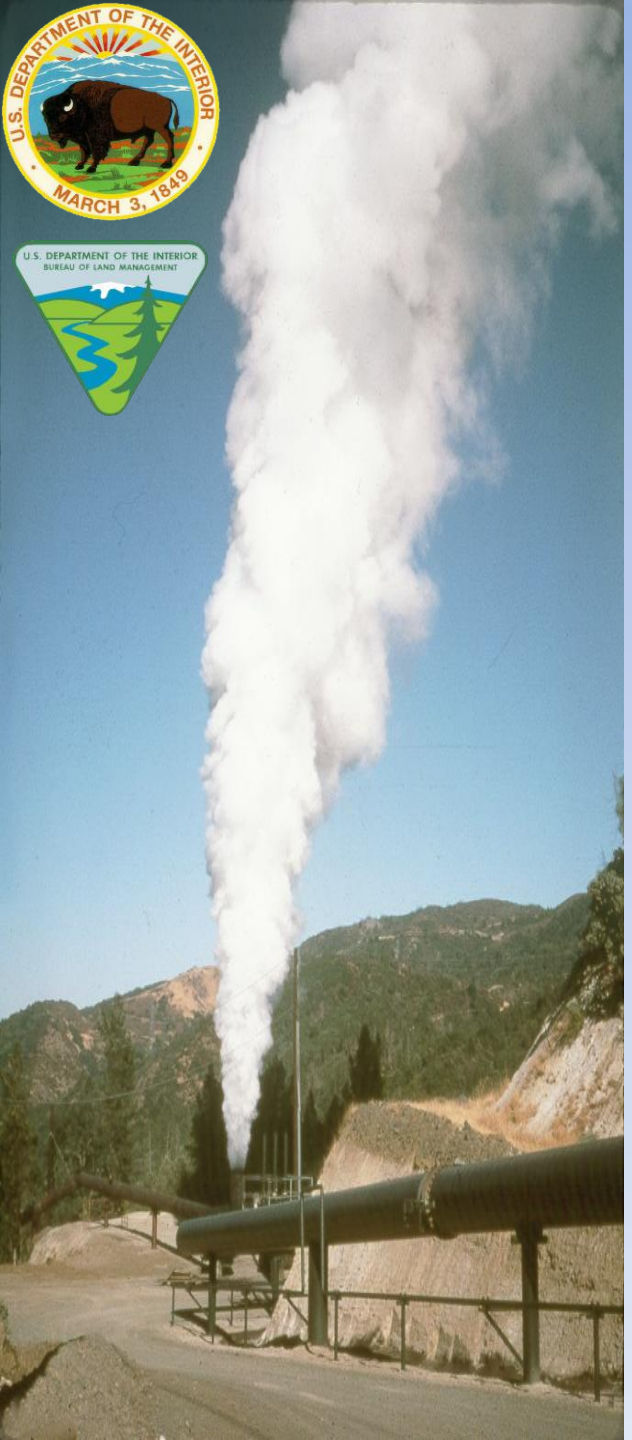


Regulatory Impacts to Geothermal Development

TECHNOLOGY PLANNING WORKSHOP

Low-Temperature, Coproduced, and Geopressured Geothermal Energy

July 13-14, 2010

Marriot Denver West

Golden Colorado

Kermit Witherbee

National Geothermal Program Manager

Bureau of Land Management

Washington, DC

GEOTHERMAL – Where We Are

Desert Peak Power Plant, NV, 21.8 MW

- Programmatic EIS completed
  - Conducted 30 implementation workshops
- Lease Sales
  - 8 lease sales
  - 347 Parcels/$ 74.2 M
- Active geothermal leases
  - 666 total/1.2 M acres
- Producing geothermal leases
  - 58 total/56 K acres
  - Supply 35 generating facilities, 17 on BLM managed lands
  - 1,300 MW capacity
- Units
  - CA – 3, NV – 25, & UT - 1
- Lease Nominations
  - Pending: 194/696 K acres
- Development plans: 22+ (>760 MW)
  - 6 Fast Track projects (285 MW)

National Geothermal Lease Sales
FY 2007 – May 11, 2010

First Competitive Sale - June 20, 2007, Salt Lake City

State	Number of Leases	Acres	Accepted Bonus Bids ($)
California	21	14,110	8,113,024
Idaho	8	17,578	5,749,804
Nevada	235	684,158	50,148,055
Utah	68	216,738	9,547,218
Oregon	11	41,362	702,755
Total	**347**	**984,538**	**$74,282,044**

Statistics

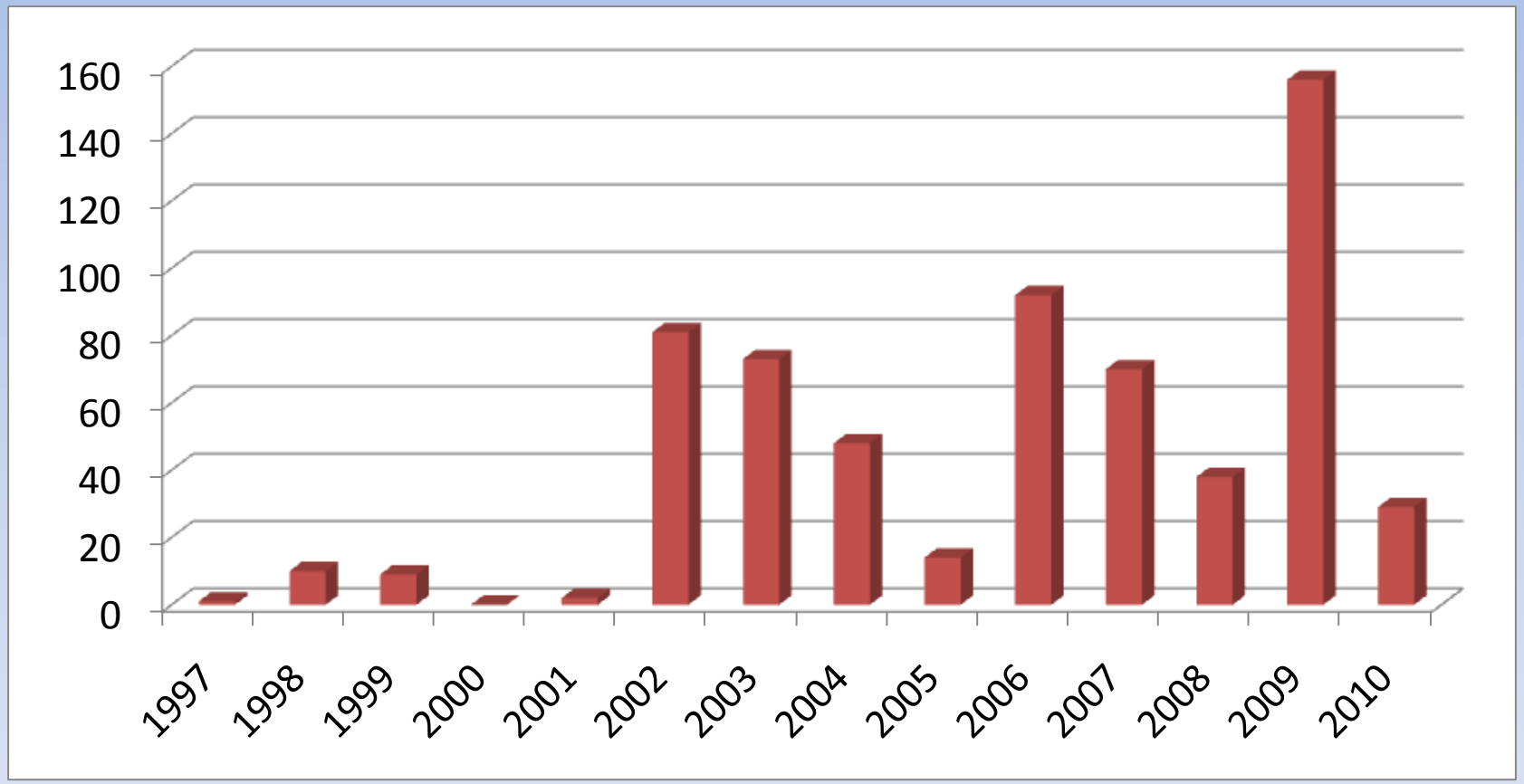
Geothermal Energy

- 17% of U.S. renewable electricity generation
- 0.4% total U.S. electricity supply
- 3,086 MW total installed capacity in U.S.
- 1,300 MW capacity from Federal leases

Geothermal Leases (September 30, 2009)

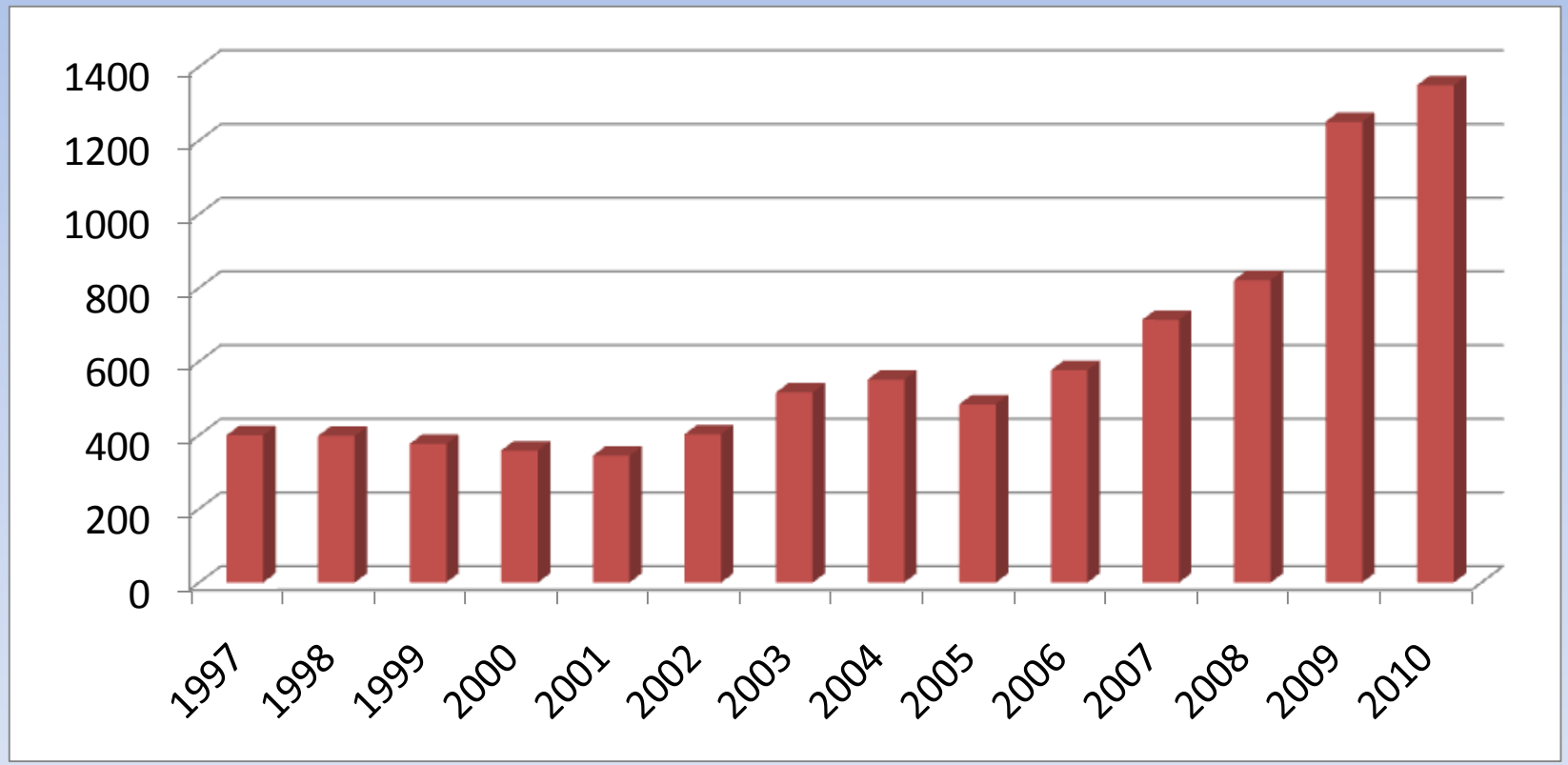
State	Leases	Acres
Nevada	452	923,435
California	92	112,181
Oregon	68	92,804
Utah	39	98,122
Idaho	11	19,574
New Mexico	3	2,941
Arizona	1	2,084
Total	666	1,251,141

Geothermal Leases Issued
FY 1997-2010*



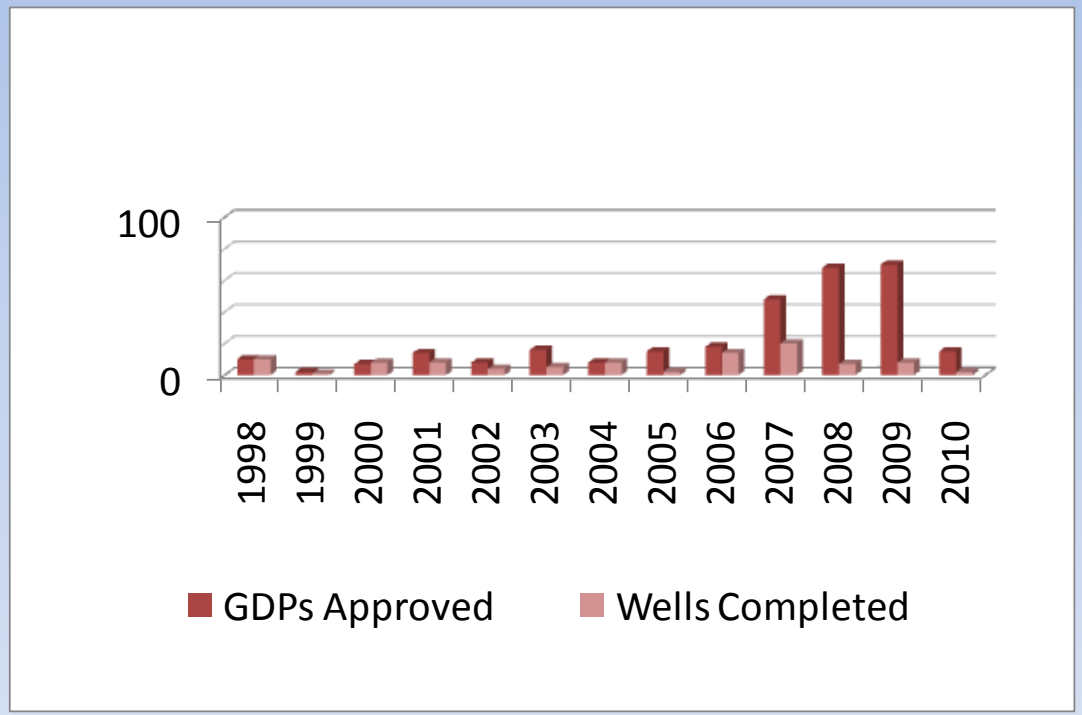
* To Date

GEOTHERMAL LEASE ACREAGE
IN EFFECT
FY 1997 – 2010*



* To date

Geothermal Drilling Permits Approved and Wells Completed



GEOTHERMAL – Where We Are

Stillwater Power Plant, NV

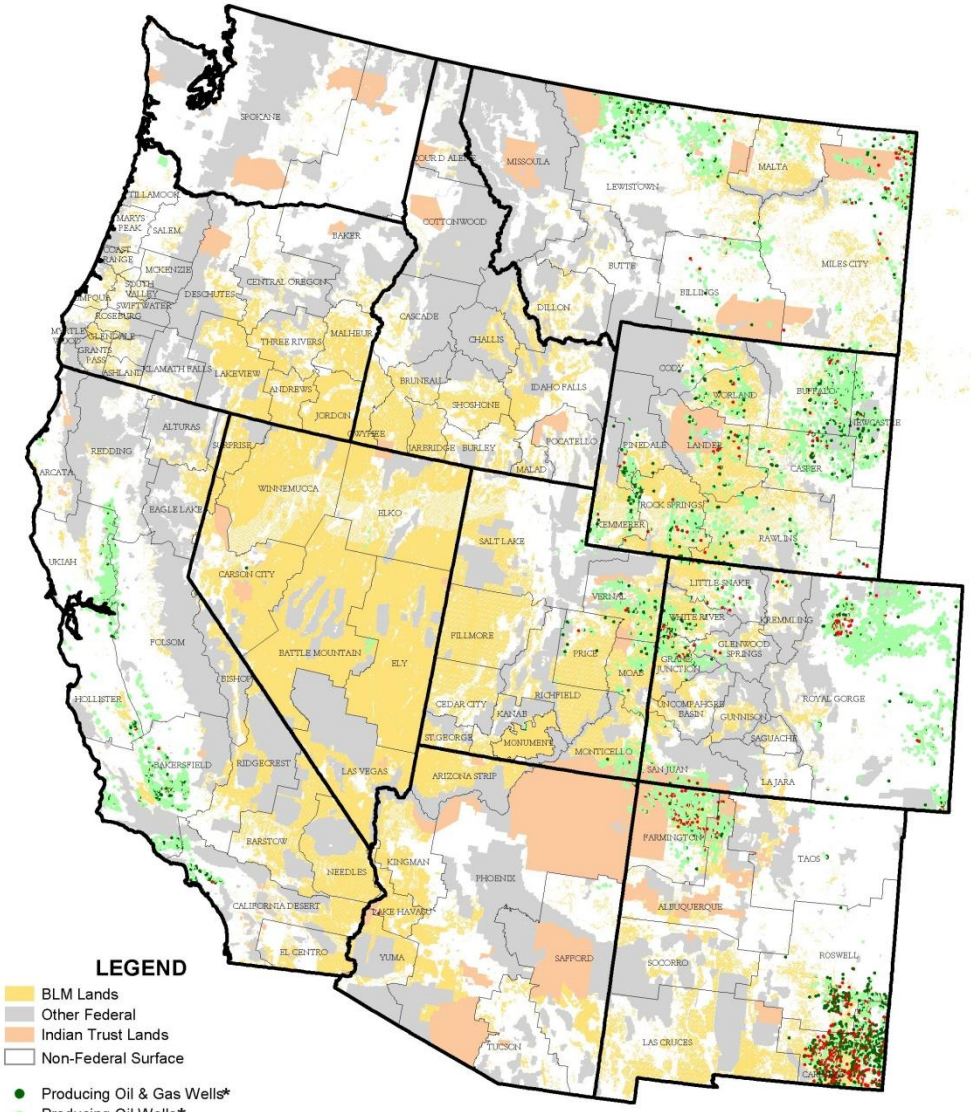
Challenges

- Geothermal Fund rescinded
- NEPA
- Surface Use conflicts
- Enhanced Geothermal Systems (induced seismicity)
- Co-Production limitations
- Litigation

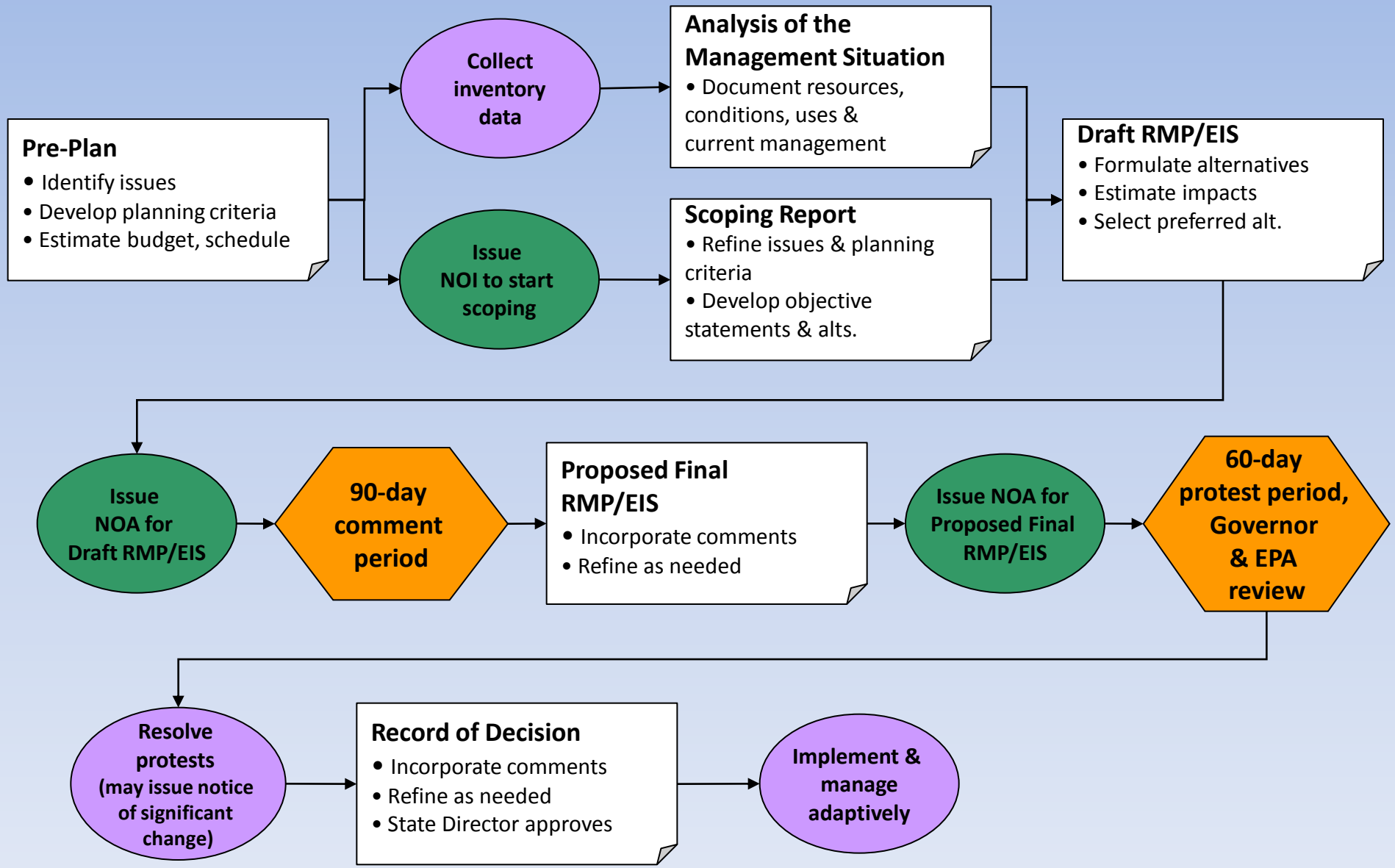
S. 1462-American Clean Energy Leadership Act of 2009

- Introduced by Sen. Bingaman – 07-16-2009
  - Provides for noncompetitive leasing to qualified oil and gas lessee

Producing Oil/Gas Wells



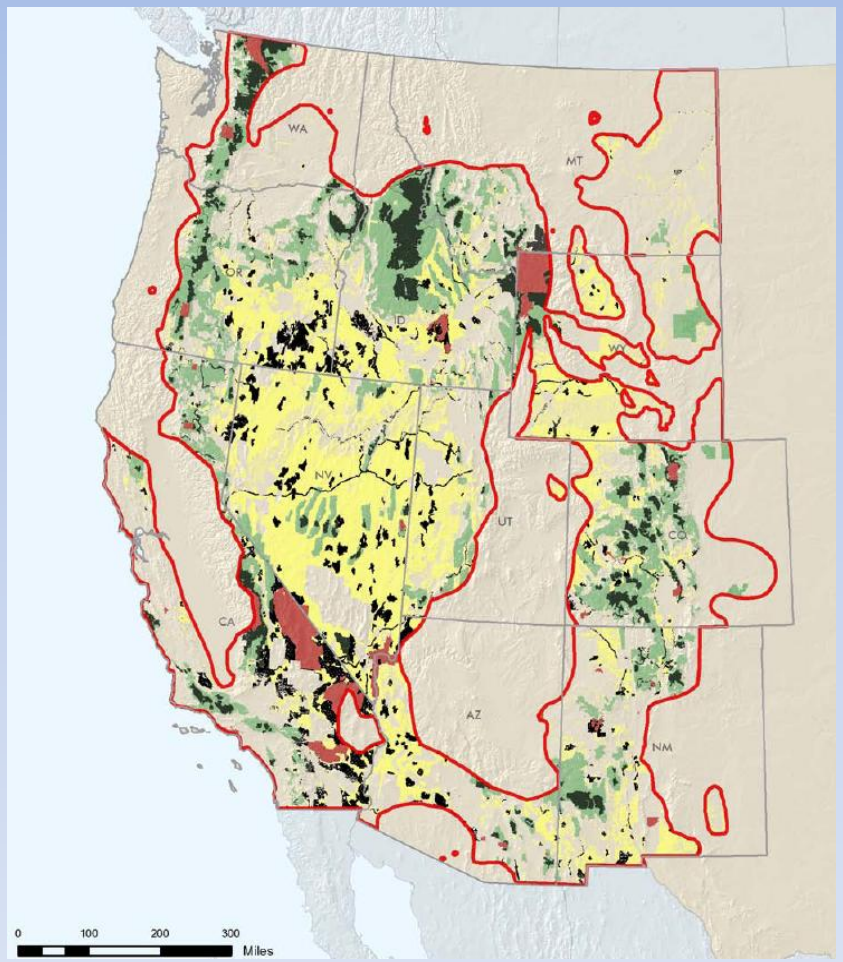
Planning Process



Geothermal Leasing PEIS

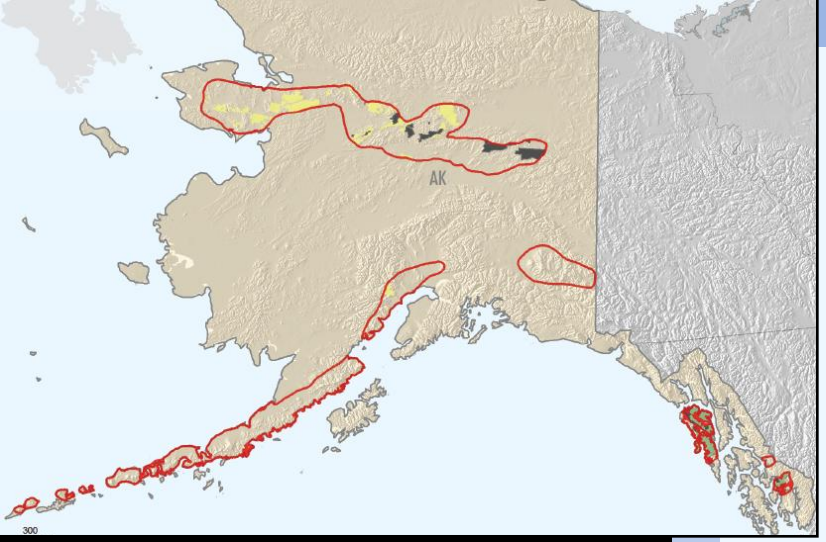
1. ROD signed December 2008
2. Scope: 12 Western States and over 142 million acres BLM public land
3. Expedited process: 18 months NOI to ROD
4. Amended 114 land use plans
5. Assessed 19 lease applications
6. Addressed seismic potential, but not induced seismicity

Geothermal Resources in the Western US



Geothermal Potential Areas

Yellow: BLM
Green: USFS
Orange: NPS
Black: Closed to Leasing



Open to Leasing

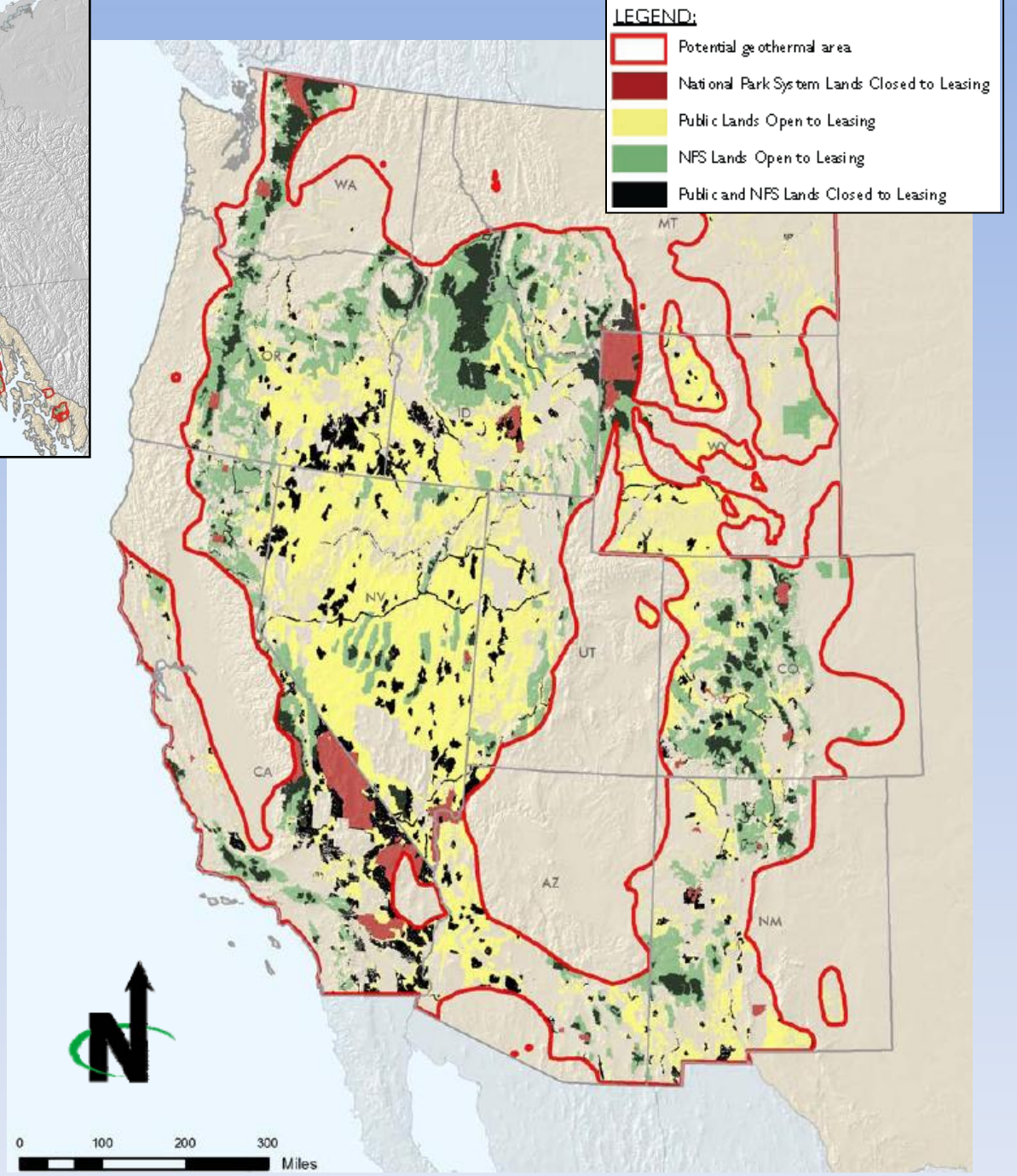
BLM: 111M acres

NFS: 79M acres

Closed to Leasing

BLM: 25M acres

NFS: 24M acres



FEDERAL GEOTHERMAL LEASING PROCESS MODEL

The Geothermal Steam Act of 1970

Authorizes geothermal leasing on BLM, National forest and other Federal lands, as well as private lands where the Federal government has retained mineral rights.

ENERGY POLICY ACT 2005

BLM State Office: Conducts Lease Sales

(Regulations that govern the BLM's geothermal leasing program may be found in Title 43, Groups 3200)

Lands included in offers filed for noncompetitive leases, i.e., Parcels from lands beyond the 24 month period on noncompetitive eligibility

Parcels nominated by Industry.

Parcels identified by the BLM for land & resource management reasons.

Example: Protective leasing.

Field Office: Checks/Evaluates Parcels

for availability, other agency consent, presence of Wilderness Study Area (WSA) and ACEC concerns, potential resource conflicts and environmental issues.

Develops and makes recommendations for special stipulations and/or withdrawal from proposed offering.

Land Use Planning System

BLM determines what lands are available for leasing through the land use planning system (mandated by the Federal Land Policy & Management Act (FLMPA) of 1976).

Generally, BLM lands are allocated in one of four categories: open with standard stipulations, open with special terms or conditions, open but no surface occupancy allowed, or closed to leasing.

Land Use Plans (LUPs)

Analyze land uses and resources to determine what lands should be open to oil and gas leasing.

Additional Site-Specific Analysis

Occurs prior to exploration, ground disturbing activities, or development activity.

State Office: Consolidates List of Parcels.

Final Sale Notice posted at least 45 days prior to sale.

State Office: Competitive Sale -- Oral Auction

Information

Coordination

Data

Supplemental Environmental Reviews

Occur prior to lease sales to ensure consistency with LUPs and NEPA adequacy. Review may result in parcels being deferred for further analysis or environmental stipulations being placed on the lease

No Bid

Lease available over-the-counter for 24 months

Not Leased

Filing Received

Issue Noncompetitive Lease (10 year primary term)

Lease Termination or Expiration

No production

BUSINESS MODEL | MARKET DRIVERS

Lessee/Operator

Exploration Development Production Abandonment Reclamation

Production

Successful Bid

Issue Competitive Lease (10 year primary term)

Lessee/Operator

Exploration, Development, Production, Abandonment, Reclamation

BUSINESS MODEL | MARKET DRIVERS

No production

Lease Termination or Expiration

Production

Fluid Minerals Program

(BLM-Related Follow-through)

- Plans of development
- Bonding- $ 10,000.00/Lease
- Assignments & Adjudication
- Diligence
- Production Verification
- Collections (MMS)
- Unitization/Communization
- Drainage
- Plugging and abandonment
- NEPA: EIS,EA,CXs
- Geophysical Permits
- Rights-of-way
- Gas storage
- Development Contracts
- RFD Analysis
- Resource Assessments (USGS & DOE)

What actions trigger NEPA?

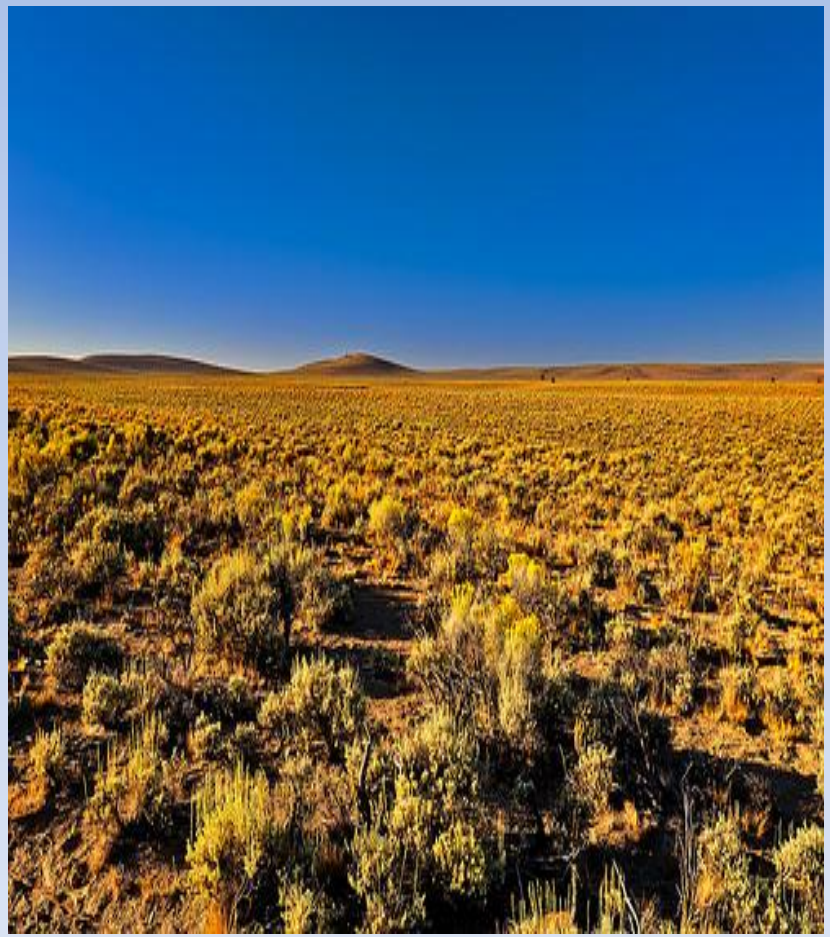
- Where the BLM manages both surface resources and subsurface resources, as on a BLM geothermal lease, any proposal to develop leasable fluid mineral resources triggers NEPA

NEPA requirements for Geothermal Operations can be different across the BLM

- There are a variety of ways to comply with NEPA and are dependent on environmental effects and issues associated with the location of the project

- Either an Environmental Assessment (EA) or an Environmental Impact Statement (EIS) are the most likely instruments

EGS projects are proposed in various ecosystems



Each ecosystem will have unique issues

- The Department of energy (DOE) has identified two main issues with EGS:
- 1. Water availability
- 2. Seismicity - The frequency or magnitude of earthquake activity in a given area or as generated by fracturing
- Additional issues common on BLM land:
- Tribal and Cultural concerns
- Threaten or endangered species – both plant and animal
- Visual designations
- Urban interface

What determines the need for an EA or EIS?

- Significant adverse effects triggers the need to prepare an EIS
- If the effects are significant, the action can not be approved by an EA as an EA requires a Finding of No Significant Impact (FONSI)

DOE/BLM Mitigation Tool

- In order to prepare an EA and have a Finding of No Significant Impact – all effects to the project need to be mitigated
- A great tool for achieving mitigation of impacts for example is following the Protocols for Induced Seismicity Associated with EGS as accepted by IEA-GIA Executive Committee on 2/2009
- These are available on-line www.iea-gia.org/publications.asp

BLM Statistics

BLM administers **258 million acres** of surface and **700 million acres of Federal mineral estate**

(BLM, Forest Service, Privately Owned, etc.)

USGS estimates that **90%** of the Geothermal resource occurs on Federally managed lands

End of FY 2008

- 530 geothermal leases – 821,379 acres
- 58 leases in producing status
- 1,275 MW capacity – electrical generation to supply about 1.2 million homes
- Royalty $ 14 million (FY 2008)

Geothermal
Permitting Requirements

- Federal Reserved Minerals
  - Geothermal Lease
    - Lessee or Operating Rights
  - Geothermal Drilling Permit
    - NEPA Analysis (EA or EIS)
  - Sundry Notice – Existing shut in well
    - NEPA Analysis (EA or EIS) for EGS
- Split Estate (Federal Surface/Non Federal Mineral Ownership)
  - Rights-of-Way (FLPMA)
    - NEPA Analysis (EA or EIS)

Geothermal
Permitting Requirements
Cont'd

- Surface Management Responsibility
  - Exploration – Notice of Intent to conduct exploration
    - No Geothermal Lease – Surface Management Agency
    - Geothermal Lease - BLM has approval authority, receives surface use plan from USFS
  - Exploration/ Development Drilling Operations and Plant Construction
    - Requires Lease - BLM has approval authority, receives surface use plan from USFS

GDP - Permit Review Process

- Administrative review
  - Lease – Status & Constraints
  - Bonding
- Surface management review
- Geological/engineering review
  - Geologic hazards
  - Groundwater
  - Drilling Program
  - Completion
- NEPA review (usually an EA)
- Conditions of Approval (COAs)
- Decision
  - Full Force in Effect
  - No State Director Review for Geothermal

Painless Permitting?

- Communication – Early & Often
  - Regulatory Agencies: Federal/State/Local
- Outreach/Education
  - Community Groups
  - Stakeholders
    - Interest Groups
    - General Public
- GDP/Sundry Notice
  - Protocol for Induced Microseismicity
    - Details of proposed project
    - Geologic Structure

Painless Permitting? Cont'd

- Stimulation plan
- Seismic potential
  - Natural
  - Induced
- Assessment of probability for induced seismicity
- Review of Laws and Regulations
- Microearthquake (MEQ) monitoring system

GDP – Operations Plan

Operations Plan

- Nine specific items
- Describes how the operator will drill & test geothermal resources on their lease
- Provide the information to initiate NEPA

- Well pad layout
- Existing & planned access roads
- Ancillary facilities
- Source of building material
- Water source
- Surface ownership
- Procedures to protect the environment
- Plans for reclamation
- Any other information BLM requires

GDPs – Drilling Program

Drilling program

- Describes the operational aspects

- Description of equipment, materials & procedures
- Proposed depth
- Directional specifics, including plan & vertical section
- Casing & Cementing program
- Circulation media (drilling fluids)
- Log description

GDPs – Drilling Program

Drilling program – (cont.)

- Blow Out Prevention Equipment (BOP)
- Fresh Water Zones
- Anticipated Reservoir Temperature & Pressure
- Anticipated Temperature Gradient
- Survey Plat by Licensed Surveyor
- Procedures and durations of well testing
- Well stimulation –hydro-fracturing
- Any other information the BLM requires

GDPs – Miscellaneous

Miscellaneous -

- The drilling permit, drilling program and operations program can be submitted together
- If Operations Plan submitted separately
  - Submit prior to drilling permit & program
  - Sundry notice for well pad construction
- Operations plan and drilling program can cover several wells, but each drilling permit is well specific
- Subsequent changes to drilling plan via sundry notice
  - Oral approval option

SUNDRY NOTICE REQUIREMENTS

A sundry notice (form 3260-3) is a written request to perform work not covered by another type of permit, or to change operations in previously approved permit.

WHEN TO USE A SUNDRY NOTICE

Routine Work – may include cleanouts, surveys, or general maintenance

Subsequent Well Operations – Operations done to a well after it is drilled. Examples: cleaning the well out, surveying it, performing well test, chemical stimulation, hydrofracturing, running a liner or other casing string, repairing existing casing, or converting the well from a producer to an injector or vice versa

GDPs – Bonding

Drilling Operations Bonding

- Necessary prior to surface disturbance
  - No Cash Bonds
  - Only LOC or Surety
- Amounts: (minimum)
  - $10,000 for individual lease
  - $50,000 for statewide
  - $150,000 for nationwide
- Released:
  - After request (not automatic)
  - All wells P&A'd
  - Surface reclaimed