# Holbrook Basin Helium Project

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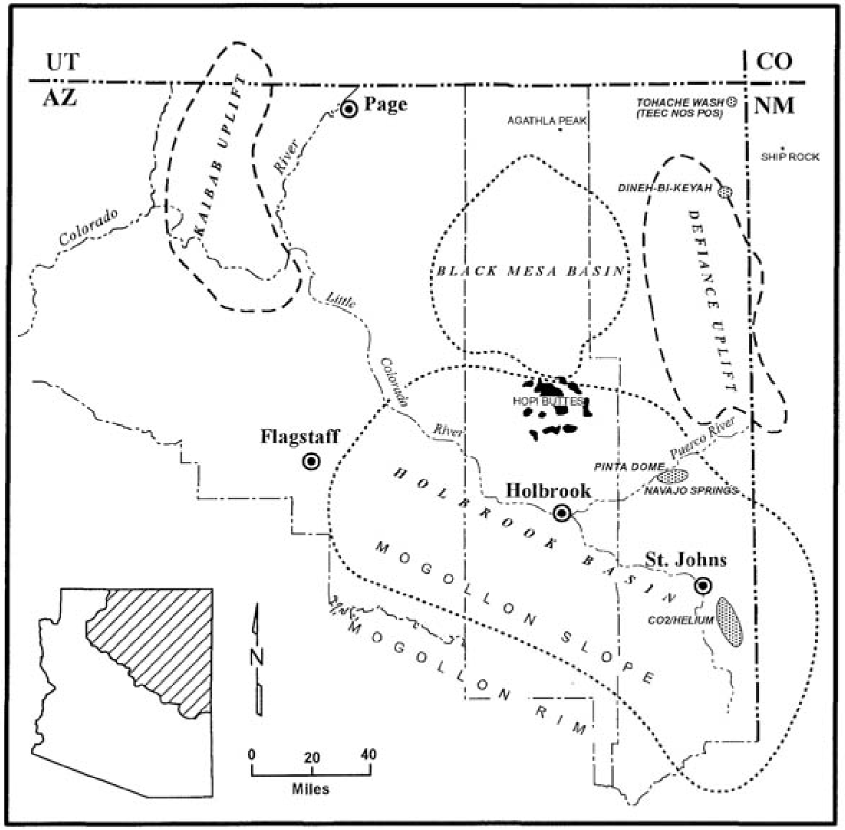
# Holbrook Basin

## Geology-Arizona

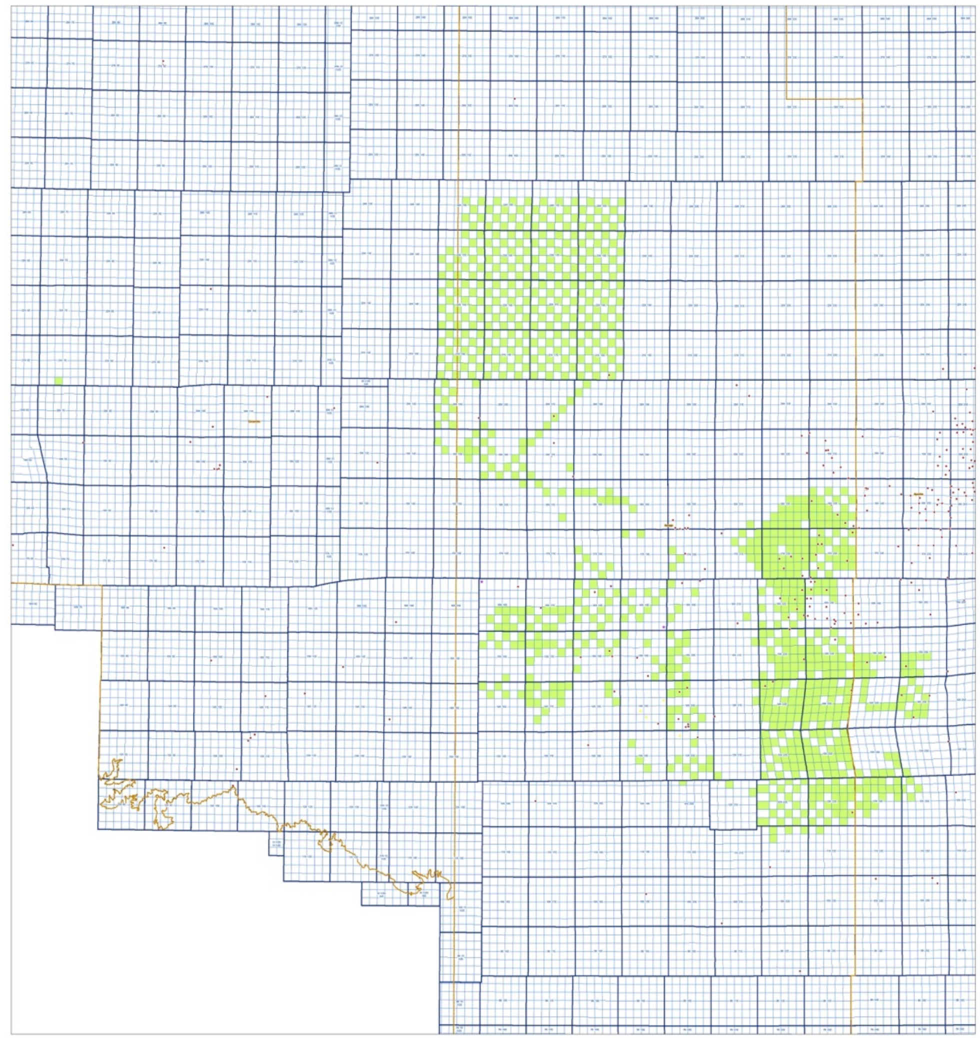
- Northeastern Arizona is part of the Colorado Plateau Physiographic province. The Colorado Plateau is characterized by flat-lying, relatively undisturbed, largely marine sedimentary rocks of Paleozoic and Mesozoic age that are covered by Tertiary to recent volcanic flows near Flagstaff and Springerville. Permian strata truncate Cambrian, Devonian, Mississippian, Pennsylvanian and Proterozoic rocks along the margins of the Defiance Uplift. Maximum submergence of the Defiance uplift may have occurred during the Mississippian, but the Mississippian rocks were subsequently eroded back, probably by renewed, slow emergence of the uplift in Pennsylvanian through Permian Time.
- As much as 2,000 feet of Permian strata were eventually deposited on the Proterozoic Basement rocks of the Defiance uplift. All past production of helium and current oil, gas and CO2 are from rock formations of Paleozoic age in the Plateau Province. The major tectonic features in Northeastern Arizona include the Defiance and Kaibab uplifts in the northern part of the area. The Black Mesa Basin is situated between the Kaibab and Defiance Uplifts. The Holbrook Basin is located between the Defiance Uplift to the north and the Mogollon Slope to the south. A prominent escarpment known as the Mogollon Rim defines much of the southern edge of the Plateau Province.



# AEP Lease Holdings

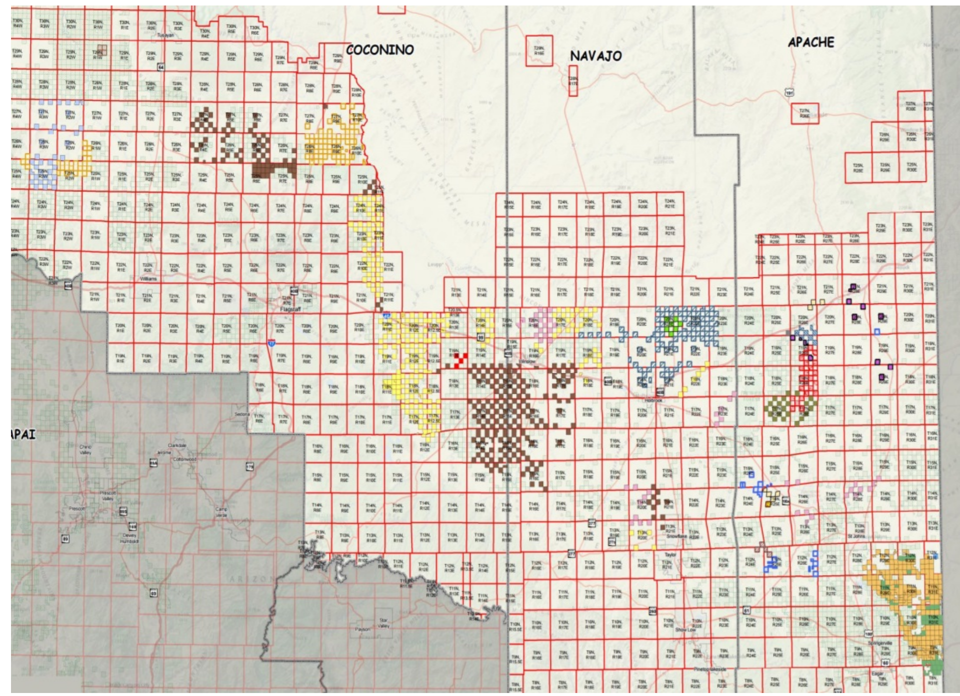
## 280,000+ Acres in Navajo & Apache Counties, AZ

- AEP's current leasehold covers not less than 282,923 gross and net acres with more acreage acquisition to come
- Total lease burdens, including, but not limited to, royalty, overriding royalty and any other lease burdens on each lease does not exceed 20%, and the average net revenue of the leases is approximately 81%
- The leases each have a Primary Term of not less than six (6) years; and said primary terms began no sooner than October, 2015
- Leases cover all rights and depths



# BECI Lease Holdings

- BECI's current leasehold covers not less than 352,000 gross and net acres with more acreage acquisition/divestures to come
- Total lease burdens, including, but not limited to, royalty, overriding royalty and any other lease burdens on each lease does not exceed 20%, and the average net revenue of the leases is approximately 80%
- The leases each have a Primary Term of not less than six (6) years; and said primary terms began no sooner than May, 2012.
- Leases cover all rights and depths




**Please note that this map for visual reference, not accurate acreage count, for this please refer to BECI lease holdings**

# Holbrook Basin

## Helium Production

- The Pinta Dome, Navajo Springs, and East Navajo Springs fields are relatively small anticlinal structures located in the Holbrook Basin in Townships 19 and 20 North, Ranges 26, 27, and 28 East. Wells in the Pinta Dome and Navajo Springs fields produced helium from the Permian Coconino Sandstone. Several wells in the East Navajo Springs field produced helium from the Shinarump Conglomerate at the base of Triassic Chinle Formation.
- Masters (1960) and Dean (1960) published the history of the exploration and development of the helium resources in the Navajo-Chambers area. The Navajo-Chambers represented the only area in the history of the helium industry that had experienced sustained exploration and development for helium gas alone.

# Holbrook Basin
## Helium Production

- In 1951, Kipling Petroleum Company discovered Helium on Pinta Dome in 1950 when it drilled the # 1 Macie in search of oil. No oil was found but a large flow of gas was encountered in the Coconino Sandstone. The gas did not burn so it was allowed to flow unrestricted from the well bore for about 8 weeks (Dean et al, 1960). Reports indicated that the gas escaping from the open well “roared like a jet engine” at an estimated initial rate of 24 million cubic feet per day (Heindl, 1952). The operator shut the well in after testing by the U.S. Bureau of Mines showed that the gas was rich in Helium (Masters, 1960).
- In 1951, Kipling Petroleum Company drilled the #2 Macie, which was abandoned because of stuck pipe. In 1955, the Apache Oil and Helium Corporation took over development of the field, and reworked the # 2 Macie, which blew out and drilled the #3 Macie, which it was abandoned before target depth (Coconino SS).
- In 1956, Kerr-McGee Oil Industries completed both the #2 & #3 Macie wells, and drilled 3 more gas wells. In 1959, Eastern Petroleum Corporation drilled three more gas wells and extended the area of helium production to the southeast.

# Holbrook Basin

## Helium Production

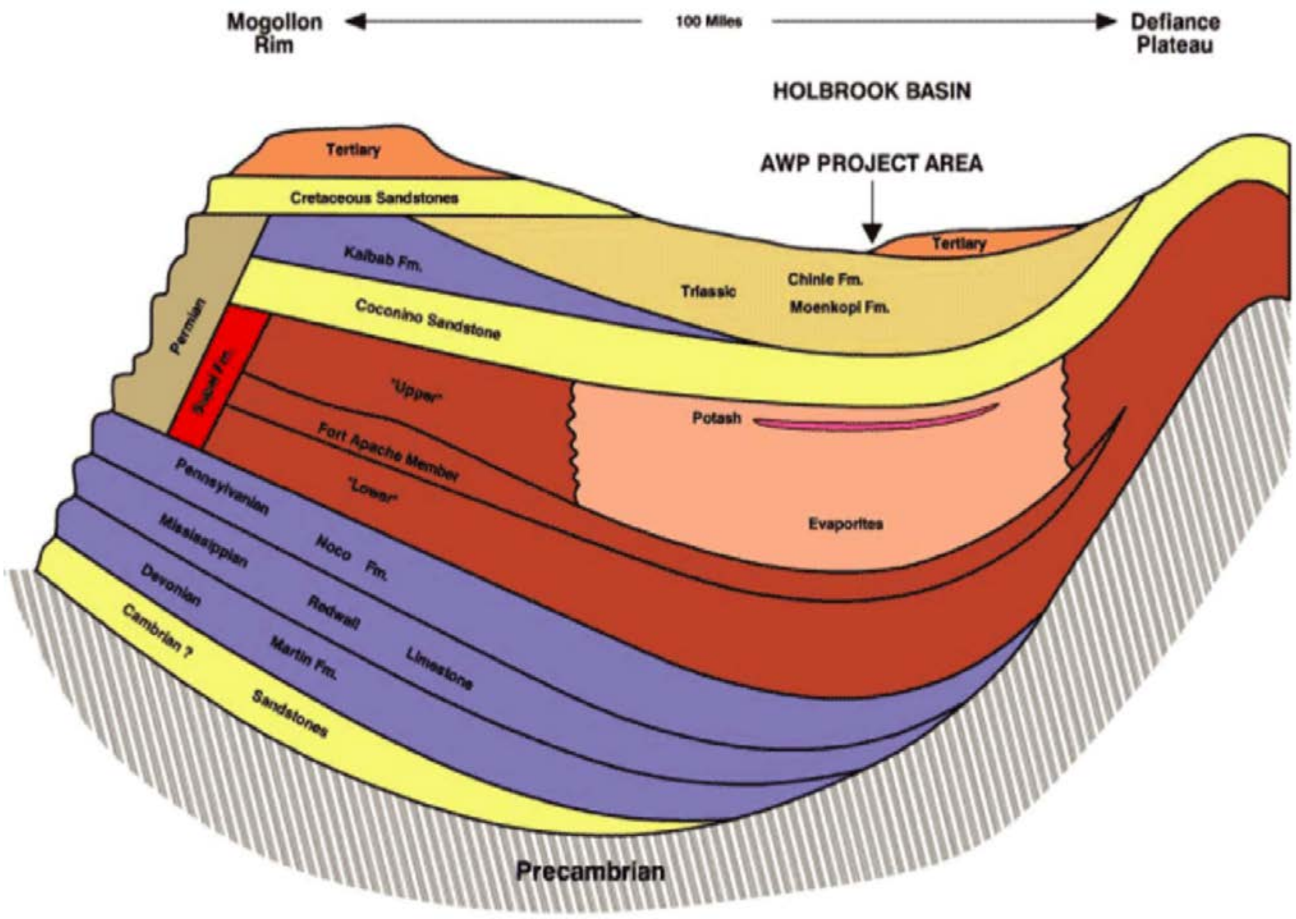
- Kerr-McGee constructed a helium-extraction plant at Navajo and started processing helium from the Pinta Dome field in 1961, Navajo Springs field in 1964, and East Navajo Springs field in 1969. Kerr-McGee's helium plant was the first privately financed helium plant in the world producing Grade-A helium (Smith et al, 1962).Nearly 9 billion cubic feet of gas containing more than 700 million cubic feet of Grade-A helium were produced from the Pinta Dome and the adjacent Navajo Springs and East Navajo Springs fields. Gas produced from the Coconino Sandstone averaged 90% Nitrogen, 8-10% Helium, and 1% carbon dioxide.

# Formation Descriptions

| Age | Formation Name | Thickness and Description |
|---|---|---|
| **Triassic** | **Moenkopi** | ***0-420' of shale, some sandstone*** |
| **Permian** | **Kaibab Limestone** | ***0-75' of limestone, some dolomite and sandstone*** |
| **Permian** | **Coconino Sandstone** | ***350-400' of light-colored sandstone, to tan and red in lower part, w/ quartz overgrowths on grains*** |
| **Permian** | **Supai Group** | ***200-750' of dark mudstone and siltstone at base, overlain by 600-900' of red siltstone and sandstone with some interbedded carbonates and evaporites, overlain by 0-80' of the Fort Apache Member (limestone and/or dolomite, porous, some shale and evaporites); overlain by 450-1300' of evaporites (halite & gypsum), some carbonates and redsiliciclastics.*** |
| **Pennsylvanian** | **Naco** | ***790-1100', more carbonate to the south, more shale to the north. Consists of alternativing gray limestones, reddish-brown calcitic shale some dolomitic limestone, generally non-porous, equivilent to Molas formation in Utah, Colorado, New Mexico*** |
| **Pennsylvanian** | **Hermosa** | ***0-250' of interbedded shale and lesser limestone*** |
| **Pennsylvanian** | **Molas** | ***karst breccia and red shale*** |
| **Mississippian** | **Redwall** | ***0-100' of fossilferous limestone, some dolomite*** |
| **Devonian** | **Martin** | ***0-130' of porous dolomite, some interbedded limestone, sandstone and shale*** |
| **Cambrian** | **Tapeats/McCracken Formation** | ***0-90' of sandstone*** |
| **PreCambrian** | **Basement** | ***granite and local metamorphics*** |

# Simplified Stratigraphic Section

Holbrook Basin



# Primary Targets

The Permian Coconino sandstone and the Supai group are the primary targets as they are very porous and permeable in the Holbrook Basin. The residual oil shows in the Coconino on the Concho Dome lend evidence to oil entrapment within the Coconino on the Manuel Seep that is structurally 500 feet higher. The Boundary Butte Field on the Utah-Arizona border has produced in excess of four million barrels of oil from 458 surface acres from a depth of 1,500 feet. Since the surface of the Manuel Seep covers 12,766 acres, the recoverable reserve potential is much greater. In addition to oil and gas reserves, the Supai group is host to vast helium reserves.

The Permian Coconino that produced helium at the Pinta Dome, Navajo Springs and East Navajo Springs on the north side of the Holbrook Basin and oil on the Arizona-Utah border and wells on either side of the Manuel Seep. The Permian Fort Apache contained oil, gas and helium in the PetroSun 17-1, gas and helium on the PetroSun 15-1 and the Holbrook Energy 26-1 displaced several barrels of oil on the pit at its Meteor Crater prospect. The Granite Wash contained shows of $C_1$ and $C_2$ in Ridgeway Petroleum's 1994 $CO_2$ and helium discovery on the St. Johns anticline to the southeast of the Manuel Seep Prospect.

# Later Targets

The Devonian formations are considered to be later targets for the following reasons:

(1) The prospective pay zones are present in the Pan American Petroleum NMALCO B-1 well on the East Taylor Anticline, the adjacent surface structure to the southwest, and the absence of the zones in the Pan American NMALCO A-1 well on the top of the Concho Dome, the adjacent surface structure to the northeast;

(2) PetroSun's NMAL 15-1 well on the flank of the Concho Dome encountered 48 feet of basal Devonian shale, indicating the whole Devonian section should be present on the Manuel Seep;

(3) Gravity and aeromagnetic data indicate rapid thinning of the sedimentary section northeast of the Manuel Seep, which is very likely the pinch-out of the Devonian; and

# Later Targets

## Continued

(4) the McCracken sandstone and the Martin dolomite have excellent reservoir qualities. Dolomite samples from the Devonian oil seep on the East Verde River were analyzed for porosity (17%) and permeability (34md). A cross section using the Amstrat logs from the PanAm wells is attached as Figure 2. A map showing the locations of these wells and the three structures is included as Figure 3. A map of the Bouguer gravity data showing the gradient that indicates the pinch-out of the Devonian is included as Figure 4. Pictures of the Devonian oil seep are included as Figure 5. Source rock analysis of the field. Devonian Martin has indicated that it was buried to sufficient depth to generate oil and natural gas, that it has total organic content (TOC) of 2.8% and that it is at the peak of the oil generation window, capable of generating 246 barrels of oil per acre foot. Oil and natural gas are likely to be encountered on the above because it is likely trapped along the up-dip pinch-out of the Devonian source rocks and reservoir beds.

# Supporting Regional Geology

A geothermal well drilled in 1993, the Alpine Federal #1, encountered oil and vugular porosity in the Supai carbonates. The PetroSun NZ 15-1 has shows of oil and discovered natural gas on the Concho Dome with oolitic and oolmoldic porosity in excess of 30% in the dolomites that contain oil and gas, indicating that reefs are present in the Permian Supai series. The 1959 Pan American on either side of the Manuel Seep also encountered oolitic Supai dolomites containing shows of oil. An Amstrat log cross section from Pan Am 1-A on Concho Dome to Pan Am 1-B on the East Taylor Anticline is included as Figure 5B to show the 40 to 55 foot thickness of the Fort Apache member of the Permian Supai, ,the oolites described in the samples and the live oil shows in the dolomites.

# Supporting Regional Geology
## Continued

- Based on a high precision gravity and multilevel aeromagnetic survey in the Concho area, there is an area of high density between Mesa Redonda and the Concho Anticline, which has been interpreted as carbonate sequences. That area coincides with the surface anticline across the Manuel Seep, so the structure overlies and may reflect a reef buildup in the Permian Supai. Figure 6 is a map showing the two profiles that were flown across on the Manuel Seep. Since the Manuel Seep is along the edge of the Upper Supai Salt Basin, reefs, beaches and sandbars may all contain oil, natural gas and helium. Oil was encountered in the Permian Supai dolomites in the potash wells between Concho Dome and Manuel Seep. Those mineral tests with multiple oil and gas shows have been added to the map of the Holbrook Basin (Figure 1). On the other side of the Manuel Seep, the East Taylor Anticline had oil shows in the Permian Supai. An oil and gas test south of St. Johns flowed water at the rate of 700 gallons per minute (24,000 barrels per day) from a sand in the Permian Supai. Therefore, the Permian Supai has the potential for prolific production rates from the sands, as well as the vugular dolomites.

# Oil Reserve Potential

- The reserve potential of the Manuel Seep is of an enormous magnitude. Based on Devonian oil production in the Lisbon and Walker Creek Fields (AZ), Devonian oil reserves could be 295,000 barrels per well. The Manuel Seep contains 172 locations on 80 acre spacing (oil) that provides a Devonian oil potential of approximately 50,000,000 barrels. The spacing for gas wells in Arizona is 640 acres that provides for 22 gas wells or a total Devonian natural gas potential of 2.1 trillion cubic feet of natural gas. Penn reserves of at least 1 billion cubic feet of natural gas per 160 acre spacing were calculated by Sumatra Energy from logs run in their well on the Concho structure that extrapolate potential natural gas reserves of 4 BCF per 640 acres. The Permian Supai oil reserves based on volumetric calculations using the porosities encountered by Ridgeway Petroleum and PetroSun allow for 553,900 barrels of oil per 40 acres and/or 1.9 BCF of natural gas per 640 acres. The Permian Coconino potential oil reserves based on the Boundary Butte Field equate to 330,000 barrels of oil per 40 acre spacing.

# General Geology

- Permian Strata truncate Devonian, Mississippian, Pennsylvanian and Proterozoic basement rocks along the southwest margin of the Defiance-Zuni Uplift in the Eastern Holbrook Basin. Maximum submergence of the Uplift may have occurred during the Mississippian (Stoyanow, 1936). The Mississippian rocks were subsequently eroded back to an edge line west of Devonian rocks, most likely due to slow emergence of the uplift in Pennsylvanian through Permian time. As much as 2,000 feet of Permian Strata was deposited on the Proterozoic basement rocks of the Defiance-Zuni Uplift.
- Devonian, Mississippian, and Pennsylvanian strata are the most extensive and prospective of the pre-Permian units in the eastern Holbrook Basin. The Manuel seep one of the highest points on the Holbrook Basin. The Devonian, Mississippian and Pennsylvanian stratas truncate and stack on one another as you move up structure to the apex of the Holbrook Basin.

# Devonian

- Devonian Strata overlay the Proterozoic and Cambrian rocks over most of the eastern Holbrook Basin. North of the Holbrook Basin (HB), Devonian sands (McCracken) are productive where they were deposited around pre-Devonian topographic relief along the northwest margin of the Defiance-Zuni Uplift. Approximately 100,000 barrels of oil have been produced from these basal Devonian sands in northeastern Arizona at the Walker Creek Field (Rauzi, 1996). South of the Holbrook Basin, basal Devonian sands (Beckers Butte, BB) were deposited on a surface of as much as 300 feet of local relief along the Mongollon Rim and in Salt River Canyon (Huddle and Dobrovolny, 1952). The isopach pattern of Devonian Rocks indicates that similar pre-Devonian relief is present at depth in the eastern Holbrook Basin. Local depressions and embayments with similar basal sand deposits are probable along the entire length of the southwest margin of the Defiance-Zuni Uplift in the eastern Holbrook Basin.

# Devonian

- Drifting plankton and algae, abundant flora of psilophytes (primitive land plants) and layers of lime mud rich in organic matter probably filled the local depressions and embayments (Teichert, 1965). As a result, these areas may contain source rocks and significant potential for stratigraphic and subtle structural traps in the pre-Permian strata in the subsurface of the eastern Holbrook Basin. Basal Devonian sands, 10 to 20 feet thick, usually occur below a thick sequence of dark brown, petroliferous limestone in outcrops along the Mogollon Rim (Huddle and Dobrovolny, 1945). In like manner, basal sands deposited in local depressions and embayments along the southwest margin of the Defiance-Zuni Uplift may contain trapped hydrocarbons generated from organic-rich source rock. Such hydrocarbon source rock at depth in the eastern Holbrook Basin may have geochemical analyses similar to or better than Devonian mudstones that crop out in Salt River Canyon. The Devonian mudstones in Salt River Canyon have a total organic carbon content of 2.81 percent and are within the oil generating window (Desborough & et al.).

# Mississippian

- The Mississippian Redwall Limestone maintains a fairly consistent thickness of about 100 feet across most of the Holbrook Basin and wedges out between Devonian and Pennsylvanian rocks along the southwest margin of the Defiance-Zuni Uplift Zone (DZUZ). Mississippian rocks are not present in a broad area northwest of Heber, probably because of late or post Mississippian uplift and erosion (Havenor and Pye, 1958). More than 800,000 barrels of oil and 385 million cubic feet of helium-bearing gas have been produced from Mississippian carbonate units in northeastern Arizona (Rauzi, 1996). As a result, the hydrocarbon and helium potential of Mississippian rocks in eastern Holbrook Basin should not be dismissed, especially along the southwest margin of the Defiance-Zuni Uplift. Mississippian rocks may contain hydrocarbons or helium-bearing gas, especially where truncated between underlying Devonian hydrocarbon source rocks and overlying impermeable Pennsylvanian shales.

# Pennsylvanian

- The fossiliferous Pennsylvanian strata at depth in the eastern Holbrook Basin, therefore, may very well have generated and trapped hydrocarbons, especially along the southwest margin of the Defiance-Zuni Uplift, where Tertiary volcanic/intrusive activity may have enhanced the hydrocarbon generation and potential of Pennsylvanian strata, much as it has enhanced the generation and production of hydrocarbons in northeastern Arizona. Most of the shoreline clastic rocks of Pennsylvanian age in the eastern Holbrook Basin are shales, calcareous siltstones, and silty limestones, indicating that the southwest margin of the Defiance-Zuni uplift remained relatively low relief, at or slightly above sea-level through Pennsylvanian time.
- The Pennsylvanian Naco Formation grades from unfossiliferous red beds in the western part of Holbrook basin into fossilferous carbonate beds in the eastern and southeastern part of the basin, where they are lithological similar to the “Bough” zone of probable upper Pennsylvanian age in southeastern New Mexico (Kottlowski et al, 1962). The bough zone produces oil in three fields and appears to have similar relationships to the Matador arch as the Naco has to the Defiance-Zuni uplift (analog).

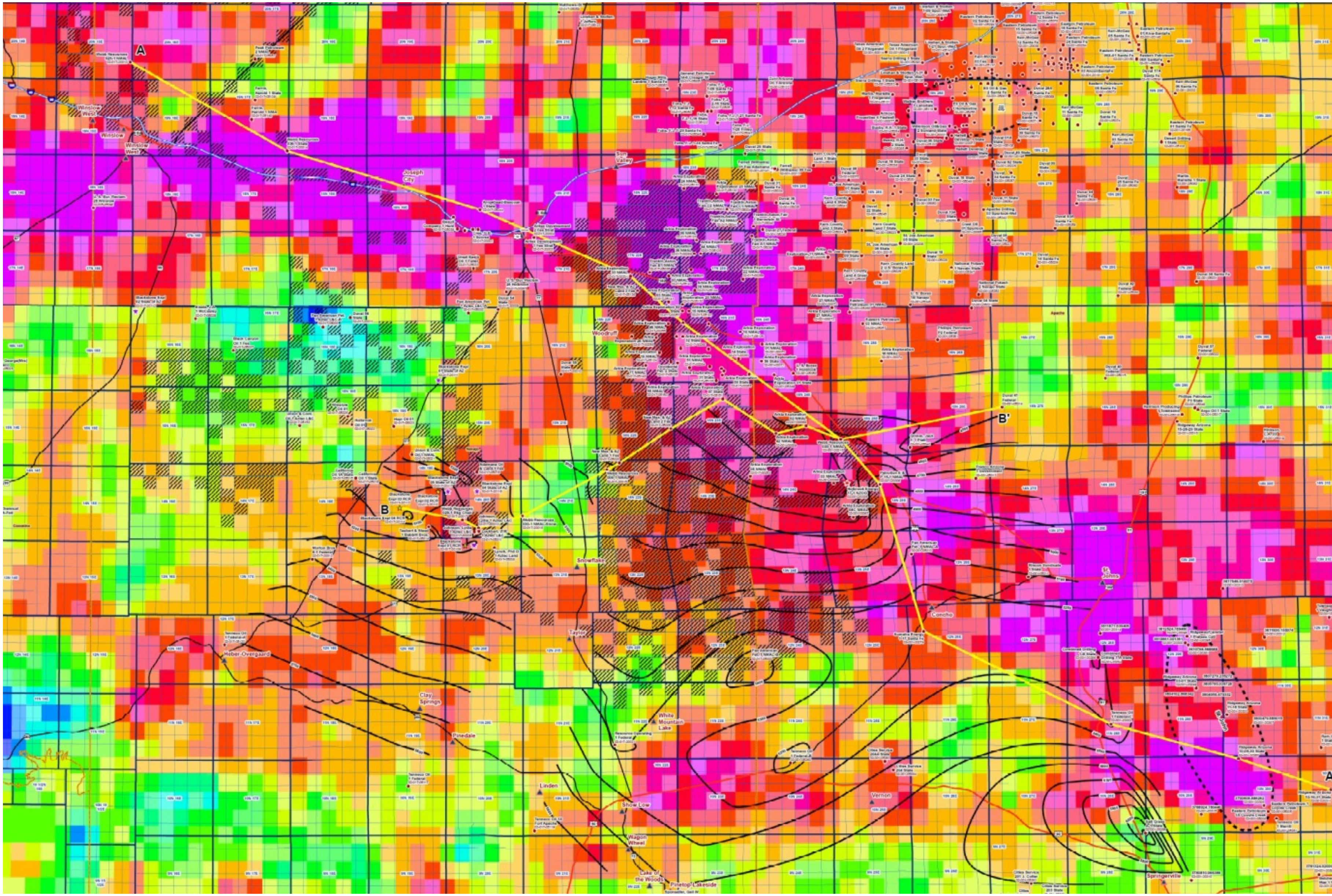
# Pennsylvanian

- Massive to nodular fossiliferous limestones of Pennsylvanian age crop out in the southeastern most part of the Holbrook Basin on the North side of Escudilla Mountain in 28-7n-31e. These outcrops indicate that a fairly thick sequence of Pennsylvanian marine strata was deposited in this portion of the Holbrook Basin and is present at depth beneath the White Mountain volcanic field. A well drilled into the Permian Supai in 1993 on the south side of Escudilla Mountain shows extensive volcanic rocks forming in the White Mountains are not extensive at depth and have not been detrimental to the oil and gas potential for this region. This volcanism, in fact, may have locally enhanced the potential for oil and gas generation and accumulation as it has in northeastern Arizona. Bleeding oil from Permian Carbonate units in the hole drilled south of Escudilla Mountain attests to the presence of hydrocarbons at depth beneath volcanic rocks in the White Mountain Area (Rauzi, 1994).

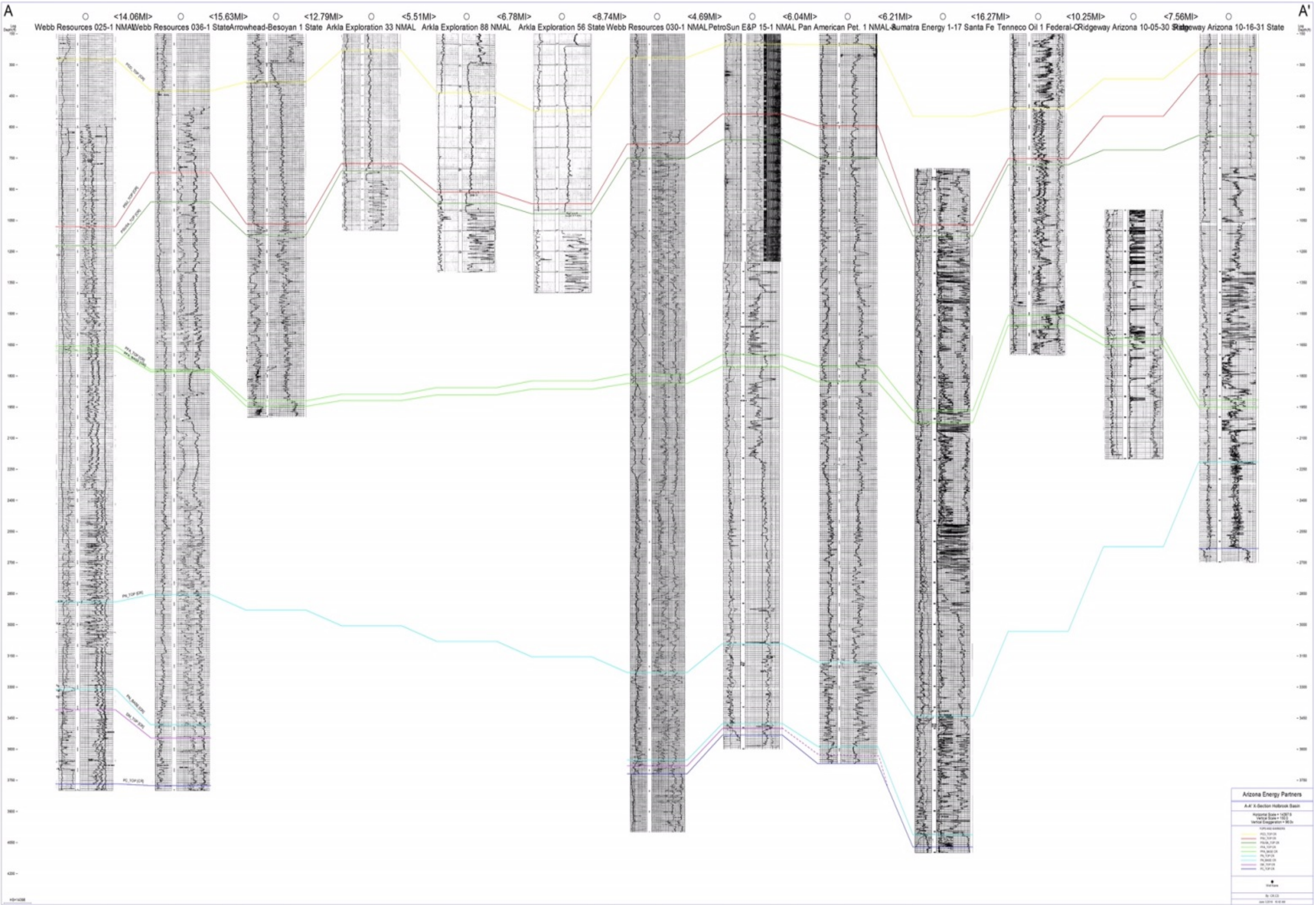
# Pennsylvanian

- The large, organic rich reefs and associated lagoonal deposits, suggested at depth by the fossilferous Pennsylvanian rocks that outcrop on the north side of Escudilla Mountain, have significant potential for generation, accumulation and production of oil and gas along this part of the southwest margin of the Defiance-Zuni Uplift. Clearly the White Mountain region of the Holbrook Basin should not be overlooked, it has favorable paleogeography and potential for hydrocarbon production.

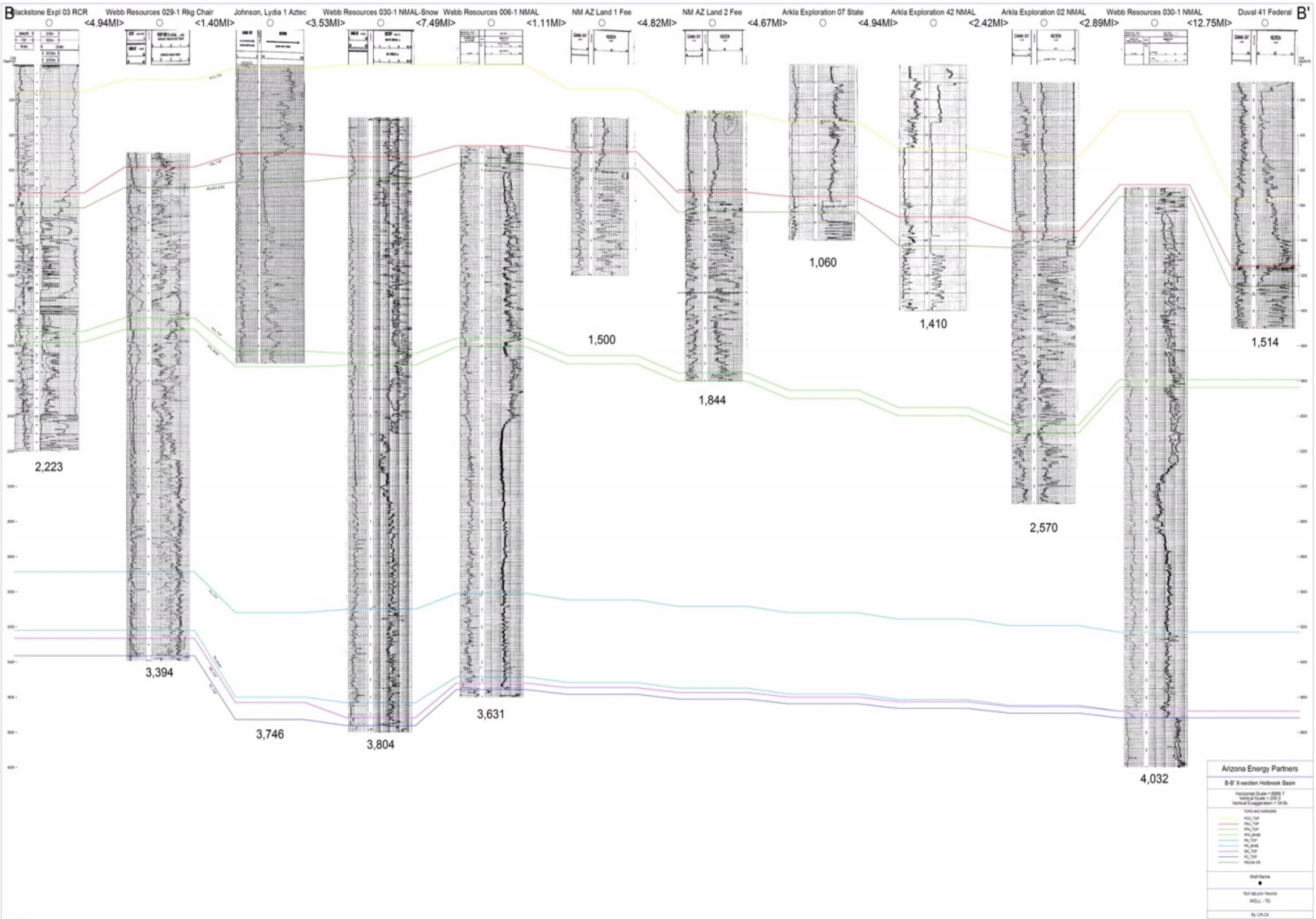
# Uranium/Thorium Survey Map with Cross-Sections



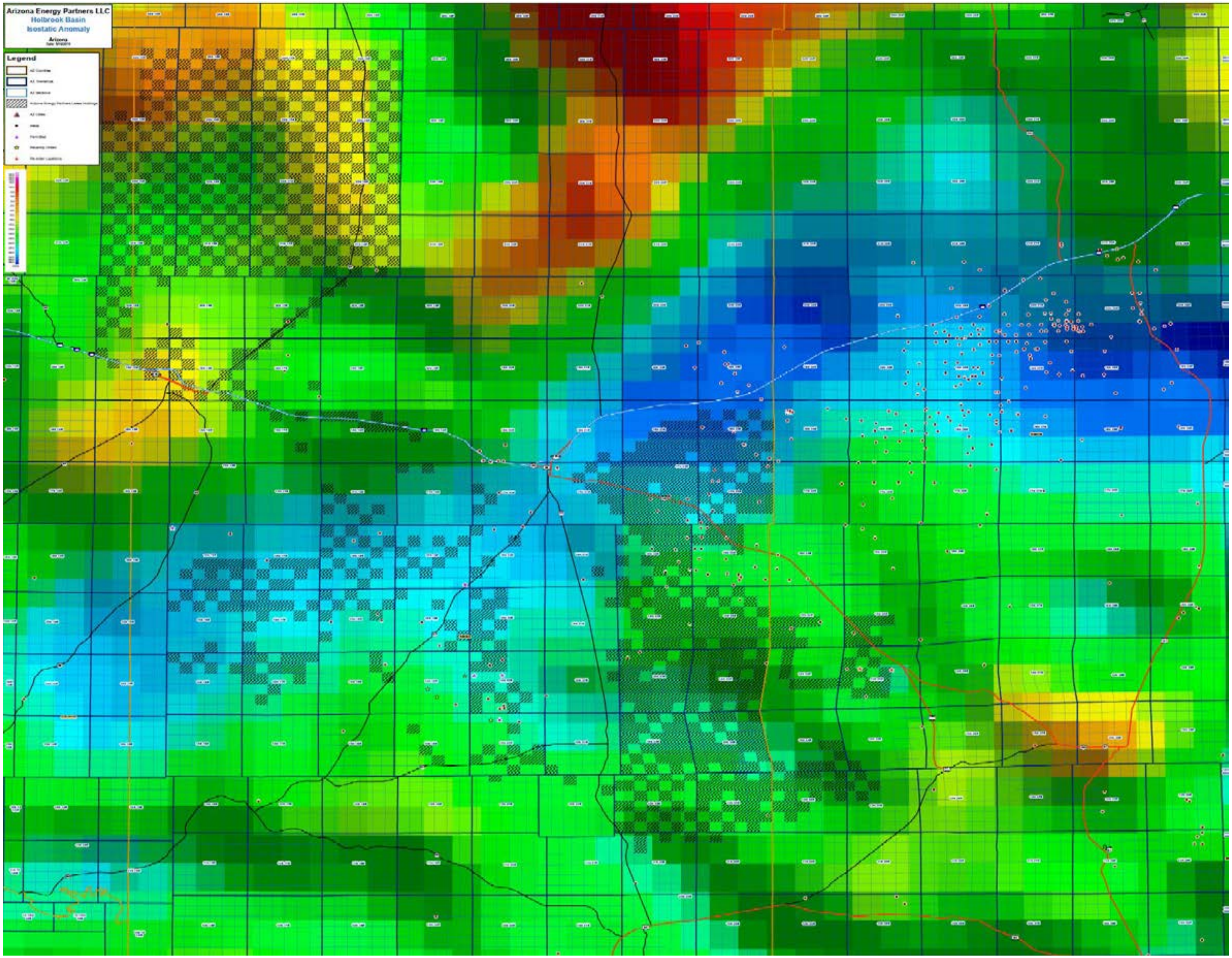
# A – A’ Holbrook Basin



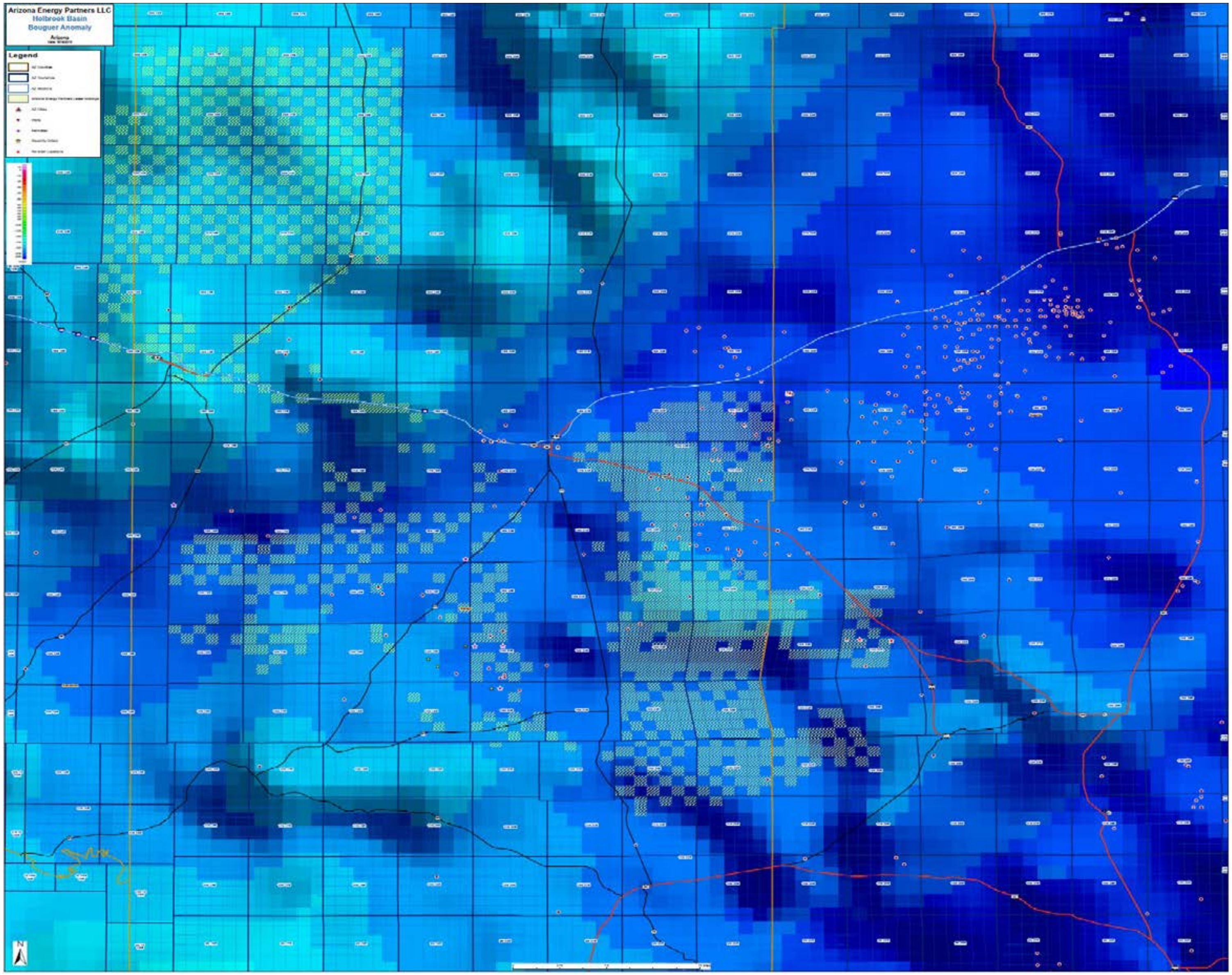
# B – B' Holbrook Basin



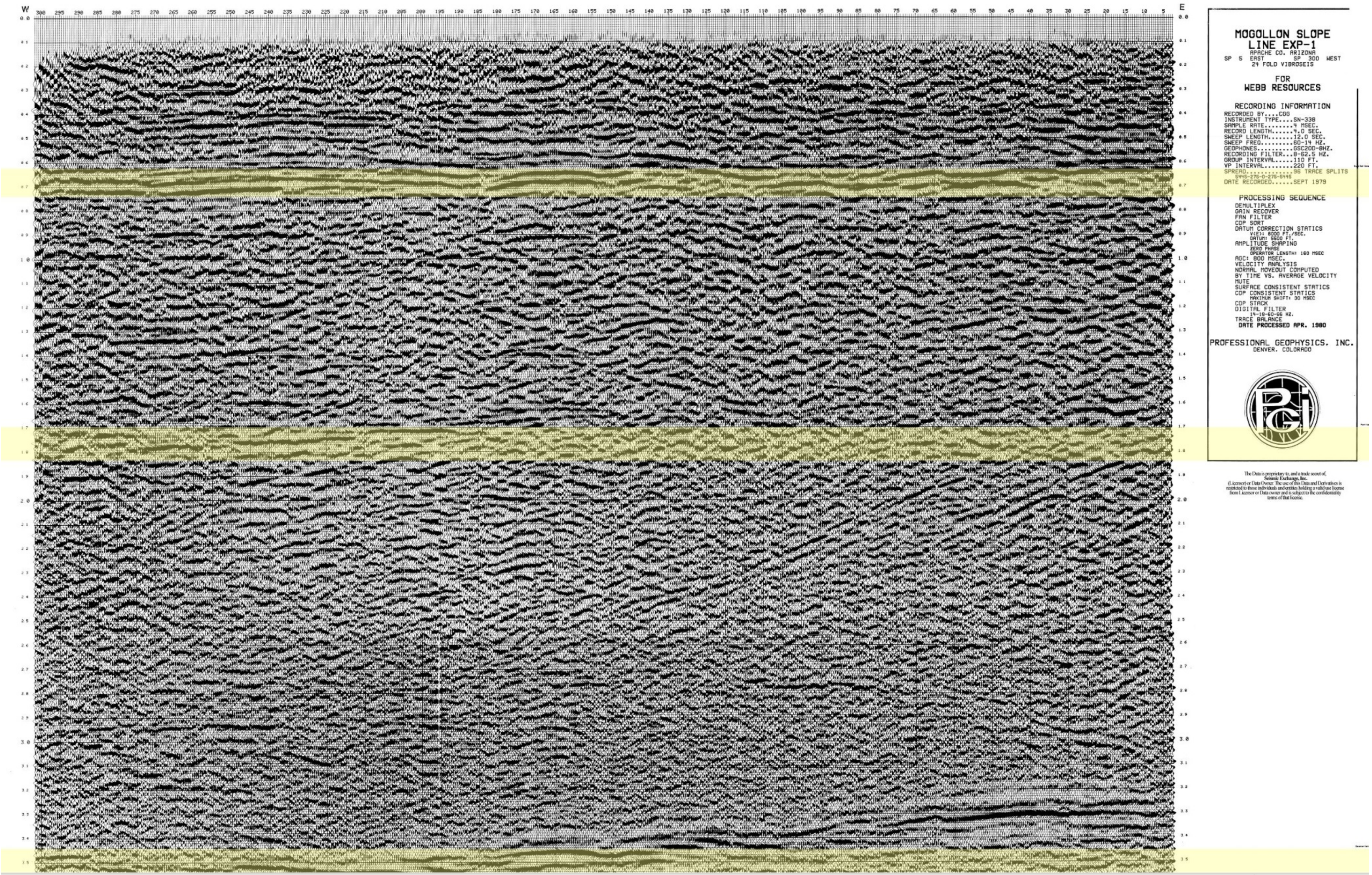
# Isostatic Anomaly Map



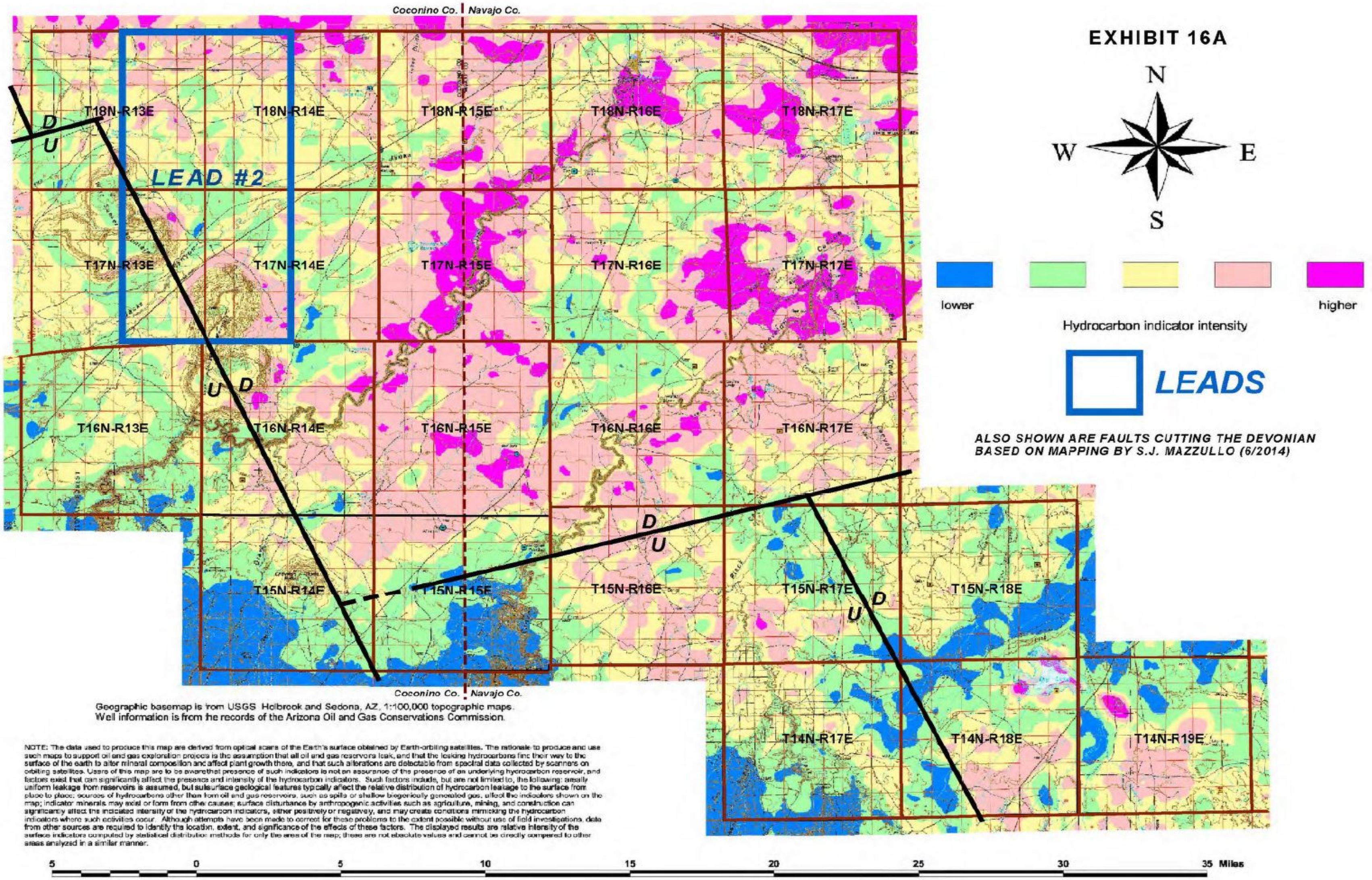
# Bouguer Anomaly Map



# Webb Resources Seismic Line (1979)

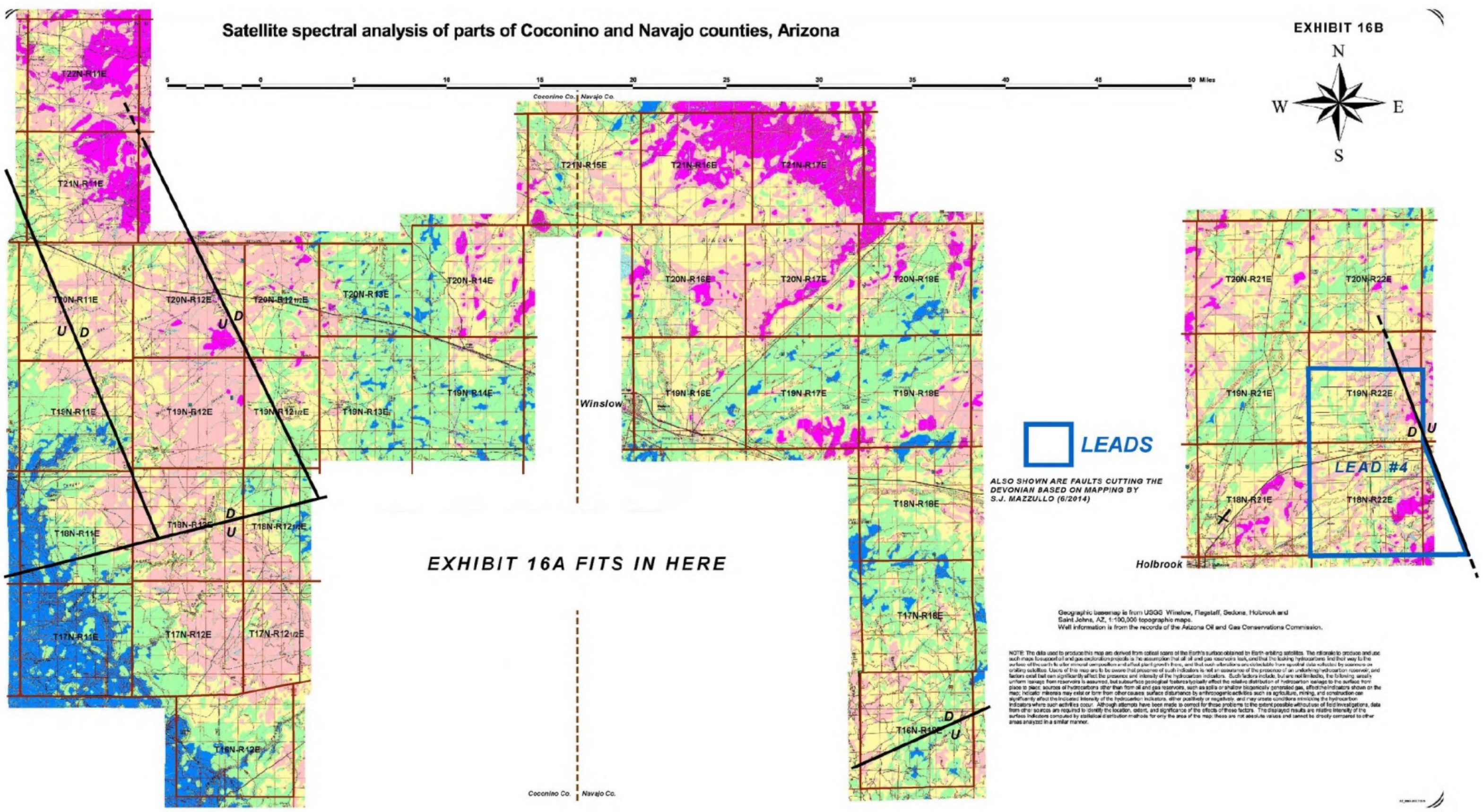


# Holbrook Basin Hydrocarbon Spectral Analysis




Satellite spectral analysis of parts of Coconino and Navajo counties, Arizona

# Holbrook Basin Hydrocarbon Spectral Analysis



# AFE for 2500’

| | | | |
|---|---|---|---|
| | | Date: | 7-Dec-15 |
| AFE No. | MS 001 | Lease Number: | Arizona State Land Department (ASLD) |
| Area: | Section 13, Township 12 North, Range 24 East | County: | Apache |
| State: | AZ Project Name: Manuel Seep # 1 | Operator: | PetroSun Inc /AZ Energy |
| Formation: | Permian test | | |
| Prepared By: | Gordon LeBlanc, Jr. | T.D. | 2,500 feet |

Exploration: Yes — Development: N/A

Results: Oil — Gas — Dry

| Drilling Intangibles: | Dry Hole Without Pipe | Completed Well | Actual Cost | Over (Under) |
|---|---|---|---|---|
| Location: Roads, Pits Damages | $ 5,000.00 | | | |
| Rig Move Ft. @ /FT. | $ 30,000.00 | | | |
| Day Work 9 Days WDP @ $ 10,500.00 /Day | $ 94,500.00 | | | |
| Days WODP @ /Day | | | | |
| Cement and Cementing | $ 18,250.00 | | | |
| Testing and Coring | $ 15,600.00 | | | |
| Logging | $ 19,800.00 | | | |
| Professional Services (Legal, Engineering, Geological, Survey) | $ 27,000.00 | | | |
| Mud Materials, Fuel, Water | $ 18,950.00 | | | |
| Bits, Coreheads and Rentals | $ 16,700.00 | | | |
| Miscellaneous Services (Inc. Marine, Rigging, Welding, ETC) | $ 5,000.00 | | | |
| Miscellaneous (Inc. Labor & Transportation & Blowout Insurance) | $ 6,500.00 | | | |
| Contingency 10 % | $ 25,730.00 | | | |
| Administrative, General Expense | | | | |
| ***Total Drilling*** | $ 283,030.00 | | | |

| Completion Intangibles | Dry Hole Without Pipe | Completed Well | Actual Cost | Over (Under) |
|---|---|---|---|---|
| Completion Unit 4 Days/Hrs. 5,500.00 | $ 22,000.00 | | | |
| Cement and Cementing | $ 26,000.00 | | | |
| Perforating and Logging | $ 13,200.00 | | | |
| Frac and/or Acid Treatment | $ 6,000.00 | | | |
| Fuel, Water, Power | $ 3,000.00 | | | |
| Battery Construction - Dirt Work, ETC. | $ 6,000.00 | | | |
| Completion Tools and Equipment - Rentals | $ 13,000.00 | | | |
| Professional Services (Legal, Engineering, Geological, Consulting) | $ 8,000.00 | | | |
| Miscellaneous Services (Inc. Marine, Welding, Back Fill ETC) | $ 2,500.00 | | | |
| Other (Including Labor & Transportation | $ 4,500.00 | | | |
| Contingency 10 % | $ 10,420.00 | | | |
| ***Total Completion*** | $ 114,620.00 | | | |
| ***Total Intangibles*** | | | | |

| Drilling and Completion Tangibles | Dry Hole Without Pipe | Completed Well | Actual Cost | Over (Under) |
|---|---|---|---|---|
| Casing @ /FT. | | | | |
| 705 FT. 7" @ $12.00 /FT. | $ 8,460.00 | | | |
| 2,500 FT. 4 1/2 @ $8.50 /FT. | $ 21,250.00 | | | |
| @ /FT. | | | | |
| Tubing 2,500 FT 2 3/8 JFE @ $3.75 /FT. | $ 9,375.00 | | | |
| Wellhead Equipment 4 1/2"x2 3/8" 7" x 4 1/2" | $ 2,500.00 | | | |
| Floating Equipment, Centralizers, Scratchers | $ 2,500.00 | | | |
| Rods @ /FT. | | | | |
| Subsurfaces Equipment - Seating Nipple & Packer | $ 5,500.00 | | | |
| Line Pipe 500 FT. @ $2.00 /FT. | $ 1,000.00 | | | |
| FT. @ /FT. | | | | |
| Tanks, Treaters, Separators, Liners, Walks, ETC. | | | | |
| Gas Processing Unit - Dehydration | | | | |
| Other Miscellaneous Equipment (Fences, Culvert, Tools, ETC) | $ 1,500.00 | | | |
| Contingency 10 % | $ 5,208.00 | | | |
| ***Total Equipment Cost*** | $ 57,293.00 | | | |
| ***Total Well Cost*** | $454,943.00 | | | |

| Leases | Dry Hole Without Pipe | Completed Well | Actual Cost | Over (Under) |
|---|---|---|---|---|
| Leases Arizona State Land Department | | | | |
| ***Total Well and Lease Cost*** | | | | |

**Aprovals**

Operator

By

WI %

Date

# AFE for 4500’

| | | | |
|---|---|---|---|
| | | Date: | 7-Dec-15 |
| AFE No. | MS 001 | Lease Number: | Arizona State Land Department (ASLD) |
| Area: | Section 13, Township 12 North, Range 24 East | County: | Apache |
| State: | AZ Project Name: Manuel Seep # 1 | Operator: | PetroSun Inc /AZ Energy |
| Formation: | Devonian test | | |
| Prepared By: | Gordon LeBlanc, Jr. | T.D. | 4,500 feet |

Exploration: Yes — Development: N/A

Results: Oil — Gas — Dry

| Drilling Intangibles: | Dry Hole Without Pipe | Completed Well | Actual Cost | Over (Under) |
|---|---|---|---|---|
| Location: Roads, Pits Damages | $ 5,000.00 | | | |
| Rig Move Ft. @ /FT. | $60,000.00 | | | |
| Day Work 17 Days WDP @ $ 10,500.00 /Day | $246,500.00 | | | |
| Days WODP @ /Day | | | | |
| Cement and Cementing | $18,250.00 | | | |
| Testing and Coring | $31,000.00 | | | |
| Logging | $ 29,900.00 | | | |
| Professional Services (Legal, Engineering, Geological, Survey) | $34,000.00 | | | |
| Mud Materials, Fuel, Water | $32,600.00 | | | |
| Bits, Coreheads and Rentals | $ 36,700.00 | | | |
| Miscellaneous Services (Inc. Marine, Rigging, Welding, ETC) | $ 5,000.00 | | | |
| Miscellaneous (Inc. Labor & Transportation & Blowout Insurance) | $11,900.00 | | | |
| Contingency 10 % | $49,895.00 | | | |
| Administrative, General Expense | | | | |
| ***Total Drilling*** | $ 548,845.00 | | | |

| Completion Intangibles | Dry Hole Without Pipe | Completed Well | Actual Cost | Over (Under) |
|---|---|---|---|---|
| Completion Unit 4 Days/Hrs. 5,500.00 | $ 22,000.00 | | | |
| Cement and Cementing | $37,990.00 | | | |
| Perforating and Logging | $17,500.00 | | | |
| Frac and/or Acid Treatment | $18,000.00 | | | |
| Fuel, Water, Power | $ 3,000.00 | | | |
| Battery Construction - Dirt Work, ETC. | $ 6,000.00 | | | |
| Completion Tools and Equipment - Rentals | $ 13,000.00 | | | |
| Professional Services (Legal, Engineering, Geological, Consulting) | $ 8,000.00 | | | |
| Miscellaneous Services (Inc. Marine, Welding, Back Fill ETC) | $ 2,500.00 | | | |
| Other (Including Labor & Transportation | $ 4,500.00 | | | |
| Contingency 10 % | $14,291.00 | | | |
| ***Total Completion*** | $ 146,781.00 | | | |
| ***Total Intangibles*** | | | | |

| Drilling and Completion Tangibles | Dry Hole Without Pipe | Completed Well | Actual Cost | Over (Under) |
|---|---|---|---|---|
| Casing @ /FT. | | | | |
| 705 FT. 8 5/8" @ $12.50 /FT. | $ 8,812.50 | | | |
| 4,500 FT. 5 1/2" @ $8.50 /FT. | $ 38,250.00 | | | |
| @ /FT. | | | | |
| Tubing 4,500 FT. 2 7/8" @ $4.75 /FT. | $ 21,375.00 | | | |
| Wellhead Equipment | $ 2,500.00 | | | |
| Floating Equipment, Centralizers, Scratchers | $ 2,500.00 | | | |
| Rods 4,500 7/8" rods @ $40 @ /FT. | | | | |
| Subsurfaces Equipment - Large Bore Pump | $ 5,000.00 | | | |
| Line Pipe 500 FT. @ $2.00 /FT. | $ 1,000.00 | | | |
| FT. @ /FT. | | | | |
| Tanks, Gun barrel, Treaters, Separators & Install Labor | $ 60,000.00 | | | |
| Pumping Unit - D320-256-120 w/ power | $ 40,000.00 | | | |
| Other Miscellaneous Equipment (Fences, Culvert, Tools, ETC) | $ 1,500.00 | | | |
| Contingency 10 % | $ 18,093.75 | | | |
| ***Total Equipment Cost*** | $ 199,031.25 | | | |
| ***Total Well Cost*** | $894,657.25 | | | |

| Leases | Dry Hole Without Pipe | Completed Well | Actual Cost | Over (Under) |
|---|---|---|---|---|
| Leases Arizona State Land Department | | | | |
| ***Total Well and Lease Cost*** | | | | |

**Aprovals**

Operator

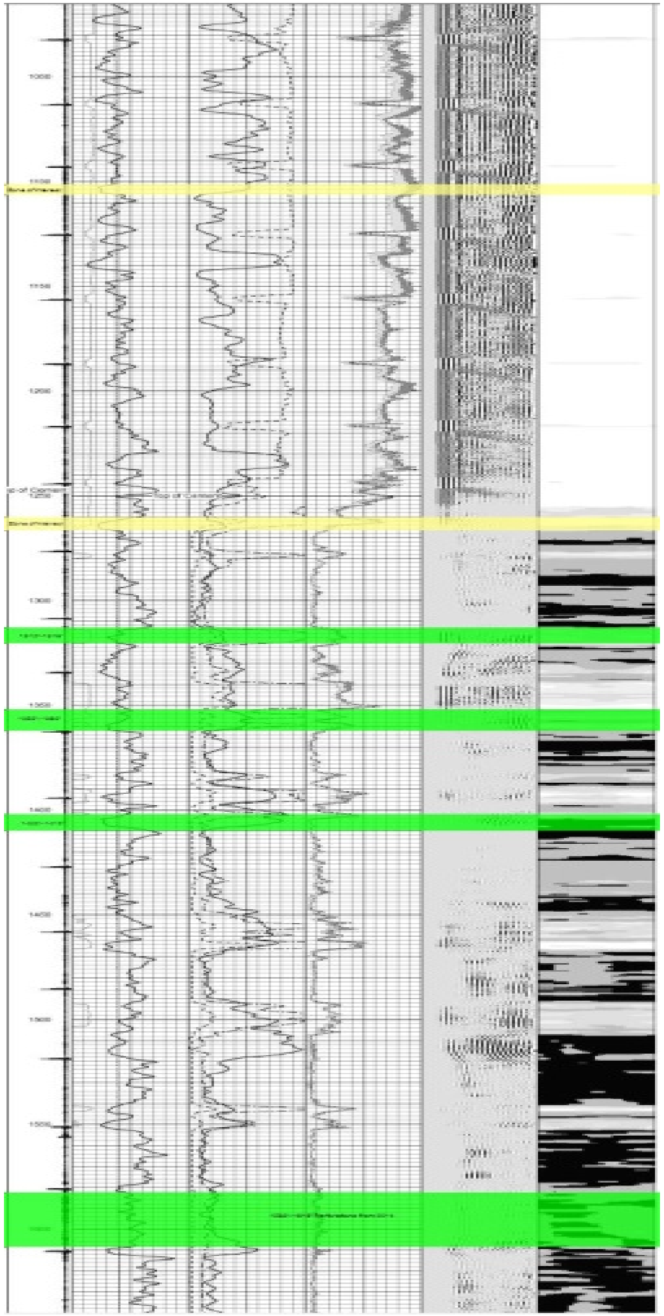
By

WI %

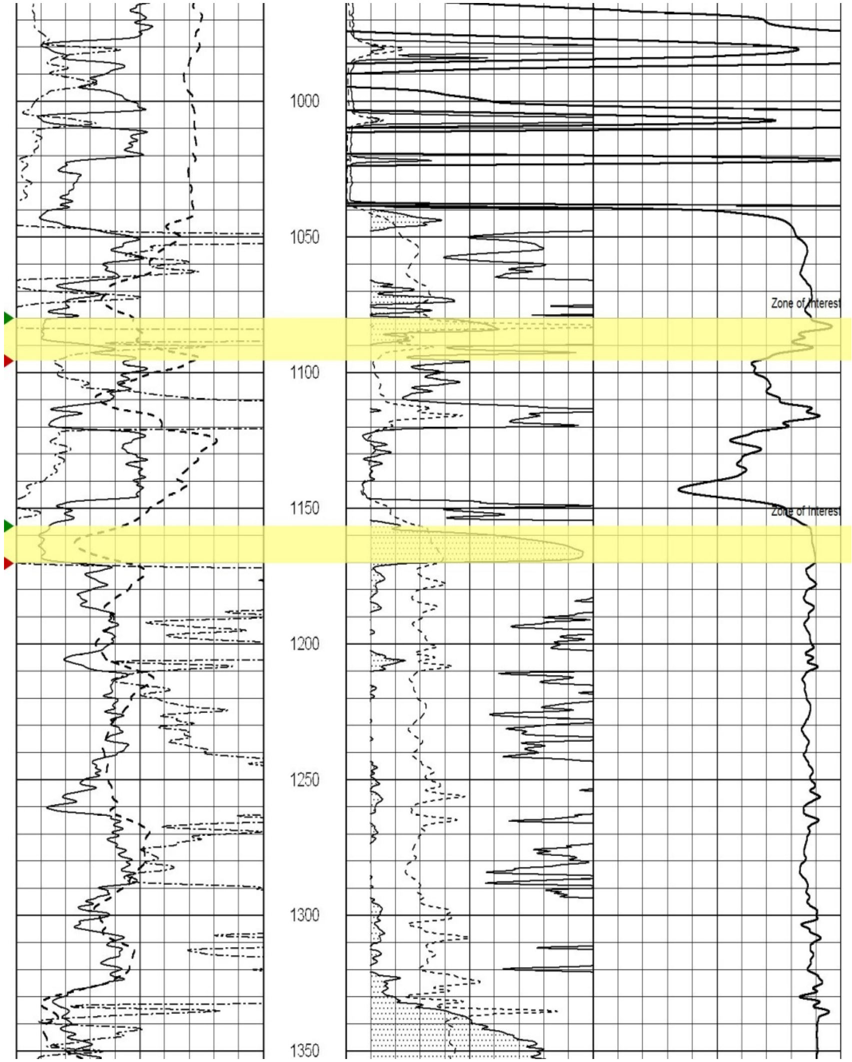
Date

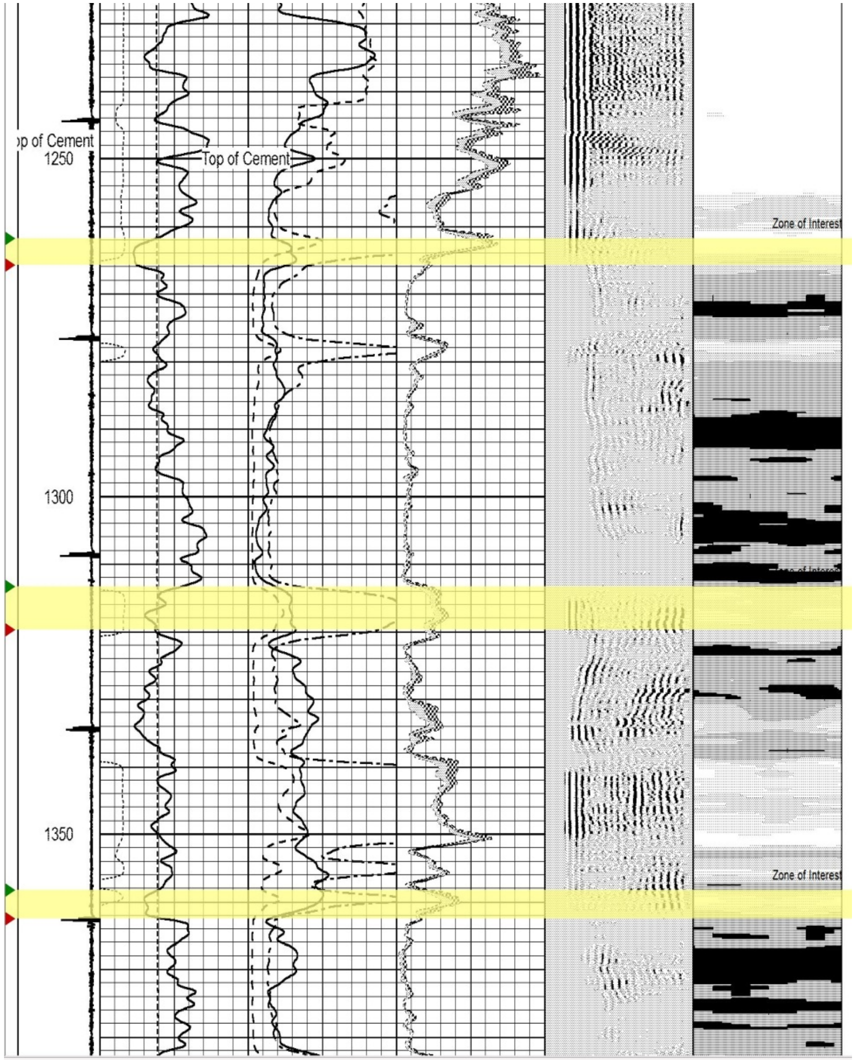
# HNZ Holdings 17-1 Re-entry

- The NZOG 17-1 well that tested 9% helium content at 1583'-1619' in 2014 was renamed the HNZ Holdings 17-1.
- On December 9, 2016, AEP re-entered the NZOG 17-1 well with the intention to test six target zones for the potential production of commercial helium gas and hydrocarbons.
- Zone 1 – 1402'-1410';Zone 2 – 1352'-1362'; Zone 3 – 1312'-1318'; Zone 4 – 1262'-1267'; Zone 5 – 1102'-1108'; Zone 6 – 867'-885'
- Due to poor cement integrity and safety concerns, we were unable to test Zones 4, 5 & 6. Zone 3 was properly tested with minor stimulation and gas samples were sent to Wyoming Analytical Laboratories for analysis.
- On January 3, 2017, gas analysis report noted 7.05% helium content in Zone 3.



# RCR 1 New Perforations and Re-entry

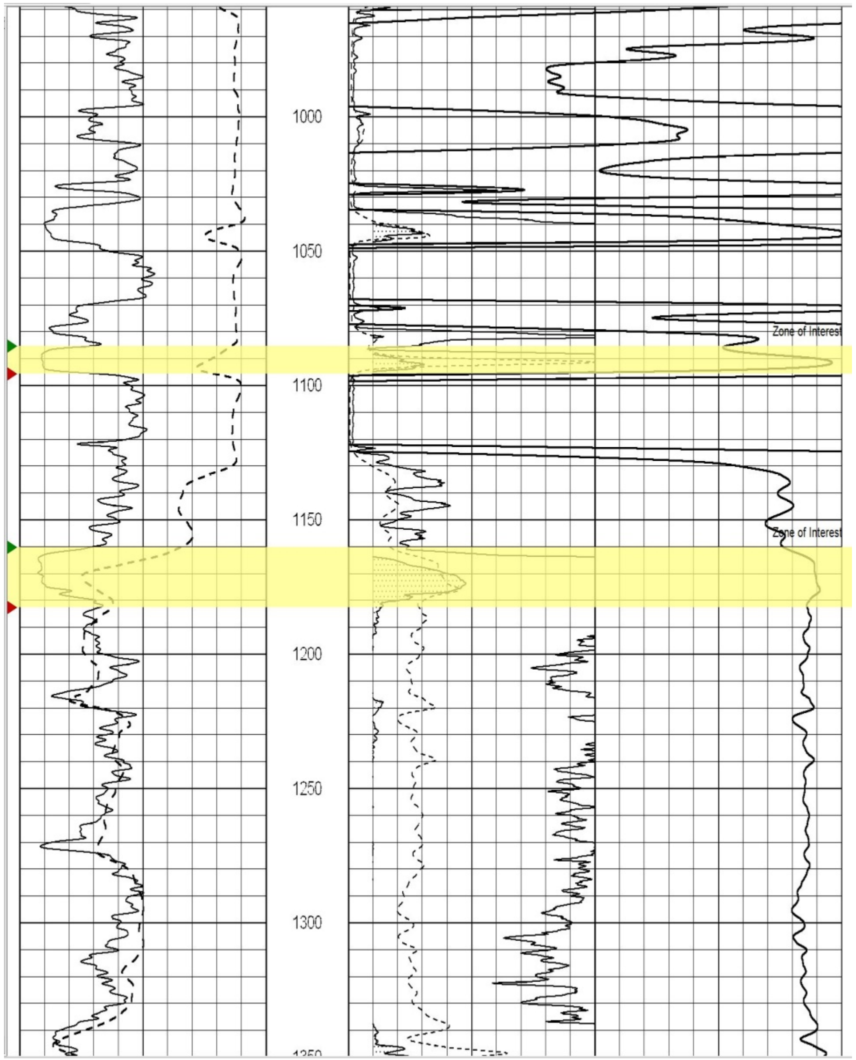


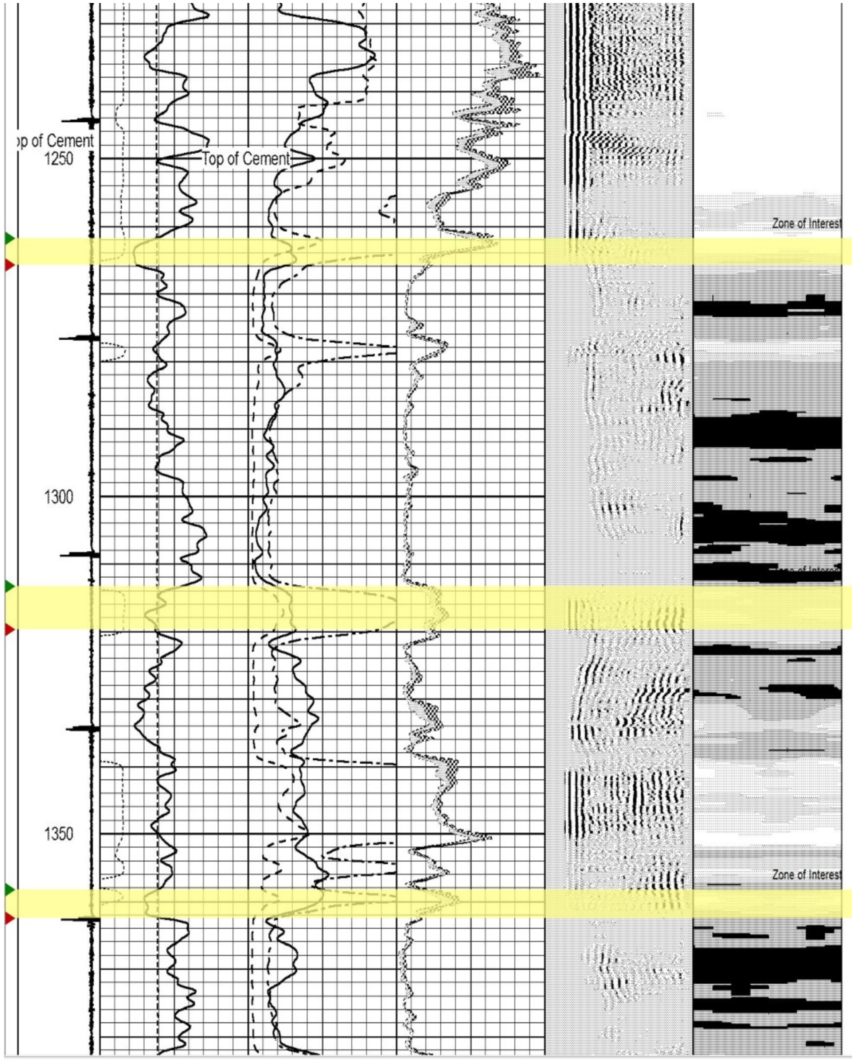



# Rocking Chair Ranch #1 Workover & Flow Test

- Current perforations were designed to test Ft. Apache formation and dolomite stringers
- After conducting workover operations it is concluded that by pumping acid into stringers, and have a strong blow back, all that occurred is over pressuring zone by pumping. This conclusion was also noted on a deeper zone in the AEP 17-1 well.
- By looking for a more rounded shape on the gamma ray signature on the dual induction logs, (rounded shape= sandstone), it is more conducive for producing gas because of its increased porosity.
- Please note that gas samples collected on the RCR #1 showed increased values of $CO2$, this is simply a by-product of the chemical reaction between Hydrocloric Acid and Carbonate rocks (i.e. dolomite)
- A proposed workover for the RCR # 1 includes setting a drillable bridge plug at 1200’ and perforating at 1160’-1170’, then stimulate perforations with 2000 gallons of 15% HCL (acid).
- After stimulating immediately begin swabbing operations until all fluid is off of well. Then tie well into flow test meter run and test for 14 days, collect samples after 6 hours to flow throughput, then collect samples every 24 hours for duration of flow test.
- After 14 day test is concluded, set drillable bridge plug at 1120’, and perforate from 1080’-1090’. Then stimulate perforations with 2000 gallons of 15% HCL (acid).
- After stimulating immediately begin swabbing operations until all fluid is off of well. Then tie well into flow test meter run and test for 14 days, collect samples after 6 hours to flow throughput, then collect samples every 24 hours for duration of flow test.
- After test, shut well in and wait for gas results from Wyoming Analytical lab, if helium content is suitable, use workover rig to drill out drillable plugs and begin gas production.

# RCR 2 New Perforations and Re-entry

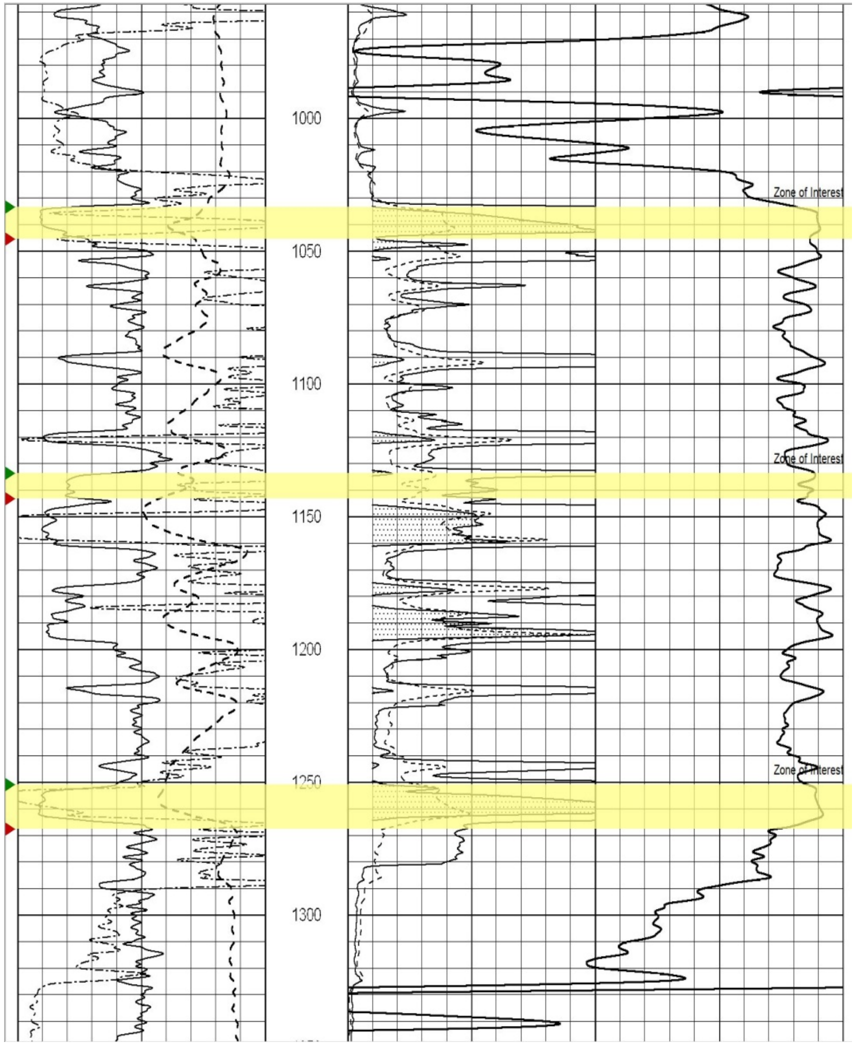


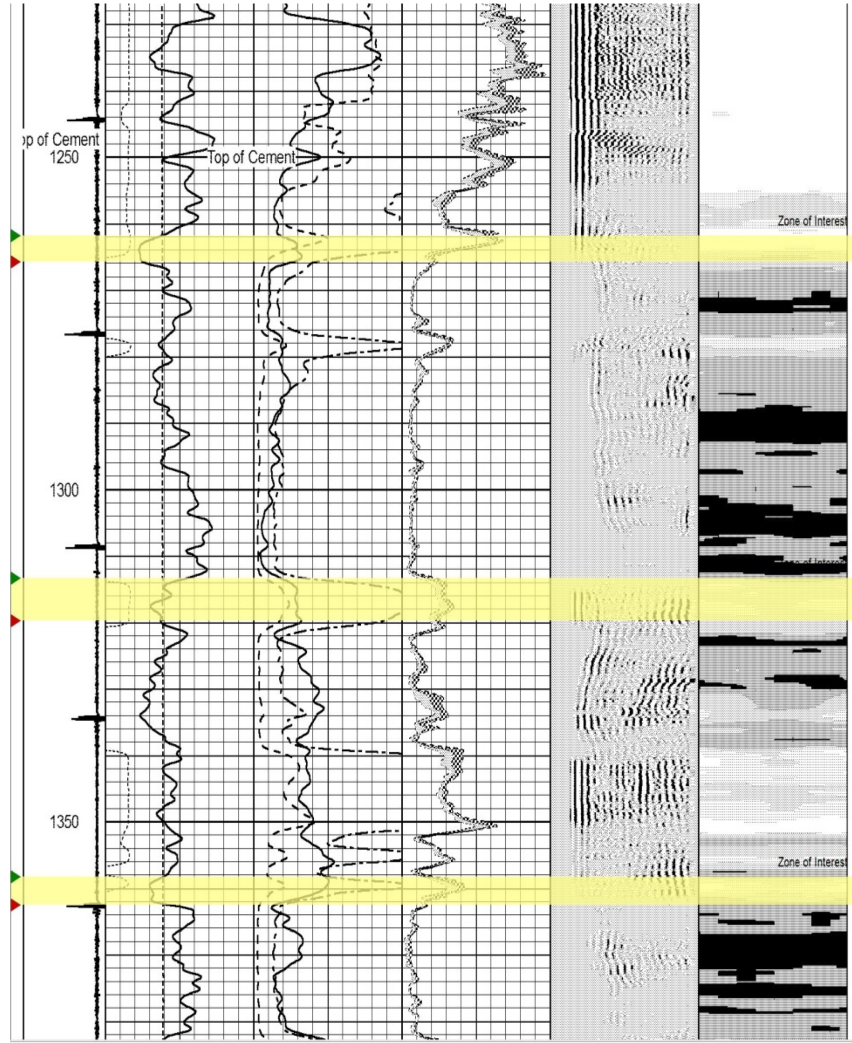



# Rocking Chair Ranch #2 Workover and Flow Test

- Current perforations were designed to test Ft. Apache formation and dolomite stringers
- After conducting workover operations it is concluded that by pumping acid into stringers, and have a strong blow back, all that occurred is over pressuring zone by pumping. This conclusion was also noted on a deeper zone in the AEP 17-1 well.
- By looking for a more rounded shape on the gamma ray signature on the dual induction logs, (rounded shape= sandstone), it is more conducive for producing gas because of its increased porosity.
- Please note that gas samples collected on the RCR #2 showed increased values of $CO_2$, this is simply a by-product of the chemical reaction between Hydrocloric Acid and Carbonate rocks (i.e. dolomite)
- A proposed workover for the RCR # 2 includes setting a drillable bridge plug at 1200’ and perforating at 1160’-1182’, then stimulate perforations with 2000 gallons of 15% HCL (acid).
- After stimulating immediately begin swabbing operations until all fluid is off of well. Then tie well into flow test meter run and test for 14 days, collect samples after 6 hours to flow throughput, then collect samples every 24 hours for duration of flow test.
- After 14 day test is concluded, set drillable bridge plug at 1105’, and perforate from 1086’-1096’. Then stimulate perforations with 2000 gallons of 15% HCL (acid).
- After stimulating immediately begin swabbing operations until all fluid is off of well. Then tie well into flow test meter run and test for 14 days, collect samples after 6 hours to flow throughput, then collect samples every 24 hours for duration of flow test.
- After test, shut well in and wait for gas results from Wyoming Analytical lab, if helium content is suitable, use workover rig to drill out drillable plugs and begin gas production.

# RCR 3 New Perforations and Re-entry

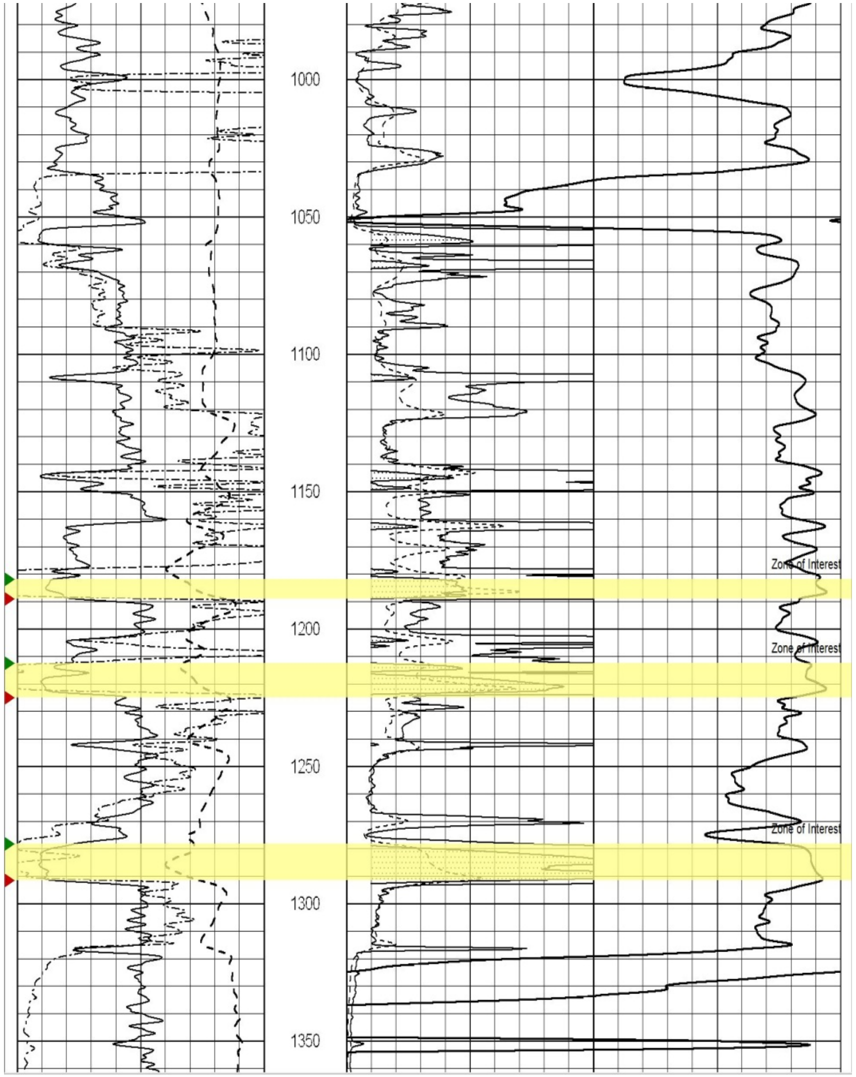


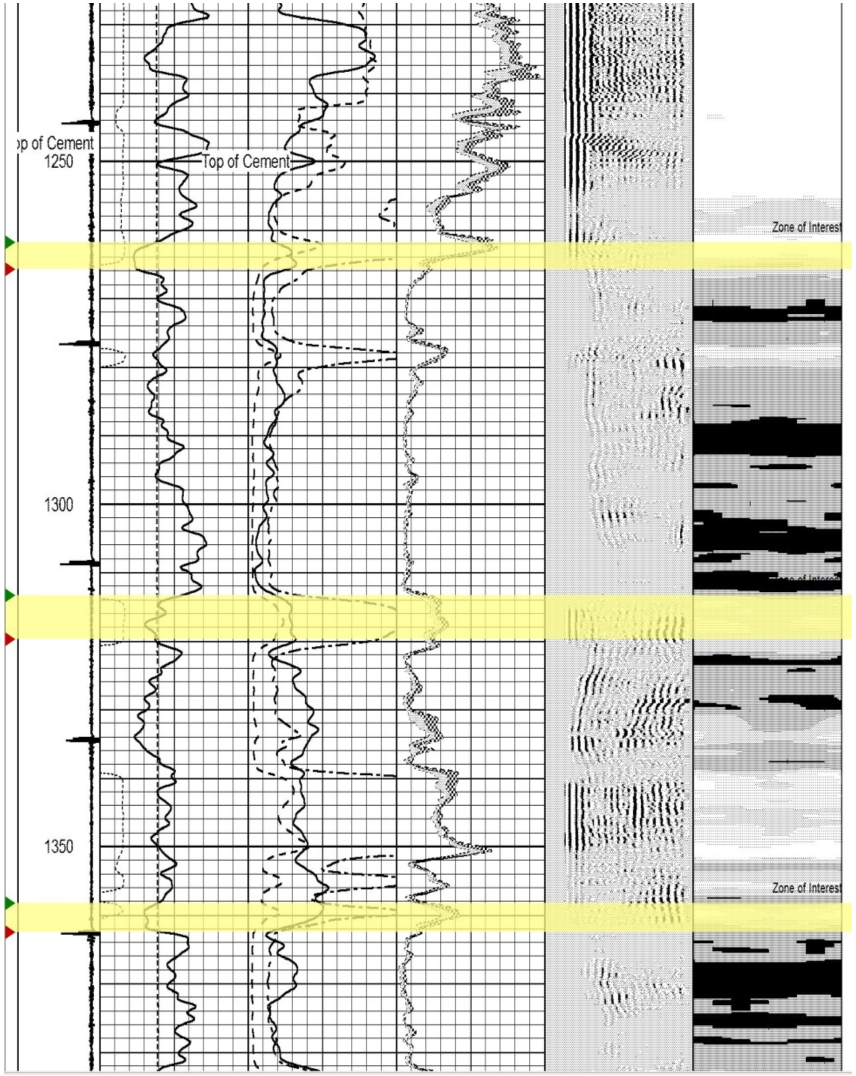



# Rocking Chair Ranch #3 Workover & Flow Test

- Current perforations were designed to test Ft. Apache formation and dolomite stringers. After conducting workover operations it is concluded that by pumping acid into stringers, and have a strong blow back, all that occurred is over pressuring zone by pumping. This conclusion was also noted on a deeper zone in the AEP 17-1 well.
- By looking for a more rounded shape on the gamma ray signature on the dual induction logs, (rounded shape= sandstone), it is more conducive for producing gas because of its increased porosity.
- Please note that gas samples collected on the RCR #3 showed increased values of $CO_2$, this is simply a by-product of the chemical reaction between Hydrocloric Acid and Carbonate rocks (i.e. dolomite)
- A proposed workover for the RCR # 3 includes setting a drillable bridge plug at 1300' and perforating at 1250'-1268', then stimulate perforations with 2000 gallons of 15% HCL (acid).
- After stimulating immediately begin swabbing operations until all fluid is off of well. Then tie well into flow test meter run and test for 14 days, collect samples after 6 hours to flow throughput, then collect samples every 24 hours for duration of flow test.
- After 14 day test is concluded, set drillable bridge plug at 1200', and perforate from 1132'-1142'. Then stimulate perforations with 2000 gallons of 15% HCL (acid).
- After stimulating immediately begin swabbing operations until all fluid is off of well. Then tie well into flow test meter run and test for 14 days, collect samples after 6 hours to flow throughput, then collect samples every 24 hours for duration of flow test.
- After 14 day test is concluded, set drillable bridge plug at 1100', and perforate from 1032'-1045'. Then stimulate perforations with 2000 gallons of 15% HCL (acid).
- After stimulating immediately begin swabbing operations until all fluid is off of well. Then tie well into flow test meter run and test for 14 days, collect samples after 6 hours to flow throughput, then collect samples every 24 hours for duration of flow test.
- After test, shut well in and wait for gas results from Wyoming Analytical lab, if helium content is suitable, use workover rig to drill out drillable plugs and begin gas production.

# RCR 4 New Perforations and Re-Entry

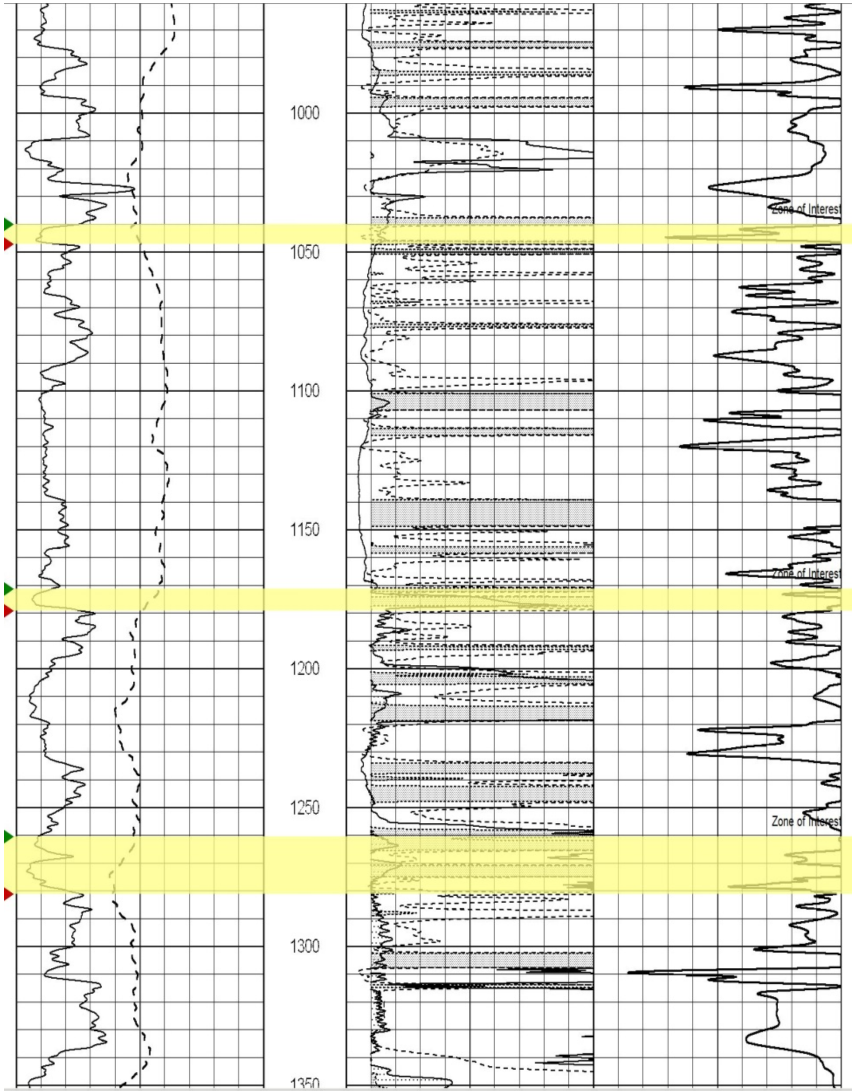


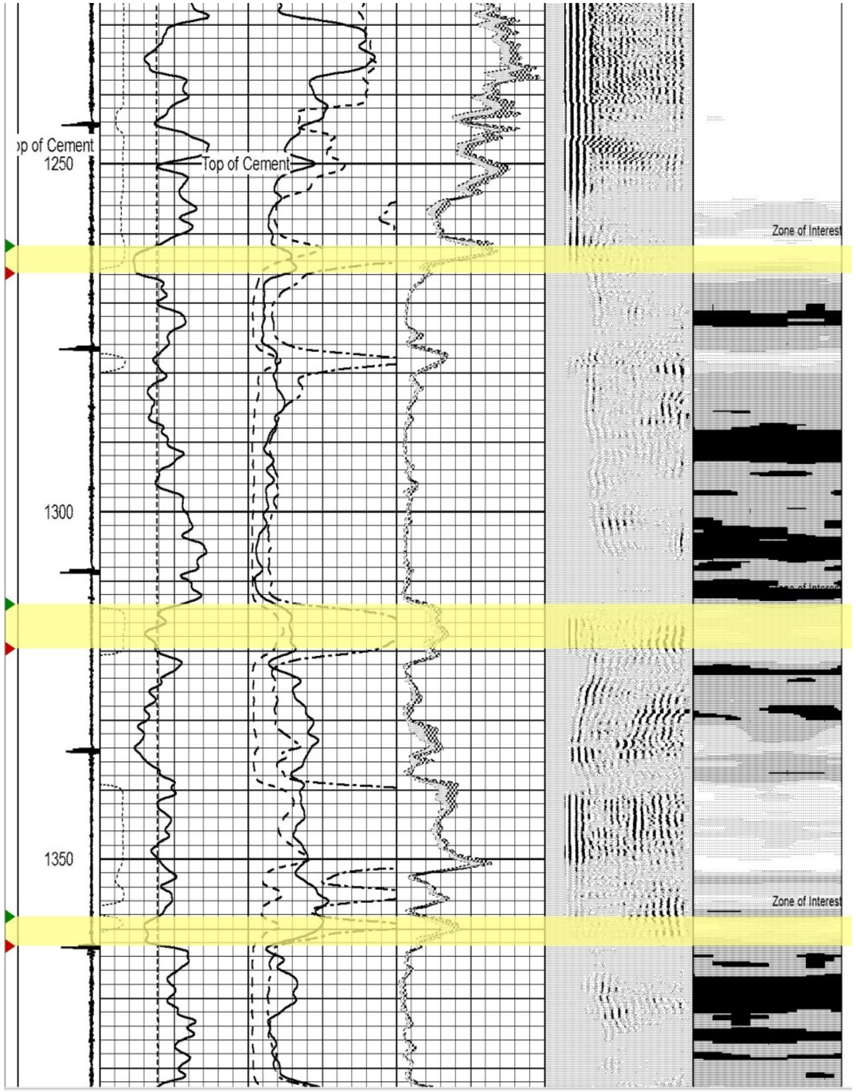



# Rocking Chair Ranch #4 Workover & Flow test

- Current perforations were designed to test Ft. Apache formation and dolomite stringers. After conducting workover operations it is concluded that by pumping acid into stringers, and have a strong blow back, all that occurred is over pressuring zone by pumping. This conclusion was also noted on a deeper zone in the AEP 17-1 well.
- By looking for a more rounded shape on the gamma ray signature on the dual induction logs, (rounded shape= sandstone), it is more conducive for producing gas because of its increased porosity.
- Please note that gas samples collected on the RCR #4 showed increased values of $CO_2$, this is simply a by-product of the chemical reaction between Hydrocloric Acid and Carbonate rocks (i.e. dolomite)
- A proposed workover for the RCR # 4 includes setting a drillable bridge plug at 1300' and perforating at 1279'-1291', then stimulate perforations with 2000 gallons of 15% HCL (acid).
- After stimulating immediately begin swabbing operations until all fluid is off of well. Then tie well into flow test meter run and test for 14 days, collect samples after 6 hours to flow throughput, then collect samples every 24 hours for duration of flow test.
- After 14 day test is concluded, set drillable bridge plug at 1250', and perforate from 1212'-1222'. Then stimulate perforations with 2000 gallons of 15% HCL (acid).
- After stimulating immediately begin swabbing operations until all fluid is off of well. Then tie well into flow test meter run and test for 14 days, collect samples after 6 hours to flow throughput, then collect samples every 24 hours for duration of flow test.
- After 14 day test is concluded, set drillable bridge plug at 1200', and perforate from 1181'-1189'. Then stimulate perforations with 2000 gallons of 15% HCL (acid).
- After stimulating immediately begin swabbing operations until all fluid is off of well. Then tie well into flow test meter run and test for 14 days, collect samples after 6 hours to flow throughput, then collect samples every 24 hours for duration of flow test.
- After test, shut well in and wait for gas results from Wyoming Analytical lab, if helium content is suitable, use workover rig to drill out drillable plugs and begin gas production.

# State of Arizona 4 New Perforations and Re-entry



# State of Arizona #4 Workover & Flow Test

- By looking for a more rounded shape on the gamma ray signature on the dual induction logs, (rounded shape= sandstone), it is more conducive for producing gas because of its increased porosity.
- Please note that gas samples were not collected. Testing the shallower zones may yield a significant helium find.
- A proposed workover for the State of Arizona #4 includes setting a drillable bridge plug at 1300' and perforating at 1260'-1280', then stimulate perforations with 2000 gallons of 15% HCL (acid).
- After stimulating immediately begin swabbing operations until all fluid is off of well. Then tie well into flow test meter run and test for 14 days, collect samples after 6 hours to flow throughput, then collect samples every 24 hours for duration of flow test.
- After 14 day test is concluded, set drillable bridge plug at 1200', and perforate from 1171'-1180'. Then stimulate perforations with 2000 gallons of 15% HCL (acid).
- After stimulating immediately begin swabbing operations until all fluid is off of well. Then tie well into flow test meter run and test for 14 days, collect samples after 6 hours to flow throughput, then collect samples every 24 hours for duration of flow test.
- After 14 day test is concluded, set drillable bridge plug at 1100', and perforate from 1040'-1048'. Then stimulate perforations with 2000 gallons of 15% HCL (acid).
- After stimulating immediately begin swabbing operations until all fluid is off of well. Then tie well into flow test meter run and test for 14 days, collect samples after 6 hours to flow throughput, then collect samples every 24 hours for duration of flow test.
- After test, shut well in and wait for gas results from Wyoming Analytical lab, if helium content is suitable, use workover rig to drill out drillable plugs and begin gas production.

# Partnership between AEP and BECI

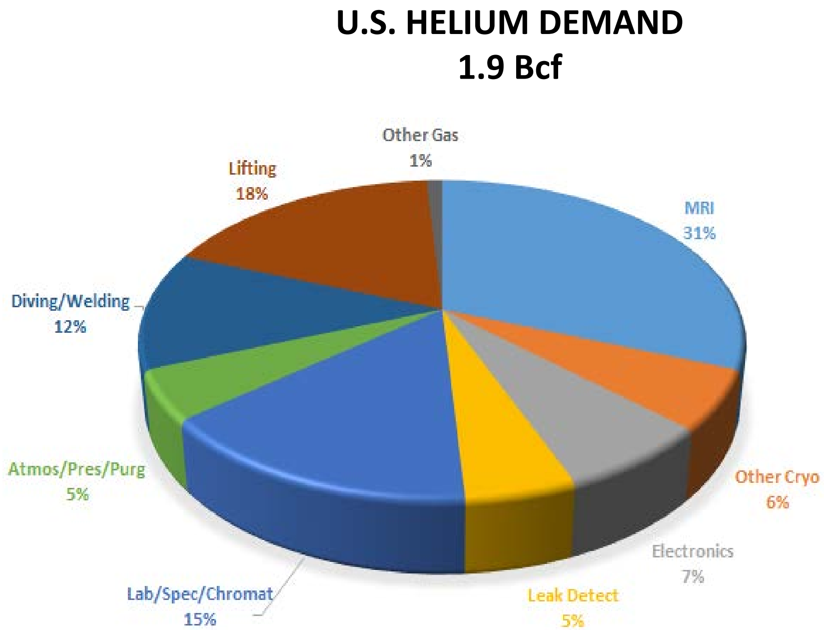
- Data should be combined between BECI & AEP to gain a better understanding of the Holbrook Basin.
- Using core data from BECI in conjunction with flow test/completion data from AEP, I firmly believe that AEP/BECI will soon find the most effective way to stimulate these reservoirs
- Also by combining seismic data from BECI, with aeroradiometric survey maps, we collectively will have every structure and fault identified to properly place wells in the basin.
- By using these data sets both AEP & BECI will be able to properly develop helium, gas and oil assets throughout the basin
- Also combining our operations, will help keep cost down, all for speedy development and a great partnership for gas processing
- These are all reasons we must work together on this basin.

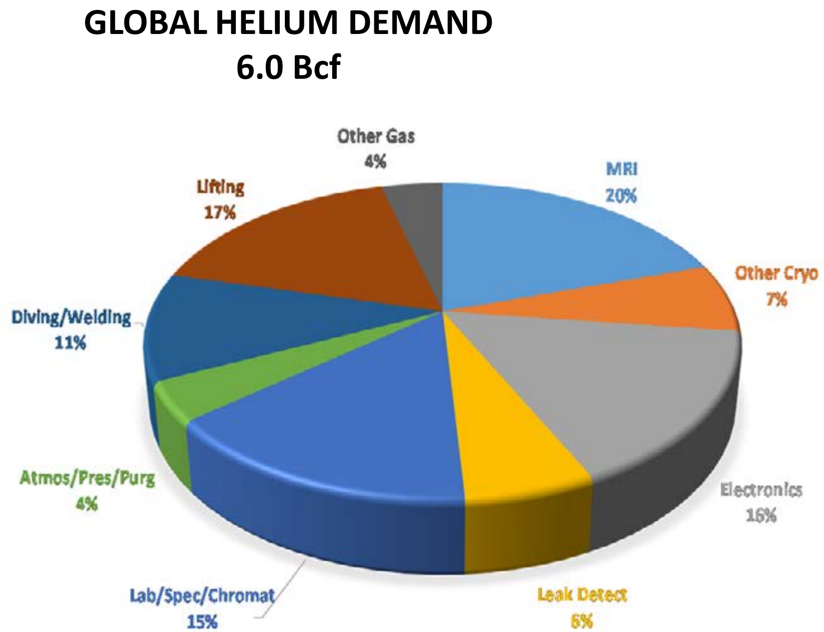
# Origin of Helium

- Terrestrial helium has two sources: (1) primordial helium that was incorporated in the Earth at the time of its formation and is now derived from sources deep within the Earth, (2) radioactive decay of uranium and thorium which are concentrated in the Earth's crust. Helium is composed of two isotopes: helium 4, which is produced by radioactive decay, and helium 3, which was created before the Earth formed and was incorporated into the Earth during its formation.

# Helium Uses – Global & Domestic

2015 – Demand by Application



# Helium Uses

## Healthcare, High-tech Manufacturing & Scientific Research

- Healthcare Industry
  - Consumption of helium was largest in healthcare industry in 2015.
  - Of the 2014 world helium production of about 180 million cubic meters of helium per year, the largest use (about 32% of the total) is in cryogenic applications, most of which involves cooling the superconducting magnets in medical MRI scanners and NMR spectrometers.
  - Helium is used in medical instrumentations, nuclear medicine, and breathing observation. It is essential in treating asthma, emphysema and other conditions that affect the lungs.
- Manufacturing & Science Research
  - Helium is used in fiber optics and utilized to cool semiconductors that manufacture many digital devices.
  - Liquid helium assists in cooling the superconducting equipment in particle accelerators.
  - Super magnets and brain cell research. Labs all over the U.S. use liquid helium to cool instruments that will only work at super-low temperatures.

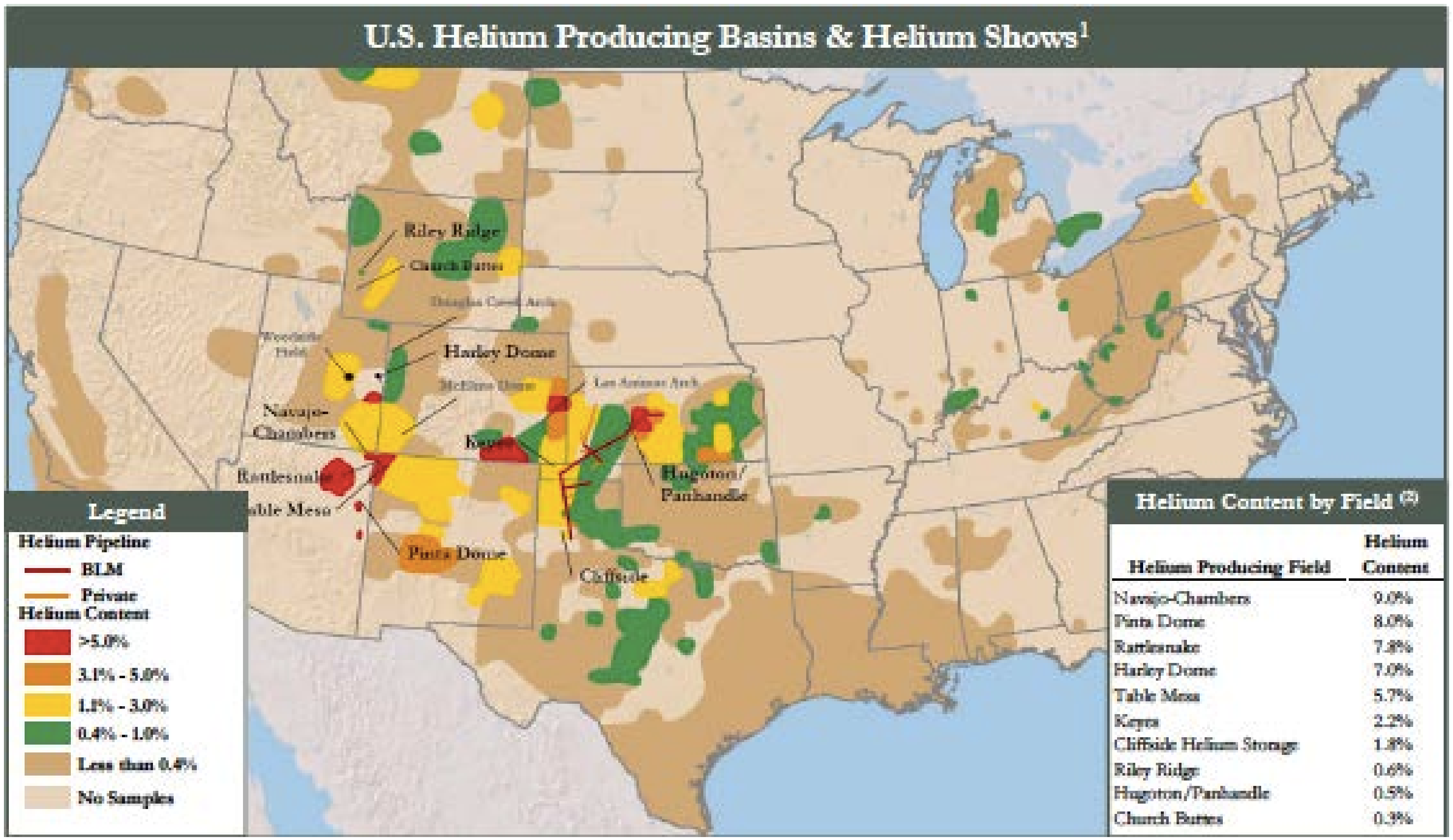
# Helium Uses

## Industrial & Governmental

- Industrial Uses
  - Arc welding uses helium to create an inert gas shield. Similarly, divers and others working under pressure can use a mix of helium and oxygen to create a safe artificial breathing atmosphere.
  - Various industries use helium to detect gas leaks before their products come to market
- Government - US Defense & Space Programs
  - Cutting edge space science and research requires helium. NASA uses helium to keep hot gases and ultra-cold liquid fuel separated during lift off of rockets.
  - National defense applications include rocket engine testing, scientific balloons, surveillance craft, air-to-air missile guidance systems, and more.

# Helium Accumulations

## Mid-Continent and Beyond

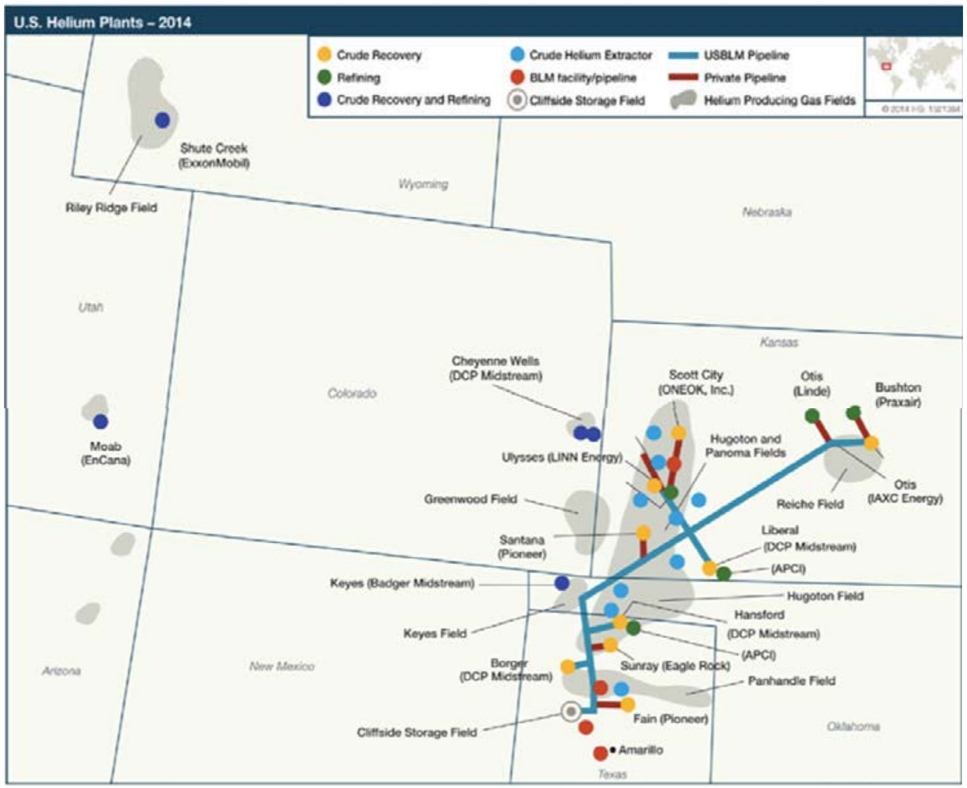



(1) Sources: BLM, IACX

(2) Source: World Helium Resources and the Perspectives of Helium Industry Development, Yakutseni V.P., 2014

# Existing US Helium Infrastructure

## Significance of U.S. Bureau of Land Management (BLM)




**FEDERAL HELIUM PROGRAM**

- Historically, helium produced in the US was, in essence, sold to, and stockpiled by, the federal Government
- Helium produced as a byproduct of natural gas in the Hugoton stored in a reservoir north of Amarillo via a 400 mile pipeline running between Cliffside and Bushton
- Helium Privatization Act of 1996
- Currently six crude helium plants and six refineries along BLM pipeline
- Refineries liquefy helium sold by the BLM, as well as native gas produced by Hugoton Fields
- Pricing prior to 2015 determined solely based on formula established within HPA to recover govt's cost of capital for helium program
- Not a true representation of market value
- Auction format has recently been implemented for a portion of federal helium sold each year
- Very little price transparency; minimal value ultimately passed through to producers
- Capacity of market and low realized value has unsurprisingly have hindered helium development

# Helium Processing

## Modular Liquid Helium Processing (MLHP) Unit

- The Modular Liquid Helium Processing (MLHP) Unit is a mobile modular gas processing plant which will process reservoir gas in the wellfield.

- The MLHP Unit is comprised of several components which are housed in ISO containers, mounted on trailers, and are interconnected at the gas production source. These small processing plants are a fraction of the cost of traditional helium processing plants, and have the advantage of being easily relocated when production stops in a gas field.

- Depending upon the geologic formation gas composition, the MLHP can be modified to produce natural gas (LNG), liquid $CO_2$, in addition to commercial grade helium. Helium quality from the MLHP unit will be commercial grade (99.999%), and will normally be compressed for tube trailer loading. Liquid helium (LHe) can also be produced from the MLHP unit if required. Loading of LHe into cryogenic trailers, requires the production of liquid nitrogen (LN), which can also be performed by the MLHP unit.

*Detailed report on MLHP Unit can be provided upon request

# US Helium Production

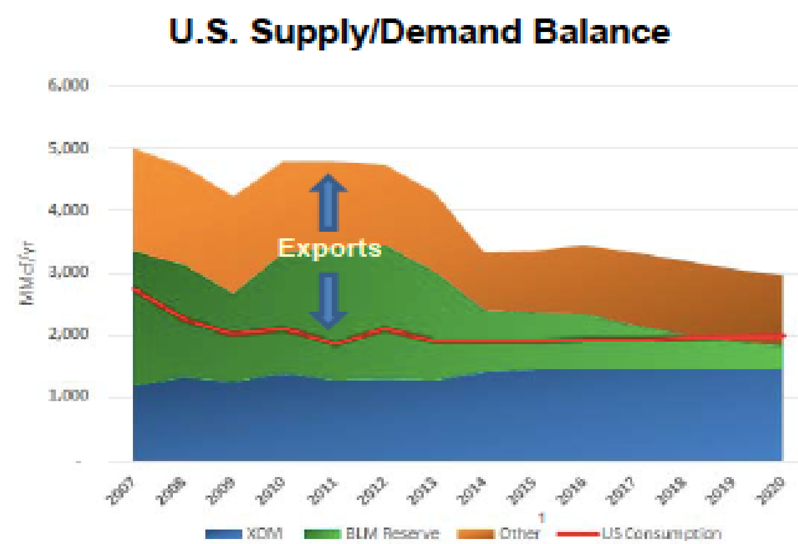
## Historical and Projected

**BLM is Declining**

- In 2014, the U.S. Federal Helium Reserve provided roughly 1/6th (1 Bcf of a 6 Bcf market) of global helium supply and much of the global market's storage and supply flexibility. The Reserve is set to wind down by 2021.
  - Critical supply source; provides some measure of price transparency
- Annual BLM helium sales have declined from >2.0 Bcf in 2012 to approximately 900 MMcf in 2015
- Significant new supplies – domestically and abroad – will be needed to offset BLM declines.

Aside from crude helium supplied by US BLM, helium has traditionally been supplied in the US from natural gas processing in the Mid-Continent, Rockies and Four Corners.

The Holbrook Basin Helium Project will help the U.S. market fill in the gap with a substantial source of helium production and a stable base of refined helium supply for years to come.




*Sources: BLM, JR Campbell & Assoc.*

*(1) Note: "Other" includes supply from Doe Canyon, Riley Ridge, IACX Energy*

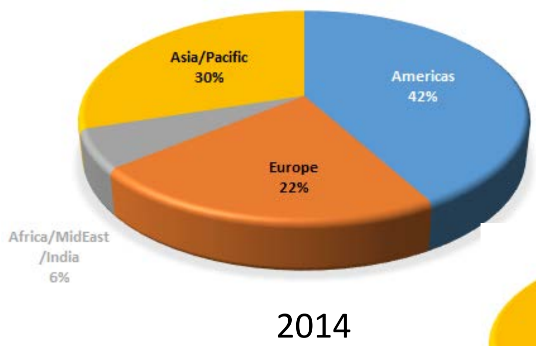
# Global Helium Demand Estimates

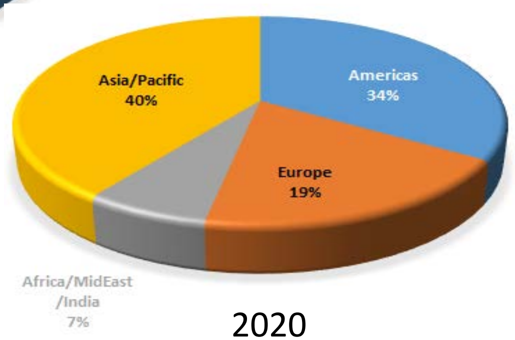
## Shift to Asian Markets

**Global Demand Increasing**

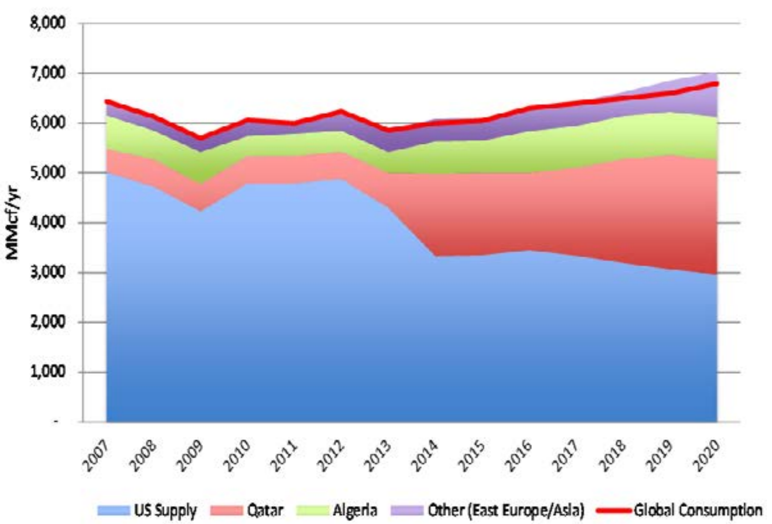
- Between 2015 and 2020, annual worldwide demand is projected to increase from approximately 6.0 Bcf to just under 7.0 Bcf
- Both overall demand, and demand growth, expected to shift from the Americas and Europe to Asia
- Asian growth driven by increased access to healthcare (MRI), continued electronics demand (domestic demand and IT component exports), and general economic activity
- On the supply side, both Algeria, and, to a much larger degree, Qatar have filled the decline wedge left by US BLM, and have become critical to overall global supply stability

**GLOBAL HELIUM DEMAND BY REGION**




**Worldwide Supply/Demand**



# Helium Demand Trends

- By the end of the decade, international helium extraction facilities will become the main source of supply for world helium users. Seven international helium plants are in operation and more are planned during the next 3 to 5 years. Expansions to facilities have been completed in Algeria and Qatar.
- In 2015, demand for helium both domestically and worldwide increased. Additionally in 2015, a new helium recovery facility began operation in southwest Colorado. As a result, demand for helium stored in the U.S. Government's helium facilities has decreased by more than 50% during the past 2 years.
- **Phase 2 of the Holbrook Basin Helium Project will involve the development and construction of a helium processing plant to bring regionally produced gas to market.**


# U.S. Consumption

| Salient Statistics—United States: | 2011 | 2012 | 2013 | 2014 | 2015[e] |
|---|---|---|---|---|---|
| Helium extracted from natural gas[2] | 71 | *73 | *69 | 75 | 76 |
| Withdrawn from storage[3] | *59 | *60 | *49 | *27 | 24 |
| Grade-A helium sales | *130 | 133 | *118 | *102 | 100 |
| Imports for consumption | — | — | 2 | 7 | 10 |
| Exports[4] | 82 | 85 | 81 | 67 | 67 |
| Consumption, apparent[4] | 48 | 48 | 39 | *42 | 43 |
| Net import reliance[5] as a percentage of apparent consumption | E | E | E | E | E |

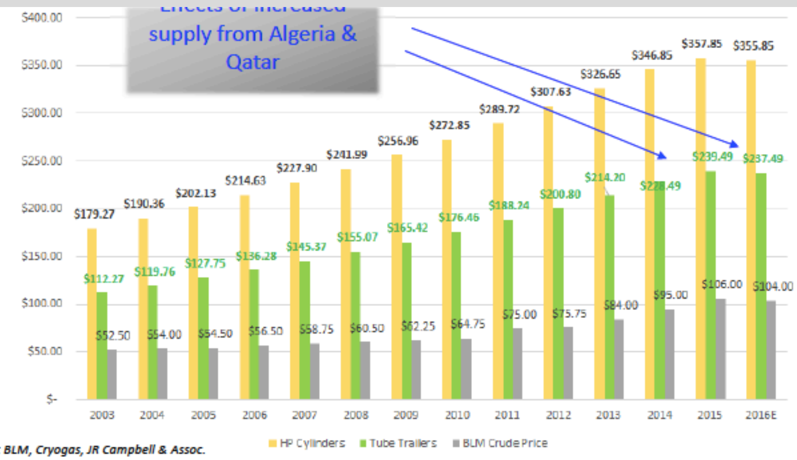
- Statistics in million cubic meters
- Estimated 2015 domestic consumption of helium is 43 million cubic meters (1.5 billion cubic feet)

*U.S. Geological Survey, Mineral Commodity Summaries, January 2016

# Helium Pricing

## Gaseous Helium

- In fiscal year (FY) 2015, the price for crude helium to Government users was $3.06 per cubic meter ($85.00 per thousand cubic feet) and to non-Government users was $3.75 per cubic meter ($104.00 per thousand cubic feet).
- The estimated price for private industry's Grade-A helium was about $7.21 per cubic meter ($200 per thousand cubic feet), with some producers posting surcharges to this price.




*(1) Sources: BLM, Cryogas, JR Campbell & Assoc.*

# Helium Pricing

## Wellhead Content Projection & NZ 17-1 Test (2014)

Effective/Realized Helium Price ($/Mcf)

| Wellhead Helium Content | $50.00 | $75.00 | $100.00 | $125.00 | $150.00 | $175.00 | $200.00 |
|---|---|---|---|---|---|---|---|
| 2.0% | $1.00 | $1.50 | $2.00 | $2.50 | $3.00 | $3.50 | $4.00 |
| 3.0% | $1.50 | $2.25 | $3.00 | $3.75 | $4.50 | $5.25 | $6.00 |
| 4.0% | $2.00 | $3.00 | $4.00 | $5.00 | $6.00 | $7.00 | $8.00 |
| 5.0% | $2.50 | $3.75 | $5.00 | $6.25 | $7.50 | $8.75 | $10.00 |
| 6.0% | $3.00 | $4.50 | $6.00 | $7.50 | $9.00 | $10.50 | $12.00 |
| 7.0% | $3.50 | $5.25 | $7.00 | $8.75 | $10.50 | $12.25 | $14.00 |
| 8.0% | $4.00 | $6.00 | $8.00 | $10.00 | $12.00 | $14.00 | $16.00 |
| 9.0% | $4.50 | $6.75 | $9.00 | $11.25 | $13.50 | $15.75 | $18.00 |

Ray Hobbs
United Helium
2999 N 44th St, Suite 530
Phoenix, AZ 82018

Date: May 23, 2014
Request Number: 32832
Date Received: 5-19-14
Matrix: Gaseous

**REPORT OF ANALYSIS**

| Lab Number | P1752 | | | | |
|---|---|---|---|---|---|
| Sample ID | NZ-17-1 013 4-14-14 1355 | Units | Method | Date Analyzed | Analyst |
| Carbon Monoxide | < 0.1 | Mole, % | TCD/FID | 5/22/2014 | KS |
| Carbon Dioxide | 30.6 | Mole, % | TCD/FID | 5/22/2014 | KS |
| Nitrogen | 54.6 | Mole, % | TCD/FID | 5/22/2014 | KS |
| Oxygen | 1.9 | Mole, % | TCD/FID | 5/22/2014 | KS |
| Methane | 3.9 | Mole, % | TCD/FID | 5/22/2014 | KS |
| Helium | 9.0 | Mole, % | TCD/FID | 5/22/2014 | KS |

*Chart illustrates helium value on a netback basis at various potential wellhead helium concentrations and realized helium prices.
*Chart does not take into account any capex, opex, processing fees, etc.

In May 2014, United Helium commissioned Wyoming Analytical Laboratories to conduct a gas analysis of the NZ 17-1 on the current leasehold. Tests identified a 9% helium show.

Gordan Leblanc
Arizona Energy Partners
2999 N 44th St. Suite 620
Phoenix, AZ 85018

Date: January 3, 2016
Request Number: 35995
Date Received: 12/20/16
Matrix: Gas
Analyzed: MLE 12/30/16

## GAS ANALYSIS REPORT

| Lab # | Sample ID | Helium | CO2 | CO | O2 | N2 | Methane | Ethane | Propane | Butane | Pentane | Hexane | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| R0463 | 001 12/15/16 1240 | | | | | | | | | | | | |
| | Mole% | 1.49 | 16.12 | 0.35 | 16.27 | 65.10 | 0.30 | 0.33 | 0.00 | 0.06 | 0.00 | 0.01 | 100.01 |
| R0464 | 002 12/15/16 1240 | | | | | | | | | | | | |
| | Mole% | 2.38 | 20.75 | 0.18 | 15.93 | 59.62 | 0.51 | 0.35 | 0.00 | 0.09 | 0.36 | 0.01 | 100.20 |
| R0465 | 003 12/16/16 0600 | | | | | | | | | | | | |
| | Mole% | 3.97 | 27.45 | 0.22 | 12.34 | 53.87 | 1.23 | 0.29 | 0.00 | 0.10 | 0.00 | 0.00 | 99.48 |
| R0466 | 004 12/16/16 0600 | | | | | | | | | | | | |
| | Mole% | 7.05 | 25.22 | 0.20 | 11.91 | 53.61 | 1.99 | 0.03 | 0.00 | 0.00 | 0.00 | 0.00 | 100.00 |

Micromat III Atmospheric Gases
**Quality Control**

| | | Result | Expected | % Rec. |
|---|---|---|---|---|
| CO2 | | 4.994 | 5 | 99.88 |
| CO | | 4.6879 | 5 | 93.758 |
| He | | 4.32 | 5 | 86.4 |
| CH4 | | 4.9194 | 5 | 98.388 |
| N2 | | 5.27 | 5 | 105.4 |
| O2 | | 5.2219 | 5 | 104.438 |

Scotty Combustible Gases
**Quality Control**

| | Result | Expected | % Rec. |
|---|---|---|---|
| Methane | 0.0113 | 0.01 | 113 |
| Ethane | 0.0072 | 0.01 | 72 |
| Propane | 0.0089 | 0.01 | 89 |
| Butane | 0.009 | 0.01 | 90 |
| Pentane | 0.0095 | 0.01 | 95 |
| Hexane | 0.0089 | 0.01 | 89 |

Monte L. Ellis

End of Report
MLE/tab

Laboratory Manager

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# Monte Carlo Reservoir Model

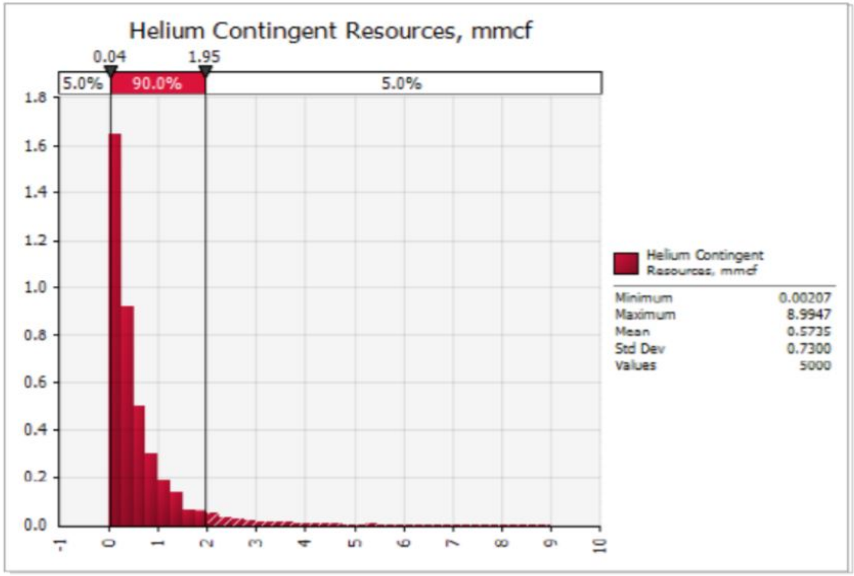
MHA Petroleum Consultants on Behalf of AEP (2017) www.mhausa.com

Concho Dome helium contingent resources

| | | parameters | | | distribution & paramaters | ref/comments |
|---|---|---|---|---|---|---|
| area, ac = | 4,000 | 160 | 4,000 | 17,928 | triangle - min, ml, max | min-Pinta D spac, ml-Pinta D, Nav Sps, max=M |
| gross thickness, ft = | 45 | 2 | 45 | 137 | triangle - min, ml, max | avg PD & NS-Fasset, 1978, Dean, 1960, Rauzi, 2 |
| helium fraction, % = | 3.0% | 1.0% | 3.0% | 14.0% | triangle - min, ml, max | Rauzi, 2003 & AEP_gas_samples.xlsx |
| porosity, % = | 16% | 8% | 16% | 27% | triangle - min, ml, max | Fasset, 1978, Dean, 1960 |
| water sat, % = | 40% | 32% | 40% | 100% | triangle - min, ml, max | Fassett, 19778, Dean, 1960 |
| gas fvf, rcf/scf = | 0.12 | 0.02 | 0.12 | 0.15 | triangle - min, ml, max | Lee & Wattenbarger, 1996, NIST |
| recovery factor, % = | 54% | 30% | 54% | 90% | triangle - min, ml, max | min-water influx, ml-PD & NS avg, max-volume |
| helium OGIP, bcf = | 0.188 | | | | | |
| helium contin res, bcf = | 0.102 | | | | | |

p10/p90 = 19.9

| chance of exceeding | atrisk, % | Con Res, bcf |
|---|---|---|
| 99% | 1% | 0.028 |
| 95% | 5% | 0.074 |
| 90% | 10% | 0.115 |
| 85% | 15% | 0.160 |
| 80% | 20% | 0.208 |
| 75% | 25% | 0.263 |
| 70% | 30% | 0.317 |
| 65% | 35% | 0.374 |
| 60% | 40% | 0.438 |
| 55% | 45% | 0.514 |
| 50% | 50% | 0.589 |
| 45% | 55% | 0.674 |
| 40% | 60% | 0.778 |
| 35% | 65% | 0.905 |
| 30% | 70% | 1.046 |
| 25% | 75% | 1.231 |
| 20% | 80% | 1.483 |
| 15% | 85% | 1.784 |
| 10% | 90% | 2.289 |
| 5% | 95% | 3.247 |
| 1% | 99% | 6.092 |



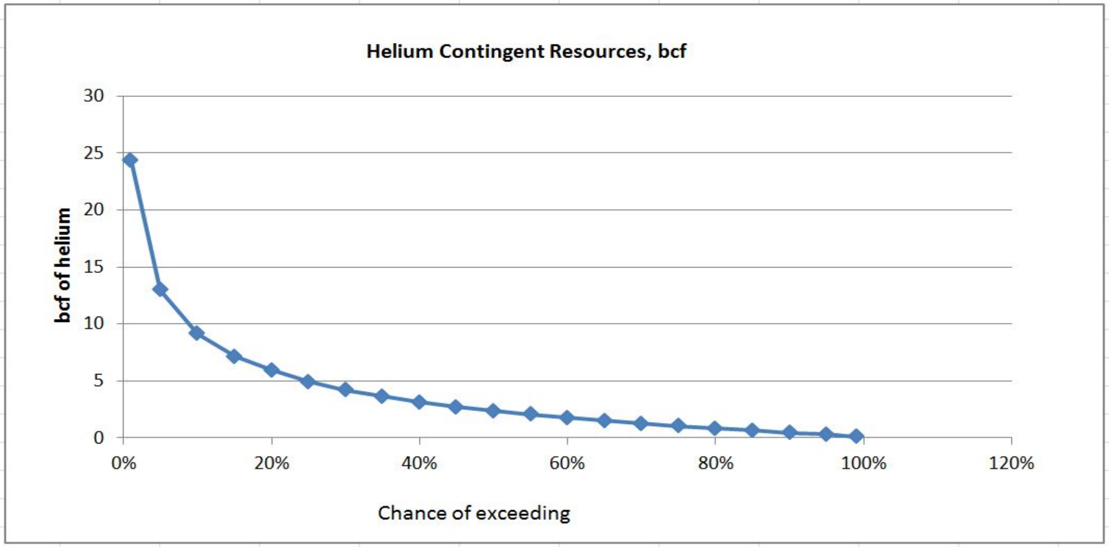
# Monte Carlo Implications for Rocking Chair Ranch

**Rocking Chair Ranch helium contingent resources**

| | | parameters | | | distribution & paramaters | ref/comments |
|---|---|---|---|---|---|---|
| area, ac= | 16000 | 640 | 16000 | 71712 | triangle- min, ml, max | min-Pinta D spac, ml-Pinta D, Nav Sps, max=M |
| gross thickness, ft= | 165 | 2 | 165 | 502 | triangle- min, ml, max | Avg PD & NS-Fasset, 1978, Dean, 1960, Rauzi, : |
| helium fraction, %= | 3.00% | 1.00% | 3.00% | 14% | triangle- min, ml, max | Rauzi, 2003 & AEP_gas_samples.xlsx |
| porosity, %= | 16% | 8% | 16% | 27% | triangle- min, ml, max | Fasset, 1978, Dean, 1960 |
| water sat, %= | 40% | 0.2 | 0.12 | 0.015 | triangle- min, ml, max | Fasset, 1978, Dean, 1960 |
| recovery factor, %= | 54% | 30% | 54% | 90% | triangle- min, ml, max | Lee & Wattenburger, 1996, NIST |
| gas fvf, rcf/scf= | 0.12 | | | | | min-water influx, ml-PD & NS avg, max-volume |
| helium OCIP, bcf= | 0.752 | | | | | |
| helium contin res, bcf= | 0.408 | | | | | |

p10/p90= 19.9

| Chance of exceeding | at risk % | Con Res bcf |
|---|---|---|
| 99% | 1% | 0.112 |
| 95% | 5% | 0.296 |
| 90% | 10% | 0.46 |
| 85% | 15% | 0.64 |
| 80% | 20% | 0.832 |
| 75% | 25% | 1.052 |
| 70% | 30% | 1.268 |
| 65% | 35% | 1.496 |
| 60% | 40% | 1.752 |
| 55% | 45% | 2.056 |
| 50% | 50% | 2.356 |
| 45% | 55% | 2.696 |
| 40% | 60% | 3.112 |
| 35% | 65% | 3.62 |
| 30% | 70% | 4.184 |
| 25% | 75% | 4.924 |
| 20% | 80% | 5.932 |
| 15% | 85% | 7.136 |
| 10% | 90% | 9.156 |
| 5% | 95% | 12.988 |
| 1% | 99% | 24.368 |




Please note this is a contingent model, until flow tests/production are recorded. This is a potential based on analogs (AEP 17-1 & Pinta Dome & Navajo Springs)

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