



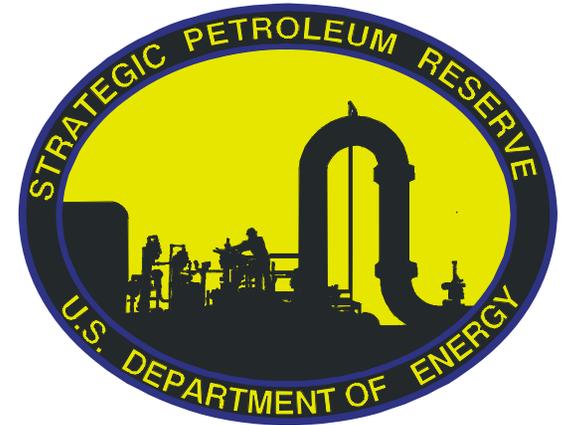
U.S. DEPARTMENT OF ENERGY  
OFFICE OF PETROLEUM RESERVES

# U.S. DOE Oil Shale Program

## Colorado School of Mines Oil Shale Symposium



October 16, 2006



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# On the Road to Energy Security

## Implementing a Comprehensive Energy Strategy: A Status Report

### A Message from the Secretary of Energy



**W**HEN PRESIDENT George W. Bush signed the Energy Policy Act of 2005 (EPAAct) into law on August 8, 2005, he declared that "... one day all Americans will look back on this bill as a vital step toward a more secure and more prosperous nation that is less dependent on foreign sources of energy."

### How?

- *Accelerating the development of oil shale, oil sands and other unconventional fuels*

# Why the Petroleum Reserves? An Objective Broker

*The Energy Policy and Conservation Act of 1975 authorized the creation of the Strategic Petroleum Reserve to “diminish the U.S. vulnerability to the effects of disruptions in petroleum supplies”.*

- **The cornerstone of U.S. Energy security program**
- **Concentration on energy and national security vulnerabilities**
- **Analytically objective – no liquid fuel or research and development preferences**
- **Supply availability oriented – Analytically Based**

# Vulnerability

## Current SPR

Protection from Short-Term  
Supply Embargos



## New SPR

Absolute Long-Term  
Supply Assurance

*Growing concern that there is  
an eminent global fuel supply problem*

- Declining World Oil Supply
- National Security (Supply interdictions)
- Supply Veracity/Confidence
- Economic and Market Implications

# Status of Strategic Planning Program

## Unconventional Oil Resources Will Complement the SPR

- Oil Shale Feasibility Study – October 2003
- Final “Strategic Significance” Report – April 2004
- Alberta Oil Sands Field Trip - Sept. 2004
- Oil Shale Steering Group Meetings – April, July, Oct 04, and Jan, Mar, Nov 05, and Jan 06
- Oil Shale Roadmap – Dec 2004
- Draft Development Plan and Peer Review – March, 2005
- America’s Oil Shale – Findings and Recommendations of the Steering Committee – June 2005
- National Oil Shale Model – June 2005
- Energy Policy Act of 2005 – August 2005
- Task Force Establishment Initiated – October 2005
- Final Draft to Congress Completed – September 2006

## Section 369(i) OPR Mission

**“Coordinate the creation and implementation of a commercial strategic fuel development program for the United States.”**

***Requires***

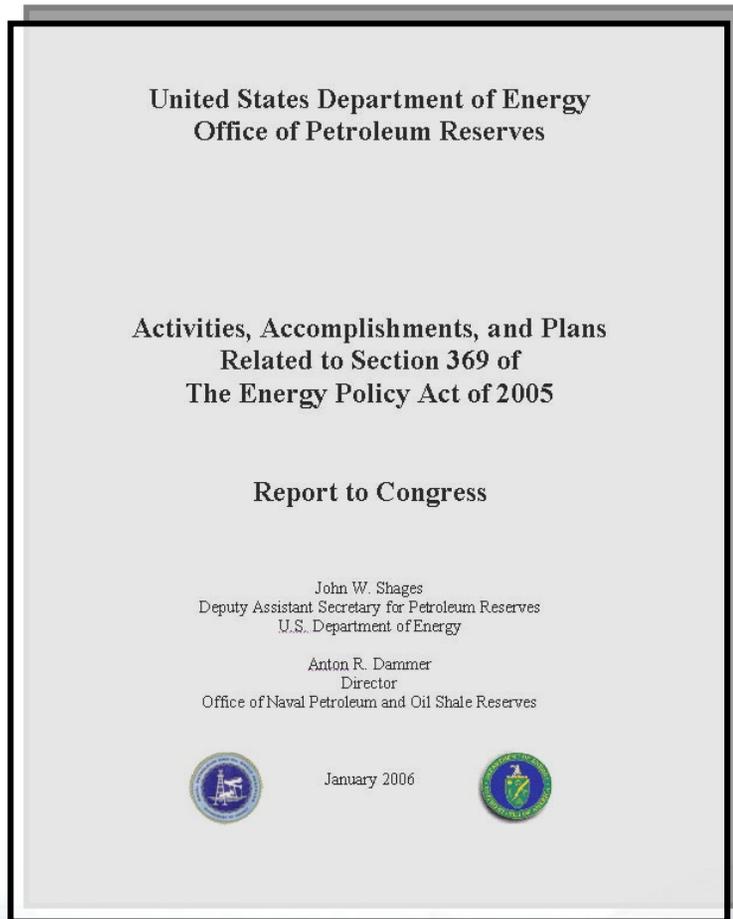
**An Annual “Report that describes the activities of the Office of Petroleum Reserves carried out under this subsection.”**



## Section 369(i) Direction

- ***Promote and coordinate*** Federal Government actions that facilitate the development of **strategic** fuels
- ***Evaluate the strategic importance*** of unconventional sources of **strategic** fuels to the security of the U.S.
- ***Identify, assess, and recommend*** Federal actions required to assist in the development and manufacture of **strategic** fuels
- ***Coordinate and facilitate appropriate relationships*** between private industry and the federal Government to promote sufficient and timely private investment

# Objectives of the Report to Congress



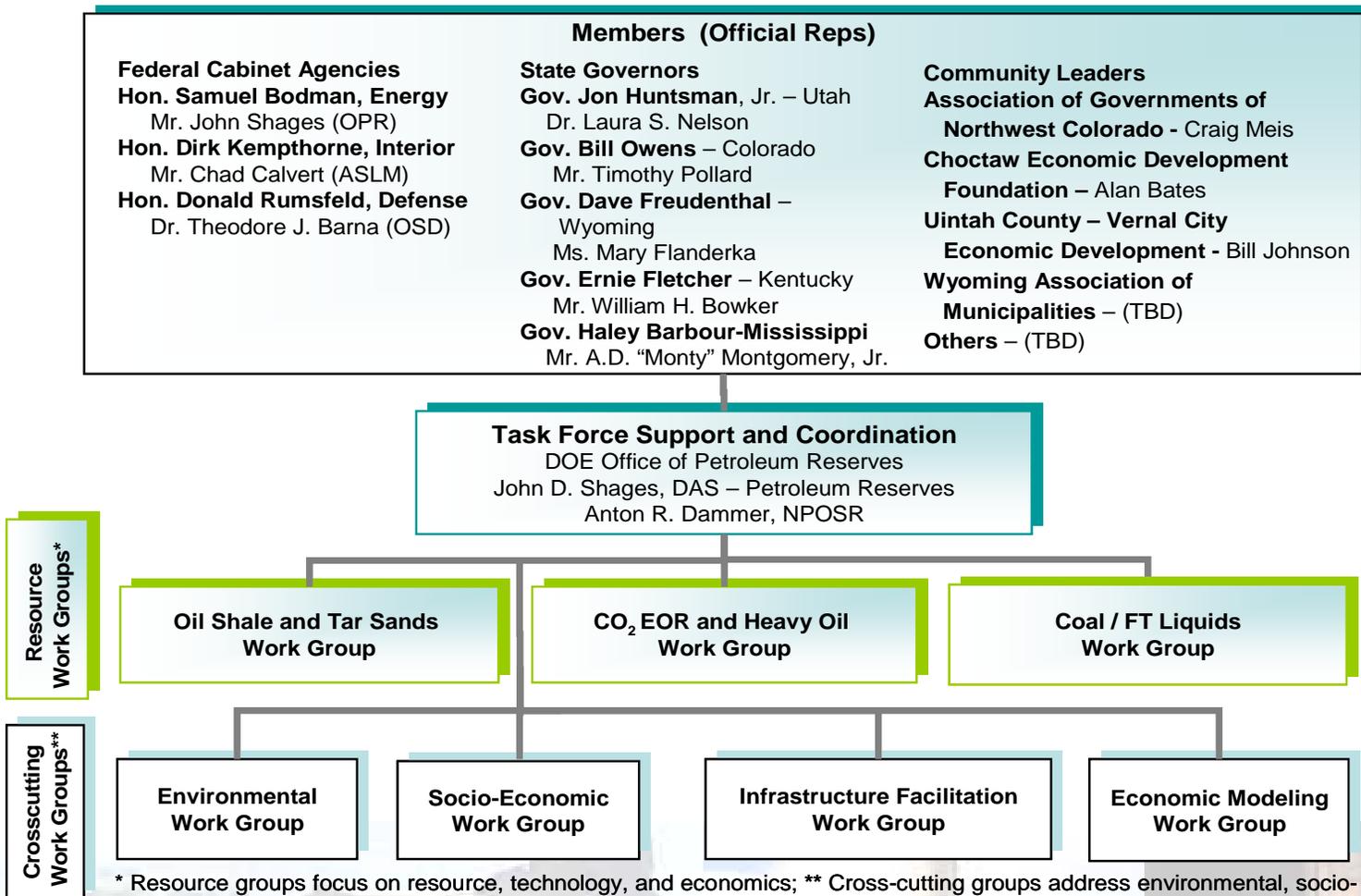
- **Provide a Status Report on Implementing Section 369**
- **Outline an Approach to Developing a Commercial Fuels Development Program**
- **Provide Recommendations to the Task Force**

## Section 369(h) Direction

***Secretary of Energy shall establish a Task Force to develop a program to coordinate and accelerate the commercial development of strategic unconventional fuels.***

- **Task Force to be composed of Secretaries of Energy, Interior, and Defense, Governors of affected States, community leaders, and local governments**
- **Make recommendations on partnerships with Alberta and other nations that contain significant oil shale resources**
- **Initial analysis and recommendations 180 days from enactment and annually for five-years thereafter**
- **Office of Petroleum Reserves to Coordinate Task Force support**

# Strategic Unconventional Fuels Task Force Organization



\* Resource groups focus on resource, technology, and economics; \*\* Cross-cutting groups address environmental, socio-economic, and infrastructure related issues for all strategic unconventional fuels resources; Work groups to be staffed by representatives of participating federal, state, and community organizations.

# Objectives of the Report to the President and Congress



TASK FORCE ON STRATEGIC  
UNCONVENTIONAL FUELS

## DEVELOPMENT OF AMERICA'S STRATEGIC UNCONVENTIONAL FUELS RESOURCES

INITIAL REPORT TO THE PRESIDENT  
AND THE CONGRESS OF THE  
UNITED STATES



PREPARED IN RESPONSE TO SECTION 369(h) (5)(A) OF THE ENERGY  
POLICY ACT OF 2005 (P.L. 109-58)

- Propose a development strategy
- Outline impediments and uncertainties that may constrain development
- Offer options for action by Federal & State Governments
- Make recommendations for immediate action

# What is Congress Asking?

- **Assessment of domestic unconventional resource base**
- **Outline a logical, but urgent development schedule**
- **Recommendations to enable and facilitate the production schedule**
- **Provide a basis for sound policy decision-making.**

**Implied question – If we implement what you recommend, will industry respond?**



# Initial Options for Task Force Consideration

## Access to Resources on Public Lands

*Provide an equitable, stable, and effective land tenure system.*

- Prepare regional resource development plans for oil shale and tar sands
- Open a new round of oil shale RD&D leasing
- Create open nomination process for oil shale RD&D and commercial leasing, like oil and coal
- Provide budget and professional staff to enable DOE and BLM to comply with Sec. 369
- Complete Oil Shale and Tar Sands Leasing Programmatic EIS on schedule
- Issue first-round BLM oil shale RD&D leases and commercial oil shale and tar sands leases on schedule
- Facilitate access to Alaskan heavy oil resources

## Economic/Fiscal Regime

*Create a fiscal regime that quickly attracts needed private development capital*

- Provide favorable royalty treatment for projects on Federal lands until project payback
- Quickly define royalty rates and fees for converting RD&D leases to commercial leases (high enough to provide fair value to the public AND low enough to encourage investment)
- Make royalty calculations simple; consider tying the oil shale royalty rates to WTI oil price
- R&D Tax Credits for unconventional fuels
- Production Tax Credits to establish parity with oil at \$~40 / Bbl
- Allow capital costs to be expensed in the year incurred or accelerate depreciation
- Purchase agreements for shale oil and other unconventional liquids
- Limit incentives to point of project payback or net positive cash flow to protect public treasuries

*You Don't Get to Heaven Overnite*

*Coalbeds: A Source of Natural Gas*

*U.S.B.M. June 16, 1975*



# Initial Options for Task Force Consideration

## Regulatory / Permitting

*Provide an inclusive regulatory system and review process that encourages expeditious development and a predictable schedule for permitting and approvals.*

- Roadmap permitting processes and timelines in major oil shale states and Federal / NEPA
- Identify Federal responsibilities that could be delegated to states
- Document federal and state environmental standards that apply to unconventional fuels
- Consider granting regulatory agencies quasi-judicial powers to arbitrate and resolve issues
- Joint Review Process to coordinate permitting processes and compress timeline
- Craft a uniform permitting process; Consider joint Fed/State offices in affected states to expedite permits
- Better define which parties have standing in legal disputes
- Establish time limits on decisions relative to permit application completeness and acceptability

## Technology RD&D

*Craft a fast-track technology program to attract investment but not break the bank.*

- Complete assessment of oil shale and tar sand technologies mandated by Section 369 ASAP
- Move best technologies toward demonstration and commercial development
- Analyze adequacy of domestic and global design, engineering, manufacturing, and fabrication to support industry development
- Focus R&D and technical assistance on current and next generation technologies, major technical issues and advancing novel concepts
- Consider research parks at White River and Anvil Points for R&D and a source for mined shale
- Cost-share technical assistance from DOE labs
- Cost-share bench-scale and pilot testing for new technologies (50 – 80%)
- Cost-share demonstration projects at commercially-representative scale (50%)



# Initial Options for Task Force Consideration

## Government Organization

*Create a government organizational structure that will promote and accelerate unconventional fuels development in a reasoned and efficient manner.*

- Activate Task Force ASAP to help develop Commercial Strategic Fuels Development Plan
- Consider a joint government organization to expedite unconventional oil development -- Consider a task force, government corporation, or outsourcing (e.g., U.S. Energy Mobilization Board or Alberta Energy and Utilities Board)

## Public Infrastructure

*Propose an integrated infrastructure plan to support efficient development, realize synergies among various unconventional fuels, and reduce duplicative investments.*

- Identify key infrastructure requirements in affected regions (roads, power, water, etc)
- Accelerate investments to coincide with integrated industry development schedule
- Allow industry to fund infrastructure development up-front; allow a dollar-for-dollar credit against future tax or royalty to recover costs

## Socio-Economic

*Propose a program for development planning, funding, and training that mitigates adverse local impacts and maximizes state and local employment opportunities and public wealth.*

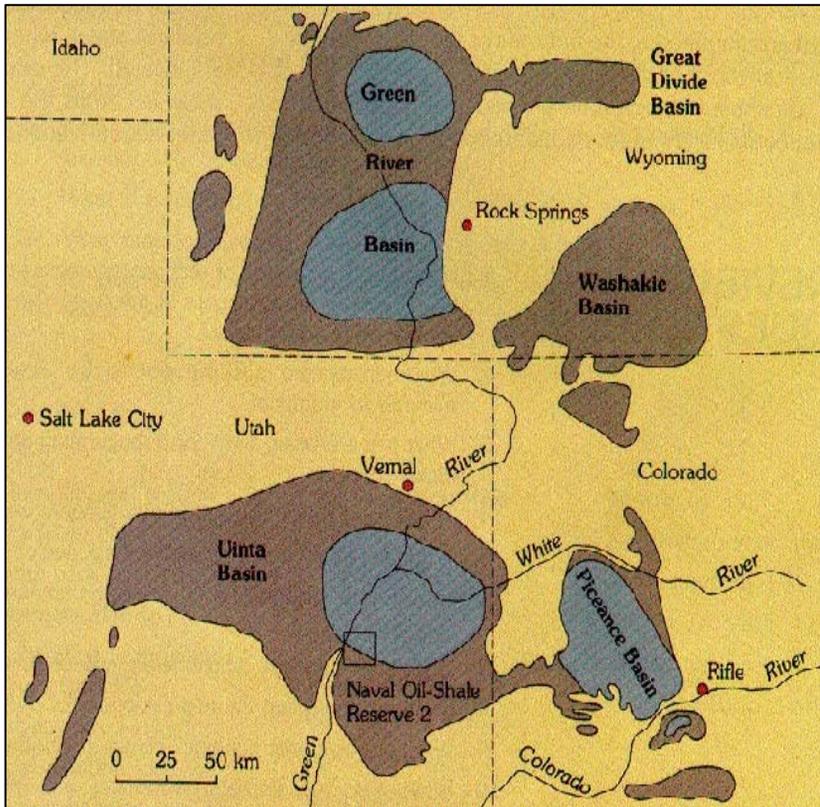
- Provide immediate planning assistance funds for affected communities
- Encourage and assist financing of infrastructure development that is needed before industry revenue flows become available (such as low-rate loans, loan guarantees, bonds, etc.)
- Immediately create and support university and vo-tech training programs within existing educational institutions so that essential skilled labor is available when needed



# Overview

- **The oil shale resources of Colorado, Utah, and Wyoming represent the world's most concentrated hydrocarbon deposits**
  - Over 1.2 trillion Bbls in highest-grade deposits
- **Initial industry development stimulated in the 1970's by a Prototype Oil Shale Leasing Program**
  - Development continued through the 1980's
  - Commercial-scale retorting technology not developed
  - Low oil prices discouraged further development
- **Industry is once again interested in oil shale development**
  - The Oil Shale Exploration Corporation, Shell, and Chevron were awarded BLM research leases in 2006

# Location and Availability of U.S. Oil Shale Resource

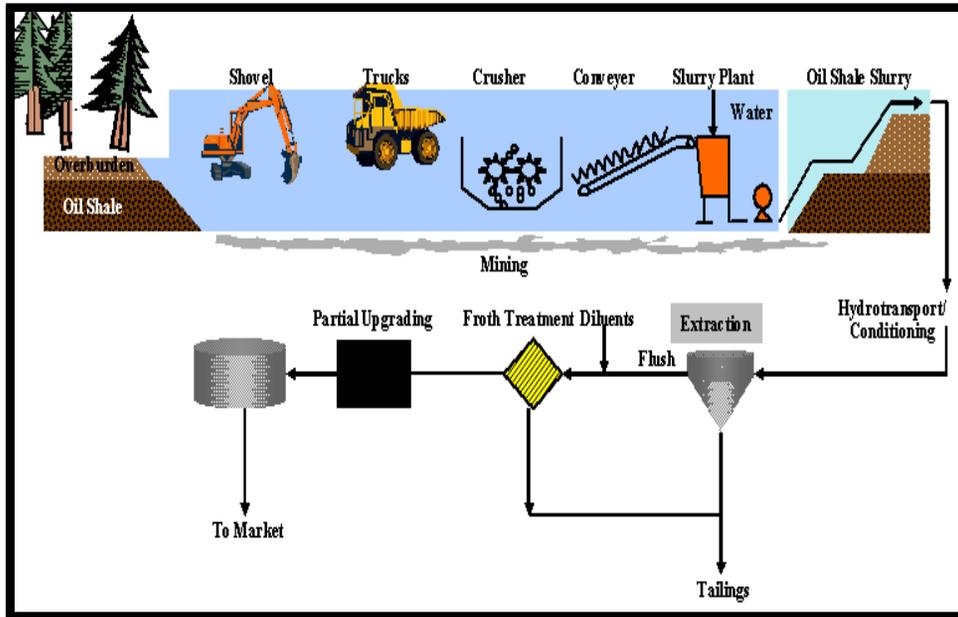


Deposits	Richness (gals/t)		
	5 - 10	10 - 25	25 - 100
Location			
	Billions of Barrels		
Colorado, Wyoming & Utah (Green River)	4,000	2,800	1,200
Central & Eastern States	2,000	1,000	NA
Alaska	Large	200	250
Total	6,000+	4,000	1,400+

# Resource Allocation

- **Industry has significant private land holdings**
  - Concentrated at 70 feet thick oil shale outcrops
  - Can support production of up to 400,000 Bbl/D
  - Also have water rights needed to support initial ops
- **Federal lands hold 80% of the resource**
  - Thickness of over 1,000 feet
  - Shale becomes richer with depth
  - Can support production of several million Bbl/D
- **Leasing of public lands is needed to grow an oil shale industry of significant size**
  - DOI initiated an oil shale R&D leasing program in 2005.
  - BLM published a Notice of Rulemaking for Commercial Oil Shale Leasing in August 2006 as directed by EPACT 2005.

# Oil Shale Surface Retorting Technology

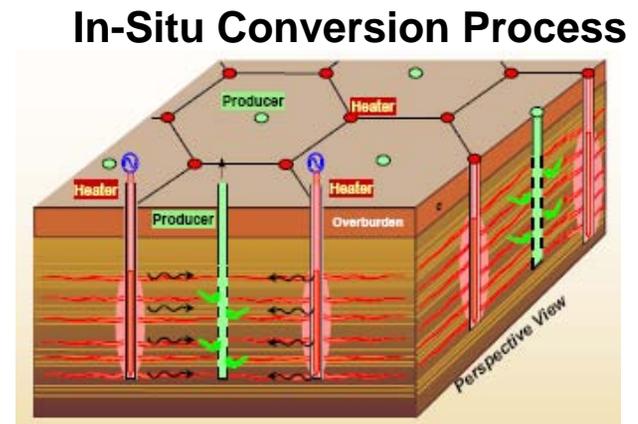
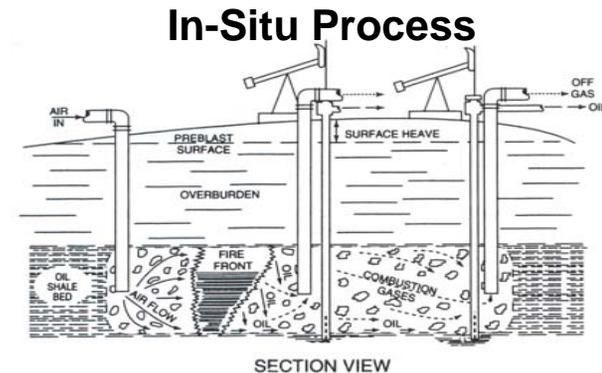


- Mined shale must be heated in “retorts” to between 400 and 500 degrees C to convert kerogen to shale oil and gases
- Two major types of surface retorts, vertical and horizontal, have offered significant promise
- Numerous variations exist for each type



# Oil Shale In-Situ Technology

- **True In-Situ**
  - Shale is fractured, air is injected, and shale is ignited to heat formation
  - Shale oil moves to production wells
- **In-Situ Conversion**
  - Slow indirect heating 2-4 years at close spacing – no combustion
  - Oil and gas recovered in conventional wells
  - Freeze wall protects groundwater



Shell Oil Company Technology

**Note: There is significant private investment in oil shale R&D flowing into the DOE National laboratories.**

# Oil Shale Economics

- **Capital investments**
  - \$4 to \$6 billion for a 100,000 Bbl/D operation
- **Operating costs**
  - High at first then decrease as operations achieve economies of scale
  - First of a kind mining and retorting plants may be economic at sustained oil prices of \$40 to \$60 per BBL
  - In-situ processes may be economic at sustained oil prices of \$30 to \$40 per BBL
- **Oil shale economic barriers**
  - Capital and operating costs uncertain
  - Oil prices uncertain
  - Return on investment uncertain

# Target and Constraints

- **Oil shale has significant potential**
  - Similar to Alberta oil sands development
  - Up to 1 million Bbl/D by 2025 and 3 million Bbl/D by 2035
- **Constraints on development**
  - Access to resources on public lands
  - Commercial-scale technology performance
  - Relative economics and market risks
  - Socio-economic and environmental issues



# DOE Initiatives

- **DOE is working closely with DOI, DOD, Industry and other stakeholders to address :**
  - Barriers and constraints to oil shale development
  - Land access issues
  - Environmental challenges
  - Socio economic impacts on local communities
- **DOE, DOI, and DOD are participating in the Strategic Unconventional Fuels Task Force (per EPACT 2005)**
- **Actively involved in preparing Task Force Report to Congress**
  - Draft scheduled for completion late in 2006



# Bits of Philosophy

*“A knowledge of probabilities will not make a good poker player. A disregard of them will make a very poor one.*

*Always deal from a position of knowledge.”*

J.D. McDonald, “Strategy in Poker,  
Business and War, 1957



# Bits of Philosophy

*“You are so right, sir. The theoretical has its place, but you must take a practical approach.”*

London Taxicab Driver, 1964



# Bits of Philosophy

*“ You never fill a job, you create one.”*

Dr. Frederic Danner, then only living charter member  
of the American Institute of Chemical Engineers



# Bits of Philosophy

*“Engineering is the art and science of weaving technology into the fabric of society.”*

Original Encyclopedia Britannica



# Bits of Philosophy

*“ O Lord, please fill my mouth with worthwhile stuff, and nudge me when I’ve said enough.”*

Old Family Prayer - 19th Century

