

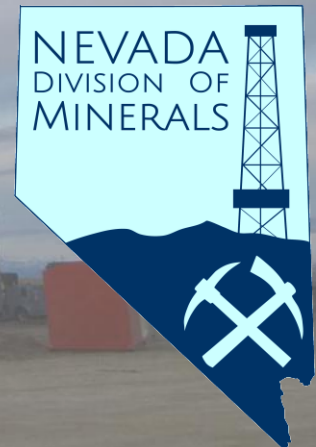
# Nevada Division of Minerals

*Hydraulic Fracturing for Oil Exploration in Nevada*

## NEVADA TRANSPORTATION CONFERENCE

APRIL 14, 2015

Richard Perry, Administrator



# TOPICS

- **WHAT IS HYDRUALIC FRACTURING AND WHY IS IT IMPORTANT?**
- **OIL PRODUCTION IN NEVADA**
- **TERTIARY EXPLORATION TARGETS**
- **UPDATING NEVADA'S OIL AND GAS REGULATIONS – NAC 522**
- **A NEVADA FRAC JOB**
- **CURRENT ACTIVITY**



# North American Shale Plays (as of March 2011)



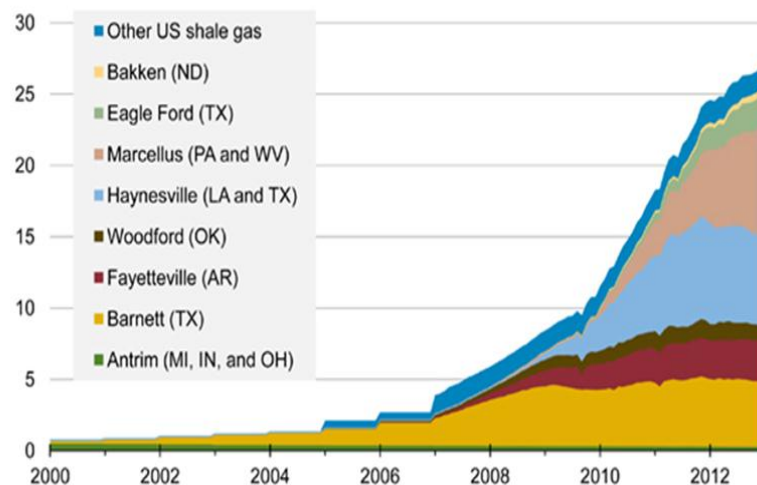


# HF- WHY IS IT IMPORTANT?

**>40% of US Natural gas from unconventional targets**

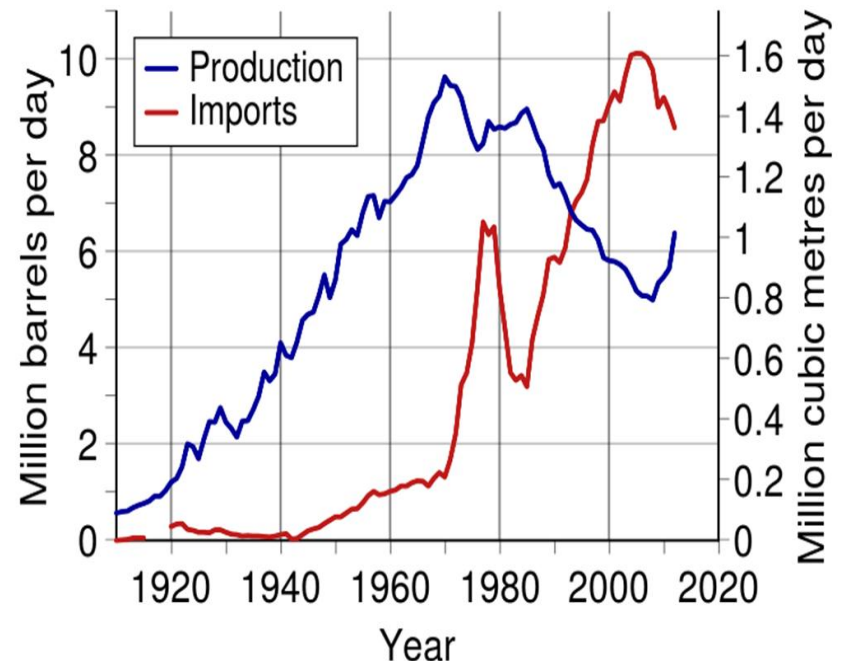
**US will be largest producer of crude oil by 2015.**

shale gas production (dry)  
billion cubic feet per day



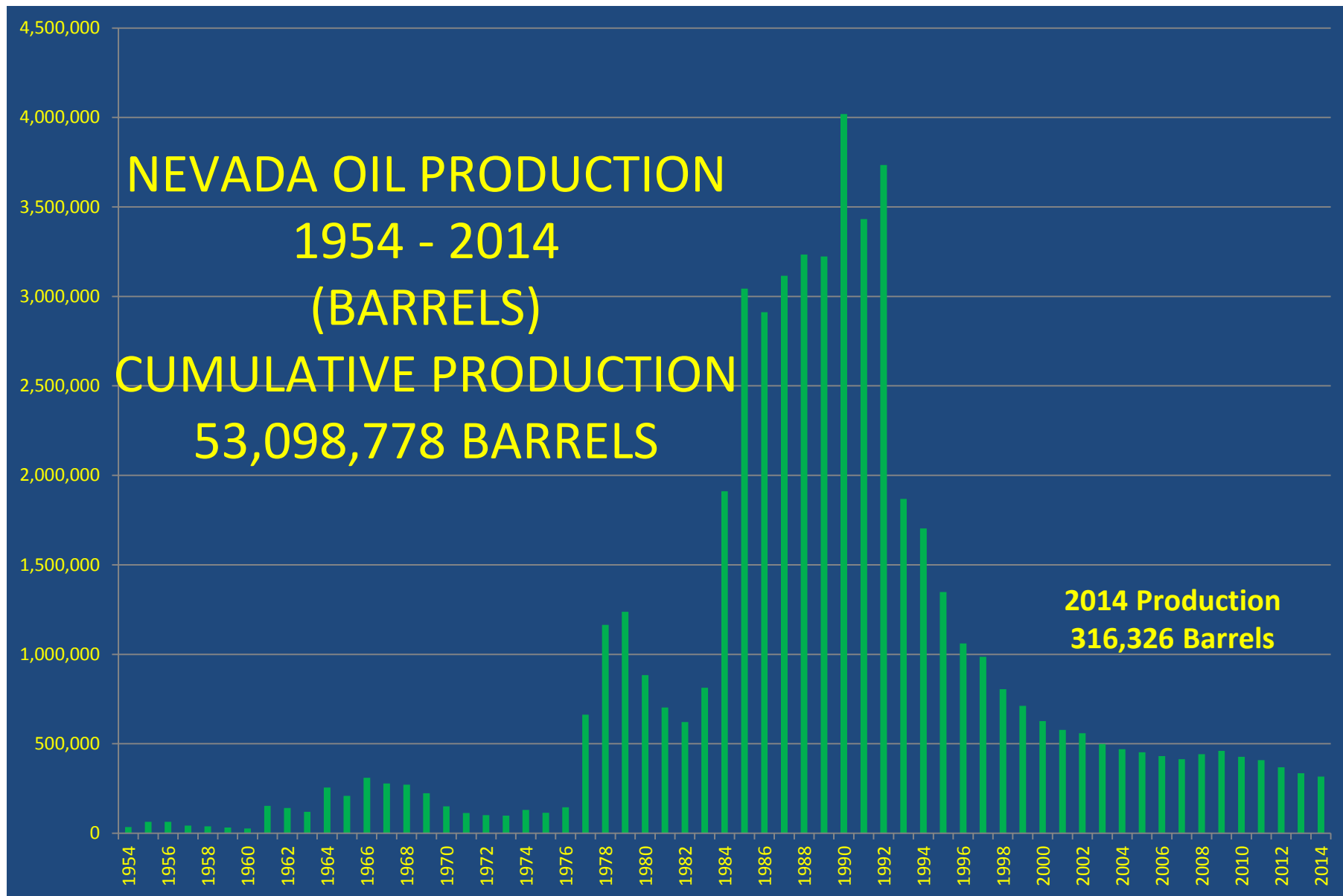
Sources: LCI Energy Insight gross withdrawal estimates as of January 2013 and converted to dry production estimates with EIA-calculated average gross-to-dry shrinkage factors by state and/or shale play.

## U.S. Crude Oil Production and Imports

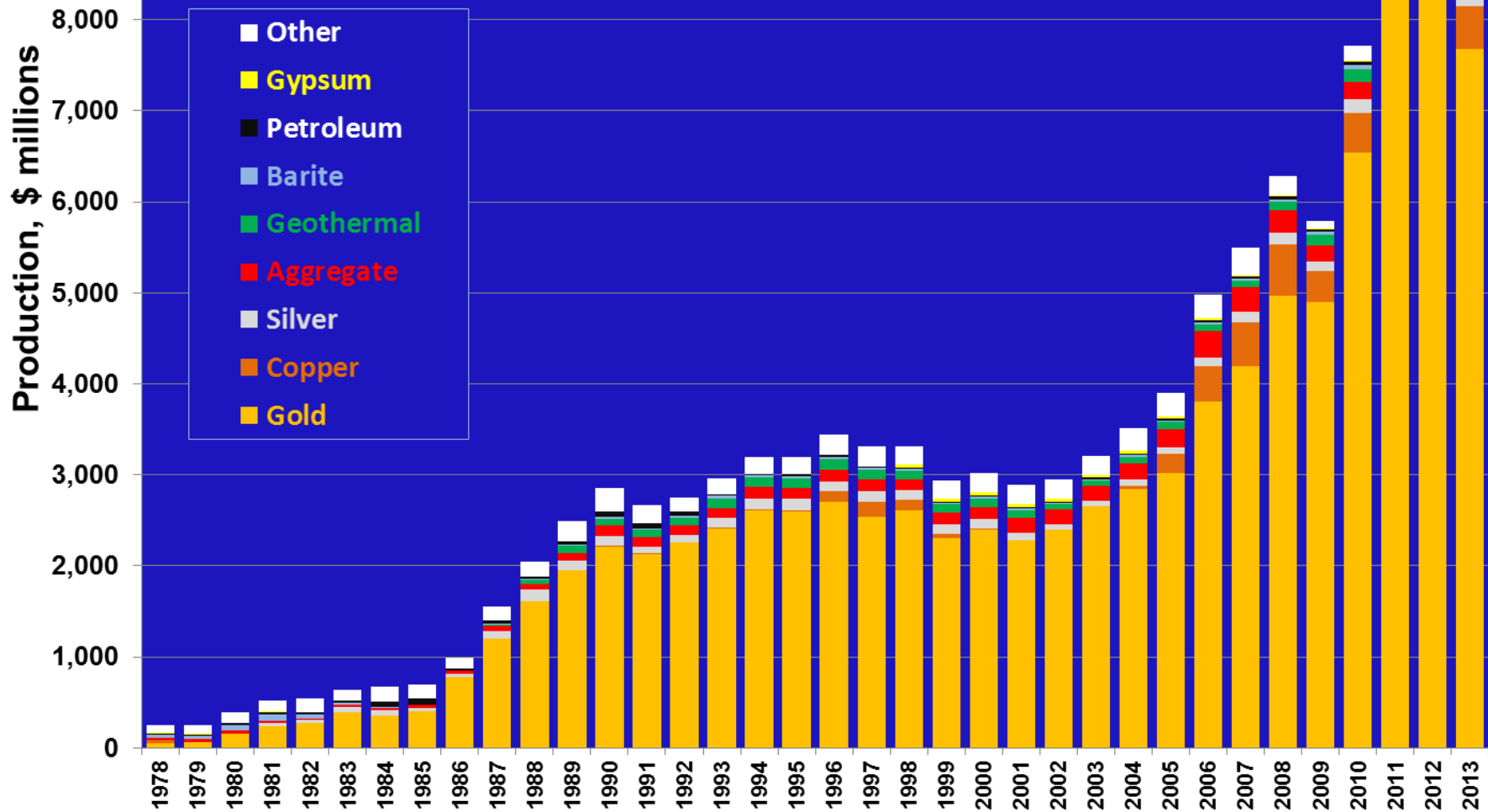


**NEVADA OIL PRODUCTION**  
**1954 - 2014**  
**(BARRELS)**  
**CUMULATIVE PRODUCTION**  
**53,098,778 BARRELS**

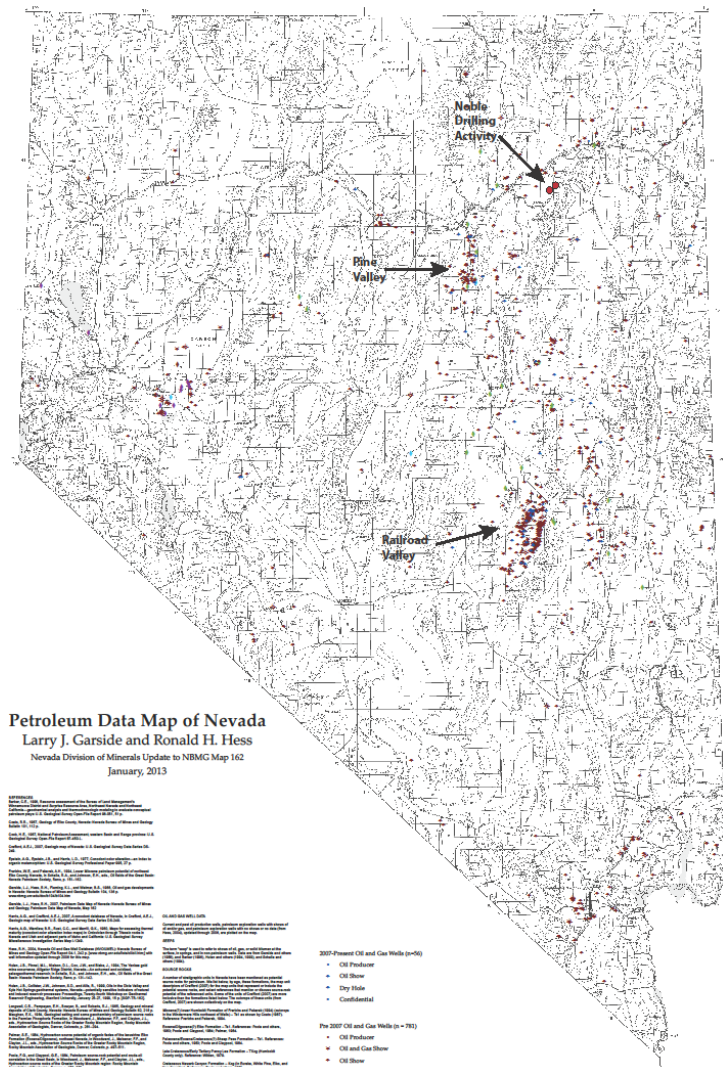
**2014 Production**  
**316,326 Barrels**



# Nevada mineral and energy production



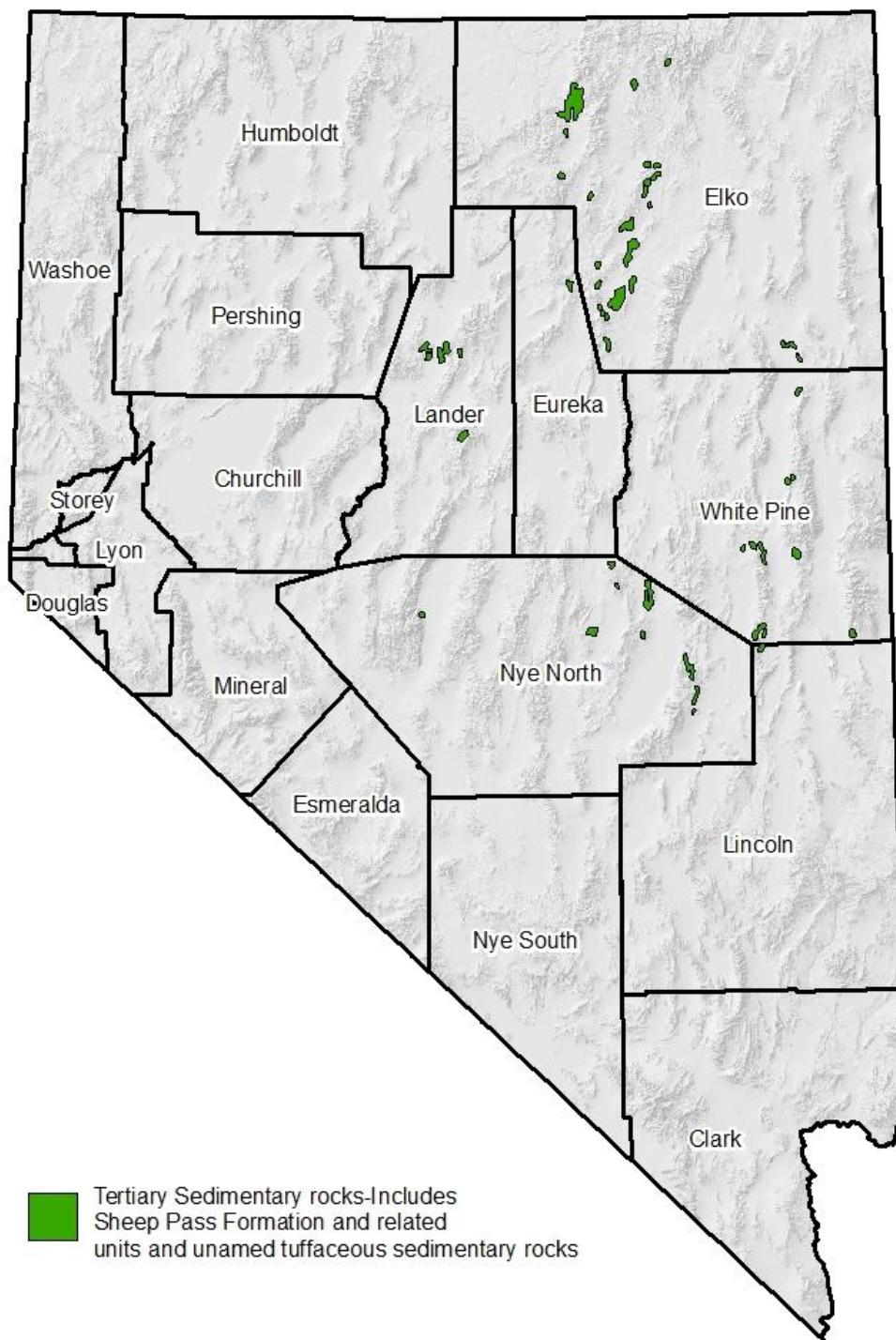





# PETROLEUM EXPLORATION WELLS AND PRODUCTION FIELDS IN NEVADA

826 oil & gas exploration wells drilled since 1907

FIELD	BBLS OIL (2014)
Eagle Springs	34,217.00
Trap Spring	136,651.30
Bacon Flat	6,223.00
Currant	143.00
Grant Canyon	46,263.00
Kate Spring	28,933.76
Duckwater	124.00
Sans Spring	1,604.00
Ghost Ranch	15,563.93
Sand Dune	7,467.00
<b>Total RR Valley</b>	<b>275,341.99</b>
Blackburn	32,217.00
Tomera Ranch	1,916.00
<b>Total Pine Valley</b>	<b>34,133.00</b>
Humboldt	2,755.77
Huntington	2,247.52
<b>Total Elko County</b>	<b>5,003.29</b>
<b>Total Nevada</b>	<b>316,326.28</b>

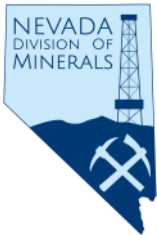


 Tertiary Sedimentary rocks-Includes Sheep Pass Formation and related units and unnamed tuffaceous sedimentary rocks

Sedimentary rocks  
> 34 Million years  
includes the Elko  
Formation, which  
has oil shales.

From: NBMG Special  
Publication 4, 1980



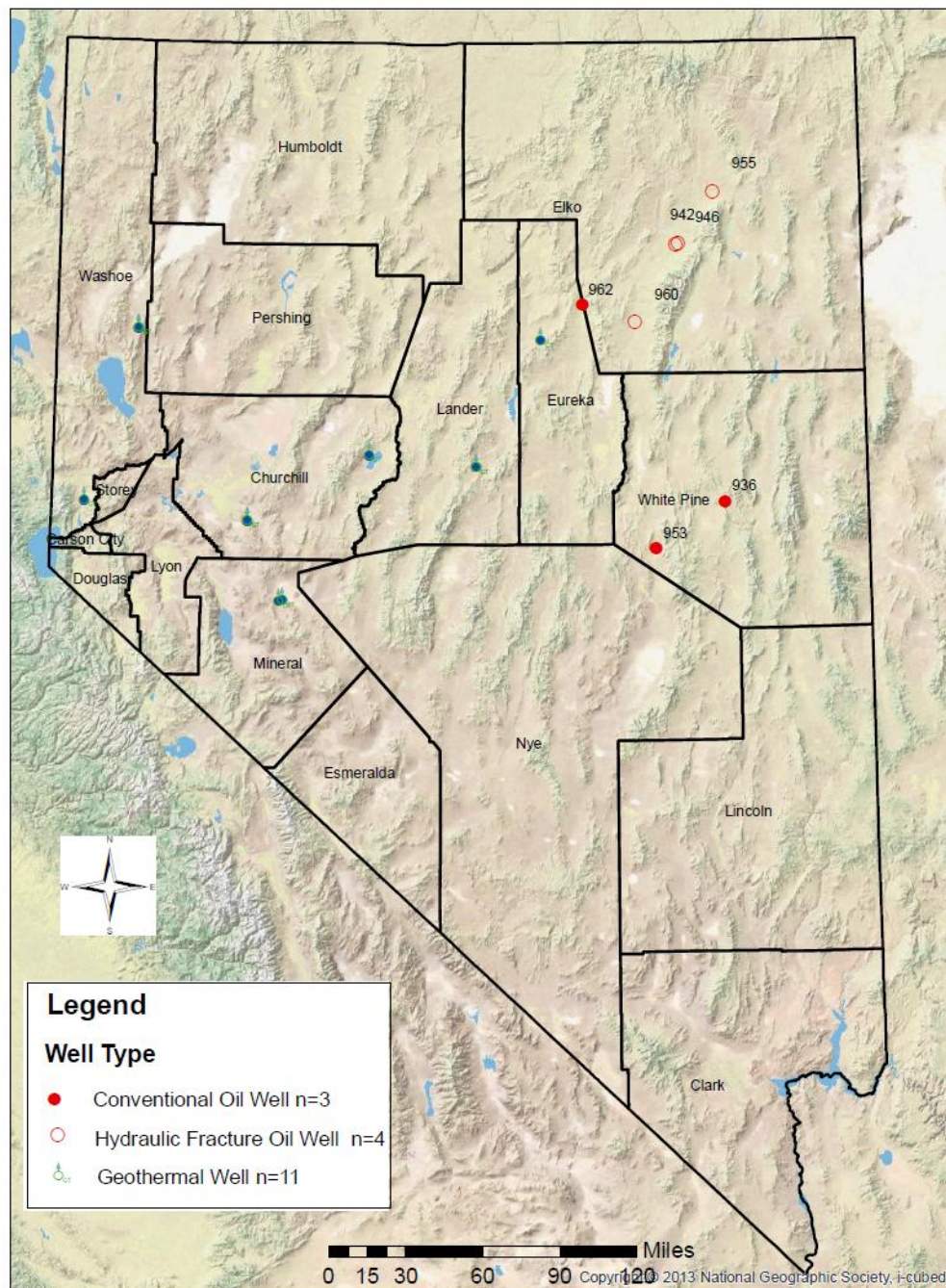


## FLUID MINERALS DRILLING ACTIVITY 9/2013 – 4/2015 (18 months)

### 7 OIL EXPLORATION WELLS DRILLED

- 3 conventional
- 4 unconventional

### 11 GEOTHERMAL EXPLORATION OR PRODUCTION WELLS DRILLED



# NRS 522.119 (SB 390)

- **NRS 522.119 Development of program; regulations.**

**1. The Division of Minerals and the Division of Environmental Protection shall, jointly, develop a hydraulic fracturing program to:**

**(a) Assess the effects of hydraulic fracturing on the waters of the State of Nevada**

**(b) Require a person who engages in hydraulic fracturing to disclose each chemical used to engage in hydraulic fracturing; and**

**(c) Provide for notice to members of the general public concerning activities relating to hydraulic fracturing in this state.**



# **DEVELOPMENT OF NEVADA'S HF REGULATIONS – UPDATE OF NAC 522**

- 1. 7 Member team developed regulations**
- 2. IOGCC - Reviewed regulations of oil-producing states**
- 3. Reviewed BLM proposed rule on hydraulic fracturing**
- 4. Staff discussed what works and what does not with regulators in Arkansas, California, Colorado, Kansas, North Dakota, Ohio, Pennsylvania, Texas and Utah.**
- 5. Benchmarked regulations against other states.**
- 6. LCB review**
- 7. Held public workshops in CC, LV, Elko in March**
- 8. Addressed all comments, modified first draft**
- 9. 2<sup>nd</sup> LCB review**
- 10. New regulations approved by CMR in August, 2014**
- 11. Recommended for approval by MOAC**
- 12. Approved by Legislative Commission on 10/24/14**



# NEVADA HF REGULATIONS SUMMARY

(Update to NAC 522)

## APPLICATION:

- application to include minimum 1-mile radius Area of Review
- Groundwater baseline sampling and monitoring of up to 4 existing water wells by operator before and 2X after HF.
- Approved applications with COA's on NDOM web site.

## DRILLING

- Cement bond logs and pressure testing to ensure casing integrity
- Intermediate casing required
- Minimum 500' cement for surface, intermediate, production casing

## HYDRAULIC FRACTURING

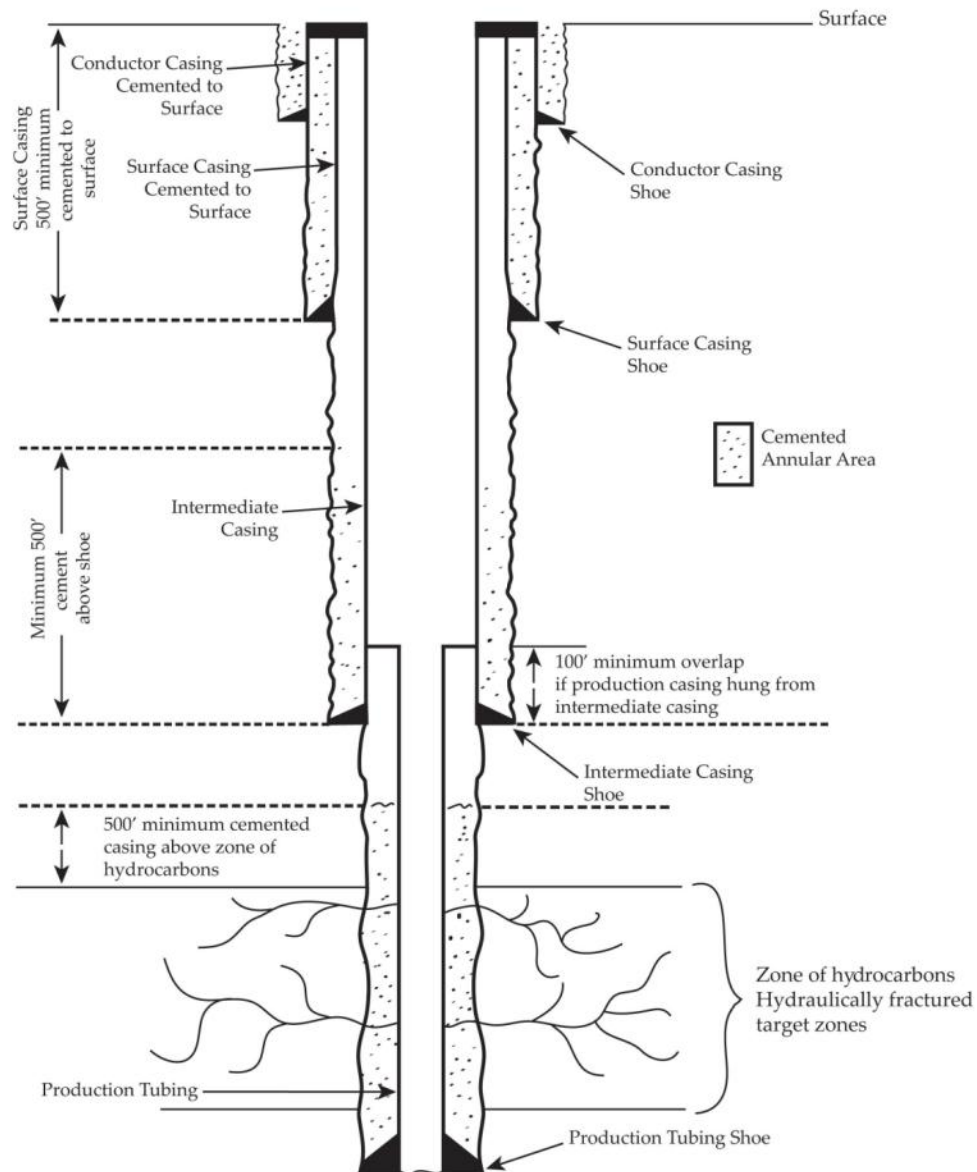
- Pre-approval sundry process for chemicals to be used in HF
- 14 day notification to county commissioners and neighbors

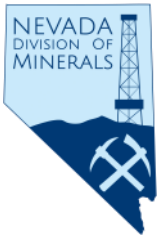
## POST-DRILLING

- Operators post HF list on [Fracfocus.org](http://Fracfocus.org) within 60 days.



# Oil & Gas Resource Well Proposed for Hydraulic Fracturing Vertical





AQUA study  
By Noble,  
NDOM  
NDEP, DRI.

Reports 1  
and 2 show  
no  
degradation  
of surface or  
groundwater

# Water-Quality Data, Hydraulic Fracturing in the Upper Humboldt River Basin, Aquifer Quality Assessment Program, Report 2

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Ronald L. Hershey  
Susan Rybarski  
James M. Thomas  
Greg Pohll

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*December 2014*

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**Publication No. 41259**

*Prepared by*  
Desert Research Institute, Reno, NV

*Prepared for*  
Noble Energy



# FOUR AGENCIES CAN BE INVOLVED WITH DRILLING AN OIL WELL IN NEVADA

- BLM – drilling on Federal lands, leasing process, NEPA process
- NDEP – Air permits for surface area disturbance, UIC permits if water is to be re-injected, water pollution control permits if water is to be discharged outside of containment.
- NDOM – Permits to drill on private/state lands, coordinates w/ BLM for drill permits on Federal lands.
- NDWR – For any water used in drilling, dust control or hydraulic fracturing

# U.S. Onshore – NE Nevada

## *Large-scale organic exploration opportunity*

### ► NBL Operated

- ⌘ 372,000 gross acres, 66% fee

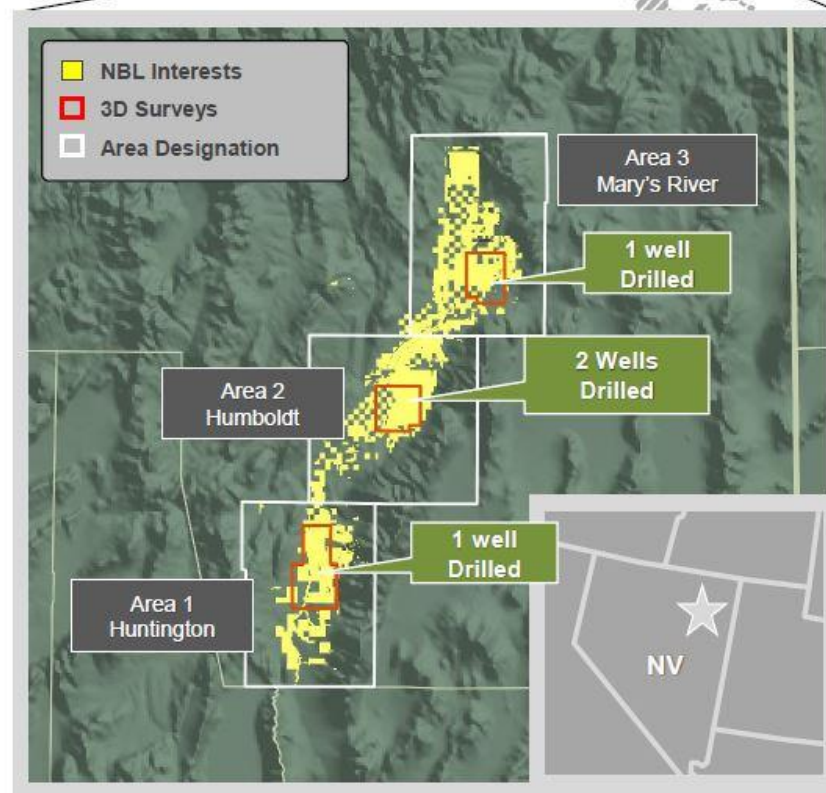
### ► Play Characteristics

- ⌘ Depth range 6,000 - 12,000 ft.
- ⌘ Unconventional tight oil prospect, similar deposition to Uinta Basin

### ► Initial Wells Proved Productive Nature of the Targeted Reservoir

- ⌘ Four wells drilled across acreage position
- ⌘ Initial vertical completion in Humboldt area currently producing
- ⌘ Initial completion in Mary's River awaiting long-term production facilities

### ► Assessing Next Steps for Appraisal







# Noble Energy: NE Nevada Oil Play

## Exploration Stage Unconventional Oil Prospects

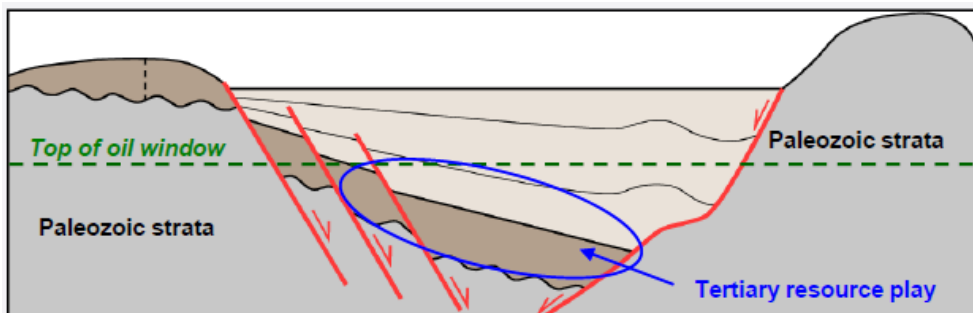
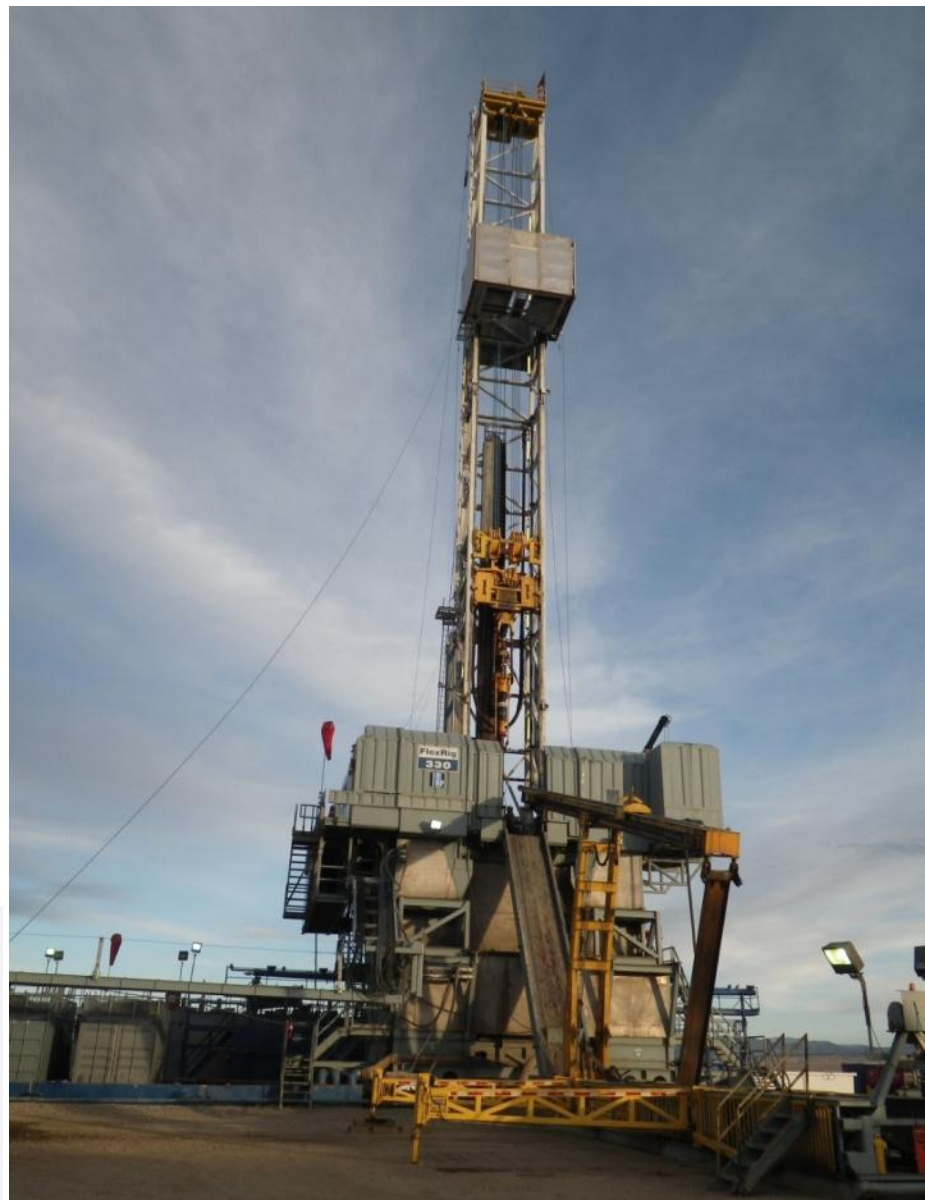
- Targeting Tertiary age lacustrine shale (Elko Formation) with play at depths between 6,000 – 12,000 ft
- Unconventional tight oil prospect
- 4 Wells drilled to date, 3 hydraulically fractured

## Results:

- Hydrocarbon saturation up to 70%
- Thermal maturity in peak oil generation window
- Total organic content 1-24%
- 2 wells recorded oil production

## Looking Forward:

- Complete Analysis of data from wells
- Design Completion and conduct production tests







65 Trucks to transport an oil rig and support equipment  
Workers live on-site in catered mobiles















**NEVADA'S FIRST UNCONVENTION OIL WELL :  
ELKO COUNTY, NOBLE ENERGY HUMBOLDT MC10-M10-11B**





# CURRENT ACTIVITY

- **Noble has 20 permits, drilled 4 wells, fracked 3**
  - All in Elko County
  - 2 wells recorded oil production
- **Water use for fracking avg. < 1 acre-foot per well**
  - 3 of the oil exploration wells had water wells drilled nearby, one used trucked-in water
- **Tank battery at first well near Deeth, another under construction near Jiggs to begin shipping soon.**
- **No oil companies are drilling at present in Nevada.**
  - Noble may drill one additional well in Fall 2015.
- **Nexus Energy Logistics oil port plan**
  - south of Wells, NV.
  - Have acquired land and received CUP from Elko County
  - Idea is to truck to oil port, load on rail cars





www.minerals.nv.gov



State of Nevada  
Commission on Mineral Resources  
**Division of Minerals**



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Geothermal drill rigs at Ormat Technologies' McGuinness Hills field in Lander County



### Important Links

- [Hydraulic Fracturing in Nevada Update and Water Use - April 7, 2015](#)
- [Presentation to the Assembly Committee on Natural Resources, Agriculture and Mining - March 3, 2015](#)
- [Final Approved Regulations for Hydraulic Fracturing - October 24, 2014](#)
- [Nevada Achieves "No Reported Injury" Year in AML Program - January 8, 2015](#)
- [NDOM YouTube Channel](#)
- [Nevada Bureau of Mines and Geology](#)

### Employment Announcement(s)

- NONE

### Programs

