Reservoir Management

COURSE OBJECTIVES:

1. **To explain the concepts of Reservoir Management and the necessity for having such a practice.**

2. **To introduce the Reservoir Management as practiced in the BLM, and finally.**

3. **To identify and explain the components of the BLM Reservoir Management practice.**

What is reservoir management?

There are probably as many different definitions of reservoir management as there are perceptions of the process.

1. The way industry perceives Reservoir Management:

In general

The management of a reservoir involves the judicious use of the various means available to a business to maximize its benefits/profits from the reservoir. It includes the marshaling of all appropriate business, technical and operating resources to exploit a reservoir optimally from discovery to abandonment.

Specifically and Technically

Reservoir management is a process where a team comprising of reservoir engineers, reservoir geologists, production and facilities engineers and field operations staff is responsible for developing and implementing a reservoir management plan.

2. Reservoir Management as Practiced by the BLM

In general

As a regulatory body, we in the BLM try to achieve the similar results as is perceived by industry through implementation of rules and regulations. Environment is also a major consideration in this process.

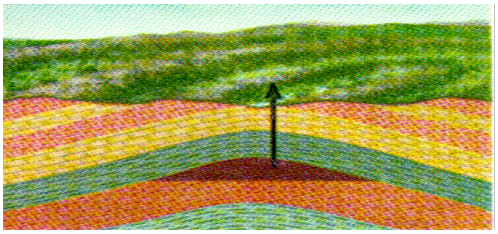
Specifically and Technically

As practiced by the BLM, reservoir management is to require and encourage operators to employ techniques leading to maximum, efficient, and environmentally sound exploration and exploitation of oil and gas reservoirs on public lands. This is accomplished through:

1. **Knowledge, understanding and practice of spacing concepts.**
2. **Approval of agreements**
   AExploratory and secondary units
   ACommunitization
3. **Development contracts**
4. **Drainage detection, and**
5. **Indian diligence program**

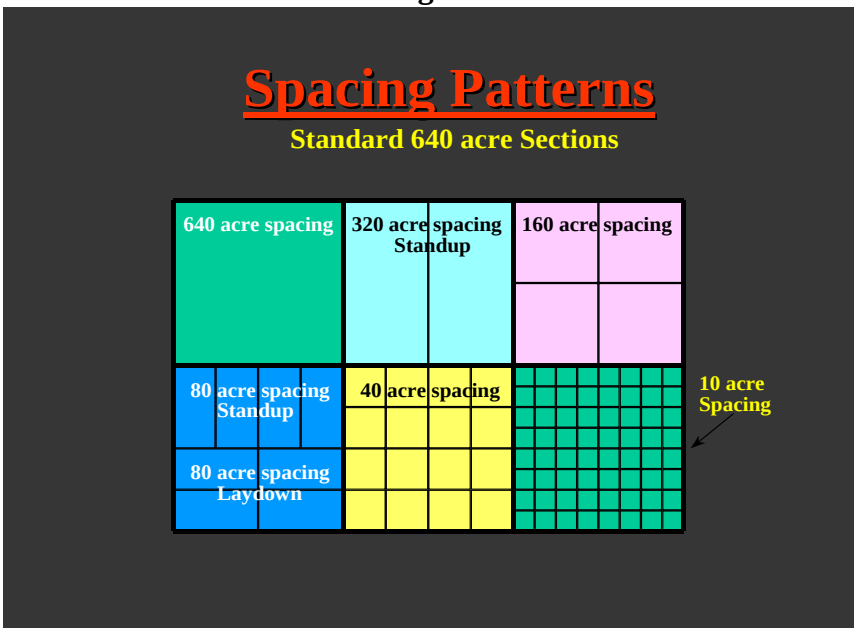
What is a reservoir?

A reservoir is a porous and permeable subsurface rock body in which oil and/or gas has accumulated and/or is stored. Most reservoir rocks are limestone, dolomite, sandstone or a combination of these rocks.



Spacing (well spacing, drilling unit) - Definition

Simply defined - the space or acreage allocated to a well. The aerial extent that a well could drain (the volume) from a reservoir. It is a conservation measure that identifies the location and number of wells that can be drilled to drain a reservoir.
Depending on the geologic structure, size of the reservoir and whether it is oil or gas, spacing could be as small as 10 acres and as large as 640 acres.



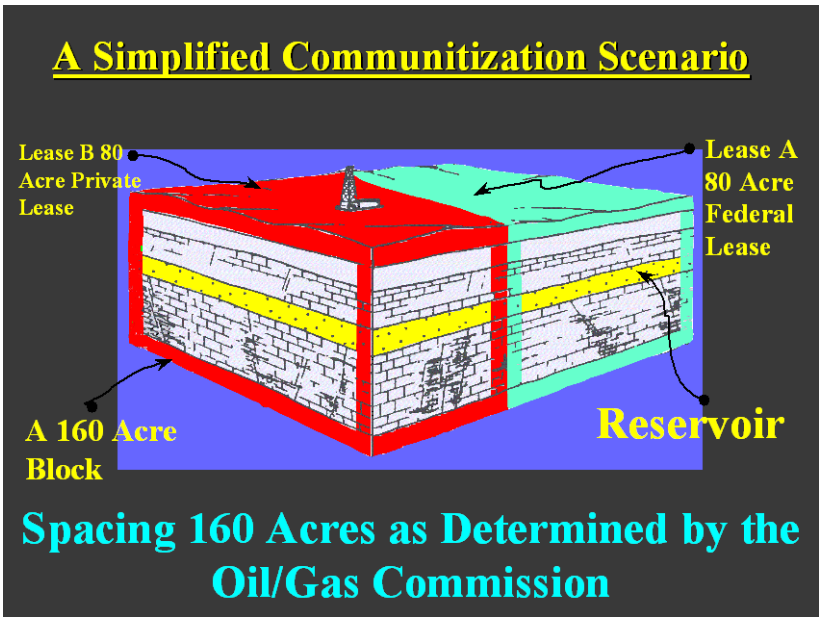
The BLM has the primacy and the authority to set the spacing patterns on Federal lands. Historically and traditionally, however, we have gone along and concurred with spacing patterns set by state oil and gas commissions.

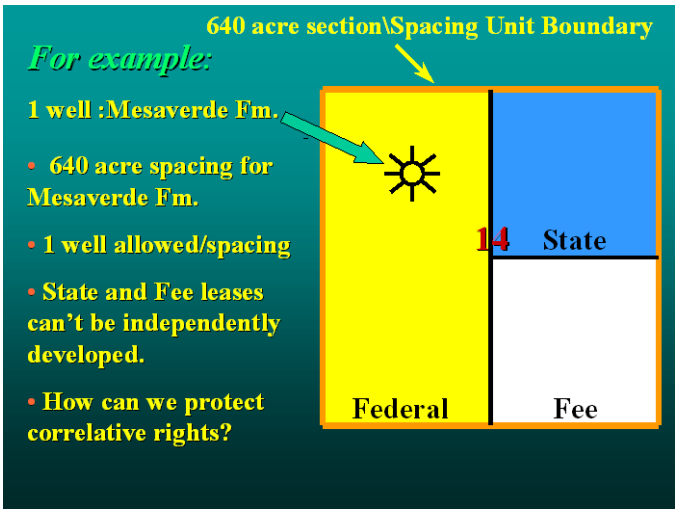
Agreements Include:

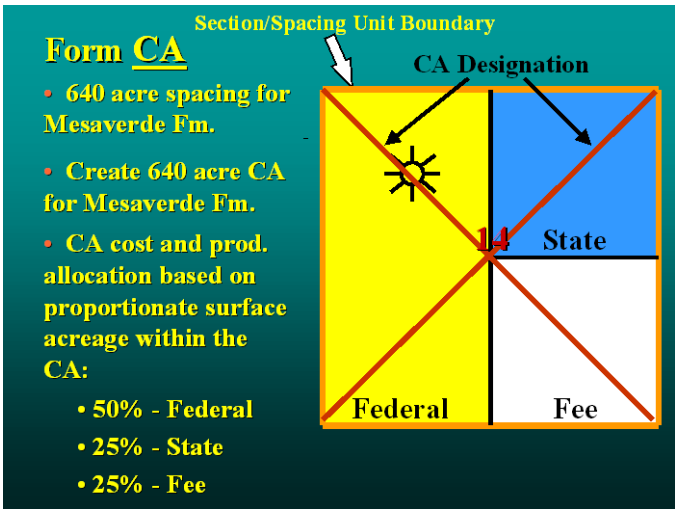
a. Communitization Agreement
b. Exploratory and secondary unit Agreements

Communitizatiuon Agreement(CA) - Definition

The purpose of communitization agreement is to provide for the development of separate Federal tracts (leases) which otherwise could not be developed independently or operated in conformity with established state spacing.
As the definition goes, a communitization agreement is the stepchild or the orphan of the state spacing orders or rulings.



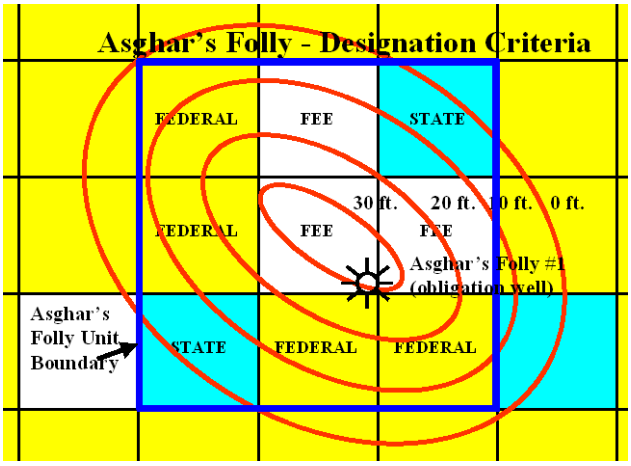




Historical Perspective: Communitization agreements were enacted to address the inadequacies and/or unintended consequences of the state spacing order or rule makings that are set by the state oil and gas commissions.

Exploratory Unit Agreement - Definition

The concept and principle of unitization is to drill and develop a potential geologic structure containing an oil and/or gas reservoir without regard to internal/ external lease boundaries, rule of capture and spacing, thereby promoting logical development and conservation of the hydrocarbon resources.



As the definition goes, we have units to hae logical, efficient, orderly, maximum recovery of oil and/or gas resources. And last but not least, it is an environmentally sound approach to exploit a reservoir. There is much less surface disturbance than drilling each lease separately.

Secondary unit Agreement - Definition

A secondary unit is a unit that unitizes only one oil reservoir in one formation. This contrasts with an exploratory unit that unitizes all gas and/or oil reservoirs in all formations. A secondary unit is formed to implement techniques to extract the last possible drop of oil from the reservoir. Most, if not all, enhancement techniques used are water flooding techniques.

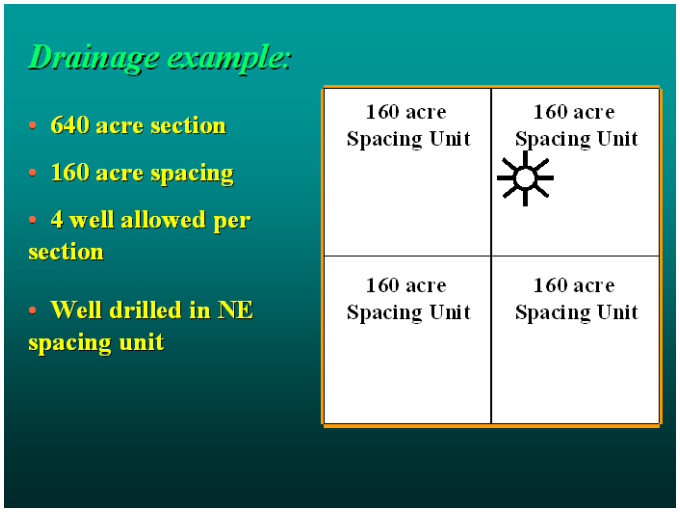
Development Contract (D.C.) - Lease acreage limitation relief

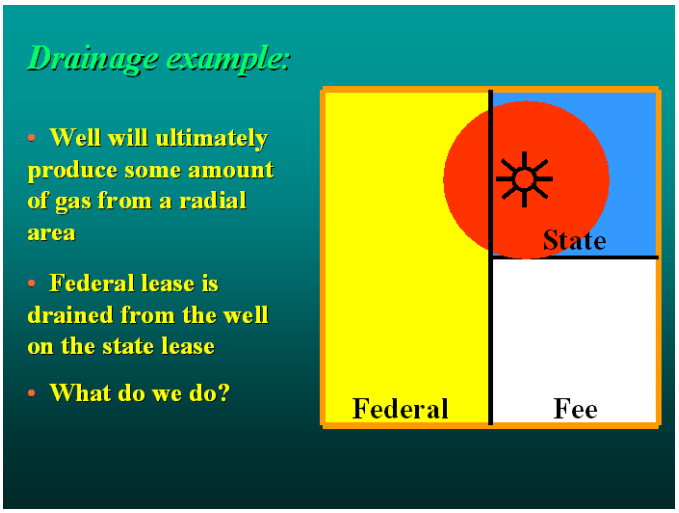
A provision whereby an operator commits financially to explore a vast areasearching for geologic structures and reservoirs to develop for the benefit of getting a relief on lease acreage holding limitation, 246,080 acres / state.

Size of D.C. - 50,000 -2 million acres.
Financial commitment - $ 500,000 - 5 million.
Primary terms of the contract - five years with potential for extension.

Drainage Detection and Protection - Definition

Drainage is the migration of oil or gas in a reservoir toward a well bore due to pressure reduction caused by the well's penetration of the reservoir. A drainage point is a well bore (or in some cases several well bores) that drain s the reservoir.





Drainage detection involves extensive administrative, geologic, engineering and other technical analysis of the reservoir and production history for both the BLM and operators.

Indian Diligence - Diligence development review of the lease

Indian diligence is a practice where the BLM monitors an Indian lease with production or allocated production to ensure that the operator is diligent in drilling and producing the oil and/or gas from each spacing unit within the lease annually.

Diligence development also involves extensive administrative, geologic, engineering and other technical analysis of the reservoir and formation for both the BLM and operators. Lease diligent development is not done on Federal leases.

Summary :

We explained and discussed how Reservoir Management is practiced in the industry and how the Bureau of Land Management applies the concepts of the Reservoir Management in administrating the oil and/or gas operations on Federal lands.

We defined what an oil and/or gas reservoir is as a reference to what you learned in the Basic Geology course.

We defined and explained *Spacing*, an important concept in administration of the Reservoir Management Program. Spacing, the acreage allocated to a well (as we discussed

in the course), is an important regulatory tool to administer the Reservoir Management Program (RMP).

We defined and discussed some of the main elements and/or parts of the the RMP such as Communitization Agreements, Exploratory and Secondary Unit Agreements, Development Contracts, Drainage, and the Indian Diligence program.

Finally, we hope to have provided you with some good basic introductory knowledge, concepts, and understanding as to how the Reservoir Management Program is administered in BLM.