.

DETAILS OF WORK

(State names of and expected depths to objective sands; show sizes, weights, and lengths of proposed casings; indicate mudding jobs, cementing points, and all other important proposed work)

Zone Tested: 12,097-12,210'. Dual packers set at 12,091' and 12,097'.
Tool shut in for 30 minutes initial shut in. Packers failed.

IHSP - 7168#
FHSP - 7168#

Temp. 200°.

Approved AUG 28 1961
(ORIG. SGD.) C. P. CLIFFORD
District Engineer

I understand that this plan of work must receive approval in writing by the Geological Survey before operations may be commenced.

Company TEXACO Inc.

Address P. O. Drawer 740

Casper, Wyoming

By Signed: WALTER RAND

Title District Superintendent

USGS (2) SMS (2) RW WR EHM
Conoco (2) UPRR (3)

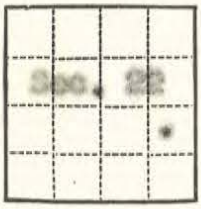
RECEIVED
AUG 28 1961
OFFICE OF MINERAL SUPERVISOR

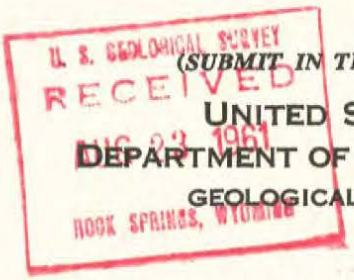
U. S. GOVERNMENT PRINTING OFFICE: 1958 O -463339

Form 9-331a
(Feb. 1951)

Budget Bureau No. 42-R358.4.
Approval expires 12-31-60.

Land Office Cheyenne
Lease No. W-075220-A
Unit Moxa





(SUBMIT IN TRIPLICATE)

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

SUNDRY NOTICES AND REPORTS ON WELLS

NOTICE OF INTENTION TO DRILL		SUBSEQUENT REPORT OF WATER SHUT-OFF	
NOTICE OF INTENTION TO CHANGE PLANS		SUBSEQUENT REPORT OF SHOOTING OR ACIDIZING	
NOTICE OF INTENTION TO TEST WATER SHUT-OFF		SUBSEQUENT REPORT OF ALTERING CASING	
NOTICE OF INTENTION TO RE-DRILL OR REPAIR WELL		SUBSEQUENT REPORT OF RE-DRILLING OR REPAIR	
NOTICE OF INTENTION TO SHOOT OR ACIDIZE		SUBSEQUENT REPORT OF ABANDONMENT	
NOTICE OF INTENTION TO PULL OR ALTER CASING		SUPPLEMENTARY WELL HISTORY	
NOTICE OF INTENTION TO ABANDON WELL		Drill Stem Test #5	X

(INDICATE ABOVE BY CHECK MARK NATURE OF REPORT, NOTICE, OR OTHER DATA)

August 18, 1961

Well No. 1 is located 1980 ft. from {N/S} line and 660 ft. from {E/W} line of sec. 22

SE Sec. 22 (¼ Sec. and Sec. No.) | 18N (Twp.) | 112W (Range) | 6th PM (Meridian)

Wildcat (Field) | Sweetwater (County or Subdivision) | Wyoming (State or Territory)

The elevation of the KB derrick floor above sea level is 6435 ft.

DETAILS OF WORK

(State names of and expected depths to objective sands; show sizes, weights, and lengths of proposed casings; indicate mudding jobs, cementing points, and all other important proposed work)

Zone Tested: 12,097-12,210'. Dual packers set at 12,091' and 12,097'. Tool shut in for 30 minutes initial shut in. Packers failed.

IHSP - 7168#
IHSP - 7160#

Temp. 200°.

Approved AUG 23 1961
(ORIG. SGD.) C. P. CLIFFORD
District Engineer



I understand that this plan of work must receive approval in writing by the Geological Survey before operations may be commenced.

Company TEXACO Inc.

Address P. O. Drawer 740

Casper, Wyoming

By Signed: WALTER RAND

Title District Superintendent

USGS (2) SMS (2) RW WR EHM
Conoco (2) UPMR (3)

U. S. GOVERNMENT PRINTING OFFICE: 1958 O -463339

Form 9-331a
(Feb. 1951)

Budget Bureau No. 42-R358.4.
Approval expires 12-31-60.

Land Office Cheyenne
Lease No. W-0[illegible]-A
Unit None

	Sec. 22		

(SUBMIT IN TRIPLICATE)

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

RECEIVED AUG 10 1961 ROCK SPRINGS, WYOMING

SUNDRY NOTICES AND REPORTS ON WELLS

NOTICE OF INTENTION TO DRILL		SUBSEQUENT REPORT OF WATER SHUT-OFF	
NOTICE OF INTENTION TO CHANGE PLANS		SUBSEQUENT REPORT OF SHOOTING OR ACIDIZING	
NOTICE OF INTENTION TO TEST WATER SHUT-OFF		SUBSEQUENT REPORT OF ALTERING CASING	
NOTICE OF INTENTION TO RE-DRILL OR REPAIR WELL		SUBSEQUENT REPORT OF RE-DRILLING OR REPAIR	
NOTICE OF INTENTION TO SHOOT OR ACIDIZE		SUBSEQUENT REPORT OF ABANDONMENT	
NOTICE OF INTENTION TO PULL OR ALTER CASING		SUPPLEMENTARY WELL HISTORY	X
NOTICE OF INTENTION TO ABANDON WELL		Drill Stem Test No. 4	

(INDICATE ABOVE BY CHECK MARK NATURE OF REPORT, NOTICE, OR OTHER DATA)

July 12, 19 61

Well No. 1 is located 1985 ft. from {N/S} line and 464 ft. from {E/W} line of sec. 22

SE Sec. 22 (¼ Sec. and Sec. No.) 19N (Twp.) 112W (Range) 6th PM (Meridian)

Wildcat (Field) Sweetwater (County or Subdivision) Wyoming (State or Territory)

The elevation of the K.B. above sea level is 6439 ft.

Approved AUG 3 1961
(ORIG. SGD.) [illegible]

DETAILS OF WORK

(State names of and expected depths to objective sands; show sizes, weights, and lengths of proposed casings; indicate mudding jobs, cementing points, and all other important proposed work)

RUN NO. 1 - Zone tested: 11410-11471'. Dual packers set at 11,405 and 11,410'. Tool shut in for 30 minutes initial shut in. Tool opened for 3 to 4 minutes when packer failed. 5000' water cushion.
IHSP - 6932 IFP - 6673 FHSP - 6932

RUN NO. 2 - Zone Tested: 11,398 - 11,473'. Dual packers set at 11,393 and 11,398'. Ran Howco hydraulic adjustable choke, 1/8" x 3/4", above perforations on bottom. Omitted initial shut in. Tool opened with weak blow which increased to fair blow. Tool opened for about 12 minutes when packer failed. Top choke 1/4". 5000' Water cushion.
IHSP - 7011 FHSP - 7011 IFP - 2376 Temp. 205°.

RECEIVED AUG 7 1961 OFFICE OF MINERAL SUPERVISOR

I understand that this plan of work must receive approval in writing by the Geological Survey before operations may be commenced.

Company TEXACO Inc.

Address P. O. Drawer 740

Casper, Wyoming

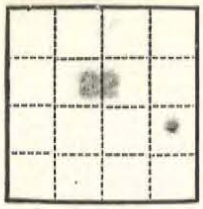
By [signature]

Title District Superintendent

USGS (2) AMS (2) BM MR
Conoco (2) OPNA (3)

U. S. GOVERNMENT PRINTING OFFICE: 1958 O - 463339

Form 9-331a
(Feb. 1951)



U. S. GEOLOGICAL SURVEY
RECEIVED
MAY 5 1961
ROCK MTN. DIST.

Budget Bureau No. 42-R358.4.
Approval expires 12-31-60.

Land Office Cheyenne
Lease No. W-0520-A
Unit Main

(SUBMIT IN TRIPLICATE)

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

SUNDRY NOTICES AND REPORTS ON WELLS

NOTICE OF INTENTION TO DRILL		SUBSEQUENT REPORT OF WATER SHUT-OFF	
NOTICE OF INTENTION TO CHANGE PLANS	X	SUBSEQUENT REPORT OF SHOOTING OR ACIDIZING	
NOTICE OF INTENTION TO TEST WATER SHUT-OFF		SUBSEQUENT REPORT OF ALTERING CASING	
NOTICE OF INTENTION TO RE-DRILL OR REPAIR WELL		SUBSEQUENT REPORT OF RE-DRILLING OR REPAIR	
NOTICE OF INTENTION TO SHOOT OR ACIDIZE		SUBSEQUENT REPORT OF ABANDONMENT	
NOTICE OF INTENTION TO PULL OR ALTER CASING		SUPPLEMENTARY WELL HISTORY	
NOTICE OF INTENTION TO ABANDON WELL			

(INDICATE ABOVE BY CHECK MARK NATURE OF REPORT, NOTICE, OR OTHER DATA)

May 3, 1961

Well No. 1 is located 1980 ft. from {N/S} line and 660 ft. from {E/W} line of sec. 22

SE Sec. 22 (¼ Sec. and Sec. No.) 19 North (Twp.) 112 West (Range) 6th PM (Meridian)

Wildcat (Field) Sweetwater (County or Subdivision) Wyoming (State or Territory)

Ungraded ground elevation 6430 ft.

The elevation of the derrick floor above sea level is ..... ft. will be furnished later.

DETAILS OF WORK

(State names of and expected depths to objective sands; show sizes, weights, and lengths of proposed casings; indicate mudding jobs, cementing points, and all other important proposed work)

Notice of Intention to Drill dated April 21, 1961, indicated 13-3/8" OD surface casing would be set at approximately 400', and cemented to surface. In order to have larger ID hole for cementing 10-3/4" intermediate casing, 16" OD surface casing will be substituted for 13-3/8" OD casing and set at approximately 350' and cemented to surface.

APPROVED
(Orig. Sgd.) JAMES W. SPECK
ACTING DISTRICT ENGINEER
MAY 5 1961
DATE

I understand that this plan of work must receive approval in writing by the Geological Survey before operations may be commenced.

Company TEXACO Inc.

Address P. O. Drawer 749

Casper, Wyoming

By Walter Hand
Walter Hand

Title District Superintendent

USGS (2) SMR (2) OGM RA ERA

U. S. GOVERNMENT PRINTING OFFICE: 1958 O -463339

FORM 3160-5
(June 1990)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

FORM APPROVED
Budget Bureau No. 1004-0135
Expires: March 31, 1993

SUNDRY NOTICES AND REPORTS ON WELLS

Do not use this form for proposals to drill or to deepen or reenter a different reservoir.
Use "APPLICATION FOR PERMIT -" for such proposals

SUBMIT IN TRIPLICATE

5. Lease Designation and Serial No.
WYW05929A

6. If Indian, Allottee or Tribe Name

7. If Unit or CA, Agreement Designation
Moxa Unit

1. Type of Well
Oil Well ☐ Gas Well ☒ Other ☐

8. Well Name and No.
Moxa Unit #1

9. API Well No.
4903705573

2. Name of Operator
Texaco Exploration & Production Inc.

10. Field and Pool, or Exploratory Area
Bruff - Frontier

3. Address and Telephone No.
P. O. Box 1629, Rock Springs, WY 82902 (307) 352-5100

11. County or Parish, State
Sweetwater, Wyoming

4. Location of Well (Footage, Sec., T., R., M., or Survey Description)
Sec. 22, T19N-R112W, NE SE, 1985' FSL & 464' FEL

12. CHECK APPROPRIATE BOX(es) TO INDICATE NATURE OF NOTICE, REPORT, OR OTHER DATA

TYPE OF SUBMISSION	TYPE OF ACTION	
☐ Notice of Intent	☐ Abandonment	☐ Change of Plans
☒ Subsequent Report	☐ Recompletion	☐ New Construction
☐ Final Abandonment Notice	☐ Plugging Back	☐ Non-Routine Fracturing
	☒ Casing Repair	☐ Water Shut-Off
	☐ Altering Casing	☐ Conversion to Injection
	☐ Other _____	☐ Dispose Water

(Note: Report results of multiple completion on Well Completion or Recompletion Report and Log form.)

RECEIVED
JUL 01 1994
WYOMING OIL & GAS CONSERVATION COMMISSION

13. Describe Proposed or Completed Operations (Clearly state all pertinent details, and give pertinent dates, including estimated date of starting any proposed work. If well is directionally drilled, give subsurface locations and measured and true vertical depths for all markers and zones pertinent to this work.)*

Texaco Exploration and Production Inc. repaired a casing leak and perforated additional Frontier pay using the following procedure. Work commenced on 4/12/94:
MIRUSU. NUBOP. Latched onto tbg to pull packer. Packer would not come free. RU wireline & RIH & cut tbg. RD wireline and lay down tbg. Fish for packer, & TOOH w/packer. TIH with RBP & packer. Find casing leak in 5-1/2" casing between 2098' and 2129'. Pressured casing to 2500# and bled to 2000# in 5 min. TOOH w/pkr. RU wireline & TIH to 2153'. Shot two squeeze holes on 190 degree phasing. RD wireline. Circ down 5-1/2" csg & up 10-3/4" x 5-1/2" annulus at 4 BPM @ 800 PSI until annulus was displaced. TIH w/plastic cement retainer & set @ 2038' KB. Mixed and pumped 425 sx light cmt & 100 sx Class G at 4 BPM & 1400 PSI. No cement to surface. TOOH w/tbg. WOC. Drill through retainer and hard cement. Tested csg to 2000# - held 5 min. TIH w/scraper to 2500'. TOOH. TIH w/retrieving tool to fish RBP. Washed sand off RBP &

14. I hereby certify that the foregoing is true and correct
Signed B. D. S. Title Acting Area Manager Date 06/30/94

(This space for Federal or State office use)
Approved by _____ Title _____ Date _____
Conditions of approval, if any:

Title 18 U.S.C. Section 1001, makes it a crime for any person knowingly and willfully to make to any department or agency of the United States andy false, fictitious or fraudulent statements or representations as to any mater within its jurisdiction.

*See Instructions on Reverse Side

TOOH w/RBP. PU bit & scraper & TIH. Tag fill at 11,415'. Clean out to 11,500. Circ hole clean. RU wireline unit. RIH with GR-CCL from 11,500' to 10,200'. Perforate 11416'-11456' w/2 JSPF. RD wireline. TIH w/packer and started hydrotesting tbg to 9500 PSI. RD floor. NDBOP. Landed tree & set pkr @ 11363' KB. RU frac equip. Frac well with 151,000 gal fluid & 244,000# sand. ISIP 4300 PSI. 15 min - 4115 PSI. RDMO frac equip. Open well - blew down to flat tank. No fluid recovered. ND tree. NUBOP. Release pkr and TOOH w/tbg. Laid down 5 jts & tbg was pulling wet. Hooked up rig pump, reset pkr & tried pumping down tbg. Went to 5000# and wouldn't move. Released pkr. RU wireline. RIH w/1 shot gun and tagged up at 10954'. Perforated tbg w/1 shot at 10940'. POOH. RD wireline unit. Last 5 jts tbg full of sand. TIH w/tbg and tagged sane at 11445'. Pump 30 bbls water & circ sand out to 11,505' KB. Land tbg @ 11402' KB. NDBOP. NU tree. Swab well. Well started flowing after 14 swab runs.

5/5/94 24 hrs on 48/64 choke 1759 MCF, 16.5 BW, 0 BO.

Form 9-331a
(Feb. 1951)

Budget Bureau No. 42-R358.4.
Approval expires 12-31-60.

Land Office Cheyenne
Lease No. W-05929-A
Unit Moxa

	Sec. 22		

U. S. GEOLOGICAL SURVEY
RECEIVED
OCT 30 1961
ROCK SPRINGS, WYOMING

(SUBMIT IN TRIPLICATE)

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

SUNDRY NOTICES AND REPORTS ON WELLS

NOTICE OF INTENTION TO DRILL		SUBSEQUENT REPORT OF WATER SHUT-OFF	
NOTICE OF INTENTION TO CHANGE PLANS		SUBSEQUENT REPORT OF SHOOTING OR ACIDIZING	
NOTICE OF INTENTION TO TEST WATER SHUT-OFF		SUBSEQUENT REPORT OF ALTERING CASING	
NOTICE OF INTENTION TO RE-DRILL OR REPAIR WELL		SUBSEQUENT REPORT OF RE-DRILLING OR REPAIR	
NOTICE OF INTENTION TO SHOOT OR ACIDIZE		SUBSEQUENT REPORT OF ABANDONMENT	
NOTICE OF INTENTION TO PULL OR ALTER CASING		SUPPLEMENTARY WELL HISTORY	
NOTICE OF INTENTION TO ABANDON WELL		Subsequent Report of Perforating & Fracing	X

(INDICATE ABOVE BY CHECK MARK NATURE OF REPORT, NOTICE, OR OTHER DATA)

October 26, 1961

Well No. 1 is located 1985 ft. from {N/S} line and 464 ft. from {E/W} line of sec. 22

SE Sec. 22 (¼ Sec. and Sec. No.) | 19N (Twp.) | 112W (Range) | 6th PM (Meridian)

Wildcat (Field) | Sweetwater (County or Subdivision) | Wyoming (State or Territory)

The elevation of the ~~derrick floor~~ KB above sea level is 6435 ft.

DETAILS OF WORK

(State names of and expected depths to objective sands; show sizes, weights, and lengths of proposed casings; indicate mudding jobs, cementing points, and all other important proposed work)

Ran McCullough Gamma Ray Correlation Log from 11,493-10,997'. Perforated intervals 11,416-11,426', 11,428-11,433', 11,436-11,445', 11,447-11,456' with two jet shots per foot. Set Packer at 11,341' and displaced tubing with 500 gals. breakdown acid followed by 200 gal. #2 diesel oil spacer. Broke down formation with 5500 gals. Dowell #2 diesel oil Petrogel containing 1/20# per gal. Mark II Adomite and 50 gals. Freflo. Breakdown pressure 8500 psi. Fraced with 33,000 gals. #2 diesel oil Petrogel containing 1/20# per gal. Mark II Adomite, Y-3 high temp gel breaker and 1040# 12-20 mesh walnut shells. Treating pressure 8900 psi. Did not change throughout job. Pressure dropped to 5200 psi immediately after injection was stopped. Average injection rate 7 BPM. Well tested 1,500 MCFPD.

I understand that this plan of work must receive approval in writing by the Geological Survey before operations may be commenced.

Company TEXACO Inc.

Address P. O. Drawer 740

Casper, Wyoming

Approved OCT 30 1961
(ORIG. SGD.) C. P. CLIFFORD
District Engineer

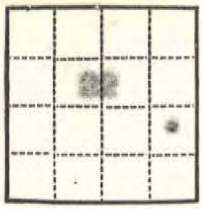
By

Title District Superintendent

USGS (2) SMS (2) RW WR HHM
Conoco (2) UPNR (3)

U. S. GOVERNMENT PRINTING OFFICE: 1958 O - 463339

Form 9-331a
(Feb. 1951)



U. S. GEOLOGICAL SURVEY
RECEIVED
MAY 5 1961
ROCK SPRINGS, WYO.

(SUBMIT IN TRIPLICATE)

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

Budget Bureau No. 42-R358.4.
Approval expires 12-31-60.

Land Office Cheyenne
Lease No. W-053929-A
Unit Hoss

14

SUNDRY NOTICES AND REPORTS ON WELLS

NOTICE OF INTENTION TO DRILL		SUBSEQUENT REPORT OF WATER SHUT-OFF	
NOTICE OF INTENTION TO CHANGE PLANS	X	SUBSEQUENT REPORT OF SHOOTING OR ACIDIZING	
NOTICE OF INTENTION TO TEST WATER SHUT-OFF		SUBSEQUENT REPORT OF ALTERING CASING	
NOTICE OF INTENTION TO RE-DRILL OR REPAIR WELL		SUBSEQUENT REPORT OF RE-DRILLING OR REPAIR	
NOTICE OF INTENTION TO SHOOT OR ACIDIZE		SUBSEQUENT REPORT OF ABANDONMENT	
NOTICE OF INTENTION TO PULL OR ALTER CASING		SUPPLEMENTARY WELL HISTORY	
NOTICE OF INTENTION TO ABANDON WELL			

(INDICATE ABOVE BY CHECK MARK NATURE OF REPORT, NOTICE, OR OTHER DATA)

May 3, 1961

Well No. 1 is located 1980 ft. from {N/S} line and 864 ft. from {E/W} line of sec. 22

SE Sec. 22 (¼ Sec. and Sec. No.) 19 North (Twp.) 112 West (Range) 6th PM (Meridian)

Wildcat (Field) Sweetwater (County or Subdivision) Wyoming (State or Territory)

Ungraded ground elevation 6430 ft.

The elevation of the derrick floor above sea level is ..... ft. will be furnished later.

DETAILS OF WORK

(State names of and expected depths to objective sands; show sizes, weights, and lengths of proposed casings; indicate mudding jobs, cementing points, and all other important proposed work)

Notice of Intention to Drill dated April 21, 1961, indicated 13-3/8" OD surface casing would be set at approximately 600' and cemented to surface. In order to have larger ID hole for cementing 10-3/4" intermediate casing, 16" OD surface casing will be substituted for 13-3/8" OD casing and set at approximately 350' and cemented to surface.

APPROVED
(Orig. Sgd.) JAMES W. SPECK
ACTING DISTRICT ENGINEER
MAY 5 1961
DATE

I understand that this plan of work must receive approval in writing by the Geological Survey before operations may be commenced.

Company TEXACO Inc.

Address P. O. Drawer 740

Casper, Wyoming

By Walter Hand
Walter Hand

Title District Superintendent

USGS (2) SMR (2) OGM WR MM

U. S. GOVERNMENT PRINTING OFFICE: 1958 O - 463339

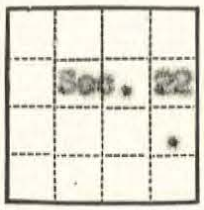
Form 9-331a
(Feb. 1951)

Budget Bureau No. 42-R358.4.
Approval expires 12-31-60.

Land Office Cheyenne
Lease No. W-063999-A
Unit Nova

(SUBMIT IN TRIPLICATE)

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY



SUNDRY NOTICES AND REPORTS ON WELLS

NOTICE OF INTENTION TO DRILL		SUBSEQUENT REPORT OF WATER SHUT-OFF	
NOTICE OF INTENTION TO CHANGE PLANS		SUBSEQUENT REPORT OF SHOOTING OR ACIDIZING	
NOTICE OF INTENTION TO TEST WATER SHUT-OFF		SUBSEQUENT REPORT OF ALTERING CASING	
NOTICE OF INTENTION TO RE-DRILL OR REPAIR WELL		SUBSEQUENT REPORT OF RE-DRILLING OR REPAIR	
NOTICE OF INTENTION TO SHOOT OR ACIDIZE		SUBSEQUENT REPORT OF ABANDONMENT	
NOTICE OF INTENTION TO PULL OR ALTER CASING		SUPPLEMENTARY WELL HISTORY	X
NOTICE OF INTENTION TO ABANDON WELL		Drill Stem Test No. 4	

(INDICATE ABOVE BY CHECK MARK NATURE OF REPORT, NOTICE, OR OTHER DATA)

July 12, 19 61

Well No. 1 is located 1985 ft. from {N/S} line and 464 ft. from {E/W} line of sec. 22

SE Sec. 22 (¼ Sec. and Sec. No.) 19N (Twp.) 112W (Range) 6th PM (Meridian)

Wildcat (Field) Sweetwater (County or Subdivision) Wyoming (State or Territory)

The elevation of the ~~derrick floor~~ K.B. above sea level is 6439 ft.

Approved AUG 8 1961
(ORIG. SGD.) E. [illegible]

DETAILS OF WORK

(State names of and expected depths to objective sands; show sizes, weights, and lengths of proposed casings; indicate mudding jobs, cementing points, and all other important proposed work)

RUN NO. 1 - Zone tested: 11410-11471'. Dual packers set at 11,405 and 11,410'. Tool shut in for 30 minutes initial shut in. Tool opened for 3 to 4 minutes when packer failed. 5000' water cushion.
IHSP - 6932 IFP - 6673 FHSP - 6932

RUN NO. 2 - Zone Tested: 11,398 - 11,473'. Dual packers set at 11,393 and 11,398'. Ran Howco hydraulic adjustable choke, 1/8" x 3/4", above perforations on bottom. Omitted initial shut in. Tool opened with weak blow which increased to fair blow. Tool opened for about 12 minutes when packer failed. Top choke 1/4". 5000' water cushion.
IHSP - 7011 FHSP - 7011 IFP - 2376 Temp. 205°.

RECEIVED
AUG - 7 1961
U.S. GEOLOGICAL SURVEY
MINERAL SUPERVISOR

I understand that this plan of work must receive approval in writing by the Geological Survey before operations may be commenced.

Company TEXACO Inc.

Address P. O. Drawer 740

Casper, Wyoming

By [signature]

Title District Superintendent

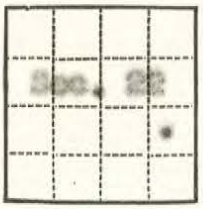
USGS (2) WMN (2) BM MT
Conoco (2) UPM (3)

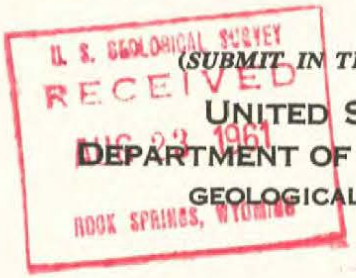
U. S. GOVERNMENT PRINTING OFFICE: 1958 O - 463339

Form 9-331a
(Feb. 1951)

Budget Bureau No. 42-R358.4.
Approval expires 12-31-60.

Land Office Cheyenne
Lease No. W-05929-A
Unit None





(SUBMIT IN TRIPLICATE)

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

SUNDRY NOTICES AND REPORTS ON WELLS

NOTICE OF INTENTION TO DRILL		SUBSEQUENT REPORT OF WATER SHUT-OFF	
NOTICE OF INTENTION TO CHANGE PLANS		SUBSEQUENT REPORT OF SHOOTING OR ACIDIZING	
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NOTICE OF INTENTION TO RE-DRILL OR REPAIR WELL		SUBSEQUENT REPORT OF RE-DRILLING OR REPAIR	
NOTICE OF INTENTION TO SHOOT OR ACIDIZE		SUBSEQUENT REPORT OF ABANDONMENT	
NOTICE OF INTENTION TO PULL OR ALTER CASING		SUPPLEMENTARY WELL HISTORY	
NOTICE OF INTENTION TO ABANDON WELL		Drill Stem Test #3	X

(INDICATE ABOVE BY CHECK MARK NATURE OF REPORT, NOTICE, OR OTHER DATA)

August 18, 1961

Well No. 1 is located 1965 ft. from {N/S} line and 464 ft. from {E/W} line of sec. 22

SE Sec. 22 (¼ Sec. and Sec. No.) | 19N (Twp.) | 112W (Range) | 6th PM (Meridian)

Wildcat (Field) | Sweetwater (County or Subdivision) | Wyoming (State or Territory)

The elevation of the KB above sea level is 6435 ft.

DETAILS OF WORK

(State names of and expected depths to objective sands; show sizes, weights, and lengths of proposed casings; indicate mudding jobs, cementing points, and all other important proposed work)

Zone Tested: 12,097-12,210'. Dual packers set at 12,091' and 12,097'. Tool shut in for 30 minutes initial shut in. Packers failed.

IHSP - 7168#
IHSP - 7168#

Temp. 200°.

Approved AUG 23 1961
(ORIG. SGD.) C. P. CLIFFORD
District Engineer

I understand that this plan of work must receive approval in writing by the Geological Survey before operations may be commenced.

Company TEXACO Inc.

Address P. O. Drawer 740

Casper, Wyoming

By Signed: WALTER RAND

USGS (2) SGS (2) RW WR RHM
Conoco (2) OPER (3)

Title District Superintendent

U. S. GOVERNMENT PRINTING OFFICE: 1958 O - 463339

Form 9-331a
(Feb. 1951)

Budget Bureau No. 42-R358.4.
Approval expires 12-31-60.

Land Office Cheyenne
Lease No. W-05929-A
Unit Moxa

	Sec. 22		

(SUBMIT IN TRIPLICATE)

U. S. GEOLOGICAL SURVEY
RECEIVED
AUG 25 1961
ROCK SPRINGS, WYOMING

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

SUNDRY NOTICES AND REPORTS ON WELLS

NOTICE OF INTENTION TO DRILL		SUBSEQUENT REPORT OF WATER SHUT-OFF	
NOTICE OF INTENTION TO CHANGE PLANS		SUBSEQUENT REPORT OF SHOOTING OR ACIDIZING	
NOTICE OF INTENTION TO TEST WATER SHUT-OFF		SUBSEQUENT REPORT OF ALTERING CASING	
NOTICE OF INTENTION TO RE-DRILL OR REPAIR WELL		SUBSEQUENT REPORT OF RE-DRILLING OR REPAIR	
NOTICE OF INTENTION TO SHOOT OR ACIDIZE		SUBSEQUENT REPORT OF ABANDONMENT	
NOTICE OF INTENTION TO PULL OR ALTER CASING		SUPPLEMENTARY WELL HISTORY	
NOTICE OF INTENTION TO ABANDON WELL		Drill Stem Test #5	X

(INDICATE ABOVE BY CHECK MARK NATURE OF REPORT, NOTICE, OR OTHER DATA)

August 18, 1961

Well No. 1 is located 1985 ft. from {N/S} line and 464 ft. from {E/W} line of sec. 22

SE Sec. 22 (¼ Sec. and Sec. No.) 19N (Twp.) 112W (Range) 6th PM (Meridian)

Wildcat (Field) Sweetwater (County or Subdivision) Wyoming (State or Territory)

The elevation of the ~~derrick floor~~ KB above sea level is 6435 ft.

DETAILS OF WORK

(State names of and expected depths to objective sands; show sizes, weights, and lengths of proposed casings; indicate mudding jobs, cementing points, and all other important proposed work)

Zone Tested: 12,097-12,210'. Dual packers set at 12,091' and 12,097'.
Tool shut in for 30 minutes initial shut in. Packers failed.

IHSP - 7168#
FHSP - 7168#

Temp. 200°.

Approved AUG 23 1961
(ORIG. SGD.) C. P. CLIFFORD
District Engineer

I understand that this plan of work must receive approval in writing by the Geological Survey before operations may be commenced.

Company TEXACO Inc.

Address P. O. Drawer 740

Casper, Wyoming

By Signed: WALTER RAND

Title District Superintendent

USGS (2) SMS (2) RW WR EHM
Conoco (2) UPRR (3)

RECEIVED
AUG 25 1961
OFFICE OF MINERAL SUPERVISOR

U. S. GOVERNMENT PRINTING OFFICE: 1958 O -463339

Form 9-331a
(Feb. 1961)

Budget Bureau No. 42-R358.4.
Approval expires 12-31-60.

Land Office Cheyenne
Lease No. W-05929-A
Unit Moxa

	Sec. 22		

U. S. GEOLOGICAL SURVEY
RECEIVED
JUL 28 1961
ROCK SPRINGS, WYOMING

(SUBMIT IN TRIPLICATE)

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

SUNDRY NOTICES AND REPORTS ON WELLS

NOTICE OF INTENTION TO DRILL		SUBSEQUENT REPORT OF WATER SHUT-OFF	
NOTICE OF INTENTION TO CHANGE PLANS		SUBSEQUENT REPORT OF SHOOTING OR ACIDIZING	
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NOTICE OF INTENTION TO SHOOT OR ACIDIZE		SUBSEQUENT REPORT OF ABANDONMENT	
NOTICE OF INTENTION TO PULL OR ALTER CASING		SUPPLEMENTARY WELL HISTORY	X
NOTICE OF INTENTION TO ABANDON WELL		Drill Stem Test #3	X

(INDICATE ABOVE BY CHECK MARK NATURE OF REPORT, NOTICE, OR OTHER DATA)

July 7, 1961

Well No. 1 is located 1985 ft. from ~~N~~ S line and 464 ft. from E ~~W~~ line of sec. 22

SE Sec. 22 (¼ Sec. and Sec. No.) 19N (Twp.) 112W (Range) 6th PM (Meridian)

Wildcat (Field) Sweetwater (County or Subdivision) Wyoming (State or Territory)

The elevation of the ~~derrick floor~~ KB above sea level is 6435 ft.

DETAILS OF WORK

(State names of and expected depths to objective sands; show sizes, weights, and lengths of proposed casings; indicate mudding jobs, cementing points, and all other important proposed work)

Zone: 10,521-10,566'. Dual packers set at 10,516' and 10,521'. Tool opened for 8 minutes with faint blow. Tool shut in for 30 minutes initial shut in. Tool opened for 1 hour, no blow. Closed tool for 15 minutes final shut in. Recovered 3600' of water cushion and 10' of drilling mud. No indication of water, oil or gas.

IHSP	5196#
ISIP	2024#
IFP	1648-1650#
FFP	1648-1650#
FSIP	1754#
FHSP	5196#

JUL 28 1961

I understand that this plan of work must receive approval in writing by the Geological Survey before operations may be commenced.

Company TEXACO Inc.

Address P. O. Drawer 740

Casper, Wyoming

By Walter Hand

Title District Superintendent

USGS (2) SMS (2) RW WR RHM
Conoco (2) UPRR (3)

U. S. GOVERNMENT PRINTING OFFICE: 1958 O - 463339

Form 9-331a
(Feb. 1951)

Budget Bureau No. 42-R358.4.
Approval expires 12-31-60.

Land Office Cheyenne
Lease No. W-05929-A
Unit Moxa

Sec 22

(SUBMIT IN TRIPLICATE)

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

SUNDRY NOTICES AND REPORTS ON WELLS

NOTICE OF INTENTION TO DRILL		SUBSEQUENT REPORT OF WATER SHUT-OFF	
NOTICE OF INTENTION TO CHANGE PLANS		SUBSEQUENT REPORT OF SHOOTING OR ACIDIZING	
NOTICE OF INTENTION TO TEST WATER SHUT-OFF		SUBSEQUENT REPORT OF ALTERING CASING	
NOTICE OF INTENTION TO RE-DRILL OR REPAIR WELL		SUBSEQUENT REPORT OF RE-DRILLING OR REPAIR	
NOTICE OF INTENTION TO SHOOT OR ACIDIZE		SUBSEQUENT REPORT OF ABANDONMENT	
NOTICE OF INTENTION TO PULL OR ALTER CASING		SUPPLEMENTARY WELL HISTORY	X
NOTICE OF INTENTION TO ABANDON WELL		Drill Stem Test No. 1	X

(INDICATE ABOVE BY CHECK MARK NATURE OF REPORT, NOTICE, OR OTHER DATA)

July 7, 1961

Well No. 1 is located 1985 ft. from {N/S} line and 464 ft. from {E/W} line of sec. 22

SE Sec. 22 (¼ Sec. and Sec. No.) 19N (Twp.) 112W (Range) 6th PM (Meridian)

Wildcat (Field) Sweetwater (County or Subdivision) Wyoming (State or Territory)

The elevation of the ~~derrick floor~~ KB above sea level is 6435 ft.

DETAILS OF WORK

(State names of and expected depths to objective sands; show sizes, weights, and lengths of proposed casings; indicate mudding jobs, cementing points, and all other important proposed work)

Zone: 6220'-6281'. Packer dual set at 6216' and 6220'. Tool shut in for 30 minutes initial shut in. Tool opened for 1 hour with no blow. Tool shut in for 30 minutes final shut in. Recovered 60' of drilling mud.

IHSP	3000#
ISP	2592#
IFP	22-25#
FFP	22-36#
FSIP	1958#
FHSP	2987#

Approved JUL 19 1961
(OIL AND GAS) Supervisor
District Engineer

I understand that this plan of work must receive approval in writing by the Geological Survey before operations may be commenced.

Company TEXACO Inc.

Address P O Drawer 740

Casper, Wyoming

By [signature]

Title District Superintendent

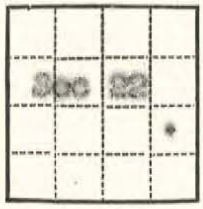
USGS (2) SMS (2) RW WR EHM
Conoco (2) UPRR (3)

U. S. GOVERNMENT PRINTING OFFICE: 1958 O -463339

Form 9-331a
(Feb. 1961)

Budget Bureau No. 42-R358.4.
Approval expires 12-31-60.

Land Office Cheyenne
Lease No. W-05929-A
Unit Nova



(SUBMIT IN TRIPLICATE)

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

SUNDRY NOTICES AND REPORTS ON WELLS

NOTICE OF INTENTION TO DRILL		SUBSEQUENT REPORT OF WATER SHUT-OFF	
NOTICE OF INTENTION TO CHANGE PLANS		SUBSEQUENT REPORT OF SHOOTING OR ACIDIZING	
NOTICE OF INTENTION TO TEST WATER SHUT-OFF		SUBSEQUENT REPORT OF ALTERING CASING	
NOTICE OF INTENTION TO RE-DRILL OR REPAIR WELL		SUBSEQUENT REPORT OF RE-DRILLING OR REPAIR	
NOTICE OF INTENTION TO SHOOT OR ACIDIZE		SUBSEQUENT REPORT OF ABANDONMENT	
NOTICE OF INTENTION TO PULL OR ALTER CASING		SUPPLEMENTARY WELL HISTORY	X
NOTICE OF INTENTION TO ABANDON WELL		Drill Stem Test #2	X

(INDICATE ABOVE BY CHECK MARK NATURE OF REPORT, NOTICE, OR OTHER DATA)

July 7, 1961

Well No. 1 is located 1985 ft. from {N/S} line and 464 ft. from {E/W} line of sec. 22

NE Sec. 22 (¼ Sec. and Sec. No.) 19N (Twp.) 112W (Range) 6th PM (Meridian)

Wildcat (Field) Sweetwater (County or Subdivision) Wyoming (State or Territory)

The elevation of the ~~derrick floor~~ KB above sea level is 6499 ft.

DETAILS OF WORK

(State names of and expected depths to objective sands; show sizes, weights, and lengths of proposed casings; indicate mudding jobs, cementing points, and all other important proposed work)

Run #1 Zone: 7756'-7812'. Packer would not hold

Run #2 Zone: 7735'-7812'. Dual packers set at 7731' and 7735'. Tool opened 5 minutes with fair blow. Tool shut in for 30 minutes initial shut in. Tool opened for 1 hour. Fair to good blow through out test. Shut in for 20 minutes final shut in. Recovered 1200' of gas cut water cushion, 550' gas cut drilling mud and 1940' gas cut salt water.

IHSP	3631#	FHIP	3298#
ISIP	3531#	FHSP	3631#
IFP	612-759#		
FFP	728-1755#		

JUL 1 1961

I understand that this plan of work must receive approval in writing by the Geological Survey before operations may be commenced.

Company TEXACO Inc.

Address P.O. Drawer 740

Casper, Wyoming

By Walter Reed

Title District Superintendent

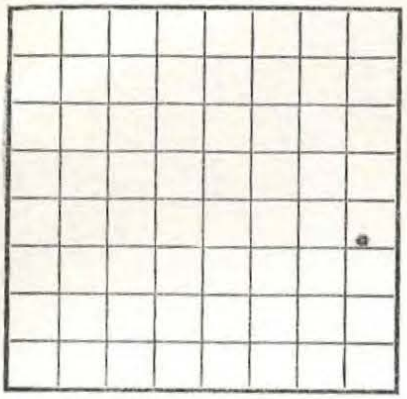
USGS (2) SMS (3) RW MR HM
Conoco (2) URR (3)

U. S. GOVERNMENT PRINTING OFFICE: 1958 O -463339

BEST COPY AVAILABLE

Budget Bureau No. 42-R355.4.
Approval expires 12-31-60.

U. S. LAND OFFICE Cheyenne
SERIAL NUMBER W-059284
LEASE OR PERMIT TO PROSPECT Moxa



LOCATE WELL CORRECTLY

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

37-05573

LOG OF OIL OR GAS WELL

Company TEXACO Inc. Address PO Drawer 740, Casper, Wyoming
Lessor or Tract Moxa Unit Field Wildcat State Wyoming
Well No. 1 Sec. 22 T. 19N R. 112W Meridian 6th PM County Sweetwater
Location 1985 ft. {N./S.} of S Line and 464 ft. {E./W.} of E Line of Sec. 22 Elevation 6435' KB
(Derrick floor relative to sea level)

The information given herewith is a complete and correct record of the well and all work done thereon so far as can be determined from all available records.

Signed

Date December 19, 1961 Title District Superintendent

The summary on this page is for the condition of the well at above date.

Commenced drilling May 25, 1961 Finished drilling September 7, 1961

OIL OR GAS SANDS OR ZONES

(*Denote gas by G*)

No. 1, from 11,416 to 11426 G No. 4, from 11,447 to 11,456G
No. 2, from 11,428 to 11,433 G No. 5, from to
No. 3, from 11,436 to 11,445 G No. 6, from to

IMPORTANT WATER SANDS

No. 1, from to No. 3, from to
No. 2, from to No. 4, from to

CASING RECORD

Size casing	Weight per foot	Threads per inch	Make	Amount	Kind of shoe	Cut and pulled from	Perforated From—	Perforated To—	Purpose
16"	65#	8RD	K-40	359'	Guide				Surface
10-3/4	40.5	8RD	J-55	2994	Guide				Intermediate
10-3/4	45.5	8RD	J-55	10C8	Guide				"
5½	17	8RD	P-110	1505	Float				Production
5½	20	8RD	N-80	3410	Float Collar				"
5½	17	8RD	N-80	3595					"

MUDDING AND CEMENTING RECORD

Size casing	Where set	Number sacks of cement	Method used	Mud gravity	Amount of mud used
16"	349'	250 Reg.	Halliburton		
10-3/4	XXXX	700 Pozmix 50%	Halliburton		
	3992'	550 Pozmix 50%	Halliburton		
5½	11,605	500 Pozmix	Halliburton (w/ .3% HR4 retarder in cement)		

PLUGS AND ADAPTERS

Heaving plug—Material Length Depth set
Adapters—Material Si:

FOLD | MARK

		Explosive used	Quantity	Date	Depth shot	Depth cleaned out

TOOLS USED

Rotary tools were used from 0 feet to 14,017 feet, and from ..... feet to ..... feet

Cable tools were used from ..... feet to ..... feet, and from ..... feet to ..... feet

DATES

Shut in - Lack of Market

....., 19..... Put to producing September 29, 19 61

Accepted Test 10/24/61

The production for the first 24 hours was ..... barrels of fluid of which ..... % was oil; ..... % emulsion; ..... % water; and ..... % sediment.

Gravity, °Bé. .....

If gas well, cu. ft. per 24 hours 1,134 MMCF Gallons gasoline per 1,000 cu. ft. of gas .....

Rock pressure, lbs. per sq. in. .....

EMPLOYEES

P. L. Fry, Driller J. Kordash, Driller

W. W. Tindel, Driller J. B. Firestone, Driller

FORMATION RECORD

FROM—	TO—	TOTAL FEET	FORMATION
0	485	485	Shale
485	1177	692	Shale & Sand
1177	1443	266	Shale
1443	1604	161	Shale & Sand
1604	1665	61	Sand
1665	3130	1465	Shale & Sand
3130	3942	812	Shale
3942	3993	51	Shale & Sand
3993	4400	407	Shale
4400	5861	1461	Shale & Sand
5861	5967	106	Shale
5967	6207	240	Shale & Sand
6207	6253	46	Shale
6253	6962	709	Shale & Sand
6962	7111	149	Shale
7111	7784	673	Shale & Sand
7784	7812	28	Sand
7812	7875	63	Shale & Sand
7875	8079	204	Sand
8079	8347	268	Shale
8347	8875	528	Shale & Sand
8875	9093	218	Shale
9093	9240	147	Shale & Sand
9240	9495	255	Shale
9495	9983	488	Shale & Sand
9983	10196	213	Shale

(OVER)

No. 2, from ..... to .....

CASING RECORD

Size casing	Weight per foot	Threads per inch	Make	Amount	Kind of shoe	Cut and pulled from	Perforated		Purpose
							From—	To—	
2-7/8	6.5#	8RD	N-80	11,322					Tubing

Form 9-331a
(Feb. 1951)

Budget Bureau No. 42-R358.4.
Approval expires 12-31-60.

Land Office Cheyenne
Lease No. W-05929-A
Unit Moxa

		Sec. 22	

U. S. GEOLOGICAL SURVEY
RECEIVED
OCT 1961
ROCK SPRINGS, WYOMING

(SUBMIT IN TRIPLICATE)

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

SUNDRY NOTICES AND REPORTS ON WELLS

NOTICE OF INTENTION TO DRILL		SUBSEQUENT REPORT OF WATER SHUT-OFF	
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NOTICE OF INTENTION TO PULL OR ALTER CASING		SUPPLEMENTARY WELL HISTORY	
NOTICE OF INTENTION TO ABANDON WELL		Subsequent Report of Running Casing	X

(INDICATE ABOVE BY CHECK MARK NATURE OF REPORT, NOTICE, OR OTHER DATA)

October 26, 19 61

Well No. 1 is located 1985 ft. from {N/S} line and 464 ft. from {E/W} line of sec. 22

SE Sec. 22 (¼ Sec. and Sec. No.) | 19N (Twp.) | 112W (Range) | 6th PM (Meridian)

Wildcat (Field) | Sweetwater (County or Subdivision) | Wyoming (State or Territory)

(9)

The elevation of the ~~derrick floor~~ KB above sea level is 643 ft.

DETAILS OF WORK

(State names of and expected depths to objective sands; show sizes, weights, and lengths of proposed casings; indicate mudding jobs, cementing points, and all other important proposed work)

9-inch hole was drilled to 14,000' total depth. Plugged back to 12,080' as follows: Plug No. 1 13,880-13780'; Plug No. 2 12,880-12,780' and Plug No. 3 12,180-12,080', each consisting of 50 sacks Pozmix with .3% HR4 retarder. Set casing with shoe set at 11,605', float collar at 11,515', scratchers: one 5' above shoe and one every 10' up to 11,235', centralizers: one 5' above shoe, one at 60' above shoe, one every 85' to 10,477' cemented with 500 sacks Pozmix with .3% HR4 retarder. Maximum pressure 1600 psi, Final pressure 1000 psi. Good circulation of cement. WOC 36 hours, tested 30 min. at 2500 lbs. pressure held.

Approved OCT 30 1961
(ORIG. SGD.) C. P. CLIFFORD
District Engineer

I understand that this plan of work must receive approval in writing by the Geological Survey before operations may be commenced.

Company TEXACO Inc.

Address P. O. Drawer 740

Casper, Wyoming

By Signed

Title District Superintendent

USGS (2) SMS (2) RW WR RHM
Conoco (2) UPRR (3)

U. S. GOVERNMENT PRINTING OFFICE: 1958 O -463339

Form 9-331a
(Feb. 1951)

Budget Bureau No. 42-R358.4.
Approval expires 12-31-60.

Land Office Cheyenne
Lease No. W-05929-A
Unit Moxa

Sec. 22

U. S. GEOLOGICAL SURVEY
RECEIVED
OCT 30 1961
ROCK SPRINGS, WYOMING

(SUBMIT IN TRIPLICATE)

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

SUNDRY NOTICES AND REPORTS ON WELLS

NOTICE OF INTENTION TO DRILL		SUBSEQUENT REPORT OF WATER SHUT-OFF	
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NOTICE OF INTENTION TO PULL OR ALTER CASING		SUPPLEMENTARY WELL HISTORY	
NOTICE OF INTENTION TO ABANDON WELL		Subsequent Report of Running Casing	X

(INDICATE ABOVE BY CHECK MARK NATURE OF REPORT, NOTICE, OR OTHER DATA)

October 26, 19 61

Well No. 1 is located 1985 ft. from {N/S} line and 464 ft. from {E/W} line of sec. 22

SE Sec. 22 (¼ Sec. and Sec. No.) | 19N (Twp.) | 112W (Range) | 6th PM (Meridian)

Wildcat (Field) | Sweetwater (County or Subdivision) | Wyoming (State or Territory)

The elevation of the ~~derrick floor~~ KB above sea level is 643 ft.

DETAILS OF WORK

(State names of and expected depths to objective sands; show sizes, weights, and lengths of proposed casings; indicate mudding jobs, cementing points, and all other important proposed work)

9-inch hole was drilled to 14,000' total depth. Plugged back to 12,080' as follows: Plug No. 1 13,880-13780'; Plug No. 2 12,880-12,780'; and Plug No. 3 12,180-12,080', each consisting of 50 sacks Pozmix with .3% HR4 retarder. Set casing with shoe set at 11,605', float collar at 11,515', scratchers: one 5' above shoe and one every 10' up to 11,235', centralizers: one 5' above shoe, one at 60' above shoe, one every 85' to 10,477' cemented with 500 sacks Pozmix with .3% HR4 retarder. Maximum pressure 1600 psi, Final pressure 1000 psi. Good circulation of cement. WOC 36 hours, tested 30 min. at 2500 lbs. pressure held.

Approved OCT 30 1961
(ORIG. SGD.) C. P. CLIFFORD
District Engineer

I understand that this plan of work must receive approval in writing by the Geological Survey before operations may be commenced.

Company TEXACO Inc.

Address P. O. Drawer 740

Casper, Wyoming

By Signed

Title District Superintendent

USGS (2) SMS (2) RM WR BLM
Conoco (2) UPRR (3)

U. S. GOVERNMENT PRINTING OFFICE: 1958 O - 463339

Form 9-331a
(Feb. 1951)

Budget Bureau No. 42-R358.4.
Approval expires 12-31-60.

Land Office Cheyenne
Lease No. W-05929-A
Unit Moxa

	Sec. 22		

(SUBMIT IN TRIPLICATE)

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

SUNDRY NOTICES AND REPORTS ON WELLS

NOTICE OF INTENTION TO DRILL		SUBSEQUENT REPORT OF WATER SHUT-OFF	
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NOTICE OF INTENTION TO SHOOT OR ACIDIZE		SUBSEQUENT REPORT OF ABANDONMENT	
NOTICE OF INTENTION TO PULL OR ALTER CASING		SUPPLEMENTARY WELL HISTORY	X
NOTICE OF INTENTION TO ABANDON WELL		Intermediate Casing	

(INDICATE ABOVE BY CHECK MARK NATURE OF REPORT, NOTICE, OR OTHER DATA)

June 15, 1961

Well No. 1 is located 1985' ft. from {N/S} line and 464 ft. from {E/W} line of sec. 22

SE Sec.22 (¼ Sec. and Sec. No.) 19N (Twp.) 112W (Range) 6th PM (Meridian)

Wildcat (Field) Sweetwater (County or Subdivision) Wyoming (State or Territory)

The elevation of the ~~derrick floor~~ KB above sea level is 6435 ft.

DETAILS OF WORK

(State names of and expected depths to objective sands; show sizes, weights, and lengths of proposed casings; indicate mudding jobs, cementing points, and all other important proposed work)

Drilled out cement plug at 8:30 PM 5/27/61. Drilled 13-3/4" hole to 3993' Ran Schlumberger Induction-Electric Survey, Micro-log, Sonic and Gamma Ray to 3975'. Ran 10-3/4" 40.5# & 45.5# J-55 8RD ST&C casing and landed at 4003' (Apparent discrepancy in the threads off tally) with Howco cement float shoe on bottom, float collar at 3972' and DV collar and cement basket at 2084', centrailizers at 2103' and 2041', centralizer and cement basket at 1863' and cement basket at 1619'. Cemented first stage with 700 sxs 50% Pozmix. Plug down 9:45 AM 6/5/61. Cemented second stage with 550 sxs 50% Pozmix. Plug down 2:30 PM 5/6/61. WOC 36 hours.

I understand that this plan of work must receive approval in writing by the Geological Survey before operations may be commenced.

Company TEXACO Inc.

Address PO Drawer 740

Casper, Wyoming

By Signed: WALTER RAND

USGS (2) SMS (2) ORH MR EHM

Title District Superintendent

U. S. GOVERNMENT PRINTING OFFICE: 1958 O - 463339

9-330
5-63)

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

SUBMIT IN DUPLICATE* (See other instructions on reverse side)

Form approved.
Budget Bureau No. 42-R355.5.

WELL COMPLETION OR RECOMPLETION REPORT AND LOG*

1a. TYPE OF WELL: OIL WELL ☐ GAS WELL ☒ DRY ☐ Other

b. TYPE OF COMPLETION: NEW WELL ☒ WORK OVER ☐ DEEP-EN ☐ PLUG BACK ☐ DIFF. RESVR. ☐ Other

2. NAME OF OPERATOR: Amoco Production Company

3. ADDRESS OF OPERATOR: P. O. Box 1400, Riverton, Wyoming 82501

4. LOCATION OF WELL (*Report location clearly and in accordance with any State requirements*)*
At surface: 1975 FEL, 1969 FSL, NW/4 SE/4 Sec. 1
At top prod. interval reported below
At total depth

5. LEASE DESIGNATION AND SERIAL NO.

6. IF INDIAN, ALLOTTEE OR TRIBE NAME

POSTED

7. UNIT AGREEMENT NAME: Wilson Ranch Unit

8. FARM OR LEASE NAME

9. WELL NO.: 2

10. FIELD AND POOL, OR WILDCAT: Wildcat

11. SEC., T., R., M., OR BLOCK AND SURVEY OR AREA: Sec. 1 T19N, R113W

14. PERMIT NO.	DATE ISSUED	12. COUNTY OR PARISH	13. STATE
73-2005	8/22/73	Lincoln	Wyoming

15. DATE SPUDDED	16. DATE T.D. REACHED	17. DATE COMPL. (*Ready to prod.*)	18. ELEVATIONS (DF, RKB, RT, GR, ETC.)*	19. ELEV. CASINGHEAD
9/10/73	6/23/75	3/12/75	6462 GL- 6494 RDB	

20. TOTAL DEPTH, MD & TVD	21. PLUG, BACK T.D., MD & TVD	22. IF MULTIPLE COMPL., HOW MANY*	23. INTERVALS DRILLED BY	ROTARY TOOLS	CABLE TOOLS
17,718	11,445		→	0-TD	

24. PRODUCING INTERVAL(S), OF THIS COMPLETION—TOP, BOTTOM, NAME (MD AND TVD)*
11,340 - 11370 Frontier

25. WAS DIRECTIONAL SURVEY MADE: Yes

26. TYPE ELECTRIC AND OTHER LOGS RUN
Inte-grated BHC—GR-Sonic FDC -GR, Temperature survey, compensated neutron, side wall neutron,

27. WAS WELL CORED: Yes

28. CASING RECORD (*Report all strings set in well*)

CASING SIZE	WEIGHT, LB./FT.	DEPTH SET (MD)	HOLE SIZE	CEMENTING RECORD	AMOUNT PULLED
13 3/8	48	2,168	17½	2500 Sacks	
9 5/8	32.3	11,423	12¼	1500 Sacks	
7	20	17,748	8 ½	2050 Sacks	

29. LINER RECORD

SIZE	TOP (MD)	BOTTOM (MD)	SACKS CEMENT*	SCREEN (MD)

30. TUBING RECORD

SIZE	DEPTH SET (MD)	PACKER SET (MD)
2 3/8	11,329	

31. PERFORATION RECORD (*Interval, size and number*)
11,340-11,370 with 2 JSPF

32. ACID, SHOT, FRACTURE, CEMENT SQUEEZE, ETC.

DEPTH INTERVAL (MD)	AMOUNT AND KIND OF MATERIAL USED
11,340-11,370	194,000 Gallons 134,400# 40/60 Sand 207,800# 20/40 Sand

33.* PRODUCTION

DATE FIRST PRODUCTION	PRODUCTION METHOD (*Flowing, gas lift, pumping—size and type of pump*)	WELL STATUS (*Producing or shut-in*)
1/3/75	Flowing	SIGW

DATE OF TEST	HOURS TESTED	CHOKE SIZE	PROD'N. FOR TEST PERIOD →	OIL—BBL.	GAS—MCF.	WATER—BBL.	GAS-OIL RATIO
3/12/75	24	N.R.		44.5 BLC	1.120 MMCFD	None	

FLOW. TUBING PRESS.	CASING PRESSURE	CALCULATED 24-HOUR RATE →	OIL—BBL.	GAS—MCF.	WATER—BBL.	OIL GRAVITY-API (CORR.)
3062	3207 SI			1.120 MMCFD		

34. DISPOSITION OF GAS (*Sold, used for fuel, vented, etc.*)

TEST WITNESSED BY

35. LIST OF ATTACHMENTS

RECEIVED
APR 21 1975
OIL & GAS SECTION

36. I hereby certify that the foregoing and attached information is complete and correct as determined from all available records

SIGNED Original Signed By K. A. HUFF TITLE Area Admin. Supervisor DATE 4/18/75

*(See Instructions and Spaces for Additional Data on Reverse Side)

INSTRUCTIONS

General: This form is designed for submitting a complete and correct well completion report and log on all types of lands and leases to either a Federal agency or a State agency, or both, pursuant to applicable Federal and/or State laws and regulations. Any necessary special instructions concerning the use of this form and the number of copies to be submitted, particularly with regard to local, area, or regional procedures and practices, either are shown below or will be issued by, or may be obtained from, the local Federal and/or State office. See instructions on items 22 and 24, and 33, below regarding separate reports for separate completions.
If not filed prior to the time this summary record is submitted, copies of all currently available logs (drillers, geologists, sample and core analysis, all types electric, etc.), formation and pressure tests, and directional surveys, should be attached hereto, to the extent required by applicable Federal and/or State laws and regulations. All attachments should be listed on this form, see item 35.
Item 4: If there are no applicable State requirements, locations on Federal or Indian land should be described in accordance with Federal requirements. Consult local State or Federal office for specific instructions.
Item 18: Indicate which elevation is used as reference (where not otherwise shown) for depth measurements given in other spaces on this form and in any attachments.
Items 22 and 24: If this well is completed for separate production from more than one interval zone (multiple completion), so state in item 22, and in item 24 show the producing interval, or intervals, top(s), bottom(s) and name(s) (if any) for only the interval reported in item 33. Submit a separate report (page) on this form, adequately identified, for each additional interval to be separately produced, showing the additional data pertinent to such interval.
Item 29: *"Sacks Cement":* Attached supplemental records for this well should show the details of any multiple stage cementing and the location of the cementing tool.
Item 33: Submit a separate completion report on this form for each interval to be separately produced. (See instruction for items 22 and 24 above.)

37. SUMMARY OF POROUS ZONES:
SHOW ALL IMPORTANT ZONES OF POROSITY AND CONTENTS THEREOF; CORED INTERVALS; AND ALL DRILL-STEM TESTS, INCLUDING DEPTH INTERVAL TESTED, CUSHION USED, TIME TOOL OPEN, FLOWING AND SHUT-IN PRESSURES, AND RECOVERIES

FORMATION	TOP	BOTTOM	DESCRIPTION, CONTENTS, ETC.
Frontier	11,344	11,388	Cored - Sand & Shale
Mesa Verde	7,360	7,428	DST-BHT 152°F,2900 PPM CL No oil or Gas
Frontier	11,336	11,387	DST-ISIP-6651, FH P-6815
Frontier	11,987	12,158	DST-10 min. IFP3396, ISIP 3508
Phosphoria	16,387	16,447	Core Phosphoria.
Phosphoria	16,461	16,500	DST- 3.92MCFD to 11.6 MCFD, FSIP 10,253 IFP 2,687
Frontier	11,460	11,462	Perf with 4 JSPF, max pressure. 3600 PSI
	16,886	17,064	with 2 JSPF- ran tracer survey
Madison	17,662	17,683	DST-ISIP 3978, FH 11,572 Packer set at 17,590, ISIP 8302, FSIP 7973

38. GEOLOGIC MARKERS

NAME	TOP MEAS. DEPTH	TOP TRUE VERT. DEPTH
Frontier	11,294	
Dakota	11,990	
Frontier	12,294	
Phosphoria	16,378	
Tensleep	16,740	
Morgan	17,270	
Madison	17,720	

STATE OIL & GAS SUPERVISOR OFFICE OF APR 21 1975 RECEIVED

U.S. GOVERNMENT PRINTING OFFICE: 1963—O-683636
837-497

9-330
5-63)

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

SUBMIT IN DUPLICATE* (See other instructions on reverse side)

Form approved.
Budget Bureau No. 42-R355.5.

10

WELL COMPLETION OR RECOMPLETION REPORT AND LOG*

1a. TYPE OF WELL: OIL WELL ☐ GAS WELL ☒ DRY ☐ Other

b. TYPE OF COMPLETION: NEW WELL ☒ WORK OVER ☐ DEEP-EN ☐ PLUG BACK ☐ DIFF. RESVR. ☐ Other

2. NAME OF OPERATOR
Amoco Production Company

3. ADDRESS OF OPERATOR
P. O. Box 1400, Riverton, Wyoming 82501

4. LOCATION OF WELL (*Report location clearly and in accordance with any State requirements*)*
At surface 1975 FEL, 1969 FSL, NW/4 SE/4 Sec. 1
At top prod. interval reported below
At total depth

5. LEASE DESIGNATION AND SERIAL NO.

6. IF INDIAN, ALLOTTEE OR TRIBE NAME

7. UNIT AGREEMENT NAME
Wilson Ranch Unit

8. FARM OR LEASE NAME

9. WELL NO.
2

10. FIELD AND POOL, OR WILDCAT
Wildcat

11. SEC., T., R., M., OR BLOCK AND SURVEY OR AREA
Sec. 1 T19N, R113W

14. PERMIT NO.	DATE ISSUED	12. COUNTY OR PARISH	13. STATE
73-00054	8/22/73	Lincoln	Wyoming

15. DATE SPUDDED	16. DATE T.D. REACHED	17. DATE COMPL. (*Ready to prod.*)	18. ELEVATIONS (DF, RKB, RT, GR, ETC.)*	19. ELEV. CASINGHEAD
9/10/73	6/23/75	3/12/75	6462 GL- 6494 RDB	

20. TOTAL DEPTH, MD & TVD	21. PLUG, BACK T.D., MD & TVD	22. IF MULTIPLE COMPL., HOW MANY*	23. INTERVALS DRILLED BY	ROTARY TOOLS	CABLE TOOLS
17,718	11,445		→	0-TD	

24. PRODUCING INTERVAL(S), OF THIS COMPLETION—TOP, BOTTOM, NAME (MD AND TVD)*
11,340 - 11370 Frontier

25. WAS DIRECTIONAL SURVEY MADE
Yes

26. TYPE ELECTRIC AND OTHER LOGS RUN
Inte-grated BHC—GR-Sonic FDC -GR, Temperature survey, compensated neutron, side wall neutron

27. WAS WELL CORED
Yes

28. CASING RECORD (*Report all strings set in well*)

CASING SIZE	WEIGHT, LB./FT.	DEPTH SET (MD)	HOLE SIZE	CEMENTING RECORD	AMOUNT PULLED
13 3/8	48	2,168	17½	2500 Sacks	
9 5/8	32.3	11,423	12¼	1500 Sacks	
7	20	17,748	8 ½	2050 Sacks	

29. LINER RECORD

SIZE	TOP (MD)	BOTTOM (MD)	SACKS CEMENT*	SCREEN (MD)

30. TUBING RECORD

SIZE	DEPTH SET (MD)	PACKER SET (MD)
2 3/8	11,329	

31. PERFORATION RECORD (*Interval, size and number*)
11,340-11,370 with 2 JSPF

32. ACID, SHOT, FRACTURE, CEMENT SQUEEZE, ETC.

DEPTH INTERVAL (MD)	AMOUNT AND KIND OF MATERIAL USED
11,340-11,370	194,000 Gallons 134,400# 40/60 Sand 207,800# 20/40 Sand

33.* PRODUCTION

DATE FIRST PRODUCTION	PRODUCTION METHOD (*Flowing, gas lift, pumping—size and type of pump*)	WELL STATUS (*Producing or shut-in*)
1/3/75	Flowing	SIGW

DATE OF TEST	HOURS TESTED	CHOKE SIZE	PROD'N. FOR TEST PERIOD →	OIL—BBL.	GAS—MCF.	WATER—BBL.	GAS-OIL RATIO
3/12/75	24	N.R.		44.5 BLC	1.120 MMCFD	None	

FLOW. TUBING PRESS.	CASING PRESSURE	CALCULATED 24-HOUR RATE →	OIL—BBL.	GAS—MCF.	WATER—BBL.	OIL GRAVITY-API (CORR.)
3062	3207 SI			1.120 MMCFD		

34. DISPOSITION OF GAS (*Sold, used for fuel, vented, etc.*)

TEST WITNESSED BY

35. LIST OF ATTACHMENTS

36. I hereby certify that the foregoing and attached information is complete and correct as determined from all available records

SIGNED Original Signed By K. A. HUFF TITLE Area Admin. Supervisor DATE 4/18/75

RECEIVED APR 21 1975 OIL & GAS SURVEY

*(See Instructions and Spaces for Additional Data on Reverse Side)

INSTRUCTIONS

General: This form is designed for submitting a complete and correct well completion report and log on all types of lands and leases to either a Federal agency or a State agency, or both, pursuant to applicable Federal and/or State laws and regulations. Any necessary special instructions concerning the use of this form and the number of copies to be submitted, particularly with regard to local, area, or regional procedures and practices, either are shown below or will be issued by, or may be obtained from, the local Federal and/or State office. See instructions on items 22 and 24, and 33, below regarding separate reports for separate completions.

If not filed prior to the time this summary record is submitted, copies of all currently available logs (drillers, geologists, sample and core analysis, all types electric, etc.), formation and pressure tests, and directional surveys, should be attached hereto, to the extent required by applicable Federal and/or State laws and regulations. All attachments should be listed on this form, see item 35.

Item 4: If there are no applicable State requirements, locations on Federal or Indian land should be described in accordance with Federal requirements. Consult local State or Federal office for specific instructions.

Item 18: Indicate which elevation is used as reference (where not otherwise shown) for depth measurements given in other spaces on this form and in any attachments.

Items 22 and 24: If this well is completed for separate production from more than one interval zone (multiple completion), so state in item 22, and in item 24 show the producing interval, or intervals, top(s), bottom(s) and name(s) (if any) for only the interval reported in item 33. Submit a separate report (page) on this form, adequately identified, for each additional interval to be separately produced, showing the additional data pertinent to such interval.

Item 29: *"Sacks Cement":* Attached supplemental records for this well should show the details of any multiple stage cementing and the location of the cementing tool.

Item 33: Submit a separate completion report on this form for each interval to be separately produced. (See instruction for items 22 and 24 above.)

37. SUMMARY OF POROUS ZONES:
SHOW ALL IMPORTANT ZONES OF POROSITY AND CONTENTS THEREOF; CORED INTERVALS; AND ALL DRILL-STEM TESTS, INCLUDING DEPTH INTERVAL TESTED, CUSHION USED, TIME TOOL OPEN, FLOWING AND SHUT-IN PRESSURES, AND RECOVERIES

FORMATION	TOP	BOTTOM	DESCRIPTION, CONTENTS, ETC.
Frontier	11,344	11,388	Cored - Sand & Shale
Mesa Verde	7,360	7,428	DST-BHT 152°F, 2900 PPM CL No oil or Gas
Frontier	11,336	11,387	DST-ISIP-6651, FH P-6815
Frontier	11,987	12,158	DST-10 min. IFP3396, ISIP 3508
Phosphoria	16,387	16,447	Core Phosphoria.
Phosphoria	16,461	16,500	DST- 3.92MCFD to 11.6 MCFD, FSIP 10,253 IFP 2,687
Frontier	11,460	11,462	Perf with 4 JSPF, max pressure. 3600 PSI
	16,886	17,064	with 2 JSPF- ran tracer survey
Madison	17,662	17,683	DST-ISIP 3978, FH 11,572 Packer set at 17,590, ISIP 8302, FSIP 7973

38. GEOLOGIC MARKERS

NAME	TOP	
	MEAS. DEPTH	TRUE VERT. DEPTH
Frontier	11,294	
Dakota	11,990	
Frontier	12,294	
Phosphoria	16,378	
Tensleep	16,740	
Morgan	17,270	
Madison	17,720	

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APR 21 1975

U.S. GOVERNMENT PRINTING OFFICE: 1963—O-683636
837-497

Form 9-331 C
(May 1963)

SUBMIT IN TRIPLICATE*
(Other instructions on reverse side)

Form approved.
Budget Bureau No. 42-R1425.

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

AUG 27 1973

APPLICATION FOR PERMIT TO DRILL, DEEPEN, OR PLUG BACK

1a. TYPE OF WORK: DRILL [X] DEEPEN [ ] PLUG BACK [ ]

b. TYPE OF WELL: OIL WELL [ ] GAS WELL [X] OTHER — SINGLE ZONE [X] MULTIPLE ZONE [ ]

2. NAME OF OPERATOR: AMOCO PRODUCTION COMPANY

3. ADDRESS OF OPERATOR: P.O. Box 1400, Riverton, Wyoming 82501

4. LOCATION OF WELL (Report location clearly and in accordance with any State requirements.*)
At surface: 1975 FEL 1969 FSL, NW/4 SE/4 Sec 1
At proposed prod. zone

5. LEASE DESIGNATION AND SERIAL NO.:

6. IF INDIAN, ALLOTTEE OR TRIBE NAME:

7. UNIT AGREEMENT NAME: Wilson Ranch Unit

8. FARM OR LEASE NAME:

9. WELL NO.: 2

10. FIELD AND POOL, OR WILDCAT: Wildcat

11. SEC., T., R., M., OR BLK. AND SURVEY OR AREA: Sec 1 T19N R113W

12. COUNTY OR PARISH: Lincoln — 13. STATE: Wyoming

14. DISTANCE IN MILES AND DIRECTION FROM NEAREST TOWN OR POST OFFICE*:

15. DISTANCE FROM PROPOSED* LOCATION TO NEAREST PROPERTY OR LEASE LINE, FT. (Also to nearest drlg. unit line, if any):

16. NO. OF ACRES IN LEASE:

17. NO. OF ACRES ASSIGNED TO THIS WELL:

18. DISTANCE FROM PROPOSED LOCATION* TO NEAREST WELL, DRILLING, COMPLETED, OR APPLIED FOR, ON THIS LEASE, FT.:

19. PROPOSED DEPTH: 17,800

20. ROTARY OR CABLE TOOLS: Rotary

21. ELEVATIONS (Show whether DF, RT, GR, etc.): Will Advise

22. APPROX. DATE WORK WILL START*: Upon Approval

23. PROPOSED CASING AND CEMENTING PROGRAM

SIZE OF HOLE	SIZE OF CASING	WEIGHT PER FOOT	SETTING DEPTH	QUANTITY OF CEMENT
17 1/2	13 3/8	48	2200	To Surface
12 1/4	9 5/8	32.3	12,700	1900 Sacks
8 1/2	7	20	17,800	To top of 9 5/8

OK Marv

Propose to drill well to test the Morgan formation. Will run linear dual induction laterlog, and BHC - Gamma Ray Sonic w/Caliper from base of surface casing to TD. Will run a compensated formation density w/caliper and sidewall neutron porosity logs over zones of interest. The entire Morgan section, approx. 450', will be cored. 9 DST'S are planned as warranted by shows. Casing will be set through prospective pay zones and will be perforated and stimulated as required. Physical location on UPRR land.

RECEIVED
AUG 20 1973
STATE OIL & GAS SUPERVISOR

IN ABOVE SPACE DESCRIBE PROPOSED PROGRAM: If proposal is to deepen or plug back, give data on present productive zone and proposed new productive zone. If proposal is to drill or deepen directionally, give pertinent data on subsurface locations and measured and true vertical depths. Give blowout preventer program, if any.

24.

SIGNED Original Signed By K. A. HUFF — TITLE Area Admin. Supervisor — DATE 8-16-73

(This space for Federal or State office use)

PERMIT NO. 49-023-20054 8/27/73 — APPROVAL DATE

APPROVED BY — TITLE — DATE

CONDITIONS OF APPROVAL, IF ANY:

*See Instructions On Reverse Side

FORM A-3
EMERGENCY AND REMEDIAL RESPONSE PLAN

TABLE OF CONTENTS

3.0 Emergency and Remedial Response Plan Overview 1

3.1 Local Resources and Infrastructure 1

3.2 Potential Risk Scenarios 2

3.3 Identification of Potential Emergency Event 3

3.4 Emergency Response Action 4

3.5 Response Personnel/Equipment and Training 4

3.5.1 Equipment 5

3.5.2 Training 5

3.6 Emergency Communication Plan 5

3.7 Emergency Remedial Response Plan Review and Update 6

LIST OF TABLES

Table A-3.1. Potential Project Emergency Events and their Detection. 3

Table A-3.2. Actions Necessary to Determine Cause of Events and Appropriate Emergency Response.……..…….Appendix A-3

Table A-3.3. Seismic Monitoring System, for Seismic Events > M1.0 with an Epicenter within 0.5 Mile Radius of the PSG Injection Wells……..Appendix A-3

Table A-3.4. Contact Information for Key Local, State, and Other Authorities. 5

LIST OF FIGURES

Figure A-3.1. Local Resources and Infrastructure. 2

ABBREVIATIONS/ACRONYMS

AoR	Area of Review
CO_2	carbon dioxide
EPA	Environmental Protection Agency
ERRP	Emergency and Remedial Response Plan
FCS	Frontier Carbon Solutions Holdings, LLC
GS	geologic sequestration
MIT	mechanical integrity test
PISC	post-injection site care
PSG	Project Speed Goat
SCS Hub	Sweetwater Carbon Storage Hub
SOP	standard operating procedure
USDW	underground source of drinking water
WDEQ	Wyoming Department of Environmental Quality
WQRR	Water Quality Rules and Regulations

FRONTIER CARBON SOLUTIONS
PROJECT SPEED GOAT
CARBON SEQUESTRATION UIC CLASS VI APPLICATION

FORM A-3, PROPOSED EMERGENCY AND REMEDIAL RESPONSE PLAN
Water Quality Rules, Chapter 24 Sections 10 and 25

3.0 Emergency and Remedial Response Plan Overview

The following proposed Emergency and Remedial Response Plan (ERRP) describes actions to be taken in the event of an emergency to mitigate the movement of injection fluid or formation fluids that may endanger an underground source of drinking water (USDW) during the construction, operation, or post-injection site care (PISC) phases.

3.1 Local Resources and Infrastructure

Project Speed Goat (PSG) is located in southwestern Wyoming in the southeast corner of Lincoln County and overlaps the Sweetwater Carbon Storage Hub (SCS Hub), which was unitized in October 2024 by the Wyoming Oil and Gas Conservation Commission (WOGCC). Project development has been focused on previously disturbed land by prior oil and gas activity to mitigate and minimize potential impact to the landowners, ranchers, community, livestock, wildlife, and other resources in the area. Investigated and identified surface and subsurface features in and around PSG are summarized in **Table A.3** of ***Form A, Project Information***. The map in **Figure A-3.1** shows local resources and infrastructure in the PSG area; no tribal lands are in or around PSG and all proposed well locations will be constructed on privately-owned surface.

Currently, project development does not contemplate capture and processing facilities, compression, or other large structures to be constructed within the PSG area. All capture and processing facilities and compression will be integrated with the emitters and situated within their facility footprint.

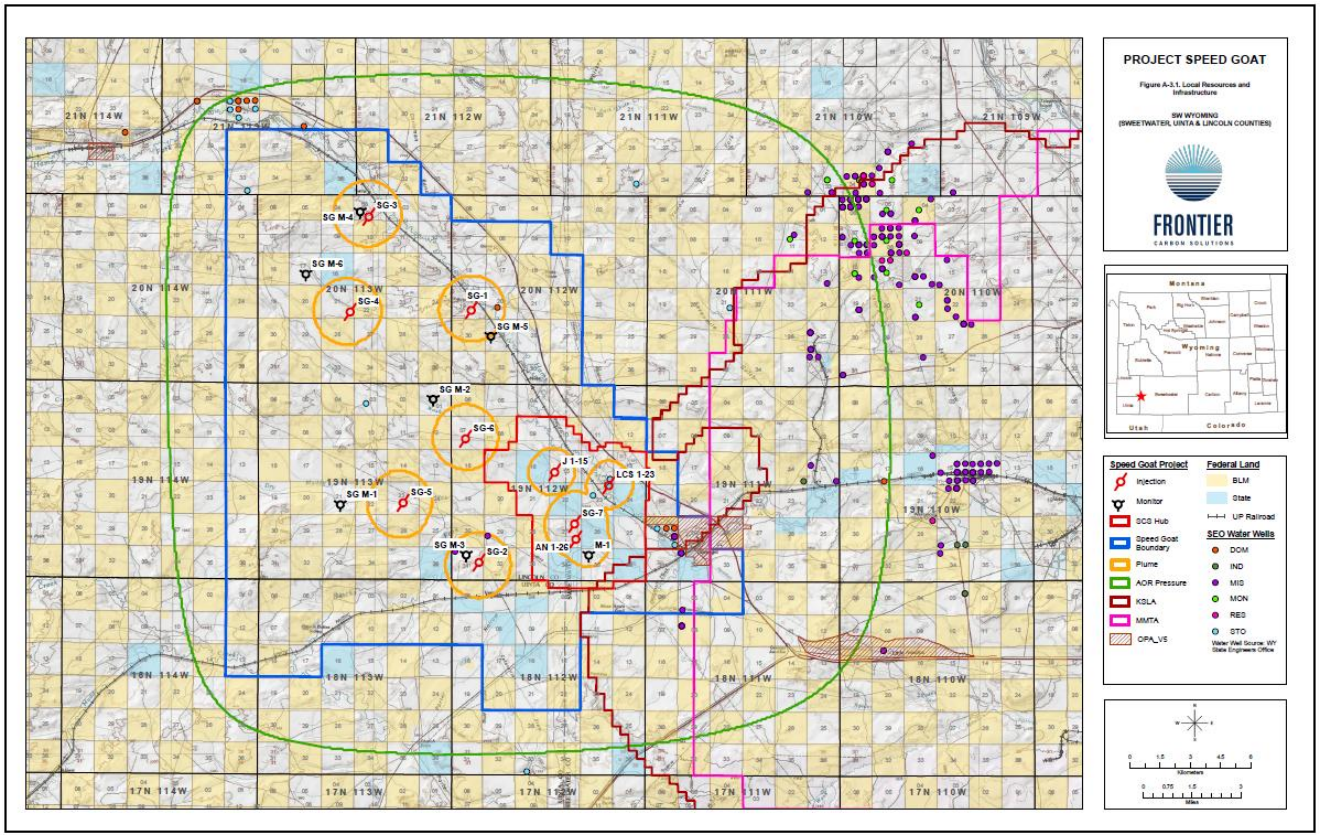


Figure A-3.1*. Local Resources and Infrastructure.*

3.2 Potential Risk Scenarios

Potential risk scenarios were identified during site characterization of PSG. These scenarios were used to address all potential risks in the proposed Testing and Monitoring Plan described in ***Form A-5, Proposed Testing and Monitoring Plan*** for all phases of project life. This plan was developed to ensure PSG will operate in accordance with Wyoming Water Quality Rules and Regulations (WQRR) Chapter 24 and will prevent the endangerment of a USDW. Potential risk scenarios could include the following:

- Overpressurized fluid (blowout) during well construction
- Injection or monitoring well integrity failure
- Migration of reservoir fluids or CO_2 to a USDW
- Breach or migration of CO_2 outside the injection zone and/or to the surface
- CO_2 migration outside unit boundaries
- Seismic event or induced seismicity
- Natural disaster

The following sections provide more detail of the potential risk scenarios, emergency events, methods of detection, and responses.

3.3 Identification of Potential Emergency Event

An emergency event is an incident caused by the movement of the injectate or formation fluids in a manner that could endanger USDWs and potentially threaten human health, life, safety, property, or the environment during the construction, operation, or PISC phases of a geologic sequestration project. Other events include the accidental release of CO_2 to the atmosphere. **Table A-3.1** identifies potential emergency events, and the methods used for their detection.

Table A-3.1. Potential Project Emergency Events and their Detection

Potential Emergency Events	Detection of Emergency Event
Over-pressurized fluid (blowout) during well construction	• Increase in drillpipe and casing pressure • Reservoir fluid leaks to surface • Pressure changes • Temperature anomalies
Injection or monitoring well integrity failure	• Wellhead pressure changes • Annular pressure changes • Visual inspection for signs of corrosion, leaks, structural issues, or other degradation
Injection well monitoring equipment failure *(e.g., shutoff valve or pressure gauge, etc.)*	• Wellhead pressure changes • Annular pressure changes • Visual inspection for signs of corrosion, leaks, structural issues, or other degradation
Natural disaster	• Seismic monitoring station • Meteorological monitoring
Reservoir fluid or CO_2 leakage to a USDW	• Near-surface and lowermost USDW sampling and analysis indicate variations from baseline values • CO_2 detectors indicate increased values • Visual inspection of equipment
CO_2 leakage to USDW	• Fluid sampling and atmospheric and subsurface monitoring
Breach or migration of CO_2 outside the injection zone and/or to the surface	• Near-surface and lowermost USDW sampling and analysis indicate variations from baseline values • CO_2 detectors indicate increased values • Changes in pressure and temperature • Visual inspection of equipment
CO_2 migration outside unit boundaries	• Data anomalies acquired from deep monitoring well contrary to model expectations • Seismic variations from monitoring data
Seismic event/induced seismicity	• Seismic monitoring station

3.4 Emergency Response Action

An emergency action describes a response to address events that could potentially cause or threaten the endangerment to a USDW, human health, safety, or the environment during the construction, operation, and PISC phases of a project.

If an anomaly is detected or monitoring data are obtained indicating operations may pose a threat or endangerment, the following actions will be taken:

1. Immediately cease injection.
2. Take all steps reasonably necessary to identify and characterize any release.
3. Verbally notify the Wyoming Department of Environmental Quality (WDEQ) Administrator within 24 hours of discovering the condition.
4. Provide a written report to the Administrator within five days of discovering the condition. The written report shall contain:
    a. A description of the noncompliance and its cause
    b. The period of noncompliance, including exact dates and times, and if the non-compliance has not been controlled, the anticipated time expected to continue
    c. Steps taken or planned to reduce, eliminate, and prevent recurrence of noncompliance.
5. If an excursion is discovered, provide written notice to all surface owners, mineral claimants, mineral owners, lessees, and other owners of record of subsurface interests within 30 days of discovery.
6. Implement applicable portions of the Administrator-approved ERRP.

Response actions will depend on the severity of the event(s) triggering an emergency response. **Table A-3.2** in ***Appendix A-3*** lists the actions necessary to determine the cause of events and the appropriate emergency response and **Table A-3.3** (found in ***Appendix A-3***) lists the monitoring system for seismic events and response actions.

3.5 Response Personnel/Equipment and Training

Response personnel and procedures to be initiated will be determined based on the emergency event that is identified. A PSG site-specific emergency contact list will be developed and maintained throughout the life of the project and will be submitted to the WDEQ Administrator. The site operator, well engineer, and project manager are the key personnel to implement this ERRP. **Table A-3.4** provides regional emergency and other state agencies and departments to be contacted in the event of an emergency.

Table A-3.4. Contact Information for Key Local, State, and Other Authorities	
Agency	**Phone Number**
EPA National Response Center (24 hours)	(800) 424-8802
Green River Fire Department	(307) 872-0582
Green River Police Department	(307) 872-0555
Lincoln County Office of Emergency Management Agency	(307) 877-9835
Rock Springs Fire Department	(307) 352-1475
Rock Springs Police Department	(307) 352-1581
Sweetwater County Office of Emergency Management Agency	(307) 922-5370 (307) 872-3884
WDEQ Quality – Spill Response Coordinator	(307) 777-5885
WDEQ Water Quality Department Administrator	(307) 777-7781
Wyoming Game and Fish Department	(307) 777-4600
Wyoming Oil and Gas Conservation Commission	(307) 234-7147
Wyoming State Engineer	(307) 777-6150
Wyoming State Geological Survey	(307) 766-2286

3.5.1 Equipment

Equipment needed in the event of an emergency and remedial response will vary depending on the triggering emergency event. Response actions (cessation of injection, well shut-in, and evacuation) will generally not require specialized equipment to implement. Where specialized equipment (such as a drilling rig or logging equipment) is required, Frontier Carbon Solutions Holdings, LLC (FCS) shall be responsible for its procurement.

3.5.2 Training

FCS will integrate the ERRP into the PSG standard operating procedure (SOP) and training program. The onboarding process for all personnel will include training on PSG's SOPs. ERRP training will be an integral piece of the SOP program. The training plan will document that all personnel have been trained and possess the required skills to perform their relevant emergency response activities described in the ERRP. Periodic training will be provided no less than annually.

3.6 Emergency Communication Plan

Emergency communication procedures will be outlined in FCS's SOP. A readily available contact list will be included that outlines a command system for the response team and respective responsibilities according to the identified event of emergency.

All coordination and communication efforts will be managed by the corresponding Project Manager according to the identified emergency event. The Project Manager will be responsible for establishing and maintaining communication with the appropriate people, entities, and agencies and will report actions taken to implement appropriate protocols outlined in the ERRP to the Administrator. FCS will communicate to the public about any event that requires an emergency response to ensure the public understands the emergency event and level of severity, and whether there are any environmental or safety implications. The information, timing, and method(s) of communications will correspond to the event severity, whether any impact to drinking water, resources, environment, or community have occurred.

FCS will also communicate with entities who may need to be informed or act in response to the event, including local water systems, CO_2 source(s) and pipeline operators, landowners, and regional response teams.

FCS will document the emergency event, any impacts to the environment or other local resources, how the event was investigated, what responses were taken, and the status of the response. For responses that occur over the long term (e.g., ongoing cleanups), FCS will provide periodic updates on the progress of the response actions.

3.7 Emergency Remedial Response Plan Review and Update

The ERRP shall be reviewed at least once every five years following its approval by the WDEQ and updated as necessary, on the same schedule as the update to the Area of Review (AoR) delineation. Any amendments to the ERRP shall be subject to approval by the Administrator, shall be incorporated into the permit, and are subject to the permit modification requirements of Section 6 of the WQRR Chapter 24. Amendments to the ERRP shall be submitted to the Administrator as follows:

- Within one year of an AoR reevaluation
- Following any significant changes to the facility such as the addition of an injection or monitoring wells
- Within 30 days, or other time prescribed by the WDEQ, following any significant changes to the injection process or the injection facility, or an emergency event
- As required by the WDEQ Administrator

If the review indicates that no amendments to the ERRP are necessary, FCS will provide the WDEQ Administrator with the documentation supporting the “no amendment necessary” determination.

If the review indicates that amendments to the ERRP are necessary, amendments shall be made and submitted to the WDEQ Administrator within 30 days, or other time prescribed by the Administrator, following an event that initiates the ERRP review procedure.

APPENDIX A-3

EMERGENCY AND REMEDIAL RESPONSE PLAN

TABLE OF CONTENTS

LIST OF TABLES

Table A-3.1. Potential Project Emergency Events and their Detection. 1

Table A-3.2. Actions Necessary to Determine Cause of Events and Appropriate Emergency Response 2

Table A-3.3. Seismic Monitoring System, for Seismic Events > M1.0 with an Epicenter within 0.5 Mile Radius of the PSG Injection Wells 7

Table A-3.4. Contact Information for Key Local, State, and Other Authorities. 8

LIST OF FIGURES

Figure A-3.1. Local Resources and Infrastructure. 9

TABLES

Table A-3.1. Potential Project Emergency Events and their Detection	
Potential Emergency Events	**Detection of Emergency Event**
Over-pressurized fluid (blowout) during well construction	• Increase in drillpipe and casing pressure • Reservoir fluid leaks to surface • Pressure changes • Temperature anomalies
Injection or monitoring well integrity failure	• Wellhead pressure changes • Annular pressure changes • Visual inspection for signs of corrosion, leaks, structural issues, or other degradation
Injection well monitoring equipment failure *(e.g., shutoff valve or pressure gauge, etc.)*	• Wellhead pressure changes • Annular pressure changes • Visual inspection for signs of corrosion, leaks, structural issues, or other degradation
Natural disaster	• Seismic monitoring station • Meteorological monitoring
Reservoir fluid or CO_2 leakage to a USDW	• Near-surface and lowermost USDW sampling and analysis indicate variations from baseline values • CO_2 detectors indicate increased values • Visual inspection of equipment
CO_2 leakage to USDW	• Fluid sampling and atmospheric and subsurface monitoring
Breach or migration of CO_2 outside the injection zone and/or to the surface	• Near-surface and lowermost USDW sampling and analysis indicate variations from baseline values • CO_2 detectors indicate increased values • Changes in pressure and temperature • Visual inspection of equipment
CO_2 migration outside unit boundaries	• Data anomalies acquired from deep monitoring well contrary to model expectations • Seismic variations from monitoring data
Seismic event/induced seismicity	• Seismic monitoring station

Table A-3.2. Actions Necessary to Determine Cause of Events and Appropriate Emergency Response						
Emergency Event	**Cause of Event**	**Severity**	**Timing of Event**	**Avoidance Measures**	**Detection Methods**	**Potential Response Action**
Over pressurized fluid (blow-out) during well construction	• Pocket of high-pressure gas or fluid encountered during drilling • Operational error or equipment failure	Low	• Pre-injection • Injection phases	• Proper maintenance, inspection, and calibration of equipment • Personnel training and monitoring	• Increase in drill pipe and casing pressure • Reservoir fluid leaks to surface • Pressure changes • Temperature anomalies	• Regain pressure control by restoring fluid levels in the wellbore with appropriate density mud, restriction of flow through choke, or both • Determine the cause of the event and initiate remediation procedures • Notify the regulator within 24 hours of the emergency event
Over pressurized fluid (blow-out) during well construction	• Pocket of high-pressure gas or fluid encountered during drilling • Operational error or equipment failure	High	• Pre-injection • Injection phases	• Proper maintenance, inspection, and calibration of equipment • Personnel training and monitoring	• Increase in drill pipe and casing pressure • Reservoir fluid leaks to surface • Pressure changes • Temperature anomalies	• Limit wellhead access to authorized personnel only • Cease drilling operations to prevent loss of drilling fluid due to lost circulation and/or drilling into an over pressured formation • Close flow valve (blowout preventer) if pressures and flows permit, at a minimum, vent to a controlled area • Regain pressure control by restoring fluid levels in the wellbore with appropriate density mud, restriction of flow through choke, or both • Initiate well control procedures • Alert local fire, police, and WDEQ Administrator immediately
Injection or Monitor Well Integrity Failure	• Wellhead pressure changes • Annulus pressure changes • Equipment failure	Low	• Injection • Monitoring	• Proper maintenance and inspection of equipment • Injection within permitted limits • Visual inspection and monitoring	• Wellhead and annulus pressure monitoring • MIT • Visual inspection for signs of corrosion, leaks, structural issues, or other degradation	• Initiate immediate shutdown plan • Monitor well pressure, temperature, and acoustics to verify integrity loss and determine the cause and extent of failure; use analog gauges to identify and implement appropriate remedial actions to repair damage to the well (in consultation with the WDEQ Administrator) • If a shut off is triggered by mechanical or electrical malfunctions without endangering a USDW, repair faulty components • Review downhole, wellhead, and annulus pressure data • Confirm well integrity prior to restarting injection (upon approval of the WDEQ Administrator) • If contamination is detected or well integrity has been determined to have occurred, then the situation becomes a Major or Serious emergency, described above
Injection or Monitor Well Integrity Failure	• Wellhead pressure changes • Annulus pressure changes • Equipment failure	High	• Injection • Monitoring	• Proper maintenance and inspection of equipment • Injection within permitted limits • Visual inspection and monitoring	• Wellhead and annulus pressure monitoring • Mechanical integrity tests (MIT) • Visual inspection for signs of corrosion, leaks, structural issues, or other	• Limit access to wellhead to authorized personnel only • Notify the WDEQ Administrator within 24 hours of the emergency event • Determine the severity of the event, based on the information available, within 24 hours of notification • Initiate immediate shutdown plan • Shut in well (close flow valve) after verifying pressures, with analog gauges, to confirm no damage

Table A-3.2. Actions Necessary to Determine Cause of Events and Appropriate Emergency Response						
Emergency Event	**Cause of Event**	**Severity**	**Timing of Event**	**Avoidance Measures**	**Detection Methods**	**Potential Response Action**
Injection or Monitor Well Integrity Failure *(continued)*					degradation	will occur to the well or USDW • Monitor well pressure, temperature, and acoustics to verify integrity loss and determine the cause and extent of failure; identify and implement appropriate remedial actions to repair damage to the well • Vent fluids, if necessary, from the wellhead to maintain acceptable pressures at surface and downhole to prevent damage to the wellhead or casing. • Communicate with operator personnel and local authorities to initiate evacuation plans, as necessary • If contamination is detected, identify, and implement appropriate remedial actions (in consultation with the WDEQ Administrator) • Conduct assessment to determine whether there has been a loss of mechanical integrity • Identify and implement appropriate remedial actions to repair damage to the well • If there is damage to the wellhead, repair the damage and conduct a survey to ensure wellhead leakage has ceased • Confirm well integrity prior to restarting injection (upon approval of the WDEQ Administrator) • Review downhole, wellhead, and annulus pressure data • Isolate the nearby area, if needed; establish a safe distance and perimeter using a hand-held air-quality monitor • Perform a well log/MIT) to detect CO_2 movement outside of the casing
Injection Well Monitoring Equipment Failure	• Monitoring equipment failure: wellhead/downhole pressure, temperature, and/or acoustic - may indicate a problem with the injection well that could endanger USDWs • Other equipment failures (sensor, computer, cabling, etc.) and damage to the wellhead could endanger the USDW but not require shutdown of the well to repair	Low	• Injection • Monitoring	• Proper maintenance and inspection of equipment • Injection within permitted limits • Visual inspection and monitoring	• Visual inspection for signs of corrosion, leaks, structural issues, or other degradation • Equipment monitoring	• Monitor well pressure, temperature, and acoustics to verify integrity loss and determine the cause and extent of failure; identify and implement appropriate remedial actions to repair damage to the well (in consultation with the WDEQ Administrator) • Conduct assessment to determine whether there has been a loss of mechanical integrity • If there has been a loss of mechanical integrity, continue the shutdown plan and refer to Major or Serious emergency guidelines • Reset automatic shutdown devices • Evaluate the cause of the failure, and mitigate if necessary (i.e., repair equipment) • Confirm well integrity prior to restarting injection and

Table A-3.2. Actions Necessary to Determine Cause of Events and Appropriate Emergency Response						
Emergency Event	**Cause of Event**	**Severity**	**Timing of Event**	**Avoidance Measures**	**Detection Methods**	**Potential Response Action**
						upon approval of the WDEQ Administrator
Injection Well Monitoring Equipment Failure	• Monitoring equipment failure: wellhead/downhole pressure, temperature, and/or acoustics - may indicate a problem with the injection well that could endanger an USDW • Other equipment failures (sensor, computer, cabling, etc.) and damage to the wellhead could endanger the USDW	High	• Injection • Monitoring	• Proper maintenance and inspection of equipment • Injection within permitted limits • Visual inspection and monitoring	• Visual inspection for signs of corrosion, leaks, structural issues, or other degradation • Equipment monitoring	• Notify the WDEQ Administrator within 24 hours of the emergency event • Determine the severity of the event, based on the information available, within 24 hours of notification • Limit access to wellhead to authorized personnel only • Initiate immediate shutdown plan • Monitor well pressure, temperature, and acoustics to verify integrity loss and determine the cause and extent of failure; identify and implement appropriate remedial actions to repair damage to the well (in consultation with the WDEQ Administrator) • Review downhole and wellhead pressure, temperature, and acoustic data • Evaluate pressures and conditions via analog gauges to determine no damage to wellbore, wellhead, or USDW will occur • Shut in well (close flow valve or allow packer fluid into reservoir, fill hole) • Vent fluids from wellbore and surface facilities • Communicate with operator personnel and local authorities to initiate evacuation plans, as necessary • Monitor well pressure, temperature, and annulus pressure to verify integrity loss and determine the cause and extent of failure; identify and implement appropriate remedial actions to repair damage to the well (in consultation with the WDEQ Administrator) • If contamination is detected, identify and implement appropriate remedial actions (in consultation with the WDEQ Administrator) • Isolate the nearby area, if needed; establish a safe distance and perimeter using a hand-held air-quality monitor • Perform a well log/MIT to detect CO_2 movement outside of the casing
Natural Disaster	• Natural disaster affecting the normal operation of the injection well • An earthquake may disturb surface and/or subsurface facilities, and weather-related disasters (e.g., tornado or lightning strike) may affect	Low	• Pre-injection • Injection • PISC	• Meteorological monitoring	• Seismic monitoring stations • Meteorological monitoring	• When possible, appropriate measures will be taken to prepare ahead of a forecasted event • Notify the WDEQ Administrator within 24 hours of the emergency event. • Determine the severity of the event, based on the information available, within 24 hours of notification • Limit access to wellhead to authorized personnel only • Conduct assessment to determine whether there has

Table A-3.2. Actions Necessary to Determine Cause of Events and Appropriate Emergency Response						
Emergency Event	**Cause of Event**	**Severity**	**Timing of Event**	**Avoidance Measures**	**Detection Methods**	**Potential Response Action**
Natural Disaster *(continued)*	surface facilities					been a loss of mechanical integrity • If there has been a loss of mechanical integrity, initiate immediate shutdown plan • If there has not been a loss of mechanical integrity, initiate gradual shutdown • Shut in well (close flow valve) • Vent CO_2 from surface facilities if appropriate. • Monitor well pressure, temperature, and annulus pressure to verify integrity loss and determine the cause and extent of failure; identify and implement appropriate remedial actions to repair damage to the well (in consultation with the WDEQ Administrator)
Natural Disaster	• Natural disaster affecting the normal operation of the injection well • An earthquake may disturb surface and/or subsurface facilities, and weather-related disasters (e.g., tornado or lightning strike) may affect surface facilities	High	• Pre-injection • Injection • PISC	• Meteorological monitoring • When possible, appropriate measures will be taken to prepare ahead of a forecasted event	• Seismic monitoring stations • Meteorological monitoring	• Notify the WDEQ Administrator within 24 hours of the emergency event • Determine the severity of the event, based on the information available, within 24 hours of notification • Limit access to wellhead to authorized personnel only • Initiate immediate shutdown plan – shut in well (close flow valve) • Vent CO_2 from surface facilities if appropriate • Communicate with Frontier Carbon Solutions (FCS) personnel and local authorities to initiate evacuation plans, as necessary • Monitor well pressure, temperature, and annulus pressure to verify integrity loss and determine the cause and extent of failure; identify and implement appropriate remedial actions to repair damage to the well (in consultation with the WDEQ Administrator) • Determine if any leaks to groundwater or surface water occurred • If contamination is detected, identify and implement appropriate remedial actions (in consultation with the WDEQ Administrator)
CO_2 (e.g., brine) leakage to a USDW	• Elevated concentrations above baseline measurements of an indicator parameter(s) are seen in groundwater sample(s)	Low to High	• Pre-injection • Injection • PISC	• Well maintenance • Injection within permitted limits	• Fluid sampling • Atmospheric and subsurface monitoring	• Notify the WDEQ administrator within 24 hours of the emergency event • Determine the severity of the event, based on the information available, within 24 hours of notification • Limit access to wellhead to authorized personnel only • Initiate shutdown plan • If the presence of indicator parameters is confirmed, develop (in consultation with the WDEQ Administrator) a case-specific work plan to

Table A-3.2. Actions Necessary to Determine Cause of Events and Appropriate Emergency Response						
Emergency Event	**Cause of Event**	**Severity**	**Timing of Event**	**Avoidance Measures**	**Detection Methods**	**Potential Response Action**
CO_2 (e.g., brine) leakage to a USDW *(continued)*						○ Install additional groundwater monitoring points near the affected groundwater well(s) to delineate the extent of impact; and ○ Remediate unacceptable impacts to the affected USDW • Perform pressure and surface monitoring and periodic visual inspection • Arrange for an alternate potable water supply, if the USDW was being utilized and has been caused to exceed drinking water standards • Proceed with efforts to remediate USDW to mitigate any unsafe conditions (e. g., install system to intercept/extract brine or CO_2 or "pump and treat" to aerate CO_2-laden water) • Continue groundwater remediation and monitoring on a frequent basis (frequency to be determined by FCS and the regulator) until unacceptable adverse USDW impact has been fully addressed • If there is a well integrity issue, specific steps will be taken to identify the location of the failure/leak, affect repairs, and demonstrate mechanical integrity • If the leak poses a risk to air quality the nearby area will be isolated, and a safe distance and perimeter will be established using a hand-held air-quality monitor
Seismic event/induced seismicity	• Natural geological event • Elevated injection pressure	Low	• Pre-injection • Injection • PISC	• Injection within permitted limits • Monitoring injection rates	• Seismic monitoring stations • Pressure monitoring • Injection rate monitoring	• Identify the location, depth, and magnitude of event • If seismic event within the PSG AoR, review injection well data to determine: ○ If there is a correlation with injection activities ○ Confirm all wells have maintained integrity ○ Any loss of CO_2 • Refer to Table A-3.3 for guidance and remediate in coordination with the WDEQ Administrator

Table A-3.3. Seismic Monitoring System, for Seismic Events > M1.0 with an Epicenter within 0.5 Mile Radius of the PSG Injection Wells		
Operating State	**Threshold Condition**[1,2]	**Response Action**[3]
Green	Seismic events less than or equal to M1.5	• Continue normal operation within permitted levels. • Document the event for reporting to WDEQ in semiannual reports.
Yellow	Five (5) or more seismic events within a 30-day period having a magnitude greater than M1.5 but less than or equal to M2.0	• Continue normal operation within permitted levels. • Initiate gradual shutdown of the well if it is determined to be appropriate. • Within 24 hours of the incident, notify the WDEQ Administrator of the operating status of the well. • Review seismic and operational data to determine location and magnitude of seismic event. If the event falls within or near the extents of the plume, use seismic, geomechanics, and facies data to estimate potential impact to USDWs. Perform a pressure falloff test to determine if the geologic sequestration (GS) complex has been compromised by the seismic event. • Document the event for reporting to the WDEQ in semiannual reports.
Orange	Seismic event greater than M1.5 and local observation or felt report Seismic event greater than M2.0 and no felt report	• Continue normal operation within permitted levels. • Initiate gradual shutdown of the well if it is determined to be appropriate. • Within 24 hours of the incident, notify the regulator of the operating status of the well. • Review seismic and operational data to determine location and magnitude of seismic event. If the event falls within or near the extents of the plume, use seismic, geomechanics, and facies data to estimate potential impact to USDWs. Perform a pressure falloff test to determine if the storage complex has been compromised by the seismic event. • Report findings to the regulator and issue corrective actions. • Document the event for reporting to WDEQ in semiannual reports.
Magenta	Seismic event greater than M2.0 and local observation or report	• Limit access to wellhead to authorized personnel only. • Initiate gradual shutdown of the well if it is determined to be appropriate. • Within 24 hours of the incident, notify the WDEQ Administrator, of the operating status of the well. • Communicate with facility personnel and local authorities to initiate evacuation plans, as necessary. • Monitor well pressure, temperature, and annulus pressure to verify well status and determine the cause and extent of any failure; identify and implement appropriate remedial actions (in consultation with the WDEQ Administrator). • Determine if leaks to ground water or surface water or a CO_2 leak to the surface occurred. • If a CO_2 leak or USDW contamination/endangerment is detected: ○ Notify the WDEQ Administrator within 24 hours of the determination and implement appropriate remedial actions in consultations with the Administrator. • Review seismic and operational data to determine location and magnitude of seismic event. If the event falls within or near the extents of the plume, use seismic, geomechanics, and facies data to estimate potential impact to USDWs. Perform a pressure falloff test to determine if the storage complex has been compromised by the seismic event. • Report findings to the WDEQ Administrator and issue corrective actions. • Document the event for reporting to WDEQ in semiannual reports.
Red	Seismic event greater than M2.0, and local observation or report, and local report and confirmation of damage[4] Seismic event greater M3.5	• Limit access to wellhead to authorized personnel only. • Initiate immediate shutdown plan. • Within 24 hours of the incident, notify the WDEQ Administrator of the operating status of the well. • Communicate with facility personnel and local authorities to initiate evacuation plans, as necessary. • Monitor well pressure, temperature, and annulus pressure to verify well status and determine the cause and extent of any failure; identify and implement appropriate remedial actions (in consultation with the WDEQ Administrator). • Determine if leaks to ground water or surface water or a CO_2 leak to the surface occurred. • If a CO_2 leak or USDW contamination/endangerment is detected: ○ Notify the WDEQ Administrator within 24 hours of the determination and implement appropriate remedial actions in consultations with the Director. • Review seismic and operational data to determine location and magnitude of seismic event. If the event falls within or near the extents of the plume, use seismic, geomechanics, and facies data to estimate potential impact to USDWs. Perform a pressure falloff test to determine if the storage complex has been compromised by the seismic event. • Report findings to the WDEQ Administrator and issue corrective actions. • Document the event for reporting to WDEQ in semiannual reports.

[1]Specified magnitudes refer to magnitudes determined by USGS seismic monitoring stations or reported by the USGS National Earthquake Information Center using the national seismic network.
[2] "Felt report" and "local observation and report" refer to events confirmed by local reports of felt ground motion or reported on the USGS "Did You Feel It?" reporting system.
[3] Reporting findings to the UIC Program Director and issuing corrective action will occur within 25 business days (five weeks) of change in operating state.
[4]Onset of damage is defined as cosmetic damage to structures, such as bricks dislodged from chimneys and parapet walls, broken windows, and fallen objects from walls, shelves, and cabinets.

FIGURES

PROJECT SPEED GOAT

Figure A-3.1. Local Resources and Infrastructure

SW WYOMING
(SWEETWATER, UINTA & LINCOLN COUNTIES)

FRONTIER
CARBON SOLUTIONS



Speed Goat Project

- Injection
- Monitor
- SCS Hub
- Speed Goat Boundary
- Plume
- AOR Pressure
- KSLA
- MMTA
- OPA_V5

Federal Land

- BLM
- State
- UP Railroad

SEO Water Wells

- DOM
- IND
- MIS
- MON
- RES
- STO

Water Well Source: WY State Engineers Office

N
W E
S

0 1.5 3 4.5 6
Kilometers

0 0.75 1.5 3
Miles

FORM A-4
FINANCIAL ASSURANCE DEMONSTRATION PLAN

TABLE OF CONTENTS

4.0 Financial Assurance Demonstration Plan 1
4.1 Cost Estimation 2
4.1.1 Corrective Action 3
4.1.2 Injection Well Plugging 4
4.1.3 PISC and Facility Site Closure 4
4.1.4 Emergency and Remedial Response 5
4.2 Financial Assurance Instruments 5
4.2.1 Liability Insurance 6
4.2.2 Surety Bond 7
4.3 Updates to the Financial Assurance Demonstration Plan 7

LIST OF TABLES

Table A-4.1. PSG Wells included in the proposed FADP. 2
Table A-4.2. Financial Assurance Components and Cost Estimate Summary 3
Table A-4.3. Corrective Action Cost Estimate. 4
Table A-4.4. Injection Well Plugging Cost Estimate. 4
Table A-4.5. PISC and Facility Site Closure Cost Estimate. 4
Table A-4.6. Emergency and Remedial Response Cost Estimate. 5
Table A-4.7. Financial Assurance Components—When Funded and Instruments. 6

LIST OF FIGURES

Figure A-4.1. Map showing AoR used for the development of the proposed FADP. 2

ABBREVIATIONS/ACRONYMS

AoR	Area of Review
CIA	Commercial Insurance Associates, LLC
ERR	Emergency Remedial Response Plan
FADP	Financial Assurance Demonstration Plan
FCS	Frontier Carbon Solutions Holdings, LLC
PISC	post-injection site care
PSG	Project Speed Goat
SCS	Sweetwater Carbon Storage
UIC	Underground Injection Control
USDW	underground sources of drinking water
WDEQ	Wyoming Department of Environmental Quality
WWQR	Wyoming Water Quality Rules

FRONTIER CARBON SOLUTIONS
PROJECT SPEED GOAT
CARBON SEQUESTRATION UIC CLASS VI APPLICATION

FORM A-4, PROPOSED FINANCIAL ASSURANCE DEMONSTRATION PLAN
Water Quality Rules, Chapter 24 Section 26

4.0 Financial Assurance Demonstration Plan

Frontier Carbon Solutions Holdings, LLC (FCS) developed the Project Speed Goat (PSG) Financial Assurance Demonstration Plan (FADP) to meet the requirements of Wyoming Department of Environmental Quality (WDEQ) Chapter 24, Section 26. FCS will maintain financial responsibility for all applicable phases of the geologic sequestration project, including:

- Permitting/characterization;
- Testing and Monitoring (pursuant to Chapter 24, Section 20);
- Operations, including injection and well-plugging (pursuant to Chapter 24, Sections 18 and 23);
- Post-injection site care (PISC) and Facility Site Closure; and
- Emergency and remedial response (pursuant to Chapter 24, Section 25).

The FADP was developed to account for seven injection wells, six monitor wells, and the PSG Area of Review (AoR) shown the map provided on **Figure A-4.1**. Because of the project overlap and proximity of injection wells to the Sweetwater Carbon Storage (SCS) Hub, dynamic simulation modeling and AoR determination is inclusive of both the SCS Hub and PSG areas. However, this PSG FADP is independent of the SCS Underground Injection Control (UIC) Class VI Permit to Construct wells: Facility Number WYS-0137-00262, UIC 2022-242; Facility Number WYS-037-00263, UIC 2022-243; Facility Number WYS-023-00205, UIC 2022-244, for the LCS 1-23, AN 1-26, and J 1-15, respectively. **Table A-4.1** list PSG injection and monitor wells included in this proposed FADP.

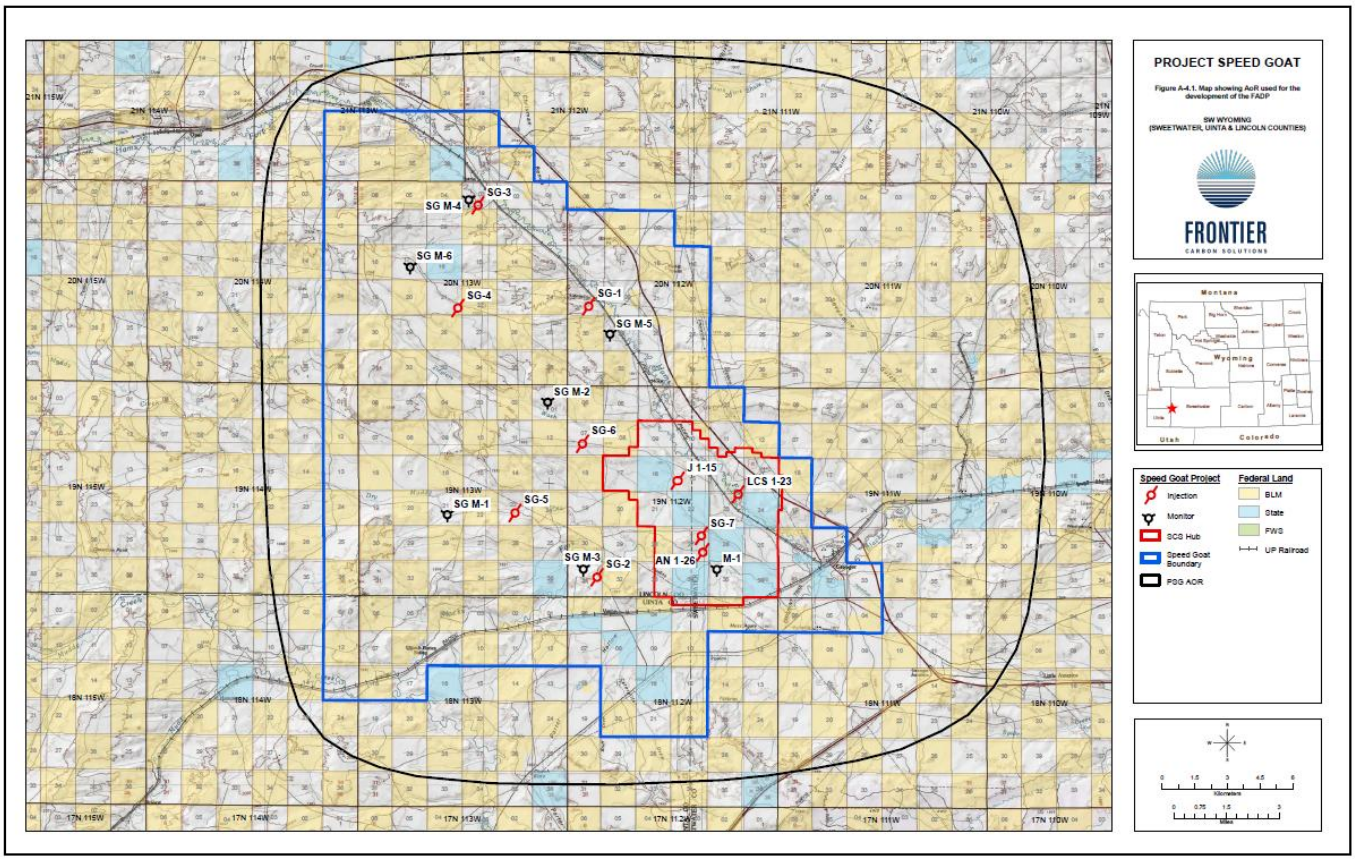


Figure A-4.1. *Map showing AoR used for the development of the FADP.*

Table A-4.1. Project Speed Goat Wells included in the Proposed Financial Assurance Demonstration Plan	
Proposed Injection Wells	**Proposed Deep Monitor Wells**
SG-1	SG M-1
SG-2	SG M-2
SG-3	SG M-3
SG-4	SG M-4
SG-5	SG M-5
SG-6	SG M-6
SG-7	

The estimates provided in the FADP are based on third-party costs provided from similar injection operations and publications. These costs are subject to change throughout the project's life and will be updated annually to account for inflation, project-related changes, and future industry developments. Any adjustments will be submitted to the Administrator for approval.

4.1 Cost Estimation

A financial assurance cost estimate, based on third-party estimates in current dollars, is provided in **Table A-4.2** for the following:

- Corrective action for all identified wells in the AoR that require it;
- Plugging the injection and monitoring wells;
- Post-Injection Site Care (PISC) (including plume stabilization, monitoring, measurement, verification, corrective action, and other actions needed to ensure that underground sources of drinking water (USDWs) are not endangered from the time of well-plugging until site closure is certified by the Administrator and above ground-reclamation is completed);
- Testing and monitoring; and
- Emergency and remedial response.

Table A-4.2. Financial Assurance Components and Cost Estimate Summary[1]		
Financial Responsibility Element	**Cost Estimate (USD)**	**Financial Assurance Required**
A. Performing Corrective Action on Wells in the AoR required under Chapter 24, Section 13	$ 0	No
B. Plugging the Injection Wells under Chapter 24, Section 23	$ 4,791,856	Yes
C. Testing and Monitoring under Chapter 24, Section 20		
(i) Pre-Injection Testing (Permitting and Site Characterization)	$ 1,300,000	No
(ii) Operation and Maintenance During Testing and Monitoring – Injection Period of 20 years in the Madison and 20 years in the Nugget	$ 15,600,000	No
D. Emergency and Remedial Response under Chapter 24, Section 25	$ 13,238,736	Yes
E. PISC and Site Closure under Chapter 24, Section 24	$ 15,996,305	Yes
Financial Assurance Total[2]	**$ 33,526,898**	

[1]Per WWQR Chapter 24 Section 26(b)(viii), updated financial assurance cost estimates will be submitted annually. The amounts shown in these tables are subject to change based on annual financial assurance updates.

[2]The Financial Assurance Total estimate includes line items B, D, and E only for the total Project. Financial assurance per well will be accounted for in the Permit to Construct.

4.1.1 Corrective Action

Four wells were identified within the AoR for corrective action investigation, discussed in ***Form A-2, Area of Review***. Based on the review of well reports and data, all identified wells were determined to be sufficiently plugged and will not require remediation. To be conservative, deep monitor wells and near-surface sampling stations will be constructed in proximity to the identified wells as part of the PSG testing and monitoring plan. These costs are inclusive of near-surface monitoring estimates summarized in the PISC and facility closure estimate**.**

Table A-4.3. Corrective Action Cost Estimate	
Activity	**Estimated Total Cost (USD)**
Corrective Action on Wells in the AoR[1]	$ 0
Corrective Action Total	**$ 0**

[1]*Corrective action will not be required; all wells are sufficiently plugged.*

4.1.2 Injection Well Plugging

The cost of plugging one injection well is estimated at $684,551. **Table A-4.4** provides a breakdown of the cost by service. ***Form B, Permit to Construct*** will include a detailed plugging procedure for each PSG injection well. The PSG Project area calculations assume the plugging of seven Class VI injection wells.

Table A-4.4. Injection Well Plugging Cost Estimate	
Service	**Estimated Cost (USD)**
Rig Mobilization, Day Rate, Casing Crew, Wellhead and Location	$ 453,250
Mechanical Integrity Test and Logging	$ 32,700
Flush and plug Injection Well	$ 198,601
Total per Well	$ 684,551
Total (Seven Injection Wells)	**$ 4,791,856**

4.1.3 PISC and Facility Site Closure

The PISC and facility site closure cost estimates shown in **Table A-4.5** include site monitoring, periodic reassessment of the AoR, the plugging of the monitoring wells, and overhead and support costs estimated for 10 years. The facility site closure estimate includes plugging and surface facility closure costs for seven facilities, estimated to be $7,607,305

Table A-4.5. Post-Injection Site Care and Facility Site Closure Cost Estimate	
Post-Injection Site Care	
Service	**Estimated Cost (USD)**
Operational and Maintenance on Monitor Wells	$ 2,537,000
Time Lapse Seismic (2 times during 10-yr PISC) with Processing	$ 5,112,000
Ground Water and Soil Analysis	$ 240,000
PISC Total	**$ 7,889,000**
Facility Site Closure	
Services	**Estimated Cost (USD)**
Plug Monitoring well	$ 4,107,305
Facilities closure	$ 3,500,000
Facility Site Closure Total	**$ 7,607,305**
PISC and Facility Site Closure Total	**$ 15,996,305**

4.1.4 Emergency and Remedial Response

The Emergency Remedial Response (ERR) estimate was prepared by a third-party industry expert and conforms to the regulatory requirements promulgated by the Wyoming Water Quality Rules (WWQR) Chapter24, Section 26(b)(i)(E) and Section 26(b)(ii)(A)-(G). Estimates were prepared using Monte Carlo analysis tailored to project-specific risks and uncertainties to generate reasonable upper-bound estimates of financial assurance costs related to emergency and remedial response and WWQR event-based risk activities.

The Monte Carlo analysis includes several conservative input assumptions and incorporates probabilistic calculations that allow for multiple release incidents through operation and PISC, which are summarized in **Table A-4.6**. Based on a model run of 50,000 Monte Carlo trials, the upper-bound financial assurance cost estimate of $13.2 million is believed to satisfy the emergency and remedial response and WWQR event-based risk in current 2024 dollars.

Table A-4.6. Emergency and Remedial Response Cost Estimate

Summary Statistic	Estimated Cost (USD)
Average	$ 3,553,833
Standard Deviation	$ 1,505,383
5th Percentile	$ 1,277,732
50th Percentile	$ 3,438,028
95th Percentile	$ 6,203,313
99th Percentile	$ 7,507,634
Minimum	$ 0
Maximum	$ 13,238,736
ERR Total (Maximum)	**$ 13,238,736**

4.2 Financial Assurance Instruments

The FADP was developed to meet the financial responsibility requirements for PSG. Financial assurance will be submitted for the applicable phase of PSG development on the required forms identified on the WDEQ Bonding site per WWQR, Chapter 24, Section 26(l).

Table A-4.7 describes financial instrument options by project phase to meet the financial responsibility requirements of the FADP. FCS has elected a combination of liability insurance and surety bond products to address the estimated costs associated with the well plugging program, PISC, Facility Site Closure, and the ERRP. FCS recommends collaboration and negotiation with the WDEQ regarding allocation of the ERR as PSG wells are developed so the Project is not incorrectly economically burdened at the onset of operations.

Table A-4.7. Financial Assurance Components – When Funded and Instruments		
Financial Responsibility Element	**When Funded**	**Financial Assurance Instrument**
A. Plugging the injection wells under Chapter 24, Section 23	Prior to Permit to Construct[1]	*WWQR Chapter 24, Section 26(c):* (i) Irrevocable Trust Funds with government-backed securities, or (ii) Surety Bonds, or (iii) Irrevocable Letter of Credit, or (iv) Cash, or (v) Federally Insured Certificates of Deposit.
B. PISC and Site Closure under Chapter 24, Section 24	Prior to Authorization to Inject	
C. Emergency and Remedial Response under Chapter 24, Section 25	Prior to Authorization to Inject	*WWQR Chapter 24, Section 26(c):* (vi) Irrevocable Trust Funds with government-backed securities, or (vii) Surety Bonds, or (viii) Irrevocable Letter of Credit, or (ix) Cash, or (x) Federally Insured Certificates of Deposit. Permittees may also cover this as part of the public liability insurance[2].

[1]*If a monitoring well or injection well has already been constructed, financial assurance will be required prior to issuance of the Permit to Construct. This will also be required for conversion of a UIC Class I, II, or V well to Class VI.*

[2]*Public liability insurance is in accordance with WWQR Chapter 24, Section 26(l) – minimum of $15M per occurrence annually and $45M aggregate.*

4.2.1 Liability Insurance

FCS will obtain and maintain public liability insurance for PSG that meets the requirements of W.S. 35-11-313(f)(ii)(O) and Chapter 24, Section 26(l)(i)(B) and will identify each facility by name, address, and EPA Identification Number; and will identify the amounts and types of coverage for the facility.

To satisfy the ERR financial assurances requirement, FCS intends to purchase environmental insurance with a minimum liability of $15 million, although conservative risk-adjusted third-party estimates recommend $13.3 million. The policy will be arranged by Commercial Insurance Associates LLC ("CIA") and provided after due diligence of the carrier marketing process. CIA will decide between multiple carriers that will give FCS the broadest coverage and most efficient pricing. The carrier will be licensed in Wyoming with an AM Best Rating of at least "A-". A support letter for PSG, inclusive of all seven proposed injection wells, is included in ***Appendix A-4***.

4.2.2 Surety Bond

FCS will use a surety bond to satisfy the financial assurance requirements for the plugging of injection and monitoring wells, and PISC and facility site closure. As outlined in the attached letter included in ***Appendix A-4***, CIA will place the financial instrument that meets all requirements posted on the bond form. We have received an Owner's Blanket Bond from Indemnity National Insurance Company (AM Best Rated "A-").

4.3 Updates to the Financial Assurance Demonstration Plan

During the active life of the project, Frontier will review and adjust the cost estimate for inflation annually. Written updates of adjustments to the financial assurance cost estimate will be provided to the Administrator within 30 days of the anniversary date when the original financial assurance cost estimate was submitted, per WWQR Chapter 24 Section 26(b)(viii).

APPENDIX A-4

FINANCIAL ASSURANCE DEMONSTRATION PLAN

TABLE OF CONTENTS

FADP Letter of Support 1

LIST OF TABLES

Table A-4.1. PSG Wells included in the proposed FADP. 2
Table A-4.2. Financial Assurance Components and Cost Estimate Summary 2
Table A-4.3. Corrective Action Cost Estimate. 3
Table A-4.4. Injection Well Plugging Cost Estimate. 3
Table A-4.5. PISC and Facility Site Closure Cost Estimate. 3
Table A-4.6. Emergency and Remedial Response Cost Estimate. 4
Table A-4.7. Financial Assurance Components—When Funded and Instruments. 4

LIST OF FIGURES

Figure A-4.1. Map showing AoR used for the development of the proposed FADP. 5

FADP LETTER OF SUPPORT

November 12, 2024

Re: Insurer Support –

To Whom it May Concern:

It is our pleasure to provide Frontier Carbon Solutions Holdings ("Frontier") insurance solutions to address project risks and their financial assurance responsibilities under the United States Environmental Protection Agency's Class VI Underground Injection Control regulations for Project Speed Goat ("Project"). Commercial Insurance Associates ("CIA") will approach carriers with AM Best ratings of A- or higher, and with the size categories of VII or greater to secure bindable quotes for pollution insurance coverage. We will request quotes for policies conforming to these specimens with a limit of liability of Fifteen Million ($15mm) as required by Wyoming regulation. CIA will secure a Surety Bond to satisfy the financial assurance requirements for the plugging of injection and monitoring wells, and PISC and Facility Site Closure.

After submission of the required underwriting data, CIA expects to present to Frontier bindable quotations to incept a Pollution Legal Liability Insurance Policy and Surety Bond, with the applicable financial assurance endorsements and required certificates. Placing these financial assurance instruments requires an underwriting review to protect the carrier's exposure, as well as to ensure that the programs they put in place will (1) comply with the Class VI Underground Injection Control regulations, and (2) protect human health and the environment – a goal shared by all parties involved in the Project. CIA as a broker and its carrier trading partners are committed to supporting the carbon capture & storage industry and will work with Frontier to support the project with effective risk transfer and financial assurance.

Sincerely,

Will Denbo

President

Commercial Insurance Associates

TABLES

Table A-4.1. Project Speed Goat Wells included in the Proposed Financial Assurance Demonstration Plan	
Proposed Injection Wells	**Proposed Deep Monitor Wells**
SG-1	SG M-1
SG-2	SG M-2
SG-3	SG M-3
SG-4	SG M-4
SG-5	SG M-5
SG-6	SG M-6
SG-7	

Table A-4.2. Financial Assurance Components and Cost Estimate Summary[1]		
Financial Responsibility Element	**Cost Estimate (USD)**	**Financial Assurance Required**
A. Performing Corrective Action on Wells in the AoR required under Chapter 24, Section 13	$ 0	No
B. Plugging the Injection Wells under Chapter 24, Section 23	$ 4,791,856	Yes
C. Testing and Monitoring under Chapter 24, Section 20		
(i) Pre-Injection Testing (Permitting and Site Characterization)	$ 1,300,000	No
(ii) Operation and Maintenance During Testing and Monitoring – Injection Period of 20 years in the Madison and 20 years in the Nugget	$ 15,600,000	No
D. Emergency and Remedial Response under Chapter 24, Section 25	$ 13,238,736	Yes
E. PISC and Site Closure under Chapter 24, Section 24	$ 15,996,305	Yes
Financial Assurance Total[2]	**$ 33,526,898**	

[1]*Per WWQR Chapter 24 Section 26(b)(viii), updated financial assurance cost estimates will be submitted annually. The amounts shown in these tables are subject to change based on annual financial assurance updates.*

[2]*The Financial Assurance Total estimate includes line items B, D, and E only for the total Project. Financial assurance per well will be accounted for in the Permit to Construct.*

Table A-4.3. Corrective Action Cost Estimate	
Activity	**Estimated Total Cost (USD)**
Corrective Action on Wells in the AoR[1]	$ 0
Corrective Action Total	**$ 0**

[1]*Corrective action will not be required; all wells are sufficiently plugged.*

Table A-4.4. Injection Well Plugging Cost Estimate	
Service	**Estimated Cost (USD)**
Rig Mobilization, Day Rate, Casing Crew, Wellhead and Location	$ 453,250
Mechanical Integrity Test and Logging	$ 32,700
Flush and plug Injection Well	$ 198,601
Total per Well	$ 684,551
Total (Seven Injection Wells)	**$ 4,791,856**

Table A-4.5. Post-Injection Site Care and Facility Site Closure Cost Estimate	
Post-Injection Site Care	
Service	**Estimated Cost (USD)**
Operational and Maintenance on Monitor Wells	$ 2,537,000
Time Lapse Seismic (2 times during 10-yr PISC) with Processing	$ 5,112,000
Ground Water and Soil Analysis	$ 240,000
PISC Total	**$ 7,889,000**
Facility Site Closure	
Services	**Estimated Cost (USD)**
Plug Monitoring well	$ 4,107,305
Facilities closure	$ 3,000,000
Facility Site Closure Total	**$ 7,607,305**
PISC and Facility Site Closure Total	**$ 15,996,305**

Table A-4.6. Emergency and Remedial Response Cost Estimate	
Summary Statistic	**Estimated Cost (USD)**
Average	$ 3,553,833
Standard Deviation	$ 1,505,383
5th Percentile	$ 1,277,732
50th Percentile	$ 3,438,028
95th Percentile	$ 6,203,313
99th Percentile	$ 7,507,634
Minimum	$ 0
Maximum	$ 13,238,736
ERR Total (Maximum)	**$ 13,238,736**

Table A-4.7. Financial Assurance Components – When Funded and Instruments		
Financial Responsibility Element	**When Funded**	**Financial Assurance Instrument**
A. Plugging the injection wells under Chapter 24, Section 23	Prior to Permit to Construct[1]	*WWQR Chapter 24, Section 26(c):* (i) Irrevocable Trust Funds with government-backed securities, or (ii) Surety Bonds, or (iii) Irrevocable Letter of Credit, or (iv) Cash, or (v) Federally Insured Certificates of Deposit.
B. PISC and Site Closure under Chapter 24, Section 24	Prior to Authorization to Inject	
C. Emergency and Remedial Response under Chapter 24, Section 25	Prior to Authorization to Inject	*WWQR Chapter 24, Section 26(c):* (vi) Irrevocable Trust Funds with government-backed securities, or (vii) Surety Bonds, or (viii) Irrevocable Letter of Credit, or (ix) Cash, or (x) Federally Insured Certificates of Deposit. Permittees may also cover this as part of the public liability insurance[2].

[1]*If a monitoring well or injection well has already been constructed, financial assurance will be required prior to issuance of the Permit to Construct. This will also be required for conversion of a UIC Class I, II, or V well to Class VI.*

[2]*Public liability insurance is in accordance with WWQR Chapter 24, Section 26(l) – minimum of $15M per occurrence annually and $45M aggregate.*

FIGURES

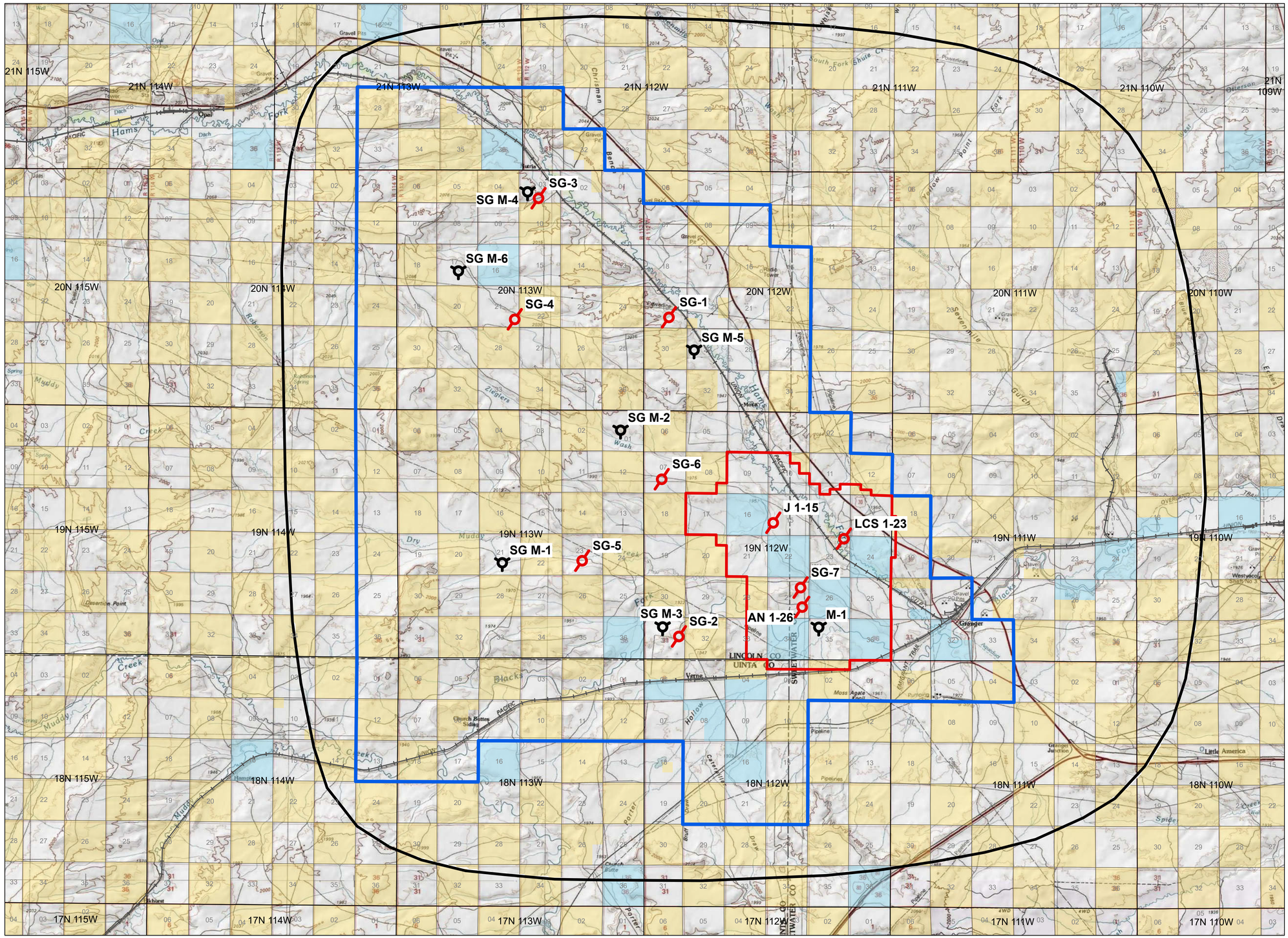
PROJECT SPEED GOAT

Figure A-4.1. Map showing AoR used for the development of the FADP

SW WYOMING
(SWEETWATER, UINTA & LINCOLN COUNTIES)

FRONTIER
CARBON SOLUTIONS



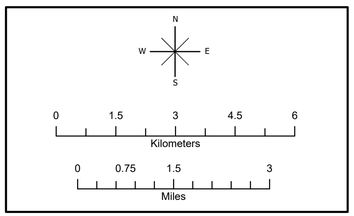


Speed Goat Project

- Injection
- Monitor
- SCS Hub
- Speed Goat Boundary
- PSG AOR

Federal Land

- BLM
- State
- FWS
- UP Railroad



FORM A-5
PROPOSED TESTING AND MONITORING PLAN

TABLE OF CONTENTS

5.0 Overview of Monitoring Program 1

5.1 Analysis of Injected CO_2 and Injection Well Testing 3

5.1.1 CO_2 Analysis 3

5.2 Injection Well Integrity Tests 3

5.2.1 Pressure Falloff Testing 4

5.2.2 Cement Evaluation and Casing Logs 4

5.2.3 Mechanical Integrity Testing 5

5.2.4 External Mechanical Integrity Testing 5

5.3 Corrosion Monitoring and Prevention Plan Event 5

5.3.1 Corrosion Monitoring Plan 5

5.3.2 Corrosion Prevention Plan 5

5.3.3 Additional Wellbore Tests 6

5.4 Surface Leak Detection and Monitoring Plan 6

5.5 Subsurface Leak Detection and Monitoring PlanTraining 6

5.6 Near-Surface Monitoring: Groundwater and Soil Gas 7

5.6.1 Completed Baseline Sampling Program: Groundwater and Soil Gas 7

5.6.2 Near-Surface Monitoring Plan: Groundwater and Soil Gas 8

5.7 Deep Surface Monitoring of Free-Phase CO_2 Plume and Pressure Front 10

5.8 Above Confining Zone Monitoring 12

5.9 Direct Monitoring Methods 14

5.10 Indirect Monitoring Methods 14

5.11 Reporting and Notice Requirements 14

LIST OF TABLES

Table A-5.1. Overview of the Monitoring Program 2

Table A-5.2. Chemical Components Targeted for Characterization in the Injected CO_2 3

Table A-5.3. Baseline Groundwater Sampling Results 7

Table A-5.4. Baseline Soil Gas Sampling Results 7

Table A-5.5. Near-Surface Sampling and Analysis Plan Monitoring Frequency and Analytical Parameters 9

Table A-5.6. Deep-Surface Description of Monitoring Program 11

LIST OF FIGURES

Figure A-5.1. Proposed Near-Surface Monitoring Groundwater and Soil Gas Locations 8

Figure A-5.2. Map showing the Madison CO_2 plumes at 1 year of injection (A), injection cessation at year 20 (B), and at plume stabilization in the PISC phase at year 2046, which is 1 year post-injection (C) 10

Figure A-5.3. Map showing the Nugget CO_2 plumes at 1 year of injection (A), injection cessation at year 20 (B), and at plume stabilization in PISC at year 2066, which is 1 year post-injection (C) 10

Figure A-5.4. PSG proposed injection and monitor well map 13

ABBREVIATIONS/ACRONYMS

%	Percent
2-D	two-dimensional
3-D VSP	three-dimensional vertical seismic profile
AoR	Area of Review
API	American Petroleum Institute
ASTM	American Society of Testing and Materials
BHP	bottomhole pressure
CaCO3	calcium carbonate
CBL	casing bond log
CO_2	carbon dioxide
DAS	distributed acoustic sensing
EMIT	electromagnetic imaging tool
EPA	Environmental Protection Agency
ERRP	Emergency and Remedial Response Plan
FCS	Frontier Carbon Solutions Holdings, LLC
H_2	hydrogen
H_2O	water
ISO	International Organization for Standardization
MFL	magnetic flux leakage
mg/L	milligram per liter
mS/cm	millisiemens per centimeter
N/A	not available
N_2	nitrogen
NACE	National Association of Corrosion Engineers
Near-surface SAP	Near-surface Sampling and Analysis Plan
O_2	oxygen
P&A	plugged and abandoned
pH	potential of hydrogen
PISC	post-injection site care
ppm	parts per million

PSG	Project Speed Goat
QA/QC	quality assurance/quality control
QASP	Quality Assurance Surveillance Plan
s.u.	standard unit
SpC	specific conductivity
TBD	to be determined
USDW	underground source of drinking water
VOC	volatile organic compound
VSP	vertical seismic profile
WDEQ	Wyoming Department of Environmental Quality
WHP	wellhead pressure
WQD	Water Quality Division
WQRR	Water Quality Rules and Regulations

FORM A-5, PROPOSED TESTING AND MONITORING PLAN
Water Quality Rules, Chapter 24 Sections 10, 20, and 22

5.0 Overview of Monitoring Program

The following Testing and Monitoring Plan was designed to meet the requirements of the Wyoming Water Quality Rules and Regulations (WQRR) Chapter 24, Section 20 and ensure the Project Speed Goat (PSG) geologic sequestration project is operating safely and as permitted without endangering underground sources of drinking water (USDW).

The Testing and Monitoring Plan includes acquisition of baseline measurements at project onset and testing throughout all phases of the project to ensure the reservoirs and injection wells are performing as expected, carbon dioxide (CO_2) is contained and confined, and surrounding resources are free from endangerment.

The testing and monitoring program for the Project includes: (1) the analysis of the injected CO_2; (2) periodic testing of each injection well (i.e., testing of external and internal mechanical integrity); (3) a corrosion-monitoring plan for the CO_2 injection well components; (4) a leak detection and monitoring plan for surface components of the CO_2 injection system (e.g., CO_2 flow line and wellhead); and (4) a near-surface/deep-subsurface leak detection plan to monitor any movement of the CO_2 outside of the storage reservoir. The latter consists of a combination of soil gas and groundwater monitoring, storage reservoir monitoring, downhole monitoring, and geophysical monitoring. Accompanying quality assurance and surveillance procedures for the Testing and Monitoring Plan are provided in the ***Form A-9, Quality Assurance and Surveillance Plan (QASP)***.

The Testing and Monitoring Plan will be reevaluated on a regular basis to incorporate monitoring data collected and modified as necessary to ensure the plan meets expectations. The testing and monitoring plan will be reviewed at least every five years. If revisions to the plan are deemed necessary, supporting documentation and an amendment will be provided to the Wyoming Department of Environmental Quality (WDEQ) Administrator for approval. A summary of the Testing and Monitoring Plan is provided below in **Table A-5.1**.

Table A-5.1. Overview of the Monitoring Program				
Monitoring Type	**Device(s)**	**Target Structure/Project Area**	**Min. Sampling Frequency**	**Min. Recording Frequency**
Analysis of Injected CO_2	• CO_2 sampling station	Wellhead	TBD	TBD
CO_2 Flow Line	• Corrosion coupon monitoring	Capture facility to the well site	Continuous	Continuous
Continuous Recording of Injection Pressure, Rate, and Volume	• Surface pressure and temperature gauges • Continuous monitoring	Surface-to-reservoir (injection well)	Continuous	Continuous
Well Annulus Pressure Between Tubing and Casing	• Surface pressure and temperature gauges • Continuous monitoring	Surface-to-reservoir (injection well)	Continuous	Continuous
Near-Surface Monitoring	• Groundwater monitor wells	Near-surface environment, USDWs	**Table A-5.5**	**Table A-5.5**
Direct Reservoir Monitoring	• Fiber and gauges installed on wells – Temperature and pressure • Fall-off test	Storage reservoir and primary sealing formation	Continuous	Continuous
Indirect Reservoir Monitoring	• Pulsed neutron logging • Vertical seismic profile (VSP)	Sequestration complex	**Table A-5.6**	**Table A-5.6**
Internal and External Mechanical Integrity	• Annulus pressure test • Casing inspection • Casing bond log (CBL) • Electromagnetic imaging tool (EMIT), and/or magnetic flux leakage (MFL) • Oxygen activation log • Acoustic (or noise) log coupled with temperature log • Ultrasonic log • Pulsed neutron logging	Well infrastructure	**Table A-5.6**	**Table A-5.6**
Corrosion Monitoring	• Corrosion coupon	Well infrastructure	**Table A-5.6**	**Table A-5.6**

5.1 Analysis of Injected CO_2 and Injection Well Testing

WQRR Chapter 24, Section 20 requires analysis of the CO_2 stream with sufficient frequency to yield data representative of its chemical and physical characteristics. Samples of the injection stream will be characterized to determine gas composition concentrations through analyses outsourced to commercial laboratories, who utilize Environmental Protection Agency (EPA) analytical methods and standards that are generally accepted by industry and employ their standard analytical quality assurance/quality control (QA/QC) protocols.

5.1.1 CO_2 Analysis

The analysis of the CO_2 stream needs to follow applicable analytical methods and standards generally accepted by industry and with sufficient frequency to yield data representative of its chemical and physical characteristics. Emissions will be captured at the point source(s) where amine-based solvent technology and/or chilled ammonia liquefaction technology will process the gas stream to remove any contaminants. The resulting gas stream will be approximately 98% pure CO_2. Samples of the injected CO_2 stream will be characterized to determine the concentrations of CO_2, nitrogen (N_2), oxygen (O_2), hydrogen (H_2), water (H_20), and a suite of hydrocarbons (i.e., ethane, propane, n-butane, and methane). **Table A-5.2** lists the chemical components of the expected gas stream for injection and permanent storage at PSG.

Table A-5.2. Chemical Components Targeted for Characterization in the Injected CO_2

Parameter	Analytical Method(s)
CO_2	TBD
Ethane	TBD
Propane	TBD
n-Butane	TBD
Hydrogen	TBD
Nitrogen	TBD
Methane	TBD
Oxygen	TBD
Water, ppm	TBD

The CO_2 injectant stream sample results will be used to evaluate and plan for potential interactions with reservoir fluids and metallurgy of well construction materials.

5.2 Injection Well Integrity Tests

Prior to injection, the following tests will be conducted to ensure well integrity and acquire data to further confirm characterization of the receiving formations. Throughout the operational phase of PSG until the injection wells are plugged, either an approved tracer survey or a temperature or noise log, or similar approved industry-standard formation test, will be run at least once per year to evaluate well integrity and confirm the absence of significant fluid movement into a USDW. Reservoir conditions will be monitored through daily records of well injection rates and pressures. It is likely that adequate data will be collected to verify that the reservoir performance is within

operating parameters during normal injection, process upsets, or planned maintenance, but in the absence of that, at a minimum of once every five years, a pressure fall-off test will be conducted to determine current reservoir conditions. The Administrator will be notified 30 days in advance of planned testing activities.

5.2.1 Pressure Falloff Testing

Falloff tests provide reservoir pressure data and characterize both injectivity and the completion condition of the injection well. Per WQRR Chapter 24, Section 17(d) and 20(b)(vii), a baseline pressure falloff test will be conducted prior to injection and at least once every five years, unless other monitoring is providing the same information, or more frequent testing is required by the Administrator. Frontier Carbon Solutions Holdings, LLC (FCS) will notify the WDEQ at least 30 days prior to conducting the test.

Pressure Falloff Testing Procedure

The test includes a period of constant injection followed by a shut-in period. The pressure during the injection and shut-in is recorded. During the shut-in period, the pressure declines or falls off, hence the name of the test. Injection rate and injection time are based on the estimated properties of each injection zone determined from analyzing the logs and core data. This injection rate should be high enough and maintained for a sufficient duration to produce a measurable pressure transient in order to get good data from the falloff test. The falloff portion of the test will be conducted for a sufficient length of time such that the pressure is no longer influenced by wellbore storage effects. Pressure data will be recorded during the pressure falloff test at the bottomhole and wellhead using the tandem bottomhole pressure (BHP) gauges and wellhead pressure (WHP) gauge, respectively. If analysis of the data shows that the BHP and WHP gauges give the same results, future tests may be conducted with just one or the other data recording location. Results will be provided to the WDEQ within 30 days following the test.

5.2.2 Cement Evaluation and Casing Logs

Cement placement must be evaluated to ensure the mechanical support of the casing, protection against fluid corrosion, and isolation of permeable zones across varying pressure regimes to prevent hydraulic communication. Per WQRR Chapter 24, Sections 17(a)(ii)(B) and 17(a)(iii)(B), a cement bond and variable density log, or other approved devices will be run in addition to a temperature log. These logs will be used to evaluate cement quality radially with sufficient resolution to identify channels, voids, or other areas of missing cement and a temperature log after the casing is set and cemented.

Casing inspection logs will be run after the surface and long string casing is set and cemented. If required by the Administrator per WQRR Chapter 23, Sections 19(d) and 20(vi), a casing inspection log will be run to determine the presence or absence of corrosion in the long-string casing. Testing results will be provided to the Administrator within 30 days of testing.

5.2.3 Mechanical Integrity Testing

Mechanical integrity testing will be conducted before the initial injection begins, and at least once per year to demonstrate the mechanical integrity of the casing, tubing, and packer per WWQR Chapter 24, Section 19(c). Mechanical integrity will be evaluated through an approved tracer survey such as an oxygen-activation log, a temperature, noise log or pulsed neutron log. Testing results will be provided to the Administrator within 30 days of testing.

5.2.4 External Mechanical Integrity Testing

External mechanical integrity will be evaluated to ensure there is no significant hydraulic communication into a USDW. Testing will be conducted prior to commencement of injection operations to acquire baseline data for future comparison, and at least once per year until the injection well is plugged as required per WQRR Chapter 24, Section 19(c) and 20(b)(v). External mechanical integrity testing will be performed through the monitoring of injection activities, and a temperature log.

5.3 Corrosion Monitoring and Prevention Plan

Corrosion monitoring provides a measure of the loss of mass of the wellbore materials over time due to interaction of the wellbore with the injected CO_2 stream and formation fluids. Corrosion monitoring will be conducted using the corrosion coupon method of samples collected according to the description below. During the injection well operation, well materials will be monitored on a scheduled basis for loss of mass, thickness, cracking, pitting, and other signs of corrosion to ensure the well components meet the minimum standards for material strength and performance.

5.3.1 Corrosion Monitoring Plan

Throughout the operational life of the wells, corrosion monitoring of materials that are representative of the flow line and injection well will be conducted at least quarterly for loss of mass, loss of thickness, cracking, pitting, and other signs of corrosion to ensure the well components meet the minimum requirements per WQRR Chapter 24, Section 14(b). The corrosion coupons will be prepared, installed, and analyzed in accordance with National Association of Corrosion Engineers (NACE) Standard RP0775 (Preparation, Installation, Analysis, and Interpretation of Corrosion Coupons in Oilfield Operations) and/or American Society of Testing and Materials (ASTM) Method G1-03 (Standard Practice of Preparing, Cleaning, and Evaluating Corrosion Test Specimens) to determine and document corrosion loss rates based on mass loss. The testing will be performed on the captured CO_2 gas stream at the beginning of the flow line to the injection wellhead. The QA/QC procedures specified in the NACE and ASTM methods will be followed.

5.3.2 Corrosion Prevention Plan

Results of the CO_2 injectant composition analysis will be evaluated for compatibility with the reservoir and the metallurgy of well construction materials. The primary actions taken to prevent corrosion include: (1) maintaining a low moisture content in the injected CO_2; and (2) using CO_2-resistant construction materials in both the flow line and injection well. The

injection well tubulars will use materials manufactured to American Petroleum Institute (API) 5CT (Casing and Tubing Specification) and International Organization for Standardization (ISO) 11960 specifications. The cement and additives will comply with API 10A (Specification for Cements and Materials for Well Cementing).

If corrosion monitoring results indicate the gas composition requires treatment, removal of corrosive constituents from the CO_2 stream may be necessary using a variety of methods: (1) dehydration of the gas when water is present (e.g., water separator, coalescers, filters, glycol, or dry desiccant); and (2) corrosion inhibitor packages (anodic, cathodic, or both). Should this be necessary, deployment methods will be chosen by the appropriate vendor that has designed a catered approach to removing corrosive components from the CO_2 stream. Over time, the effectiveness of the catered design will be evaluated based on the corrosion monitoring results, and the corrosion removal methods will be adjusted accordingly.

5.3.3 Additional Wellbore Tests

Wireline logs will be used to investigate downhole corrosion to supplement surface measurements. Downhole logging data will be performed prior to commencing injection operations. These logs will provide a baseline casing thickness measurement to which future logs will be compared. These logs can be used to verify readings obtained from surface monitoring equipment. Logging tools that may be used to monitor downhole corrosion include ultrasonic imaging tool, magnetic flux leakage, and electromagnetic imaging as these technologies are proven and widely accepted within the industry for their accuracy in determining casing thickness and identifying casing corrosion.

5.4 Surface Leak Detection and Monitoring Plan

Pressure monitoring and flowmeter readings will be utilized to detect surface leaks at the wellhead. Inspection logs and records will be kept and maintained until site closure and made available upon request. Any detected surface leaks shall be immediately reported.

5.5 Subsurface Leak Detection and Monitoring Plan

The purpose of the pressure fall-off test is to identify injection interval characteristics (reservoir pressure, transmissibility, etc.) and/or near-wellbore effects (skin, etc.). The injection zone pressure fall-off test will be performed in the injection well prior to initiation of CO_2 injection activities. During the period of active injection, reservoir conditions will be monitored through daily records of well injection rates and pressure. Depending on well monitoring systems in and on the well, adequate reservoir information may be collected during process upsets or planned maintenance, but in the absence of this data giving adequate description of the interval characteristics, a falloff test will be carried out at least once every five years thereafter to demonstrate storage reservoir injectivity in the near-wellbore environment.

Monitor wells will be constructed with pressure and temperature gauges and monitored for any changes that would indicate movement of CO_2 into the lowermost USDW. Data obtained from these wells will be used to validate and calibrate the plume model.

5.6 Near-Surface Monitoring: Groundwater and Soil Gas

The Near-surface Sampling and Analysis Plan (Near-Surface SAP) discussed herein comprises: (1) sampling of shallow groundwater aquifers; and (2) sampling of soil gas in the shallow vadose zone. Sampling and chemical analysis of these zones provide concentrations of chemical constituents, including CO_2, which are focused on detecting movement of the CO_2 out of the reservoir. Ultimately, these monitoring efforts will provide data to confirm that near surface environments are not adversely impacted by CO_2 injection and storage operations. Details on the Near-surface SAP is discussed in detail in ***Form A-9, Proposed Quality Assurance Surveillance Plan (QASP)***.

5.6.1 Completed Baseline Sampling Program: Groundwater and Soil Gas

The Near-Surface SAP is designed to acquire accurate baseline groundwater and soil gas data in which to compare future test results and monitor any movement of the CO_2 outside of the storage reservoir in support of the testing and monitoring program throughout all phases of the project life (development and pre-injection, operation or injection, and post-injection). The near-surface environment includes the shallowest groundwater below the water table, and the vadose zone between the water table and the ground surface.

Sampling locations, frequency, and analyses will be determined based on proximity to the most likely potential CO_2 migration pathways such as wellbores across the PSG Area of Review (AoR). Baseline groundwater and soil gas data collection frequency will account for seasonal fluctuations.

Groundwater sampling and analyses will be conducted to establish baseline concentrations. These will be taken from multiple locations in and around the injection site over several months to account for seasonal fluctuations. All groundwater and soil gas analyses will be conducted in accordance with standard procedures to as defined in **Tables A-5.3** through **Table A-5.4**.

Table A-5.3. Baseline Groundwater Sampling Results

Parameter	**pH (s.u.)**			**SpC (mS/cm)**			**Alkalinity as $CaCO_3$ (mg/L)**		
Well No.	Date	Date	Date	Date	Date	Date	Date	Date	Date
TBD									

Note: Baseline results to be determined.

Table A-5.4. Baseline Soil Gas Sampling Results

Sample No.	Date	**CO_2 (%)**	**O_2 (%)**	**N_2 (%)**
TBD				

Note: Baseline results to be determined.

5.6.2 Near-Surface Monitoring Plan: Groundwater and Soil Gas

Proposed sampling locations are shown on the map in **Figure A-5.1**. **Table A-5.5** summarizes the Near-surface SAP by project phase.

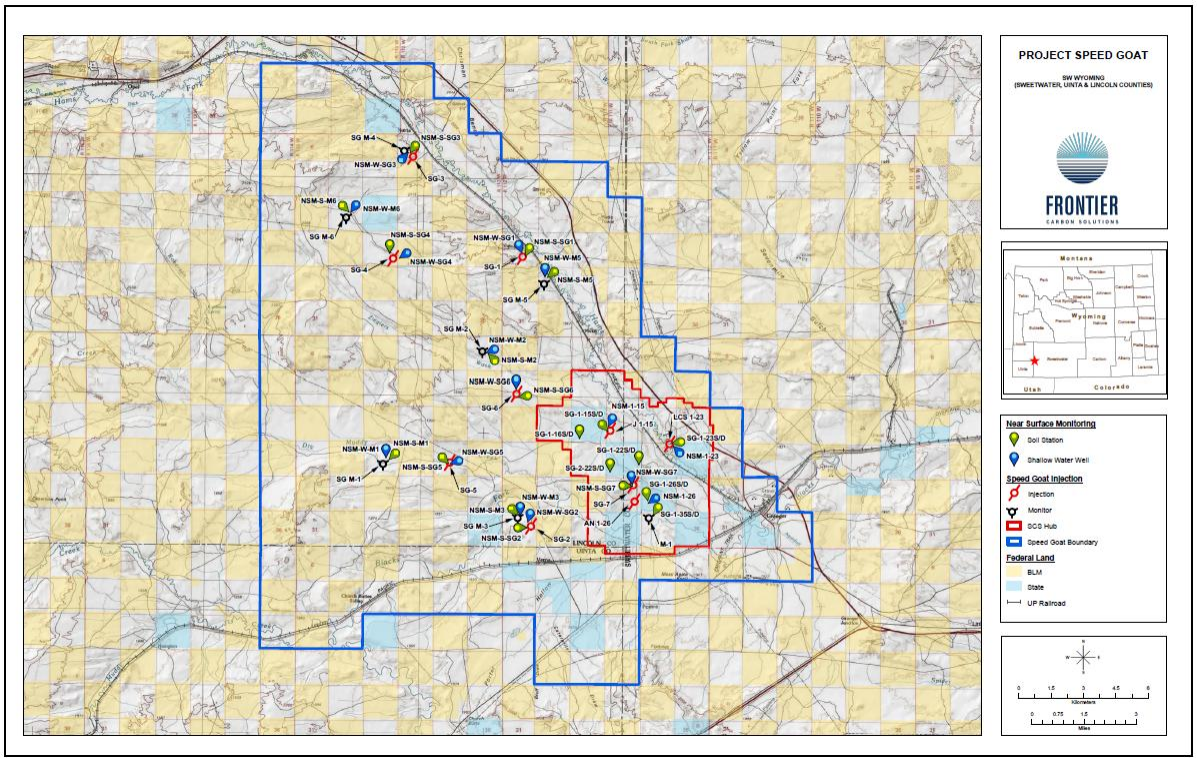


Figure A-5.1. *Proposed Near-Surface Monitoring Groundwater and Soil Gas Locations.*

Table A-5.5. Near-Surface Sampling and Analysis Plan Monitoring Frequency and Analytical Parameters		
Well Type	**Frequency**	**Laboratory Analytical Parameter**
Baseline Monitoring		
Existing Water	Twice at least three months apart	• WDEQ/WQD Chapter 8, Table 1 Use Suitability Parameters • Specific Conductivity • Alkalinity (Total Carbonate and Bicarbonate) • Total Inorganic Carbon
	Once	• Volatile organic compounds (VOCs)
Near-Surface Monitor	Quarterly for one year	• WDEQ/WQD Chapter 8, Table 1 Use Suitability Parameters • Specific Conductivity • Alkalinity (Total Carbonate, and Bicarbonate) • Total Inorganic Carbon
	Once	• VOCs
Soil Gas Profile Station		• N_2 • O_2 • CO_2
Injection Monitoring		
Existing Water	Annually	• WDEQ/WQD Chapter 8, Table 1 Use Suitability Parameters • Specific Conductivity • Alkalinity (Total Carbonate and Bicarbonate) • Total Inorganic Carbon
Near-Surface Monitor	Quarterly (field measurements[2])	• Depth to Water • pH • Specific Conductivity
	Annually	• Specific Conductivity • Alkalinity (Total Carbonate and Bicarbonate) • Total Inorganic Carbon
Soil Gas Profile Station	Quarterly for the first year of injection, then annually	• N_2 • O_2 • CO_2
Post-Injection Site Care Monitoring		
Existing Water	Annually for five years, then every five years until site closure	• WDEQ/WQD Chapter 8, Table 1 Use Suitability Parameters • Specific Conductivity • Alkalinity (Total Carbonate and Bicarbonate) • Total Inorganic Carbon
Near-Surface Monitor	Annually for five years, then every five years until site closure	• pH • Specific Conductivity • Alkalinity (Total Carbonate and Bicarbonate) • Total Inorganic Carbon
Soil Gas Profile Station	Annually for five years, then every five years until site closure	• N_2 • O_2 • CO_2

5.7 Deep Surface Monitoring of Free-Phase CO_2 Plume and Pressure Front

The CO_2 plume and associated pressure front will be monitored through direct and indirect monitoring methods throughout the injection and post-injection phases of the Project. Monitoring data will be used to calibrate plume models through history matching. The geologic storage complex will be assessed to determine whether injection and storage performance is as modeled. Should observations of the geologic storage complex vary from the permitted models and simulations, additional studies will be conducted to address the variations and ensure lateral and vertical containment and confinement of CO_2. **Figure A-5.2** and **Figure A-5.3** show the predicted CO_2-modeled plumes after 1 year of CO_2 injection, at injection cessation at year 20, and upon CO_2 plume stabilization and at years 2046 and 2066 during the PISC phase for both the Madison and Nugget injection zones, respectively.

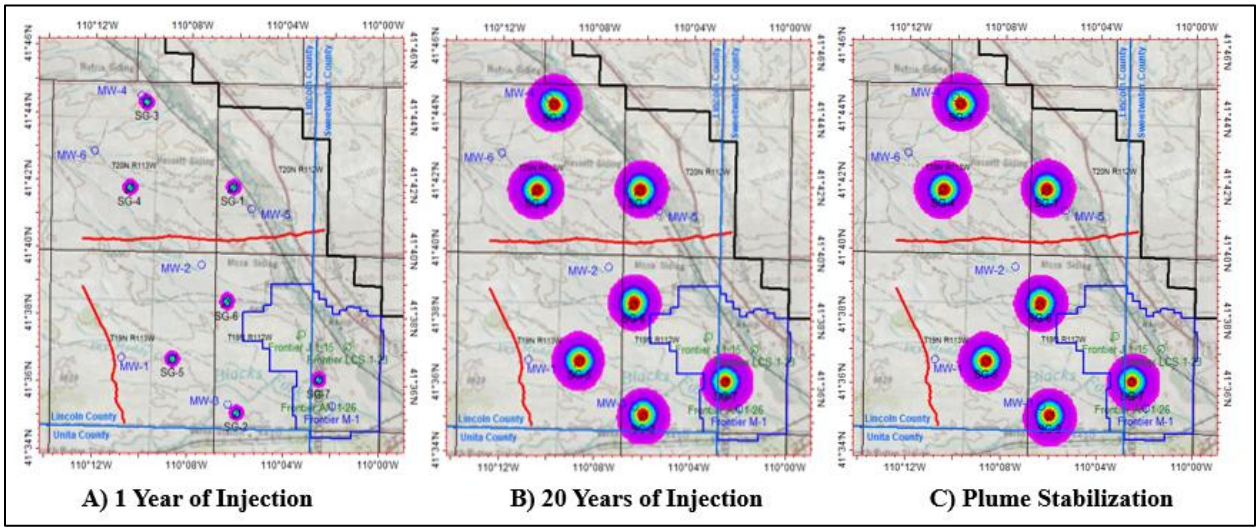


Figure A-5.2. *Map showing the Madison CO_2 plumes at 1 year of injection (A), injection cessation at year 20 (B), and at plume stabilization in the PISC phase at year 2046, which is 1 year post-injection (C).*

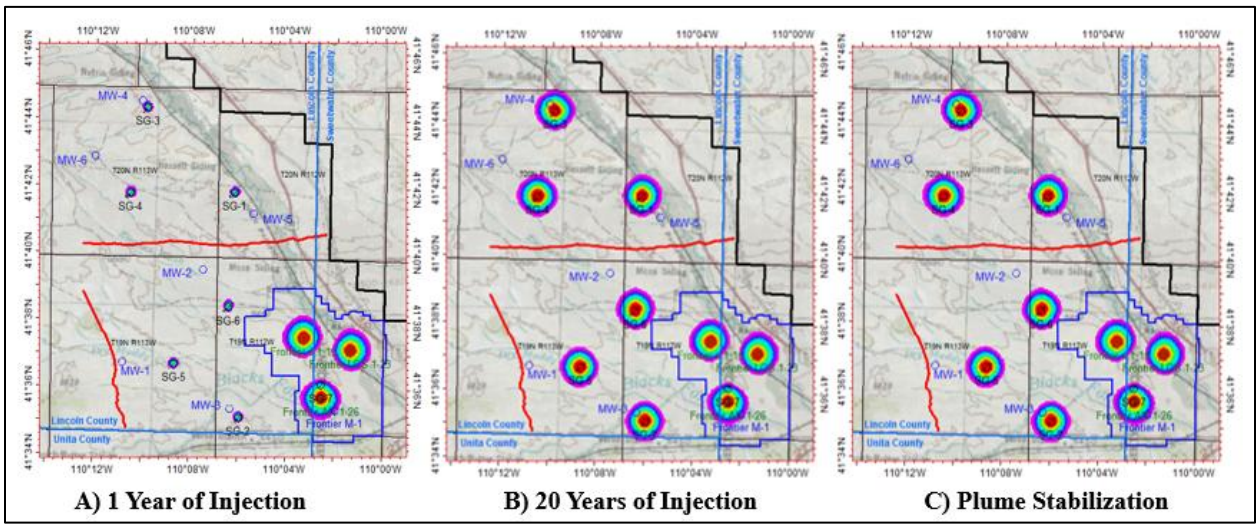


Figure A-5.3*. Map showing the Nugget CO_2 plumes at 1 year of injection (A), injection cessation at year 20 (B), and at plume stabilization in PISC at year 2066, which is 1 year post-injection (C).*

Any modifications to the simulation models, potential re-delineation of the AoR, and subsequent modifications to monitoring programs will be documented and submitted to the WDEQ Administrator for review and approval. A description of the monitoring methods is presented in **Table A-5.6**.

Table A-5.6. Deep-Surface Description of Monitoring Program			
Monitoring Type	**Pre-operational (Baseline)**	**Operational**	**Post-Operational**
Storage Reservoir Monitoring			
Monitoring During Injection Well Operations: • Flow rates • Volumes • Surface injection pressure • Surface injectate temperature • Annulus pressure, between tubing and long-string • Added annulus volumes	Duration: Prior to injection Frequency: Continuous monitoring	Duration: During injection Frequency: Continuous monitoring	Duration: Plugged and abandoned (P&A) after injection operations cease Frequency: Continuous monitoring until well P&A
Packer Fluid (Corrosion Inhibitor) Volume	Duration: 24-hour minimum recording Frequency: Four hours minimum sampling frequency	Duration: 24-hour minimum recording Frequency: Four hours minimum sampling frequency	Duration: P&A after injection operations cease Frequency: Continuous monitoring until well P&A
Downhole Monitoring (Injection Well and Monitoring Well(s))			
Downhole Pressure and Temperature Gauge	Duration: Prior to injection for baseline measurements	Duration: Continuous monitoring during injection	Duration: Pressure and temperature monitoring until plume stabilization Frequency: Monitoring to continue throughout post-injection site care
Wireline Logging and Retrievable Monitoring			
Internal Mechanical Integrity: Tubing-Casing Annulus Pressure Test	Duration: Prior to injection Frequency: Once	Duration: During injection Frequency: Perform during well workovers	Duration: Five years post-injection Frequency: Perform during workovers Not applicable after P&A

Table A-5.6. Deep-Surface Description of Monitoring Program			
Monitoring Type	**Pre-operational (Baseline)**	**Operational**	**Post-Operational**
External Mechanical Integrity	Duration: Prior to injection Frequency: Once	Duration: During injection Frequency: Every five years; perform during well workovers	Duration: • After injection operations cease, before injection well P&A • Monitor well – At the end of injection and every five years until plume stabilization Frequency: Perform during workovers Not applicable after P&A
Pressure Fall-Off Test (Injection Zone)	Duration: To be determined Frequency: Before injection	Duration: 72 hours, to be adjusted based on pre-operational Fall-Off test Frequency: Every five years	Not applicable after P&A
Corrosion Monitoring	Duration: Prior to injection for baseline measurements Frequency: Once	Duration: During injection Frequency: Quarterly sampling	Not applicable after P&A
Geophysical Monitoring			
3-D Vertical Seismic Profile (3-D VSP)	Duration: Baseline 3-D VSPs will be acquired for each injection well Frequency: N/A	Duration: Once Frequency: N/A	Duration: Once to confirm plume stabilization Frequency: N/A

5.8 Above Confining Zone Monitoring

Monitoring wells will be placed at a distance and direction from the injection wells to optimize verification and calibration of the target reservoirs. The distance and direction of the monitoring wells are sited where the model predicts detectable pressure changes or a CO_2 saturation of 2% post-injection. Monitor wells 1 and 2 were chosen to be outside the CO_2 plumes to aid with modelling of the pressure field by monitoring the more distal pressure increase from CO_2 injection.

The wells will be instrumented with pressure and temperature gauges for continuous monitoring. Pressure, temperature, and acoustic monitoring will provide early warning of parameters outside of the predicted model and operational limits. **Figure A-5.4** shows locations of proposed PSG injection and monitor wells.

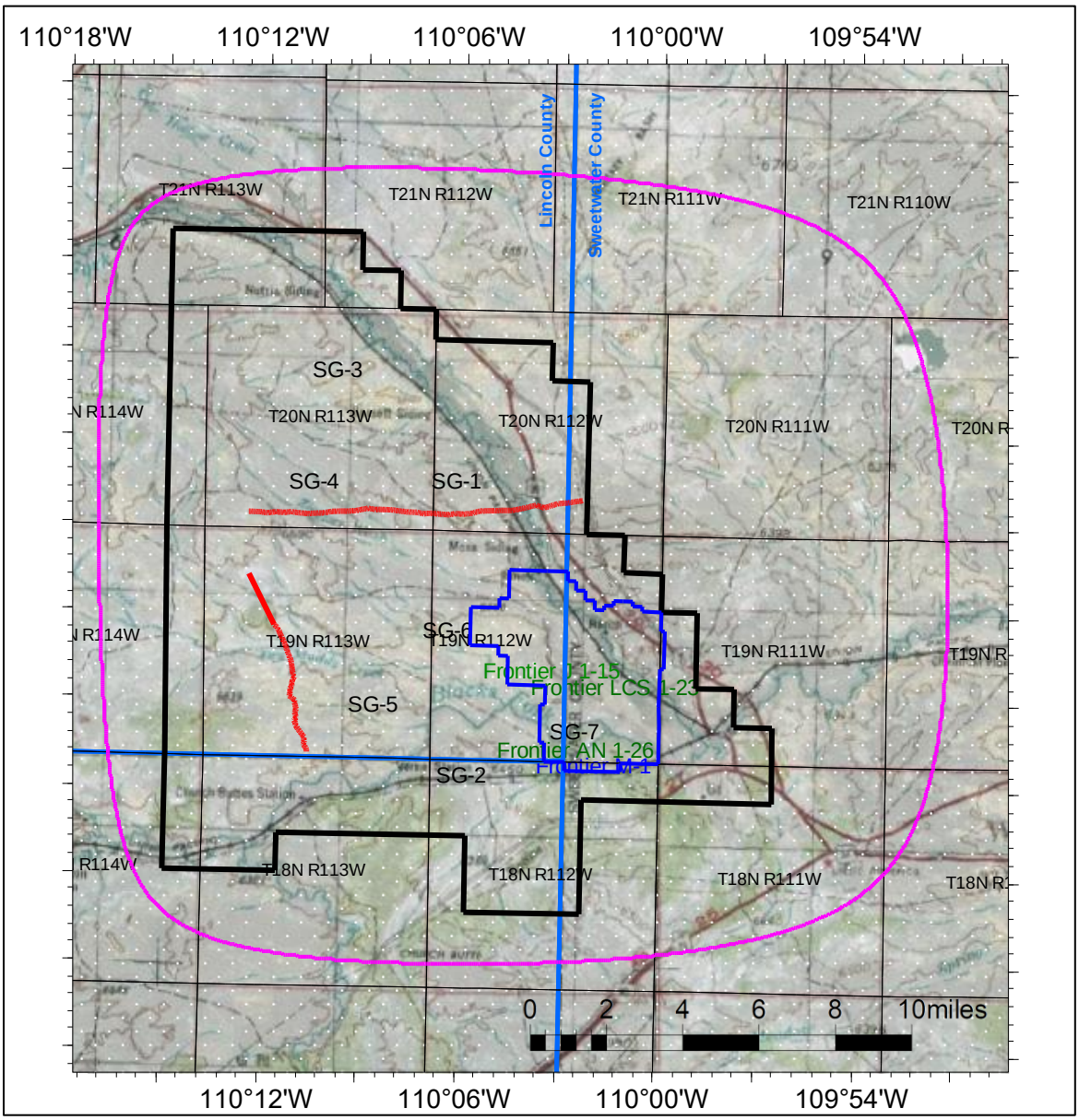


Figure A-5.4. *PSG proposed injection and monitor well map.*

All monitor wells will be designed to sample the lowermost USDW; the lowermost USDW will be verified during the drilling and construction of the proposed injection wells.

Data observations from the deep subsurface monitor wells will be used in combination with the near-surface monitoring program to validate project models. Should there be any deviations from baseline measurements or predicted modeled assumptions, additional sampling, testing, and

analysis may be necessary. If variances exceed baseline ranges, next steps will be taken to identify potential events that may have occurred and actions and responses to follow as outlined in ***Form A-3, Emergency and Remedial Response (ERRP) Plan***.

5.9 Direct Monitoring Methods

Direct methods used to monitor the reservoir during injection well operations will include temperature sensors run on fiber optic cable behind the casing in the injection wells. Downhole pressure will be monitored using a ported thru-tubing gauge above the packer, allowing the data cable to be run on the outside of the injection tubing string. The gauges will continuously monitor and provide data in real time. Temperatures and pressures will be continuously monitored to gauge the performance of the geologic storage complex and provide insight and early warning should there be unexpected migration of fluids outside the storage reservoir. **Table A-5.6** describes the planned direct monitoring methods.

5.10 Indirect Monitoring Methods

The CO_2 plume will be monitored using 3-D VSP to image near the wellbore to monitor the CO_2 during injection. Before injection begins at each well location, a 3-D VSP baseline survey will be acquired using optical distributed acoustic sensing (DAS) fiber permanently installed in the borehole. Once CO_2 plume development exceeds the resolution of the 3-D VSP capabilities, 2-D time-lapse seismic surveys may be incorporated into indirect reservoir monitoring as needed. This data will be interpreted, integrated with other data acquired, modeled, and compared to baseline seismic surveys to determine the extent of the CO_2 plume. The results will also be used to refine the plume model and update the AoR as needed. This same workflow will be used during the PISC period to confirm plume stabilization.

5.11 Reporting and Notice Requirements

All monitoring reporting and notifications will meet the requirements and timelines of WQRR Chapter 24 Section 22 and include at least the following:

- Semi-annual reports submitted to the Administrator within 30 days following the end of the period covered in the report:
    - Any changes to the physical, chemical, and other relevant characteristics of the carbon dioxide stream from the proposed operating data;
    - Monthly average, maximum, and minimum values for injection pressure, flow rate and volume, and annular pressure;
    - A description of any event that exceeds operating parameters for annulus pressure or injection pressure as specified in the permit;
    - A description of any event that triggers a shutdown device required pursuant to Section 18(g) of WWQRR Chapter 24, and the response taken;
    - The monthly volume of the carbon dioxide stream injected over the reporting period and project cumulatively;
    - Monthly annulus fluid volume added; and
    - The results of monitoring required by WWQR Chapter 24 Section 20.

- Reports (within 30 days):
    - Periodic tests of mechanical integrity;
    - Any other test of the injection well conducted by the owner or operator if required by the Administrator; and
    - Any well workover.

- Reports (within 24 hours):
    - Any evidence that the injected CO_2 stream or associated pressure front may cause an endangerment to a USDW;
    - Any noncompliance with a permit condition, or malfunction of the injection system, which may cause fluid migration into or between USDWs;
    - Any triggering of a shut-off system, either down-hole or at the surface;
    - Any release of carbon dioxide to the atmosphere or biosphere indicated by the surface air or soil gas monitoring or other monitoring technology required by WWQR Chapter 24 Section 20(b)(ix);
    - Any failure to maintain mechanical integrity.

- The Administrator will be notified in writing 30 days in advance of:
    - Any planned well workover;
    - Any planned stimulation activities;
    - Any other planned test of the injection well.

- All required reports, submittals, and notifications will be submitted in a format approved by the Administrator.
- A written report will be submitted to the Administrator of all remedial work concerning the failure of equipment or operational procedures that resulted in a violation of a permit condition at the completion of the remedial work.
- For any aborted or curtailed operation, a complete report will be provided to the Administrator within 30 days of complete termination of the discharge or associated activity.

APPENDIX A-5

PROPOSED TESTING AND MONITORING PLAN

TABLE OF CONTENTS

LIST OF TABLES

Table A-5.1. Overview of the Monitoring Program 1

Table A-5.2. Chemical Components Targeted for Characterization in the Injected CO_2 2

Table A-5.3. Baseline Groundwater Sampling Results 2

Table A-5.4. Baseline Soil Gas Sampling Results 2

Table A-5.5. Near-Surface Sampling and Analysis Plan Monitoring Frequency and Analytical Parameters 3

Table A-5.6. Deep-Surface Description of Monitoring Program 4

LIST OF FIGURES

Figure A-5.1. Proposed Near-Surface Monitoring Groundwater and Soil Gas Locations 5

Figure A-5.2. Map showing the Madison CO_2 plumes at 1 year of injection (A) 6

Figure A-5.2. Map showing the Madison CO_2 plumes at injection cessation at year 20 (B) 7

Figure A-5.2. Map showing the Madison CO_2 plumes at plume stabilization in the PISC phase at year 2046, which is 1 year post-injection (C) 8

Figure A-5.3. Map showing the Nugget CO_2 plumes at 1 year of injection (A) 9

Figure A-5.3. Map showing the Nugget CO_2 plumes at injection cessation at year 20 (B 10

Figure A-5.3. Map showing the Nugget CO_2 plumes at plume stabilization in PISC at year 2066, which is 1 year post-injection (C) 11

Figure A-5.4. PSG proposed injection and monitor well map 12

TABLES

Table A-5.1. Overview of the Monitoring Program				
Monitoring Type	**Device(s)**	**Target Structure/Project Area**	**Min. Sampling Frequency**	**Min. Recording Frequency**
Analysis of Injected CO_2	• CO_2 sampling station	Wellhead	TBD	TBD
CO_2 Flow Line	• Corrosion coupon monitoring	Capture facility to the well site	Continuous	Continuous
Continuous Recording of Injection Pressure, Rate, and Volume	• Surface pressure and temperature gauges • Continuous monitoring	Surface-to-reservoir (injection well)	Continuous	Continuous
Well Annulus Pressure Between Tubing and Casing	• Surface pressure and temperature gauges • Continuous monitoring	Surface-to-reservoir (injection well)	Continuous	Continuous
Near-Surface Monitoring	• Groundwater monitor wells	Near-surface environment, USDWs	**Table A-5.5**	**Table A-5.5**
Direct Reservoir Monitoring	• Fiber and gauges installed on wells – Temperature and pressure • Fall-off test	Storage reservoir and primary sealing formation	Continuous	Continuous
Indirect Reservoir Monitoring	• Pulsed neutron logging • Vertical seismic profile (VSP)	Sequestration complex	**Table A-5.6**	**Table A-5.6**
Internal and External Mechanical Integrity	• Annulus pressure test • Casing inspection • Casing bond log (CBL) • Electromagnetic imaging tool (EMIT), and/or magnetic flux leakage (MFL) • Oxygen activation log • Acoustic (or noise) log coupled with temperature log • Ultrasonic log • Pulsed neutron logging	Well infrastructure	**Table A-5.6**	**Table A-5.6**
Corrosion Monitoring	• Corrosion coupon	Well infrastructure	**Table A-5.6**	**Table A-5.6**

Table A-5.2. Chemical Components Targeted for Characterization in the Injected CO_2	
Parameter	**Analytical Method(s)**
CO_2	TBD
Ethane	TBD
Propane	TBD
n-Butane	TBD
Hydrogen	TBD
Nitrogen	TBD
Methane	TBD
Oxygen	TBD
Water, ppm	TBD

Table A-5.3. Baseline Groundwater Sampling Results									
Parameter	**pH (s.u.)**			**SpC (mS/cm)**			**Alkalinity as $CaCO_3$ (mg/L)**		
Well No.	Date	Date	Date	Date	Date	Date	Date	Date	Date
TBD									

Note: Baseline results to be determined.

Table A-5.4. Baseline Soil Gas Sampling Results				
Sample No.	Date	**CO_2 (%)**	**O_2 (%)**	**N_2 (%)**
TBD				

Note: Baseline results to be determined.

Table A-5.5. Near-Surface Sampling and Analysis Plan Monitoring Frequency and Analytical Parameters		
Well Type	**Frequency**	**Laboratory Analytical Parameter**
Baseline Monitoring		
Existing Water	Twice at least three months apart	• WDEQ/WQD Chapter 8, Table 1 Use Suitability Parameters • Specific Conductivity • Alkalinity (Total Carbonate and Bicarbonate) • Total Inorganic Carbon
	Once	• Volatile organic compounds (VOCs)
Near-Surface Monitor	Quarterly for one year	• WDEQ/WQD Chapter 8, Table 1 Use Suitability Parameters • Specific Conductivity • Alkalinity (Total Carbonate, and Bicarbonate) • Total Inorganic Carbon
	Once	• VOCs
Soil Gas Profile Station		• N_2 • O_2 • CO_2
Injection Monitoring		
Existing Water	Annually	• WDEQ/WQD Chapter 8, Table 1 Use Suitability Parameters • Specific Conductivity • Alkalinity (Total Carbonate and Bicarbonate) • Total Inorganic Carbon
Near-Surface Monitor	Quarterly (field measurements[2])	• Depth to Water • pH • Specific Conductivity
	Annually	• Specific Conductivity • Alkalinity (Total Carbonate and Bicarbonate) • Total Inorganic Carbon
Soil Gas Profile Station	Quarterly for the first year of injection, then annually	• N_2 • O_2 • CO_2
Post-Injection Site Care Monitoring		
Existing Water	Annually for five years, then every five years until site closure	• WDEQ/WQD Chapter 8, Table 1 Use Suitability Parameters • Specific Conductivity • Alkalinity (Total Carbonate and Bicarbonate) • Total Inorganic Carbon
Near-Surface Monitor	Annually for five years, then every five years until site closure	• pH • Specific Conductivity • Alkalinity (Total Carbonate and Bicarbonate) • Total Inorganic Carbon
Soil Gas Profile Station	Annually for five years, then every five years until site closure	• N_2 • O_2 • CO_2

Table A-5.6. Deep-Surface Description of Monitoring Program			
Monitoring Type	**Pre-operational (Baseline)**	**Operational**	**Post-Operational**
Storage Reservoir Monitoring			
Monitoring During Injection Well Operations: • Flow rates • Volumes • Surface injection pressure • Surface injectate temperature • Annulus pressure, between tubing and long-string • Added annulus volumes	Duration: Prior to injection Frequency: Continuous monitoring	Duration: During injection Frequency: Continuous monitoring	Duration: Plugged and abandoned (P&A) after injection operations cease Frequency: Continuous monitoring until well P&A
Packer Fluid (Corrosion Inhibitor) Volume	Duration: 24-hour minimum recording Frequency: Four hours minimum sampling frequency	Duration: 24-hour minimum recording Frequency: Four hours minimum sampling frequency	Duration: P&A after injection operations cease Frequency: Continuous monitoring until well P&A
Downhole Monitoring (Injection Well and Monitoring Well(s))			
Downhole Pressure and Temperature Gauge	Duration: Prior to injection for baseline measurements	Duration: Continuous monitoring during injection	Duration: Pressure and temperature monitoring until plume stabilization Frequency: Monitoring to continue throughout post-injection site care
Wireline Logging and Retrievable Monitoring			
Internal Mechanical Integrity: Tubing-Casing Annulus Pressure Test	Duration: Prior to injection Frequency: Once	Duration: During injection Frequency: Perform during well workovers	Duration: Five years post-injection Frequency: Perform during workovers Not applicable after P&A

Table A-5.6. Deep-Surface Description of Monitoring Program			
Monitoring Type	**Pre-operational (Baseline)**	**Operational**	**Post-Operational**
External Mechanical Integrity	Duration: Prior to injection Frequency: Once	Duration: During injection Frequency: Every five years; perform during well workovers	Duration: • After injection operations cease, before injection well P&A • Monitor well – At the end of injection and every five years until plume stabilization Frequency: Perform during workovers Not applicable after P&A
Pressure Fall-Off Test (Injection Zone)	Duration: To be determined Frequency: Before injection	Duration: 72 hours, to be adjusted based on pre-operational Fall-Off test Frequency: Every five years	Not applicable after P&A
Corrosion Monitoring	Duration: Prior to injection for baseline measurements Frequency: Once	Duration: During injection Frequency: Quarterly sampling	Not applicable after P&A
Geophysical Monitoring			
3-D Vertical Seismic Profile (3-D VSP)	Duration: Baseline 3-D VSPs will be acquired for each injection well Frequency: N/A	Duration: Once Frequency: N/A	Duration: Once to confirm plume stabilization Frequency: N/A

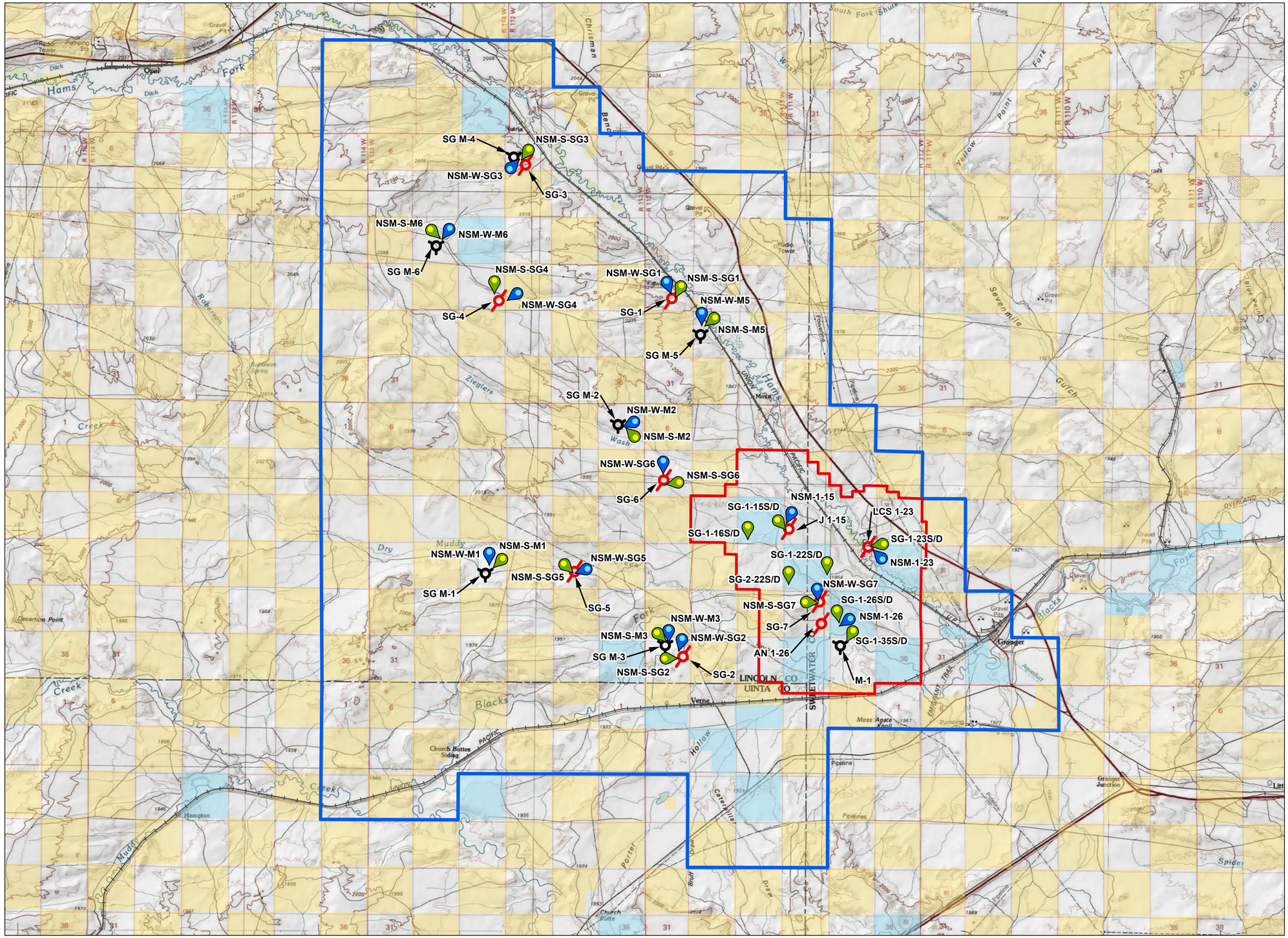
FIGURES

PROJECT SPEED GOAT

Figure A-5.1. Proposed Near-Surface Monitoring Groundwater and Soil Gas Locations

SW WYOMING
(SWEETWATER, UINTA & LINCOLN COUNTIES)

FRONTIER
CARBON SOLUTIONS





Near Surface Monitoring

- Soil Station
- Shallow Water Well

Speed Goat Injection

- Injection
- Monitor
- SCS Hub
- Speed Goat Boundary

Federal Land

- BLM
- State
- UP Railroad

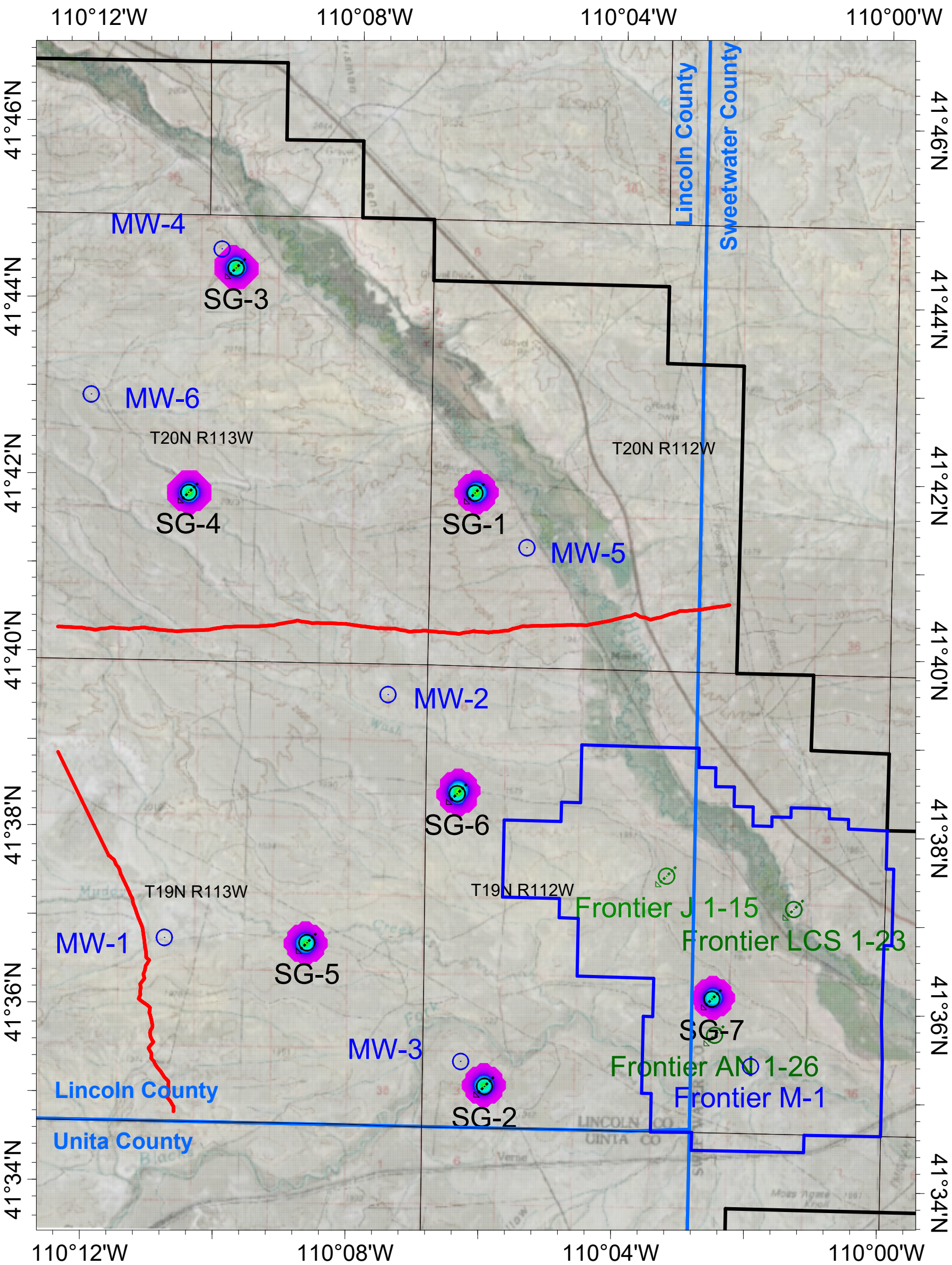
N
W E
S

0 1.5 3 4.5 6
Kilometers

0 0.75 1.5 3
Miles

Madison

1 Year of Injection



Symbol legend

- WY Counties
- WY T & R
- Project Speedgoat (PSG)
- SCS Hub
- W-E Madison Faulting
- SW Nugget Faulting
- Planned gas injector
- Monitor Well

Gas Saturation > 2%

90
72
54
36
18

Madison

20 Years of Injection

110°12'W 110°08'W 110°04'W 110°00'W

41°46'N 41°44'N 41°42'N 41°40'N 41°38'N 41°36'N 41°34'N

Lincoln County

Sweetwater County

MW-4

SG-3

MW-6

T20N R113W

SG-4

SG-1

T20N R112W

MW-5

MW-2

SG-6

T19N R113W

T19N R112W

MW-1

SG-5

Frontier J 1-15

Frontier LCS 1-23

SG-7

MW-3

Frontier AN 1-26

Frontier M-1

SG-2

Lincoln County

Unita County

LINCOLN CO
UINTA CO

0 0.5 1 1.5 2 2.5miles

Symbol legend

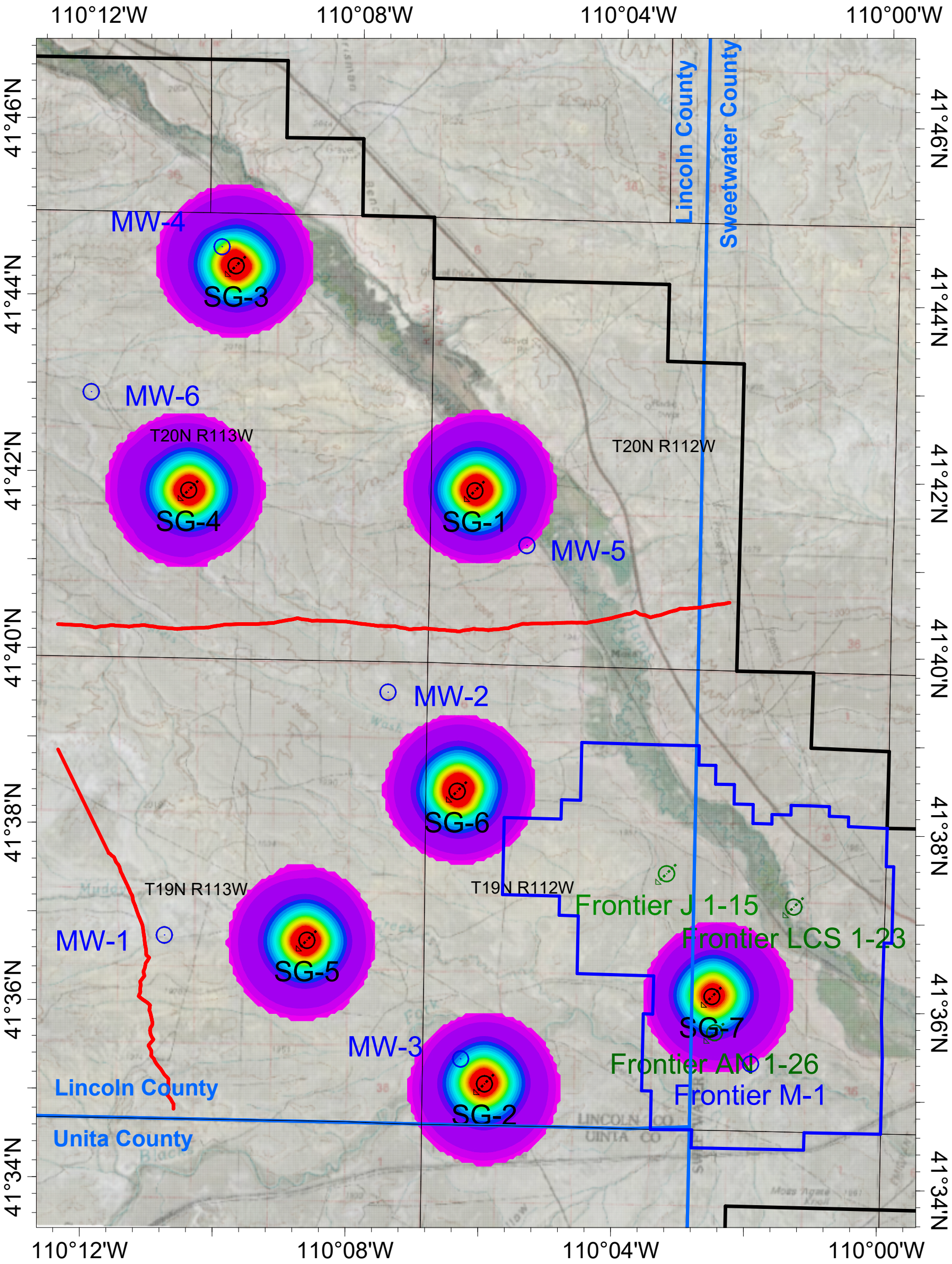
- WY Counties
- WY T & R
- Project Speedgoat (PSG)
- SCS Hub
- W-E Madison Faulting
- SW Nugget Faulting
- Planned gas injector
- Monitor Well

Gas Saturation > 2%

100
80
60
40
20

Madison

Plume Stabilization



Nugget

1 Year of Injection

110°12'W 110°08'W 110°04'W 110°00'W

41°46'N 41°44'N 41°42'N 41°40'N 41°38'N 41°36'N 41°34'N

Lincoln County

Sweetwater County

MW-4

SG-3

MW-6

T20N R113W

T20N R112W

SG-4

SG-1

MW-5

MW-2

SG-6

T19N R113W

T19N R112W

Frontier J 1-15

Frontier LCS 1-23

MW-1

SG-5

SG-7

MW-3

Frontier AN 1-26

Frontier M-1

Lincoln County

SG-2

Unita County

0 0.5 1 1.5 2 2.5miles

Symbol legend

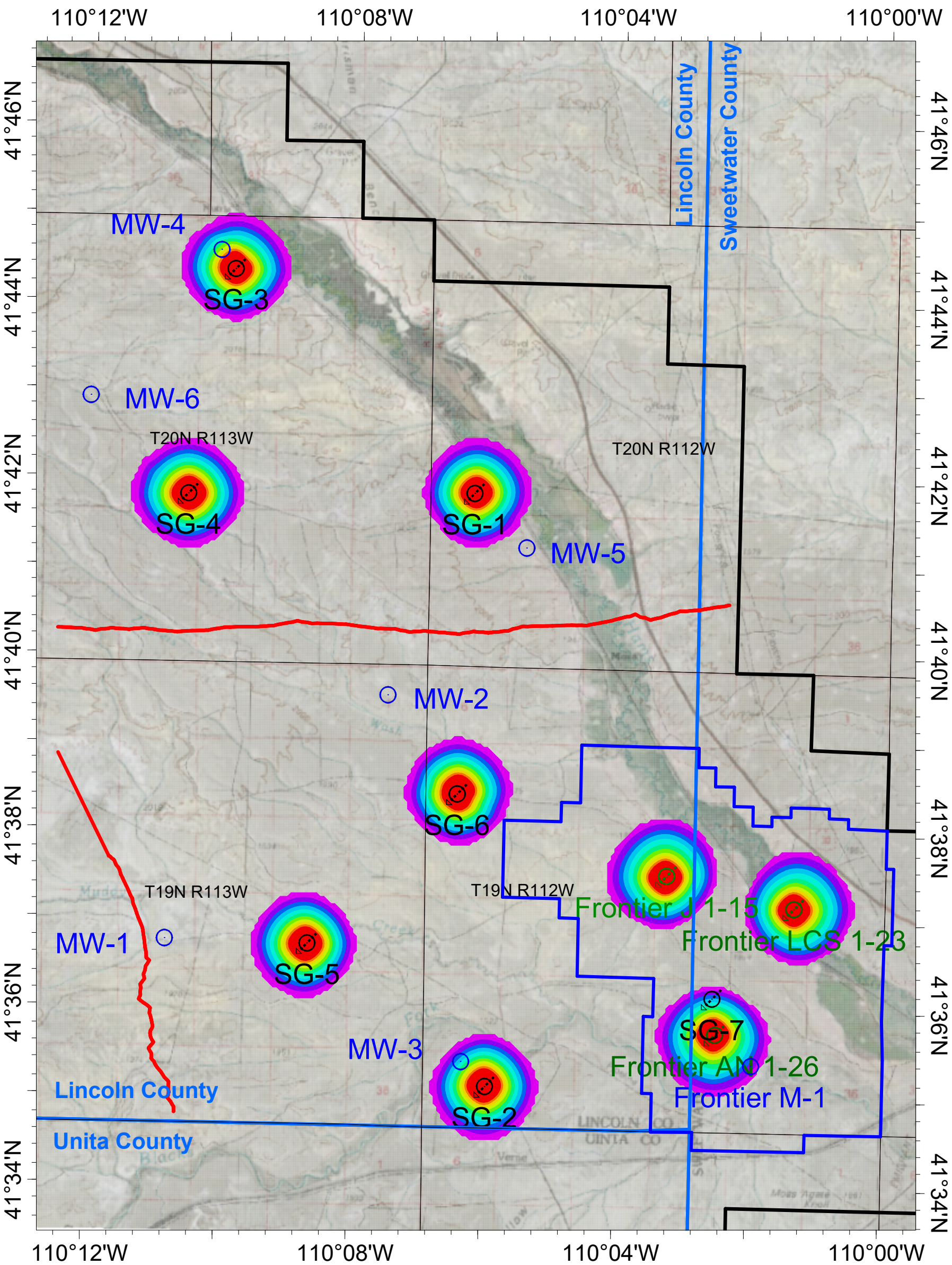
- WY Counties
- WY T & R
- Project Speedgoat (PSG)
- SCS Hub
- W-E Madison Faulting
- SW Nugget Faulting
- Planned gas injector
- Monitor Well

Gas Saturation > 2%

100
80
60
40
20

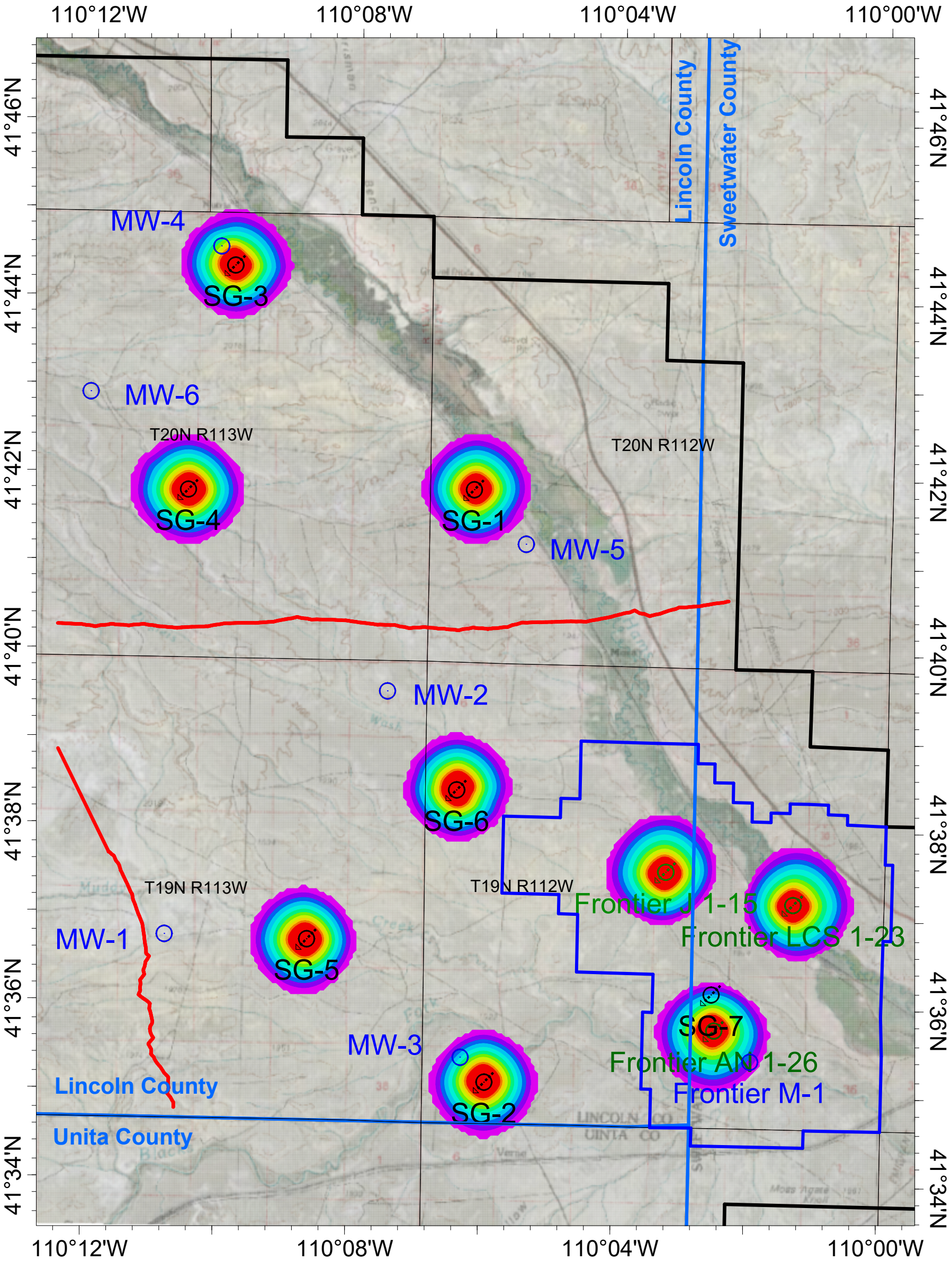
Nugget

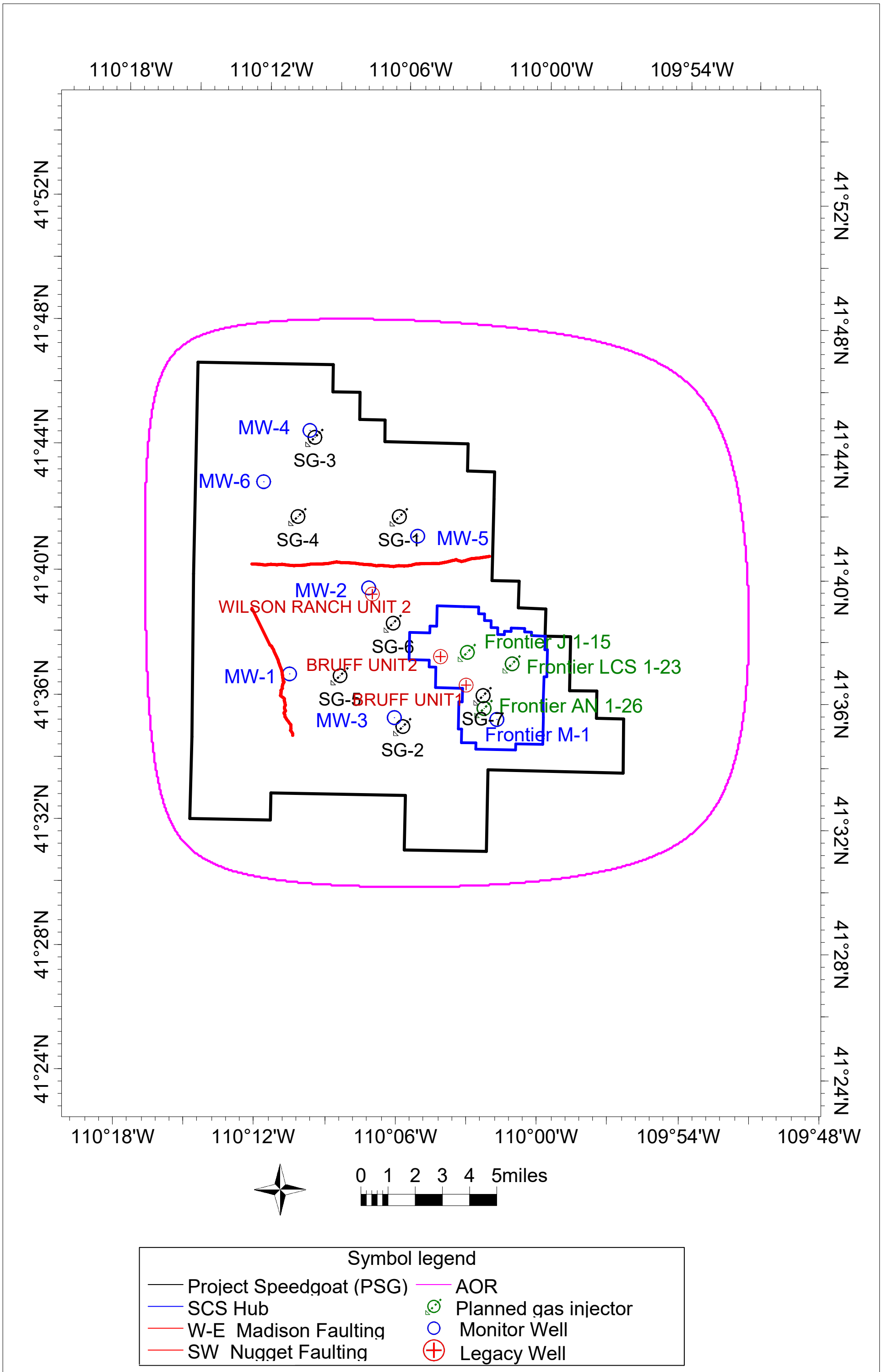
20 Years of Injection



Nugget

Plume Stabilization




110°18'W
110°12'W
110°06'W
110°00'W
109°54'W
109°48'W
41°52'N
41°48'N
41°44'N
41°40'N
41°36'N
41°32'N
41°28'N
41°24'N
MW-4
SG-3
MW-6
SG-4
SG-1
MW-5
MW-2
WILSON RANCH UNIT 2
SG-6
Frontier J 1-15
BRUFF UNIT2
Frontier LCS 1-23
MW-1
SG-5
BRUFF UNIT1
Frontier AN 1-26
MW-3
SG-7
Frontier M-1
SG-2
0 1 2 3 4 5miles
Symbol legend
Project Speedgoat (PSG)
AOR
SCS Hub
Planned gas injector
W-E Madison Faulting
Monitor Well
SW Nugget Faulting
Legacy Well

FORM A-6
PISC AND FACILITY SITE CLOSURE

TABLE OF CONTENTS

6.0 Post-Injection Site Care and Facility Closure Plan 1

6.1 Non-Endangerment Demonstration Criteria 3

6.2 Pre- and Post-Injection Pressure Differential 4

6.2.1 Madison 4

6.2.2 Nugget 6

6.3 Predicted Extent of CO_2 Plume and Associated Pressure Front at Site Closure 9

6.3.1 Madison 9

6.3.2 Nugget 10

6.4 Mechanisms of Geological Confinement 12

6.5 Remediation and Reclamation 13

6.6 Post-Injection Monitoring Plan 13

6.6.1 Groundwater and Soil Gas Sampling 16

6.6.2 Monitoring of CO_2 Plume and Pressure Front 18

6.7 Schedule for Submitting Post-Injection Monitoring Results 19

LIST OF TABLES

Table A-6.1. Predicted Pressure Differential and Average Rate of Pressure Decline in the Madison 5

Table A-6.2. Predicted Pressure Differential and Average Rate of Pressure Decline in the Nugget 7

Table A-6.3. Summary of Post-Injection Site Care Monitoring Program 14

Table A-6.4. Sampling and Recording Frequencies for Continuous Monitoring 16

Table A-6.5. Summary of Analytical and Field Parameters for Groundwater Samples 17

Table A-6.6. Summary of Analytical and Field Parameters for Fluid Sampling in the Injection Zones 17

LIST OF FIGURES

Figure A-6.1. Madison CO_2 plume extent 1 year post injection 2

Figure A-6.2. Nugget CO_2 plume extent 1 year post injection 3

Figure A-6.3. Predicted change in pressure in the Madison sequestration zone 100 years following the cessation of CO_2 injection 5

Figure A-6.4. Predicted change in pressure in the Madison at cessation of CO_2 injection (2045) and 10 years post cessation of CO_2 injection (2055) 6

Figure A-6.5. Predicted change in pressure in the Nugget sequestration zone 100 years following the cessation of CO_2 injection 7

Figure A-6.6. Predicted change in pressure in the Nugget at injection cessation (2065) and 10 years post cessation of CO_2 injection (2075) 8

Figure A-6.7. Predicted change in pressure in the Madison and Nugget sequestration zones 100 year following the cessation of CO_2 injection 9

Figure A-6.8. Madison pressure front map at estimated plume stabilization one year after cessation of CO_2 injection (2046) 10

Figure A-6.9. Nugget pressure front map one year after cessation of CO_2 injection at plume stabilization (2066) 11

Figure A-6.10. Field aqueous (Solubility), mobile vapor (Structural) and immobile (Residual) vapor trapping mechanisms over time 12

Figure A-6.11. PSG proposed injection and monitoring wells 15

Figure A-6.12. Near-surface monitoring locations 18

Figure A-6.13. Areal extent of a proposed 2-D seismic survey 19

ABBREVIATIONS/ACRONYMS

2-D	two-dimensional
3-D	three-dimensional
AoR	Area of Review
CO_2	carbon dioxide
DIC	dissolved inorganic carbon
DOC	dissolve organic carbon
EPA	Environmental Protection Agency
N/A	not available
pH	potential of hydrogen
PISC	post-injection site care
PSG	Project Speed Goat
psi	pounds per square inch
SCS Hub	Sweetwater Carbon Storage Hub
SM	standard method
TBD	to be determined
TDS	total dissolved solids
TIC	total inorganic carbon
TOC	total organic carbon
USDW	underground source of drinking water
W.S.	Wyoming Statute
WDEQ	Wyoming Department of Environmental Quality
WQRR	Water Quality Rules and Regulations

FRONTIER CARBON SOLUTIONS
PROJECT SPEED GOAT
CARBON SEQUESTRATION UIC CLASS VI APPLICATION

FORM A-6, PROPOSED POST-INJECTION SITE CARE AND FACILITY CLOSURE PLAN
Water Quality Rules, Chapter 24 Sections 10, 22, and 24

6.0 Post-Injection Site Care and Facility Closure Plan

The Project Speed Goat (PSG) Post-Injection Site Care (PISC) Plan describes activities and monitoring during the final phase of the Project. PISC monitoring activities begin once carbon dioxide (CO_2) injection has ceased and continues thereafter until plume stabilization has been demonstrated, to ensure CO_2 will not migrate beyond the Project boundary. The Facility Closure Plan refers to procedures immediately following PISC and authorization from the Administrator to facilitate closure and the conclusion of the permit. These plans were developed to meet the Wyoming Department of Environmental Quality (WDEQ) Water Quality Rules and Regulations (WQRR), Chapter 24, Section 24 to ensure the non-endangerment of underground sources of drinking water (USDW). Moreover, the PISC and Facility Closure Plans are designed to protect and ensure that no endangerment to the surrounding communities, environment, wildlife, ranching, and agriculture exists within the area of review (AoR).

Reservoir simulation of the CO_2 plumes indicate that stabilization for the Nugget and Madison is predicted to occur one year after injection ceases, as shown on **Figure A-6.1**, **Figure A-6.2,** and referred to in ***Form A-2, Area of Review***. Additionally, PSG comprises an area of approximately 121,344 acres of leased pore space, which provides a significant buffer around the CO_2 plumes.

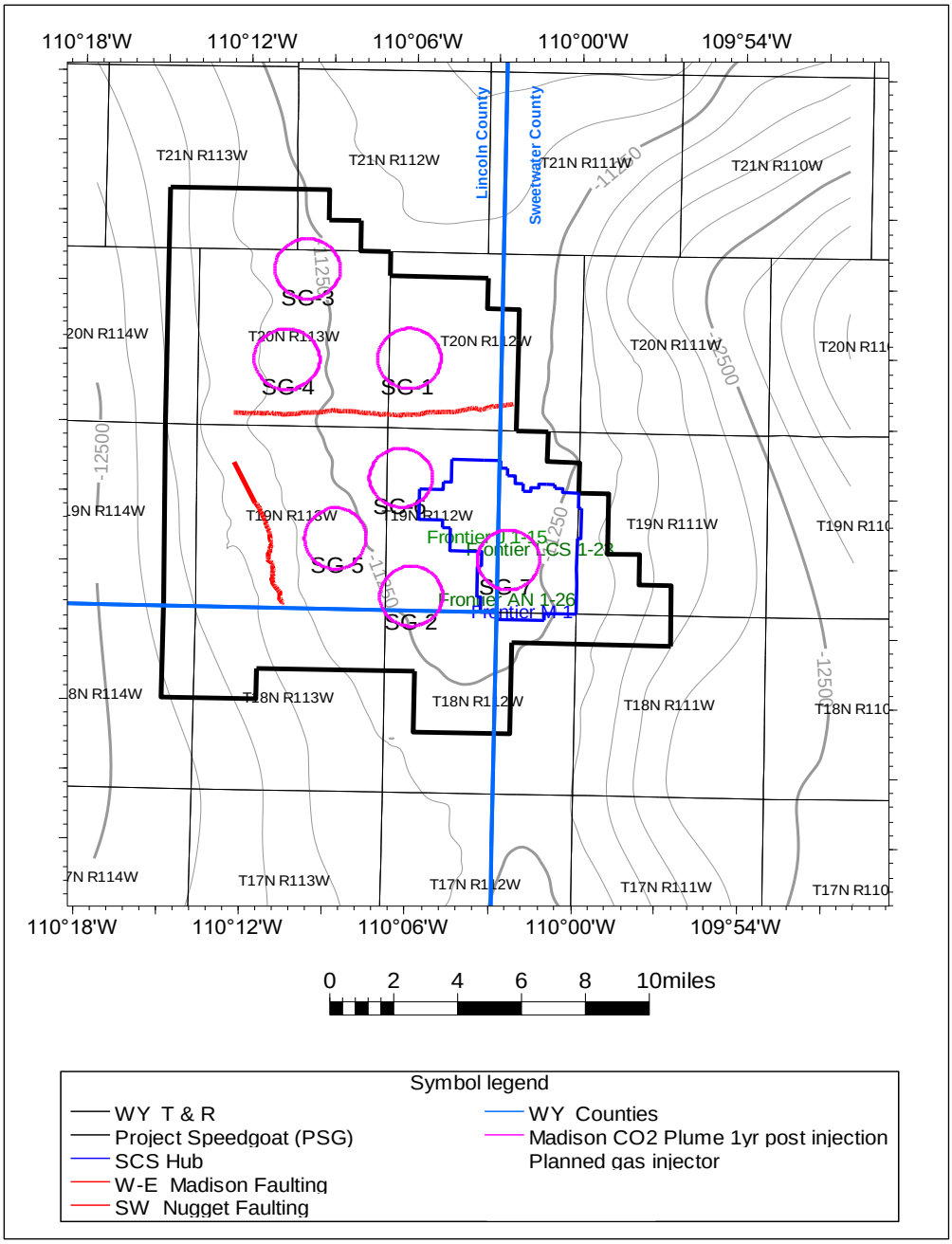


Figure A-6.1. *Madison CO_2 plume extent 1 year post injection.*

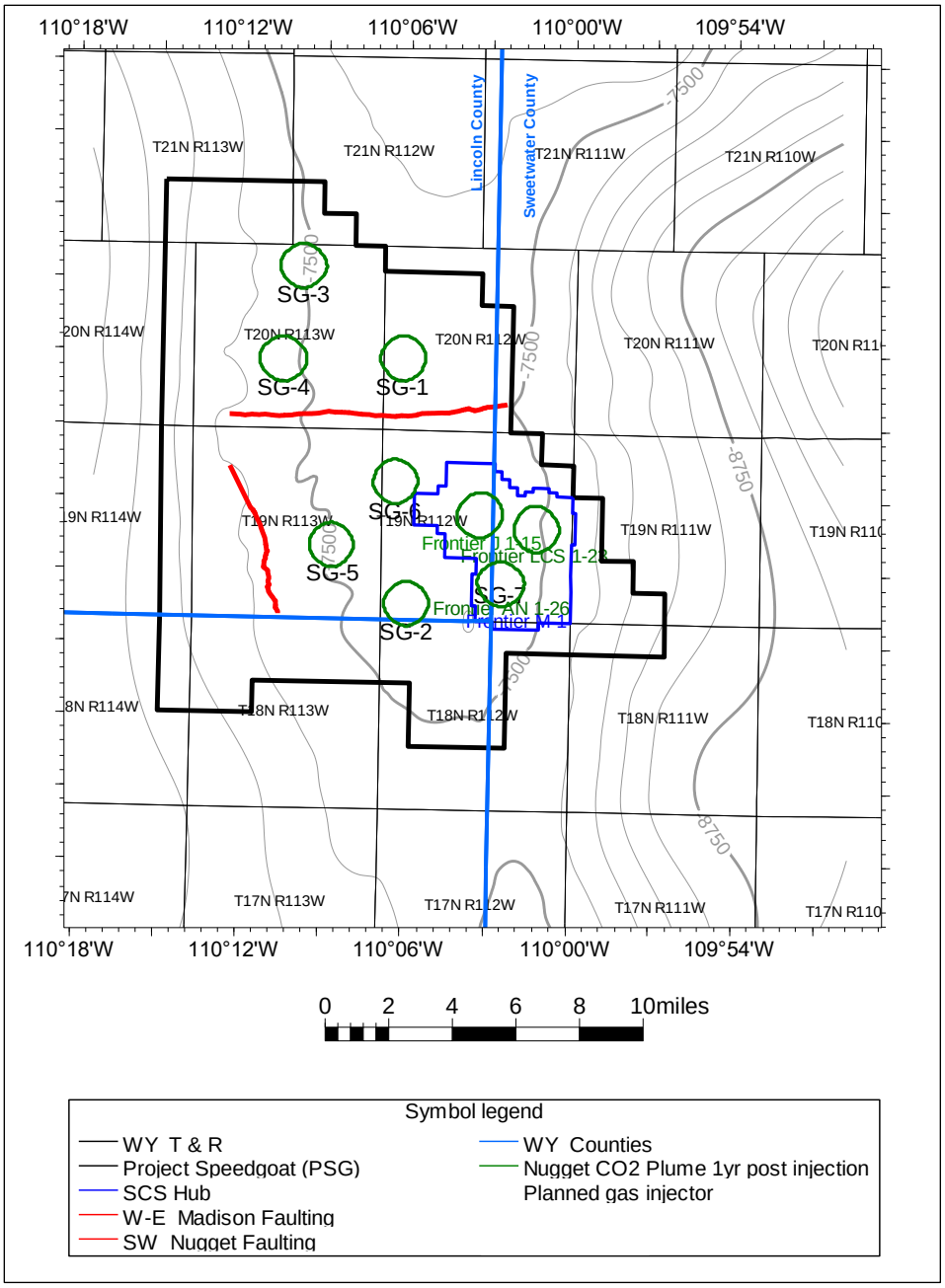


Figure A-6.2. *Nugget CO_2 plume extent 1 year post injection.*

6.1 Non-Endangerment Demonstration Criteria

The PSG Class VI permit applications were prepared using publicly available well data, 3-D seismic data, and regional studies. ***Form A-1, Site Characterization*** provides support that demonstrates PSG is a suitable geologic system comprised of (1) stacked injection zones of sufficient areal extent, thickness, porosity, and permeability that will safely receive injection volumes of CO_2, and (2) the confining zones are of sufficient areal extent and integrity for safe and secure containment and confinement of the injected CO_2.

The PISC and Facility Closure Plan includes reclamation as close as practical to its original condition (prior to start of injection) and confirmation of CO_2 plume stability. Simulation results indicate this will be achieved one year post injection for both formations by year 2046 and 2066 for the Madison and Nugget, respectively. It is expected that within this timeframe, sufficient evidence will be provided to demonstrate and satisfy the WDEQ Administrator's criteria for facility site closure. If, however, it is determined that additional monitoring will be required past the initial 10-year PISC period, the monitoring program will be reviewed, modified, and extended in collaboration with the WDEQ and implemented until CO_2 plume stabilization and facility closure is achieved.

Some or a combination of the following will provide evidence of CO_2 plume stability:

- Monitor wells to measure reservoir temperatures and pressures
- Time-lapse 2-D seismic surveys (if required by the WDEQ)
- Microseismic (if required by the WDEQ)

A final assessment with evidence in support of plume stability will be submitted to the WDEQ Administrator as part of a site closure report.

6.2 Pre- and Post-Injection Pressure Differential

The PSG development plan is to inject into two formations in two phases over the life of the project. Injection begins in the Madison in 2025, which is the deeper saline reservoir, and continues for 20 years. Post 20 years of Madison CO_2 injection, operations commence in the Nugget with injection starting in 2045 for 20 years. Since the AoR delineation is based on the Madison, AoR pressure discussion is focused within this formation. The pressure differential discussed for the Madison in this section is, therefore, also applicable to the AoR and consistent with the results from ***Form A-2, Area of Review***.

6.2.1 Madison

Reservoir pressure at the Madison injection site is estimated to be 8,192 pounds per square inch (psi) prior to CO_2 injection and the maximum pressure differential is forecasted to be 2,669 psi at cessation of 20 years of injection. **Figure A-6.3** shows the Madison predicted change in pressure through the end of simulation.

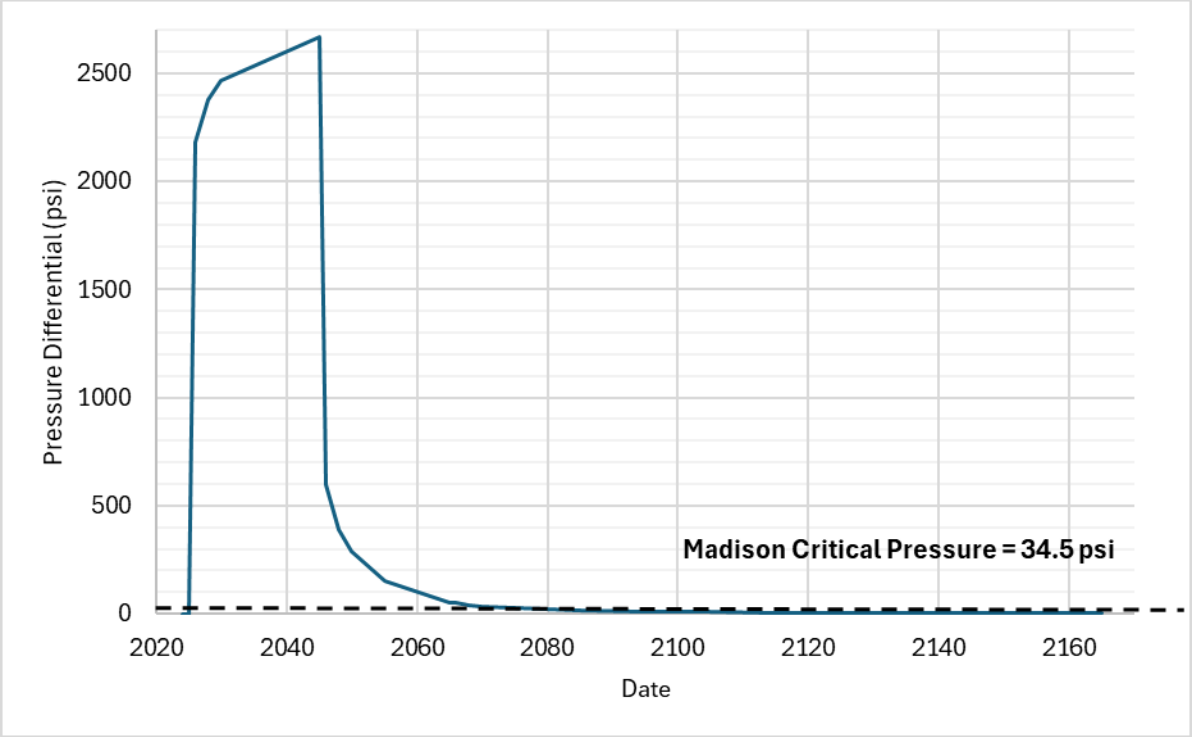


Figure A-6.3. *Predicted change in pressure in the Madison sequestration zone 100 years following the cessation of CO_2 injection.*

The Madison average rate of pressure decline ranged between 476 psi/year and 0.1 psi/year. Results of the pressure differential and average rate of pressure decline over 100 years post injection were tabulated in **Table A-6.1.**

Table A-6.1. Predicted Pressure Differential and Average Rate of Pressure Decline in the Madison

Time Since End of Injection (Years)	Pressure Differential (psi)	Average Rate of Pressure Decline over Interval (psi/year)
0	2,669	N/A
5	287	476
10	150	28
20	54	10
50	10	2
100	3	0.1

Figure A-6.4 shows the Madison pressure differential at injection cessation and 10 years post-injection.

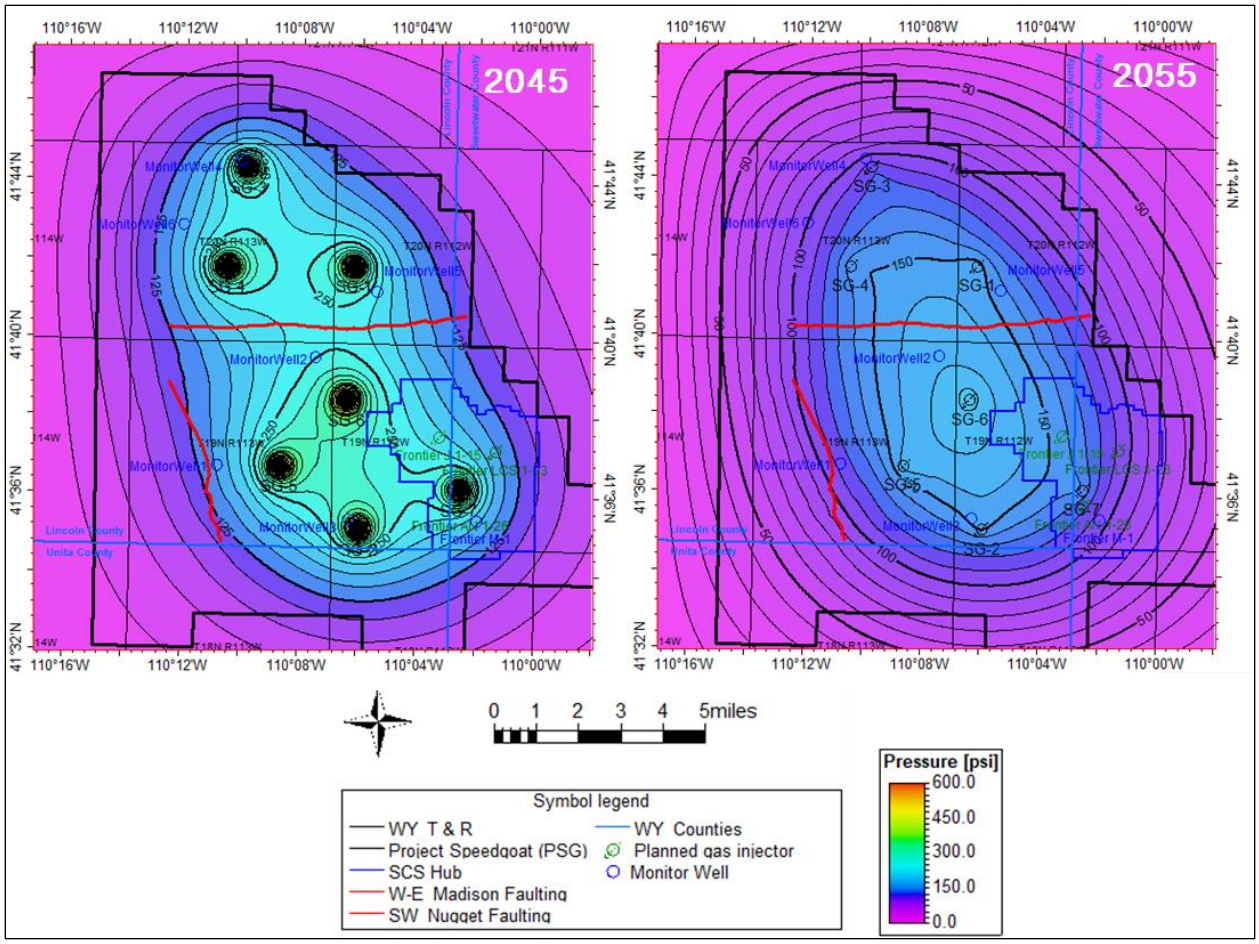


Figure A-6.4. *Predicted change in pressure in the Madison at cessation of CO_2 injection (2045) and 10 years post cessation of CO_2 injection (2055).*

6.2.2 Nugget

The pre-injection average pressure at the injection site in the Nugget is estimated to be 6,379 psi and the maximum pressure differential is forecasted to be 1,528 psi at cessation of the 20 years of injection. **Figure A-6.5** shows the Nugget average pressure differential to the end of simulation.

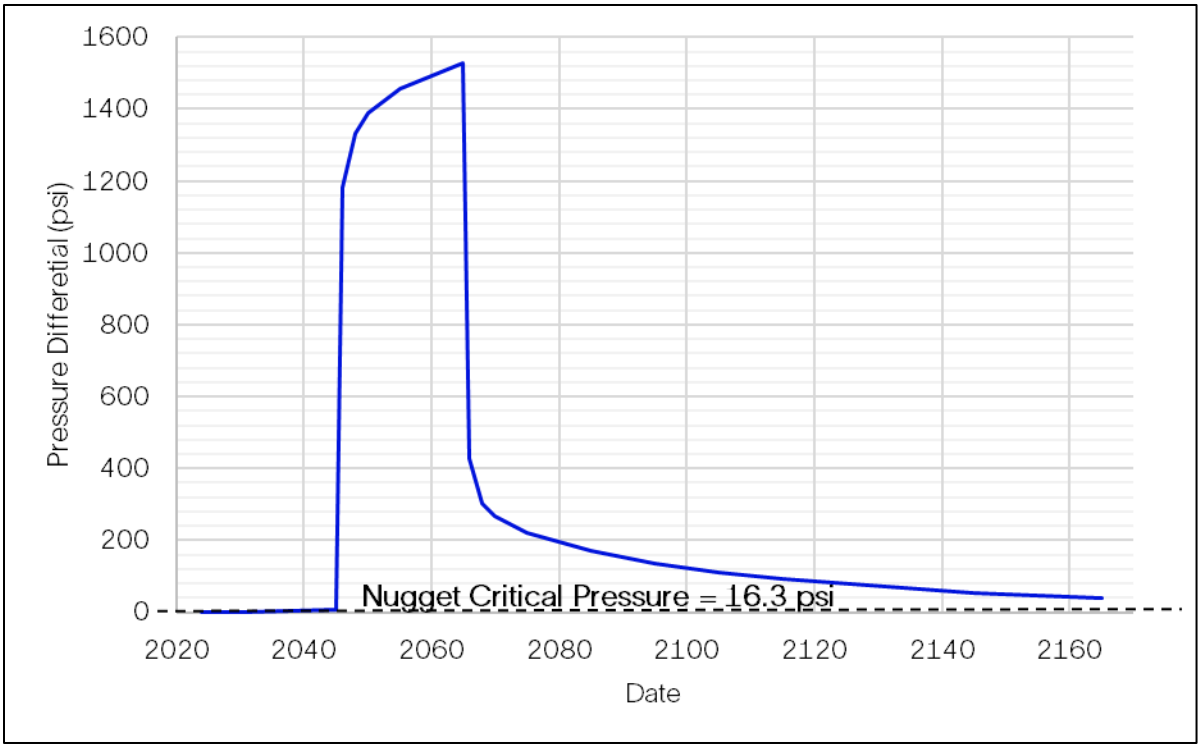


Figure A-6.5. *Predicted change in pressure in the Nugget sequestration zone 100 years following the cessation of CO_2 injection.*

Simulation results of the pressure differential and average rate of pressure decline are tabulated in **Table A-6.2**. The average rate of pressure decline in the Nugget ranges between 245 psi/year and one psi/year.

Table A-6.2. Predicted Pressure Differential and Average Rate of Pressure Decline in the Nugget

Time Since End of Injection (Years)	Pressure Differential (psi)	Average Rate of Pressure Decline over interval (psi/year)
0	1,528	N/A
5	266	245
10	219	9
20	170	5
50	93	3
100	38	1

Figure A-6.6 shows the differential pressure results at injection cessation and 10 years post cessation of injection at the end of facility site closure.

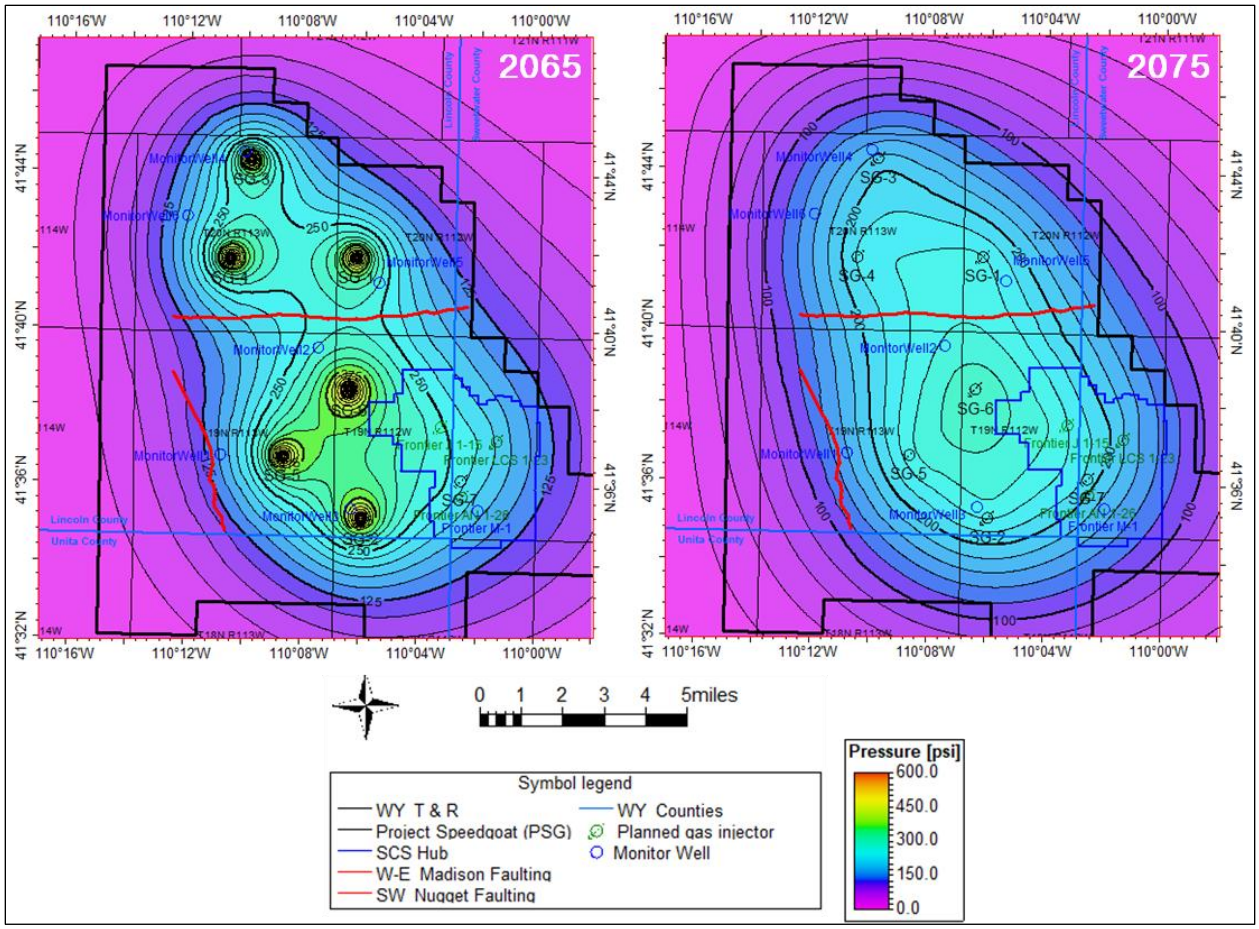


Figure A-6.6. *Predicted change in pressure in the Nugget at injection cessation (2065) and 10 years post cessation of CO_2 injection (2075).*

In summary, the pre-injection pressure of the Madison and Nugget is estimated to be 8,192 and 6,379 psi, respectively. Maximum pressure differential occurs at the last year of injection for both formations and is estimated to be 2,669 and 1,528 psi for the Madison and Nugget, respectively as shown in **Figure A-6.7**. Simulation results indicated that stabilization of CO_2 plumes is achieved at one year post cessation of injection for both Madison and Nugget (**Figure A-6.1** and **Figure A-6.2**). This is also discussed in ***Form A-2, Area of Review***.

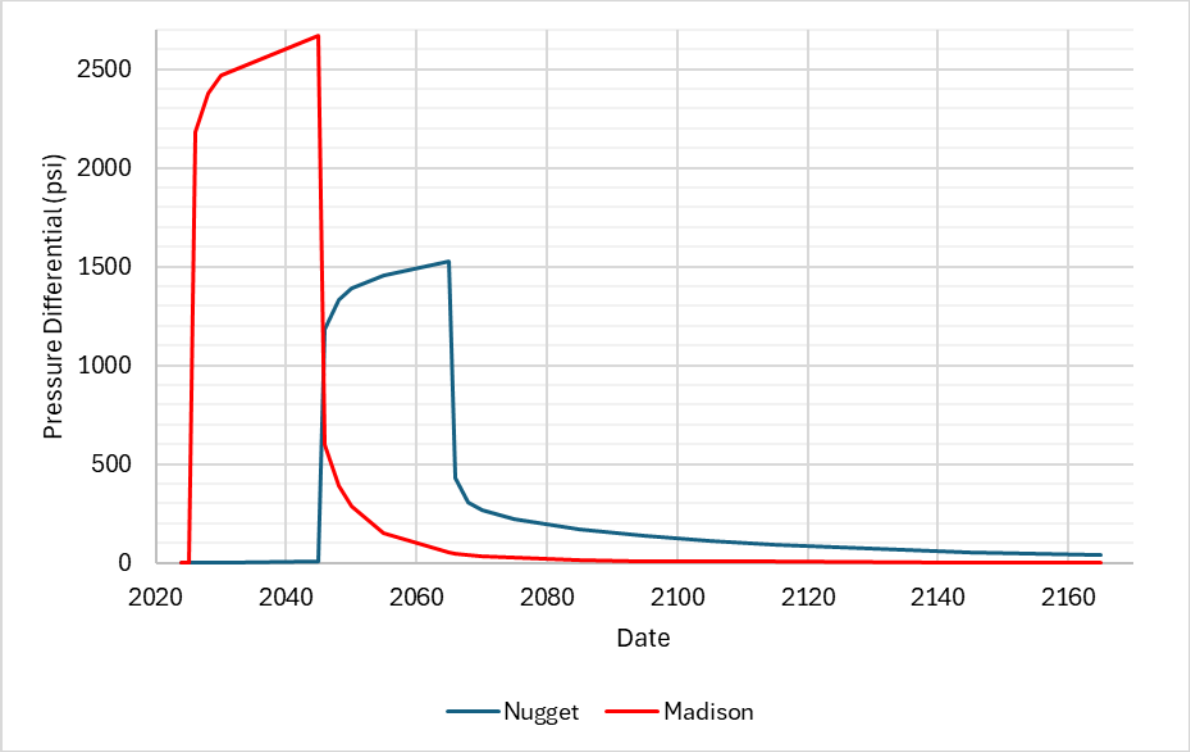


Figure A-6.7. *Predicted change in pressure in the Madison and Nugget sequestration zones 100 year following the cessation of CO_2 injection.*

6.3 Predicted Extent of CO_2 Plume and Associated Pressure Front at Site Closure

6.3.1 Madison

The Madison average pressure front at the injection site goes below critical pressure of 34.5 psi at 50 years post injection and returns to initial reservoir pressure 100 years post injection.

Reservoir simulation results of the stabilized Madison plume in 2046, one year post cessation of injection, are shown in **Figure A-6.2**. The modelled pressure front in the Madison one year post cessation of CO_2 injection at simulated plume stabilization (2046) is shown in **Figure A-6.8**.

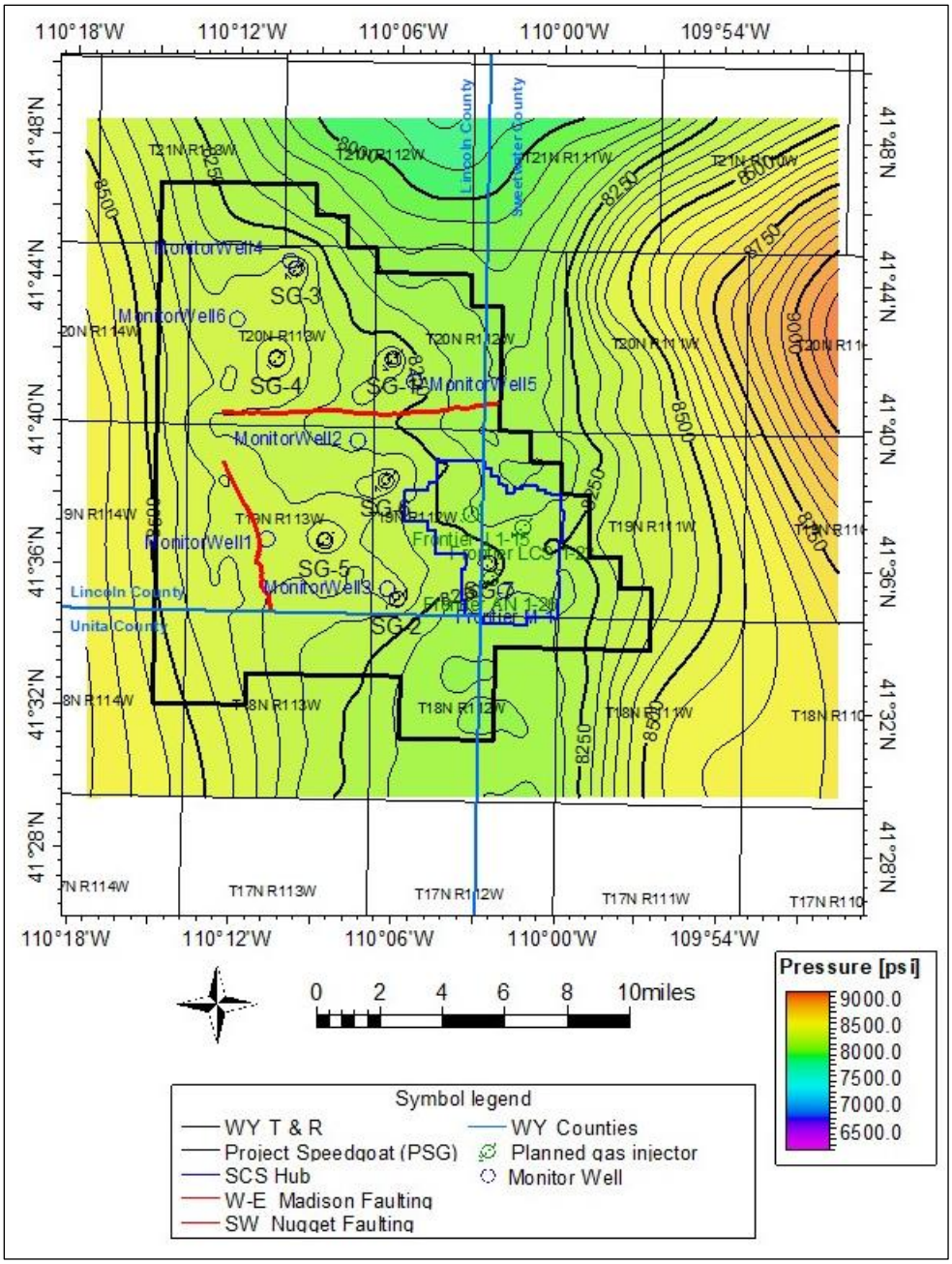


Figure A-6.8. *Madison pressure front map at estimated plume stabilization one year after cessation of CO_2 injection (2046).*

6.3.2 Nugget

The Nugget average pressure front at the injection site exhibited a steady pressure decline from injection cessation through the end of the simulation and almost reached initial reservoir pressure at 100 years post injection.

Reservoir simulation results of the stabilized Nugget plume at 2066, one year post cessation of injection is shown in **Figure A-6.1**. The map showing the simulated pressure front in the Nugget one year post cessation of CO_2 injection (2066) is shown in **Figure A-6.9**.

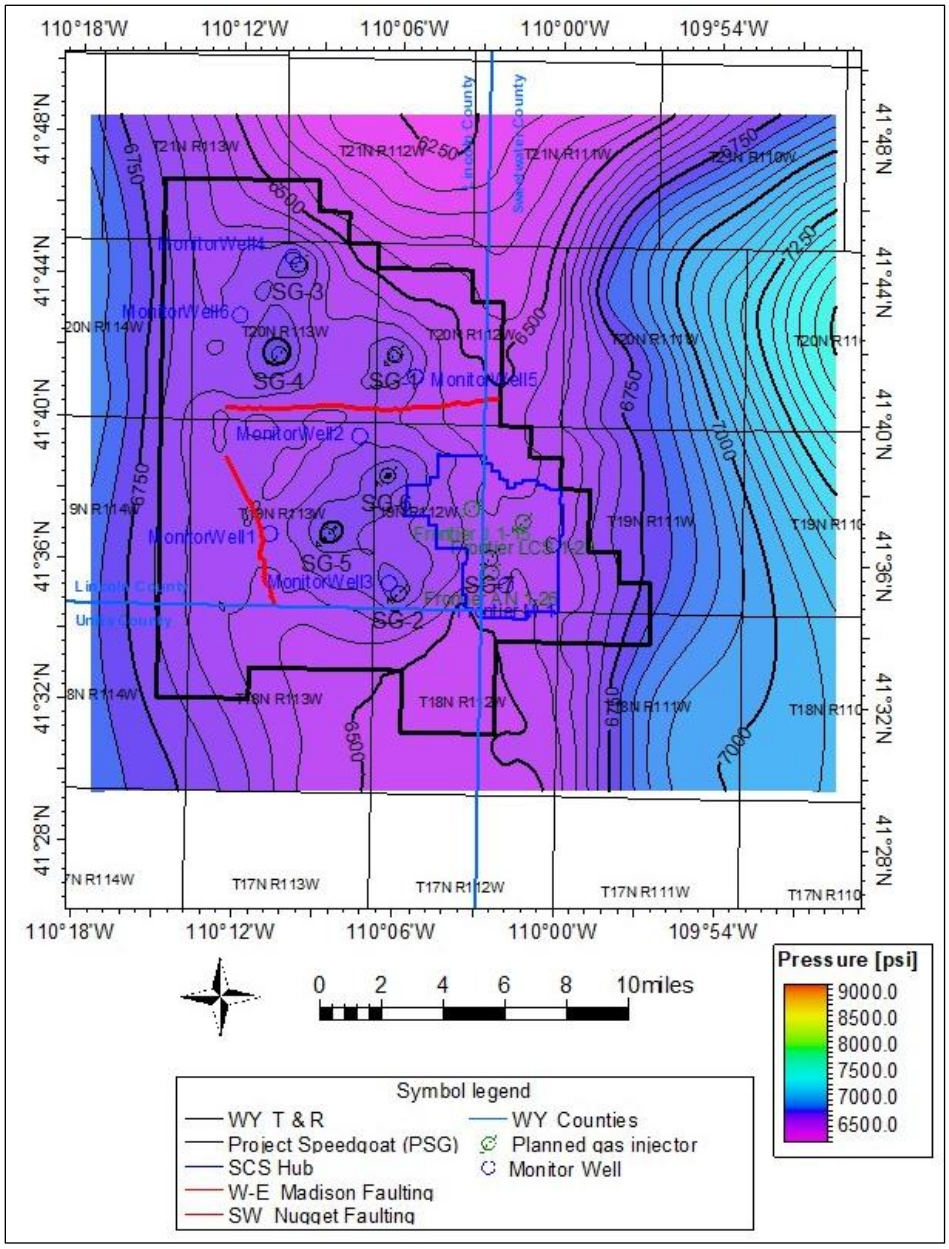


Figure A-6.9. *Nugget pressure front map one year after cessation of CO_2 injection at plume stabilization (2066).*

Cessation of CO_2 plume migration is predicted to occur approximately one-year post-injection for both Madison and Nugget, therefore the rate of CO_2 plume migration is insignificant.

6.4 Mechanisms of Geological Confinement

Three trapping mechanisms were modeled in this Project. They were solubility trapping through dissolution, residual trapping through imbibition of brine into the pore space once injection has ended, and stratigraphic trapping. They are discussed further in ***Form A-1, Site Characterization*** as part of the Mechanism of Geological Confinement Section. Mineral trapping was not considered since mineralization becomes a significant trapping mechanism after 100 years of injection, and the simulation conducted does not go beyond this timeframe.

At the end of the simulation time frame (50 years post injection for Nugget, 70 years post-injection for Madison), the total trapped CO_2 volume has been estimated to be 84.1 million metric tons. **Figure A-6.10** shows the effect of the different trapping mechanisms considered. Around 47% is estimated to be trapped by the residual trapping mechanism, 40% through structural trapping and 13% through dissolution. Since the previously approved permit to construct for wells Frontier AN 1-26, Frontier LCS 1-23, and Frontier J 1-15 are also in the region, they were included in the simulation as their results can directly affect the newly proposed injection wells. Therefore, the trapping volumes also include the three previously permitted wells.

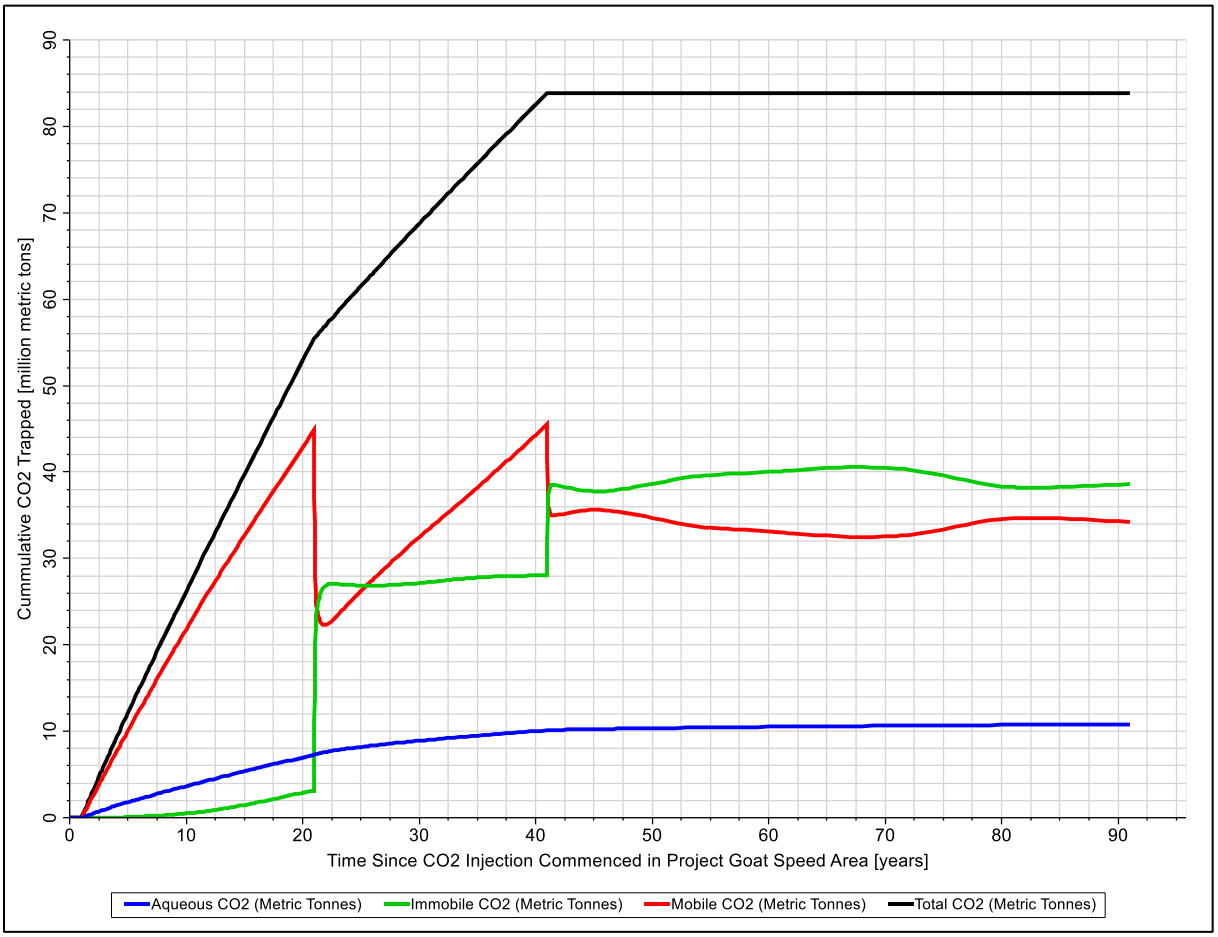


Figure A-6.10. *Field aqueous (Solubility), mobile vapor (Structural) and immobile (Residual) vapor trapping mechanisms over time.*

6.5 Remediation and Reclamation

The Facility Site Closure Plan addresses the final phase of the geologic sequestration project and includes reclamation, monitoring, and remediation sufficient to demonstrate injected CO_2 will not harm human health, safety, the environment, or drinking water.

Remediation of facilities and site reclamation will begin as soon as injection ceases and PSG transitions to the PISC phase. Injection wells will be plugged according to the plan provided in ***Form B, Permit to Construct*** and surface equipment will be removed except what is required for long-term monitoring.

Upon confirmation of CO_2 plume stabilization, the Administrator will be issued a site closure notice 120 days prior to remediation and reclamation. The notice will include: (1) the original PISC and Facility Site Closure Plans that describes the plugging of all Facility wells, (2) decommissioning of PSG equipment and associated infrastructure, (3) reclamation of the surface to as close as practically possible to its original condition, (4) monitoring data, and (5) the final plume model.

Plugging and abandonment of all wells will be conducted under the requirements of WQRR Chapter 24, Section 23 using sound engineering practices. The plugging operations will use materials that are compatible with CO_2 and reservoir fluids to ensure the non-endangerment of USDWs. Any revisions to the original PISC and Facility Site Closure Plans will be included in the notice to the Administrator if required. Ninety days within completion of all remediation and reclamation activities, a site closure report will be submitted to the Administrator.

6.6 Post-Injection Monitoring Plan

PISC monitoring activities of the CO_2 plume begin once injection ceases and will continue until plume stabilization is demonstrated to ensure CO_2 will not migrate beyond the Project boundary. Reservoir temperatures and pressures will be measured in the monitor wells and the plume will be measured with time-lapse 2-D seismic surveys. All data will be used to confirm the predicted plume model and stabilization.

Table A-6.3 summarizes the PISC monitoring plan. The monitoring program is further described in ***Form A-5, Testing and Monitoring Plan*** and ***Form A-9, Quality Assurance and Surveillance Plan***. The map provided in **Figure A-6.11** shows the proposed PSG monitoring locations.

Table A-6.3. Summary of Post-Injection Site Care Monitoring Program			
Type of Monitoring	**Frequency**	**Spatial Coverage**	**Comments**
Near-Surface Monitoring			
Soil Gas	Every five (5) years	1 location per well	
Groundwater Wells	Every five (5) years	1 location per well	
Lowermost USDW			
Formation	Every five (5) years	1 location per well	
Storage Reservoir Monitoring			
Injection Wells	Continuously using gauges	Conversion of injection well to monitor well TBD	Until measurements indicate plume stability
Downhole Monitoring			
Downhole Pressure and Temperature	Continuously using gauges	Wellbore	Until measurements indicate plume stability
Geophysical Monitoring			
Time-lapse 2-D seismic	Once	TBD	If required by WDEQ to confirm plume stabilization
Microseismic	Continuous after injection for three (3) years	TBD	If required by WDEQ to confirm plume stabilization

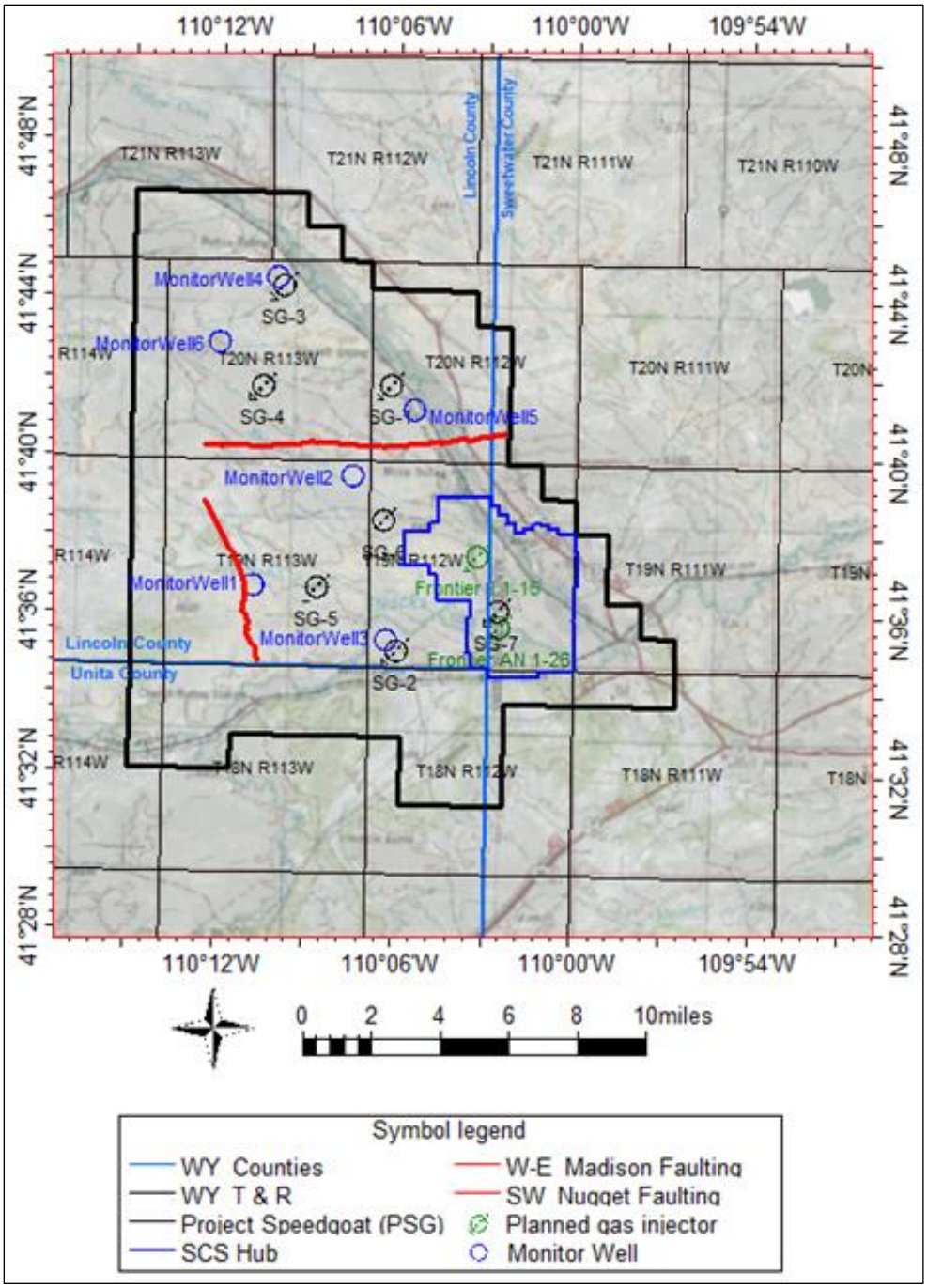


Figure A-6.11. *PSG proposed injection and monitoring wells.*

Sampling and data recording will be captured at an appropriate frequency, which have not been determined at this time. **Table A-6.4** will be provided to the Administrator prior to injection operations.

Table A-6.4. Sampling and Recording Frequencies for Continuous Monitoring				
Parameter	**Device(s)**	**Location**	**Minimum Frequency**	
			Sampling	**Recording**
Downhole Temperature Pressure	Pressure Temperature Gauge	Injection Well	TBD	TBD
Flow Rate	Flowmeter	Wellhead	TBD	TBD
Injection Volume	Calculated	Wellhead	TBD	TBD
Injection Pressure	Pressure Gauge	Wellhead	TBD	TBD
Injection Temperature	Temperature Gauge	Wellhead	TBD	TBD
Packer Fluid Volume	Flowmeter	Surface	TBD	TBD
Annulus Pressure	Pressure Gauge	Wellhead	TBD	TBD

Monitoring well locations have been selected based on proximity to faults and, where injector wells are far from the faults they were selected based on their proximity to injector wells (**Figure *A-6.11***). All monitoring wells will penetrate both the Madison and Nugget. Monitor Well 1 and Monitor Well 2 were placed near the faults primarily to monitor the pressure changes near them. Monitor Well 3 and Monitor Well 4 locations were chosen to monitor CO_2 plume migration. These wells are expected to have CO_2 reach them after three years of injection. Monitor Well 5 and Monitor Well 6 were chosen to monitor the CO_2 plume proximity to the PSG lease boundary. The CO_2 plume is simulated to arrive at Monitor Well 5 at injection cessation, while the CO_2 plume is not expected to reach Monitor Well 6.

6.6.1 Groundwater and Soil Gas Sampling

Groundwater and soil gas sampling sites identified as part of the monitoring program for the baseline and operational phases will continue to be sampled as part of the 10-year PISC period. It is, however, anticipated that the testing parameters and program will likely be reduced or modified for the PISC period based on monitoring results gathered during the 20-year injection period. The sampling and monitoring program is detailed by phase in ***Form A-9, Proposed Quality Assurance Surveillance Plan***. **Table A-6.5** and **Table A-6.6** describe the proposed analytical and field parameters for the groundwater and injection zone samples, respectively.

Table A-6.5. Summary of Analytical and Field Parameters for Groundwater Samples	
Parameters	**Analytical Methods**
pH	Field water quality meter
Conductivity	Field water quality meter
Temperature	Field water quality meter

Table A-6.6. Summary of Analytical and Field Parameters for Fluid Sampling in the Injection Zones	
Parameters	**Analytical Methods**
Alkalinity	SM 2320B[1]
Bromide	EPA 300.0[2]
Chloride	EPA 300.0
Dissolved Inorganic Carbon (DIC)	EPA 9060
Dissolved Mercury	EPA 245.2
Dissolved Metals (31 metals)	EPA 200.7/200.8
Dissolved Organic Carbon (DOC)	SM 5310B
Fluoride	EPA 300.0
Sulfate	EPA 300.0
Sulfide	SM 4500-S2– F
Total Dissolved Solids (TDS)	SM 2540C
Total Inorganic Carbon (TIC)	EPA 9060
Total Mercury	EPA 7470A
Total Metals (31 metals)	EPA 6010B/6020
Total Organic Carbon (TOC)	SM 5310B

[1]*Standard method; American Public Health Association (2017)*

[2]*U.S. Environmental Protection Agency*

Groundwater monitoring wells will be drilled and constructed for the purpose of monitoring near-surface water. These wells will be drilled in and around the injection site and monitored on a scheduled basis. The map shown in **Figure A-6.12** indicates proposed near-surface monitoring locations.

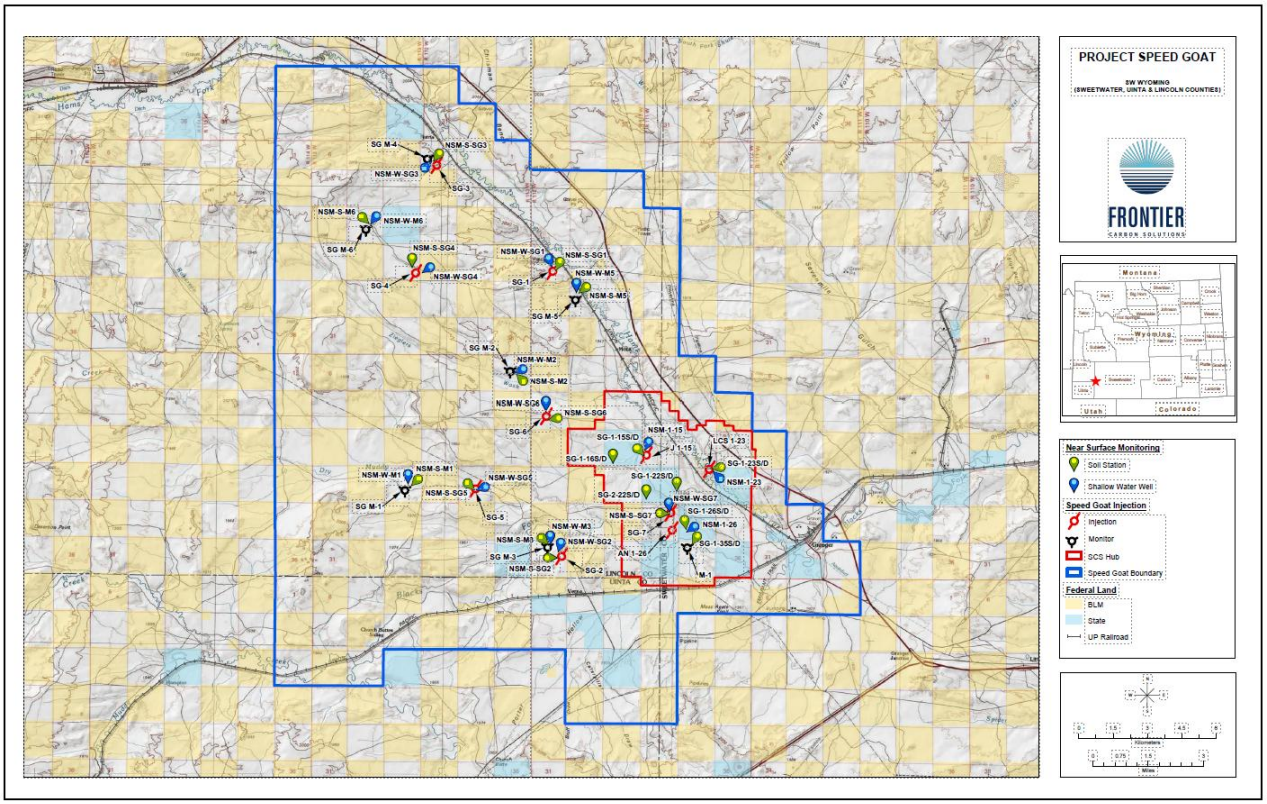


Figure A-6.12. *Near-surface monitoring locations.*

6.6.2 Monitoring of CO_2 Plume and Pressure Front

The CO_2 plume and associated pressure front will be monitored after injection ceases. A combination of direct and indirect monitoring methods will be used to identify the extent of the plume, validate predicted models, and verify CO_2 plume stabilization. A description of the monitoring methods is presented in **Table A-6.3**. Monitoring methods include a combination of formation-monitoring and geophysical monitoring to verify CO_2 plume stabilization. A potential time-lapse seismic monitoring program will be determined based on the most cost-effective 2-D line modeling. A possible version is shown in **Figure A-6.13**. This design will be finalized once more detailed subsurface formation data is acquired.

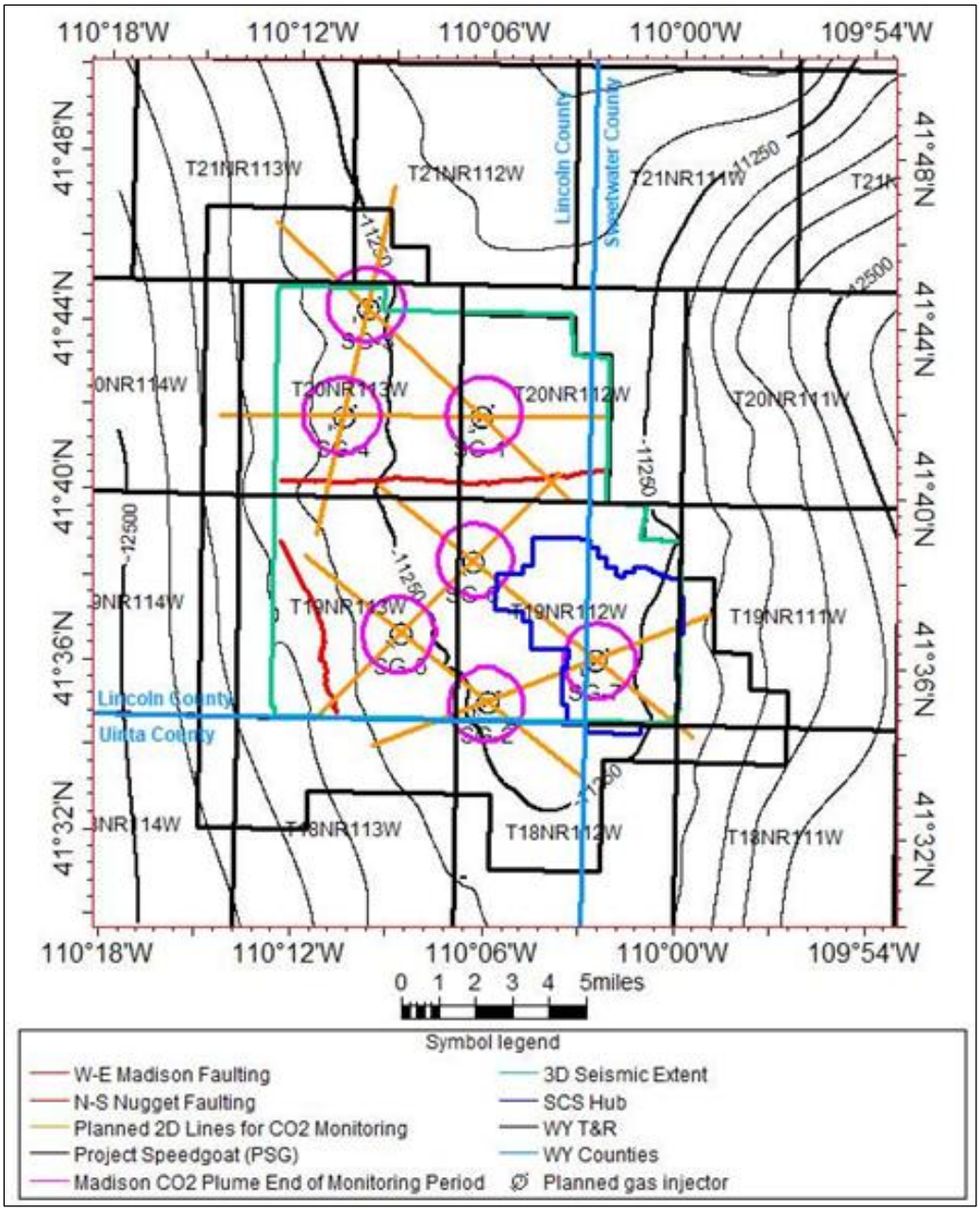


Figure A-6.13. *Areal extent of a proposed 2-D seismic survey.*

6.7 Schedule for Submitting Post-Injection Monitoring Results

Per WDEQ Chapter 24, Section 22, all PISC monitoring data and monitoring results collected using the methods described above will be submitted to the WDEQ in reports on an annual basis, within 60 days of the anniversary of CO_2 injection cessation. An alternative shorter PISC timeframe may be proposed if at any point in the Project it can be demonstrated, based on monitoring and other site-specific data, that the Project does not pose an endangerment to any USDWs.

A site closure report will be submitted to WDEQ within 90 days following the completion of the PISC facility closure plan. This report will be a final assessment documenting the CO_2 storage area in the reservoir along with supporting evidence of the plume stability in the reservoir over time. The site closure report will include the following:

- Documentation of the injection and monitoring well plugging.
- Location of sealed injection well on a survey plat that has been submitted to the local zoning authority.
- Notification to the state, local, and federal authorities as required.
- Records regarding the nature, composition, and volume of the sequestered CO_2.
- CO_2 injection volume and post-injection monitoring records.

In addition, a notation on the deed or any other document will be recorded that is normally examined during title search that will provide notice to any potential purchaser of the property on which the injection well was located, in accordance with W.S. § 35-11-313(f)(vi)(G).

APPENDIX A-6

PISC AND FACILITY SITE CLOSURE

TABLE OF CONTENTS

LIST OF TABLES

Table A-6.1. Predicted Pressure Differential and Average Rate of Pressure Decline in the Madison 1

Table A-6.2. Predicted Pressure Differential and Average Rate of Pressure Decline in the Nugget 1

Table A-6.3. Summary of Post-Injection Site Care Monitoring Program 2

Table A-6.4. Sampling and Recording Frequencies for Continuous Monitoring 2

Table A-6.5. Summary of Analytical and Field Parameters for Groundwater Samples 3

Table A-6.6. Summary of Analytical and Field Parameters for Fluid Sampling in the Injection Zones 3

LIST OF FIGURES

Figure A-6.1. Madison CO_2 plume extent 1 year post injection 4

Figure A-6.2. Nugget CO_2 plume extent 1 year post injection 5

Figure A-6.3. Predicted change in pressure in the Madison sequestration zone 100 years following the cessation of CO_2 injection 6

Figure A-6.4. Predicted change in pressure in the Madison at cessation of CO_2 injection (2045) 7

Figure A-6.4. Predicted change in pressure in the Madison and 10 years post cessation of CO_2 injection (2055) 8

Figure A-6.5. Predicted change in pressure in the Nugget sequestration zone 100 years following the cessation of CO_2 injection 9

Figure A-6.6. Predicted change in pressure in the Nugget at injection cessation (2065) 10

Figure A-6.6. Predicted change in pressure in the Nugget 10 years post cessation of CO_2 injection (2075) 11

Figure A-6.7. Predicted change in pressure in the Madison and Nugget sequestration zones 100 year following the cessation of CO_2 injection 12

Figure A-6.8. Madison pressure front map at estimated plume stabilization one year after cessation of CO_2 injection (2046) 13

Figure A-6.9. Nugget pressure front map one year after cessation of CO_2 injection at plume stabilization (2066) 14

Figure A-6.10. Field aqueous (Solubility), mobile vapor (Structural) and immobile (Residual) vapor trapping mechanisms over time 15

Figure A-6.11. PSG proposed injection and monitoring wells 16

Figure A-6.12. Near-surface monitoring locations 17

Figure A-6.13. Areal extent of a proposed 2-D seismic survey 18

TABLES

Table A-6.1. Predicted Pressure Differential and Average Rate of Pressure Decline in the Madison		
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10	150	28
20	54	10
50	10	2
100	3	0.1

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Time Since End of Injection (Years)	**Pressure Differential (psi)**	**Average Rate of Pressure Decline over interval (psi/year)**
0	1,528	N/A
5	266	245
10	219	9
20	170	5
50	93	3
100	38	1

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Type of Monitoring	**Frequency**	**Spatial Coverage**	**Comments**
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Downhole Pressure and Temperature	Continuously using gauges	Wellbore	Until measurements indicate plume stability
Geophysical Monitoring			
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Parameter	**Device(s)**	**Location**	**Minimum Frequency**	
			Sampling	**Recording**
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Flow Rate	Flowmeter	Wellhead	TBD	TBD
Injection Volume	Calculated	Wellhead	TBD	TBD
Injection Pressure	Pressure Gauge	Wellhead	TBD	TBD
Injection Temperature	Temperature Gauge	Wellhead	TBD	TBD
Packer Fluid Volume	Flowmeter	Surface	TBD	TBD
Annulus Pressure	Pressure Gauge	Wellhead	TBD	TBD

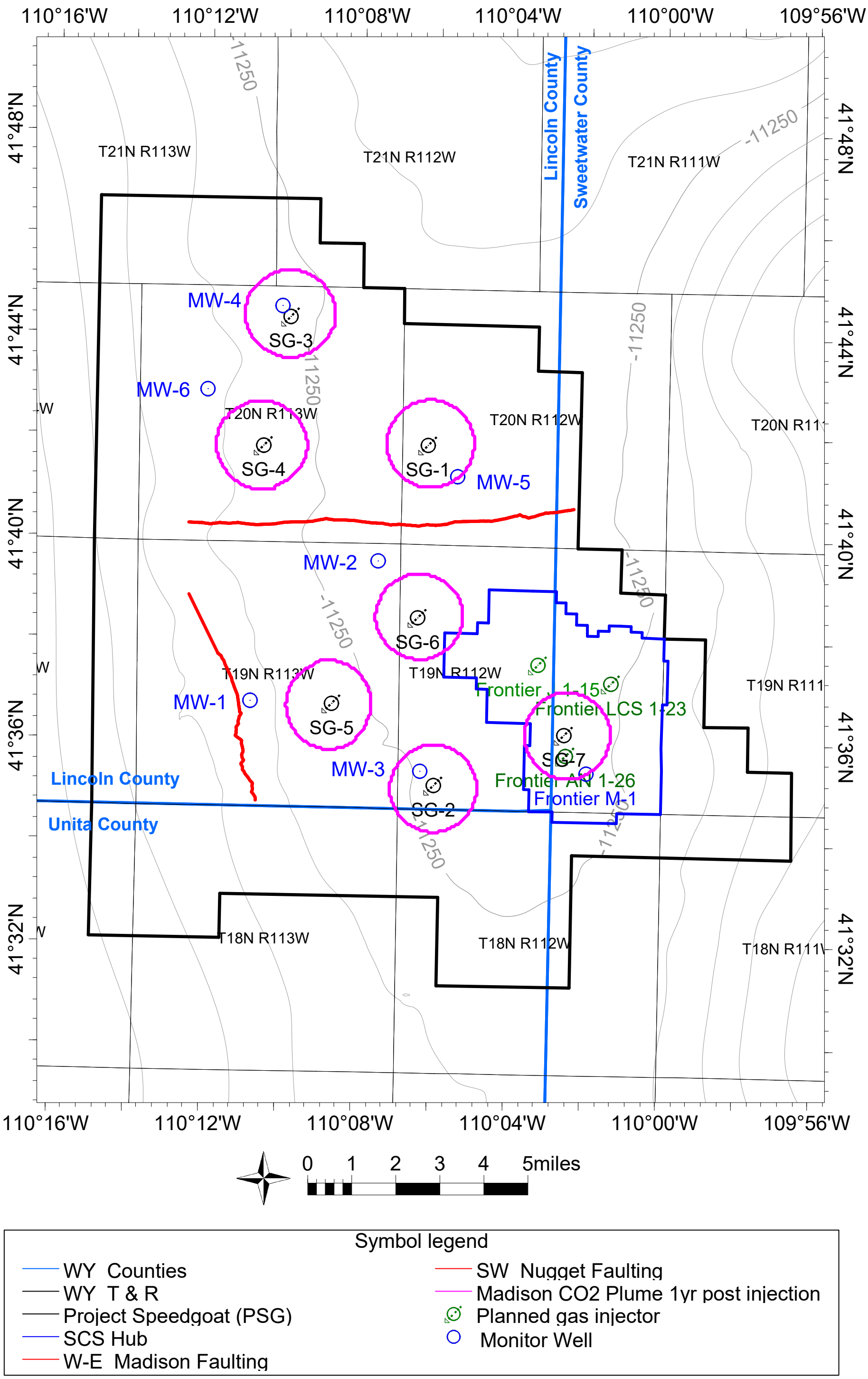
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Conductivity	Field water quality meter
Temperature	Field water quality meter

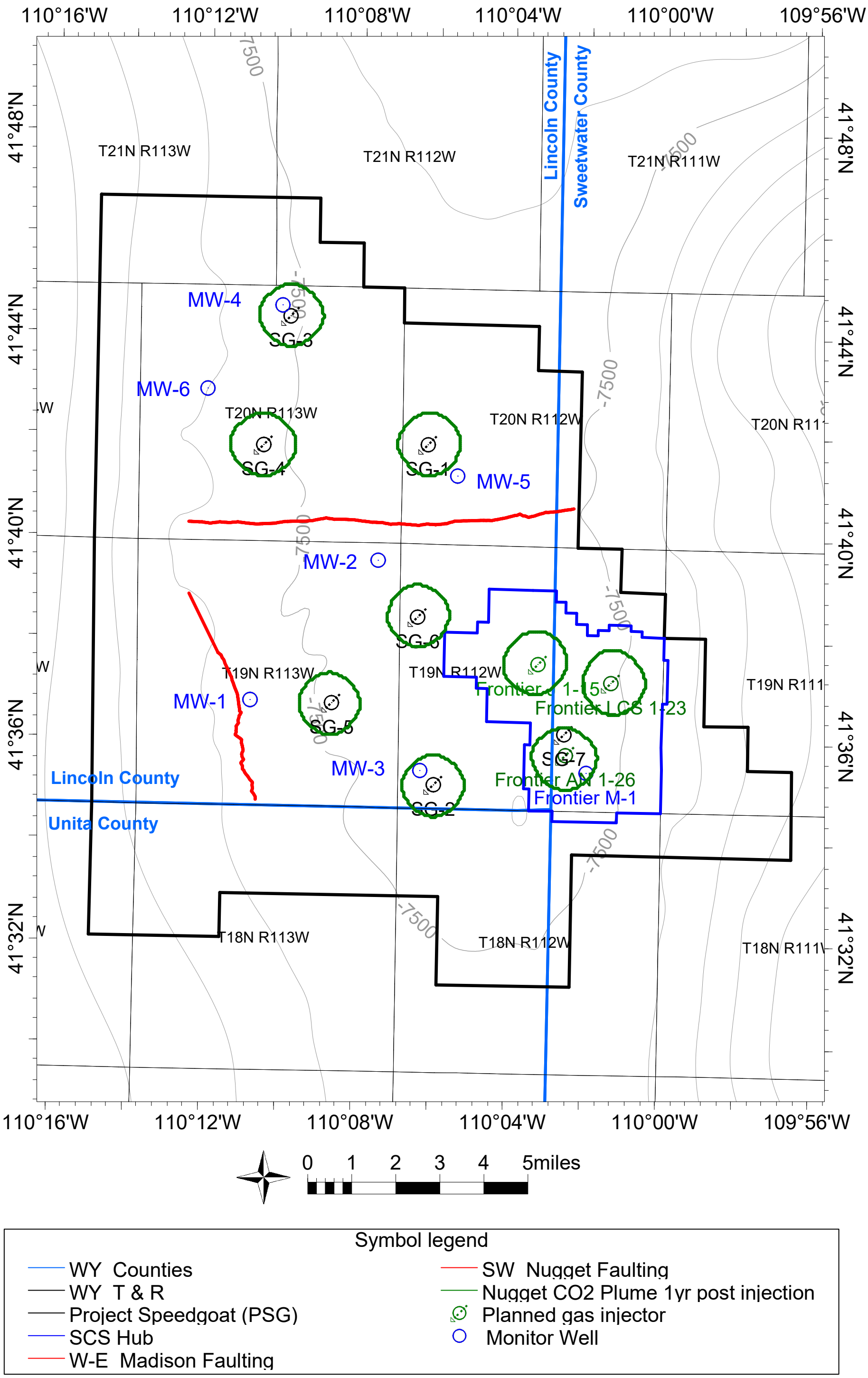
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Parameters	**Analytical Methods**
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Chloride	EPA 300.0
Dissolved Inorganic Carbon (DIC)	EPA 9060
Dissolved Mercury	EPA 245.2
Dissolved Metals (31 metals)	EPA 200.7/200.8
Dissolved Organic Carbon (DOC)	SM 5310B
Fluoride	EPA 300.0
Sulfate	EPA 300.0
Sulfide	SM 4500-S2– F
Total Dissolved Solids (TDS)	SM 2540C
Total Inorganic Carbon (TIC)	EPA 9060
Total Mercury	EPA 7470A
Total Metals (31 metals)	EPA 6010B/6020
Total Organic Carbon (TOC)	SM 5310B

[1] *Standard method; American Public Health Association (2017)*

[2] *U.S. Environmental Protection Agency*

FIGURES


110°16'W
110°12'W
110°08'W
110°04'W
110°00'W
109°56'W
41°48'N
41°44'N
41°40'N
41°36'N
41°32'N
T21N R113W
T21N R112W
T21N R111W
Lincoln County
Sweetwater County
-11250
MW-4
SG-3
MW-6
T20N R113W
T20N R112W
SG-4
SG-1
MW-5
MW-2
SG-6
T19N R113W
T19N R112W
T19N R111
MW-1
SG-5
Frontier LCS 1-23
SG-7
MW-3
Frontier AN 1-26
Frontier M-1
SG-2
Lincoln County
Unita County
T18N R113W
T18N R112W
T18N R111
0 1 2 3 4 5miles
Symbol legend
WY Counties
WY T & R
Project Speedgoat (PSG)
SCS Hub
W-E Madison Faulting
SW Nugget Faulting
Madison CO2 Plume 1yr post injection
Planned gas injector
Monitor Well


110°16'W
110°12'W
110°08'W
110°04'W
110°00'W
109°56'W
41°48'N
41°44'N
41°40'N
41°36'N
41°32'N
T21N R113W
T21N R112W
T21N R111W
Lincoln County
Sweetwater County
-7500
MW-4
SG-3
MW-6
T20N R113W
T20N R112W
T20N R11
SG-4
SG-1
MW-5
MW-2
SG-6
T19N R113W
T19N R112W
T19N R111
MW-1
SG-5
Frontier LCS 1-23
SG-7
MW-3
Frontier AN 1-26
Frontier M-1
SG-2
Lincoln County
Unita County
T18N R113W
T18N R112W
T18N R111
0 1 2 3 4 5miles
Symbol legend
WY Counties
WY T & R
Project Speedgoat (PSG)
SCS Hub
W-E Madison Faulting
SW Nugget Faulting
Nugget CO2 Plume 1yr post injection
Planned gas injector
Monitor Well

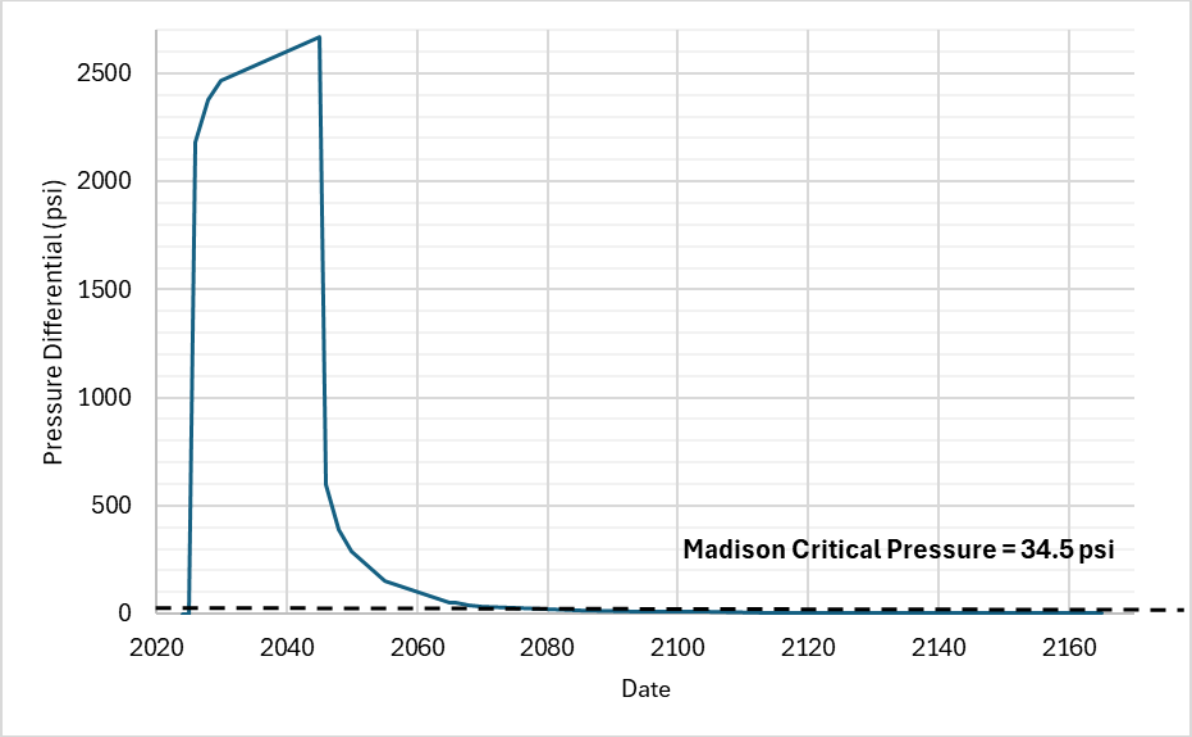
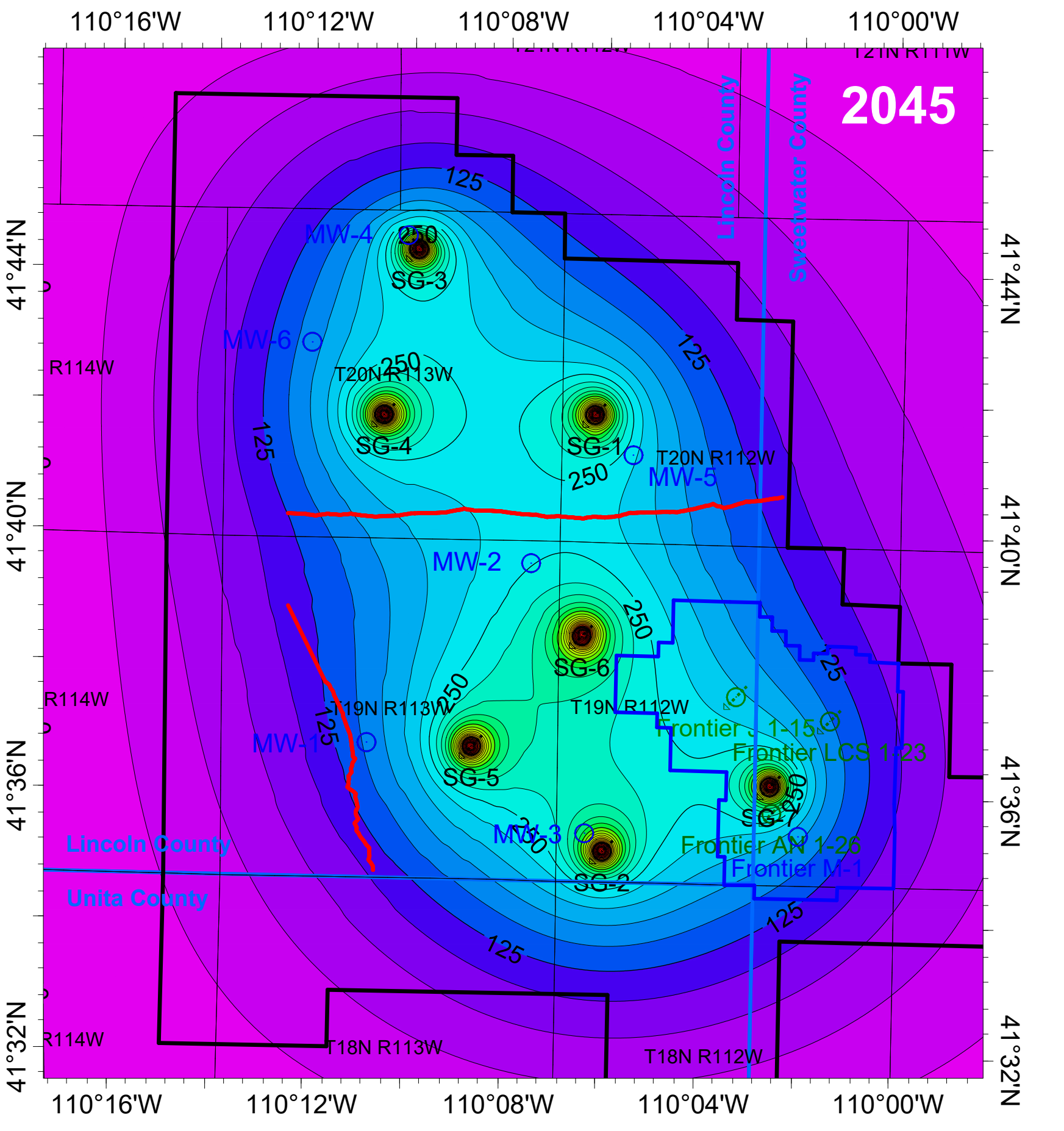
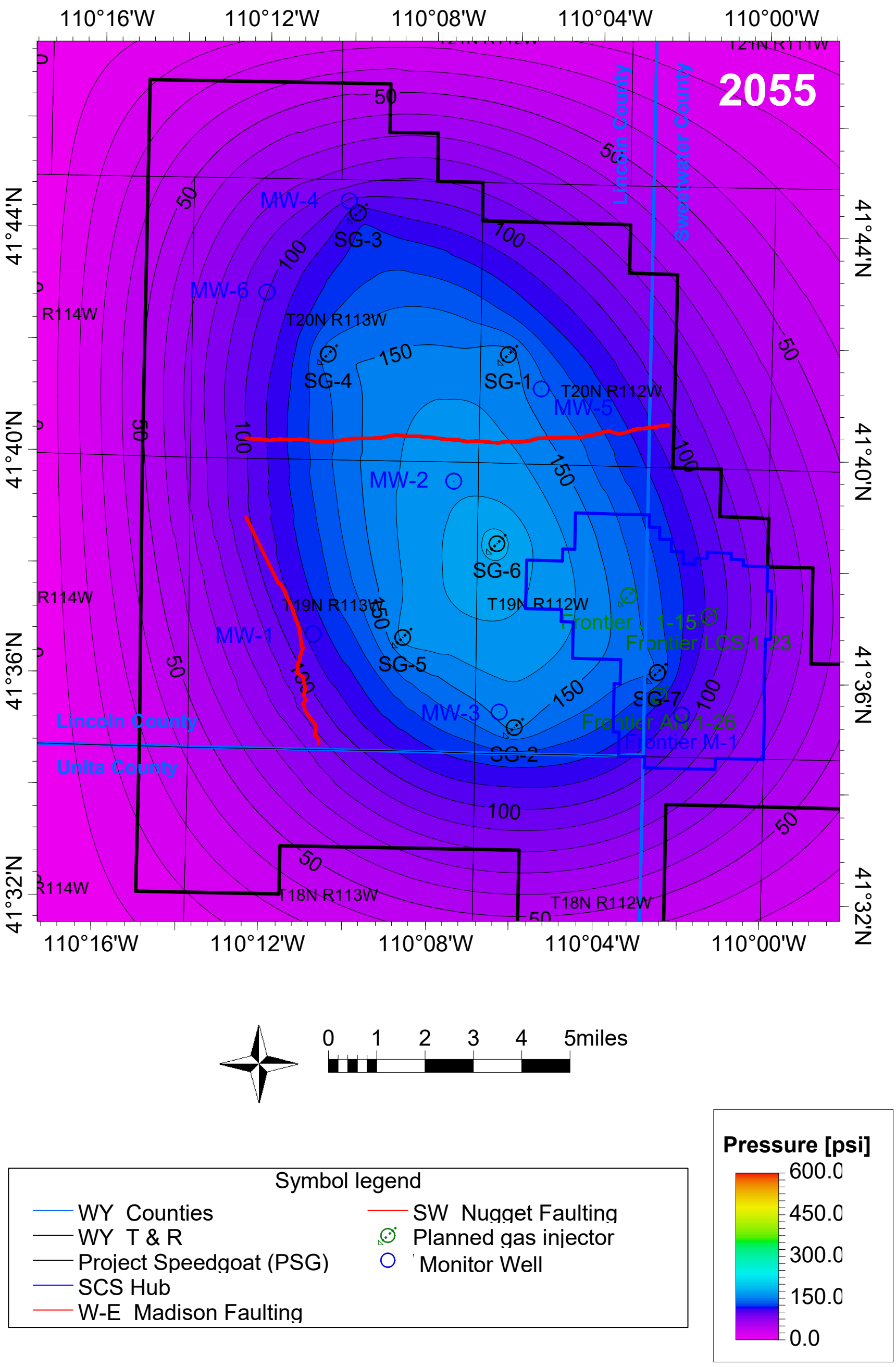


Figure A-6.3. *Predicted change in pressure in the Madison sequestration zone 100 years following the cessation of CO_2 injection.*


110°16'W
110°12'W
110°08'W
110°04'W
110°00'W
41°44'N
41°40'N
41°36'N
41°32'N
2045
Lincoln County
Sweetwater County
125
250
MW-4
SG-3
MW-6
T20N R113W
SG-4
SG-1
T20N R112W
MW-5
R114W
MW-2
SG-6
T19N R113W
T19N R112W
MW-1
SG-5
Frontier J 1-15
Frontier LCS 1-23
SG-7
MW-3
SG-2
Frontier AN 1-26
Frontier M-1
Lincoln County
Unita County
T18N R113W
T18N R112W
0 1 2 3 4 5miles
Symbol legend
WY Counties
WY T & R
Project Speedgoat (PSG)
SCS Hub
W-E Madison Faulting
SW Nugget Faulting
Planned gas injector
Monitor Well
Pressure [psi]
600.0
450.0
300.0
150.0
0.0


2055
110°16'W
110°12'W
110°08'W
110°04'W
110°00'W
41°44'N
41°40'N
41°36'N
41°32'N
Lincoln County
Sweetwater County
Unita County
MW-1
MW-2
MW-3
MW-4
MW-5
MW-6
SG-1
SG-2
SG-3
SG-4
SG-5
SG-6
SG-7
Frontier - 1-15
Frontier LCS 1-23
Frontier AN 1-26
Frontier M-1
T20N R113W
T20N R112W
T19N R113W
T19N R112W
T18N R113W
T18N R112W
R114W
50
100
150
0 1 2 3 4 5miles
Symbol legend
WY Counties
WY T & R
Project Speedgoat (PSG)
SCS Hub
W-E Madison Faulting
SW Nugget Faulting
Planned gas injector
Monitor Well
Pressure [psi]
600.0
450.0
300.0
150.0
0.0

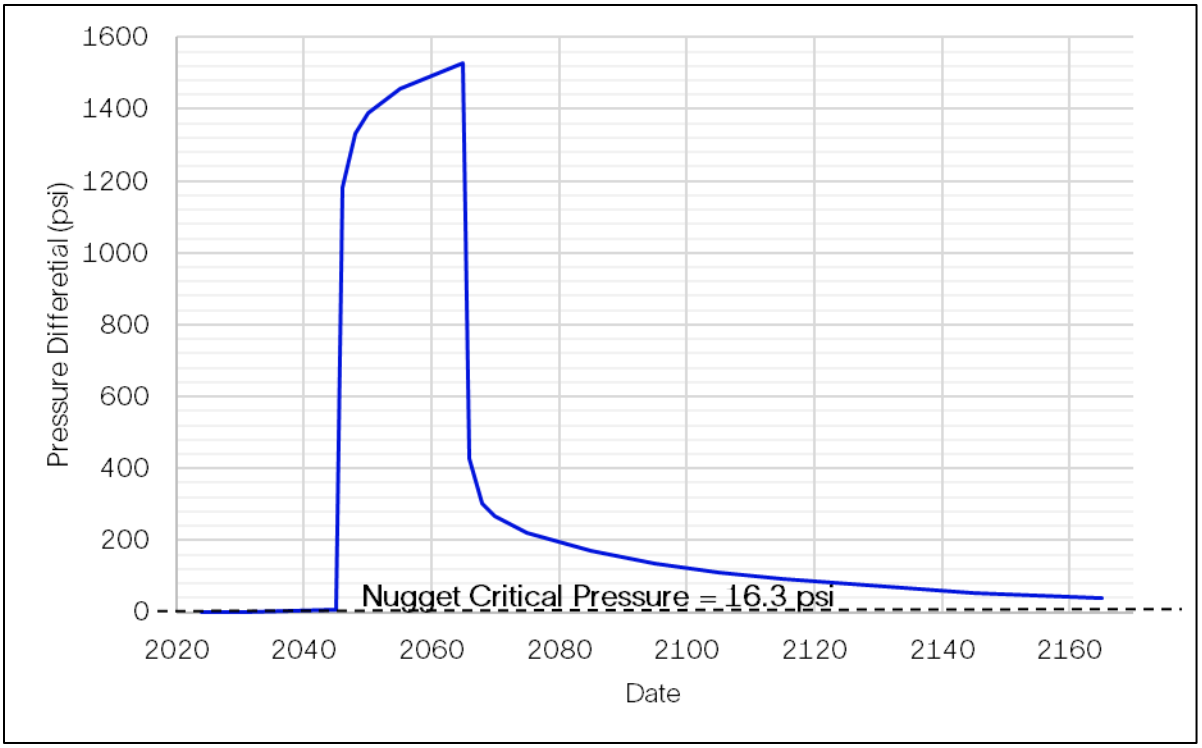
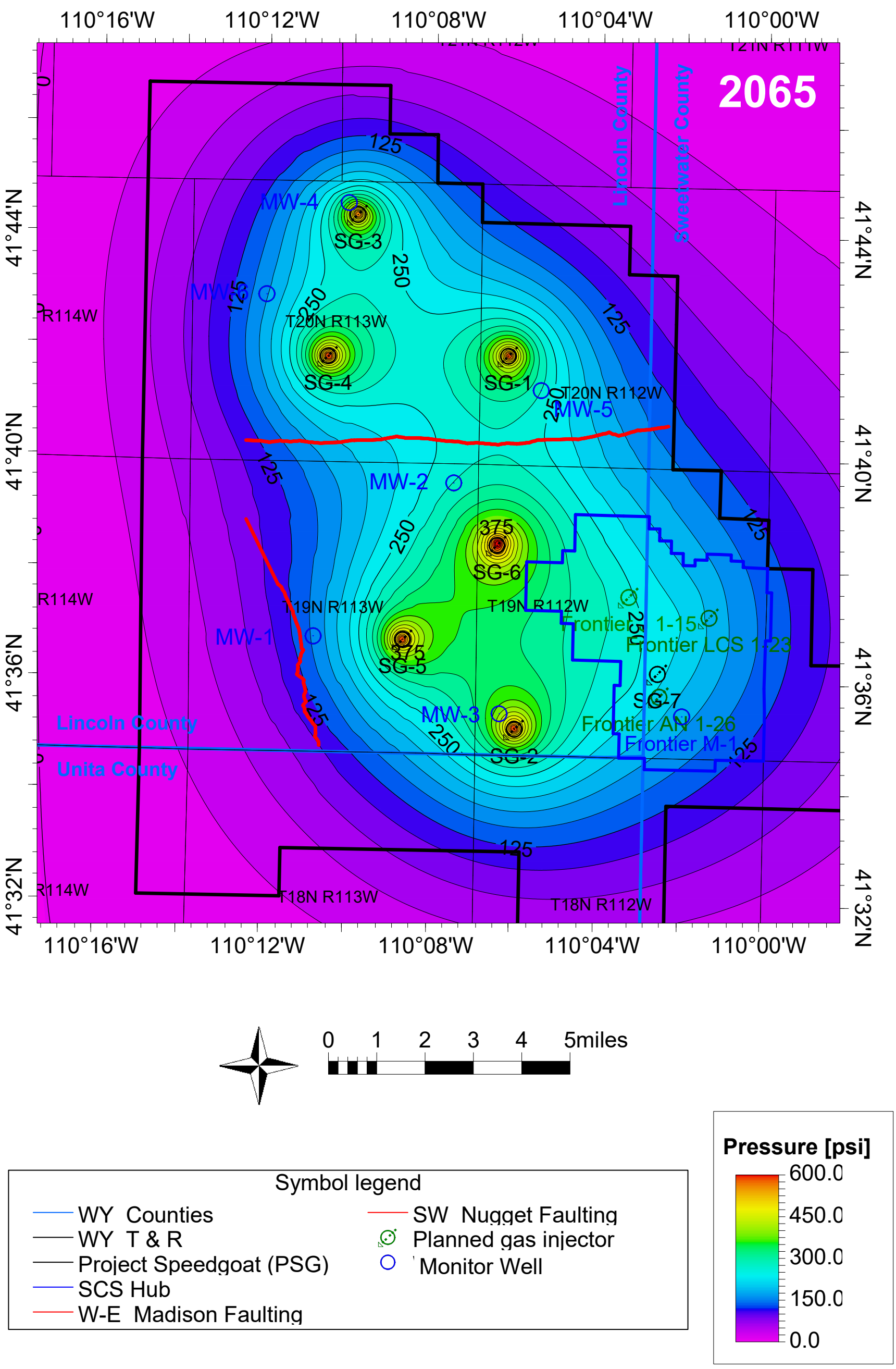
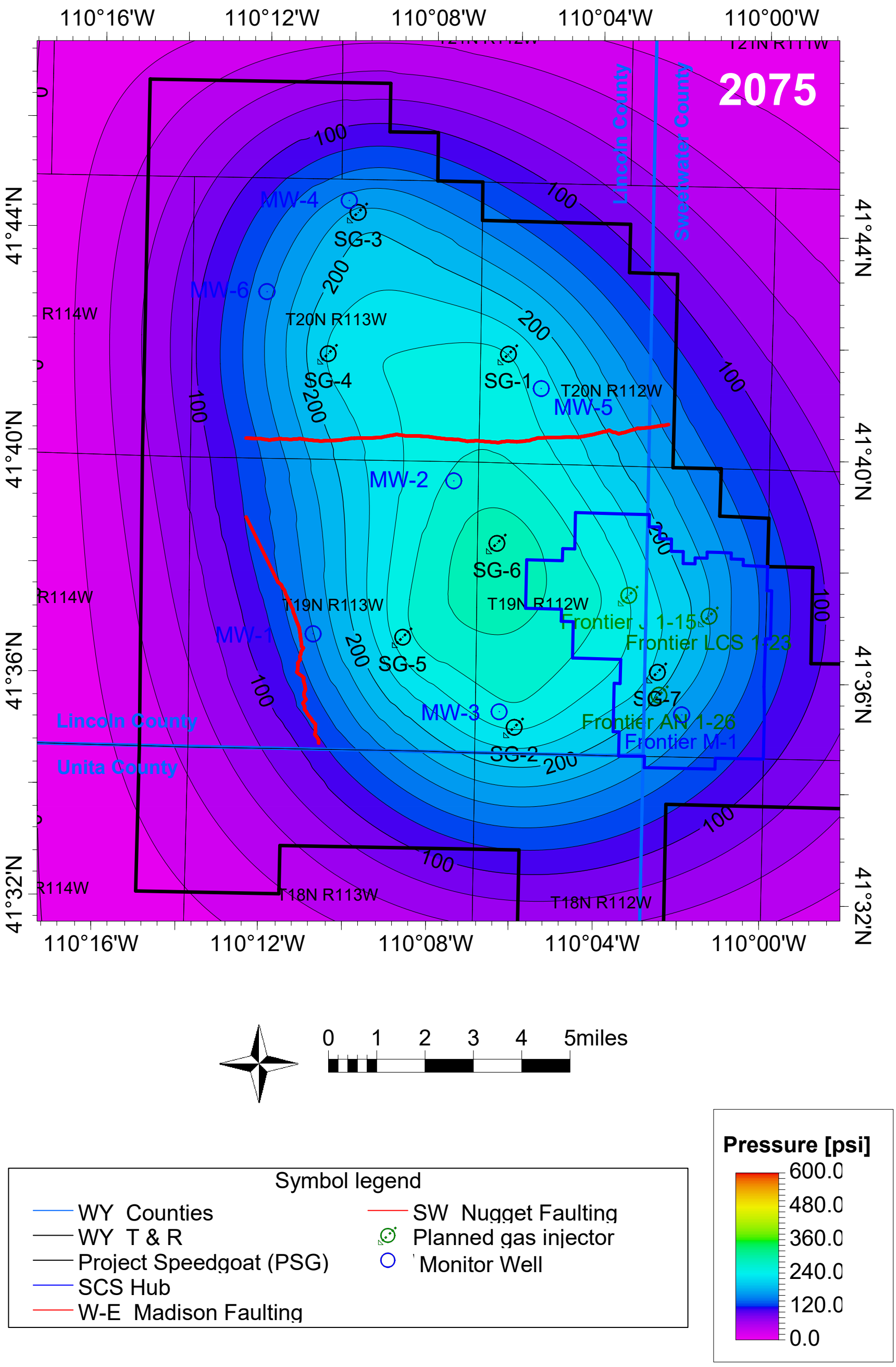


Figure A-6.5. *Predicted change in pressure in the Nugget sequestration zone 100 years following the cessation of CO_2 injection.*


2065
110°16'W
110°12'W
110°08'W
110°04'W
110°00'W
41°44'N
41°40'N
41°36'N
41°32'N
Lincoln County
Sweetwater County
Unita County
MW-4
MW-5
MW-2
MW-1
MW-3
SG-3
SG-4
SG-1
SG-6
SG-5
SG-2
SG-7
Frontier 1-15
Frontier LCS 1-23
Frontier AH 1-26
Frontier M-1
T20N R113W
T20N R112W
T19N R113W
T19N R112W
T18N R113W
T18N R112W
R114W
125
250
375
0 1 2 3 4 5miles
Symbol legend
WY Counties
WY T & R
Project Speedgoat (PSG)
SCS Hub
W-E Madison Faulting
SW Nugget Faulting
Planned gas injector
Monitor Well
Pressure [psi]
600.0
450.0
300.0
150.0
0.0


110°16'W
110°12'W
110°08'W
110°04'W
110°00'W
41°44'N
41°40'N
41°36'N
41°32'N
2075
100
200
MW-4
SG-3
MW-6
T20N R113W
SG-4
SG-1
T20N R112W
MW-5
MW-2
SG-6
T19N R113W
T19N R112W
MW-1
SG-5
MW-3
SG-2
SG-7
T18N R113W
T18N R112W
R114W
Lincoln County
Sweetwater County
Unita County
Frontier J 1-15
Frontier LCS 1-23
Frontier AN 1-26
Frontier M-1
0 1 2 3 4 5miles
Symbol legend
WY Counties
WY T & R
Project Speedgoat (PSG)
SCS Hub
W-E Madison Faulting
SW Nugget Faulting
Planned gas injector
Monitor Well
Pressure [psi]
600.0
480.0
360.0
240.0
120.0
0.0

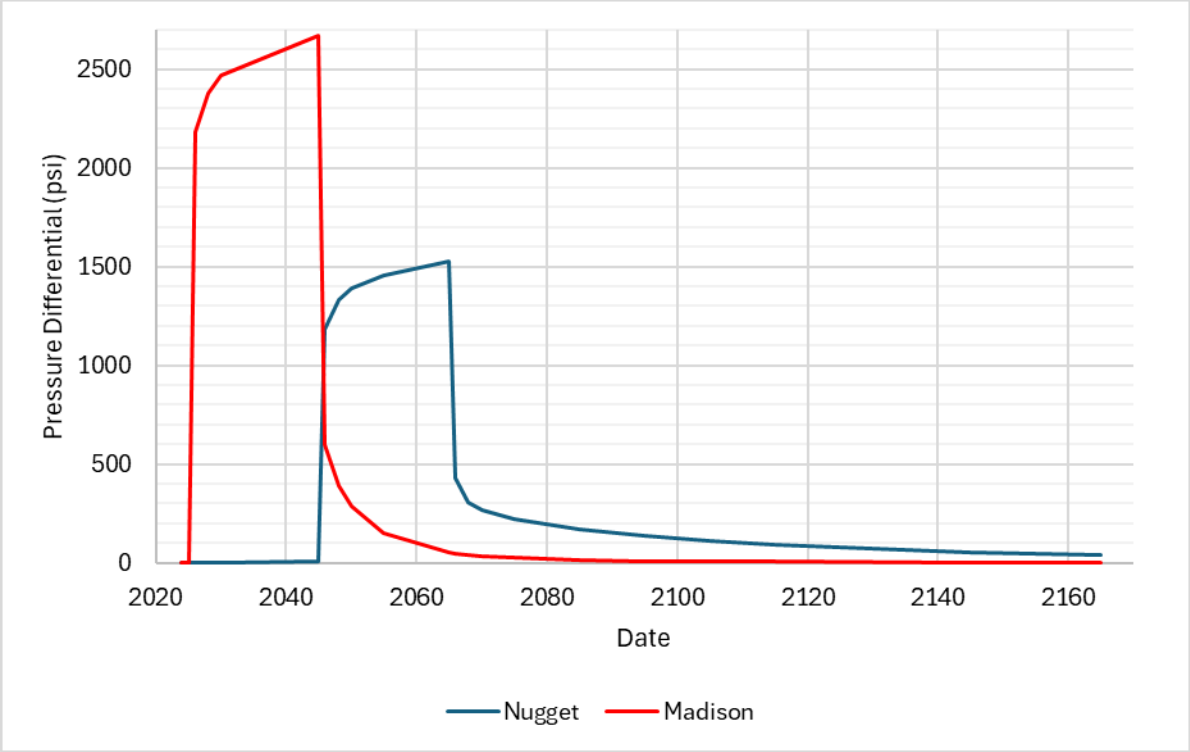
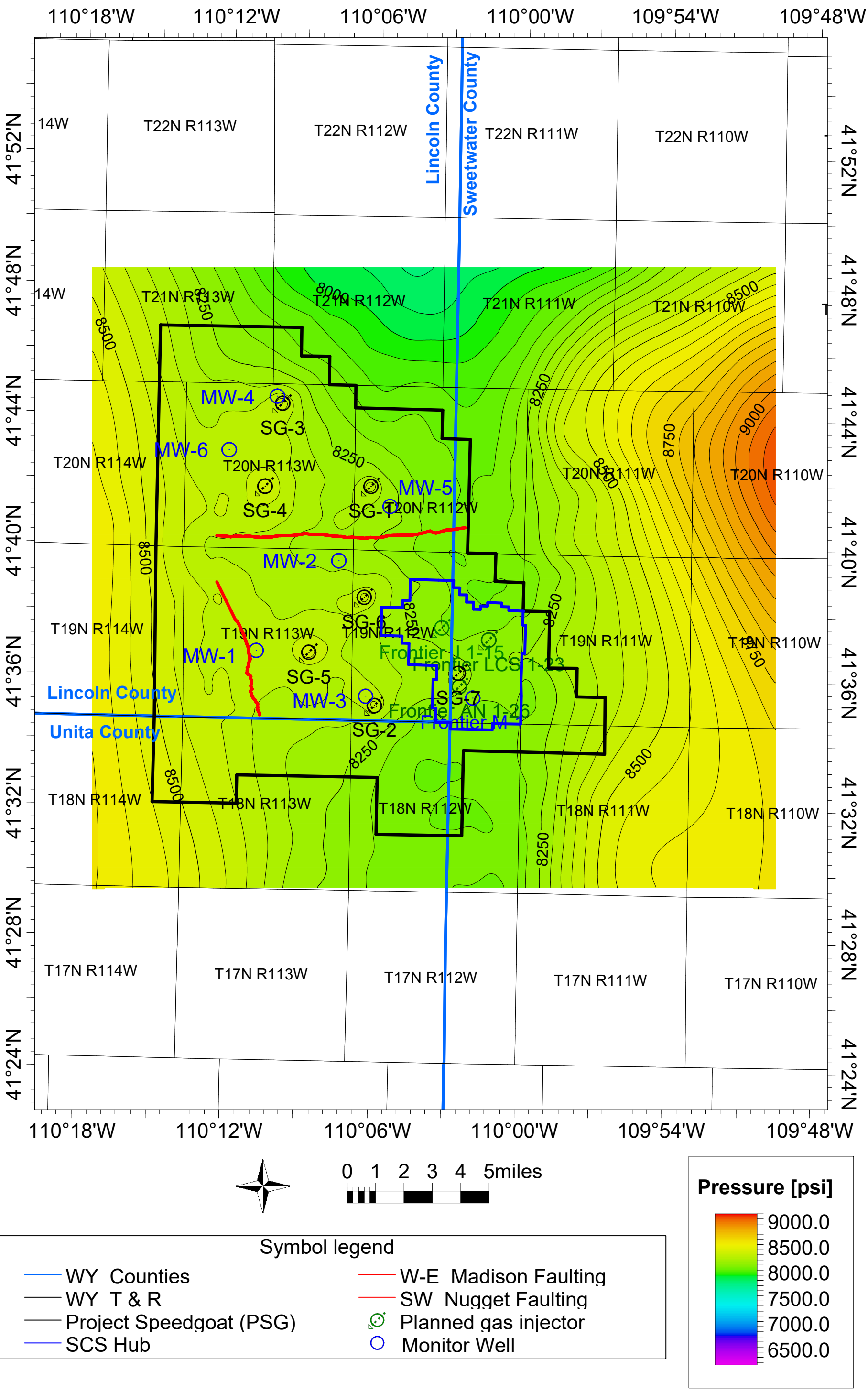
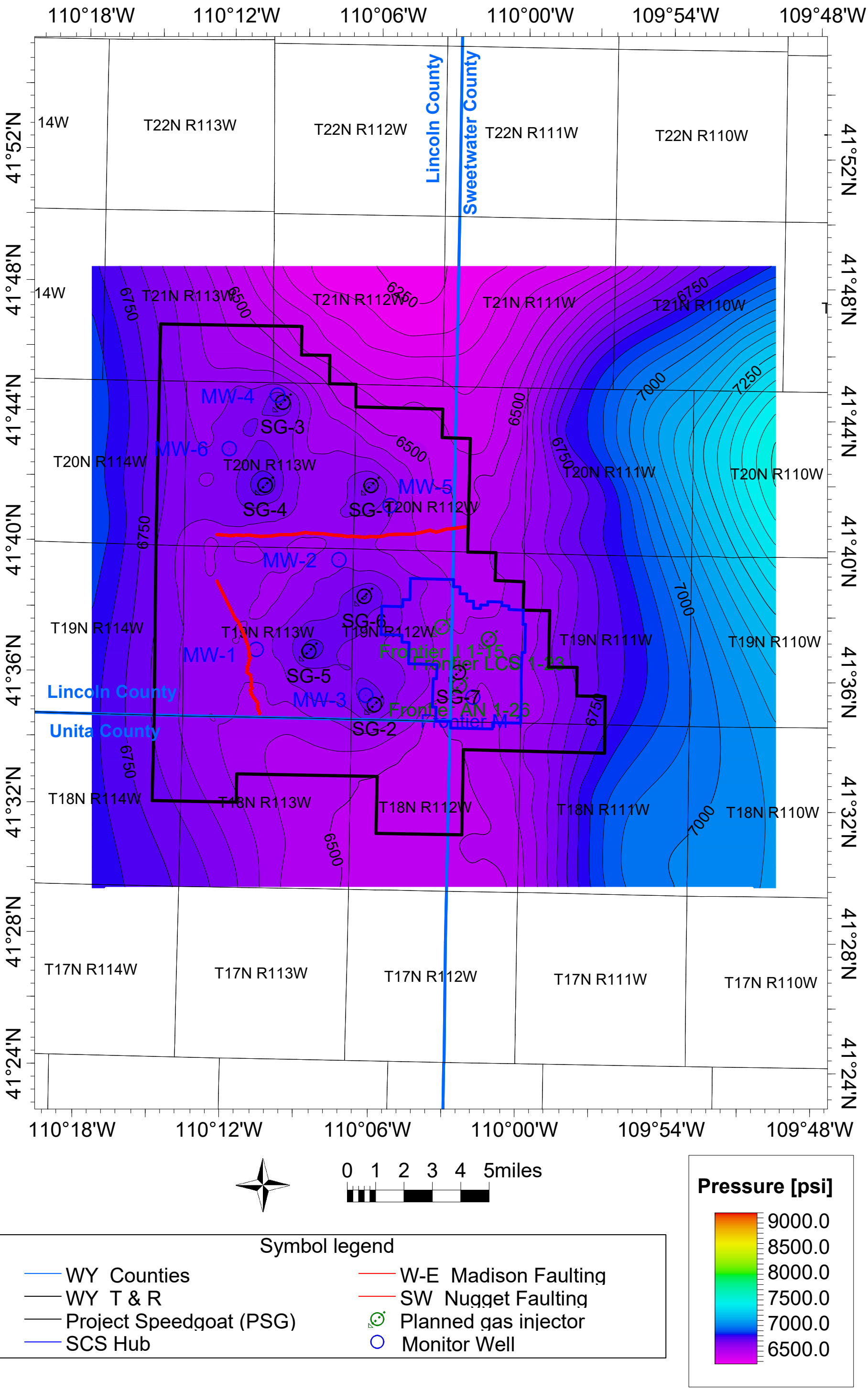


Figure A-6.7. *Predicted change in pressure in the Madison and Nugget sequestration zones 100 year following the cessation of CO_2 injection.*


110°18'W
110°12'W
110°06'W
110°00'W
109°54'W
109°48'W
41°52'N
41°48'N
41°44'N
41°40'N
41°36'N
41°32'N
41°28'N
41°24'N
14W
T22N R113W
T22N R112W
T22N R111W
T22N R110W
Lincoln County
Sweetwater County
T21N R113W
T21N R112W
T21N R111W
T21N R110W
T20N R114W
T20N R113W
T20N R112W
T20N R111W
T20N R110W
T19N R114W
T19N R113W
T19N R112W
T19N R111W
T19N R110W
T18N R114W
T18N R113W
T18N R112W
T18N R111W
T18N R110W
T17N R114W
T17N R113W
T17N R112W
T17N R111W
T17N R110W
8000
8250
8500
8750
9000
MW-1
MW-2
MW-3
MW-4
MW-5
MW-6
SG-1
SG-2
SG-3
SG-4
SG-5
SG-6
SG-7
Frontier J 1-15
Frontier LCS 1-23
Frontier AN 1-26
Frontier M 1
Unita County
0 1 2 3 4 5miles
Pressure [psi]
9000.0
8500.0
8000.0
7500.0
7000.0
6500.0
Symbol legend
WY Counties
WY T & R
Project Speedgoat (PSG)
SCS Hub
W-E Madison Faulting
SW Nugget Faulting
Planned gas injector
Monitor Well


110°18'W
110°12'W
110°06'W
110°00'W
109°54'W
109°48'W
41°52'N
41°48'N
41°44'N
41°40'N
41°36'N
41°32'N
41°28'N
41°24'N
14W
T22N R113W
T22N R112W
T22N R111W
T22N R110W
Lincoln County
Sweetwater County
T21N R113W
T21N R112W
T21N R111W
T21N R110W
T20N R114W
T20N R113W
T20N R112W
T20N R111W
T20N R110W
T19N R114W
T19N R113W
T19N R112W
T19N R111W
T19N R110W
T18N R114W
T18N R113W
T18N R112W
T18N R111W
T18N R110W
T17N R114W
T17N R113W
T17N R112W
T17N R111W
T17N R110W
6750
6500
6250
7000
7250
MW-4
SG-3
MW-6
SG-4
SG-1
MW-5
MW-2
SG-6
MW-1
SG-5
MW-3
SG-2
SG-7
Frontier J 1-15
Frontier LCS 1-22
Frontier AN 1-26
Frontier M
Unita County
0 1 2 3 4 5miles
Pressure [psi]
9000.0
8500.0
8000.0
7500.0
7000.0
6500.0
Symbol legend
WY Counties
WY T & R
Project Speedgoat (PSG)
SCS Hub
W-E Madison Faulting
SW Nugget Faulting
Planned gas injector
Monitor Well

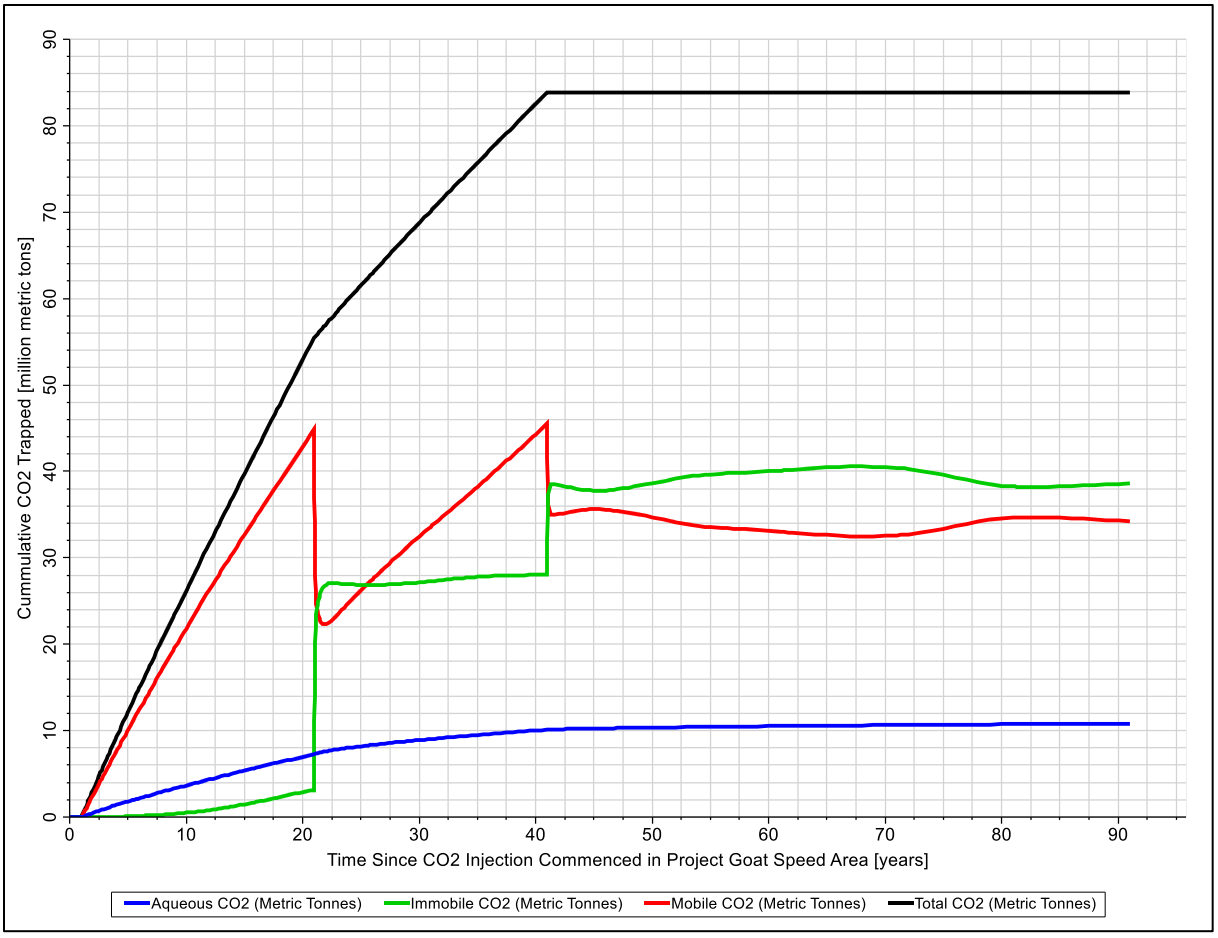
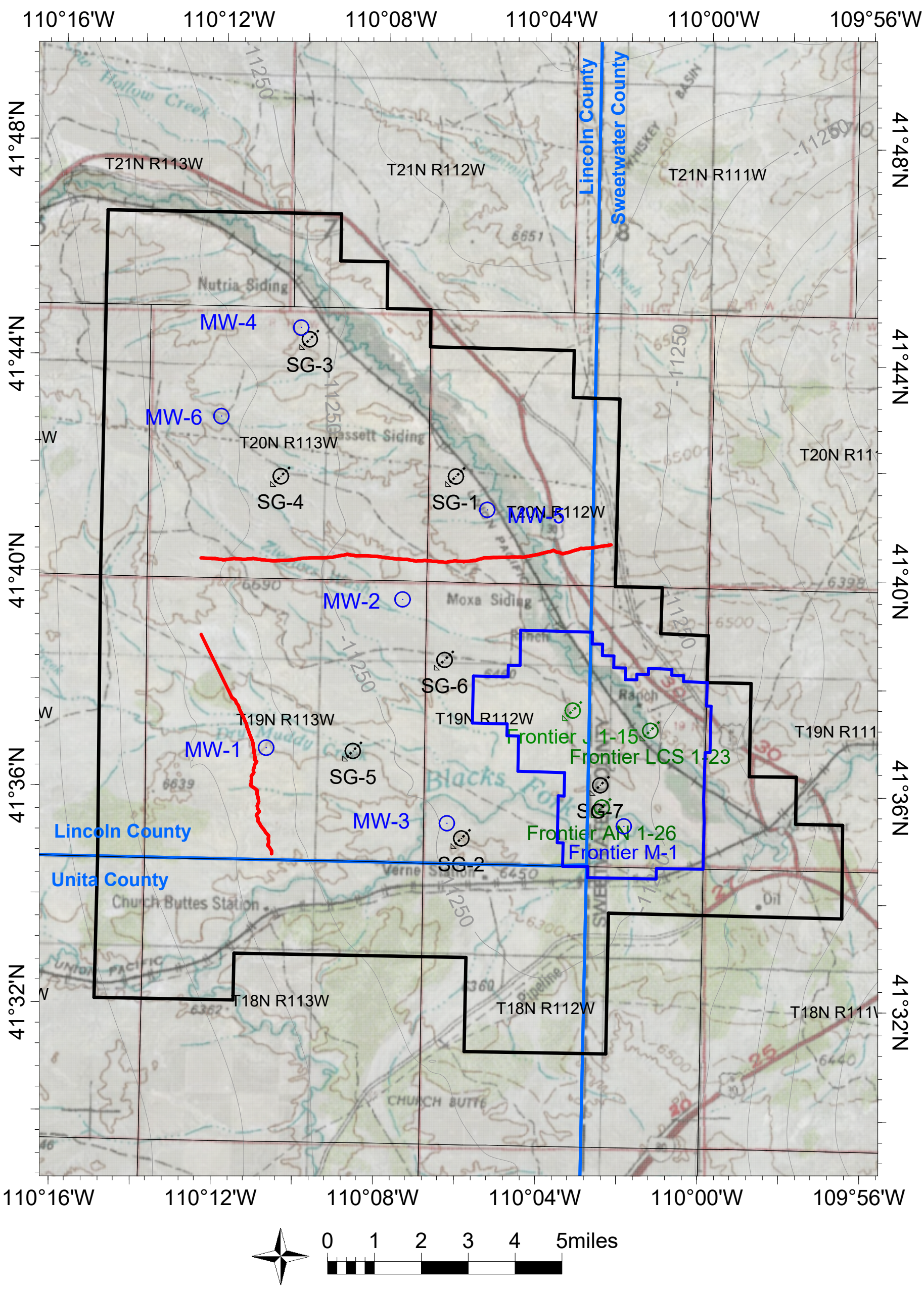


Figure A-6.10. *Field aqueous (Solubility), mobile vapor (Structural) and immobile (Residual) vapor trapping mechanisms over time.*

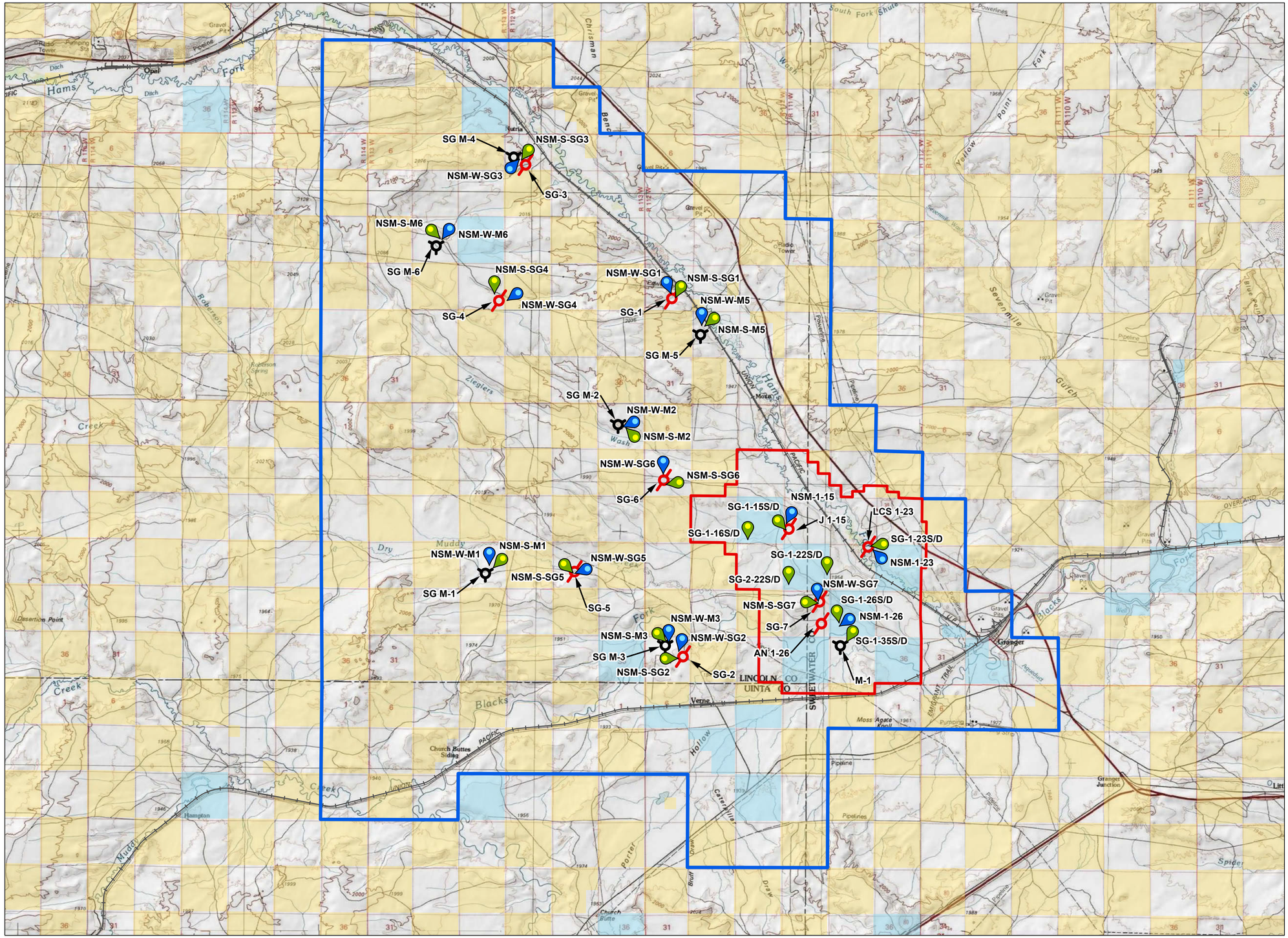

110°16'W
110°12'W
110°08'W
110°04'W
110°00'W
109°56'W
41°48'N
41°44'N
41°40'N
41°36'N
41°32'N
T21N R113W
T21N R112W
T21N R111W
Lincoln County
Sweetwater County
Nutria Siding
MW-4
SG-3
MW-6
T20N R113W
SG-4
SG-1
T20N R112W
MW-5
MW-2
Moxa Siding
SG-6
T19N R113W
T19N R112W
MW-1
SG-5
MW-3
Frontier J 1-15
Frontier LCS 1-23
SG-7
Frontier AN 1-26
Frontier M-1
SG-2
Lincoln County
Unita County
Church Buttes Station
T18N R113W
T18N R112W
T18N R111W
0 1 2 3 4 5miles
Symbol legend
WY Counties
WY T & R
Project Speedgoat (PSG)
SCS Hub
W-E Madison Faulting
SW Nugget Faulting
Planned gas injector
Monitor Well

PROJECT SPEED GOAT

Figure A-6.12. Near-Surface Monitoring Locations

SW WYOMING
(SWEETWATER, UINTA & LINCOLN COUNTIES)

FRONTIER
CARBON SOLUTIONS





Near Surface Monitoring

- Soil Station
- Shallow Water Well

Speed Goat Injection

- Injection
- Monitor
- SCS Hub
- Speed Goat Boundary

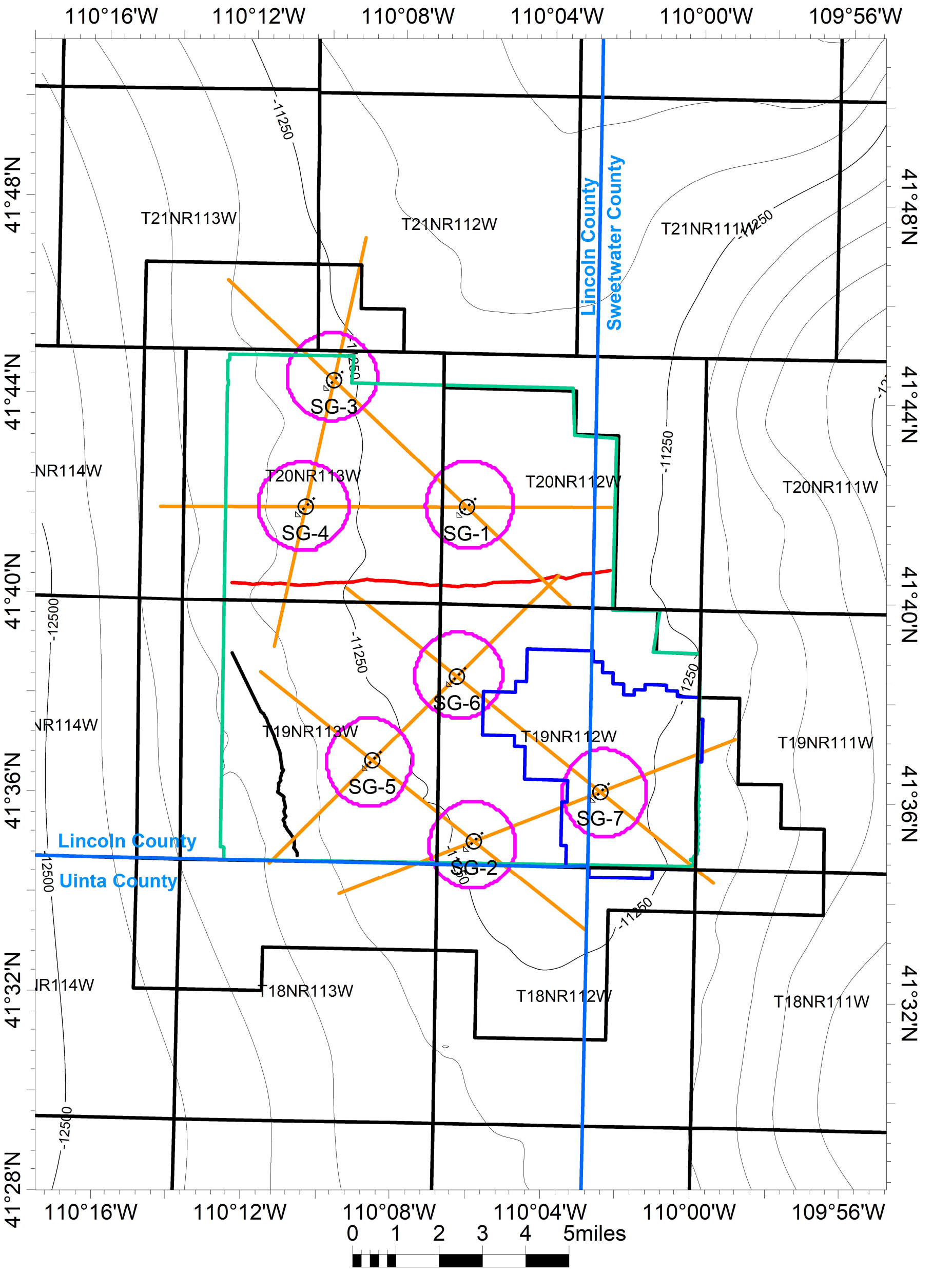
Federal Land

- BLM
- State
- UP Railroad

N
W E
S

0 1.5 3 4.5 6
Kilometers

0 0.75 1.5 3
Miles



Symbol legend

- W-E Madison Faulting
- N-S Nugget Faulting
- Planned 2D Lines for CO2 Monitoring
- Project Speedgoat (PSG)
- Madison CO2 Plume End of Monitoring Period
- 3D Seismic Extent
- SCS Hub
- WY T&R
- WY Counties
- Planned gas injector

FORM A-7
FORMATION FLUID TESTING

TABLE OF CONTENTS

7.0 Water Chemistry Information 1
7.1 Proposed Formation Fluid Testing Plan 3
7.2 References 4

LIST OF TABLES

Table A-7.1. Formation Water Chemistry from the Injection Formations. 4

LIST OF FIGURES

Figure A-7.1. PSG hydrostratigraphy showing aquifers, USDWs, confining units, and injection zones; after Ahren et al. (1981), Clarey et al. (2010), and Lynds (2013). 2

ABBREVIATIONS/ACRONYMS

amps	amperes
AoR	Area of Review
CO_3^{2-}	carbonate
DIC	dissolved inorganic carbon
DOC	dissolved organic carbon
FCS	Frontier Carbon Solutions Holdings, LLC
HCO3-	bicarbonate
IFA	in-situ fluid analyzer
LFA	live fluid analyzer
OH-	hydroxide
ppm	parts per million
PSG	Project Speed Goat
psi	pounds per square inch
rpm	revolutions per minute
TBD	to be determined
TDS	total dissolved solids
USDW	underground sources of drinking water
WDEQ	Wyoming Department of Environmental Quality

FRONTIER CARBON SOLUTIONS
PROJECT SPEED GOAT
CARBON SEQUESTRATION UIC CLASS VI APPLICATION

FORM A-7, PROPOSED FORMATION FLUID TESTING PROGRAM
Water Quality Rules, Chapter 24 Section 17

7.0 Water Chemistry Information

Publicly-available water chemistry information for aquifers within the Project Speed Goat (PSG) area is provided in ***Form A-8, Underground Source of Drinking Water (USDW) Analysis Plan***. Based on these data and industry-accepted practices for calculating log-based salinity values, the Nugget and Madison injection formations exceed 10,000 parts per million (ppm) and are confirmed not to be USDWs. Site specific fluid sampling and testing will be conducted when the proposed injection wells are drilled to further validate the proposed injection zones are not USDWs. This water chemistry information will also provide baseline data in which to compare future monitoring test results during the operational and post-injection phases of the Project. **Figure A-7.1** is a modified stratigraphic column after Ahren, et.al. (1981), Clarey, et.al. (2010), and Lynds (2013) showing aquifers, USDWs, confining units, and injection zones in PSG.

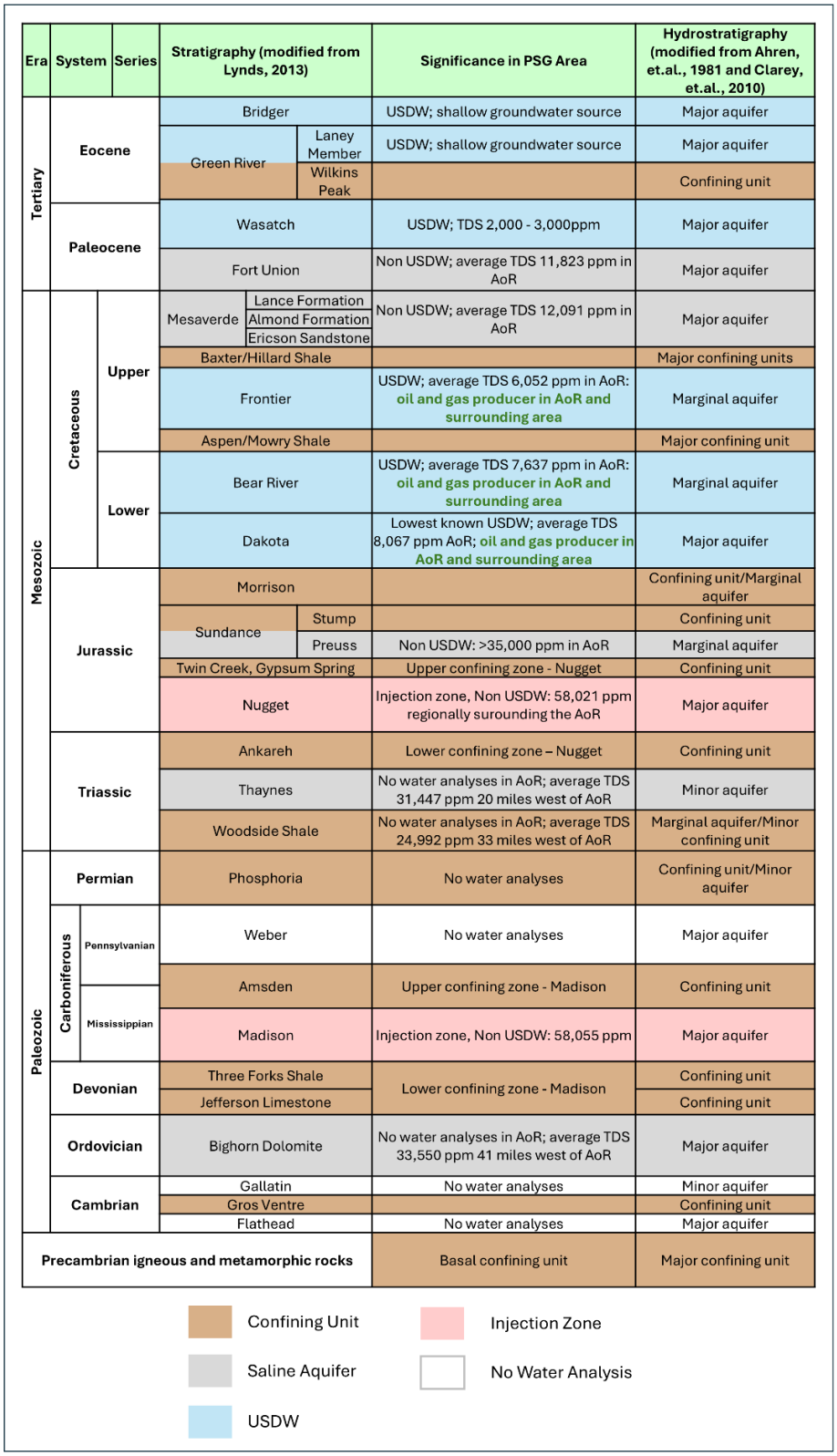


Figure A-7.1. *PSG hydrostratigraphy showing aquifer, USFDWs, confining units, and injection zones; modified from Ahren, et al. (1981), Clarey (et al. (2010), and Lynds (2013).*

7.1 Proposed Formation Fluid Testing Plan

The proposed formation fluid testing plan will characterize the water quality of the receiving formations, which will be provided to the Administrator. For identified aquifers lacking sufficient water quality data in PSG, Frontier Carbon Solutions Holdings, LLC (FCS) will endeavor to obtain data within the capabilities of the tools. These data will establish the baseline water quality and chemistry in which future data will be compared. The following formations are identified as preliminary targets for water quality sampling and testing:

- Wasatch
- Mesaverde
- Dakota (lowest identified USDW)
- Morrison and Entrada
- Nugget (injection zone)
- Thaynes
- Phosphoria
- Weber
- Madison (injection zone)

The SLB MDT™ modular formation dynamics tester and the Saturn™ 3D radial probe will be used for the formation fluid testing program. Testing will occur after the injection well is drilled and before it is cased starting with the Madison, which is the deepest formation. The durations provided in the following program are estimates only and will be adjusted in real time based on actual formation properties and wellbore conditions.

The testing procedure is as follows:

1. Based on openhole correlation logs move the Saturn probe to the first sampling station. Inflate the Saturn with 5 to 7 liters (between 350 and 400 pounds per square inch (psi)). Inflation pressure may decrease during operations to as low as 50 or 20 psi but no further action is required.
2. Perform a pretest with 2 to 4 strokes to ensure probe seal. Likely, pretest duration is 10 to 30 minutes.
3. Pump-out starting with 300 revolutions per minute (rpm) and increase the rate by 300 rpm steps to the highest rate possible without exceeding 10 amperes (amps) on the pump or 5,000 psi differential pressure on the Saturn. Continue to pump out until formation fluid is observed on the live fluid analyzer in situ fluid analyzer/live fluid analyzer (IFA/LFA).
4. Continue to pump out at the same rate in step 3 until low contamination is achieved.
5. Fill sample bottle with formation fluid and seal the bottle.
6. Pump out two to six strokes and fill the second bottle and seal.
7. Deflate the Saturn probe and move to the next sampling station.

8. Pack labeled bottles into cooler with ice, complete chain of custody paperwork, and deliver to the lab within designated hold time per laboratory specifications for the required water chemistry parameters listed in **Table A-7.1**.

Table A-7.1. Formation Water Chemistry from the Injection Formations		
Parameter	**Nugget (mg/L)**	**Madison (mg/L)**
Alkalinity, as Bicarbonate (HCO3-)	TBD	TBD
Alkalinity, as Carbonate (CO32-)	TBD	TBD
Alkalinity, as Hydroxide (OH^-)	TBD	TBD
Boron	TBD	TBD
Barium	TBD	TBD
Bromide	TBD	TBD
Dissolved Inorganic Carbon (DIC)	TBD	TBD
Dissolved Organic Carbon (DOC)	TBD	TBD
Calcium	TBD	TBD
Chloride	TBD	TBD
Iron	TBD	TBD
Potassium	TBD	TBD
Lithium	TBD	TBD
Magnesium	TBD	TBD
Sodium	TBD	TBD
Lead	TBD	TBD
Sulfate	TBD	TBD
Strontium	TBD	TBD
Zinc	TBD	TBD
Total Dissolved Solids (TDS)	TBD	TBD

7.2 References

Ahern, J., Collentine, M., and Cooke, S., 1981, Occurrence and characteristics of ground water in the Green River Basin and Overthrust Belt, Wyoming – Report to U.S. Environmental Protection Agency, Contract Number G-008269- 79, by Water Resources Research Institute, University of Wyoming, Laramie, Wyoming, Volume V-A and Volume V-B (plates), 2 vols., 123 p.

Clarey, K.E., Bartos, T.T., Copeland, David, Hallberg, L.L., Clark, M.L., and Thompson, Melissa, 2010, Available groundwater determination—WWDC Green River Basin water plan I, groundwater study, level I (2008–2009): Wyoming State Geological Survey Technical Memorandum 2, 471 p.

Lynds, R., 2013, Geologic Storage Assessment of Carbon Dioxide (CO_2) in the Laramide Basins of Wyoming, Technical Memorandum No.3, Wyoming State Geological Survey, 198 p.

APPENDIX A-7

FORMATION FLUID TESTING

TABLE OF CONTENTS

LIST OF TABLES

Table A-7.1. Formation Water Chemistry from the Injection Formations. 1

LIST OF FIGURES

Figure A-7.1. PSG hydrostratigraphy showing aquifers, USDWs, confining units, and injection zones; after Ahren et al. (1981), Clarey et al. (2010), and Lynds (2013). 2

TABLES

Table A-7.1. Formation Water Chemistry from the Injection Formations		
Parameter	**Nugget (mg/L)**	**Madison (mg/L)**
Alkalinity, as Bicarbonate (HCO3-)	TBD	TBD
Alkalinity, as Carbonate (CO32-)	TBD	TBD
Alkalinity, as Hydroxide (OH^-)	TBD	TBD
Boron	TBD	TBD
Barium	TBD	TBD
Bromide	TBD	TBD
Dissolved Inorganic Carbon (DIC)	TBD	TBD
Dissolved Organic Carbon (DOC)	TBD	TBD
Calcium	TBD	TBD
Chloride	TBD	TBD
Iron	TBD	TBD
Potassium	TBD	TBD
Lithium	TBD	TBD
Magnesium	TBD	TBD
Sodium	TBD	TBD
Lead	TBD	TBD
Sulfate	TBD	TBD
Strontium	TBD	TBD
Zinc	TBD	TBD
Total Dissolved Solids (TDS)	TBD	TBD

FIGURES

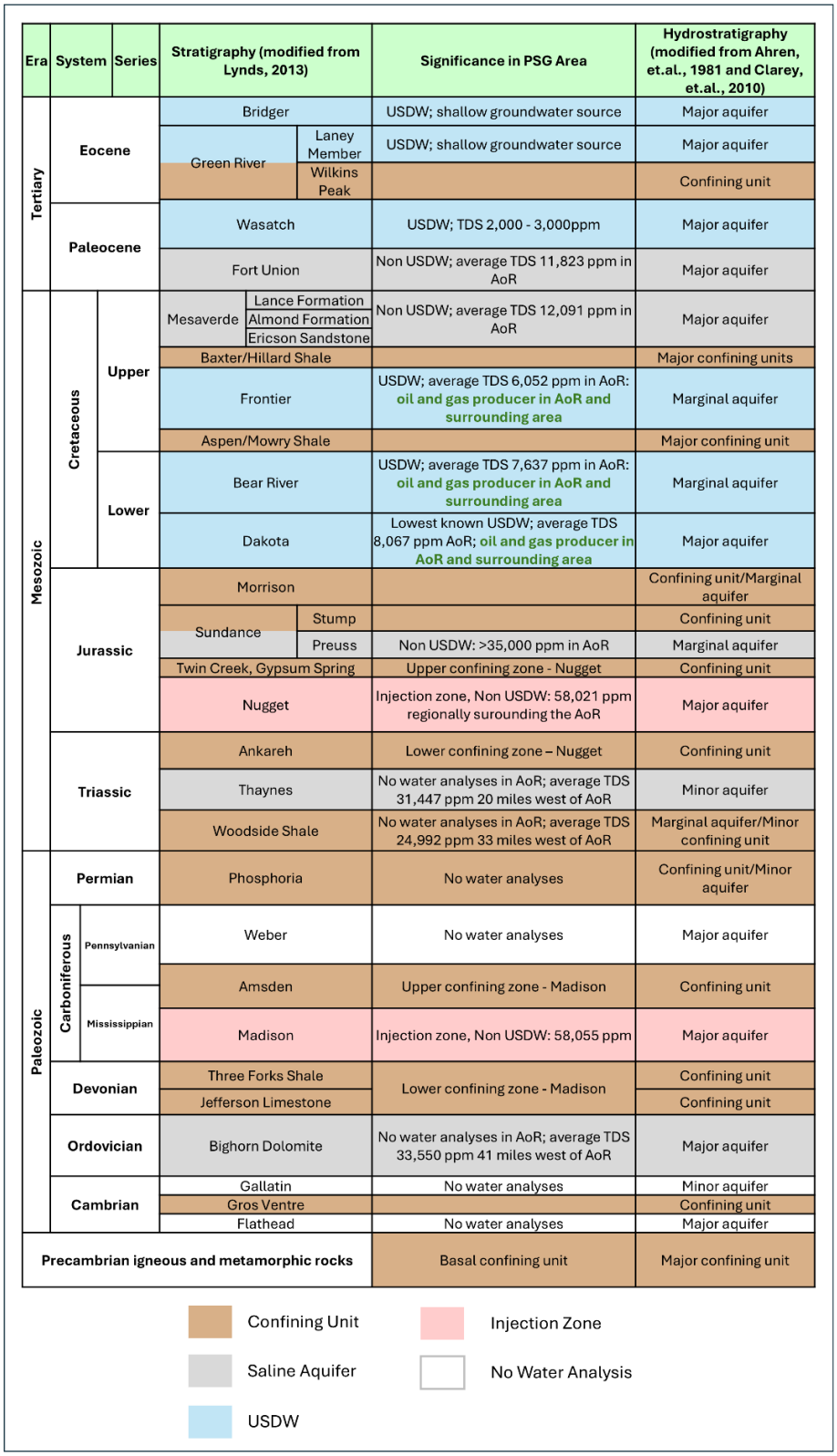


Figure A-7.1. *PSG hydrostratigraphy showing aquifers, USDWs, confining units, and injection zones; modified from Ahren, et.al. (1981), Clarey, et.al. (2010), and Lynds (2013).*

FORM A-8
UNDERGROUND SOURCE OF DRINKING WATER ANALYSIS PLAN

TABLE OF CONTENTS

8.0 Regional Geologic Overview of USDWs 1
8.1 USDW Determination 2
8.2 Geochemistry 11
8.2.1 Lowest USDW 11
8.2.2 Injection Zones 13
8.3 Proposed Formation Fluid Testing Program 13
8.4 References 13

TABLES

Table A-8.1 Water Quality of the Fort Union Aquifer 3
Table A-8.2 Water Quality of the Mesaverde Aquifer 3
Table A-8.3 Water Quality of the Bear River / Muddy Aquifer 4
Table A-8.4 Water Quality of the Lowermost USDW (Dakota) Above the Nugget Injection Zone 5
Table A-8.5 Water Quality of the Twin Creek Aquifer 6
Table A-8.6 Water Quality of Receiving Formation (Nugget) 7
Table A-8.7 Water Quality of the Thaynes Aquifer 8
Table A-8.8 Water Quality of the Woodside Aquifer 8
Table A-8.9 Water Quality of the Amsden Aquifer 8
Table A-8.10 Water Quality of Receiving Formation (Madison) 9
Table A-8.11 Water Quality of the Big Horn Aquifer 9
Table A-8.12 Water Quality of the Frontier Aquifer ..... Appendix A-8
Table A-8.13 Dakota Water Chemistry 11
Table A-8.14 Water Chemistry of Receiving Formation (Nugget) 12
Table A-8.15 Water Chemistry of Receiving Formation (Madison) 12

FIGURES

Figure 8.1 Stratigraphic Section denoting USDWs, confining zones, and injection zones..... 2
Figure 8.2 Aquifer Summary 10

ABBREVIATIONS/ACRONYMS

%	percent
AoR	Area of Review
API	American Petroleum Institute
Ca	calcium
CBE	charge-balance error
Cl	chloride
EPA	Environmental Protection Agency
GGRB	Greater Green River Basin
HCO_3-	bicarbonate
HCO_3	carbonate
K	potassium
Mg	magnesium
mg/L	milligram per liter
NA	not available
Na	sodium
NaCl	sodium chloride
pH	potential of hydrogen
ppm	parts per million
PSG	Project Speed Goat
PSG	Project Speed Goat
SO	sulfate
TDS	total dissolved solids
USDW	underground sources of drinking water
USGS	U.S. Geological Survey
WOGCC	Wyoming Oil and Gas Conservation Commission

FRONTIER CARBON SOLUTIONS
PROJECT SPEED GOAT
CARBON SEQUESTRATION UIC CLASS VI APPLICATION

FORM A-8, UNDERGROUND SOURCE OF DRINKING WATER ANALYSIS PLAN
Water Quality Rules, Chapter 24 Section 9 and 10

8.0 Regional Geologic Overview of USDWs

There are six aquifers in the Greater Green River Basin (GGRB) which are classified as confirmed or possible underground sources of drinking water (USDWs) in the Project Speed Goat (PSG) Area of Review (AoR). USDWs are defined by the Environmental Protection Agency (EPA) as those with total dissolved solids (TDS) less than 10,000 parts per million (ppm). A comprehensive description of USDWs and all aquifers in the AoR from the surface to the Precambrian is provided in ***Form A-1, Site Characterization Section 1.1.5*** including sequence of geologic units, thickness, lateral extent, and the direction of water movement. The AoR with water wells and springs are also shown in ***Figures A-1.15 and A-1.16*** of ***Form A-1, Site Characterization,*** as well as ***Figure A.2*** in ***Appendix A***.

8.1 USDW Determination

Regional water quality data were collected from the Wyoming Oil and Gas Conservation Commission (WOGCC) database and the U.S. Geological Survey (USGS) Produced Waters database. The search was generally restricted to the AoR region, roughly Townships 18 through 21 North and Range 111 through 114 West, but extended beyond this in the case of limited samples. Notably, there is often a wide range of salinity data. Regionally, water is fresher at recharge zones where formations are uplifted or exposed, frequently at the basin margins. However, in many cases even data points within close proximity are found to have very different salinity values. This points to erroneous sample measurement or misclassification of the zone the sample was taken from. The term "confirmed" USDW is used herein for aquifers with substantial data that is generally consistent or overwhelmingly points to a TDS less than 1,000 ppm. Aquifers with little data that are highly conflicted were denoted as "possible" USDWs. By these criteria, the Bridger, Green River (Laney), Wasatch, and Frontier aquifers are considered confirmed USDWs, and the Bear River and Dakota are possible USDWs (**Figure A-8.1**). The lowest known (*possible*) USDW is estimated to be the Dakota aquifer, which is an oil and gas producing formation. Available water quality data for aquifers from the surface to the Precambrian is provided in **Tables A-8.1** through **Table A-8.12** and summarized in **Figure A-8.2**. Water quality data for the Frontier Formation is included in **Table A-8.13** located in ***Appendix A-8*** because of the large number of samples in the AoR.

Tabulated well data were not found for the shallower Wasatch, Green River, and Bridger Formations. However, Naftz 1996 mapped Wasatch salinity as 2,000 to 3,000 ppm in the AoR. The Laney aquifer in the Green River Formation has a described average TDS of 1,260 ppm (Clarey, 2010). Data was not found for the shallow Bridger aquifers. However, this formation is exposed at the AoR and experiences regular surface recharge and as such is known to have low salinity water. Upon drilling, PSG water samples will be collected, and water analyses will confirm the lowest USDW, as well as gather additional data for other aquifers. The sampling and analyses will be

conducted in accordance with standard procedures and will also serve as preoperational baseline measurements for PSG.

Stratigraphic Section			
Age	**Formation / *Submember***	**Depth Below Surface (ft)**	**Approximate Thickness**
Neogene	Browns Park FM, Qa		
Paleogene	Bridger FM — Confirmed USDW	0	600
	Green River FM — Confirmed USDW	600	1,000
	Wasatch / Knight FM — Confirmed USDW	1,600	2,500
	Almy FM / Fort Union	4,100	1,600
Cretaceous	Mesaverde Group	5,700	2,100
	Lance FM	*5,700*	500
	Almond FM	*6,200*	500
	Ericson Sandstone	*6,700*	1,100
	Hilliard/Baxter Shale — Confining	7,800	3,450
	Frontier FM — O&G Res / Confirmed USDW	11,250	250
	Aspen/Mowry Shale — Confining	11,500	400
	Bear River FM — Possible USDW	11,900	100
	Dakota Sandstone — O&G Res / Possible USDW	12,000	200
Jurassic	Morrison FM — Confining	12,200	700
	Sundance FM	12,900	800
	Stump	*12,900*	100
	Preuss	*13,000*	100
	Twin Creek Limestone — Confining	13,100	550
	Gypsum Spring FM — Confining	*13,650*	50
	Nugget Sandstone — CO_2 Storage	13,700	700
Triassic	Ankareh FM — Confining	14,400	600
	Thaynes Limestone	15,000	400
	Woodside Shale — Confining	15,400	600
	Dinwoody FM	16,000	100
Permian	Phosphoria FM — Confining	16,100	400
Carboniferous	Tensleep/Weber Sandstone	16,500	500
	Amsden FM — Confining	17,000	500
	Madison Limestone — CO_2 Storage	17,500	700
Devonian	Three Forks Shale — Confining	18,200	100
	Jefferson Limestone — Confining	18,300	200
Ordovician	Bighorn Dolomite	18,500	300

Figure A-8.1. *Stratigraphic Section denoting USDWs, confining zones, and injection zones.*

Table 8.1. Water Quality of the Fort Union Aquifer					
Well Name (API)	**Distance from proposed injection wells, miles**	**Depth of sample, feet**	**Date of Sample Collection**	**Constituent**	**Concentration (mg/L)**
04902320045	4.5	5,407 - 5,456	9/15/1972	TDS	13,959
04902320759	6.3	5,918 - 6,860	9/9/2010	TDS	11,490
04902320759	6.3	5,918 - 6,860	9/9/2010	TDS	11,500
04902320759	6.3	5,918 - 6,860	9/9/2010	TDS	11,310
04902320759	6.3	5,918 - 6,860	9/9/2010	TDS	11,520
04902320759	6.3	5,918 - 6,860	9/9/2010	TDS	11,320
04902320759	6.3	5,918 - 6,860	9/9/2010	TDS	11,660
				Average	**11,823**

Table A-8.2. Water Quality of the Mesaverde Aquifer					
Well Name (API)	**Distance from proposed injection wells, miles**	**Depth of sample, feet**	**Date of Sample Collection**	**Constituent**	**Concentration (mg/L)**
4903723983	29.3	NA	2/3/2022	TDS	14,600
49-02320759	6.3	NA	9/5/2010	TDS	11,730
4902320759	6.3	7,017 - 7,380	9/5/2010	TDS	11,630
4902320759	6.3	7,017 - 7,380	9/5/2010	TDS	11,620
4902320759	6.3	7,017 - 7,380	9/5/2010	TDS	11,690
4902320759	6.3	7,017 - 7,380	9/5/2010	TDS	11,650
4902320759	6.3	7,017 - 7,380	9/5/2010	TDS	11,720
4902320714	4.3	9,800 - 10,570	6/2/2010	TDS	62*
				Average	**12,091**

Table A-8.3. Water Quality of the Bear River / Muddy Aquifer					
Well Name (API)	**Distance from proposed injection wells, miles**	**Depth of sample, feet**	**Date of Sample Collection**	**Constituent**	**Concentration (mg/L)**
4903520250	-	NA	5/9/1973	TDS	21,063
4903520231	-	8,822 – 8,864	4/2/1998	TDS	7,523
4903520231	-	NA	4/2/1998	TDS	7,712
4903520264	-	-	4/2/1998	TDS	6,511
4903520264	-	-	4/2/1998	TDS	6,226
4903520253	-	-	4/2/1998	TDS	16,556
4903520262	-	-	4/2/1998	TDS	8,549
4903520201	-	9,394 – 9,437	4/2/1998	TDS	11,982
4904121031	10.7	NA	11/20/2017	TDS	5,309
4904121033	10.7	NA	11/20/2017	TDS	1,702
4904121261	9.4	NA	11/20/2017	TDS	861
4904121109	3.5	NA	7/13/2018	TDS	2,775
4902320988	2.8	NA	11/20/2018	TDS	4,872
4902321597	2.0	NA	11/20/2017	TDS	1,330
4903726048	4.0	12,128 – 12,133	3/20/2006	TDS	8,607
4902321731	8.2	NA	11/20/2017	TDS	12,294
4902321739	7.6	NA	11/20/2017	TDS	1,989
4902321568	14.6	NA	11/20/2018	TDS	11,611
				Average	**5,135**

Table A-8.4. Water Quality of the Lowermost USDW (Dakota) Above the Nugget Injection Zone					
Well Name (API)	**Distance from proposed injection wells, miles**	**Depth of sample, feet**	**Date of Sample Collection**	**Constituent**	**Concentration (mg/L)**
4902320349	-	11,942 – 12,108	9/26/1984	TDS	2,046
4902320679	-	11,880 – 12,038	6/2/2010	TDS	3,600
4902320933	-	12,094 - 12106	8/1/2015	TDS	10,226
4902320942	-	11,874 – 12,220	4/6/1994	TDS	3,848
4902320970	14.0	10,900 – 10,916	3/17/1994	TDS	7,479
4902321015	-	11,274 – 11,904	5/17/2010	TDS	2,060
4902321067	-	11,956 – 12,014	6/16/2010	TDS	3,530
4902321447	12.4	12,319 – 12,378	12/21/2005	TDS	1,840
4902321488	9.4	12,483 – 12,514	12/21/2005	TDS	12,060
4902321518	-	11,962 – 12,018	8/1/2015	TDS	1,611
4902321589	12.4	12,331 – 12,362	12/21/2005	TDS	1,710
4902321596	14.1	12,401 – 12,466	12/21/2005	TDS	12,220
4902321808	-	12,018 – 12,076	11/11/1993	TDS	6,732
4902322085	3.5	11,968 – 11,975	9/18/2006	TDS	8,150
4903705317	16.0	12,588	6/27/1947	TDS	7,715
4903705317	16.0	12,588	7/15/1947	TDS	8,193
4903721366	10.2	12,134 – 12,196	9/24/1980	TDS	1,216
4903721366	-	NA	NA	TDS	15,156
4903721366	-	12,278 – 12,302	NA	TDS	17,044
4903721366	-	12,134 – 12,196	NA	TDS	1,216
4903721477	-	12,260 – 12,441	1/25/2006	TDS	22,200
4903721477	-	NA	8/20/2018	TDS	10,944
4903721477	-	NA	3/6/2018	TDS	1,990
4903721482	-	12,160 – 12,192	3/20/2006	TDS	9,035
4903721526	-	12,204 – 12,272	5/3/2010	TDS	9,660
4903722691	-	11,976 – 12,034	3/20/2006	TDS	8,992
4903722752	-	12,174 – 12,246	5/17/2010	TDS	7,800
4903722834	9	12,113 – 12,153	3/20/2006	TDS	11,268
4903722988	-	11,958 – 11,986	4/6/1994	TDS	7,876
4903726326	-	12,231 – 12,246	3/28/2006	TDS	8,960
4903726777	-	12,142 – 12,173	4/14/2008	TDS	1,563
4904105240	18	12,646	3/2/1965	TDS	8,414
4904120245	-	12,247 – 12,318	5/11/2010	TDS	7,140
4904120354	-	12,072 – 12,260	6/14/1985	TDS	2,705

Table A-8.4. Water Quality of the Lowermost USDW (Dakota) Above the Nugget Injection Zone					
Well Name (API)	**Distance from proposed injection wells, miles**	**Depth of sample, feet**	**Date of Sample Collection**	**Constituent**	**Concentration (mg/L)**
4904120476		12,174 – 12,338	5/9/2010	TDS	10,180
4904120548		12,312 – 12,550	5/11/2010	TDS	3,150
4904120834		12,132 – 12,270	12/26/1992	TDS	11,911
4904120840		12,182 – 12,260	5/11/2010	TDS	6,530
4904120842	10	12,371 – 12,384	12/26/1992	TDS	11,775
4904120842	10	NA	11/30/2017	TDS	11,440
4904120904		12,350 – 12,534	4/6/1994	TDS	11,220
4904120913		12,304 – 12,446	4/6/1994	TDS	12,463
4904121095		12,210 – 12,265	8/1/2015	TDS	18,646
4904121105		12,160 – 12,207	8/1/2015	TDS	11,445
				Average	**8,067**

Table A-8.5. Water Quality of the Twin Creek Aquifer					
Well Name (API)	**Distance from proposed injection wells, miles**	**Depth of sample, feet**	**Date of Sample Collection**	**Constituent**	**Concentration (mg/L)**
4904120142	50.1	5,944 – 6,536	5/18/1980	TDS	236,665
4904120142	50.1	NA	5/25/1980	TDS	144,600
4904120142	50.1	NA	5/26/1980	TDS	235,496
4904120247	52.7	6,252 – 6,406	3/20/1980	TDS	31,403
4904120264	52.1	7,365 – 7,525	9/16/1979	TDS	316,830
4904120264	52.1	7,365 – 7,252	9/16/1979	TDS	318,980
4904120264	52.1	7,365 – 7,525	9/16/1979	TDS	329,499
				Average	**230,496**

A Wyoming State Geological Survey report (Taboga et al., 2020) on groundwater salinity in the GGRB compiled water quality data from almost 2,100 wells. The historical geochemical data for subsurface water in the GGRB shows that the waters from the Nugget are dominated by sodium chloride (NaCl) brines and that it is a saline aquifer with an average TDS of 42,110 ppm (87 wells) (Smith et al., 2010). Low TDS only exists in the recharge zones, along the basin margins, and in the Rock Springs Uplift (Smith et al., 2010). In most of the GGRB, and in PSG, the salinity of the Nugget far exceeds that of a USDW. Water analyses from the Nugget near the PSG area are listed in **Table A-8.6**. An overall increase in TDS is observed from north to southwest. The lower values observed in the west and southwest analyses indicate possible recharge with meteoric waters.

Table A-8.6 Water Quality of Receiving Formation (Nugget)

API	Distance from proposed injection well, miles	Depth of sample, feet	Date of Sample Collection	Constituent	Concentration (mg/L)
4903520165	52.3	10,994	1/14/1981	TDS	60,923
4903520239	52.6	11,179	1/14/1981	TDS	59,405
4903520218	52.6	10,988	1/14/1981	TDS	56,007
4903520279	50.1	10,823	1/14/1981	TDS	53,442
4903520302	49.6	10,945	1/14/1981	TDS	60,512
4903520891	52.5	10,885	3/22/1986	TDS	65,492
4903505450	45.8	10,128 - 10,178	4/25/1961	TDS	98,105
4903505450	45.8	10,128 - 10,176	3/21/1957	TDS	101,460
4903505450	45.8	10,128 - 10,176	3/26/1957	TDS	100,446
4904120019	28.5	14,597 - 14,463	4/1/1972	TDS	76,557
4904105230	21.1	14,526 - 14,646	1/19/1950	TDS	78,417
4904120208	34.6	NA	6/3/1979	TDS	28,152
4904120210	36.7	NA	1/25/1988	TDS	18,614
4904105215	33.9	1,923 - 2,003	8/29/1949	TDS	27,544
4904105218	33.7	NA	3/8/1951	TDS	21,454
4904105218	33.7	2,135	8/8/1951	TDS	21,809
				Average	**58,021**

Legend
Wells north of AoR on edge of Overthrust
Wells in northern Moxa Arch
Wells in southern Moxa Arch
Wells to west and southwest of AoR

Table A-8.7. Water Quality of the Thaynes Aquifer					
Well Name (API)	**Distance from proposed injection wells, miles**	**Depth of sample, feet**	**Date of Sample Collection**	**Constituent**	**Concentration (mg/L)**
4904105215	31.2	1,923 – 2,003	8/27/1949	TDS	27,544
4904105216	30.2	2,315 – 2,359	9/19/1950	TDS	25,758
4904105218	30.2	2,754 – 3,080	8/7/1970	TDS	22,364
4904105218	30.2	2,485 – 3,075	6/23/1970	TDS	19,005
4904105218	30.2	NA	8/6/1951	TDS	21,454
4904120287	42.8	8,638 – 8,710	8/4/1983	TDS	72,559
				Average	**31,447**

Table A-8.8. Water Quality of the Woodside Aquifer					
Well Name (API)	**Distance from proposed injection wells, miles**	**Depth of sample, feet**	**Date of Sample Collection**	**Constituent**	**Concentration (mg/L)**
4904120072	43.4	9,178 - 9,266	8/4/1983	TDS	**24,992**

Table A-8.9. Water Quality of the Amsden Aquifer					
Well Name (API)	**Distance from proposed injection wells, miles**	**Depth of sample, feet**	**Date of Sample Collection**	**Constituent**	**Concentration (mg/L)**
4902320461	25.7	7,288 – 7,397	3/15/1982	TDS	13,178
4902320461	25.7	NA	3/15/1982	TDS	12,276
4902320461	25.7	7,288 -7,397	3/15/1982	TDS	12,479
4902320461	25.7	5,486 – 5,576	2/26/1982	TDS	17,077
4902320461	25.7	5,486 – 5,576	2/26/1982	TDS	23,556
4902320461	25.7	5,486 – 5,576	2/26/1982	TDS	21,362
4902320461	25.7	5,486 – 5,576	2/26/1982	TDS	22,538
				Average	**17,495**

The historical geochemical data for subsurface water in the GGRB shows that the waters from the Madison are dominated by NaCl brines and that it is a saline aquifer with an average TDS of 14,114 ppm (41 wells) (Smith et al., 2010). Low TDS only exists in the recharge zones, along the basin margins, Rawlins Uplift and the Overthrust belt in the extreme northwest part of the basin (Smith et al., 2010). In most of the GGRB, and in PSG, the salinity of the Madison far exceeds that of a USDW. Water samples from the Madison near the proposed injection wells are listed in **Table A-8.10**. Two samples from the closest wells, AGI 3-14 (4902321674) and AGI 2-18 (4902321687) approximately 16.5 miles away from the center of PSG, have TDS values of 56,140 and 59,790 ppm, respectively.

Table A-8.10. Water Quality of Receiving Formation (Madison)

API	Distance from proposed injection well, miles	Depth of sample, feet	Date of Sample Collection	Constituent	Concentration (mg/L)
4902321674	16.5	17,140	9/5/2002	TDS	56,140
4902321687	16.7	17,130	1/4/2003	TDS	59,970
				Average	**58,055**

Table A-8.11. Water Quality of the Big Horn Aquifer

Well Name (API#)	Distance from proposed injection wells, miles	Depth of sample, feet	Date of Sample Collection	Constituent	Concentration (mg/L)
4904120282	42.8	15,205 - 15,270	8/24/1983	TDS	18,960
4904120117	43.4	15,375 - 15,395	12/23/1983	TDS	14,522
4902320423	40.1	15,057 - 15,271	6/30/1981	TDS	63,997
				Average	**32,493**

Era	System	Series	Stratigraphy (modified from Lynds, 2013)		Significance in PSG Area	Hydrostratigraphy (modified from Ahren, et.al., 1981 and Clarey, et.al., 2010)
Tertiary	Eocene		Bridger		USDW; shallow groundwater source	Major aquifer
			Green River	Laney Member	USDW; shallow groundwater source	Major aquifer
				Wilkins Peak		Confining unit
	Paleocene		Wasatch		USDW; TDS 2,000 - 3,000ppm	Major aquifer
			Fort Union		Non USDW; average TDS 11,823 ppm in AoR	Major aquifer
Mesozoic	Cretaceous	Upper	Mesaverde		Non USDW; average TDS 12,091 ppm in AoR	Major aquifer
			Baxter/Hillard Shale			Major confining units
			Frontier		USDW; average TDS 6,052 ppm in AoR: **oil and gas producer in AoR and surrounding area**	Marginal aquifer
			Aspen/Mowry Shale			Major confining unit
		Lower	Bear River		USDW; average TDS 7,637 ppm in AoR: **oil and gas producer in AoR and surrounding area**	Marginal aquifer
			Dakota		Lowest known USDW; average TDS 8,067 ppm AoR; **oil and gas producer in AoR and surrounding area**	Major aquifer
	Jurassic		Morrison			Confining unit/Marginal aquifer
			Sundance	Stump		Confining unit
				Preuss	Non USDW: >35,000 ppm in AoR	Marginal aquifer
			Twin Creek, Gypsum Spring		Upper confining zone - Nugget	Confining unit
			Nugget		Injection zone, Non USDW: 58,021 ppm regionally surounding the AoR	Major aquifer
	Triassic		Ankareh		Lower confining zone – Nugget	Confining unit
			Thaynes		No water analyses in AoR; average TDS 31,447 ppm 20 miles west of AoR	Minor aquifer
			Woodside Shale		No water analyses in AoR; average TDS 24,992 ppm 33 miles west of AoR	Marginal aquifer/Minor confining unit
Paleozoic	Permian		Phosphoria		No water analyses	Confining unit/Minor aquifer
	Carboniferous	Pennsylvanian	Weber		No water analyses, presumed saline	Major aquifer
			Amsden		Upper confining zone - Madison	Confining unit
		Mississippian	Madison		Injection zone, Non USDW: 58,055 ppm	Major aquifer
	Devonian		Three Forks Shale		Lower confining zone - Madison	Confining unit
			Jefferson Limestone			Confining unit
	Ordovician		Bighorn Dolomite		No water analyses in AoR; average TDS 33,550 ppm 41 miles west of AoR	Major aquifer
	Cambrian		Gallatin		No water analyses, presumed saline	Minor aquifer
			Gros Ventre			Confining unit
			Flathead		No water analyses, presumed saline	Major aquifer
Precambrian igneous and metamorphic rocks					Basal confining unit	Major confining unit

Saline Aquifer
Injection Zone
USDW
Confining Unit

Figure A-8.2. *Aquifer Summary.*

8.2 Geochemistry

8.2.1 Lowest USDW

The water chemistry of the Dakota, which is the lowest possible USDW is shown in **Table A-8.13**.

Table A-8.13. Dakota Water Chemistry

API	pH	Ca (ppm)	Mg (ppm)	Na (ppm)	K (ppm)	Cl (ppm)	HCO_3	SO_4 (ppm)	CBE	Source
4902320584	7.38	47	6	19	7	26	98	110	9.27%	WOGCC
4904120837	7.02	8	5	170	0	193	70	18	8.17%	WOGCC
4903721366	6.7	107	2	337	51	410	567	30	0.04%	WOGCC
4902321589	6.99	60	0	491	26	788	216	15	2.08%	WOGCC
4902321447	6.44	34	0	580	34	810	254	23	0.55%	WOGCC
4902320349	6.32	145	8	663	14	1142	116	16	3.69%	WOGCC
4904105233	0.00*	177	-1	751	-3	272	1,450	484	0.02%	USGS-PWD
4902320970	7.55	31	20	2,536	100	3620	1,098	0	1.71%	WOGCC
4902322085	7.89	18	11	2,520	84	3700	1,450	320	8.55%	WOGCC
4904120019	8.1	20	6	2,965	20	3860	1,281	53	0.00%	USGS-PWD
4903705317	6.9	56	17	3,157	-3	4552	770	30	0.05%	USGS-PWD
4904105240	8.1	90	5	3,205	15	4680	708	68	0.12%	USGS-PWD
4902321380	5.43	82	5	3,040	63	5585	368	12	8.43%	WOGCC
4904105097	7.2	126	102	3,487	-3	4900	1,320	316	0.02%	USGS-PWD
4903705317	8.7	31	8	3,090	-3	1400	5,000	728	0.01%	USGS-PWD
4902321310	6.18	129	8	3,320	155	6169	710	44	9.09%	WOGCC
4904120019	8.3	39	9	4,016	47	5700	939	58	0.33%	USGS-PWD
4903722834	5.5	76	42	4,171	0	6480	268	155	0.46%	WOGCC
4904120842	7.42	136	49	3,510	0	5000	3,000	80	7.99%	WOGCC
4904105229	8.4	25	2	4,823	-3	6600	795	370	1.03%	USGS-PWD
4902321596	6.92	135	6	4,350	57	8164	456	21	9.24%	WOGCC
4902321488	6.89	150	16	4,490	67	8198	494	39	7.70%	WOGCC
4904105156	7.5	132	10	5,011	-3	7400	952	54	0.02%	USGS-PWD
4902321358	6.42	147	3	5,020	119	9118	431	16	7.22%	WOGCC
4902321169	6.14	104	0	5,262	329	9101	786	19	5.37%	WOGCC
4902321462	7.01	175	6	6,000	109	10480	545	26	5.55%	WOGCC
4904120015	7.3	120	18	8,508	420	12300	488	1,608	0.02%	USGS-PWD
Average	7	89	13	3,166	63	4839	912	175		

Note: Clarey et al., 2010. Where necessary, ion concentrations were rounded to whole numbers and pH values were rounded to two significant figures.

**A pH of 0 is included for completion, but not considered a true measurement.*

8.2.2 Injection Zones

Detailed chemical composition of water samples in the Butcher Knife Spring 1 (49-041-20019) and Church Buttes 7 (49-041-05230) is shown in **Table A-8.14.** Very high chlorides, sodium, and TDS are shown.

Table A-8.14. Water Chemistry of Receiving Formation (Nugget)		
Parameter	**Results, mg/L**	
Well (API)	**4904120019**	**4904105230**
Alkalinity, as Bicarbonate (HCO_3^-)	488	990
Calcium	1,078	1475
Chloride	46,000	45,600
Potassium	1,000	NA
Magnesium	239	139
Sodium	27,816	28,645
Sulfate	184	216
TDS	76,557	78,417

Source: USGS Produced Waters Database

Detailed chemical composition of water samples in the AGI-13 (4902321674) and AGI 2-18 (4902321687) is shown in **Table A-8.15**. Being a carbonate reservoir, there is significant bicarbonate.

Table A-8.15. Water Chemistry of Receiving Formation (Madison)		
Parameter	**Results, mg/L**	
Well (API)	**4902321674**	**4902316870**
Alkalinity, as Bicarbonate (HCO_3^-)	2,746	2,746
Calcium	125	250
Chloride	30,230	31,460
Potassium	3,050	3,198
Magnesium	29	32
Sodium	18,570	19,780
Sulfate	1,330	2,220
TDS	56,160	59,760

Source: USGS Produced Waters Database

8.3 Proposed Formation Fluid Testing Program

Details are provided in ***Form A-7, Proposed Formation Fluid Testing Program***.

8.4 References

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APPENDIX A-8

UNDERGROUND SOURCE OF DRINKING WATER ANALYSIS PLAN

TABLE OF CONTENTS

TABLES

Table A-8.1 Water Quality of the Fort Union Aquifer 1
Table A-8.2 Water Quality of the Mesaverde Aquifer 1
Table A-8.3 Water Quality of the Bear River / Muddy Aquifer 2
Table A-8.4 Water Quality of the Lowermost USDW (Dakota) Above the Nugget Injection Zone 3
Table A-8.5 Water Quality of the Twin Creek Aquifer 4
Table A-8.6 Water Quality of Receiving Formation (Nugget) 5
Table A-8.7 Water Quality of the Thaynes Aquifer 6
Table A-8.8 Water Quality of the Woodside Aquifer 6
Table A-8.9 Water Quality of the Amsden Aquifer 6
Table A-8.10 Water Quality of Receiving Formation (Madison) 7
Table A-8.11 Water Quality of the Big Horn Aquifer 7
Table A-8.12 Water Quality of the Frontier Aquifer 8
Table A-8.13 Dakota Water Chemistry 23
Table A-8.14 Water Chemistry of Receiving Formation (Nugget) 24
Table A-8.15 Water Chemistry of Receiving Formation (Madison) 24

FIGURES

Figure 8.1 Stratigraphic Section denoting USDWs, confining zones, and injection zones 25
Figure 8.2 Aquifer Summary 26

TABLES

Table 8.1. Water Quality of the Fort Union Aquifer					
Well Name (API)	**Distance from proposed injection wells, miles**	**Depth of sample, feet**	**Date of Sample Collection**	**Constituent**	**Concentration (mg/L)**
04902320045	4.5	5,407 - 5,456	9/15/1972	TDS	13,959
04902320759	6.3	5,918 - 6,860	9/9/2010	TDS	11,490
04902320759	6.3	5,918 - 6,860	9/9/2010	TDS	11,500
04902320759	6.3	5,918 - 6,860	9/9/2010	TDS	11,310
04902320759	6.3	5,918 - 6,860	9/9/2010	TDS	11,520
04902320759	6.3	5,918 - 6,860	9/9/2010	TDS	11,320
04902320759	6.3	5,918 - 6,860	9/9/2010	TDS	11,660
				Average	**11,823**

Table A-8.2. Water Quality of the Mesaverde Aquifer					
Well Name (API)	**Distance from proposed injection wells, miles**	**Depth of sample, feet**	**Date of Sample Collection**	**Constituent**	**Concentration (mg/L)**
4903723983	29.3	NA	2/3/2022	TDS	14,600
49-02320759	6.3	NA	9/5/2010	TDS	11,730
4902320759	6.3	7,017 - 7,380	9/5/2010	TDS	11,630
4902320759	6.3	7,017 - 7,380	9/5/2010	TDS	11,620
4902320759	6.3	7,017 - 7,380	9/5/2010	TDS	11,690
4902320759	6.3	7,017 - 7,380	9/5/2010	TDS	11,650
4902320759	6.3	7,017 - 7,380	9/5/2010	TDS	11,720
4902320714	4.3	9,800 - 10,570	6/2/2010	TDS	62*
				Average	**12,091**

Table A-8.3. Water Quality of the Bear River / Muddy Aquifer					
Well Name (API)	**Distance from proposed injection wells, miles**	**Depth of sample, feet**	**Date of Sample Collection**	**Constituent**	**Concentration (mg/L)**
4903520250	-	NA	5/9/1973	TDS	21,063
4903520231	-	8,822 – 8,864	4/2/1998	TDS	7,523
4903520231	-	NA	4/2/1998	TDS	7,712
4903520264	-	-	4/2/1998	TDS	6,511
4903520264	-	-	4/2/1998	TDS	6,226
4903520253	-	-	4/2/1998	TDS	16,556
4903520262	-	-	4/2/1998	TDS	8,549
4903520201	-	9,394 – 9,437	4/2/1998	TDS	11,982
4904121031	10.7	NA	11/20/2017	TDS	5,309
4904121033	10.7	NA	11/20/2017	TDS	1,702
4904121261	9.4	NA	11/20/2017	TDS	861
4904121109	3.5	NA	7/13/2018	TDS	2,775
4902320988	2.8	NA	11/20/2018	TDS	4,872
4902321597	2.0	NA	11/20/2017	TDS	1,330
4903726048	4.0	12,128 – 12,133	3/20/2006	TDS	8,607
4902321731	8.2	NA	11/20/2017	TDS	12,294
4902321739	7.6	NA	11/20/2017	TDS	1,989
4902321568	14.6	NA	11/20/2018	TDS	11,611
				Average	**5,135**

Table A-8.4. Water Quality of the Lowermost USDW (Dakota) Above the Nugget Injection Zone					
Well Name (API)	**Distance from proposed injection wells, miles**	**Depth of sample, feet**	**Date of Sample Collection**	**Constituent**	**Concentration (mg/L)**
4902320349	-	11,942 – 12,108	9/26/1984	TDS	2,046
4902320679	-	11,880 – 12,038	6/2/2010	TDS	3,600
4902320933	-	12,094 - 12106	8/1/2015	TDS	10,226
4902320942	-	11,874 – 12,220	4/6/1994	TDS	3,848
4902320970	14.0	10,900 – 10,916	3/17/1994	TDS	7,479
4902321015	-	11,274 – 11,904	5/17/2010	TDS	2,060
4902321067	-	11,956 – 12,014	6/16/2010	TDS	3,530
4902321447	12.4	12,319 – 12,378	12/21/2005	TDS	1,840
4902321488	9.4	12,483 – 12,514	12/21/2005	TDS	12,060
4902321518	-	11,962 – 12,018	8/1/2015	TDS	1,611
4902321589	12.4	12,331 – 12,362	12/21/2005	TDS	1,710
4902321596	14.1	12,401 – 12,466	12/21/2005	TDS	12,220
4902321808	-	12,018 – 12,076	11/11/1993	TDS	6,732
4902322085	3.5	11,968 – 11,975	9/18/2006	TDS	8,150
4903705317	16.0	12,588	6/27/1947	TDS	7,715
4903705317	16.0	12,588	7/15/1947	TDS	8,193
4903721366	10.2	12,134 – 12,196	9/24/1980	TDS	1,216
4903721366	-	NA	NA	TDS	15,156
4903721366	-	12,278 – 12,302	NA	TDS	17,044
4903721366	-	12,134 – 12,196	NA	TDS	1,216
4903721477	-	12,260 – 12,441	1/25/2006	TDS	22,200
4903721477	-	NA	8/20/2018	TDS	10,944
4903721477	-	NA	3/6/2018	TDS	1,990
4903721482	-	12,160 – 12,192	3/20/2006	TDS	9,035
4903721526	-	12,204 – 12,272	5/3/2010	TDS	9,660
4903722691	-	11,976 – 12,034	3/20/2006	TDS	8,992
4903722752	-	12,174 – 12,246	5/17/2010	TDS	7,800
4903722834	9	12,113 – 12,153	3/20/2006	TDS	11,268
4903722988	-	11,958 – 11,986	4/6/1994	TDS	7,876
4903726326	-	12,231 – 12,246	3/28/2006	TDS	8,960
4903726777	-	12,142 – 12,173	4/14/2008	TDS	1,563
4904105240	18	12,646	3/2/1965	TDS	8,414
4904120245	-	12,247 – 12,318	5/11/2010	TDS	7,140
4904120354	-	12,072 – 12,260	6/14/1985	TDS	2,705

Table A-8.4. Water Quality of the Lowermost USDW (Dakota) Above the Nugget Injection Zone					
Well Name (API)	**Distance from proposed injection wells, miles**	**Depth of sample, feet**	**Date of Sample Collection**	**Constituent**	**Concentration (mg/L)**
4904120476		12,174 – 12,338	5/9/2010	TDS	10,180
4904120548		12,312 – 12,550	5/11/2010	TDS	3,150
4904120834		12,132 – 12,270	12/26/1992	TDS	11,911
4904120840		12,182 – 12,260	5/11/2010	TDS	6,530
4904120842	10	12,371 – 12,384	12/26/1992	TDS	11,775
4904120842	10	NA	11/30/2017	TDS	11,440
4904120904		12,350 – 12,534	4/6/1994	TDS	11,220
4904120913		12,304 – 12,446	4/6/1994	TDS	12,463
4904121095		12,210 – 12,265	8/1/2015	TDS	18,646
4904121105		12,160 – 12,207	8/1/2015	TDS	11,445
				Average	**8,067**

Table A-8.5. Water Quality of the Twin Creek Aquifer					
Well Name (API)	**Distance from proposed injection wells, miles**	**Depth of sample, feet**	**Date of Sample Collection**	**Constituent**	**Concentration (mg/L)**
4904120142	50.1	5,944 – 6,536	5/18/1980	TDS	236,665
4904120142	50.1	NA	5/25/1980	TDS	144,600
4904120142	50.1	NA	5/26/1980	TDS	235,496
4904120247	52.7	6,252 – 6,406	3/20/1980	TDS	31,403
4904120264	52.1	7,365 – 7,525	9/16/1979	TDS	316,830
4904120264	52.1	7,365 – 7,252	9/16/1979	TDS	318,980
4904120264	52.1	7,365 – 7,525	9/16/1979	TDS	329,499
				Average	**230,496**

Table A-8.6 Water Quality of Receiving Formation (Nugget)					
API	**Distance from proposed injection well, miles**	**Depth of sample, feet**	**Date of Sample Collection**	**Constituent**	**Concentration (mg/L)**
4903520165	52.3	10,994	1/14/1981	TDS	60,923
4903520239	52.6	11,179	1/14/1981	TDS	59,405
4903520218	52.6	10,988	1/14/1981	TDS	56,007
4903520279	50.1	10,823	1/14/1981	TDS	53,442
4903520302	49.6	10,945	1/14/1981	TDS	60,512
4903520891	52.5	10,885	3/22/1986	TDS	65,492
4903505450	45.8	10,128 - 10,178	4/25/1961	TDS	98,105
4903505450	45.8	10,128 - 10,176	3/21/1957	TDS	101,460
4903505450	45.8	10,128 - 10,176	3/26/1957	TDS	100,446
4904120019	28.5	14,597 - 14,463	4/1/1972	TDS	76,557
4904105230	21.1	14,526 - 14,646	1/19/1950	TDS	78,417
4904120208	34.6	NA	6/3/1979	TDS	28,152
4904120210	36.7	NA	1/25/1988	TDS	18,614
4904105215	33.9	1,923 - 2,003	8/29/1949	TDS	27,544
4904105218	33.7	NA	3/8/1951	TDS	21,454
4904105218	33.7	2,135	8/8/1951	TDS	21,809
				Average	**58,021**

Legend
Wells north of AoR on edge of Overthrust
Wells in northern Moxa Arch
Wells in southern Moxa Arch
Wells to west and southwest of AoR

Table A-8.7. Water Quality of the Thaynes Aquifer					
Well Name (API)	**Distance from proposed injection wells, miles**	**Depth of sample, feet**	**Date of Sample Collection**	**Constituent**	**Concentration (mg/L)**
4904105215	31.2	1,923 – 2,003	8/27/1949	TDS	27,544
4904105216	30.2	2,315 – 2,359	9/19/1950	TDS	25,758
4904105218	30.2	2,754 – 3,080	8/7/1970	TDS	22,364
4904105218	30.2	2,485 – 3,075	6/23/1970	TDS	19,005
4904105218	30.2	NA	8/6/1951	TDS	21,454
4904120287	42.8	8,638 – 8,710	8/4/1983	TDS	72,559
				Average	**31,447**

Table A-8.8. Water Quality of the Woodside Aquifer					
Well Name (API)	**Distance from proposed injection wells, miles**	**Depth of sample, feet**	**Date of Sample Collection**	**Constituent**	**Concentration (mg/L)**
4904120072	43.4	9,178 - 9,266	8/4/1983	TDS	**24,992**

Table A-8.9. Water Quality of the Amsden Aquifer					
Well Name (API)	**Distance from proposed injection wells, miles**	**Depth of sample, feet**	**Date of Sample Collection**	**Constituent**	**Concentration (mg/L)**
4902320461	25.7	7,288 – 7,397	3/15/1982	TDS	13,178
4902320461	25.7	NA	3/15/1982	TDS	12,276
4902320461	25.7	7,288 -7,397	3/15/1982	TDS	12,479
4902320461	25.7	5,486 – 5,576	2/26/1982	TDS	17,077
4902320461	25.7	5,486 – 5,576	2/26/1982	TDS	23,556
4902320461	25.7	5,486 – 5,576	2/26/1982	TDS	21,362
4902320461	25.7	5,486 – 5,576	2/26/1982	TDS	22,538
				Average	**17,495**

Table A-8.10. Water Quality of Receiving Formation (Madison)					
API	**Distance from proposed injection well, miles**	**Depth of sample, feet**	**Date of Sample Collection**	**Constituent**	**Concentration (mg/L)**
4902321674	16.5	17,140	9/5/2002	TDS	56,140
4902321687	16.7	17,130	1/4/2003	TDS	59,970
				Average	**58,055**

Table A-8.11. Water Quality of the Big Horn Aquifer					
Well Name (API#)	**Distance from proposed injection wells, miles**	**Depth of sample, feet**	**Date of Sample Collection**	**Constituent**	**Concentration (mg/L)**
4904120282	42.8	15,205 - 15,270	8/24/1983	TDS	18,960
4904120117	43.4	15,375 - 15,395	12/23/1983	TDS	14,522
4902320423	40.1	15,057 - 15,271	6/30/1981	TDS	63,997
				Average	**32,493**

Table A-8.12. Water Quality of the Frontier Aquifer					
Well Name (API)	**Location**	**Depth of Sample, feet**	**Date of Sample Collection**	**Constituent**	**Concentration (mg/L)**
04904121326	SW SW SEC 16 T 16 N R 112 W	12,452 - 12,482	5/11/2008	TDS	4,553
04903727088	NW SE SEC 3 T 17 N R 112 W	12,188 - 12,234	5/14/2008	TDS	6,256
04903727087	SW NE SEC 10 T 17 N R 112 W	12,152 - 12,188	5/14/2008	TDS	7,836
04904121368	NW NW SEC 10 T 17 N R 112 W	12,090 - 12,140	5/11/2008	TDS	9,290
04904121352	NE SW SEC 19 T 17 N R 112 W	12,261 - 12,297	4/30/2008	TDS	6,192
04903727232	SE NE SEC 23 T 17 N R 112 W	12,032 - 12,082	5/11/2008	TDS	14,031
04904121379	NW NW SEC 21 T 17 N R 112 W	12,242 - 12,316	11/5/2008	TDS	9,106
04904121384	NE SW SEC 21 T 17 N R 112 W	12,330 - 12,370	6/25/2009	TDS	5,115
04904121403	NE NE SEC 17 T 17 N R 112 W	12,313 - 12,366	5/13/2010	TDS	14,868
04904120992	SE NW SEC 13 T 17 N R 113 W	12,196 - 12,216	5/11/2010	TDS	8,210
04904120854	NW SE SEC 8 T 17 N R 112 W	12,138 - 12,480	1/2/1993	TDS	16,566
04904120854	NW SE SEC 8 T 17 N R 112 W	NA	7/30/2017	TDS	8,379
04904120894	NE SW SEC 8 T 17 N R 112 W	NA	11/20/2017	TDS	8,955
04904120587	NE NW SEC 8 T 17 N R 112 W	NA	11/20/2018	TDS	7,363
04904120857	C SE SEC 6 T 17 N R 112 W	NA	11/20/2017	TDS	3,848
04904120921	NW SW SEC 6 T 17 N R 112 W	NA	7/23/2018	TDS	14,979
04904120909	SW NE SEC 6 T 17 N R 112 W	NA	11/20/2017	TDS	8,804
04904120681	NE NW SEC 18 T 17 N R 112 W	NA	11/20/2017	TDS	2,666
04904120858	NW SE SEC 18 T 17 N R 112 W	12,140 - 12,190	3/22/1994	TDS	8,917
04904120858	NW SE SEC 18 T 17 N R 112 W	NA	11/20/2017	TDS	4,393
04904120905	NE SE SEC 12 T 17 N R 113 W	NA	11/20/2017	TDS	2,509
04904120931	NE NE SEC 12 T 17 N R 113 W	NA	11/20/2017	TDS	9,103
04904120719	SE NW SEC 12 T 17 N R 113 W	NA	11/20/2017	TDS	13,504
04904120858	NW SE SEC 18 T 17 N R 112 W	12,140 - 12,190	3/22/1994	TDS	8,917
04904120858	NW SE SEC 18 T 17 N R 112 W	NA	11/20/2017	TDS	4,393
04904120854	NW SE SEC 8 T 17 N R 112 W	12,138 - 12,480	1/2/1993	TDS	16,566
04904120884	SW SW SEC 10 T 17 N R 112 W	12,144 - 12,178	1/2/1993	TDS	12,746
04904120884	SW SW SEC 10 T 17 N R 112 W	12,144 - 12,178	11/2/2010	TDS	2,990
04904121099	NW NE SEC 15 T 17 N R 117 W	NA	10/21/2003	TDS	148
04904121099	NW NE SEC 15 T 17 N R 117 W	NA	11/3/2003	TDS	1,910
04904120958	C SE SEC 31 T 18 N R 112 W	12,066 - 12,680	2/1/1994	TDS	15,483
04904120958	C SE SEC 31 T 18 N R 112 W	12,066 - 12,082	8/1/2005	TDS	18,493
04903721546	NW NW SEC 2 T 18 N R 112 W	11,432 - 11,514	3/20/2006	TDS	12,010
04903723049	NE SW SEC 2 T 18 N R 112 W	11,462 - 11,566	3/20/2006	TDS	8,524
04903723049	NE SW SEC 2 T 18 N R 112 W	NA	4/11/2017	TDS	7,350
04904120915	SE NE SEC 24 T 18 N R 113 W	11,714 - 11,730	3/17/1994	TDS	4,576

Table A-8.12. Water Quality of the Frontier Aquifer					
Well Name (API)	**Location**	**Depth of Sample, feet**	**Date of Sample Collection**	**Constituent**	**Concentration (mg/L)**
04904120958	C SE SEC 31 T 18 N R 112 W	12,066 - 12,680	2/1/1994	TDS	15,483
04904120958	C SE SEC 31 T 18 N R 112 W	12,066 - 12,082	8/1/2005	TDS	18,493
04904120972	SE NE SEC 36 T 18 N R 113 W	11,914 - 11,930	3/1/1994	TDS	1,010
04903723149	C SW SEC 7 T 18 N R 111 W	11,804 - 11,820	11/16/1993	TDS	26,050
04904120897	NW SW SEC 4 T 18 N R 112 W	11,462 - 11,502	4/6/1994	TDS	4,895
04904120939	C SW SEC 7 T 18 N R 112 W	11,582 - 11,750	8/26/1993	TDS	6,541
04904120919	SW NE SEC 8 T 18 N R 112 W	11,506 - 11,540	4/6/1994	TDS	4,710
04903722952	SE NE SEC 34 T 18 N R 112 W	12,020 - 12,080	3/30/1994	TDS	3,337
04903721479	SE NW SEC 23 T 18 N R 112 W	11,980 - 12,016	12/3/1990	TDS	9,580
04904120807	SE SE SEC 33 T 18 N R 112 W	11,972 - 12,022	12/3/1990	TDS	80
04903722689	SW SE SEC 6 T 18 N R 111 W	11,854 - 11,910	12/3/1990	TDS	14,800
04903722647	SW SE SEC 27 T 18 N R 112 W	NA	12/3/1990	TDS	20
04904121080	NE NE SEC 22 T 18 N R 113 W	NA	7/13/2018	TDS	12,711
04904121102	SE SE SEC 15 T 18 N R 113 W	NA	11/20/2017	TDS	1,999
04903727597	NE NW SEC 24 T 18 N R 112 W	11,829 - 11,872	5/12/2009	TDS	12,050
04903727597	NE NW SEC 24 T 18 N R 112 W	11,829 - 11,872	5/2/2017	TDS	3,496
04903727589	NW SW SEC 24 T 18 N R 112 W	NA	5/2/2017	TDS	36
04903724162	SE NW SEC 24 T 18 N R 112 W	NA	5/2/2017	TDS	5,640
04903722967	SW NE SEC 24 T 18 N R 112 W	NA	5/2/2017	TDS	928
04903721565	NW NW SEC 24 T 18 N R 112 W	NA	5/2/2017	TDS	15,248
04903727323	SW SW SEC 12 T 18 N R 112 W	11,652 - 11,774	5/12/2009	TDS	8,070
04903727323	SW SW SEC 12 T 18 N R 112 W	NA	5/2/2017	TDS	6,416
04903723174	SE NE SEC 12 T 18 N R 112 W	NA	5/2/2017	TDS	5,109
04904121109	SW SW SEC 2 T 18 N R 113 W	NA	7/13/2018	TDS	2,775
04903722995	SE NE SEC 26 T 18 N R 112 W	NA	7/13/2018	TDS	8,488
04903722995	SE NE SEC 26 T 18 N R 112 W	NA	11/20/2017	TDS	7,635
04903723074	SW NE SEC 2 T 18 N R 112 W	NA	1/26/2008	TDS	6,304
04903723049	NE SW SEC 2 T 18 N R 112 W	11,462 - 11,566	3/20/2006	TDS	8,524
04903722707	SW SE SEC 2 T 18 N R 112 W	NA	4/11/2017	TDS	3,919
04903723074	SW NE SEC 2 T 18 N R 112 W	NA	1/26/2008	TDS	6,304
04903722707	SW SE SEC 2 T 18 N R 112 W	NA	4/11/2017	TDS	3,919
04904121347	SE NE SEC 4 T 18 N R 112 W	11,380 - 11,474	10/28/2009	TDS	5,939
04903727294	NW NW SEC 10 T 18 N R 112 W	11,830 - 11,882	11/23/2009	TDS	8,810
04904121410	NE NW SEC 21 T 18 N R 112 W	11,709 - 11,742	10/28/2009	TDS	7,420
04903726512	NE SW SEC 7 T 18 N R 111 W	11,830 - 11,880	7/8/2008	TDS	20,989
04903723044	SE SE SEC 18 T 18 N R 111 W	12,004 - 12,064	2/20/2008	TDS	4,619

Table A-8.12. Water Quality of the Frontier Aquifer					
Well Name (API)	**Location**	**Depth of Sample, feet**	**Date of Sample Collection**	**Constituent**	**Concentration (mg/L)**
04904120033	NE SW SEC 11 T 18 N R 113 W	11,602 - 11,622	5/11/2010	TDS	3,390
04903722995	SE NE SEC 26 T 18 N R 112 W	NA	7/13/2018	TDS	8,488
04903722995	SE NE SEC 26 T 18 N R 112 W	NA	11/20/2017	TDS	7,635
04902322334	SE NE SEC 13 T 19 N R 113 W	11,350 - 11,366	8/11/2008	TDS	15,299
04903726787	SW NW SEC 6 T 19 N R 111 W	11,920 - 12,016	11/13/2007	TDS	4,799
04902322107	NE NW SEC 20 T 19 N R 112 W	11,242 - 11,280	1/7/2008	TDS	8,280
04903725933	SW SE SEC 2 T 19 N R 112 W	11,572 - 11,636	2/20/2008	TDS	3,711
04902321064	SE NE SEC 7 T 19 N R 112 W	11,276 - 11,296	5/17/2010	TDS	1,220
04902321140	SW SW SEC 7 T 19 N R 112 W	11,356 - 12,049	5/17/2010	TDS	305
04902321126	SW NE SEC 8 T 19 N R 112 W	NA	5/17/2010	TDS	631
04902320806	SW NE SEC 4 T 19 N R 112 W	11,208 - 11,283	3/2/1993	TDS	3,250
04902321095	NE SE SEC 4 T 19 N R 112 W	11,220 - 11,278	6/1/2010	TDS	252
04902321930	SE SE SEC 7 T 19 N R 112 W	11,328 - 11,358	6/1/2010	TDS	156
04902322361	SE SW SEC 7 T 19 N R 112 W	11,346 - 11,379	6/1/2010	TDS	220
04903727295	NW SE SEC 10 T 19 N R 112 W	11,468 - 11,512	8/3/2009	TDS	6,770
04903723039	C SW SEC 36 T 19 N R 112 W	11,540 - 11,610	3/20/2006	TDS	8,805
04903725915	NW NW SEC 36 T 19 N R 112 W	11,493 - 11,532	3/20/2006	TDS	9,208
04903725915	NW NW SEC 36 T 19 N R 112 W	NA	4/11/2017	TDS	2,626
04903725915	NW NW SEC 36 T 19 N R 112 W	NA	1/26/2008	TDS	2,134
04903723040	NW NE SEC 24 T 19 N R 112 W	NA	8/20/2018	TDS	1,680
04903723040	NW NE SEC 24 T 19 N R 112 W	NA	8/20/2018	TDS	1,680
04902320882	NE SW SEC 34 T 19 N R 112 W	NA	3/6/2018	TDS	1,430
04903726039	SE SW SEC 24 T 19 N R 112 W	NA	3/6/2018	TDS	1,439
04903726040	NE NW SEC 36 T 19 N R 112 W	NA	4/11/2017	TDS	1,945
04903725915	NW NW SEC 36 T 19 N R 112 W	11,493 - 11,532	3/20/2006	TDS	9,208
04903725915	NW NW SEC 36 T 19 N R 112 W	NA	4/11/2017	TDS	2,626
04903725915	NW NW SEC 36 T 19 N R 112 W	NA	1/26/2008	TDS	2,134
04903723041	NE NE SEC 36 T 19 N R 112 W	11,654 - 11,710	3/20/2006	TDS	8,088
04903723041	NE NE SEC 36 T 19 N R 112 W	NA	8/20/2018	TDS	2,001
04903723039	C SW SEC 36 T 19 N R 112 W	11,540 - 11,610	3/20/2006	TDS	8,805
04903723039	C SW SEC 36 T 19 N R 112 W	NA	1/26/2008	TDS	4,914
04903723039	C SW SEC 36 T 19 N R 112 W	NA	8/20/2018	TDS	366
04903723039	C SW SEC 36 T 19 N R 112 W	NA	1/26/2008	TDS	4,914
04903721471	NE NW SEC 14 T 19 N R 112 W	NA	8/20/2018	TDS	211
04903722835	NE SE SEC 14 T 19 N R 112 W	NA	8/20/2018	TDS	348
04903722835	NE SE SEC 14 T 19 N R 112 W	NA	8/20/2018	TDS	349

Table A-8.12. Water Quality of the Frontier Aquifer					
Well Name (API)	**Location**	**Depth of Sample, feet**	**Date of Sample Collection**	**Constituent**	**Concentration (mg/L)**
04903723047	C NE SEC 26 T 19 N R 112 W	11,442 - 11,552	3/20/2006	TDS	8,504
04903723047	C NE SEC 26 T 19 N R 112 W	NA	3/6/2018	TDS	2,524
04903723048	NW SW SEC 26 T 19 N R 112 W	NA	3/6/2018	TDS	5,859
04903721471	NE NW SEC 14 T 19 N R 112 W	NA	8/20/2018	TDS	211
04903723040	NW NE SEC 24 T 19 N R 112 W	NA	8/20/2018	TDS	1,680
04903721477	SE SE SEC 24 T 19 N R 112 W	NA	8/20/2018	TDS	10,944
04902320882	NE SW SEC 34 T 19 N R 112 W	NA	3/6/2018	TDS	1,430
04903726039	SE SW SEC 24 T 19 N R 112 W	NA	3/6/2018	TDS	1,439
04903726040	NE NW SEC 36 T 19 N R 112 W	NA	4/11/2017	TDS	1,945
04903722834	NW NW SEC 24 T 19 N R 112 W	NA	4/11/2017	TDS	2,626
04902321573	NE SW SEC 23 T 19 N R 113 W	NA	11/20/2017	TDS	3,321
04902321587	SE NW SEC 23 T 19 N R 113 W	NA	11/20/2017	TDS	1,837
04902321491	NW NE SEC 23 T 19 N R 113 W	NA	11/20/2017	TDS	2,158
04902321879	SE NW SEC 23 T 19 N R 113 W	NA	11/20/2017	TDS	1,994
04902321880	SW NW SEC 23 T 19 N R 113 W	NA	11/20/2017	TDS	836
04903724276	SW SW SEC 30 T 19 N R 111 W	NA	11/20/2017	TDS	7,474
04903721916	C NW SEC 30 T 19 N R 111 W	NA	11/20/2017	TDS	9,103
04902321008	SE SW SEC 30 T 19 N R 112 W	NA	11/20/2017	TDS	2,332
04902320984	NW NE SEC 30 T 19 N R 112 W	NA	11/20/2017	TDS	3,664
04902321396	NW NE SEC 26 T 19 N R 113 W	NA	11/20/2017	TDS	838
04902321366	SE SE SEC 22 T 19 N R 113 W	NA	11/20/2017	TDS	2,018
04902321033	C NW SEC 26 T 19 N R 113 W	NA	11/20/2017	TDS	4,554
04903723150	SE SW SEC 31 T 19 N R 111 W	11,706 - 11,722	11/16/1993	TDS	7,744
04903722915	NE SE SEC 12 T 19 N R 112 W	11,698 - 11,770	4/6/1994	TDS	7,858
04902320275	NW SE SEC 17 T 19 N R 112 W	11,269 - 11,278	9/6/1984	TDS	4,957
04902321006	SW SW SEC 29 T 19 N R 112 W	11,274 - 12,004	2/1/1994	TDS	13,361
04902320803	NW SE SEC 32 T 19 N R 112 W	11,472 - 11,510	12/26/1992	TDS	11,776
04903722692	C SE SEC 34 T 19 N R 112 W	11,378 - 11,408	3/20/2006	TDS	8,882
04903723072	NE NE SEC 34 T 19 N R 112 W	11,290 - 11,398	3/20/2006	TDS	9,268
04903725932	SE NW SEC 24 T 19 N R 112 W	11,585 - 11,647	3/20/2006	TDS	15,737
04903725932	SE NW SEC 24 T 19 N R 112 W	11,585 - 11,647	8/20/2018	TDS	5,554
04903722706	C SE SEC 36 T 19 N R 112 W	11,598 - 11,638	3/20/2006	TDS	16,699
04903723041	NE NE SEC 36 T 19 N R 112 W	11,654 - 11,710	3/20/2006	TDS	8,088
04903723041	NE NE SEC 36 T 19 N R 112 W	NA	8/20/2018	TDS	2,001
04903723039	C SW SEC 36 T 19 N R 112 W	11,540 - 11,610	3/20/2006	TDS	8,805
04903723039	C SW SEC 36 T 19 N R 112 W	NA	1/26/2008	TDS	4,914

Table A-8.12. Water Quality of the Frontier Aquifer					
Well Name (API)	**Location**	**Depth of Sample, feet**	**Date of Sample Collection**	**Constituent**	**Concentration (mg/L)**
04903723039	C SW SEC 36 T 19 N R 112 W	NA	8/20/2018	TDS	366
04903725914	SW NE SEC 36 T 19 N R 112 W	11,571 - 11,646	3/20/2006	TDS	8,728
04903725915	NW NW SEC 36 T 19 N R 112 W	11,493 - 11,532	3/20/2006	TDS	9,208
04903725915	NW NW SEC 36 T 19 N R 112 W	NA	4/11/2017	TDS	2,626
04903725915	NW NW SEC 36 T 19 N R 112 W	NA	1/26/2008	TDS	2,134
04903723038	C NE SEC 14 T 19 N R 112 W	12,010 - 12,071	1/25/2006	TDS	1,410
04903723038	C NE SEC 14 T 19 N R 112 W	12,010 - 12,071	3/20/2006	TDS	9,451
04903723064	SW SW SEC 24 T 19 N R 112 W	11,512 - 11,572	1/25/2006	TDS	1,680
04903705573	NE SE SEC 22 T 19 N R 112 W	11,416 - 11,456	1/25/2006	TDS	405
04903723038	C NE SEC 14 T 19 N R 112 W	12,010 - 12,071	1/25/2006	TDS	1,410
04903723038	C NE SEC 14 T 19 N R 112 W	12,010 - 12,071	3/20/2006	TDS	9,451
04903723047	C NE SEC 26 T 19 N R 112 W	11,442 - 11,552	3/20/2006	TDS	8,504
04903723047	C NE SEC 26 T 19 N R 112 W	NA	3/6/2018	TDS	2,524
04902321988	SE SE SEC 1 T 19 N R 113 W	11,296 - 11,334	3/14/2006	TDS	2,340
04903722878	SE NW SEC 19 T 20 N R 111 W	11,770 - 11,900	6/2/2010	TDS	9,430
04903723490	SE SW SEC 19 T 20 N R 111 W	11,780 - 11,825	6/2/2010	TDS	6,230
04903726724	W NW SEC 19 T 20 N R 111 W	11,760 - 11,862	6/7/2010	TDS	7,960
04903721632	SW SE SEC 19 T 20 N R 111 W	11,908 - 11,954	6/2/2010	TDS	3,920
04903724247	NE NW SEC 30 T 20 N R 111 W	NA	11/20/2017	TDS	11,117
04903726726	NW SW SEC 31 T 20 N R 111 W	12,033 - 12,086	9/16/2020	TDS	1,170
04903722740	NW NE SEC 31 T 20 N R 111 W	12,054 - 12,146	6/2/2010	TDS	2,140
04903723319	NE NW SEC 31 T 20 N R 111 W	11,998 - 12,024	6/2/2010	TDS	6,910
04903723318	C SE SEC 31 T 20 N R 111 W	12,142 - 12,162	6/2/2010	TDS	9,140
04903724095	SE SW SEC 1 T 20 N R 112 W	NA	11/20/2017	TDS	9,955
04903721781	NE SW SEC 2 T 20 N R 112 W	11,342 - 11,355	9/15/1984	TDS	10,824
04903727633	SW SW SEC 2 T 20 N R 112 W	11,321 - 11,342	6/14/2009	TDS	5,620
04903723280	C SE SEC 3 T 20 N R 112 W	11,274 - 11,290	8/1/2005	TDS	12,338
04902321672	SE SE SEC 6 T 20 N R 112 W	NA	11/20/2017	TDS	503
04902321673	SE NE SEC 6 T 20 N R 112 W	NA	11/20/2017	TDS	9,804
04902322364	NE SE SEC 7 T 20 N R 112 W	11,180 - 11,328	4/12/2009	TDS	9,640
04902320313	NE SW SEC 7 T 20 N R 112 W	11,208 - 11,223	6/8/2010	TDS	418
04902322353	NE NE SEC 7 T 20 N R 112 W	11,166 - 11,250	7/9/2008	TDS	17,900
04902322155	SW SE SEC 8 T 20 N R 112 W	11,270 - 11,309	11/12/2007	TDS	5,493
04902321784	SE NW SEC 8 T 20 N R 112 W	NA	6/24/2004	TDS	7,476
04902320620	SE SW SEC 8 T 20 N R 112 W	11,211 - 11,266	6/8/2010	TDS	4,660
04902320369	NE SW SEC 9 T 20 N R 112 W	11,300 - 11,340	6/8/2010	TDS	14,230

Table A-8.12. Water Quality of the Frontier Aquifer					
Well Name (API)	**Location**	**Depth of Sample, feet**	**Date of Sample Collection**	**Constituent**	**Concentration (mg/L)**
04902321518	C NW SEC 9 T 20 N R 112 W	11,962 - 12,018	8/1/2005	TDS	1,611
04902320850	SE NE SEC 9 T 20 N R 112 W	11,310 - 11,326	8/1/2005	TDS	5,834
04902320800	C SW SEC 10 T 20 N R 112 W	11,332 - 12,034	8/1/2005	TDS	6,531
04903722905	SE NE SEC 10 T 20 N R 112 W	11,322 - 12,016	8/1/2005	TDS	8,164
04903721356	NE SW SEC 13 T 20 N R 112 W	11,676 - 11,724	6/7/2010	TDS	7,760
04903722968	C NW SEC 14 T 20 N R 112 W	11,453 - 11,469	7/8/2008	TDS	12,651
04902321811	SW SE SEC 16 T 20 N R 112 W	11,376 - 11,403	6/1/2005	TDS	11,600
04902320742	C NE SEC 16 T 20 N R 112 W	11,402 - 11,450	6/7/2010	TDS	385
04902320852	SE SW SEC 16 T 20 N R 112 W	11,356 - 11,400	6/7/2010	TDS	88
04902321041	NE SE SEC 16 T 20 N R 112 W	11,386 - 11,402	6/7/2010	TDS	4,380
04902320154	C SW SEC 17 T 20 N R 112 W	11,180 - 11,490	9/10/1985	TDS	4,615
04902322053	SW SE SEC 17 T 20 N R 112 W	11,234 - 11,328	9/18/2006	TDS	3,520
04902322053	SW SE SEC 17 T 20 N R 112 W	11,234 - 11,328	5/17/2010	TDS	442
04902321819	NW SE SEC 17 T 20 N R 112 W	11,260 - 11,296	6/1/2005	TDS	5,380
04902320700	SW NE SEC 17 T 20 N R 112 W	11,272 - 11,332	6/8/2010	TDS	289
04902320878	SE SE SEC 17 T 20 N R 112 W	11,260 - 11,272	6/8/2010	TDS	7,870
04902322365	SE NE SEC 18 T 20 N R 112 W	11,190 - 11,297	5/12/2009	TDS	6,400
04902321005	NE NW SEC 20 T 20 N R 112 W	11,276 - 11,292	8/1/2005	TDS	3,939
04902320305	NE SW SEC 21 T 20 N R 112 W	11,286 - 11,306	6/8/2010	TDS	14,670
04902320701	SE NE SEC 21 T 20 N R 112 W	11,344 - 11,366	6/8/2010	TDS	599
04902321866	NW SW SEC 21 T 20 N R 11	11,302 - 11,343	6/2/2010	TDS	64
04902322072	NW NW SEC 21 T 20 N R 112 W	11,259 - 11,323	3/26/2007	TDS	8,050
04903725916	NW SE SEC 22 T 20 N R 112 W	11,416 - 11,438	6/7/2010	TDS	7,970
04903723263	NW SE SEC 22 T 20 N R 112 W	11,445 - 11,461	6/7/2010	TDS	76
04902321401	NE NW SEC 22 T 20 N R 112 W	11,359 - 11,410	11/10/1993	TDS	84
04902321401	NE NW SEC 22 T 20 N R 112 W	11,359 - 11,410	6/8/2010	TDS	1,410
04903721106	NE SW SEC 23 T 20 N R 112 W	11,471 - 11,505	6/7/2010	TDS	536
04903722854	SW NE SEC 23 T 20 N R 112 W	11,490 - 11,570	6/7/2010	TDS	5,030
04903723256	SE SE SEC 23 T 20 N R 112 W	11,512 - 11,528	6/7/2010	TDS	5,540
04903724004	SE NW SEC 23 T 20 N R 112 W	11,392 - 11,455	6/7/2010	TDS	3,320
04903721693	NW SW SEC 24 T 20 N R 112 W	11,600 - 11,636	6/7/2010	TDS	8,160
04903721693	NW SW SEC 24 T 20 N R 112 W	11,600 - 11,636	6/7/2010	TDS	8,340
04903726356	SW NE SEC 26 T 20 N R 112 W	11,542 - 11,620	11/13/2007	TDS	7,090
04903723258	C SE SEC 27 T 20 N R 112 W	11,478 - 11,494	2/1/1994	TDS	10,954
04902320185	SE SW SEC 27 T 20 N R 112 W	11,360 - 11,656	6/2/2010	TDS	67
04902321049	SW NW SEC 29 T 20 N R 112 W	11,228 - 11,244	5/23/2010	TDS	2,420

Table A-8.12. Water Quality of the Frontier Aquifer					
Well Name (API)	**Location**	**Depth of Sample, feet**	**Date of Sample Collection**	**Constituent**	**Concentration (mg/L)**
04902321828	NW SE SEC 29 T 20 N R 112 W	11,206 - 11,274	6/1/2005	TDS	4,060
04902321824	SW NE SEC 29 T 20 N R 112 W	11,208 - 11,271	6/1/2005	TDS	7,140
04902320602	NW SE SEC 30 T 20 N R 112 W	NA	1/26/2008	TDS	1,996
04902321210	NE NE SEC 30 T 20 N R 112 W	11,318 - 11,328	3/20/2006	TDS	10,516
04902320502	NW SE SEC 31 T 20 N R 112 W	11,434 - 11,460	5/23/2010	TDS	53
04902320794	C NW SEC 31 T 20 N R 112 W	11,414 - 11,489	5/23/2010	TDS	515
04902322025	SE NW SEC 32 T 20 N R 112 W	11,289 - 11,992	9/26/2007	TDS	2,170
04902320332	NE SW SEC 32 T 20 N R 112 W	11,340 - 11,356	5/23/2010	TDS	7,120
04902321120	C SE SEC 32 T 20 N R 112 W	11,195 - 11,268	5/23/2010	TDS	605
04902322002	SW SE SEC 32 T 20 N R 112 W	11,261 - 11,371	9/18/2006	TDS	6,180
04902320269	NE SW SEC 33 T 20 N R 112 W	11,186 - 11,246	6/2/2010	TDS	3,580
04903721226	SE SW SEC 35 T 20 N R 112 W	11,677 - 11,702	6/2/2010	TDS	436
04903726273	NE SW SEC 35 T 20 N R 112 W	11,718 - 11,776	6/7/2010	TDS	558
04903726687	SW SE SEC 35 T 20 N R 112 W	11,618 - 11,722	7/10/2008	TDS	9,460
04902322253	SW NW SEC 1 T 20 N R 113 W	11,242 - 11,328	7/9/2008	TDS	16,200
04902322211	SE NE SEC 2 T 20 N R 113 W	11,262 - 11,334	1/7/2008	TDS	10,500
04902321429	SW SE SEC 11 T 20 N R 113 W	NA	7/13/2018	TDS	4,231
04902321608	NW SW SEC 13 T 20 N R 113 W	NA	7/13/2018	TDS	6,907
04902321430	NW SE SEC 13 T 20 N R 113 W	NA	11/20/2017	TDS	1,497
04902321347	NE SE SEC 14 T 20 N R 113 W	NA	11/20/2017	TDS	7,938
04902320044	SW SE SEC 25 T 20 N R 113 W	11,515 - 11,524	5/23/2010	TDS	8,550
04902320377	NW SE SEC 36 T 20 N R 113 W	11,364 - 11,440	5/23/2010	TDS	348
04902321887	NW SW SEC 7 T 21 N R 111 W	10,955 - 11,057	7/13/2005	TDS	14,300
04902322058	SW NW SEC 7 T 21 N R 111 W	11,063 - 11,105	9/26/2007	TDS	16,800
04902320311	NE SW SEC 7 T 21 N R 111 W	11,110 - 11,063	6/24/2010	TDS	10,300
04903723610	C SE SEC 7 T 21 N R 111 W	11,130 - 11,160	6/24/2010	TDS	4,370
04903723467	NW SE SEC 19 T 21 N R 111 W	11,213 - 11,290	6/28/2010	TDS	8,840
04903723036	NE NE SEC 31 T 21 N R 111 W	11,234 - 11,250	8/1/2005	TDS	4,082
04903722814	C NW SEC 33 T 21 N R 111 W	11,546 - 11,603	6/28/2010	TDS	9,430
04902320241	NW SW SEC 1 T 21 N R 112 W	11,086 - 11,118	9/16/1984	TDS	12,428
04902322091	NE SW SEC 1 T 21 N R 112 W	11,071 - 11,153	9/18/2006	TDS	13,900
04902321912	SW SW SEC 1 T 21 N R 112 W	11,062 - 11,142	6/21/2007	TDS	11,000
04902321914	NE SE SEC 1 T 21 N R 112 W	11,018 - 11,082	10/23/2008	TDS	13,597
04902321901	NW SE SEC 1 T 21 N R 112 W	11,026 - 11,109	10/23/2008	TDS	14,278
04902322273	NW NW SEC 1 T 21 N R 112 W	11,070 - 11,214	10/23/2008	TDS	5,110
04902322377	SW NW SEC 1 T 21 N R 112 W	11,141 - 11,226	4/12/2009	TDS	6,190

Table A-8.12. Water Quality of the Frontier Aquifer					
Well Name (API)	**Location**	**Depth of Sample, feet**	**Date of Sample Collection**	**Constituent**	**Concentration (mg/L)**
04902321196	C NW SEC 1 T 21 N R 112 W	11,090 - 11,136	6/24/2010	TDS	10,520
04902320801	NE NE SEC 1 T 21 N R 112 W	10,956 - 11,064	6/28/2010	TDS	13,040
04902321077	SE SE SEC 2 T 21 N R 112 W	11,110 - 11,130	6/24/2010	TDS	627
04902321076	C NW SEC 2 T 21 N R 112 W	11,124 - 11,160	6/24/2010	TDS	1,230
04902321905	SE SW SEC 2 T 21 N R 112 W	11,108 - 11,188	9/12/2005	TDS	7,190
04902322338	SW SW SEC 2 T 21 N R 112 W	11,115 - 11,250	1/13/2009	TDS	3,740
04902320771	SW NE SEC 2 T 21 N R 112 W	11,120 - 11,182	6/21/2010	TDS	3,970
04902320264	NE SW SEC 2 T 21 N R 112 W	11,117 - 11,158	6/21/2010	TDS	5,900
04902322134	NW SE SEC 2 T 21 N R 112 W	11,124 - 11,222	1/7/2008	TDS	4,690
04902322216	NW SW SEC 2 T 21 N R 112 W	11,180 - 11,240	1/7/2008	TDS	3,300
04902321884	SW SW SEC 3 T 21 N R 112 W	11,081 - 11,176	3/13/2006	TDS	14,900
04902321884	SW SW SEC 3 T 21 N R 112 W	11,081 - 11,176	3/28/2006	TDS	7,990
04902321895	SW NE SEC 3 T 21 N R 112 W	11,118 - 11,179	3/13/2006	TDS	1,210
04902322348	SW SW SEC 3 T 21 N R 112 W	11,098 - 11,242	10/23/2008	TDS	8,410
04902321892	NE NE SEC 3 T 21 N R 112 W	11,096 - 11,167	6/21/2010	TDS	2,100
04902321870	NW SW SEC 3 T 21 N R 112 W	11,102 - 11,174	6/21/2010	TDS	3,990
04902321888	NW NE SEC 3 T 21 N R 112 W	11,116 - 11,168	6/21/2010	TDS	665
04902320257	NE SW SEC 3 T 21 N R 112 W	11,160 - 11,192	6/21/2010	TDS	2,840
04902321783	SE SE SEC 3 T 21 N R 112 W	11,121 - 11,208	9/25/1994	TDS	5,481
04902321884	SW SW SEC 3 T 21 N R 112 W	11,081 - 11,176	3/13/2006	TDS	14,900
04902321884	SW SW SEC 3 T 21 N R 112 W	11,081 - 11,176	3/28/2006	TDS	7,990
04902321891	SE SW SEC 3 T 21 N R 112 W	11,089 - 11,261	3/26/2007	TDS	5,000
04902321890	NE SE SEC 3 T 21 N R 112 W	11,136 - 11,219	3/26/2007	TDS	7,970
04902321889	NW NW SEC 3 T 21 N R 112 W	11,140 - 11,171	7/25/2005	TDS	11,500
04902321061	NW SE SEC 3 T 21 N R 112 W	11,150 - 11,170	6/24/2010	TDS	2,370
04902321071	C NE SEC 3 T 21 N R 112 W	11,136 - 11,166	6/24/2010	TDS	3,800
04902321185	C NW SEC 3 T 21 N R 112 W	11,050 - 11,100	6/24/2010	TDS	3,520
04902321892	NE NE SEC 3 T 21 N R 112 W	11,096 - 11,167	6/21/2010	TDS	2,100
04902321255	C NW SEC 4 T 21 N R 112 W	11,090 - 11,185	6/21/2010	TDS	3,790
04902322082	NE SW SEC 4 T 21 N R 112 W	11,105 - 11,200	9/18/2006	TDS	2,900
04902321195	C SE SEC 4 T 21 N R 112 W	11,080 - 11,967	6/21/2010	TDS	3,800
04902320606	NW SW SEC 4 T 21 N R 112 W	11,162 - 11,200	6/21/2010	TDS	3,680
04902321633	NE SE SEC 5 T 21 N R 112 W	NA	11/20/2017	TDS	12,076
04902321543	SW SE SEC 7 T 21 N R 112 W	NA	11/20/2017	TDS	4,986
04902321601	C NE SEC 7 T 21 N R 112 W	NA	11/20/2017	TDS	664
04902321638	SW NE SEC 7 T 21 N R 112 W	NA	11/20/2017	TDS	1,827

Table A-8.12. Water Quality of the Frontier Aquifer					
Well Name (API)	**Location**	**Depth of Sample, feet**	**Date of Sample Collection**	**Constituent**	**Concentration (mg/L)**
04902322206	NW NE SEC 8 T 21 N R 112 W	11,114 - 11,166	9/26/2007	TDS	10,700
04902320587	NE SW SEC 8 T 21 N R 112 W	11,074 - 11,138	6/21/2010	TDS	6,900
04902322115	SE NW SEC 8 T 21 N R 112 W	11,087 - 11,145	3/26/2007	TDS	10,100
04902322299	SW NW SEC 8 T 21 N R 112 W	11,116 - 11,206	1/12/2009	TDS	9,130
04902322298	NW SW SEC 8 T 21 N R 112 W	11,130 - 11,198	7/10/2008	TDS	9,740
04902322013	NE SE SEC 8 T 21 N R 112	11,012 - 11,090	3/13/2006	TDS	12,200
04902322234	SW SW SEC 8 T 21 N R 112 W	11,106 - 11,210	1/7/2008	TDS	4,170
04902322252	SW SE SEC 8 T 21 N R 112 W	11,060 - 11,144	1/7/2008	TDS	8,110
04902322230	NW SE SEC 9 T 21 N R 112 W	11,055 - 11,104	1/7/2007	TDS	6,810
04902322054	NW NE SEC 9 T 21 N R 112 W	11,177 - 11,225	6/21/2007	TDS	16,600
04902322055	NW NW SEC 9 T 21 N R 112 W	11,163 - 11,215	6/21/2007	TDS	9,070
04902322288	SW SW SEC 9 T 21 N R 112 W	11,088 - 11,096	7/9/2008	TDS	8,820
04902322289	NE NE SEC 9 T 21 N R 112 W	11,082 - 11,218	7/10/2008	TDS	18,000
04902322290	NE SE SEC 9 T 21 N R 112 W	11,104 - 11,202	7/10/2008	TDS	17,000
04902322062	SE SW SEC 9 T 21 N R 112 W	10,990 - 11,070	9/18/2006	TDS	5,400
04902322370	SE NW SEC 9 T 21 N R 112 W	11,111 - 11,185	4/12/2009	TDS	9,010
04902322371	W NE SEC 9 T 21 N R 112 W	11,018 - 11,128	4/12/2009	TDS	6,220
04902322375	SW SE SEC 9 T 21 N R 112 W	11,040 - 11,909	4/12/2009	TDS	3,460
04902320797	C NE SEC 9 T 21 N R 112 W	11,078 - 11,192	6/21/2010	TDS	10,790
04902322287	SW NE SEC 9 T 21 N R 112 W	11,074 - 11,126	6/21/2010	TDS	3,010
04902321781	NE NW SEC 9 T 21 N R 112 W	11,180 - 11,224	7/25/2005	TDS	9,450
04902322066	SW NW SEC 9 T 21 N R 112 W	11,105 - 11,153	3/26/2007	TDS	8,060
04902322222	SW SW SEC 9 T 21 N R 112 W	11,036 - 11,118	9/26/2007	TDS	5,200
04902320260	NE SW SEC 9 T 21 N R 112 W	11,078 - 11,115	6/21/2010	TDS	8,340
04902321995	SE SE SEC 9 T 21 N R 112 W	11,131 - 11,197	9/26/2007	TDS	5,850
04902322244	NW NE SEC 10 T 21 N R 112 W	11,087 - 11,148	9/26/2007	TDS	9,020
04902321060	SW NW SEC 10 T 21 N R 112 W	11,052 - 11,152	6/21/2010	TDS	3,690
04902320202	NW SW SEC 10 T 21 N R 112 W	11,143 - 11,201	6/21/2010	TDS	14,750
04902321908	NE SW SEC 10 T 21 N R 112 W	11,050 - 11,144	6/21/2010	TDS	2,060
04902320779	SE NE SEC 10 T 21 N R 112 W	11,085 - 11,139	6/21/2010	TDS	3,040
04902321039	SE SE SEC 10 T 21 N R 112 W	11,028 - 11,123	6/16/2010	TDS	1,165
04902322217	NE SE SEC 10 T 21 N R 112 W	11,000 - 11,114	10/23/2008	TDS	4,330
04902321841	SE SW SEC 10 T 21 N R 112 W	11,082 - 11,184	3/13/2006	TDS	6,420
04902321885	SE NE SEC 11 T 21 N R 112 W	11,066 - 11,096	9/18/2006	TDS	4,650
04902322291	NW NE SEC 11 T 21 N R 112 W	11,080 - 11,117	10/23/2008	TDS	6,950
04902322295	SW SE SEC 11 T 21 N R 112 W	11,038 - 11,102	7/9/2008	TDS	14,400

Table A-8.12. Water Quality of the Frontier Aquifer					
Well Name (API)	**Location**	**Depth of Sample, feet**	**Date of Sample Collection**	**Constituent**	**Concentration (mg/L)**
04902320132	NW SW SEC 11 T 21 N R 112 W	10,078 - 11,138	6/21/2010	TDS	2,170
04902320132	NW SW SEC 11 T 21 N R 112 W	11,072 - 11,138	6/21/2010	TDS	2,170
04902320764	C NE SEC 11 T 21 N R 112 W	11,056 - 11,124	6/21/2010	TDS	3,910
04902321886	NE SW SEC 11 T 21 N R 112 W	11,118 - 11,179	6/23/2005	TDS	11,500
04902322136	NE NE SEC 11 T 21 N R 112 W	11,100 - 11,160	3/26/2007	TDS	3,310
04902322095	SW NW SEC 11 T 21 N R 112 W	11,088 - 11,168	3/26/2007	TDS	9,930
04902320132	NW SW SEC 11 T 21 N R 112 W	10,078 - 11,138	6/21/2010	TDS	2,170
04902320132	NW SW SEC 11 T 21 N R 112 W	11,072 - 11,138	6/21/2010	TDS	2,170
04902321010	NE NW SEC 11 T 21 N R 112 W	11,116 - 11,136	6/24/2010	TDS	418
04902321011	C SE SEC 11 T 21 N R 112 W	11,048 - 11,123	6/24/2010	TDS	7,150
04902320775	SW NE SEC 12 T 21 N R 112 W	11,010 - 11,070	6/24/2010	TDS	13,460
04902321075	C NW SEC 12 T 21 N R 112 W	11,023 - 11,043	6/24/2010	TDS	1,050
04902321184	SW SE SEC 12 T 21 N R 112 W	11,090 - 11,136	6/24/2010	TDS	592
04902321909	NW SE SEC 12 T 21 N R 112 W	11,044 - 11,100	6/24/2010	TDS	10,400
04902320265	NE SW SEC 12 T 21 N R 112 W	11,066 - 11,116	6/28/2010	TDS	9,900
04902322175	NW SW SEC 12 T 21 N R 112 W	11,066 - 11,300	1/12/2009	TDS	6,580
04902321883	NE NW SEC 13 T 21 N R 112 W	11,077 - 11,147	9/19/2006	TDS	11,800
04902320261	NE SW SEC 13 T 21 N R 112 W	11,090 - 11,126	6/24/2010	TDS	9,590
04902321197	C SE SEC 13 T 21 N R 112 W	11,100 - 11,128	6/24/2010	TDS	500
04902321232	C NE SEC 13 T 21 N R 112 W	11,100 - 11,129	6/24/2010	TDS	4,220
04902321871	SE NW SEC 13 T 21 N R 112 W	11,060 - 11,138	6/24/2010	TDS	4,310
04902322138	NE NE SEC 13 T 21 N R 112 W	11,093 - 11,156	3/26/2007	TDS	10,200
04902321902	SW NW SEC 13 T 21 N R 112 W	10,960 - 11,014	4/6/2006	TDS	14,300
04902321872	SE SW SEC 13 T 21 N R 112 W	11,050 - 11,126	7/13/2005	TDS	980
04902321836	SE SW SEC 14 T 21 N R 112 W	10,983 - 11,016	6/24/2010	TDS	332
04902320750	C NE SEC 14 T 21 N R 112 W	10,941 - 11,057	6/24/2010	TDS	9,190
04902321904	SE NW SEC 14 T 21 N R 112 W	11,053 - 11,100	6/24/2010	TDS	9,460
04902321068	NW SE SEC 14 T 21 N R 112 W	11,020 - 11,048	6/24/2010	TDS	7,850
04902322337	NW NW SEC 14 T 21 N R 112 W	NA	1/12/2009	TDS	6,690
04902320201	NW SW SEC 14 T 21 N R 112 W	10,929 - 11,030	6/16/2010	TDS	2,800
04902321037	SW NW SEC 14 T 21 N R 112 W	11,096 - 11,116	6/16/2010	TDS	1,100
04902320262	NE SW SEC 15 T 21 N R 112 W	11,036 - 11,082	6/16/2010	TDS	4,367
04902320745	C NE SEC 15 T 21 N R 112 W	11,071 - 11,880	6/16/2010	TDS	1,625
04902322294	SW NE SEC 15 T 21 N R 112 W	10,984 - 11,088	1/12/2009	TDS	6,310
04902322292	NW NE SEC 15 T 21 N R 112 W	10,984 - 11,088	NA	TDS	6,390
04902322376	SW NW SEC 15 T 21 N R 112 W	10,984 - 11,909	4/12/2009	TDS	2,820

Table A-8.12. Water Quality of the Frontier Aquifer					
Well Name (API)	**Location**	**Depth of Sample, feet**	**Date of Sample Collection**	**Constituent**	**Concentration (mg/L)**
04902322373	NW SW SEC 15 T 21 N R 112 W	11,000 - 11,117	4/12/2009	TDS	2,800
04902321065	SE NW SEC 15 T 21 N R 112 W	10,935 - 11,045	6/16/2010	TDS	1,455
04902321042	SW SE SEC 15 T 21 N R 112 W	10,918 - 11,030	6/16/2010	TDS	2,280
04902322322	SE SE SEC 15 T 21 N R 112 W	10,938 - 11,056	10/23/2008	TDS	8,658
04902322096	NE NE SEC 15 T 21 N R 112 W	11,056 - 11,124	6/21/2007	TDS	5,740
04902322135	SW NW SEC 15 T 21 N R 112 W	10,972 - 11,075	6/21/2007	TDS	3,880
04902321894	NW SE SEC 15 T 21 N R 112 W	10,955 - 11,070	8/8/2005	TDS	13,400
04902322145	NW NW SEC 15 T 21 N R 112 W	11,006 - 11,108	3/26/2007	TDS	9,310
04902322204	SW NE SEC 16 T 21 N R 112 W	11,058 - 11,138	9/26/2007	TDS	9,810
04902321982	SE NE SEC 16 T 21 N R 112 W	11,013 - 11,191	6/28/2006	TDS	3,940
04902321849	SE NW SEC 16 T 21 N R 112 W	11,092 - 11,134	3/13/2006	TDS	7,060
04902321086	SW SE SEC 16 T 21 N R 112 W	11,142 - 11,162	6/16/2010	TDS	3,320
04902320289	NW SW SEC 16 T 21 N R 112 W	11,186 - 11,217	6/8/2010	TDS	2,710
04902322325	SE SW SEC 16 T 21 N R 112 W	11,170 - 11,232	1/12/2009	TDS	2,390
04902322326	NW SW SEC 16 T 21 N R 112 W	11,176 - 11,234	1/12/2009	TDS	4,200
04902321088	NW NE SEC 16 T 21 N R 112 W	11,040 - 11,060	6/16/2010	TDS	3,840
04902322372	NE SE SEC 17 T 21 N R 112 W	11,149 - 11,244	4/12/2012	TDS	13,510
04902320309	NE SW SEC 17 T 21 N R 112 W	11,238 - 11,301	6/8/2010	TDS	231
04902321873	SW SW SEC 17 T 21 N R 112 W	11,338 - 11,374	6/8/2010	TDS	1,615
04902322087	NW SW SEC 17 T 21 N R 112 W	11,246 - 11,330	6/8/2010	TDS	1,660
04902322265	NW SE SEC 17 T 21 N R 112 W	11,158 - 11,234	10/23/2008	TDS	5,338
04902322057	NW NW SEC 17 T 21 N R 112 W	11,148 - 11,228	3/13/2006	TDS	6,330
04902322174	NE NW SEC 17 T 21 N R 112 W	11,128 - 11,184	6/21/2008	TDS	7,060
04902322171	NW NW SEC 17 T 21 N R 112 W	11,162 - 11,246	6/21/2007	TDS	5,800
04902322267	NE NE SEC 17 T 21 N R 112 W	11,088 - 11,148	4/9/2008	TDS	4,220
04902322065	SE NE SEC 17 T 21 N R 112 W	11,136 - 11,190	6/21/2007	TDS	4,890
04902322271	SE SE SEC 17 T 21 N R 112 W	11,166 - 11,250	7/9/2008	TDS	4,380
04902322266	SW NE SEC 17 T 21 N R 112 W	11,140 - 11,222	7/9/2008	TDS	310
04902322268	NW NE SEC 17 T 21 N R 112 W	11,062 - 11,150	7/9/2008	TDS	8,980
04902322270	NW SE SEC 17 T 21 N R 112 W	11,216 - 11,372	7/9/2008	TDS	15,200
04902321896	SW SE SEC 17 T 21 N R 112 W	11,253 - 11,306	9/12/2005	TDS	7,590
04902322057	NW NW SEC 17 T 21 N R 112 W	11,148 - 11,228	3/13/2006	TDS	6,330
04902322226	SE NE SEC 17 T 21 N R 112 W	11,141 - 11,209	9/26/2007	TDS	8,270
04902322264	SE SW SEC 17 T 21 N R 112 W	11,252 - 11,306	4/7/2008	TDS	4,320
04902322087	NW SW SEC 17 T 21 N R 112 W	11,246 - 11,330	6/8/2010	TDS	1,660
04902322087	NW SW SEC 17 T 21 N R 112 W	11,246 - 11,330	6/28/2006	TDS	5,510

Table A-8.12. Water Quality of the Frontier Aquifer					
Well Name (API)	**Location**	**Depth of Sample, feet**	**Date of Sample Collection**	**Constituent**	**Concentration (mg/L)**
04902322093	SW SE SEC 18 T 21 N R 112 W	11,294 - 11,396	6/12/2006	TDS	5,479
04902322059	SW NE SEC 19 T 21 N R 112 W	11,366 - 11,418	3/13/2006	TDS	7,960
04902322123	NW NE SEC 19 T 21 N R 112 W	11,405 - 11,451	6/21/2007	TDS	8,620
04902322319	SW SE SEC 19 T 21 N R 112 W	11,216 - 11,442	10/23/2008	TDS	5,782
04902322336	SW SW SEC 19 T 21 N R 112 W	11,344 - 11,392	10/23/2008	TDS	5,630
04902322215	SE NW SEC 19 T 21 N R 112 W	11,286 - 11,388	4/8/2008	TDS	10,000
04902320767	NE SW SEC 19 T 21 N R 112 W	11,292 - 11,400	6/8/2010	TDS	2,560
04902322094	NE NW SEC 19 T 21 N R 11,2 W	11,354 - 11,407	6/8/2010	TDS	1,965
04902322351	SE SE SEC 19 T 21 N R 112 W	11,250 - 11,358	6/8/2010	TDS	1,470
04902322304	NE SE SEC 19 T 21 N R 11,2 W	11,330 - 11,368	4/8/2008	TDS	4,260
04902322059	SW NE SEC 19 T 21 N R 112 W	11,366 - 11,418	3/13/2006	TDS	7,960
04902322059	SW NE SEC 19 T 21 N R 112 W	11,366 - 11,418	3/28/2006	TDS	4,740
04902320774	C NE SEC 20 T 21 N R 112 W	11,190 - 11,254	6/14/2010	TDS	3,660
04902321170	SW NW SEC 20 T 21 N R 112 W	11,305 - 11,352	6/14/2010	TDS	3,530
04902321079	SE SE SEC 20 T 21 N R 112 W	NA	6/14/2010	TDS	2,180
04902320316	NE SW SEC 20 T 21 N R 112 W	11,308 - 11,350	6/14/2010	TDS	783
04902321925	SE SW SEC 20 T 21 N R 112 W	11,210 - 11,325	8/8/2005	TDS	9,010
04902321859	SW SW SEC 20 T 21 N R 112 W	11,262 - 11,418	12/20/2005	TDS	9,080
04902322073	NE NW SEC 20 T 21 N R 112 W	11,224 - 11,320	1/7/2008	TDS	5,570
04902322359	NW NW SEC 21 T 21 N R 112 W	11,128 - 11,240	10/23/2008	TDS	5,238
04902322308	SW NE SEC 21 T 21 N R 112 W	11,144 - 11,240	7/9/2008	TDS	8,720
04902322347	NW NE SEC 21 T 21 N R 112 W	11,132 - 11,199	7/9/2008	TDS	12,000
04902322255	SE SW SEC 21 T 21 N R 112 W	11,210 - 11,306	4/22/2008	TDS	6,060
04902322305	NW NE SEC 21 T 21 N R 112 W	11,100 - 11,204	6/8/2010	TDS	80
04902321911	SE SW SEC 21 T 21 N R 112 W	11,235 - 11,280	6/16/2010	TDS	285
04902322152	NE NE SEC 21 T 21 N R 112 W	11,048 - 11,142	6/16/2010	TDS	598
04902322152	NE NE SEC 21 T 21 N R 112 W	11,048 - 11,142	9/26/2007	TDS	3,300
04902322146	NE SE SEC 21 T 21 N R 112 W	11,111 - 11,221	9/26/2007	TDS	2,470
04902322238	SW NW SEC 21 T 21 N R 112 W	11,194 - 11,248	9/26/2007	TDS	4,860
04902322149	NE NW SEC 21 T 21 N R 112 W	11,168 - 11,220	9/26/2007	TDS	6,700
04902322248	NW SW SEC 21 T 21 N R 112 W	11,211 - 11,266	9/26/2007	TDS	10,000
04902320242	NE SW SEC 21 T 21 N R 112 W	11,215 - 11,267	6/14/2010	TDS	1,980
04902321882	SW SW SEC 21 T 21 N R 112 W	11,249 - 11,299	6/14/2010	TDS	940
04902321069	NW SE SEC 21 T 21 N R 112 W	11,214 - 11,244	6/14/2010	TDS	4,295
04902320286	NE SW SEC 22 T 21 N R 112 W	11,135 - 11,190	6/14/2010	TDS	6,150
04902321058	SW NW SEC 22 T 21 N R 112 W	11,121 - 11,147	6/14/2010	TDS	222

Table A-8.12. Water Quality of the Frontier Aquifer					
Well Name (API)	**Location**	**Depth of Sample, feet**	**Date of Sample Collection**	**Constituent**	**Concentration (mg/L)**
04902320746	C NE SEC 22 T 21 N R 112 W	11,062 - 11,096	6/14/2010	TDS	7,010
04902321857	SW SE SEC 22 T 21 N R 112 W	11,054 - 11,060	6/21/2010	TDS	7,000
04902321059	SE SE SEC 22 T 21 N R 112 W	10,990 - 11,055	6/16/2010	TDS	5,020
04902321907	NE NW SEC 22 T 21 N R 112 W	11,017 - 11,097	3/14/2006	TDS	9,990
04902321944	NW SW SEC 23 T 21 N R 112 W	11,062 - 11,131	9/18/2006	TDS	3,610
04902322133	SW SW SEC 23 T 21 N R 112 W	10,982 - 11,092	10/23/2008	TDS	5,758
04902322124	SE SW SEC 23 T 21 N R 11,2 W	10,950 - 11,056	10/23/2008	TDS	5,764
04902321066	NE NW SEC 23 T 21 N R 112 W	10,955 - 11,026	6/16/2010	TDS	5,420
04902321881	SE NW SEC 23 T 21 N R 112 W	10,918 - 11,030	6/16/2010	TDS	2,450
04902322332	SW NW SEC 23 T 21 N R 112 W	11,030 - 11,088	1/12/2009	TDS	8,040
04902321044	NE SE SEC 23 T 21 N R 112 W	10,940 - 11,000	6/16/2010	TDS	8,770
04902320734	C NE SEC 23 T 21 N R 112 W	10,970 - 11,028	6/14/2010	TDS	7,010
04902320288	NE SW SEC 23 T 21 N R 112 W	11,040 - 11,090	6/14/2010	TDS	7,000
04902322074	NE NE SEC 23 T 21 N R 112 W	10,948 - 11,007	6/28/2006	TDS	7,010
04902321893	NW NW SEC 23 T 21 N R 112 W	10,946 - 11,052	6/14/2010	TDS	5,780
04902322097	SE NE SEC 23 T 21 N R 112 W	10,916 - 11,168	9/26/2007	TDS	10,000
04902321860	NW SW SEC 24 T 21 N R 112 W	10,987 - 11,034	9/12/2005	TDS	10,700
04902321080	NE NW SEC 24 T 21 N R 112 W	11,070 - 11,105	6/24/2010	TDS	1,680
04902321227	C NE SEC 24 T 21 N R 112 W	11,091 - 11,136	6/24/2010	TDS	502
04902321817	SE SW SEC 25 T 21 N R 112 W	11,082 - 11,226	9/18/2006	TDS	7,850
04902321817	SE SW SEC 25 T 21 N R 112 W	11,082 - 11,226	6/28/2006	TDS	9,980
04902321817	SE SW SEC 25 T 21 N R 112 W	11,082 - 11,226	6/1/2005	TDS	9,430
04902322052	SW NW SEC 25 T 21 N R 112 W	11,042 - 11,117	6/28/2006	TDS	9,820
04902320368	NE SW SEC 25 T 21 N R 112 W	11,052 - 11,150	6/14/2010	TDS	2,500
04902321054	C SE SEC 25 T 21 N R 112 W	11,054 - 11,964	6/16/2010	TDS	4,660
04902321360	NE NW SEC 25 T 21 N R 112 W	10,930 - 11,040	6/16/2010	TDS	8,790
04902321817	SE SW SEC 25 T 21 N R 112 W	11,082 - 11,226	9/18/2006	TDS	7,850
04902321817	SE SW SEC 25 T 21 N R 112 W	11,082 - 11,226	6/28/2006	TDS	9,980
04902321817	SE SW SEC 25 T 21 N R 112 W	11,082 - 11,226	6/1/2005	TDS	9,430
04902322102	SE SE SEC 25 T 21 N R 112 W	11,223 - 11,229	9/18/2006	TDS	10,700
04902321281	SE NW SEC 26 T 21 N R 112 W	11,055 - 11,121	6/16/2010	TDS	2,630
04902321057	SW SE SEC 26 T 21 N R 112 W	11,148 - 11,164	6/16/2010	TDS	3,870
04902321833	NW SW SEC 26 T 21 N R 112 W	11,148 - 11,164	6/16/2010	TDS	3,390
04902320322	NE SW SEC 26 T 21 N R 112 W	11,118 - 11,144	6/14/2010	TDS	2,620
04902320778	C NE SEC 26 T 21 N R 112 W	11,008 - 11,090	9/16/2020	TDS	940
04902320308	NE SW SEC 27 T 21 N R 112 W	11,116 - 11,161	6/14/2010	TDS	6,160

Table A-8.12. Water Quality of the Frontier Aquifer					
Well Name (API)	**Location**	**Depth of Sample, feet**	**Date of Sample Collection**	**Constituent**	**Concentration (mg/L)**
04902322011	SE NE SEC 27 T 21 N R 112 W	11,172 - 11,188	6/28/2006	TDS	12,600
04902322033	SW SE SEC 27 T 21 N R 112 W	11,134 - 11,174	6/28/2006	TDS	3,220
04902321053	C SE SEC 27 T 21 N R 112 W	11,152 - 11,188	6/16/2010	TDS	3,490
04902320754	C NE SEC 27 T 21 N R 112 W	11,058 - 11,126	6/16/2010	TDS	3,420
04902322075	NW SE SEC 28 T 21 N R 112 W	11,220 - 11,316	4/12/2009	TDS	12,170
04902321977	SE NW SEC 28 T 21 N R 112 W	11,158 - 11,298	3/13/2006	TDS	2,580
04902321981	NE NE SEC 28 T 21 N R 112 W	11,073 - 11,181	9/19/2006	TDS	9,180
04902322076	SW SW SEC 28 T 21 N R 112 W	11,241 - 11,306	6/21/2007	TDS	5,500
04902320271	NE SW SEC 28 T 21 N R 112 W	11,214 - 11,258	6/14/2010	TDS	1,310
04902321118	SW NE SEC 28 T 21 N R 112 W	11,160 - 11,188	6/14/2010	TDS	788
04902321981	NE NE SEC 28 T 21 N R 112 W	11,073 - 11,181	9/19/2006	TDS	9,180
04902321851	SE SE SEC 28 T 21 N R 112 W	11,144 - 11,214	12/20/2006	TDS	10,700
04902322237	SE NW SEC 29 T 21 N R 112 W	11,262 - 11,354	9/26/2007	TDS	3,780
04902322140	SE SE SEC 29 T 21 N R 112 W	11,248 - 11,351	9/26/2007	TDS	4,920
04902322223	SW SE SEC 29 T 21 N R 112 W	11,036 - 11,118	9/26/2007	TDS	5,360
04902322063	NE SE SEC 29 T 21 N R 112 W	11,280 - 11,330	6/28/2006	TDS	5,410
04902321910	SW NE SEC 29 T 21 N R 112 W	11,324 - 11,362	9/12/2005	TDS	4,180
04902321915	SE NE SEC 29 T 21 N R 112 W	11,290 - 11,342	6/14/2010	TDS	1,135
04902321073	C NE SEC 29 T 21 N R 112 W	11,231 - 11,300	6/14/2010	TDS	188
04902321186	NE NW SEC 29 T 21 N R 112 W	11,310 - 11,360	6/14/2010	TDS	350
04902322172	SW SW SEC 29 T 21 N R 112 W	11,365 - 11,318	6/21/2007	TDS	13,600
04902322139	NE NE SEC 29 T 21 N R 112 W	11,276 - 11,338	6/21/2007	TDS	2,990
04902322247	SE NE SEC 29 T 21 N R 112 W	11,252 - 11,342	7/9/2008	TDS	413
04902322277	NW SW SEC 29 T 21 N R 112 W	11,290 - 11,404	10/23/2008	TDS	5,354
04902322239	SW NW SEC 29 T 21 N R 112 W	11,276 - 11,356	4/22/2008	TDS	3,200
04902322246	NW NE SEC 29 T 21 N R 112 W	11,238 - 11,352	4/8/2008	TDS	11,100
04902322245	NW SE SEC 29 T 21 N R 11,2 W	11,277 - 11,352	1/7/2008	TDS	10,400
04902322276	NW NW SEC 29 T 21 N R 112 W	11,030 - 11,088	1/12/2009	TDS	1,040
04902320159	NW SW SEC 29 T 21 N R 112 W	11,278 - 11,304	6/8/2010	TDS	3,840
04902321567	SE NE SEC 31 T 21 N R 112 W	NA	11/20/2017	TDS	995
04902321600	C NW SEC 31 T 21 N R 112 W	NA	11/20/2017	TDS	169
04902321603	NE SW SEC 31 T 21 N R 112 W	NA	11/20/2017	TDS	1,514
04902320318	SE NW SEC 32 T 21 N R 112 W	11,220 - 11,264	6/8/2010	TDS	3,770
04902322307	NW SE SEC 32 T 21 N R 112 W	11,216 - 11,388	1/12/2009	TDS	11,500
04902322141	SW NE SEC 32 T 21 N R 112 W	11,237 - 11,329	9/26/2007	TDS	10,000
04902322214	SW SE SEC 32 T 21 N R 112 W	11,138 - 11,248	1/7/2008	TDS	9,250

Table A-8.12. Water Quality of the Frontier Aquifer					
Well Name (API)	**Location**	**Depth of Sample, feet**	**Date of Sample Collection**	**Constituent**	**Concentration (mg/L)**
04902322014	NE NE SEC 32 T 21 N R 112 W	11,281 - 11,333	3/13/2006	TDS	7,930
04902322125	NE SE SEC 32 T 21 N R 112 W	11,235 - 11,267	6/21/2007	TDS	9,580
04902321903	NE NW SEC 33 T 21 N R 112 W	11,190 - 11,248	7/9/2008	TDS	3,500
04902322274	SW NE SEC 33 T 21 N R 112 W	11,172 - 11,244	10/23/2008	TDS	5,650
04902322368	SW NW SEC 33 T 21 N R 112 W	11,264 - 11,398	4/12/2009	TDS	8,980
04902320371	NE SW SEC 33 T 21 N R 112 W	11,260 - 11,308	6/8/2010	TDS	3,680
04902321876	NW NW SEC 33 T 21 N R 112 W	11,262 - 11,291	6/14/2010	TDS	3,330
04902322235	SW NW SEC 33 T 21 N R 112 W	11,224 - 11,312	4/9/2008	TDS	4,440
04902321996	SE SW SEC 33 T 21 N R 112 W	11,183 - 11,283	6/28/2006	TDS	9,760
04902322203	NW NE SEC 34 T 21 N R 112 W	11,140 - 11,200	1/7/2008	TDS	4,490
04902322024	SE NE SEC 35 T 21 N R 112 W	11,106 - 11,234	3/9/2006	TDS	7,510
04902322023	NE NE SEC 35 T 21 N R 112 W	11,114 - 11,188	3/9/2006	TDS	10,600
04902321091	C NE SEC 35 T 21 N R 112 W	11,107 - 11,123	2/17/2003	TDS	2,662
04902322010	NE NW SEC 35 T 21 N R 112 W	11,048 - 11,110	9/16/2020	TDS	720
04902322103	NW NE SEC 36 T 21 N R 112 W	11,147 - 11,258	3/26/2007	TDS	4,970
04902320358	NE SW SEC 36 T 21 N R 112 W	11,124 - 11,240	6/14/2010	TDS	2,620
04902320749	C NE SEC 36 T 21 N R 112 W	11,180 - 11,327	6/16/2010	TDS	5,470
04902321804	SE SE SEC 25 T 21 N R 113 W	NA	11/20/2017	TDS	1,873
				Average	**6,052**

Table A-8.13. Dakota Water Chemistry										
API	**pH**	**Ca (ppm)**	**Mg (ppm)**	**Na (ppm)**	**K (ppm)**	**Cl (ppm)**	**HCO_3**	**SO_4 (ppm)**	**CBE**	**Source**
4902320584	7.38	47	6	19	7	26	98	110	9.27%	WOGCC
4904120837	7.02	8	5	170	0	193	70	18	8.17%	WOGCC
4903721366	6.7	107	2	337	51	410	567	30	0.04%	WOGCC
4902321589	6.99	60	0	491	26	788	216	15	2.08%	WOGCC
4902321447	6.44	34	0	580	34	810	254	23	0.55%	WOGCC
4902320349	6.32	145	8	663	14	1142	116	16	3.69%	WOGCC
4904105233	0.00*	177	-1	751	-3	272	1,450	484	0.02%	USGS-PWD
4902320970	7.55	31	20	2,536	100	3620	1,098	0	1.71%	WOGCC
4902322085	7.89	18	11	2,520	84	3700	1,450	320	8.55%	WOGCC
4904120019	8.1	20	6	2,965	20	3860	1,281	53	0.00%	USGS-PWD
4903705317	6.9	56	17	3,157	-3	4552	770	30	0.05%	USGS-PWD
4904105240	8.1	90	5	3,205	15	4680	708	68	0.12%	USGS-PWD
4902321380	5.43	82	5	3,040	63	5585	368	12	8.43%	WOGCC
4904105097	7.2	126	102	3,487	-3	4900	1,320	316	0.02%	USGS-PWD
4903705317	8.7	31	8	3,090	-3	1400	5,000	728	0.01%	USGS-PWD
4902321310	6.18	129	8	3,320	155	6169	710	44	9.09%	WOGCC
4904120019	8.3	39	9	4,016	47	5700	939	58	0.33%	USGS-PWD
4903722834	5.5	76	42	4,171	0	6480	268	155	0.46%	WOGCC
4904120842	7.42	136	49	3,510	0	5000	3,000	80	7.99%	WOGCC
4904105229	8.4	25	2	4,823	-3	6600	795	370	1.03%	USGS-PWD
4902321596	6.92	135	6	4,350	57	8164	456	21	9.24%	WOGCC
4902321488	6.89	150	16	4,490	67	8198	494	39	7.70%	WOGCC
4904105156	7.5	132	10	5,011	-3	7400	952	54	0.02%	USGS-PWD
4902321358	6.42	147	3	5,020	119	9118	431	16	7.22%	WOGCC
4902321169	6.14	104	0	5,262	329	9101	786	19	5.37%	WOGCC
4902321462	7.01	175	6	6,000	109	10480	545	26	5.55%	WOGCC
4904120015	7.3	120	18	8,508	420	12300	488	1,608	0.02%	USGS-PWD
Average	7	89	13	3,166	63	4839	912	175		

Table A-8.14. Water Chemistry of Receiving Formation (Nugget)		
Parameter	**Results, mg/L**	
Well (API)	**4904120019**	**4904105230**
Alkalinity, as Bicarbonate (HCO_3^-)	488	990
Calcium	1,078	1475
Chloride	46,000	45,600
Potassium	1,000	NA
Magnesium	239	139
Sodium	27,816	28,645
Sulfate	184	216
TDS	76,557	78,417

Table A-8.15. Water Chemistry of Receiving Formation (Madison)		
Parameter	**Results, mg/L**	
Well (API)	**4902321674**	**4902316870**
Alkalinity, as Bicarbonate (HCO_3^-)	2,746	2,746
Calcium	125	250
Chloride	30,230	31,460
Potassium	3,050	3,198
Magnesium	29	32
Sodium	18,570	19,780
Sulfate	1,330	2,220
TDS	56,160	59,760

FIGURES

Stratigraphic Section			
Age	**Formation / *Submember***	**Depth Below Surface (ft)**	**Approximate Thickness**
Neogene	Browns Park FM, Qa		
Paleogene	Bridger FM — Confirmed USDW	0	600
	Green River FM — Confirmed USDW	600	1,000
	Wasatch / Knight FM — Confirmed USDW	1,600	2,500
	Almy FM / Fort Union	4,100	1,600
Cretaceous	Mesaverde Group	5,700	2,100
	Lance FM	*5,700*	500
	Almond FM	*6,200*	500
	Ericson Sandstone	*6,700*	1,100
	Hilliard/Baxter Shale — Confining	7,800	3,450
	Frontier FM — O&G Res / Confirmed USDW	11,250	250
	Aspen/Mowry Shale — Confining	11,500	400
	Bear River FM — Possible USDW	11,900	100
	Dakota Sandstone — O&G Res / Possible USDW	12,000	200
Jurassic	Morrison FM — Confining	12,200	700
	Sundance FM	12,900	800
	Stump	*12,900*	100
	Preuss	*13,000*	100
	Twin Creek Limestone — Confining	13,100	550
	Gypsum Spring FM — Confining	*13,650*	50
	Nugget Sandstone — CO_2 Storage	13,700	700
Triassic	Ankareh FM — Confining	14,400	600
	Thaynes Limestone	15,000	400
	Woodside Shale — Confining	15,400	600
	Dinwoody FM	16,000	100
Permian	Phosphoria FM — Confining	16,100	400
Carboniferous	Tensleep/Weber Sandstone	16,500	500
	Amsden FM — Confining	17,000	500
	Madison Limestone — CO_2 Storage	17,500	700
Devonian	Three Forks Shale — Confining	18,200	100
	Jefferson Limestone — Confining	18,300	200
Ordovician	Bighorn Dolomite	18,500	300

Figure A-8.1. *Stratigraphic Section denoting USDWs, confining zones, and injection zones.*

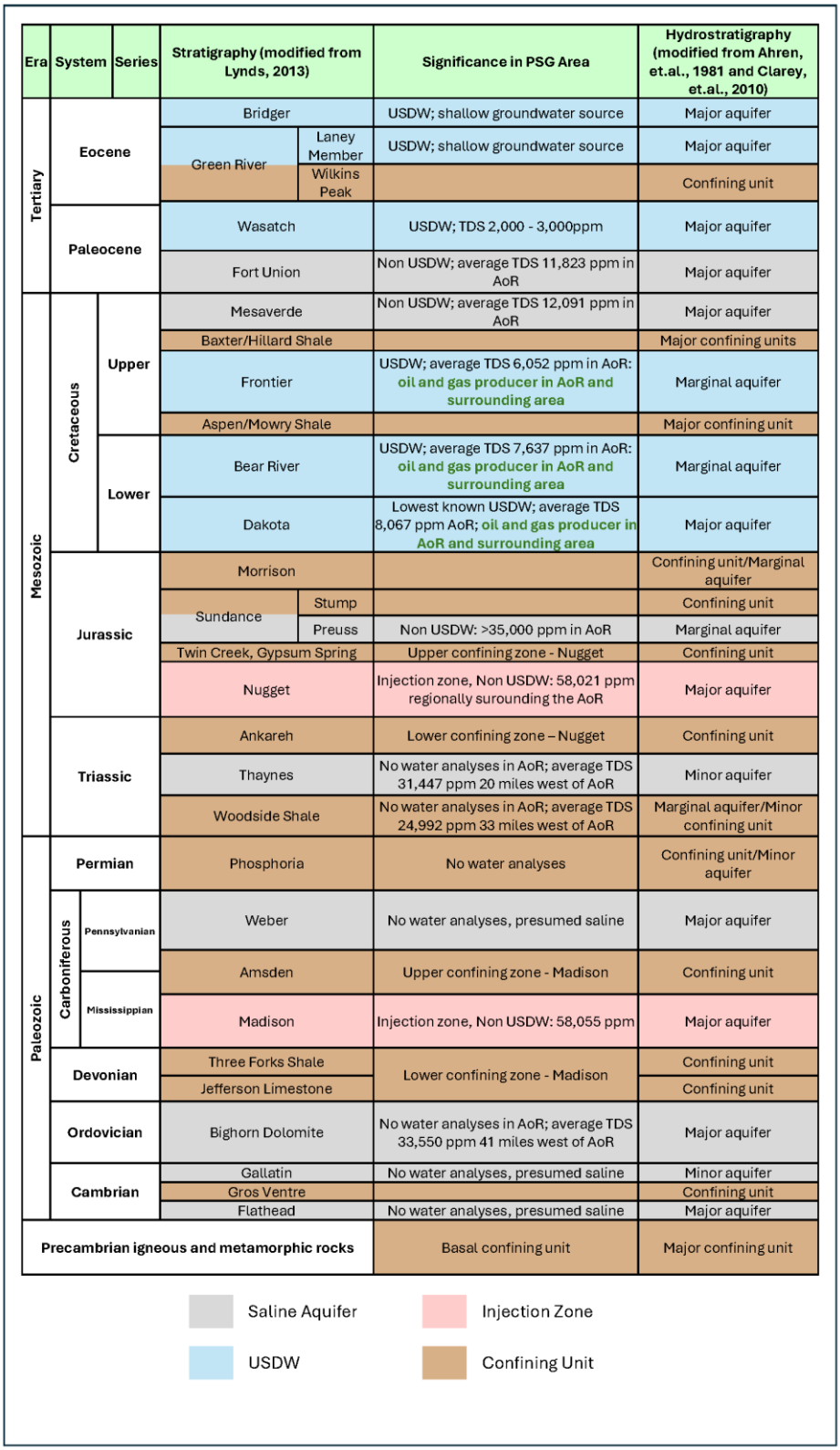


Figure A-8.2. *Aquifer Summary.*

FORM A-9
QUALITY ASSURANCE SURVEILLANCE PLAN

TABLE OF CONTENTS

9.0 Quality Assurance and Surveillance Plan Goal 1
9.1 Testing and Monitoring Overview 1
9.2 Monitoring and Analysis of Injected CO_2 1
9.3 Injection Well Testing 1
9.4 Corrosion Monitoring and Prevention 2
9.4.1 Corrosion Monitoring 2
9.4.2 Corrosion Prevention 2
9.5 Surface Leak Monitoring 2
9.6 Near-Surface Monitoring: Groundwater and Soil Gas 2
9.6.1 Acquisition of Baseline Data 3
9.6.2 Near-Surface SAP Locations 3
9.6.3 Groundwater Sampling Methods 3
9.6.4 Soil-Gas Sampling and Analysis Protocol 4
9.6.5 QA/QC Procedures 6
9.7 Storage Reservoir Monitoring 6
9.8 Downhole Monitoring 7
9.8.1 Wireline Logging and Retrievable Monitoring 7
9.8.2 Modular Formation Dynamics Tester (MDT) 8
9.8.2.1 Formation Fluid Sample 8
9.8.2.2 Microfracture Testing 8
9.9 Direct Reservoir Monitoring 8
9.10 Indirect Reservoir Monitoring 9

LIST OF TABLES

Table A-9.1. Near-Surface Sampling and Analysis Plan Monitoring Frequency and Analytical Parameters 5

ABBREVIATIONS/ACRONYMS

°C	degree Celsius
3-D	three-dimensional
3-D VSP	3-D vertical seismic profile
AoR	Area of Review
API	American Petroleum Institute
ASTM	American Society of Testing and Materials
BHP	bottomhole pressure
BHT	bottomhole temperature
CCL	casing collar locator
CO_2	carbon dioxide
COC	chain of custody
EC	electrical conductivity
EPA	Environmental Protection Agency
ERRP	Emergency and Remedial Response Plan
FCS	Frontier Carbon Solutions Holdings, LLC
GR	gamma ray
GS	geologic sequestration
ISO	International Organization for Standardization
MDT	modular dynamics tester
MIT	mechanical integrity test
N_2	nitrogen
NACE	National Association of Corrosion Engineers
O_2	oxygen
pH	potential of hydrogen
PISC	post-injection site care
PNL	pulsed neutron log
PSG	Project Speed Goat
psi	pounds per square inch
QA/QC	quality assurance/quality control

QASP	Quality Assurance and Surveillance Plan
SAP	Sampling and Analysis Plan
SCADA	supervisory control and data acquisition
SCS Hub	Sweetwater Carbon Storage Hub
SOP	standard operating procedure
TDS	total dissolved solids
USDW	underground source of drinking water
USGS	United States Geological Survey
USIT	Ultrasonic Imaging Tool
VOC	volatile organic compounds
WDEQ	Wyoming Department of Environmental Quality
WOGCC	Wyoming Oil and Gas Conservation Commission
WQD	Water Quality Division
WQRR	Water Quality Rules and Regulations

FRONTIER CARBON SOLUTIONS
PROJECT SPEED GOAT
CARBON SEQUESTRATION UIC CLASS VI APPLICATION

FORM A-9, PROPOSED QUALITY ASSURANCE SURVEILLANCE PLAN
Water Quality Rules, Chapter 24 Section 10 and 20

9.0 Quality Assurance and Surveillance Plan Goal

The primary goal of Project Speed Goat's (PSG's) testing and monitoring plan is to ensure the geologic sequestration project is operating as permitted and not endangering underground sources of drinking water (USDW). In compliance with the Water Quality Rules Chapter 24, Section 20, this Quality Assurance and Surveillance Plan (QASP) was developed and provided as part of the testing and monitoring program.

9.1 Testing and Monitoring Overview

The testing and monitoring program for the project includes: (1) the analysis of the injected carbon dioxide (CO_2); (2) periodic testing of each injection well (i.e., testing of external and internal mechanical integrity); (3) a corrosion-monitoring plan for the CO_2 injection well components; (4) a leak detection and monitoring plan for surface components of the CO_2 injection system (e.g., CO_2 flow line and wellhead); and (4) a near-surface/deep-subsurface leak detection plan to monitor any movement of the CO_2 outside of the storage reservoir. The latter consists of a combination of soil-gas and groundwater monitoring, storage reservoir monitoring, downhole monitoring, and geophysical monitoring. The following quality assurance and surveillance procedures for the testing and monitoring plan are provided below.

9.2 Monitoring and Analysis of Injected CO_2

Water Quality Rules and Regulations (WQRR) Chapter 24, Section 20 requires analysis of the CO_2 stream with sufficient frequency to yield data representative of its chemical and physical characteristics. Samples of the injection stream will be characterized to determine gas composition concentrations through analyses will be outsourced to commercial laboratories, who utilize Environmental Protection Agency (EPA) analytical methods and standards that are generally accepted by industry and employ their standard analytical quality assurance/quality control (QA/QC) protocols.

9.3 Injection Well Testing

The mechanical integrity of the injection well will be confirmed using an Ultrasonic Imaging Tool (USIT) or similar technology. In addition, a pressure test will be conducted to assess the internal mechanical integrity of the wellbore between the tubing/casing annulus before injection begins. Technical specifications of a USIT tool are provided in **Attachment A-9.1** found in ***Appendix A-9***.The internal mechanical integrity of the injection well will be tested at a minimum of once every five years by performing tubing/casing annular pressure tests.

9.4 Corrosion Monitoring and Prevention

9.4.1 Corrosion Monitoring

Corrosion coupons that are representative of the construction materials of the flow line and injection well will be tested quarterly during the first year of injection, and once per year thereafter, to aid in ensuring the mechanical integrity of the injection well equipment. These coupons will be prepared, installed, and analyzed in accordance with National Association of Corrosion Engineers (NACE) Standard RP0775 (Preparation, Installation, Analysis, and Interpretation of Corrosion Coupons in Oilfield Operations) and/or American Society of Testing and Materials (ASTM) Method G1-03 (Standard Practice of Preparing, Cleaning, and Evaluating Corrosion Test Specimens) to determine and document corrosion loss rates based on mass loss. The testing will be performed on the captured CO_2 gas stream at the beginning of the flow line to the injection wellhead. The QA/QC procedures specified in the NACE and ASTM methods will be followed.

9.4.2 Corrosion Prevention

The primary actions taken to prevent corrosion include: (1) maintaining a low moisture content in the injected CO_2; and (2) using CO_2-resistant materials of construction in both the flow line and injection well. The injection well tubulars will use materials manufactured to American Petroleum Institute (API) 5CT (Casing and Tubing Specification) and International Organization for Standardization (ISO) 11960 specifications. The cement and additives will comply with API 10A (Specification for Cements and Materials for Well Cementing).

In addition, if corrosion monitoring results indicate the gas composition requires treatment, removal of corrosive constituents from the CO_2 stream may be necessary using a variety of methods: (1) dehydration of the gas when water is present (e.g., water separator, coalescers, filters, glycol, or dry desiccant); and (2) corrosion inhibitor packages (anodic, cathodic, or both). Should this be necessary, deployment methods will be chosen by the appropriate vendor that has designed a catered approach to removing corrosive components from the CO_2 stream. Over time, the effectiveness of the catered design will be evaluated based on the corrosion monitoring results, and the corrosion removal methods will be adjusted accordingly.

9.5 Surface Leak Monitoring

Pressure monitoring and flowmeter readings will be used to detect surface leaks at the wellhead.

9.6 Near-Surface Monitoring: Groundwater and Soil Gas

The Near-Surface Sampling and Analysis Plan (Near-Surface SAP) discussed herein comprises: (1) sampling of shallow groundwater aquifers (USDWs); and (2) sampling of soil gas in the shallow vadose zone. Sampling and chemical analysis of these zones provide concentrations of chemical constituents, including CO_2, which are focused on detecting movement of the CO_2 out

of the reservoir. Ultimately, these monitoring efforts will provide data to confirm that near-surface environments are not adversely impacted by CO_2 injection and storage operations.

9.6.1 Acquisition of Baseline Data

The Near-Surface SAP is designed to acquire accurate baseline groundwater and soil gas data in which to compare future test results and monitor any movement of the CO_2 outside of the storage reservoir in support of the testing and monitoring program throughout all phases of the project life (development and pre-injection, operation or injection, and post-injection). The near-surface environment includes the shallowest groundwater below the water table, and the vadose zone between the water table and the ground surface.

Sampling locations, frequency, and analyses will be determined based on proximity to the most likely potential CO_2 migration pathways such as wellbores. Baseline groundwater and soil gas data collection frequency will account for seasonal fluctuations.

9.6.2 Near-Surface SAP Locations

Since the purpose of sampling is to confirm that the near-surface environment is not being affected by migration of stored CO_2 outside of the reservoir, sampling locations are preferentially located near potential migration pathways, i.e., wells that penetrate the injection zones. A near-surface monitor well and a gas profile station will be located at each injection wellsite. Additional soil gas profile stations are located near other wells that have penetrated the injection zones, including the formation monitor well(s) and existing gas wells.

Soil gas monitoring directly measures the characteristics of the air space between soil components and is an indirect indicator of both chemical and biological processes occurring in and below a sampling horizon. One soil gas profile station will be located at each injection well and monitoring well.

9.6.3 Groundwater Sampling Methods

Field observations are recorded on field forms. A wellhead inspection is completed upon arrival. Water level measurements are taken immediately before water quality sampling. Free-flowing artesian wells are completely enclosed and stabilized before pressure measurements are taken. Pressure is recorded to the nearest 0.1 pounds per square inch (psi). Static groundwater levels are measured, converted to elevation and reported in tenths of a foot above mean sea level.

Prior to collecting water-quality samples, all wells are pumped, bailed, or allowed to flow to evacuate the casing of stagnant water and draw in formation water for at least two casing volumes if possible. If this is not possible, then low-flow sampling is conducted by clearing the casing once and then sampling the water that subsequently enters the well. The procedure used to evacuate each well and the number of casing volumes purged is recorded prior to sampling. Water-quality samples are collected by allowing the well to flow, pumping, or bailing.

Field parameters, including pH (to the nearest 0.1 standard units), electrical conductivity (EC, µmhos/cm corrected to 25°C), and temperature are recorded. pH, EC, and temperature are evaluated for geochemical stability prior to collecting laboratory samples. For low-flow sampling, three consecutive readings spaced five minutes apart that are within 10% of the previous reading demonstrate stabilization.

Samples are collected in clean, unused containers and are preserved as required. Chain of custody (COC) forms are used and completed with the required information.

Samples may be field filtered; any field filtering is noted on the COC. Samples are kept on ice (4°C) and in the dark until arrival at the on-site or contract laboratory.

9.6.4 Soil Gas-Sampling and Analysis Protocol

Field observations are recorded on field forms. A probe inspection is completed upon arrival. Field measurements of soil temperature and CO_2 and oxygen (O_2) concentrations in ambient air are taken immediately before soil gas sampling.

Prior to collecting soil gas samples, at least three volumes are purged from the probe and pumping/sampling assembly. This may be accomplished using a syringe, a pump, or a multigas meter with a built-in pump. Purging and sampling are performed at a low flow rate (approximately 200 mL/min) to minimize gas mixing and ensure representative samples. The procedure used to purge each probe, and the number of volumes purged is recorded prior to sampling.

Field parameters, including CO_2 and oxygen (O_2), are recorded during purging and are evaluated for stability prior to collecting laboratory samples. Soil gas concentrations of CO_2 are expected to be significantly higher than in ambient air and should stabilize prior to sampling.

Samples are collected in clean containers provided by the contract laboratory and are filled according to laboratory instructions. Sample containers may include Tedlar bags, Summa canisters, or other appropriate containers as determined by the contract laboratory. COC forms are used and are completed with the required information. Soil gas samples are stored and transported as directed by the contract laboratory.

Table A-9.1 below provides the well type, sample frequency and analytical methods for baseline, injection and post-injection monitoring.

Table A-9.1. Near-Surface Sampling and Analysis Plan Monitoring Frequency and Analytical Parameters		
Well Type	**Frequency**	**Laboratory Analytical Parameter**
Baseline Monitoring		
Existing water	Twice at least three months apart	• WDEQ/Water Quality Division (WQD) Chapter 8, Table 1 Use Suitability Parameters[1] • Specific conductivity • Alkalinity (total carbonate and bicarbonate) • Total inorganic carbon
	Once	• Volatile organic compounds (VOCs)
Near-surface monitor	Quarterly for one year	• WDEQ/WQD Chapter 8, Table 1 Use Suitability Parameters[1] • Specific conductivity • Alkalinity (total carbonate and bicarbonate) • Total inorganic carbon
	Once	• VOCs
Soil Gas Profile Station		• Nitrogen (N_2) • O_2 • CO_2
Injection Monitoring		
Existing Water	Annually	• WDEQ/WQD Chapter 8, Table 1 Use Suitability Parameters[1] • Specific conductivity • Alkalinity (total carbonate and bicarbonate) • Total inorganic carbon
Near-surface monitor	Quarterly (field measurements[2])	• Depth to water • pH[1] • Specific conductivity
	Annually	• Specific conductivity • Alkalinity (total carbonate and bicarbonate) • Total inorganic carbon
Soil Gas profile station	Quarterly for the first year of injection, then annually	• N_2 • O_2 • CO_2
Post-Injection Site Care Monitoring		
Existing water	Annually for five years, then every five years until site closure	• WDEQ/WQD Chapter 8, Table 1 Use Suitability Parameters[1] • Specific conductivity • Alkalinity (total carbonate and bicarbonate) • Total inorganic carbon

Table A-9.1. Near-Surface Sampling and Analysis Plan Monitoring Frequency and Analytical Parameters		
Well Type	**Frequency**	**Laboratory Analytical Parameter**
Near-surface monitor	Annually for five years, then every five years until site closure	• pH[1] • Specific conductivity • Alkalinity (total carbonate and bicarbonate) • Total inorganic carbon
Soil Gas profile station	Annually for five years, then every five years until site closure	• N_2 • O_2 • CO_2

[1]*pH will be measured in the field because of the limited hold time.*
[2]*Measured with field equipment (no laboratory analysis).*

9.6.5 QA/QC Procedures

QA/QC includes the following:

- A naming convention is established for sample stations and sample labeling and is consistently followed.
- Duplicate samples and sample preservation blanks (field blanks) are collected, analyzed and reported every 20 samples or once every sample collection round, whichever is less. Original and duplicate samples are compared by relative percent difference.
- If CO_2 concentrations decrease significantly during soil gas purging, it may indicate a leak in the probe/sampling assembly. If this occurs, all fittings will be tightened and leak-checked and purging will be repeated to see if stability can be achieved. If there are still indications of a leak, additional testing with helium or other gas may be performed to determine if the bentonite seal around the probe is compromised. Probes with compromised seals will be resealed or replaced prior to sampling.
- Field water-quality meters are calibrated daily, and calibration records are maintained. Field water-quality measurements are compared to laboratory water-quality measurements to assess consistency.
- Field soil gas meters are calibrated daily, and calibration records are maintained. Bump testing is used to check calibration during the day, and the meters are recalibrated if needed. Field measurements are compared to laboratory soil gas measurements to assess consistency.

9.7 Storage Reservoir Monitoring

Monitoring of the storage reservoir during injection operations include monitoring of the injection flow rates and volumes, wellhead injection temperature and pressure (WHT/P), bottomhole injection pressure, and the tubing-casing annulus pressure or casing pressure. The storage monitoring will be accomplished using flowmeters, surface digital pressure and temperature

gauges, and bottomhole pressure/temperature (BHP/BHT) gauges. The surface injection temperature along with the flowline, wellhead, and bottomhole temperatures will be continuously monitored and recorded in real time. These pressure/temperature data will be either periodically downloaded (i.e., monthly basis or bimonthly basis) or continuously recorded as part of the supervisory control and data acquisition (SCADA) system that will be employed off-site.

9.8 Downhole Monitoring

The downhole monitoring of the injection and monitoring wells will focus on the downhole pressure and temperature. This monitoring will be achieved on both wells using external BHT and BHP gauges to provide continuous data recorded in real time. The specifications for the BHT/BHP gauges are provided in **Attachment A-9.2** found in ***Appendix A-9***. These pressure and temperature data will be periodically downloaded (i.e., monthly basis or bimonthly basis) or continuously recorded as part of the SCADA system that will be employed off-site.

9.8.1 Wireline Logging and Retrievable Monitoring

The wireline logging and retrievable monitoring that will be performed consist of pulsed neutron logs (PNLs) and ultrasonic logs, injection zone pressure falloff tests, and corrosion monitoring. The information provided by these monitoring efforts is as follows:

- PNL: Provides information regarding gas saturation in the formations, which can be used to determine if the injected CO_2 is contained within the storage formation as well as ground-truth information provided by 3-D seismic surveys.
- Ultrasonic Logs or USIT: The USIT and casing pressure test will be used to assess the internal and external mechanical integrity of the casing.
- Corrosion monitoring: Measures the loss of mass, loss of thickness, cracking, pitting, and other signs of corrosion of the wellbore materials over time caused by the wellbore interacting with the injected CO_2 and formation fluids. Corrosion monitoring will be performed and recorded at least quarterly to ensure the well components meet the minimum standards for material strength and performance set forth in WDEQ Chapter 24, Section 14(b).
- Pressure falloff test: The falloff test interprets the pressure decline with respect to time recorded after injecting a measured volume of fluid to give information about skin, permeability-thickness, and boundary conditions. The injection zone pressure falloff test will be performed in the injection well prior to initiation of CO_2 injection activities and at least once every five years thereafter to demonstrate storage reservoir injectivity. Pressure data will be recorded during the pressure falloff test at the bottomhole and at the wellhead using the tandem BHP gauges and wellhead pressure gauge, respectively. The BHP gauge specification is provided in **Attachment A-9.2**.

Several measurements of the storage formation properties will be made in the injection and monitoring wells using wireline logging techniques. These logs are listed below:

- Imaging log
- Casing collar locator (CCL) log
- Gamma ray (GR) log
- Triple-combo logs (i.e., resistivity, density, porosity, caliper, and spontaneous potential)
- Spectral GR log
- Electric imaging log

All wireline logging events will follow API guidelines along with the standard operating procedures (SOPs) of a third-party wireline operator.

9.8.2 Modular Formation Dynamics Tester (MDT)

The MDT modular formation dynamics tester, or a similar wireline formation testing tool, will be used to collect real-time formation fluid samples, pressure measurements, and test formation stress of the injection zone and the upper confining zone.

9.8.2.1 Formation Fluid Sample

The wireline-conveyed MDT tool assembly incorporates a dual-packer module to isolate intervals, a large-diameter probe for formation pressure and temperature measurements, a pump out module to pump unwanted mud filtrate, a flow control module, and sample chambers for formation fluid collection. Fluid samples from the injection formations will be collected from the wellbore via the MDT tool. In-situ fluid pressure testing will be performed in the upper and lower confining zones with the MDT tool. This test uses the tool's large-diameter probe to test both mobility and reservoir pressure.

9.8.2.2 Microfracture Testing

Microfracture testing will be also performed using the MDT tool. In-situ reservoir stress testing measurements will provide real-time formation temperatures, formation, fracture breakdown, fracture propagation, and closure pressures. Microfracture tests will be performed in the injection and confining zones.

9.9 Direct Reservoir Monitoring

The storage reservoir will be monitored during injection well operations using temperature sensors run on fiber optic cable behind the casing in the injection wells. Downhole pressure will be monitored using a ported through-tubing gauge above the packer, enabling the data cable to be run

on the outside of the injection tubing string. The gauges will continuously monitor and provide data recorded in real time. The specifications for these gauges are provided in **Attachment A-9.2**.

9.10 Indirect Reservoir Monitoring

The CO_2 plume will be monitored using a three-dimensional vertical seismic profile (3-D VSP) to image near the wellbore to monitor the CO_2 during the early stages of injection. Once CO_2 plume development exceeds the resolution of the VSP capabilities, time-lapse seismic surveys may be incorporated into indirect reservoir modeling as needed. These data will be interpreted, integrated with other data acquired, modeled, and compared to baseline seismic surveys to determine the extent of the CO_2 plume. The results will also be used to refine the plume model and update the area of review (AoR) as needed. This same workflow will be used during the Project's post-injection site care (PISC) period to confirm plume stabilization.

APPENDIX A-9

QUALITY ASSURANCE SURVEILLANCE PLAN

TABLE OF CONTENTS

LIST OF TABLES

Table A-9.1. Near-Surface Sampling and Analysis Plan Monitoring Frequency and Analytical Parameters 1

LIST OF ATTACHMENTS

Attachment A-9.1. Ultrasonic Logging (USIT) Tool (Mechanical Test) 2

Attachment A-9.2. External Borehole Temparture / Pressure Gauges 4

TABLES

Table A-9.1. Near-Surface Sampling and Analysis Plan Monitoring Frequency and Analytical Parameters		
Well Type	**Frequency**	**Laboratory Analytical Parameter**
Baseline Monitoring		
Existing Water	Twice at least three months apart	• WDEQ/WQD Chapter 8, Table 1 Use Suitability Paramters[1] • Specific Conductivity • Alkalinity (Total Carbonate, and Bicarbonate) • Total Inorganic Carbon
	Once	• Volatile organic compounds (VOCs)
Near-Surface Monitor	Quarterly for one year	• WDEQ/WQD Chapter 8, Table 1 Use Suitability Paramters[1] • Specific Conductivity • Alkalinity (Total Carbonate, and Bicarbonate) • Total Inorganic Carbon
	Once	• VOCs
Soil Gas Profile Station		• N_2 • O_2 • CO_2
Injection Monitoring		
Existing Water	Annually	• WDEQ/WQD Chapter 8, Table 1 Use Suitability Paramters[1] • Specific Conductivity • Alkalinity (Total Carbonate, and Bicarbonate) • Total Inorganic Carbon
Near-Surface Monitor	Quarterly (field measurements[2])	• Depth to Water • pH[1] • Specific Conductivity
	Annually	• Specific Conductivity • Alkalinity (Total Carbonate, and Bicarbonate) • Total Inorganic Carbon
Soil Gas Profile Station	Quarterly for the first year of injection, then annually	• N_2 • O_2 • CO_2
Post-Injection Site Care Monitoring		
Existing Water	Annually for five years, then every five years until site closure	• WDEQ/WQD Chapter 8, Table 1 Use Suitability Paramters[1] • Specific Conductivity • Alkalinity (Total Carbonate, and Bicarbonate) • Total Inorganic Carbon
Near-Surface Monitor	Annually for five years, then every five years until site closure	• pH[1] • Specific Conductivity • Alkalinity (Total Carbonate, and Bicarbonate) • Total Inorganic Carbon
Soil Gas Profile Station	Annually for five years, then every five years until site closure	• N_2 • O_2 • CO_2

[1] *pH will be measured in the field because of the limited hold time.*
[2] *Measured with field equipment (no laboratory analysis).*

ATTACHMENTS

Attachment A-9.1. Ultrasonic Logging (USIT) Tool (Mechanical Integrity Test)

USI UltraSonic Imager Tool

Schlumberger



The USI* UltraSonic Imager tool (USIT) uses a single transducer mounted on an Ultrasonic Rotating Sub (USRS) on the bottom of the tool. The transmitter emits ultrasonic pulses between 200 and 700 kHz and measures the received ultrasonic waveforms reflected from the internal and external casing interfaces. The rate of decay of the waveforms received indicates the quality of the cement bond at the cement/casing interface, and the resonant frequency of the casing provides the casing wall thickness required for pipe inspection. Because the transducer is mounted on the rotating sub, the entire circumference of the casing is scanned. This 360° data coverage enables the evaluation of the quality of the cement bond as well as the determination of the internal and external casing condition. The very high angular and vertical resolutions can detect channels as narrow as 1.2 in. [3.05 cm]. Cement bond, thickness, internal and external radii, and self-explanatory maps are generated in real time at the wellsite.

Applications

- Cement evaluation
- Casing inspection
  - Corrosion detection and monitoring
  - Detection of internal and external damage or deformation
  - Casing thickness analysis for collapse and burst pressure calculations

Measurement Specifications

	USIT
Output	Acoustic impedance, cement bonding to casing, internal radius, casing thickness
Logging speed	1,800 ft/hr [549 m/h]
Range of measurement	Acoustic impedance: 0 to 10 MRayl [0 to 10 MPa.s/m]
Vertical resolution	Standard: 6 in. [15.24 cm]
Accuracy	Less than 3.3 MRayl: ±0.5 MRayl
Depth of investigation	Casing-to-cement interface
Mud type or weight limitations†	Water-base mud: Up to 15.9 lbm/gal Oil-base mud: Up to 11.2 lbm/gal
Combinability	Bottom-only tool, combinable with most tools
Special applications	Identification and orientation of narrow channels

† Exact value depends on the type of mud system and casing size.

Attachment A-9.1. Ultrasonic Logging (USIT) Tool (Mechanical Integrity Test) *(continued)*

Mechanical Specifications

	USIT
Temperature rating	350°F [177°C]
Pressure rating	20,000 psi [138 MPa]
Casing size—min.	4½ in. [11.43 cm]
Casing size—max.	13⅜ in. [33.97 cm]
Outer diameter†	3.375 in. [8.57 cm]
Length†	19.75 ft [6.02 m]
Weight†	333 lbm [151 kg]
Tension	40,000 lbf [177,930 N]
Compression	4,000 lbf [17,790 N]

† Excluding the rotating sub

USIT Rotating Sub Mechanical Specifications

	USRS-AB	USRS-A	USRS-B	USRS-C	USRS-D
Outer diameter	3.41 in. [8.66 cm]	3.58 in. [9.09 cm]	4.625 in. [11.75 cm]	6.625 in. [16.83 cm]	8.625 in. [21.91 cm]
Length	9.8 in. [24.89 cm]	9.92 in. [25.20 cm]	9.8 in. [24.89 cm]	8.3 in. [21.08 cm]	8.3 in. [21.08 cm]
Weight	7.7 lbm [3.5 kg]	7.7 lbm [3.5 kg]	10.6 lbm [4.8 Kg]	15.0 lbm [6.8 kg]	18.3 lbm [8.3 kg]

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Attachment A-9.2. Downhole Pressure and Temperature Gauges

COMPLETION SOLUTIONS | Permanent Monitoring

DataSphere® Opsis™ Permanent Downhole Gauges

RELIABLE, REAL-TIME MONITORING OF DOWNHOLE CONDITIONS

OVERVIEW

In today's challenging environments, there is an increasing need for reliable and accurate reservoir data, driving the need for continuous improvement of monitoring technology. Opsis™ permanent downhole gauges are the latest addition to the DataSphere® permanent monitoring suite, providing real-time downhole data for increased productivity throughout the life of the well.

Opsis gauges feature ASIC (Application Specific Integrated Circuit) technology in combination with field-proven resonating quartz crystal sensors. The result is highly accurate pressure and temperature measurements, even under extreme temperature conditions.

Opsis gauges can be used for single or multi-zone monitoring applications. These gauges may be ported to tubing, annulus, or control line. The addition of feed-through or splitter block assemblies enables the monitoring of multiple zones.

APPLICATIONS

- Life of the well production monitoring
- Life of the field reservoir monitoring
- SmartWell® completion system optimization
- Artificial lift optimization

GAUGE DESIGNS

- Quartz transducer
- ASIC technology
- Maximum 200°C operating temperature
- 0.75-in OD slim line design
- Improved shock and vibration performance

FMJ CABLE TERMINATION

Opsis gauges use a high performance cable termination with a sealing arrangement based on our highly reliable intelligent completion FMJ connector. This cable termination incorporates a pressure-testable dual metal-to-metal ferrule seal arrangement for isolating the downhole cable outer metal sheath from the well fluid.

FEATURES

- ASIC hybrid electronics qualified to 200°C
- Demonstrated downhole gauge reliability 10 years @185°C
- Onboard intelligent gauge diagnostics
- Bellows to isolate quartz crystal from well fluids
- Designed for harsh environments up to 30,000 psi and 200°C
- Extensive qualification testing performed
- Simplified system with multiple sensor options
- Field-testable dual metal-to-metal seal
- Fault-tolerance features for maximum reliability

BENEFITS

- Continuous pressure and temperature data without the need for well intervention
- Enhanced reservoir management
- Increased system reliability using stable pressure/temperature measurements
- Quartz-based sensor for high accuracy, low drift



HALLIBURTON | Completion Tools

COMPLETION SOLUTIONS | Permanent Monitoring

TESTING

Opsis gauges are tested to the full pressure and temperature rating during Factory Acceptance Testing (FAT), and each gauge comes with an independently checked calibration certificate.

New gauge designs are subjected to Reliability Demonstration Testing (RDT) per AWES Recommended Practices.

Opsis™ Gauge Temperature Performance

Accuracy (°C)	0.5
Typical Accuracy (°C)	0.15
Achievable Resolution (°C/sec)	<0.005
Repeatability (°C)	<0.01
Drift at 177°C (°C/year)	<0.1

Opsis™ Gauge Pressure Performance

Pressure Range (psi / bar)	0 to 10,000 0 to 690	0 to 16,000 0 to 1,100	0 to 20,000 0 to 1,1380	0 to 25,000 0 to 1,725	0 to 30,000 0 to 2070
Accuracy (% FS) (psi)	0.015 (1.5)	0.02 (3.2)	0.02 (4.0)	0.02 (5.0)	0.025 (7.5)
Typical Accuracy (% FS) (psi)	0.012 (1.2)	0.015 (2.4)	0.015 (3.0)	0.015 (3.75)	0.02 (6.0)
Achievable Resolution (psi/sec)	<0.006	<0.008	<0.008	<0.010	<0.010
Drift at 14 psi and 25°C (% FS)	Negligible	Negligible	Negligible	Negligible	Negligible
Maximum Drift at Maximum Pressure and Temperature (% FS/Year) (psi)	0.02 (2.0)	0.02 (3.2)	0.02 (4.0)	0.02 (5.0)	0.025 (7.5)

Opsis™ Gauge Variants

Configurations	150°C Gauge	175°C Gauge		200°C Gauge	
	10k	16k	20k	25k	30k
Single Sensor					
Single Sensor + Feedthrough					
Dual Sensor					
Dual Sensor + Feedthrough					

Special calibration available upon request
Single sensor non feedthrough variants for 150°C and 175°C have 0.75-in. OD
All feedthrough and dual sensor variants have 1.125-in. OD

For more information, contact your local Halliburton representative or visit us on the web at www.halliburton.com

Sales of Halliburton products and services will be in accord solely with the terms and conditions contained in the contract between Halliburton and the customer that is applicable to the sale.

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FORM A-10
STIMULATION PROGRAM

TABLE OF CONTENTS

10.0 Introduction 1
10.1 Procedure 1
10.1.1 Pre-Injection Stimulation 1
10.1.2 During Injection Stimulation 2

ABBREVIATIONS/ACRONYMS

%	percent
CaF_2	calcium fluoride
HCl	hydrochloric acid
HF	hydrofluoric acid
KCl	potassium chloride
MgF_2	magnesium fluoride
MSE	matrix stimulation engineering
NaCl	sodium chloride
NH_4Cl	ammonium chloride
pH	potential of hydrogen

FRONTIER CARBON SOLUTIONS
PROJECT SPEED GOAT
CARBON SEQUESTRATION UIC CLASS VI APPLICATION

FORM A-10, PROPOSED STIMULATION PROGRAM
Water Quality Rules, Chapter 24 Section 10

10.0 Introduction

Matrix stimulation is the process of injecting a fluid (acid or solvent) into a completed well below the fracturing pressure to remove or bypass damage. The primary goal of matrix stimulation is to restore the natural permeability; i.e., to obtain undamaged flow capacity in the injection zone by removing the formation damage. Dramatic results can be achieved via matrix stimulation if treatments are properly engineered, including tasks done within the methodology of matrix stimulation engineering (MSE), which is the practical application of scientific and mathematical principles to matrix stimulation.

The MSE process steps are:

- Formation damage determination
- Fluid selection
- Treatment design
- Execution
- Treatment evaluation.

The matrix stimulation process for the Project will be developed based on evaluation of pressure fall-off test and well performance. The matrix stimulation process will include at least two time periods: one prior to the beginning of the injection and the other (or others) during the injection period. The latter is to be determined based on injection performance and routine analysis.

10.1 Procedure

The program proposed below entails injecting stimulation fluids into the target formation at matrix rates and below the interval fracture pressure. The pressure limit for injection will be obtained from the calibrated geomechanical model. There will be no injection of stimulation fluids into the confining zones, hence maintaining their seal integrity.

10.1.1 Pre-Injection Stimulation

The purpose of performing stimulation prior to beginning injection is to remove existing damage from drilling and completion fluids that reduces the injectivity performance of the well. This step is usually carried out using acid or non-acid based systems containing dispersant-type surfactants and chelating agents to remove mud solids from the critical matrix region.

An acid-based system, generally with hydrochloric acid (HCl), is recommended to remove damage prior to the injection. This system provides a secondary benefit of cleaning up the wellbore and/or perforations prior to the subsequent matrix stimulation treatment. The surfactant and chelating additives are very effective in dispersing and suspending solids causing damage to the injection zone. Pre- and post-treatment injection tests will help determine the effectiveness of the matrix stimulation treatment. For sandstones, if the

executed treatment is not successful in removing the damage, a mud acid-based system, which is a combination of HCl and hydrofluoric acid (HF) with compatible surfactant and chelating agents, can be pumped. A pre-flush will be pumped in this case, to minimize formation damage from fluorosilicates, as explained below.

10.1.2 During Injection Stimulation

Matrix stimulation using various acid systems such as HCl, mud acid, and clay acid can remove existing damage and restore injectivity. Mud acid is used primarily to restore permeability due to precipitation and/or fines migration in sandstone formations. The design of mud acid is critical for an effective stimulation treatment, due to potential secondary and tertiary reactions. Insoluble precipitation of calcium (CaF_2) or magnesium fluoride (MgF_2) from the reaction with limestone and dolomite can reduce permeability. For this reason, a pre-flush of 5 to 15% HCl is normally pumped to dissolve these minerals. A secondary reaction from the contact of partially spent mud acid with the cations results in precipitation of gelatinous fluorosilicates, which can cause severe permeability reduction, in fact much worse than the existing damage. For this purpose, use of potassium chloride (KCl) or sodium chloride (NaCl) should be avoided during the treatment.

Mud acid is represented as a ratio of HCl to HF, with regular mud acid being 12% HCl with 1.5 to 3% HF. The strength of the mud acid will be determined following laboratory tests conducted on the core samples to determine stability of the cementing material and identify the potential for fines migration. If there is a risk of calcite reprecipitation, a larger volume of HCl pre-flush might be pumped to dissolve and sweep the precipitates. An injectivity index based on well performance will provide a basis for the stimulation treatment design, including HCl pre-flush volumes and mud acid concentration.

The treatment sequence of the stimulation treatment and its purpose are detailed below:

1. Pre-flush – A diluted HCl pre-flush is done to dissolve calcareous materials before introducing HF.
2. Ammonium chloride (NH_4Cl) spacer – The spacer prevents the HCl-dissolved products from contacting HF in mud acid and/or clay acid. As detailed above, NaCl and KCl should be avoided during this treatment. Additives such as solvents can be added to this fluid to lower surface tension.
3. Mud acid – The mud acid treatment is done to remove formation damage and restore permeability in the critical area of the wellbore; the treatment generally ranges from 110 to 150 gallons US/net ft.
4. NH_4Cl spacer – This provides a spacer between reaction materials and following fluid.
5. HCl overflush – The overflush pushes dissolved minerals and precipitates away from the near-wellbore region and lowers pH in this region.
6. NH_4Cl displacement fluid – This fluid pushes dissolved minerals and precipitates away from the near-wellbore region.

FORM A-11
SIGNATORY AUTHORITIES

TABLE OF CONTENTS

11.0 Certification 1
11.1 Carbon Dioxide Stream Exclusion 1
11.2 Certification of Professional Geologist 2
11.3 Certification of Professional Engineer 2

FRONTIER CARBON SOLUTIONS
PROJECT SPEED GOAT
CARBON SEQUESTRATION UIC CLASS VI APPLICATION

FORM A-11, SIGNATORY AUTHORITIES
Water Quality Rules, Chapter 24 Section 10

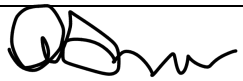
11.0 Certification

All applications for permits, reports, or information submitted to the Administrator shall be signed by a responsible corporate officer.

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to ensure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of a fine and imprisonment for knowing violations."		
Signature 	**Printed Name** Alicia Summers	
Title Chief Development Officer		**Date** December 19, 2024

11.1 Carbon Dioxide Stream Exclusion

The definition of the "carbon dioxide stream" means carbon dioxide, plus associated substances derived from the source materials and any processing, and any substances added to the stream to enable or improve the injection process. Within Chapter 24, the term "carbon dioxide stream" does not include any carbon dioxide stream that meets the definition of a hazardous waste under 40 CFR 261.3. Any Class VI UIC well owner or operator, who claims that a carbon dioxide stream is excluded under paragraph (h) of 40 CFR 261.4 must have an authorized representative (as defined in WWQR Chapter 24 Section 2(mm)) sign a certification statement worded as follows:

"I certify under penalty of law that the carbon dioxide stream that I am claiming to be excluded under 40 CR 261.4(h) has not been mixed with, or otherwise co-injected with, hazardous waste at the UIC Class VI permitted facility, and that injection of the carbon dioxide stream is in compliance with the applicable requirements for UIC Class VI wells, including the applicable requirements in WWQR Chapter 24."		
Signature 	**Printed Name** Alicia Summers	
Title Chief Development Officer		**Date** December 19, 2024

11.2 Certification of Professional Geologist

Section of permit applications representing geologic work shall be sealed, signed, and dated by a licensed professional geologist as required by W.S. § 33-41-115.

The geologic interpretations, cross-sections, maps, and hydrologic studies that are included in this application were all completed under the responsible charge or direct supervision of the licensee, who has reviewed this work and certifies that it is prepared according to the highest standards of Professional Geology.

Melissa L. Northcott	December 19, 2024
Printed Name of Professional Geologist	Date Signed
Melissa L. Northcott	
Signature of Professional Geologist	P.G. Number (SEAL)

11.3 Certification of Professional Engineer:

Section of permit applications representing engineering work shall be sealed, signed, and dated by a licensed professional engineer as required by W.S. § 33-29-601.

The Engineering Designs, Plans, and Specifications that are included in this application were all completed under the responsible charge or direct supervision of the licensee who has reviewed this work and certifies that it is prepared according to the highest standards of Professional Engineering.

Randal M. Brush	December 19, 2024
Printed Name of Professional Engineer	Date Signed
Randal M Brush	
Signature of Professional Engineer	P.E. Number (SEAL)