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Delivering Energy to Improve Lives

Service Outages

San Diego LDC Forum, August 14, 2024

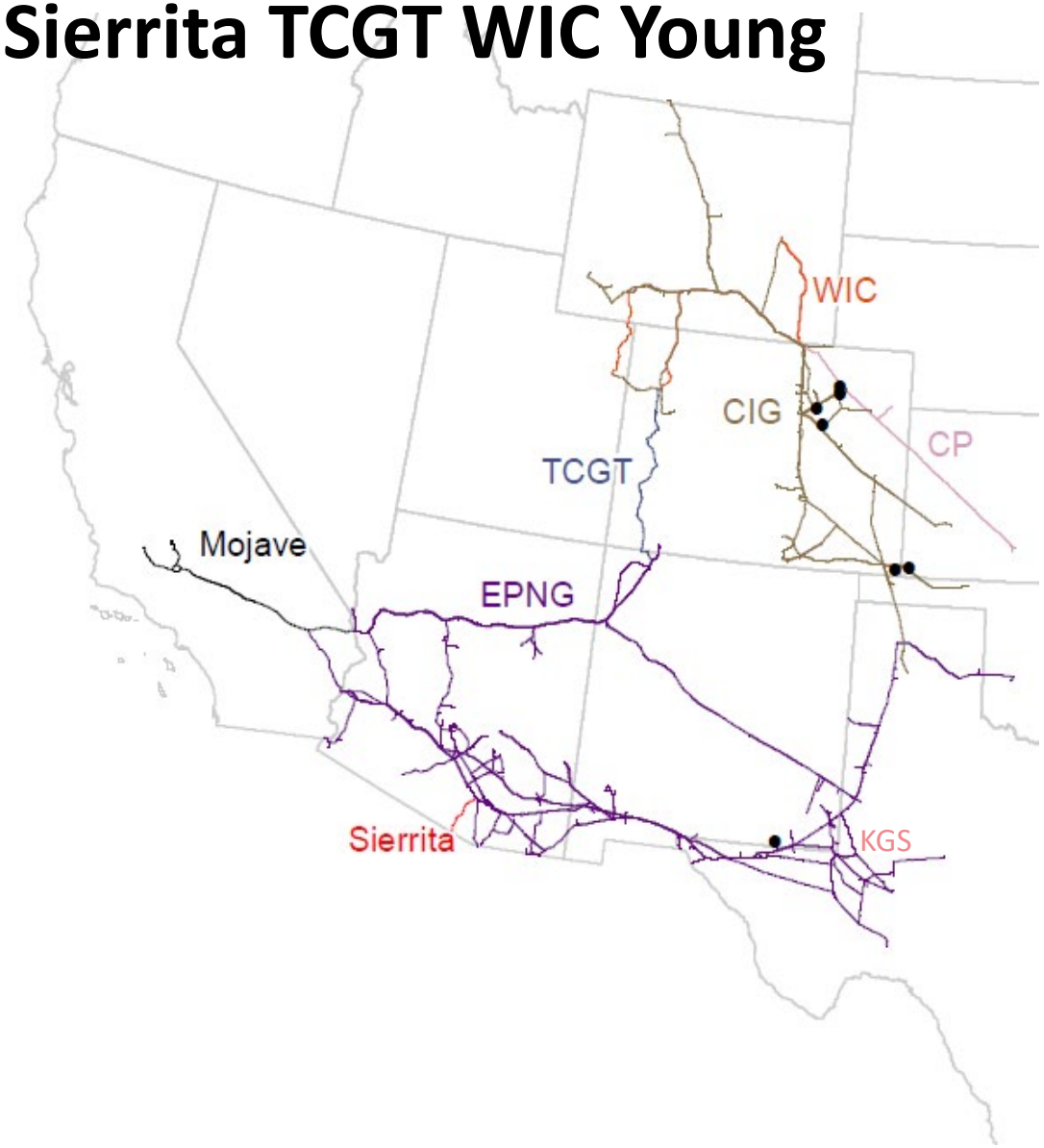
Agenda

- West Region Asset History
- Pipeline Facilities
- EPNG System Utilization
- Outage Drivers
- Pipeline Integrity Program
- Outage Planning Process
- Continuous Improvement

KMI West Region Gas

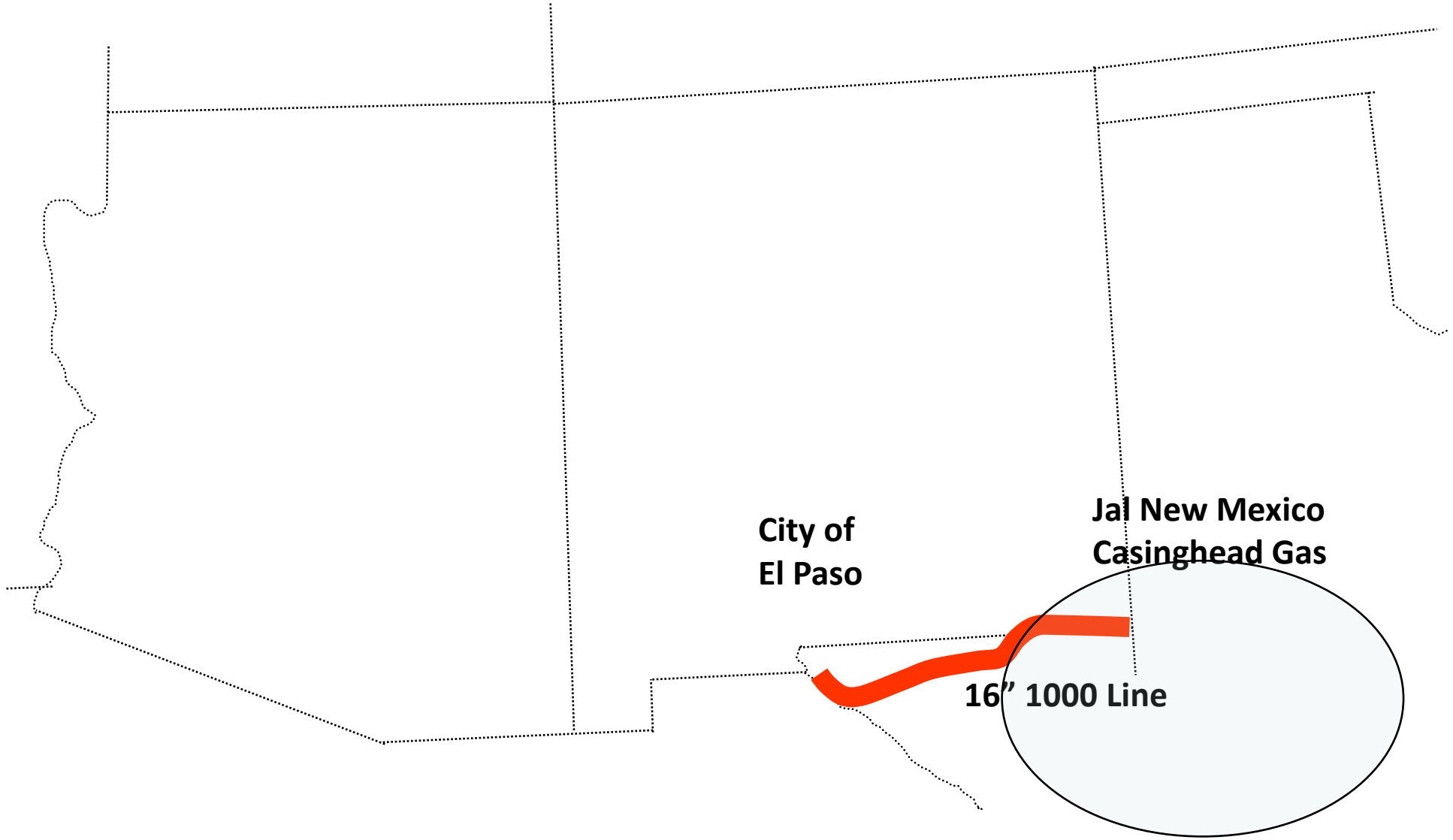
CIG CP EPNG KGS Mojave Sierrita TCGT WIC Young

- Vast, irreplaceable network
- Over 17,000 miles of pipeline
- Over 110 compressor stations
  - ~ 400 engine-compressor sets
  - ~ 1.35 million horsepower
- Nearly 1500 meter stations
- 8 storage facilities
- High utilization

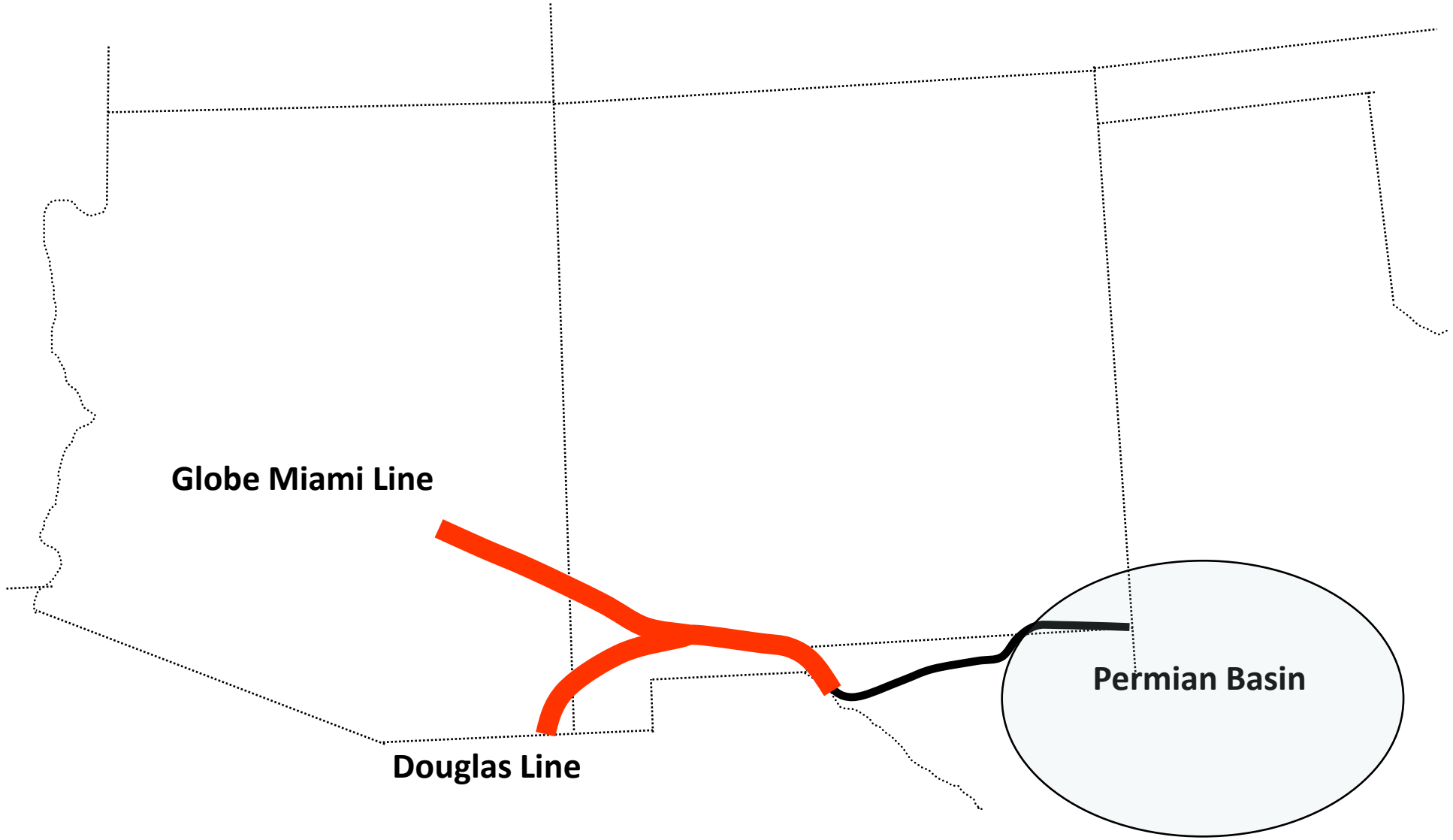


KMI Southwest Region History

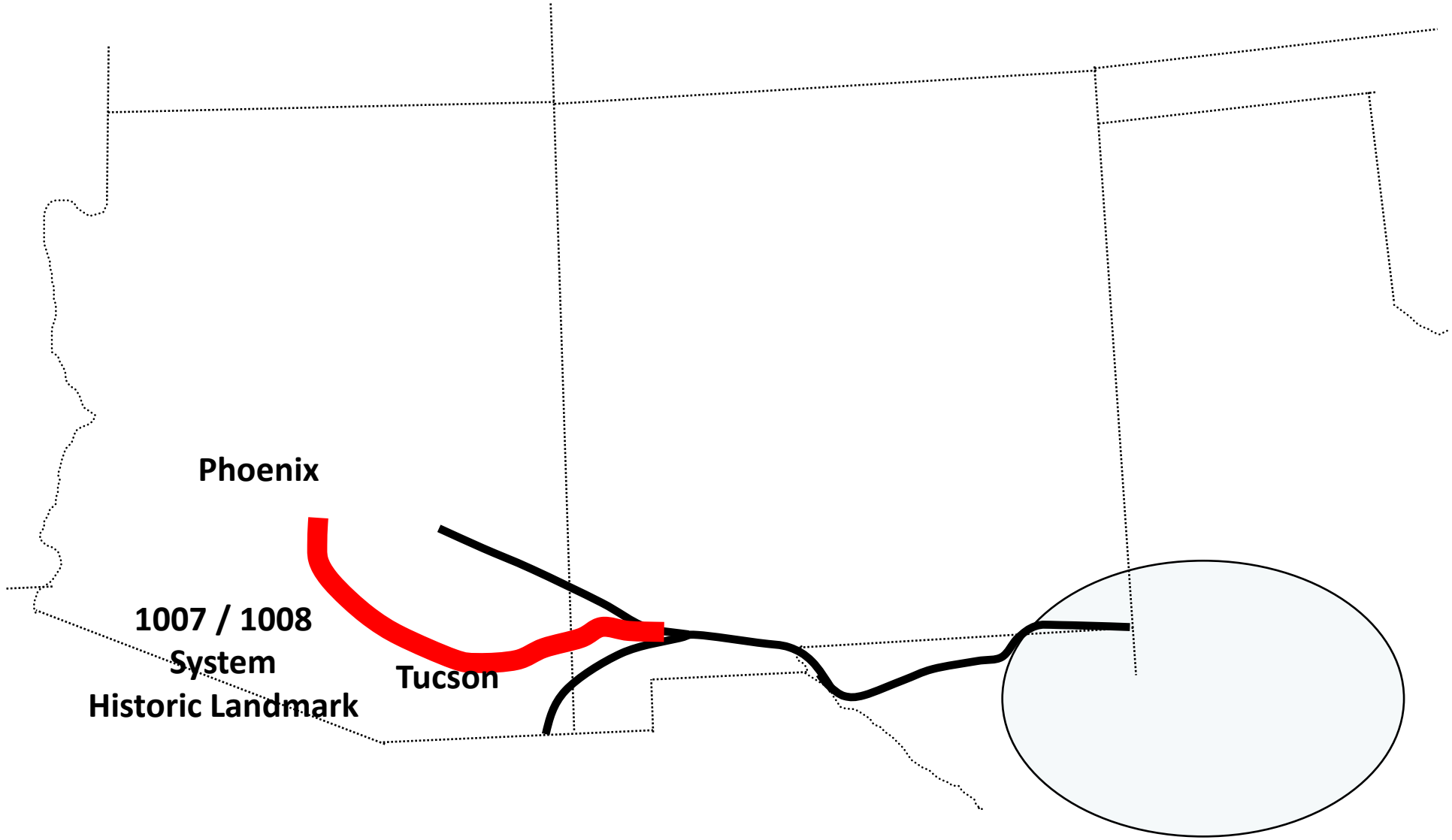
June 19, 1929 – El Paso Texas



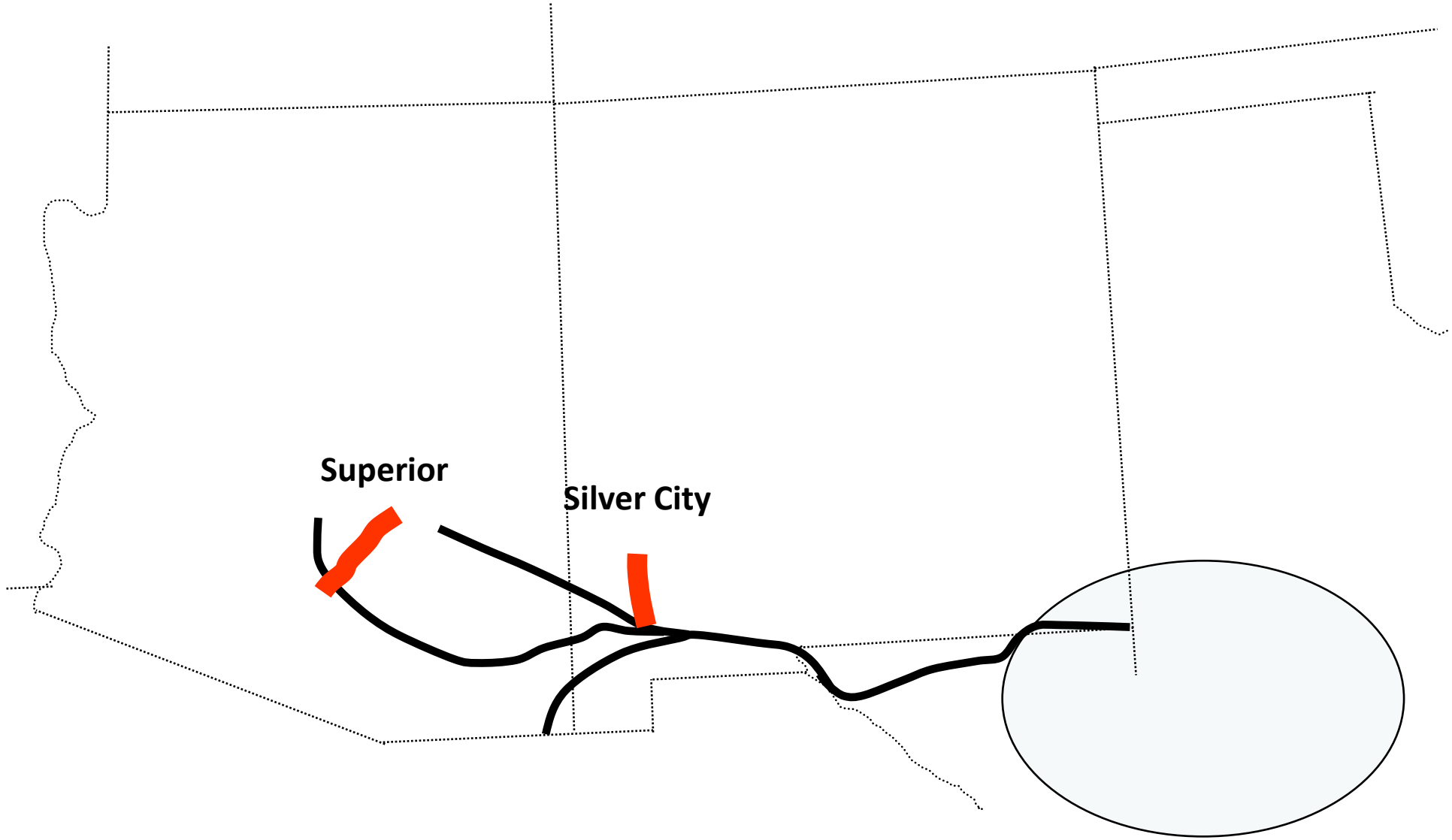
June 1931 – Copper Mines



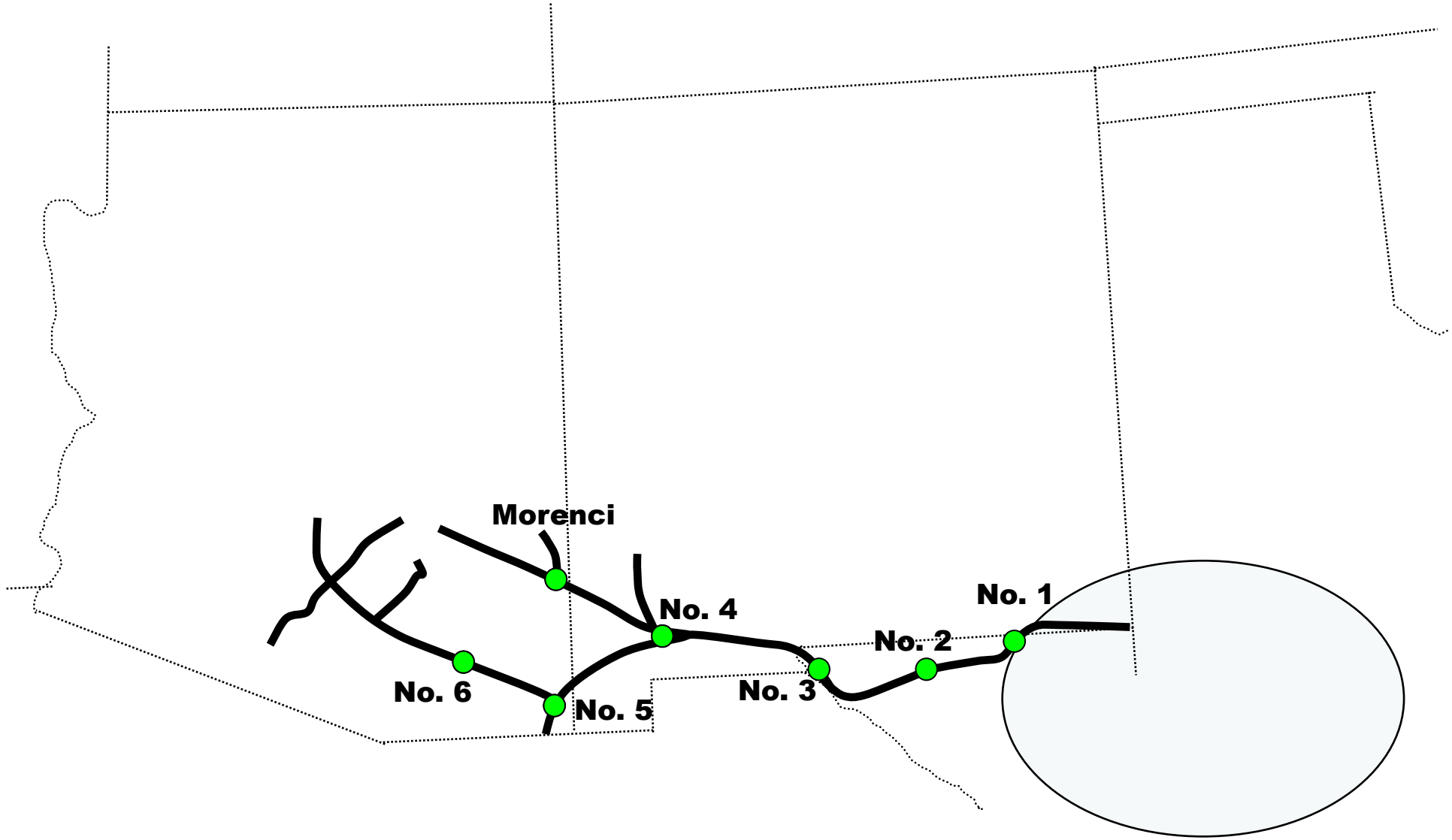
1933 & 1934 - Phoenix and Tucson



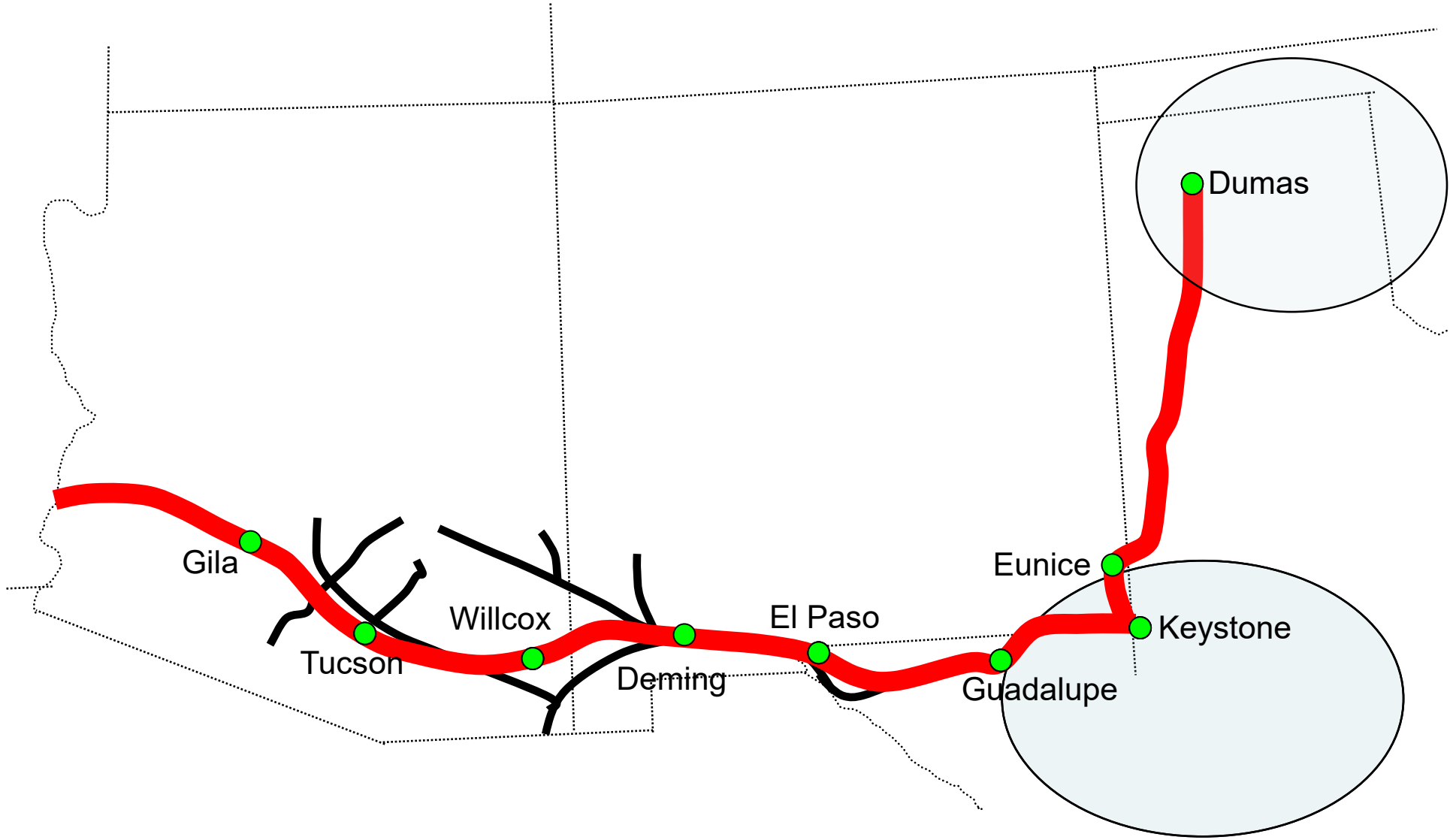
Late 1930s - Superior & Silver



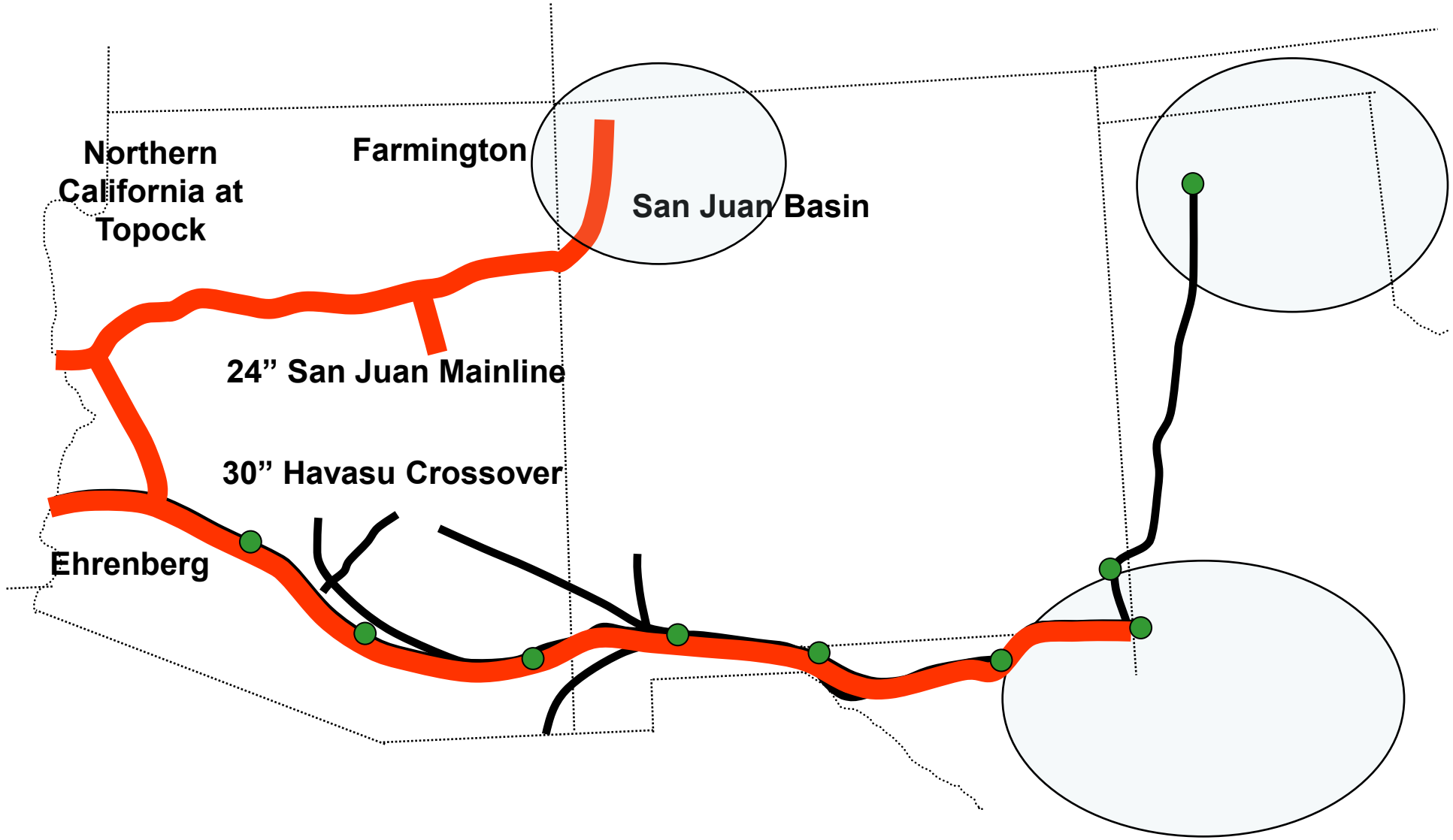
1940s - Original Compression



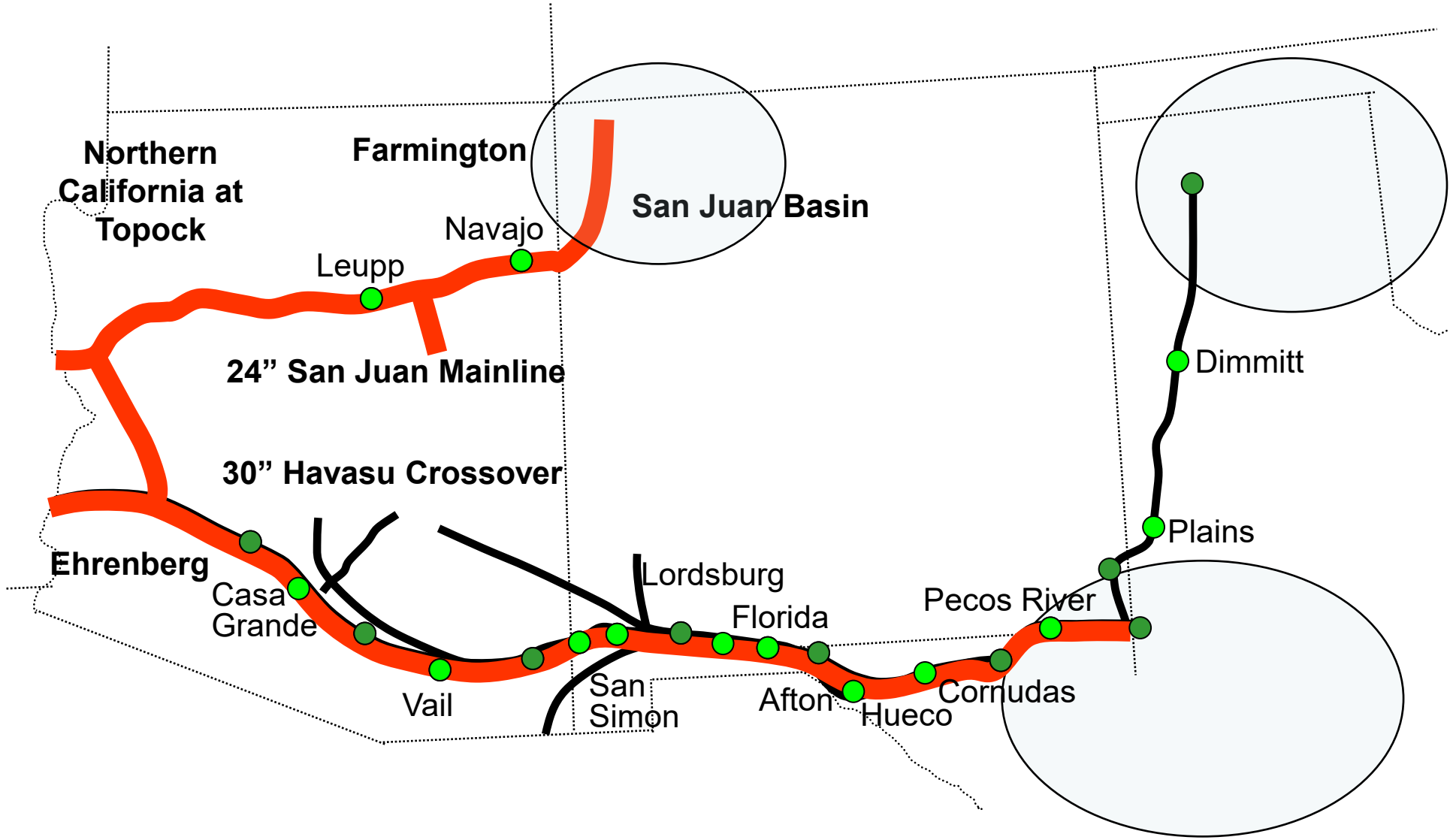
1947 - California



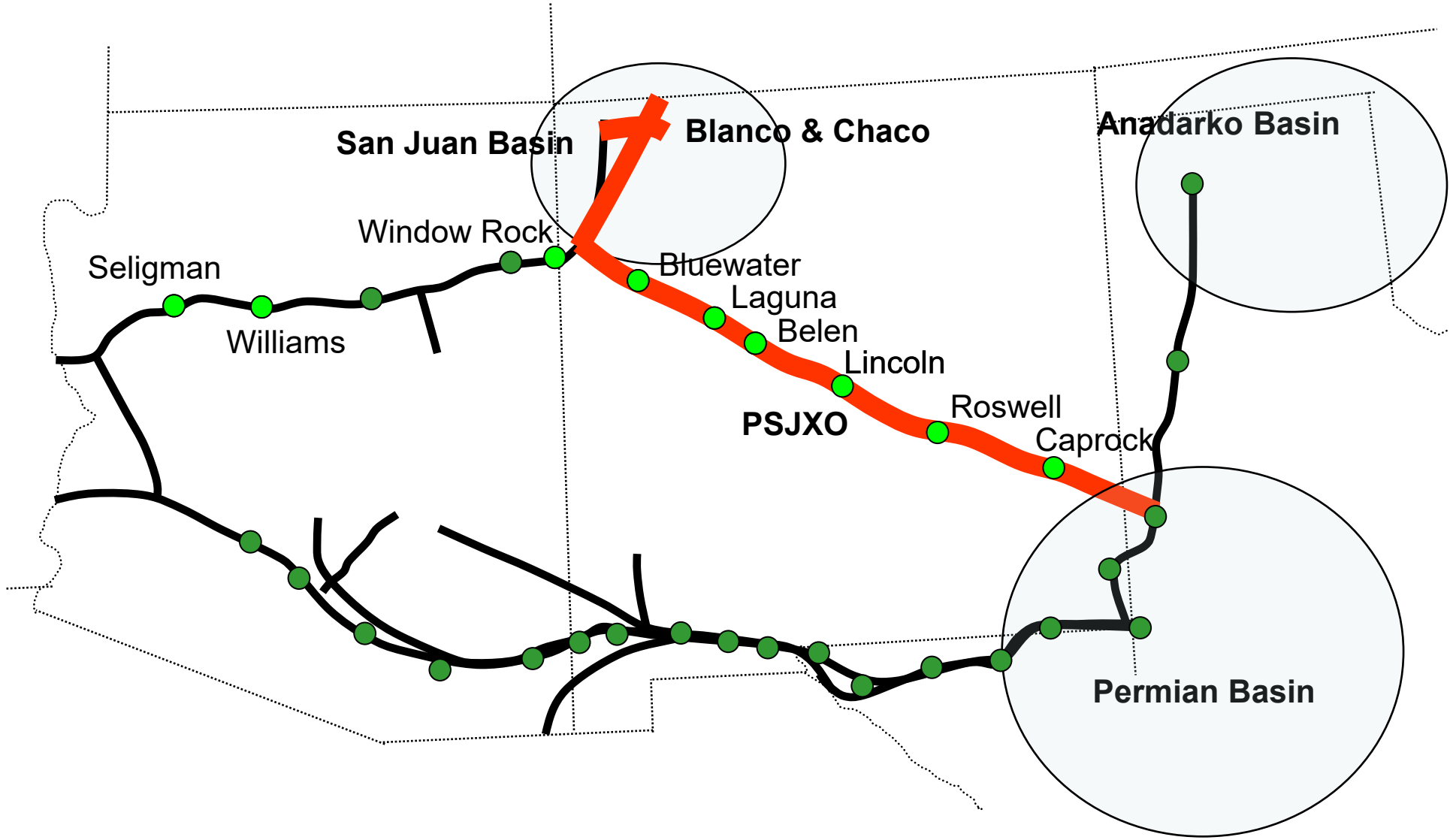
August 1951 - San Juan Basin



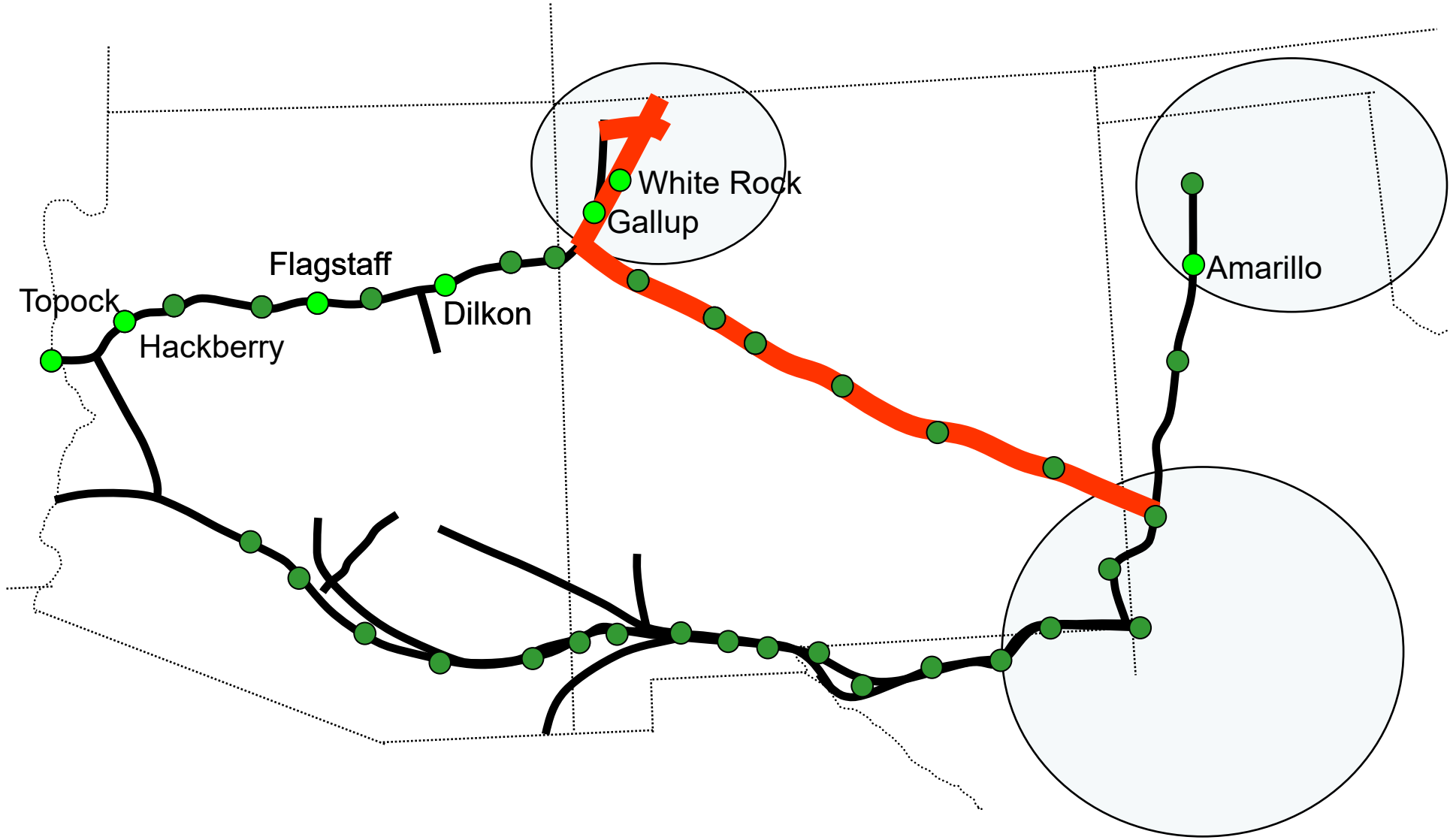
1951 to 1954 - Compression



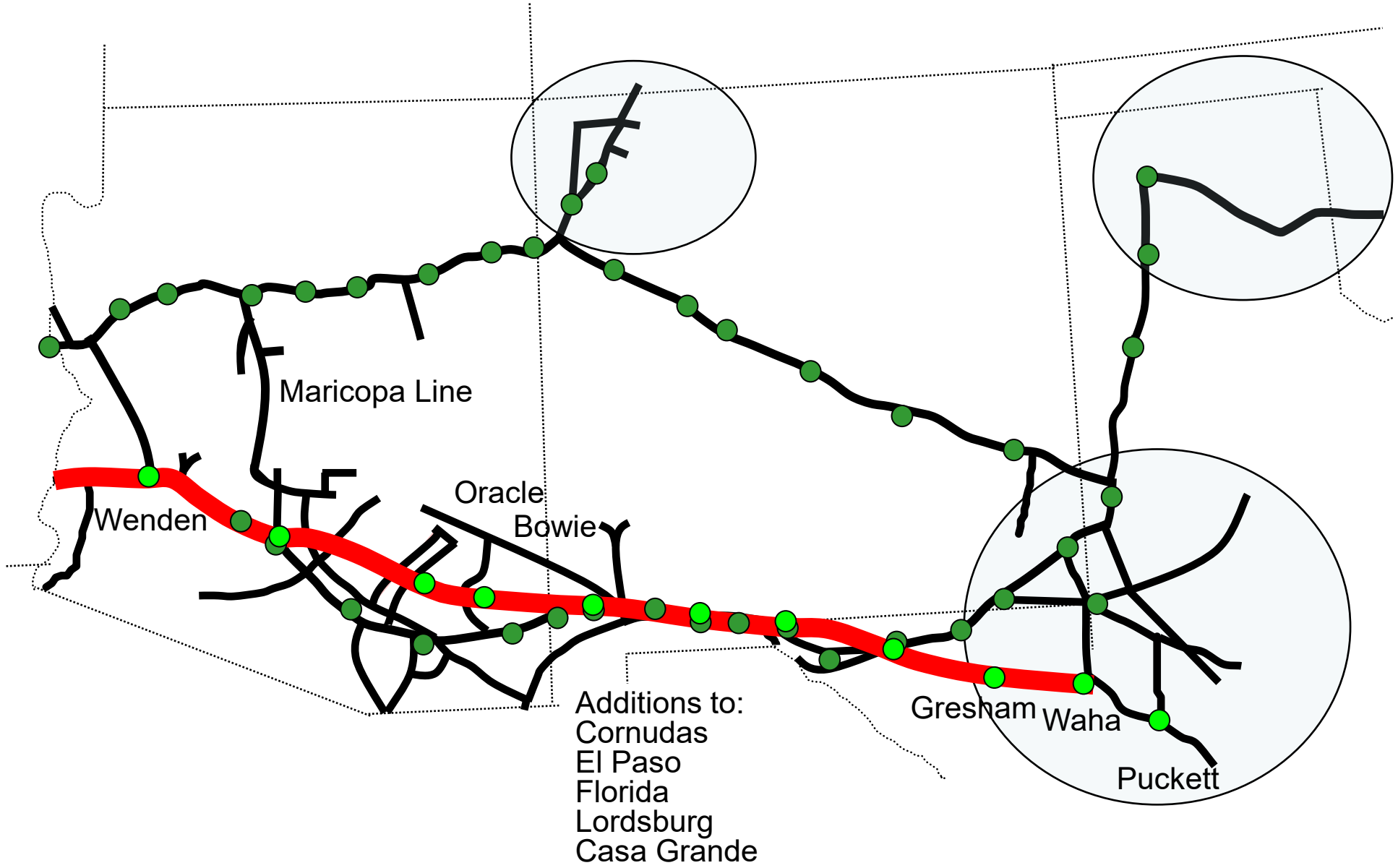
1958 - Permian San Juan Crossover



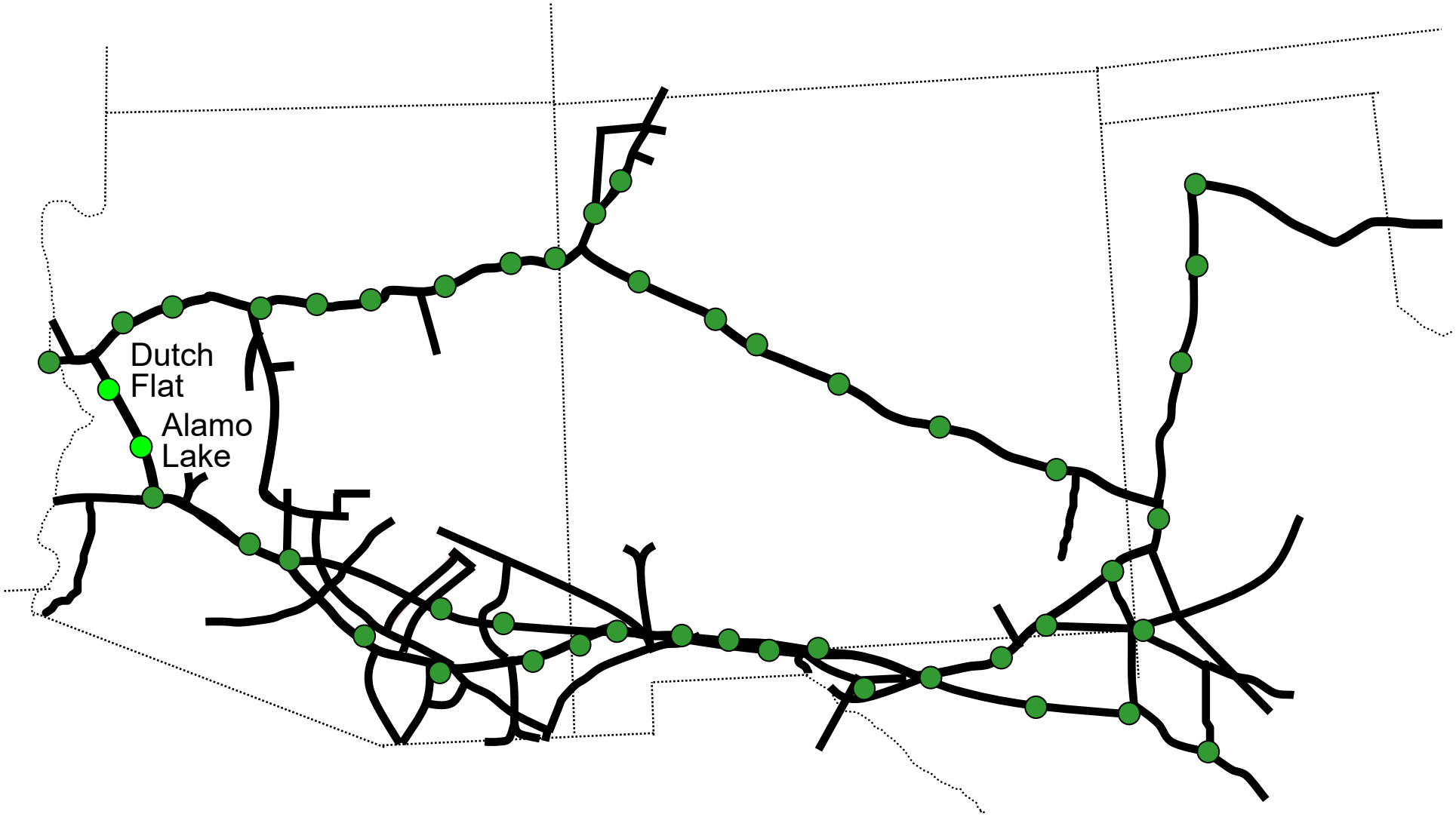
1960s - Compression



1969 - High Pressure System



1993 - Havasu Expansion



1990s to 2000s - New Laterals to Mexico

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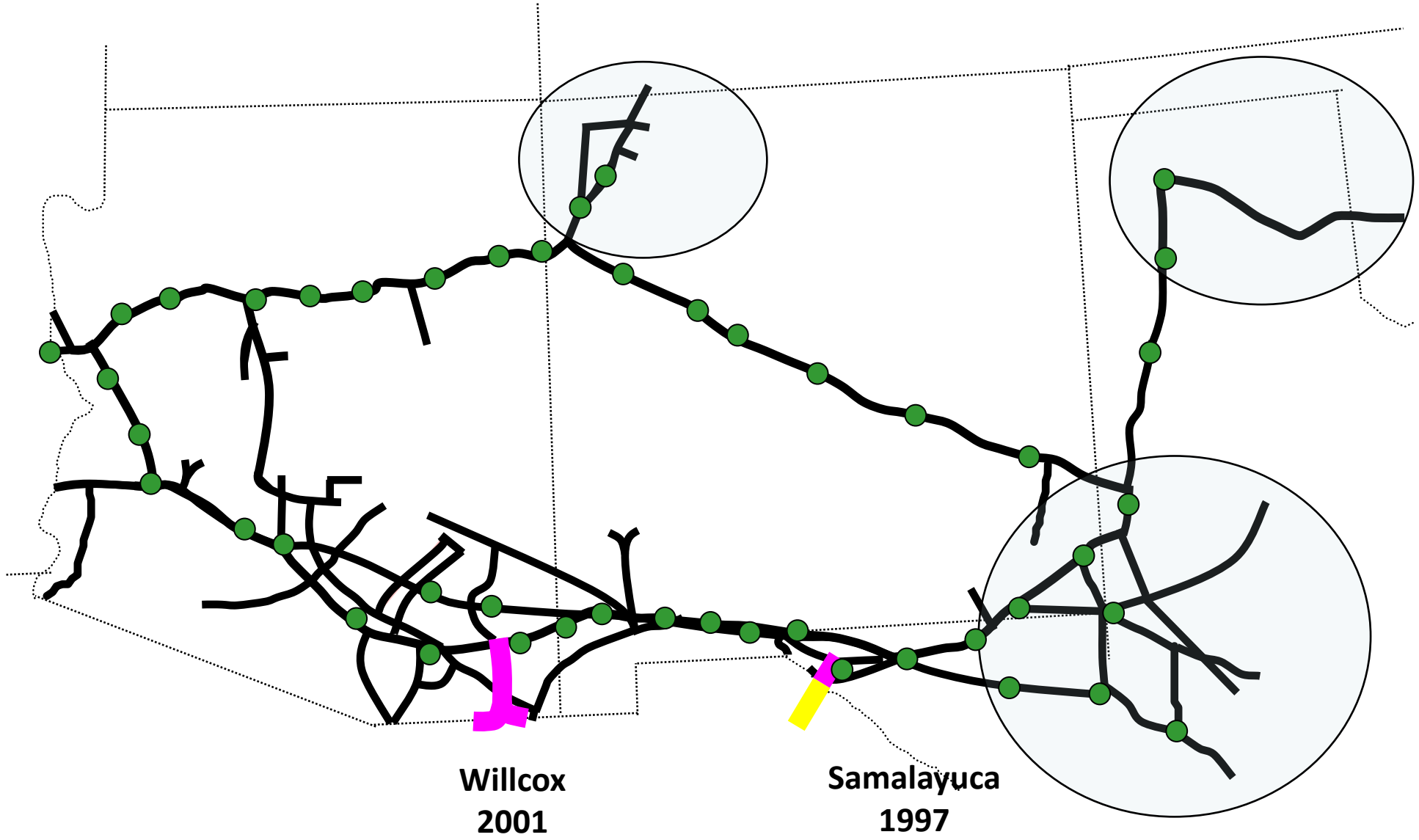

2000s - All American Conversion and L2000 Power-Up

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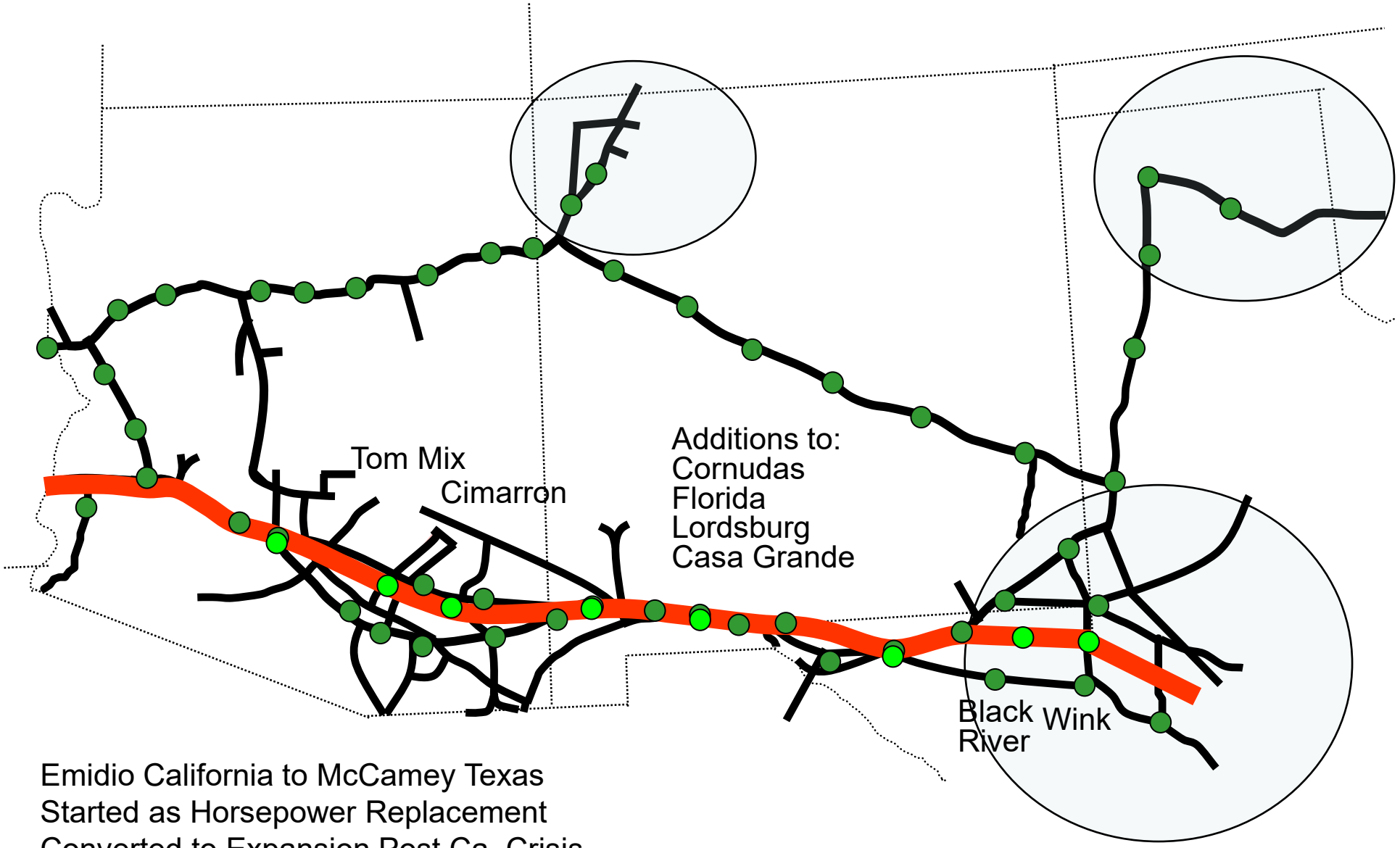

Emidio California to McCamey Texas
Started as Horsepower Replacement
Converted to Expansion Post Ca. Crisis

2010 to 2020s - Sierrita, Horsepower additions

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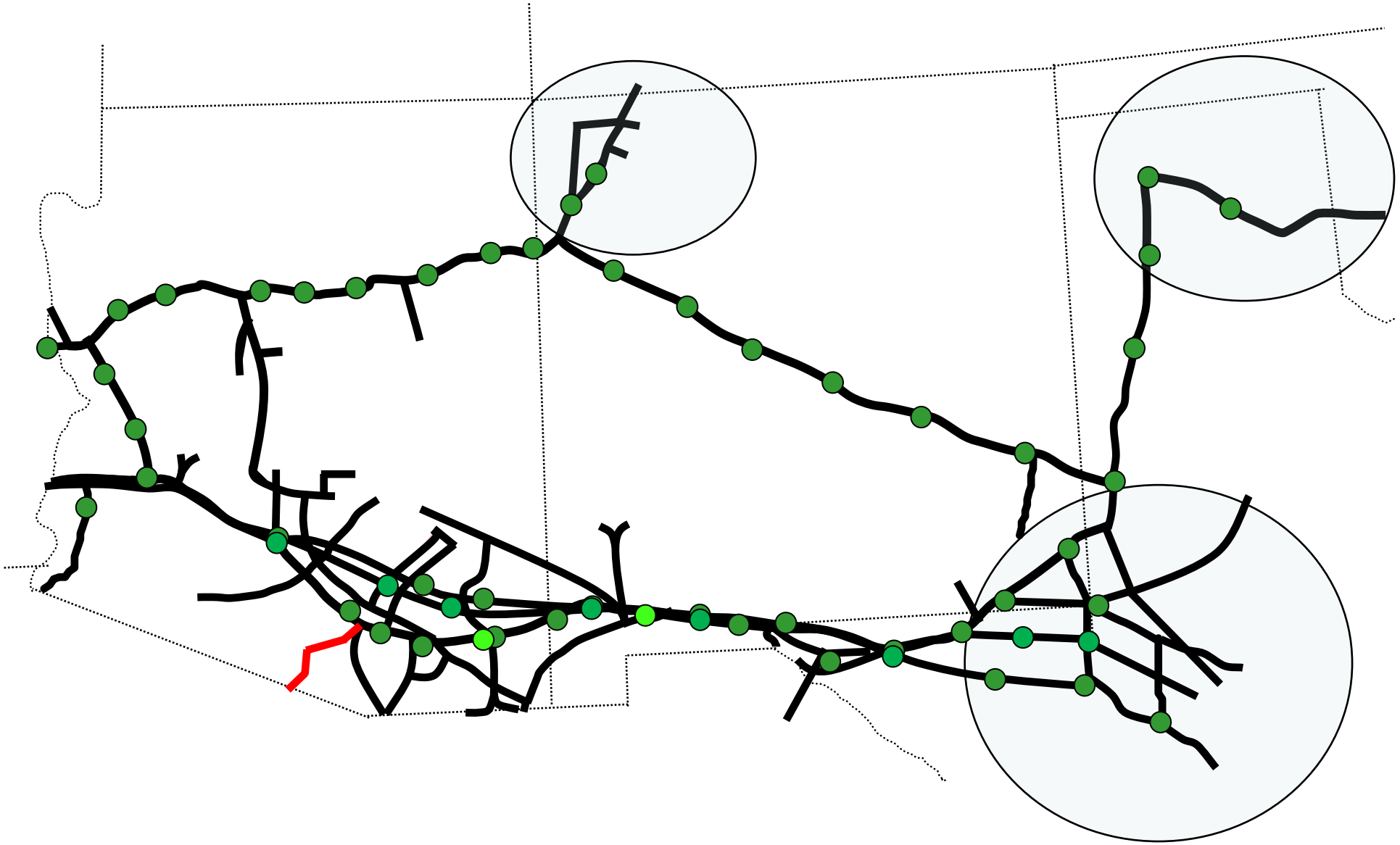
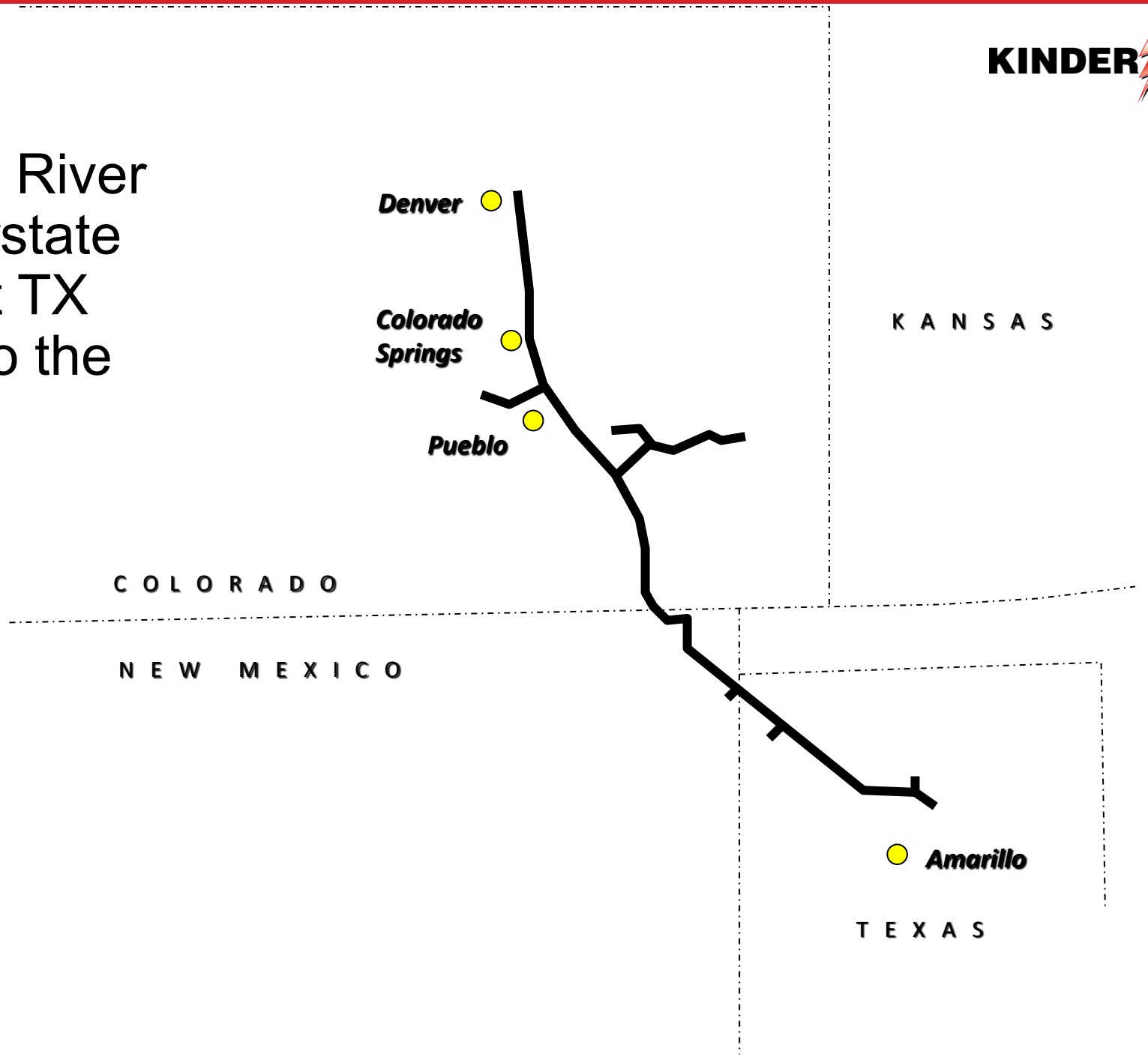


KMI Rockies Region History

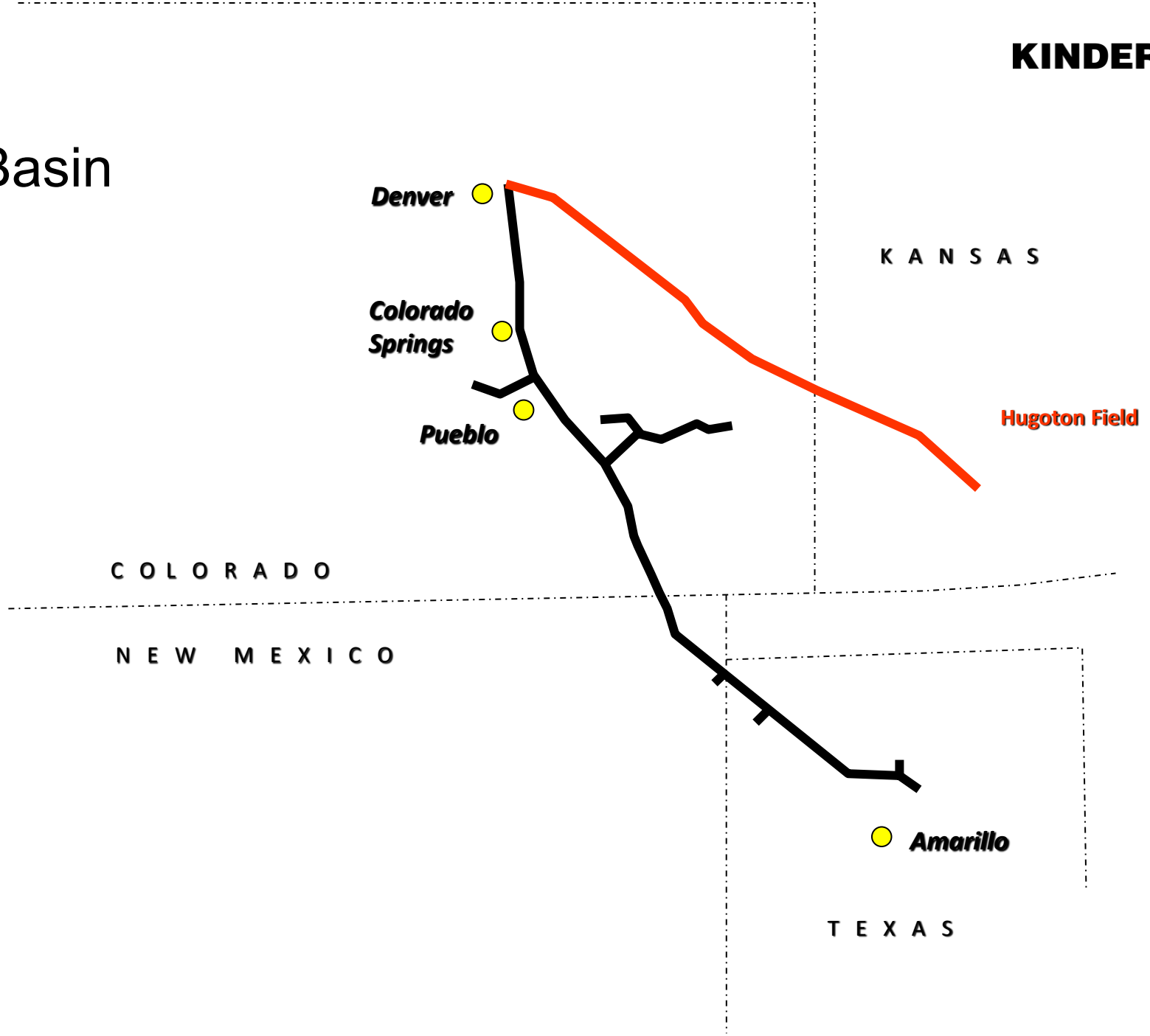
1928 – 1930s CIG

- Originally Canadian River Gas, Colorado Interstate Gas (CIG) transport TX Panhandle supply to the Front Range of CO



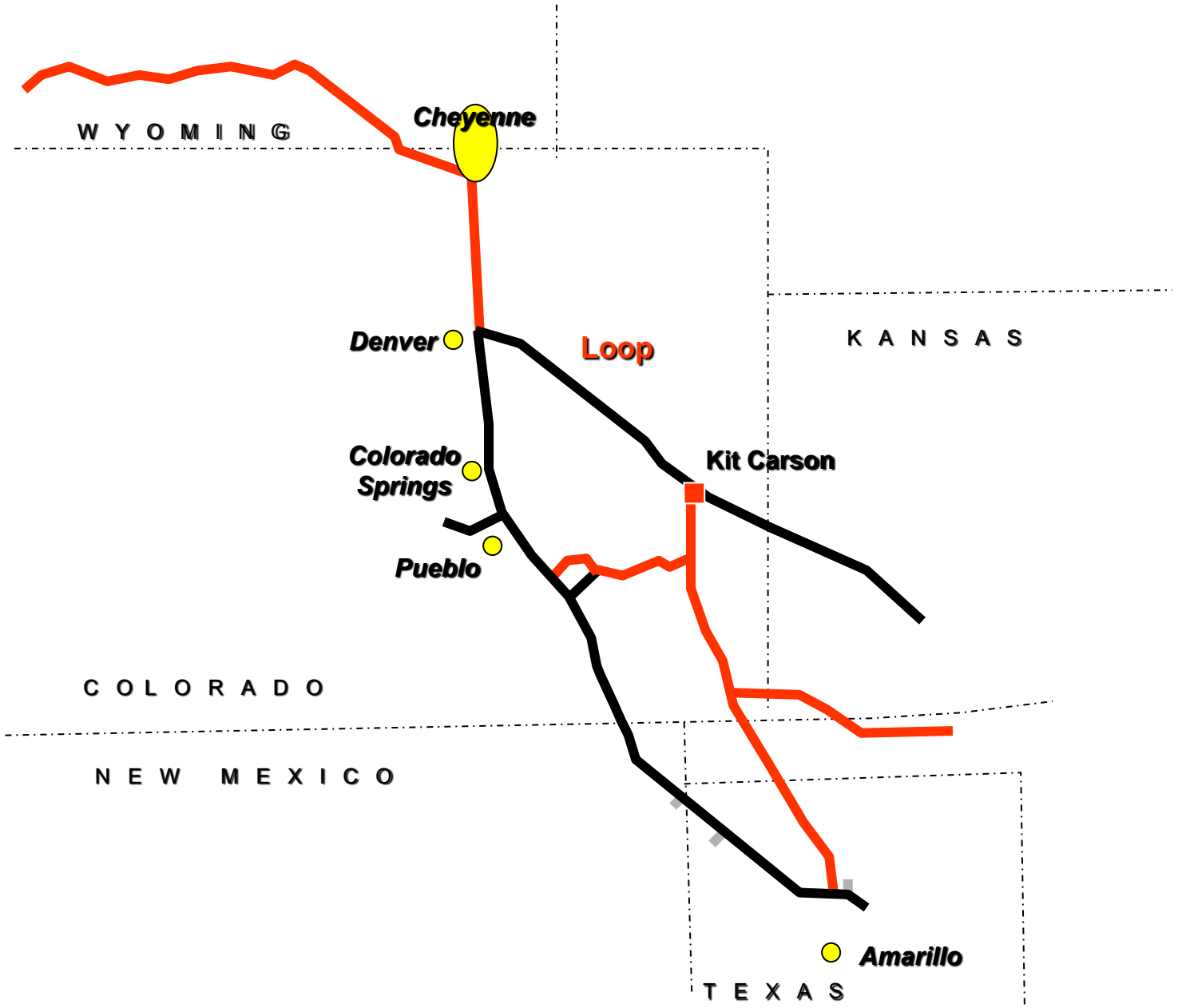
1940s CIG

- Access Hugoton Basin



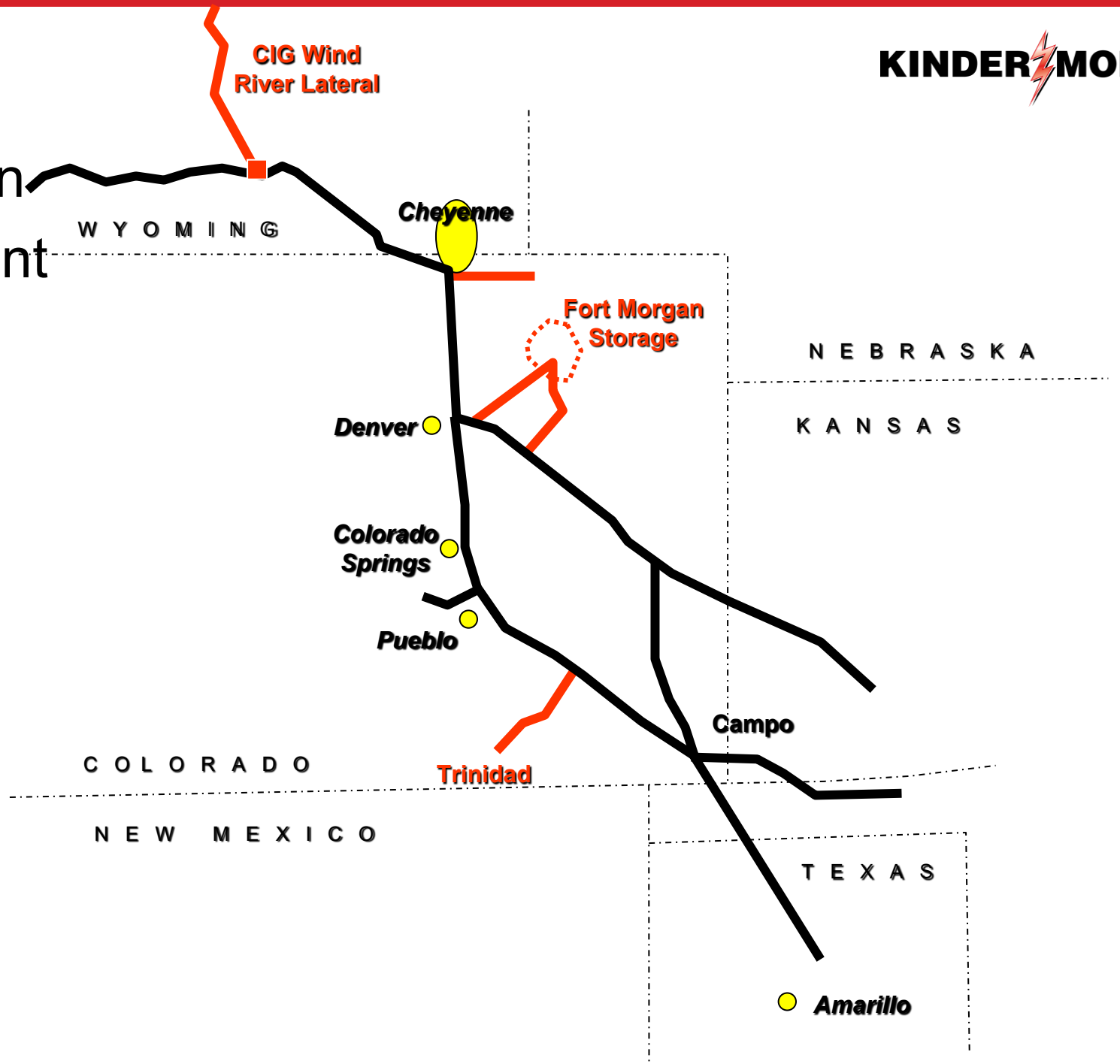
1950s CIG

- Access WY supply
- Access OK supply
- Expand southern CO deliveries



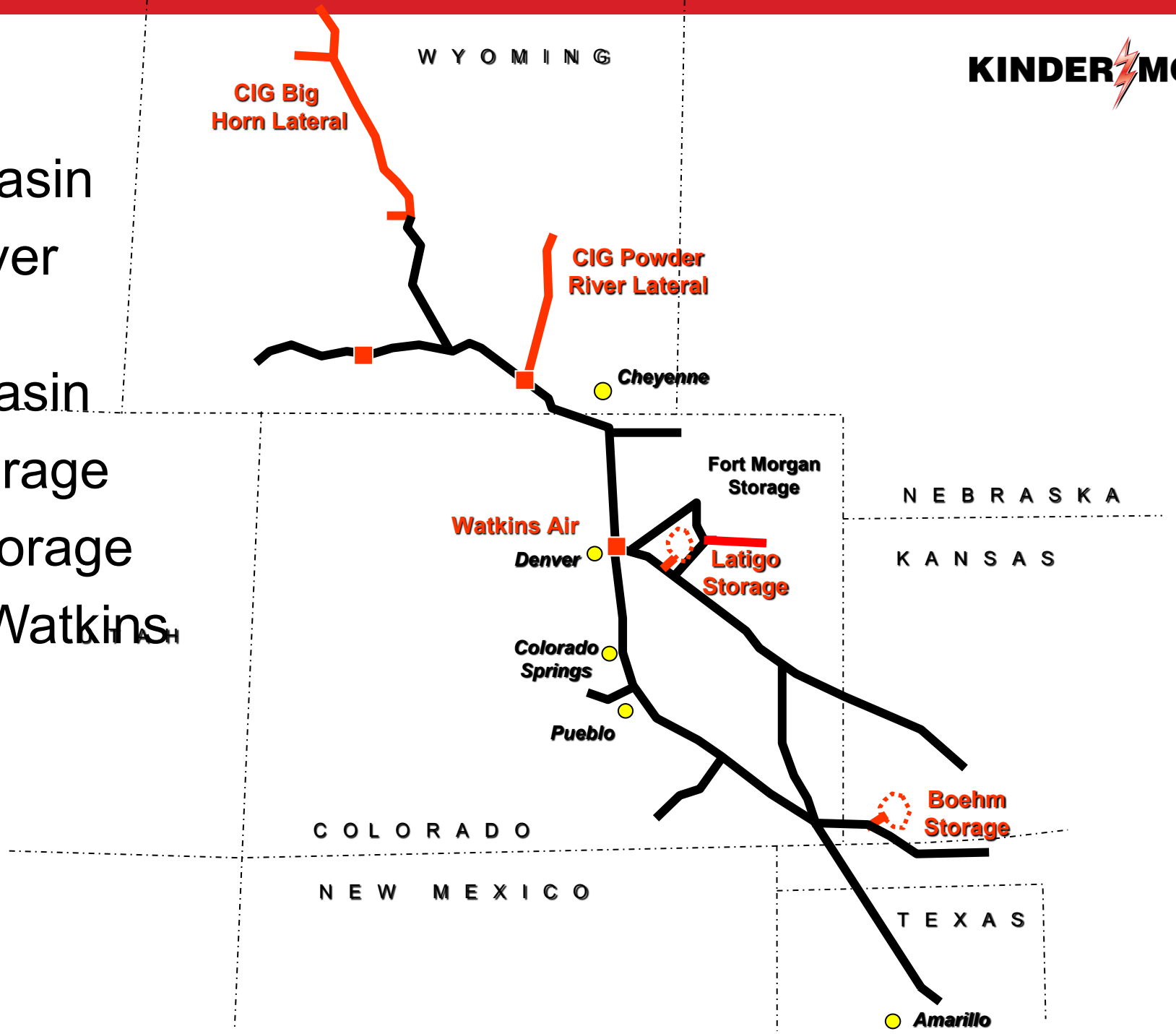
1960s CIG

- Access Wind River Basin
- First storage development Ft Morgan Storage
- Serve Trinidad



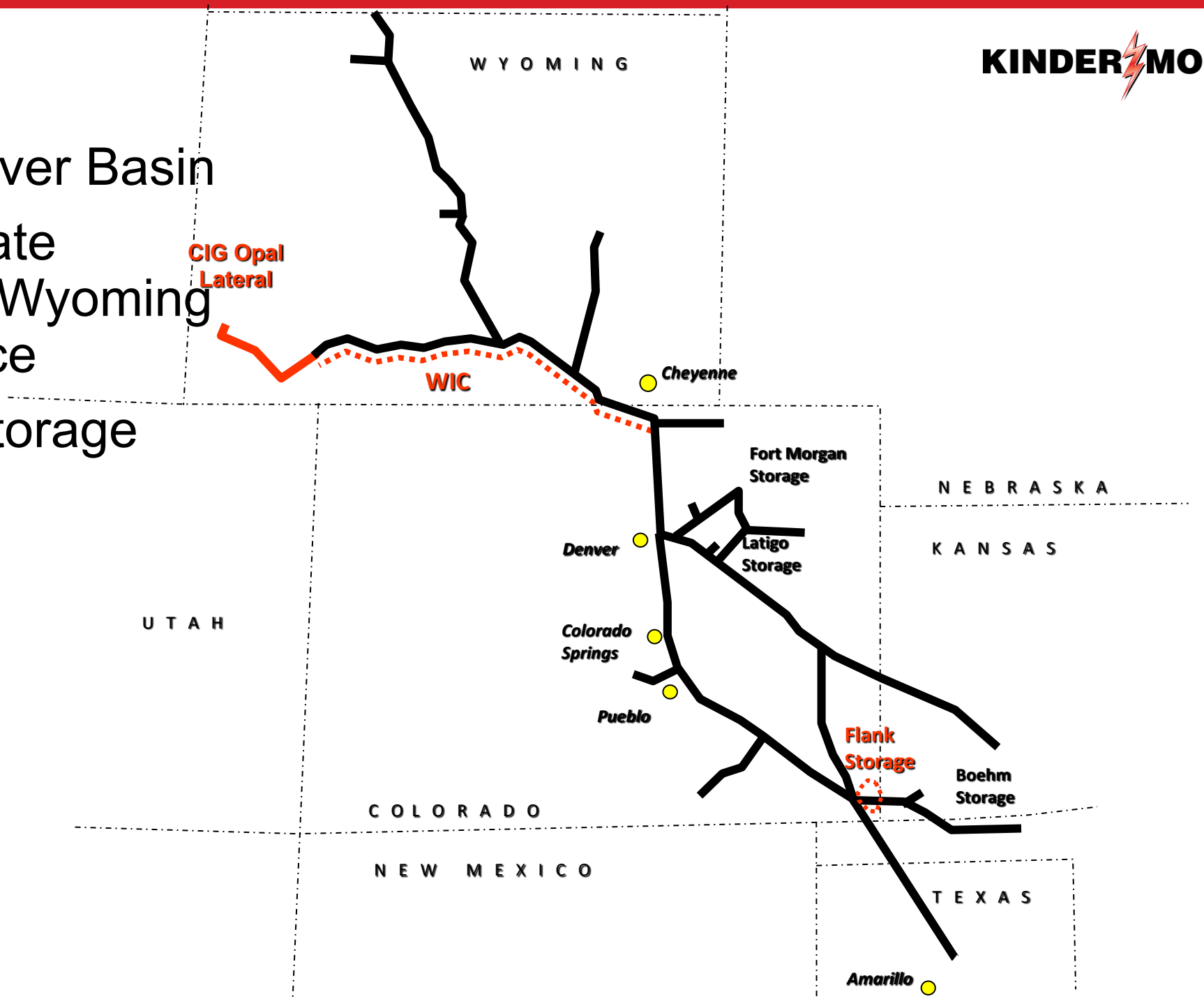
1970s CIG

- Access Big Horn Basin
- Access Powder River Basin
- Access Niobrara Basin
- Develop Latigo Storage
- Develop Boehm Storage
- Wobbe Control at Watkins



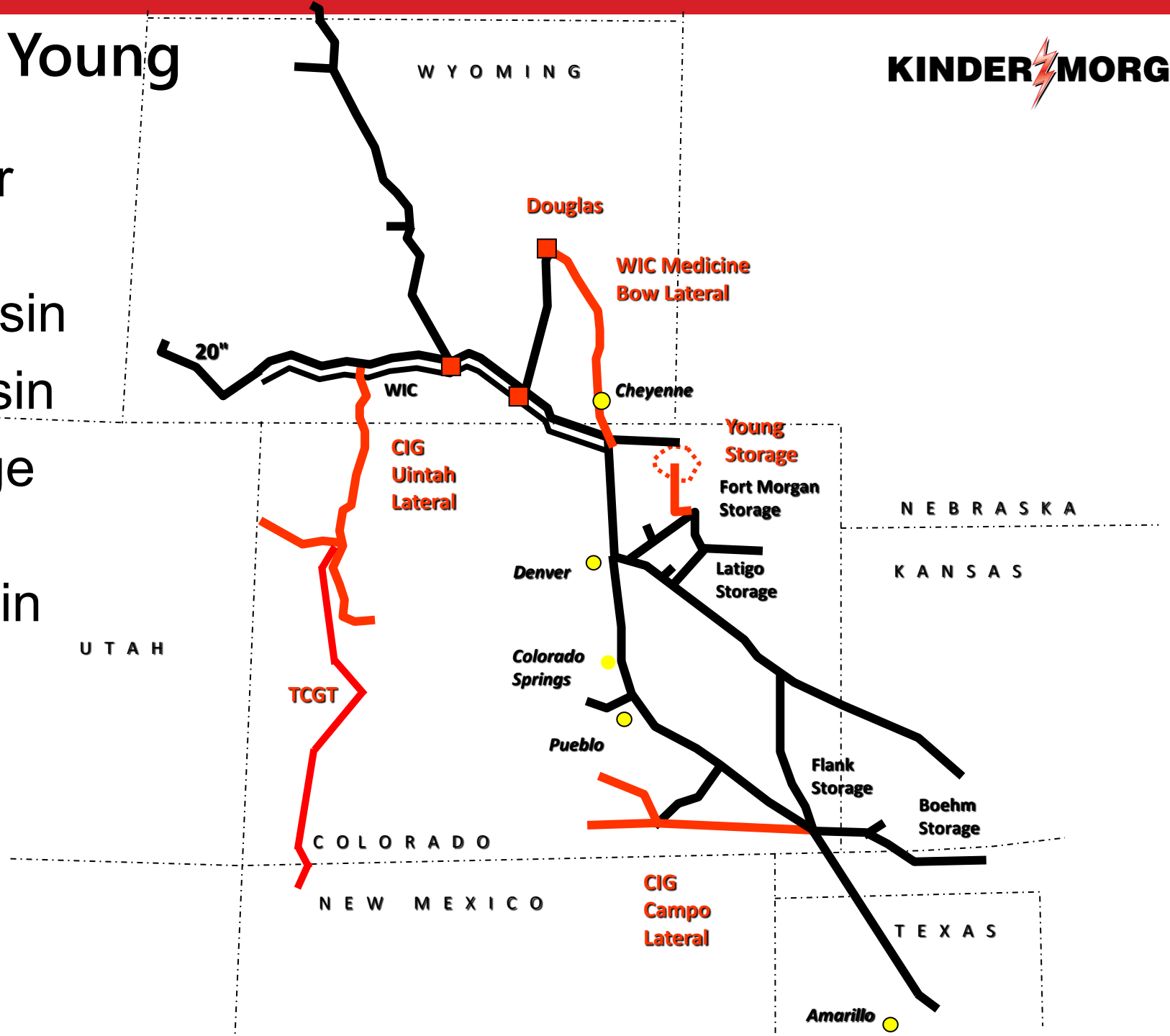
1980s CIG WIC

- Access Green River Basin
- Wyoming Interstate Company (WIC) Wyoming Mainline in service
- Develop Flank Storage



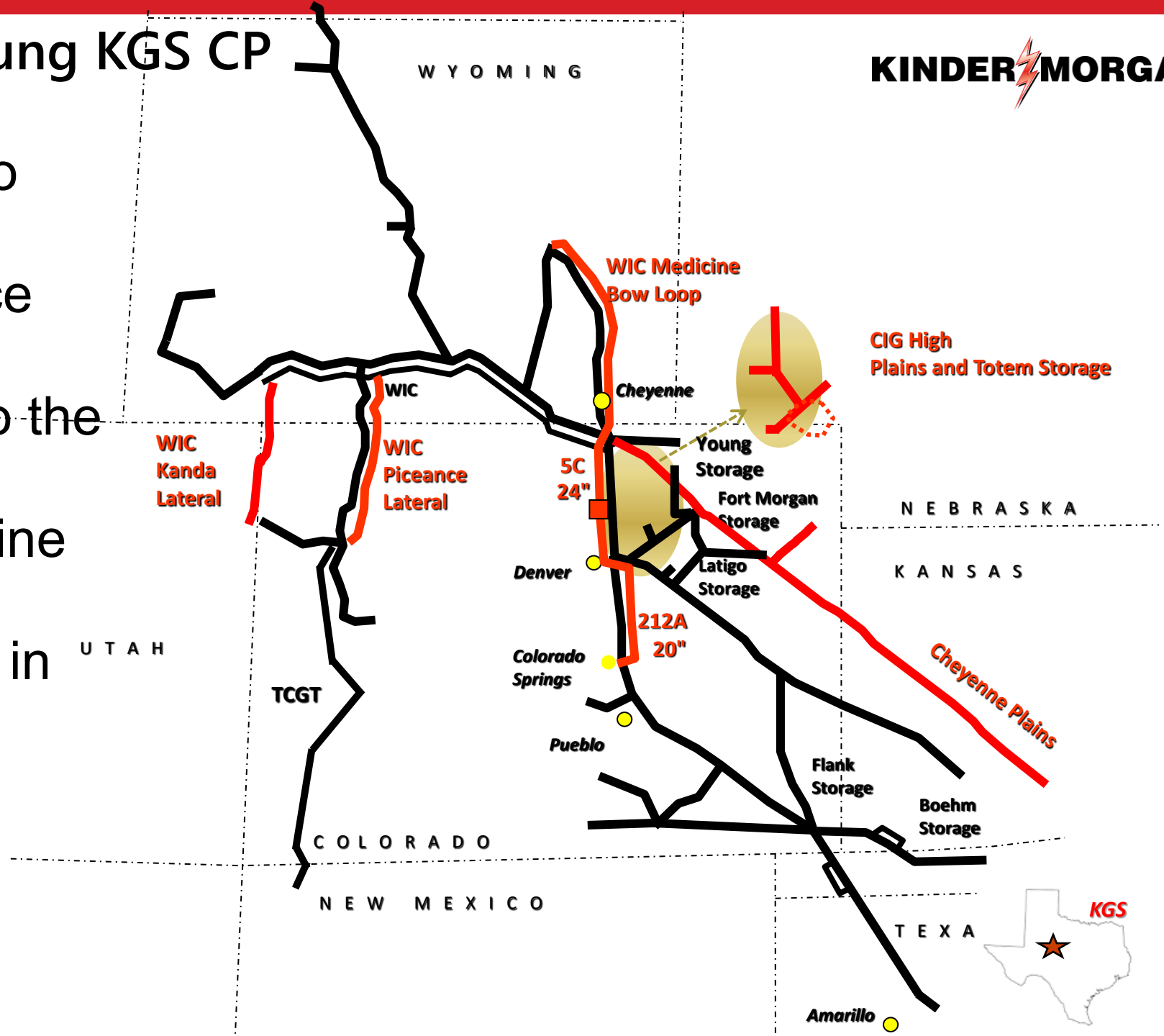
1990s CIG WIC TCGT Young

- WIC access to Powder River Basin
- CIG access Uintah Basin
- CIG access Raton Basin
- Develop Young Storage
- TransColorado Gas Transmission (TCGT) in service



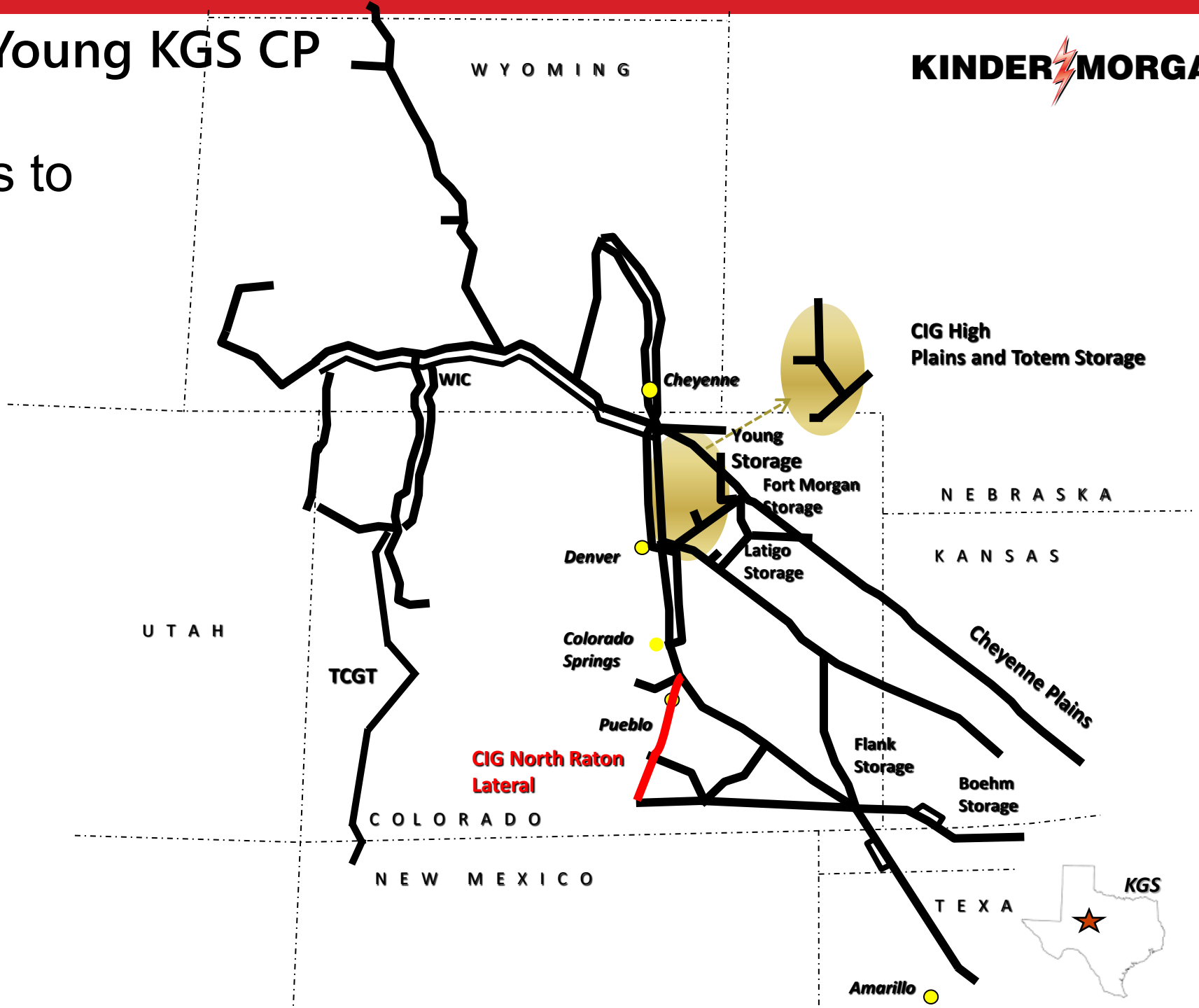
2000s CIG WIC TCGT Young KGS CP

- WIC expands access to Powder River Basin
- WIC accesses Piceance and Uintah Basins
- CIG expands service to the Front Range of CO
- Cheyenne Plains Pipeline (CP) in service
- Keystone Gas Storage in service



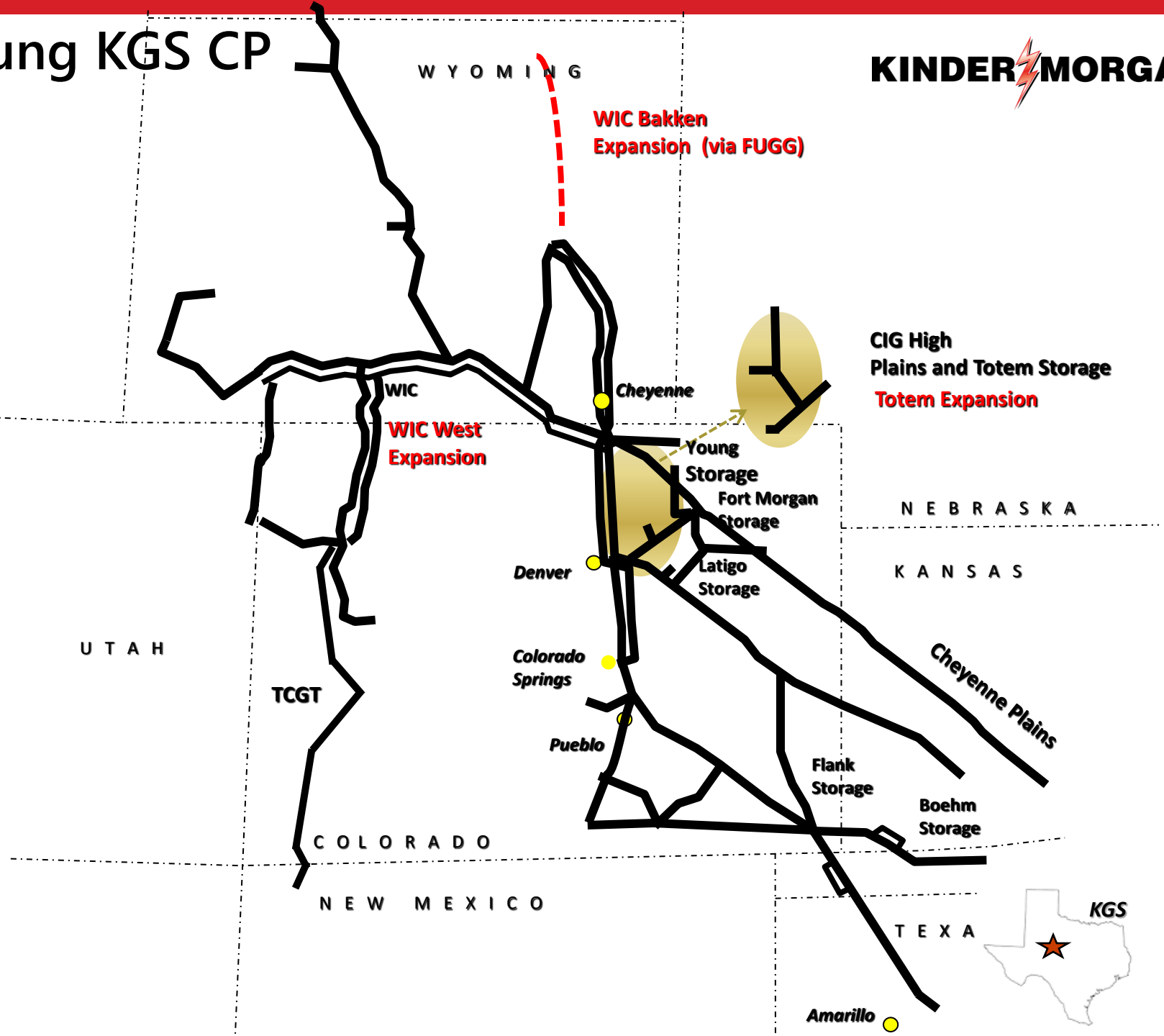
2010s CIG WIC TCGT Young KGS CP

- CIG expands access to Raton Basin



2020s CIG WIC TCGT Young KGS CP

- WIC accesses Bakken supply via FUGG
- CIG Totem expansion
- WIC West expansion



Major Types of Pipeline Facilities

Major Types of Pipeline Facilities

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- Pipelines
- Compressor Stations
- Measurement Stations
- Underground Storage

Major Types of Pipeline Facilities

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Pipelines

- Buried steel pipe 36” or more below the surface
- Maximum Allowable Operating Pressures (MAOP) ranges up to 1,480 psig
- Welded together with 40’ to 80’ pipe joints
- Main line valves every 5 to 20 miles
- Different safety factors (1.39 to 2.5) depending on population density (Class 1, 2, 3 or 4)

Major Types of Pipeline Facilities

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Compressor Station

- Filters, compresses, cools, gas in the pipeline
- Located ~ every 40 to 100 miles
  - Land area ~40-100 acres
- Gas compressor drivers
  - Reciprocating engines
  - Turbines
  - Electric motors
- Gas compressors
  - Reciprocating compressors
  - Centrifugal compressors
- Ancillary equipment (control systems, compressed air system, electrical substation, electrical distribution, backup power generation, etc.)

Major Types of Pipeline Facilities

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Turbine or Electric Motor - Centrifugal Compressor Sets

Major Types of Pipeline Facilities

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Reciprocating Engine – Reciprocating Compressor Sets

Major Types of Pipeline Facilities

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- Meter Stations
  - Whenever custody of gas changes
- Types of meters
  - Ultrasonic
  - Orifice
  - Turbine or positive displacement
- Flow and/or pressure control valves
- Gas quality analyzers
- Gas flow computer
- Telecomm equipment
- Backup power

Major Types of Pipeline Facilities

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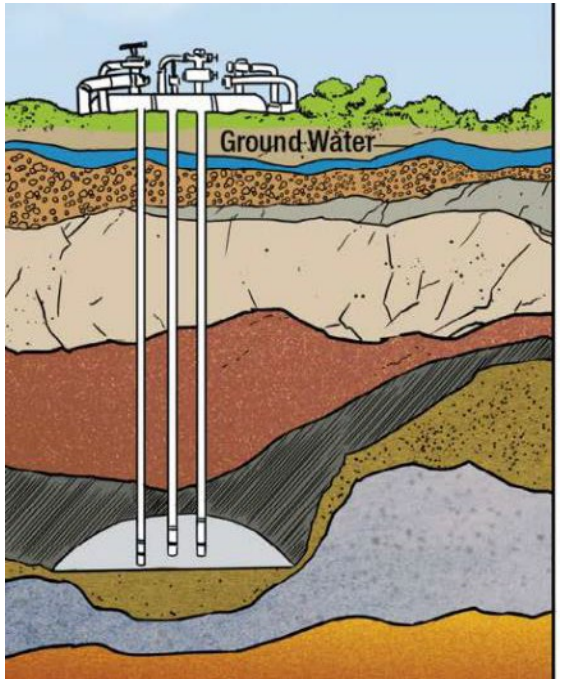
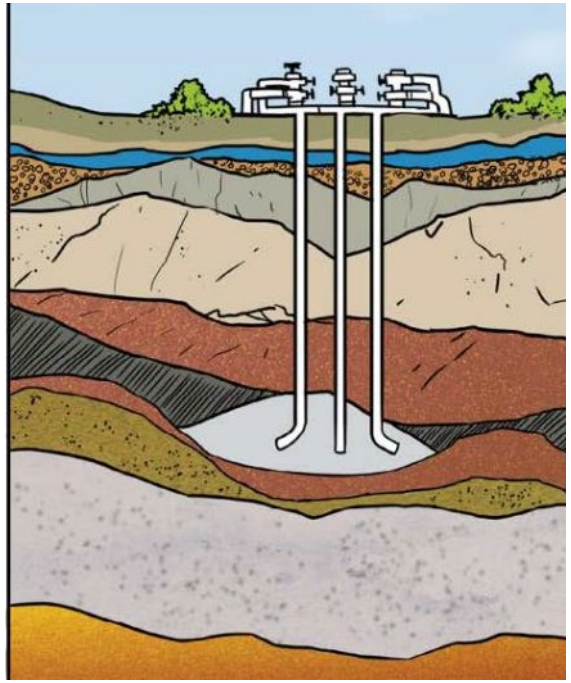
Storage facilities

- Depleted reservoirs, aquifers, salt caverns
- In addition to the underground formation, facilities include well gathering pipeline system, gas dehydration, compression and metering

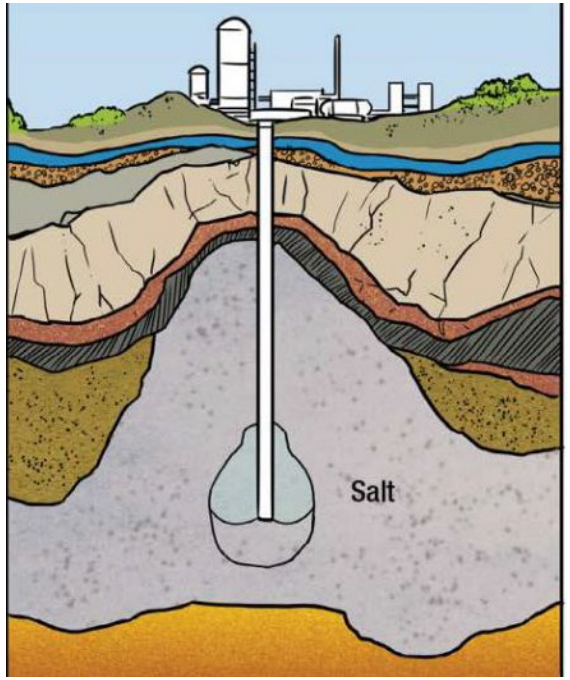
Depleted Reservoir



Aquifer



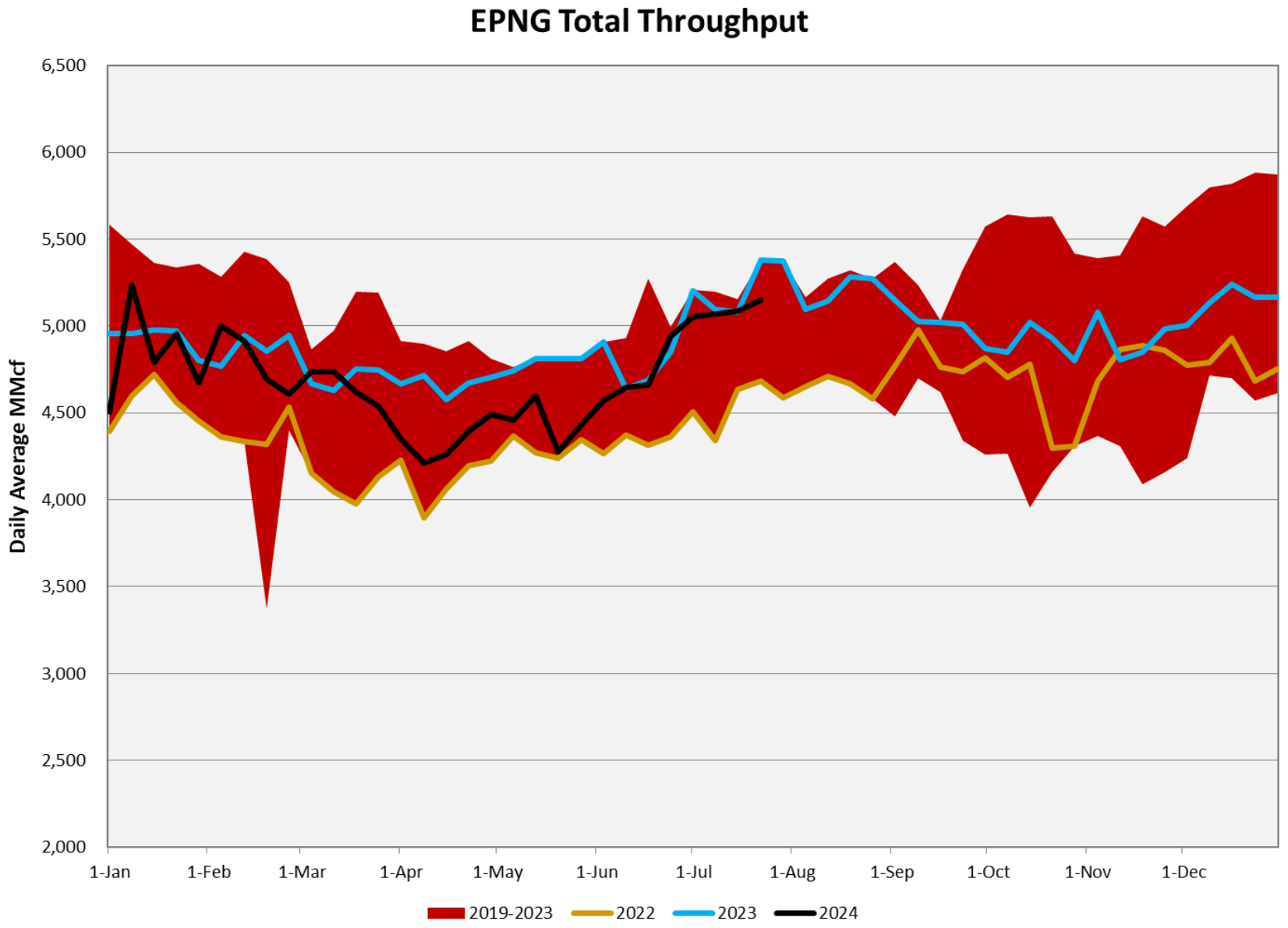
Salt Cavern



EPNG System Utilization

EPNG Total System

2019-2024 Throughput Trends (MMcf/d)



Through Week 16

Arizona Power Generation

2019-2024 Throughput Trends (MMcf/d)

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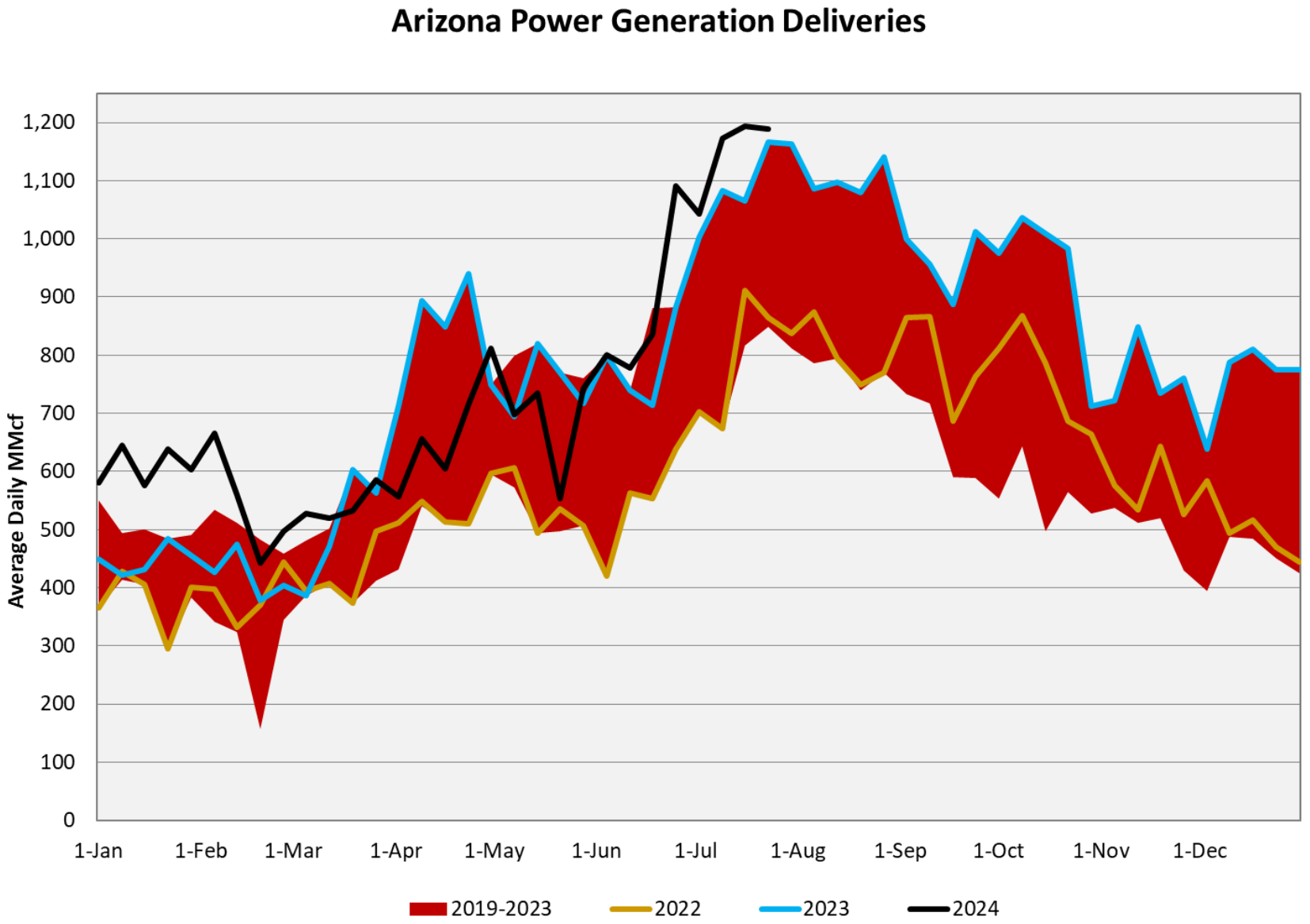

Arizona LDC

2019-2024 Throughput Trends (MMcf/d)

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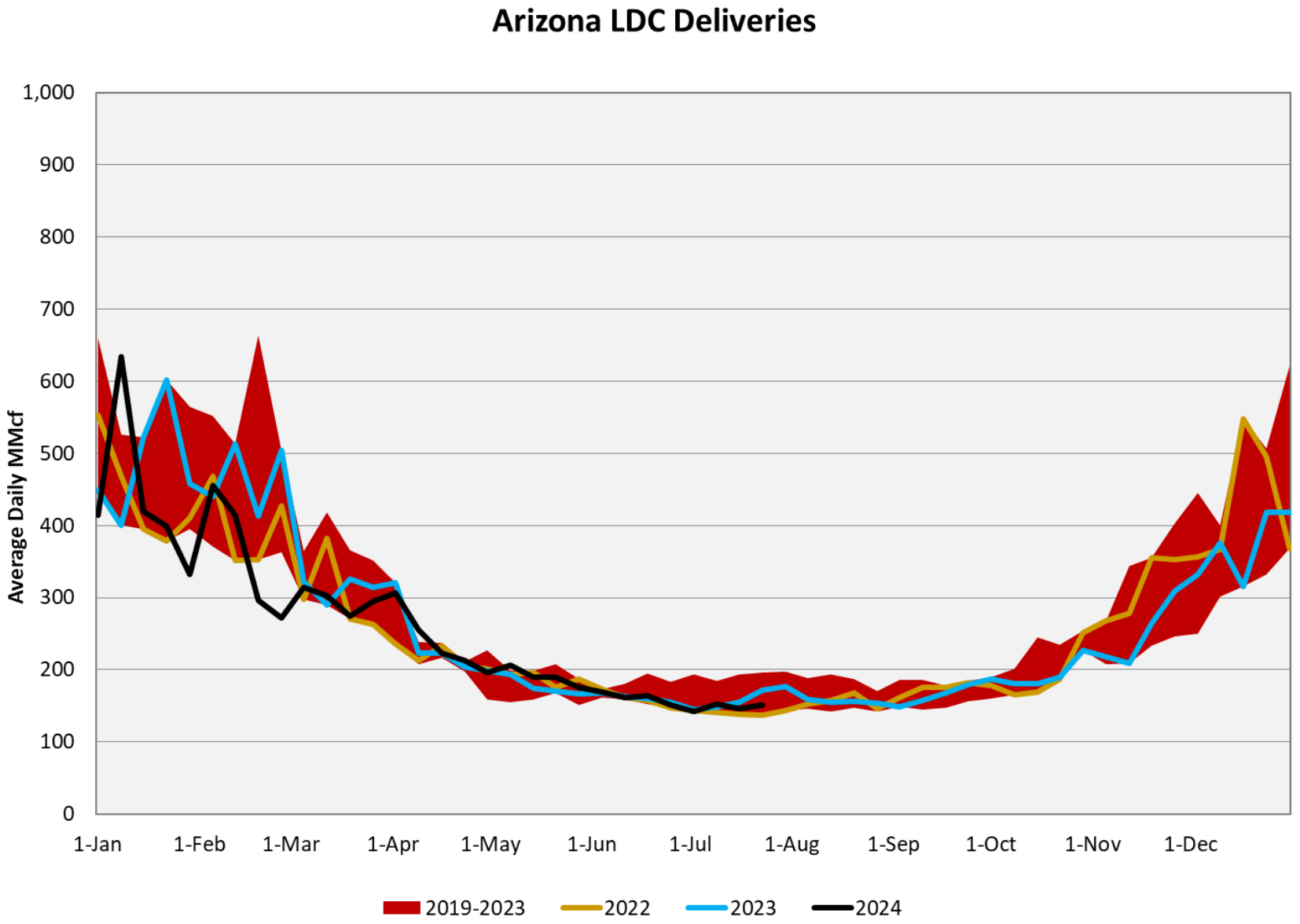
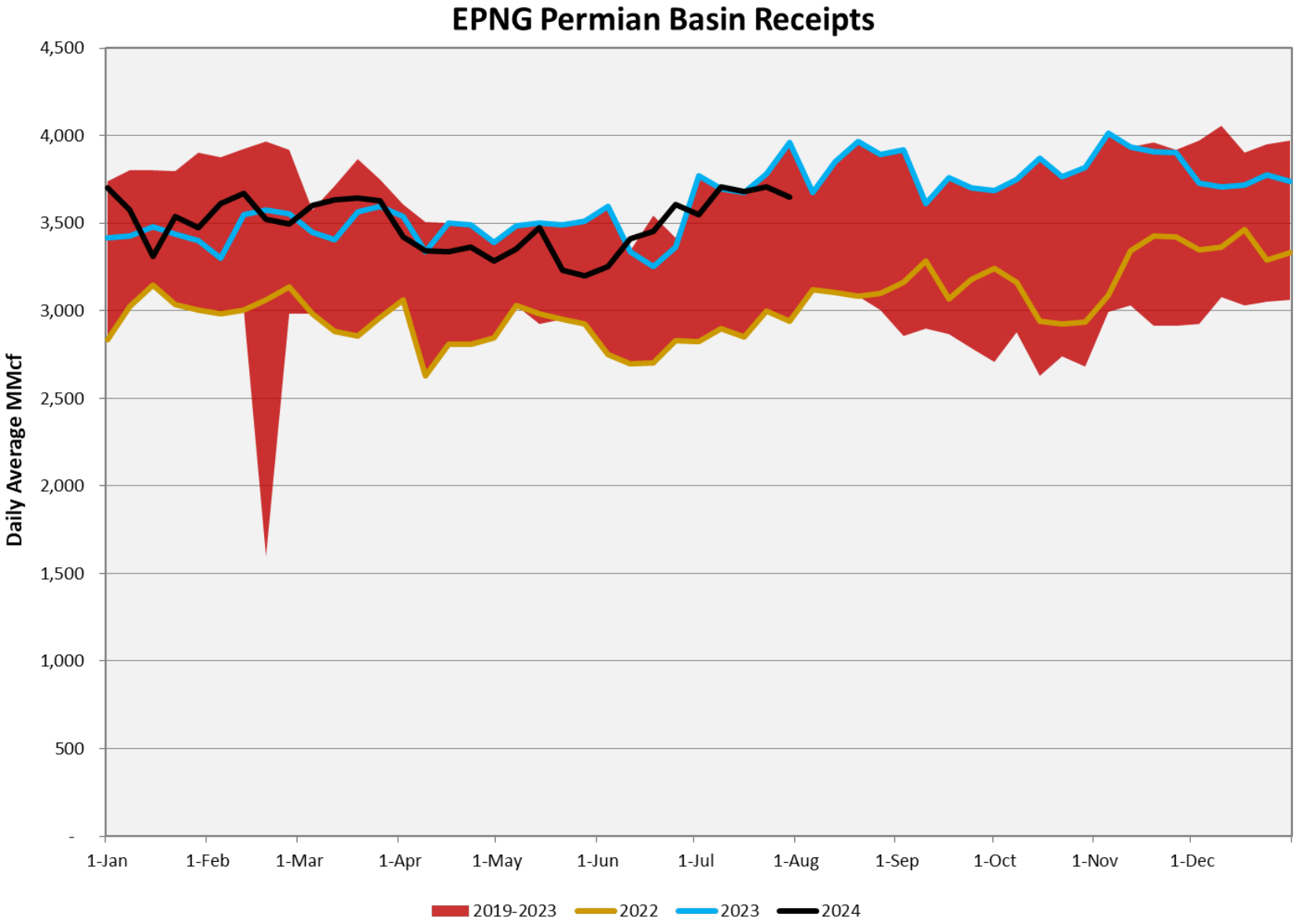


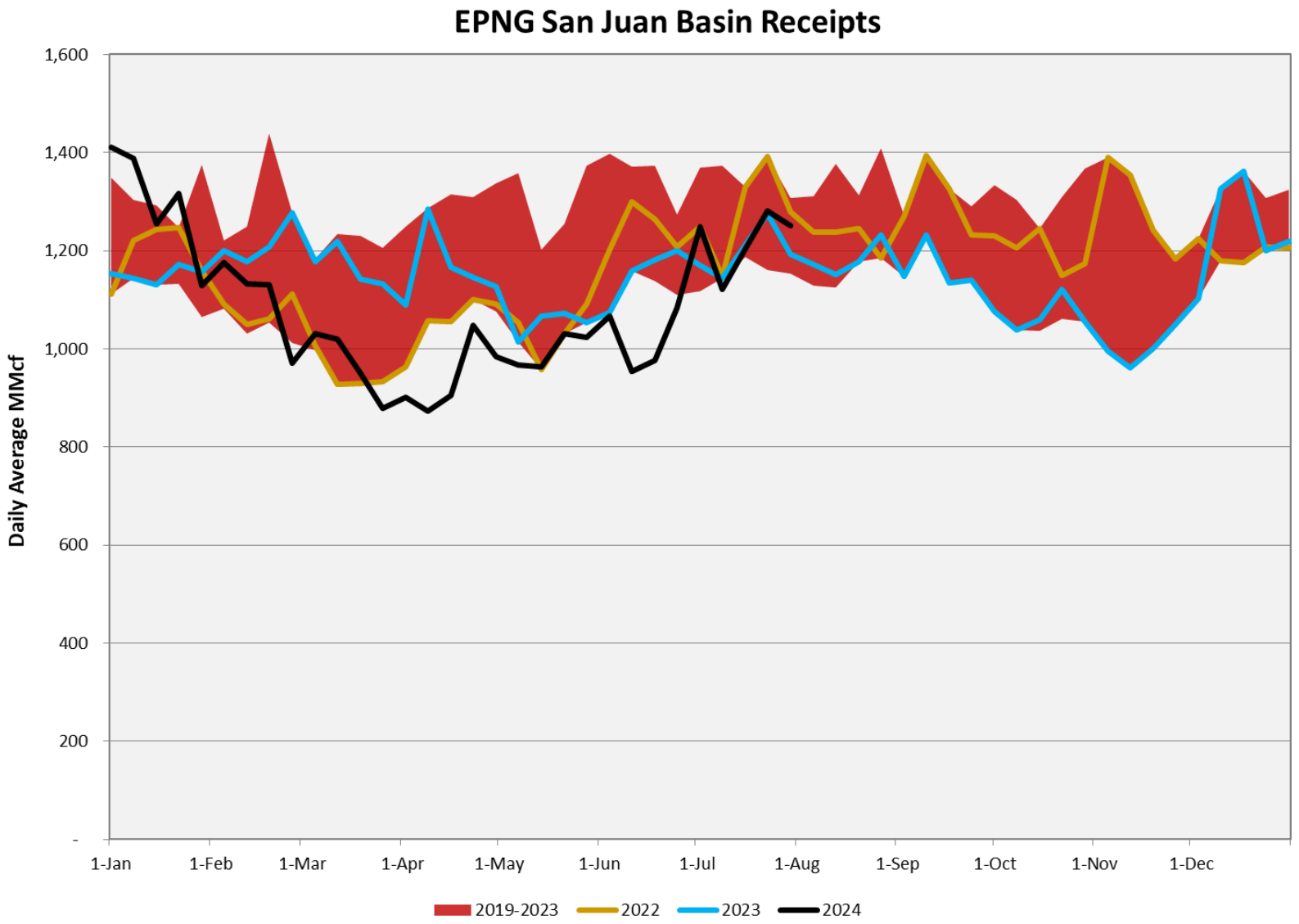
Permian Basin Receipts

2019-2024 Throughput Trends (MMcf/d)



San Juan Basin Receipts

2019-2024 Throughput Trends (MMcf/d)



What drives pipeline outages?

Pipeline Outage Drivers

- Pipeline Integrity Management
- Planned compliance and hours-based maintenance, equipment upgrades
- Unplanned emergent maintenance
- Expansion capital project integration
- Storage semi-annual bottom hole pressure surveys and maintenance

Pipeline Integrity Management

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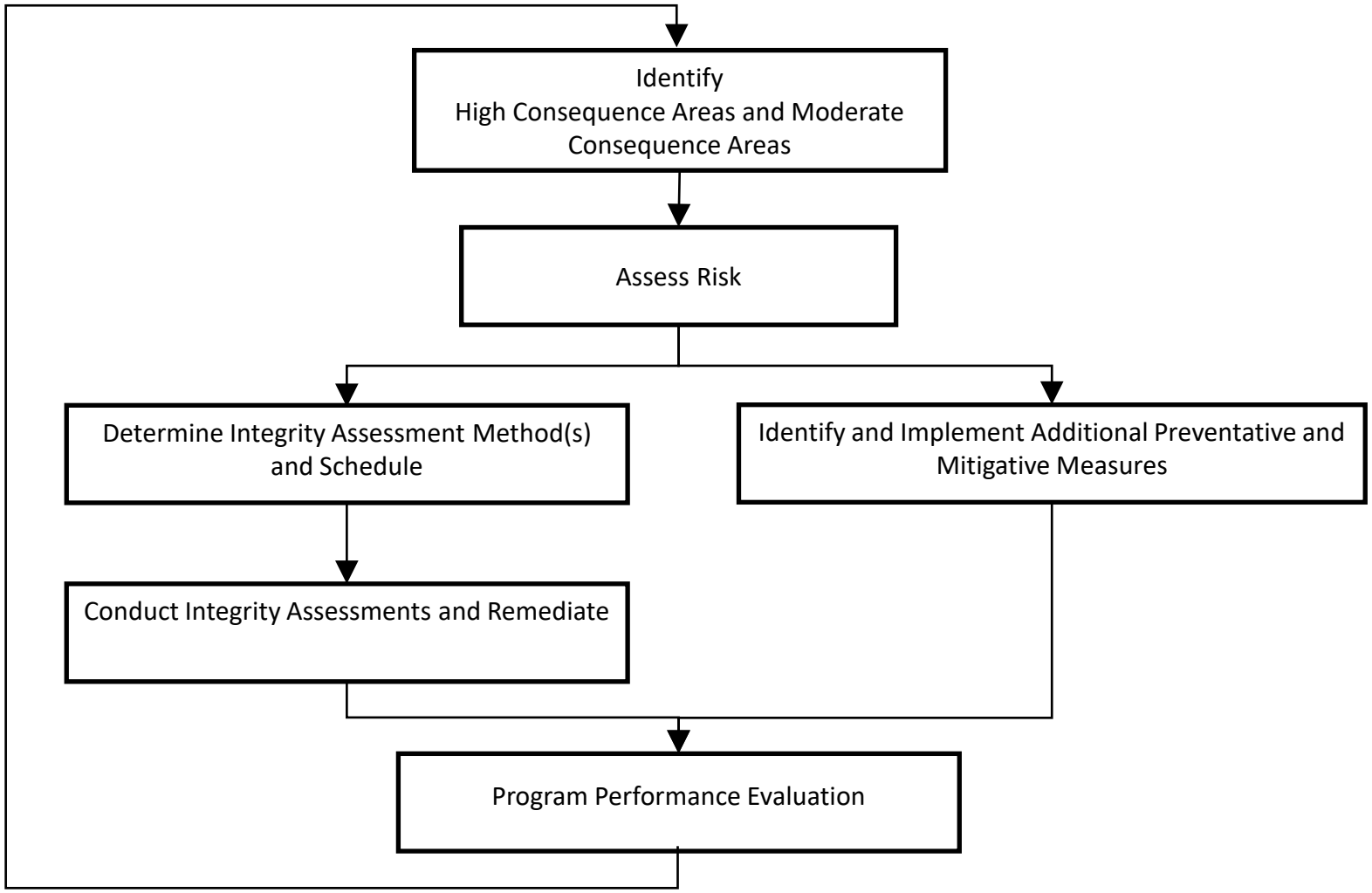
- Protect the public through continuous and systematic improvements to system and operation safety
- Active risk-based management of assets
  - Identify High Consequence Areas and 192.710 regulated pipelines - prioritize efforts in these areas
- Regulatory Driven
  - 49 CFR 192 Subpart O – *Gas Transmission Pipeline Integrity Management*
  - *49 CFR 192.710 Integrity Management Outside HCAs*
  - *49 CFR 192.624 MAOP Reconfirmation*
  - ASME B31.8S – *Managing System Integrity of Gas Pipelines*

Pipeline Integrity Management: Program Flow



Pipeline Integrity Management - Threats

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Composed of threats categorized by their relationship to time:

- Time dependent threats
  - external corrosion
  - internal corrosion
  - stress corrosion cracking
- Time independent threats
  - third party or mechanical damage
  - weather or outside forces
- Stable threats
  - manufacturing defects
  - construction issues

Pipeline Integrity Management - Outage Drivers

- Assessment methodology is threat specific
- Assessment findings drive pressure restrictions, evaluation digs, remediation
- Integrity assessment methods:
  - In-Line Inspection (ILI)
    - Cleaning
    - Caliper
    - Magnetic Flux Leakage (MFL) A & C
    - Electro Magnetic Acoustic Transducer (EMAT)
  - Hydrostatic Pressure Test
  - External Corrosion Direct Assessment (ECDA)
  - Internal Corrosion Direct Assessment (ICDA)
  - Stress Corrosion Cracking Direct Assessment (SCCDA)
  - In Situ Direct examination

Pipeline Integrity Management – Going forward

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- As our commitment to public safety, and the long-term viability of our irreplaceable assets will not wain, our commitment to a strong pipeline integrity program will not wain
- As we saturate our pipeline systems with in-line inspection runs, the risks and therefore follow-on remediation activity will trend downward reducing pipeline outages
- As in-line inspection technology improves, and as we continue to grow in our knowledge, we will continue to refine and improve upon our program

Compliance & hrs-based maintenance upgrades

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Compliance related

- DOT required annual testing
- Company required annual maintenance
  - Safety
  - Best practices

Planned hours-based maintenance

We like to find the problems before the problems find us.

- Original Equipment Manufacturer (OEM) recommended maintenance
- Best practices

Unplanned Emergent Maintenance

- Failure or out of tolerance performance of any number of pieces of equipment

Outage Planning Process

Outage Planning Process

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Next year planning

- Meetings begin in June of current year and continue through October
  - Discuss all known outages
    - Pipeline Integrity Management in-line inspection runs, and plan for receipt of preliminary and final findings
    - Planned compliance and hours-based maintenance, equipment upgrades
    - Expansion capital project integration
  - Optimization
    - Consolidate or separate outages to reduce time and capacity impact to the market
    - Optimization opportunities bounded by compliance dates, safety, crews and equipment
  - 4th quarter, first pass at the Annual outage posting for the coming year

Outage Planning Process

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Current year planning

- Weekly and Monthly meetings prior to flow month
- Interleave new outages driven by inspection tool findings and emergent issues into existing schedule of outages
- Optimization
  - Consolidate or separate outages to reduce time and capacity impact to the market
  - Optimization opportunities bounded by compliance dates, safety, crews and equipment
- Post Monthly outage report
- Update and re-post Annual outage as needed

Annual and Monthly Outage Postings Location

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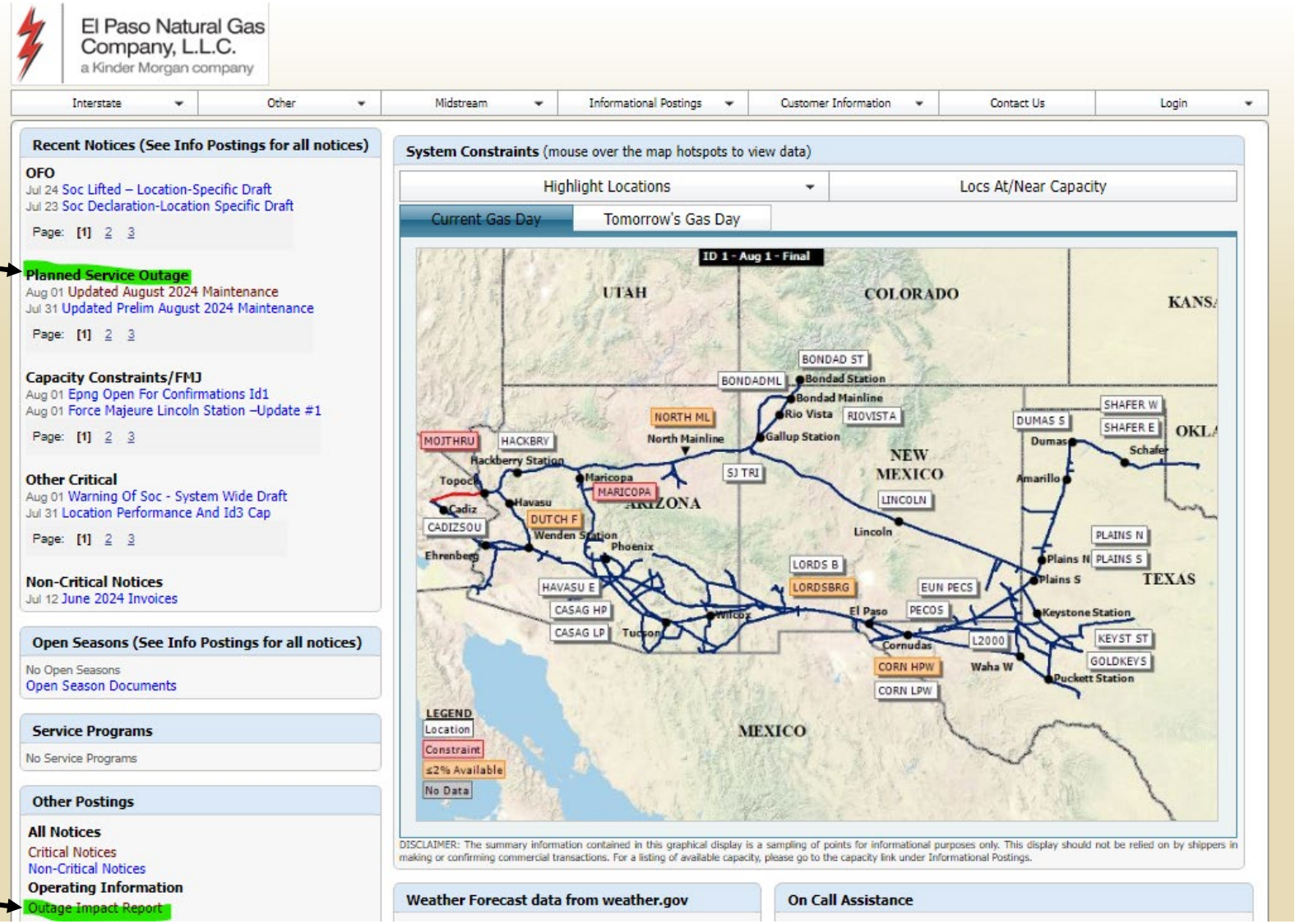
Monthly

Annual



Continuous Improvement

Continuous Improvement

- Continue to identify and broaden circle of stakeholders to improve the process
  - New employees
  - Newly assigned project engineers
  - Back-office pipeline integrity risk management team
- Data consolidation and enhanced tool development
- Longer horizon (multiple years out) to spot risks and opportunities to limit impact to our shippers

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We appreciate your business