



# Oil Shale and the AMSO RD&D Program

American Shale Oil, LLC

110 East 3<sup>rd</sup> Street

Rifle, CO 81650

[www.amso.net](http://www.amso.net)

[info@amso.net](mailto:info@amso.net)

April 2011

# Safe Harbor for Forward Looking Statements

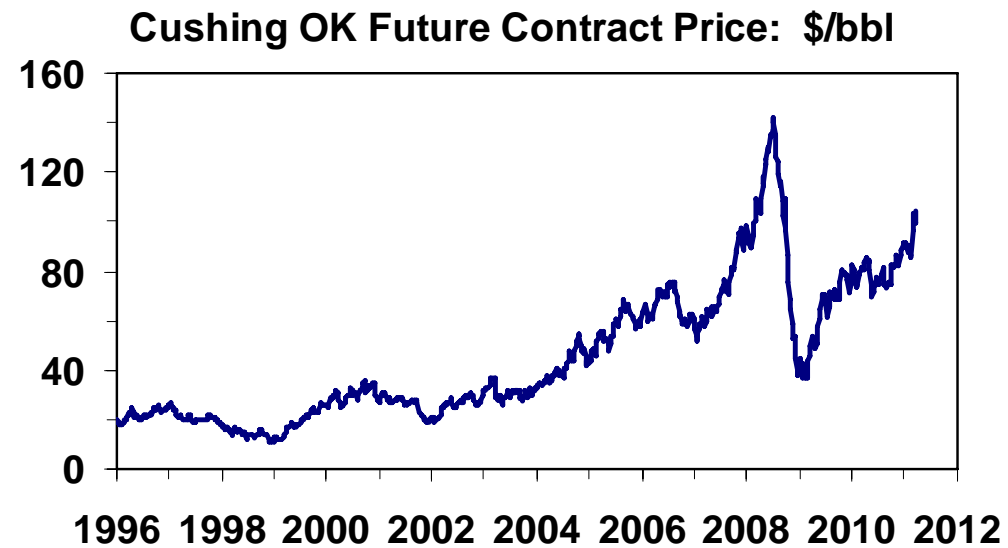
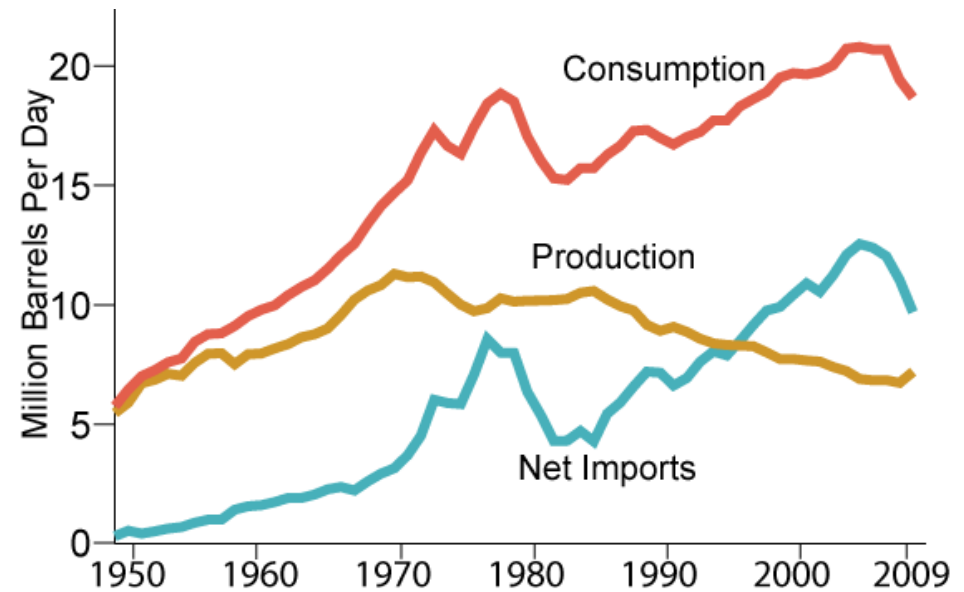


- ❑ All information, projections, expectations and opinions in this RD&D Program Presentation (“Presentation”) are made based on assumptions that American Shale Oil, LLC (the “Company”) believes were reasonable as of the date made, but those assumptions and the conclusions reached are subject to change without notice. The assumptions and estimates underlying the projections are inherently uncertain and are subject to significant business, economic and competitive uncertainties and contingencies, all of which are difficult to predict and many of which are beyond the control of management of the Company. Accordingly, there can be no assurance that the projected results will be realized.
- ❑ While these forward-looking statements represent our current judgment of what may happen in the future, actual results may differ materially from the results expressed or implied by these statements due to numerous important factors, including, but not limited to, those with respect to the Company described in IDT Corporation’s periodic filings with the Securities and Exchange Commission (under the headings “Risk Factors” and “Management’s Discussion and Analysis of Financial Condition and Results of Operations”). We are under no obligation, and expressly disclaim any obligation, to update the forward-looking statements in this Presentation, whether as a result of new information, future events or otherwise.

# Our Nation depends on imported crude oil



- ❑ **Transportation requires liquid fuel**
  - It will take decades to replace a significant fraction with electricity, natural gas, or non-corn biofuels
  
- ❑ **We import more than half our petroleum product needs**
  - Colorado produces only 1/3 of its needs
  
- ❑ **In 2008, imported oil cost ~\$400B**
  - ~50% of the US trade deficit
  - 3% of the US GDP
  
- ❑ **World events have pushed crude oil prices above the 2008 average price of \$95/bbl**

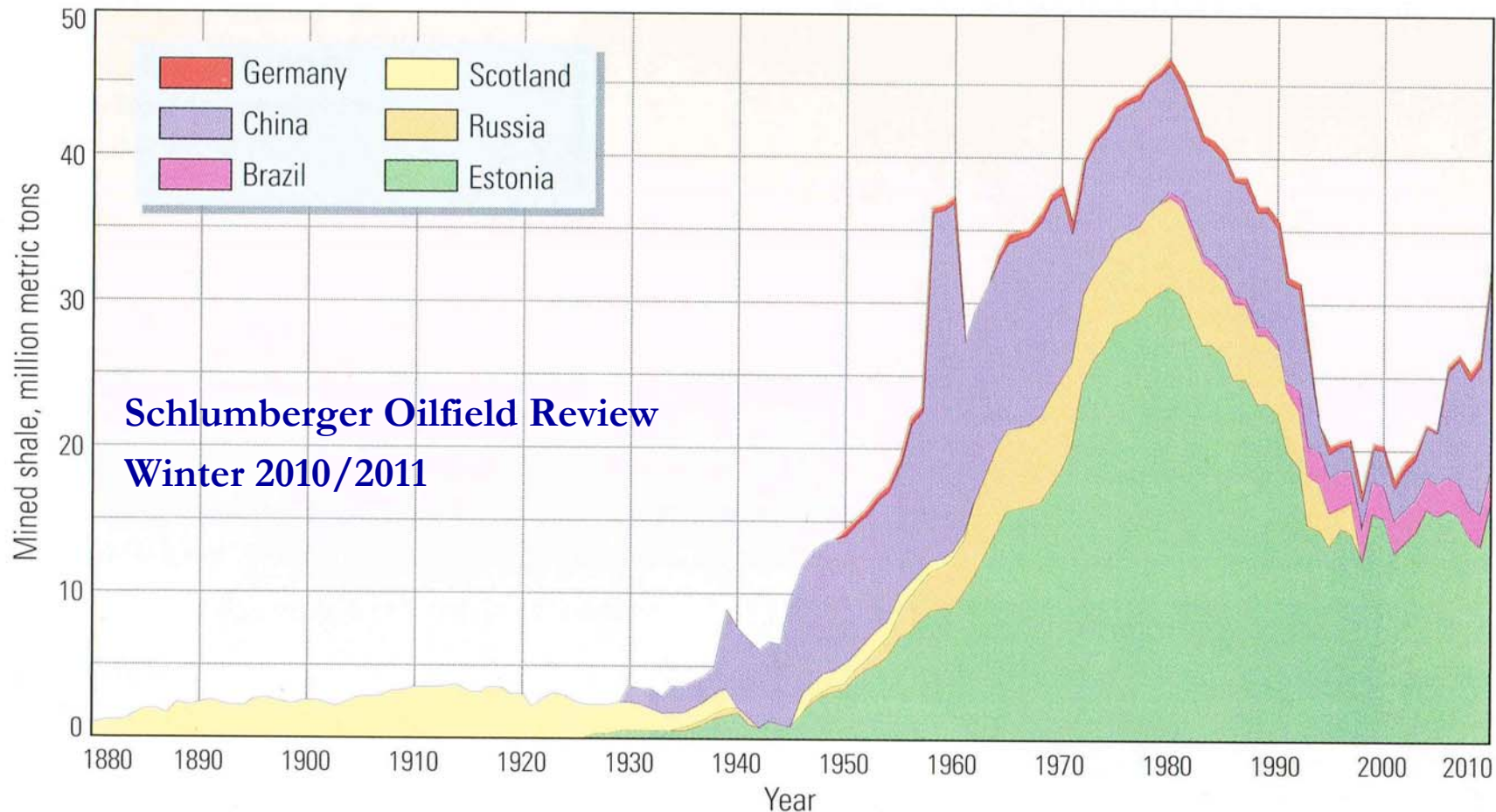


# Oil shale is important for our Nation



- ❑ We should use our country's domestic resources to solve our energy needs, while creating high paying jobs and generating much needed tax revenues
- ❑ The USGS recently upgraded its estimate of oil shale resource in Colorado's Piceance Basin to 1.5 trillion barrels
  - Enough to supply a significant fraction of our petroleum needs for centuries
  - Could provide a sustainable industry base for Colorado
- ❑ Renewables will not make us independent of imported oil in the foreseeable future; energy independence will require a number of solutions
- ❑ It is prudent to develop Colorado oil shale in an economically, socially, and environmentally sound manner and not once we're in an energy crisis

# World oil shale production is increasing



- ❑ 33 million metric tons corresponds approximately to 16 million barrels of shale oil, although most of the Estonian oil shale is burned directly for electric power generation
- ❑ World annual consumption is 32 billion barrels

# The United States is the Middle East of oil shale



## Oil Shale (potential resource)\*

Country	Billion barrels
United States	2500
China	350
Russia	250
Israel	250
Congo	100
Jordan	100
Brazil	80
Italy	70
Morocco	50

## Crude Oil (reserves)†

Country	Billion barrels
Saudi Arabia	270
Canada	180
Iran	140
Iraq	120
Kuwait	100
Venezuela	100
UAE	100
Russia	60
United States	20

\*Different sources have significantly different resource values for oil shale

†Oil reserves from Oil and Gas Journal, Dec, 2008

# Colorado has had periodic bursts of oil shale activity

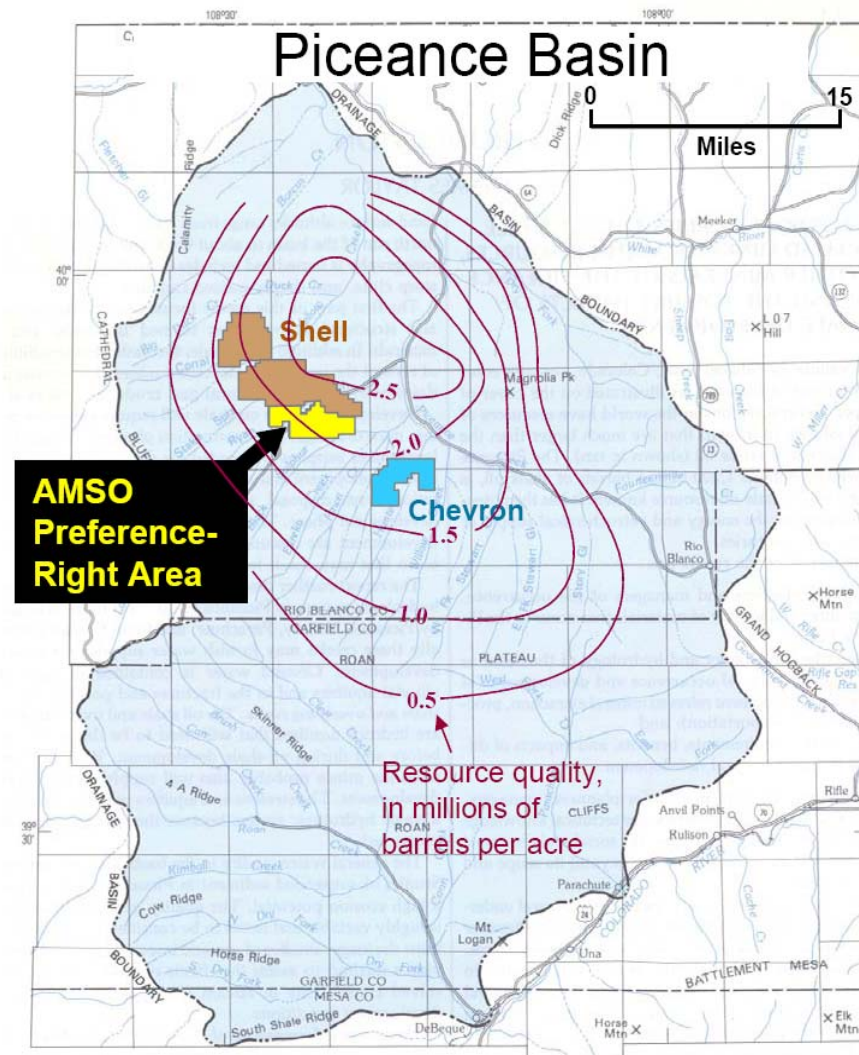


- ❑ 1920s activity, prediction of dwindling petroleum supplies and birth of the Naval Oil Shale Reserve
- ❑ Post WWII Bureau of Mines retorting program
- ❑ 1970s Middle East Problems and the Synthetic Fuels Corporation
- ❑ 2005 BLM RD&D Program

# AMSO is one of three RD&D Leaseholders in Colorado's Piceance Basin



- ❑ EGL Resources obtained a BLM 160-acre RD&D lease in January 2007, held under EGL Oil Shale
- ❑ IDT acquired EGL Oil Shale in 2008 and renamed it AMSO
- ❑ In March 2009, Total acquired a 50% interest in AMSO
- ❑ Upon demonstration of commercial viability, the RD&D lease can be expanded to a 5120-acre Preference Right Area\*



\*Using the USGS 2-million barrels per acre estimate (see map), this area contains an estimated 10 billion barrels of potential resource

# There are number of important issues to be addressed for oil shale development



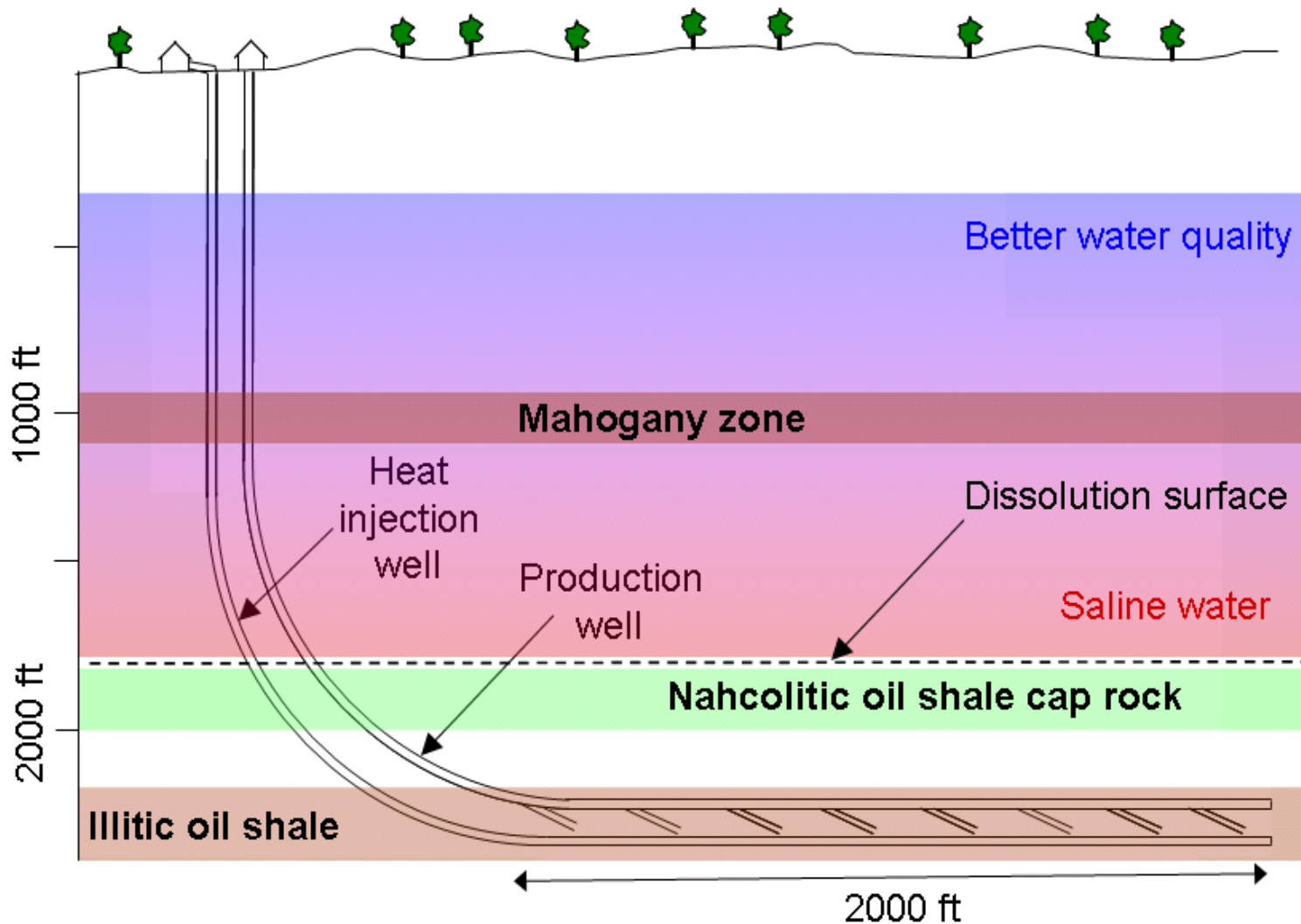
- ❑ Protection of aquifers
- ❑ Land and wildlife disturbance
- ❑ Impact on communities
  - Jobs
  - Population growth
  - Infrastructure needs
- ❑ Water usage
- ❑ Air emissions, including CO<sub>2</sub>

**AMSO's process and development plan  
addresses all these issues**

# AMSO's process and target are unique



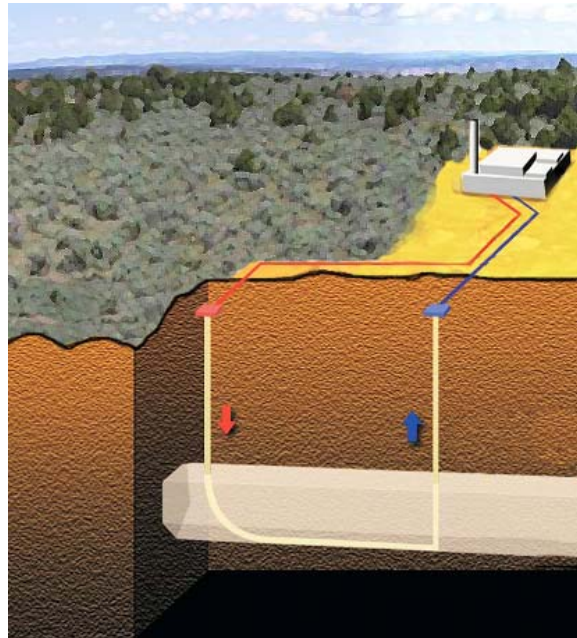
- We propose to first develop the illitic oil shale separated from protected waters by nahcolitic oil shale



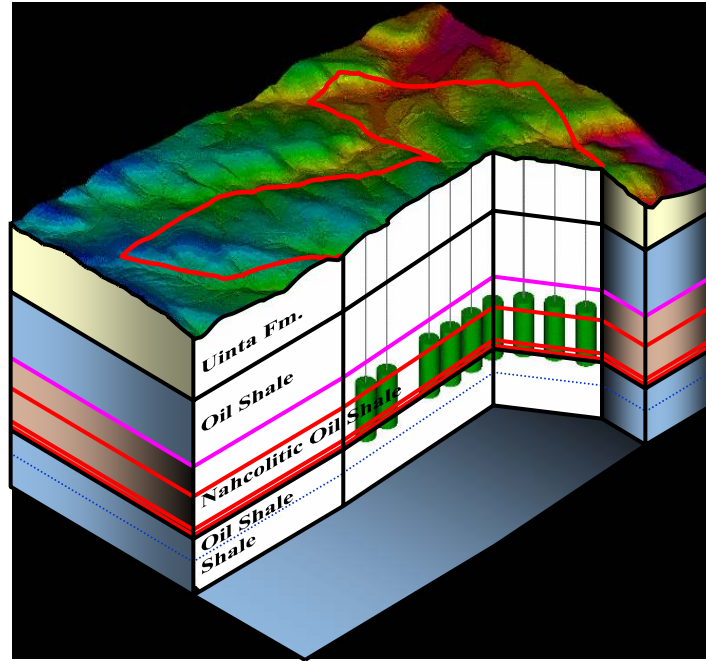
# The AMSO process is an extension of demonstrated technology of resource recovery below the aquifers



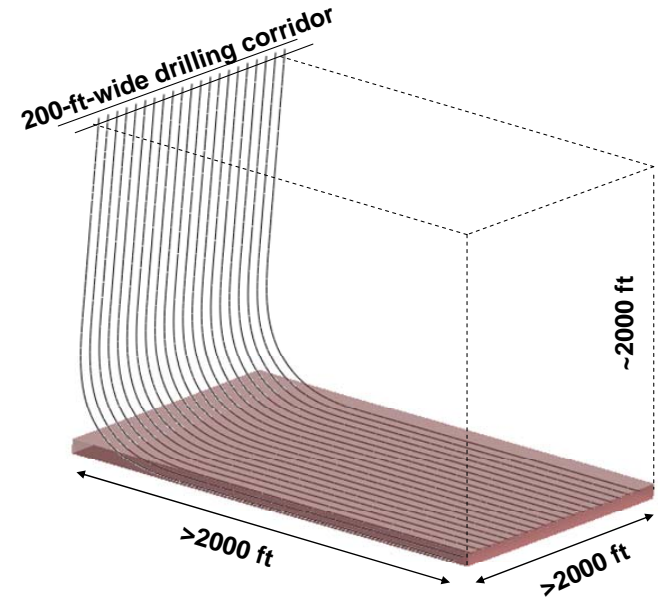
*Based on a logical progression of commercial in-situ technologies in the Piceance Basin*



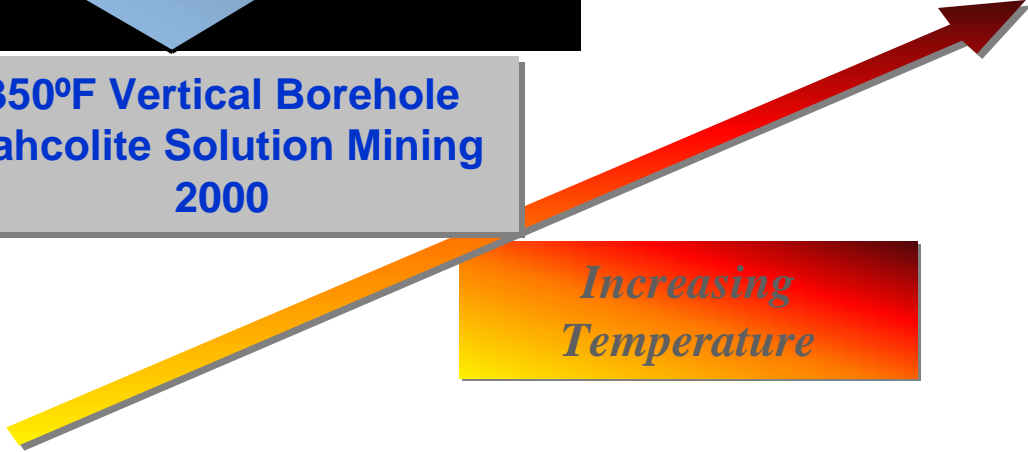
**225°F Horizontal Borehole Nahcolite Solution Mining 1991**



**350°F Vertical Borehole Nahcolite Solution Mining 2000**



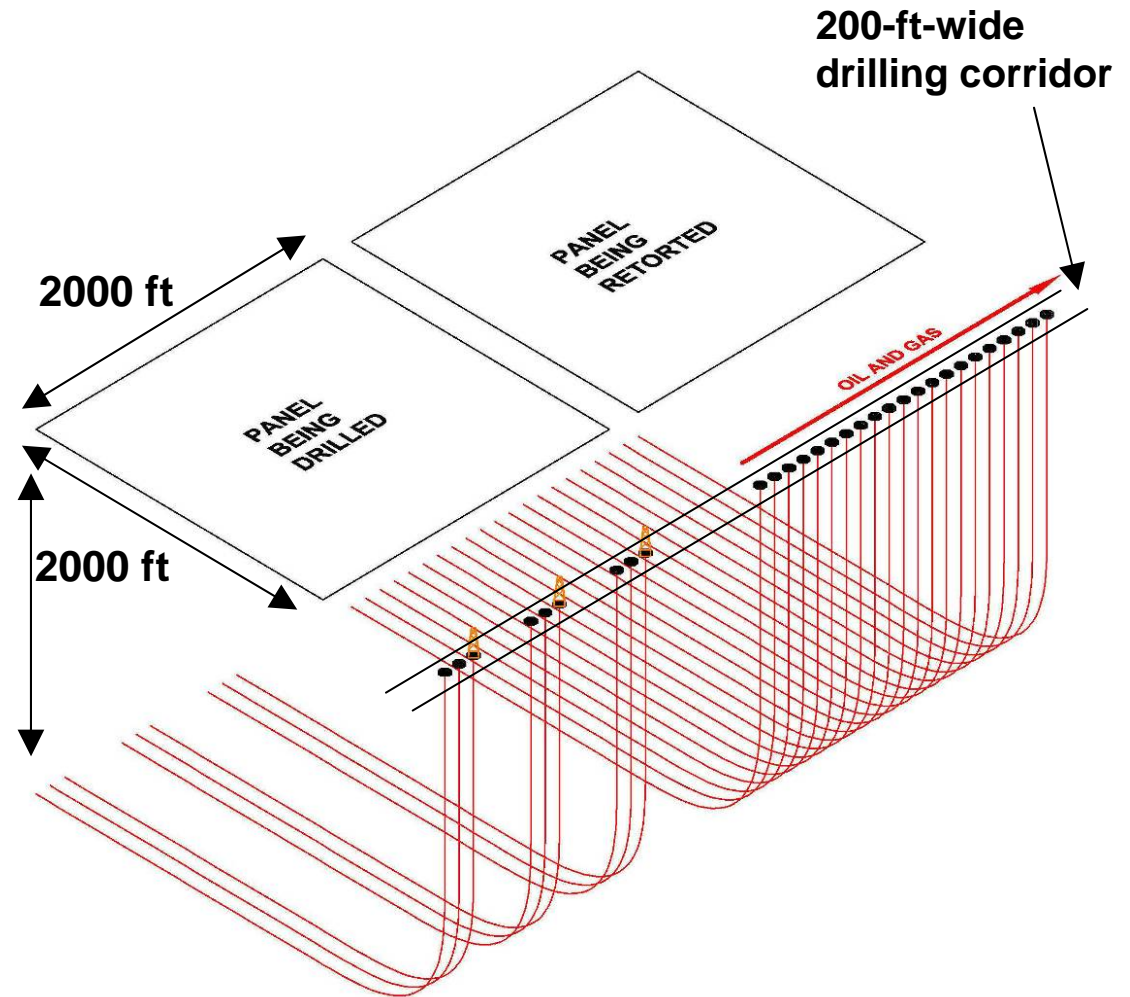
**650°F Horizontal Borehole Oil Shale Retorting 2007 RD&D Lease**



# AMSO plans fewer wells to minimize surface footprint



- ❑ Our retort panels will achieve high resource recovery in the illite shale
- ❑ By using long horizontal wells, drilling should impact <10% of the surface area



# Land reclamation has already been demonstrated from the 1980s activity



Photo of reclaimed land from Rio Blanco Oil Shale Project in Piceance Basin



# Our approach maximizes benefits and minimizes impacts to the Nation and local communities



- ❑ **Our RD&D phase will involve about two dozen people**
- ❑ **Our commercial process will use a small, stable labor force**
  - A few hundred people for drilling and production operations
  - Production target of about 100,000 bbl/day\*
- ❑ **At 350 bbl/day per worker, each worker will produce enough oil for 5,000 people**
- ❑ **At a royalty rate of \$10/barrel\*\*, each worker would generate \$1.2 million per year in royalties**
  - It is important that part of these royalties are used to improve infrastructure in the area

\* This exceeds Colorado's average 2010 oil production of 66,000 bbl/day over the past

\*\* The BLM has established a maximum royalty rate of 12.5%, which at a price per barrel of \$80, would translate into \$10/barrel

# AMSO's oil shale process effectively uses water for high economic contribution



- ❑ True in-situ processes have no mining, crushing, or spent-shale disposal needing water for dust control
- ❑ AMSO's retort interval is isolated from drinking water, so no water is needed for aquifer remediation
- ❑ Anticipated water usage is less than one barrel of water per barrel of shale oil
- ❑ Projected to 100,000 bbl/day (4700 acre-ft/yr), AMSO would use <0.1% of the state's water and generate ~1% of the state's GDP



White River in Rio Blanco County

# Our RD&D Plan aims to demonstrate important aspects of our process



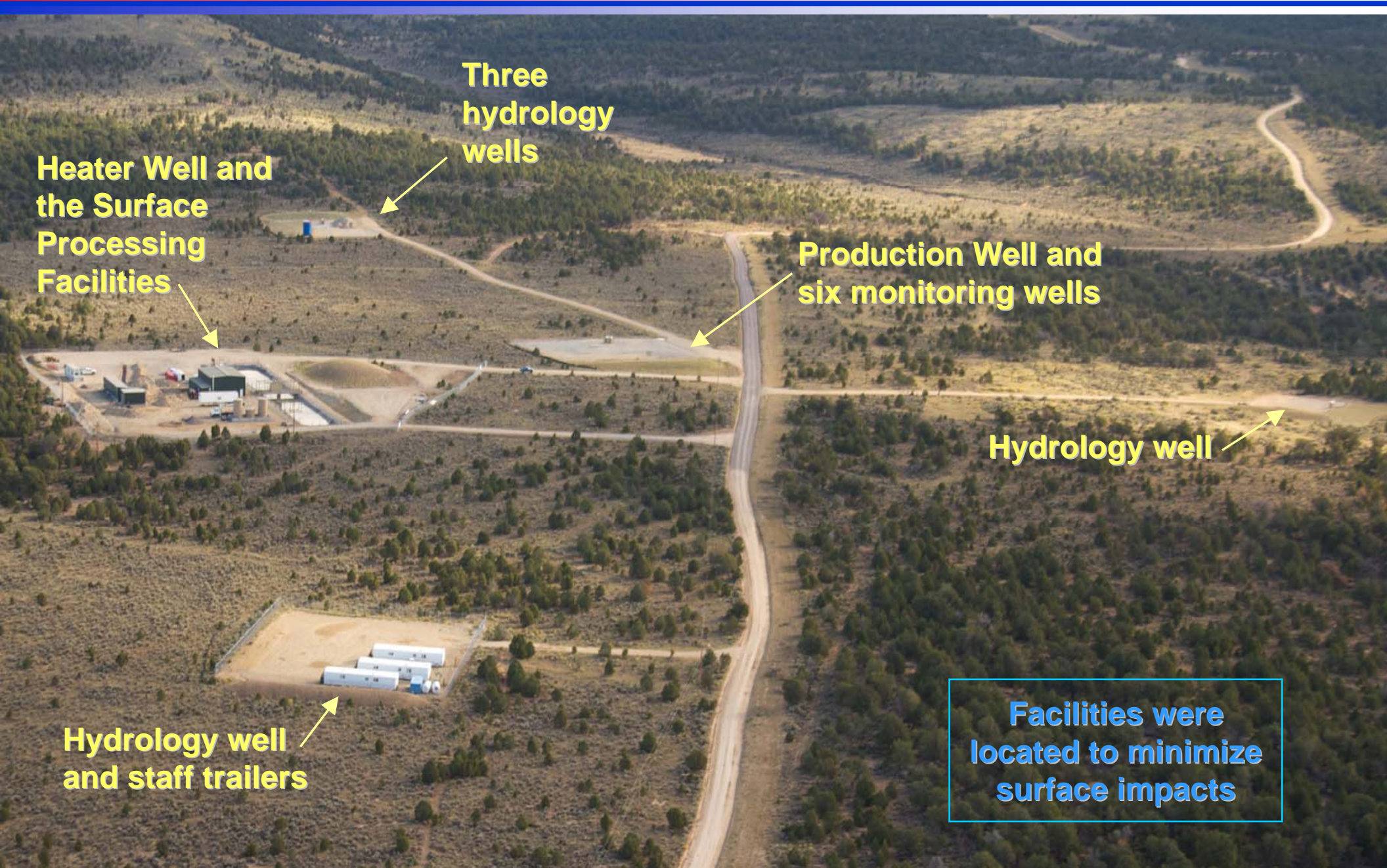
- ❑ **Geochemical and geomechanical properties of the illitic oil shale**
- ❑ **Hydrologic isolation of the illitic oil shale from protected waters**
- ❑ **Adequate heat transfer using a boiling oil pool**
  - Central to the Conduction, Convection, Reflux (CCR<sup>TM</sup>) concept
  - Enhancement by thermo-mechanical fragmentation
- ❑ **Premium oil quality**
  - High API gravity, low metals content, low nitrogen content
- ❑ **Minimal water usage (<1 barrel of water per barrel of oil)**
- ❑ **Ability to meet all applicable air emission regulations**
- ❑ **Technology for carbon sequestration**
- ❑ **Economic viability**

# Our demonstration and commercialization strategy is stepwise, deliberate and responsible



- ❑ **Initial RD&D Pilot Test in summer 2011**
- ❑ **Heating will occur over 100-200 days**
  - Will retort up to 4000 tons of oil shale
  - Will produce up to 2000 barrels of shale oil
- ❑ **Conduct subsequent RD&D retort tests as needed to satisfy AMSO and Lease commercial conversion requirements**
- ❑ **Step-wise commercial development**
  - Ramp up to 100,000 bbl/day commercial operation
  - Produce ~100,000 bbls/day for 25 years from only 8 sq. miles

# Our Pilot Test facilities are under construction



**Heater Well and the Surface Processing Facilities**

**Three hydrology wells**

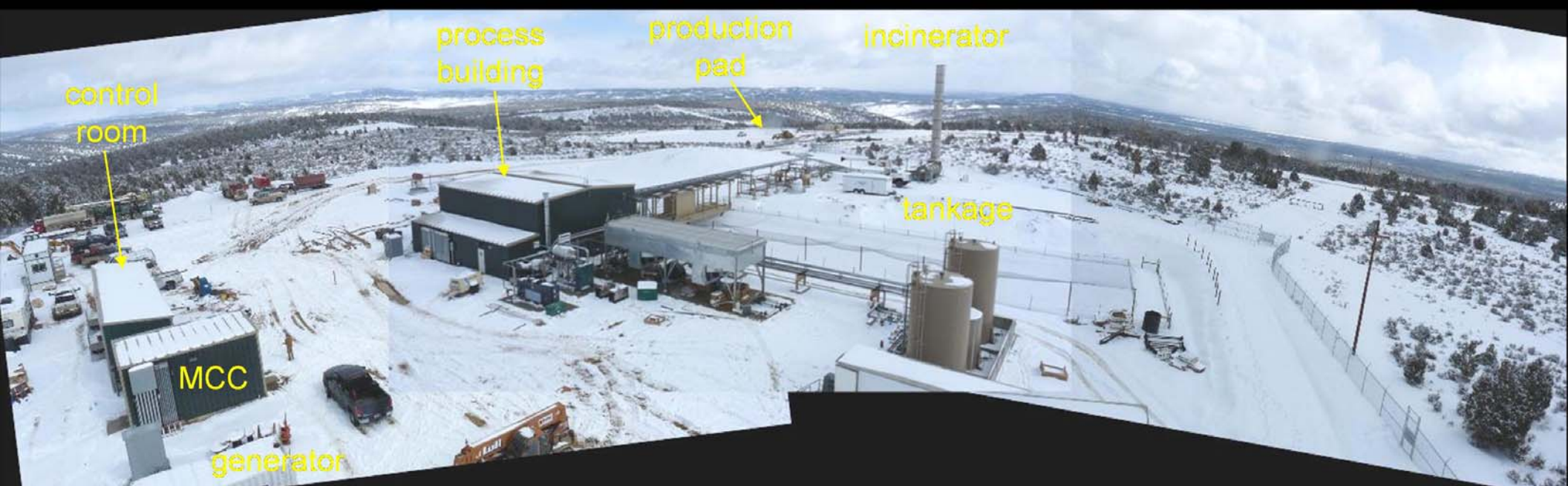
**Production Well and six monitoring wells**

**Hydrology well**

**Hydrology well and staff trailers**

**Facilities were located to minimize surface impacts**

# Surface facilities and wells will be completed in June, with heating starting a month later



# Our Pilot Test is moving towards realization



- ❑ **Our site characterization activities confirm the suitability of the Illite Mining Interval**
  - Hydrologic isolation from protected waters has been demonstrated
  - High oil shale grade and minimal groundwater favor high retort efficiency
  - Minor amounts of gas and bitumen are already present
- ❑ **All major permits and agency approvals are in place**
- ❑ **Surface processing facilities are nearing completion**
- ❑ **Drilling of the remaining wells has started**
- ❑ **All downhole equipment procurements are in progress**
- ❑ **An operational and training plan is in place**

# AMSO's approach to commercial shale oil recovery is to be a good steward of the Nation's resource



- ❑ Colorado oil shale should be developed in an economically, socially, and environmentally sustainable manner
- ❑ AMSO's Pilot Test includes developing and demonstrating methods to enhance environmental protections
- ❑ AMSO needs agency partnerships in identifying specific environmental concerns and in developing methods to avoid, minimize, and/or mitigate potential environmental impacts
- ❑ AMSO will demonstrate the environmental viability of its oil recovery process before proceeding to commercial operations