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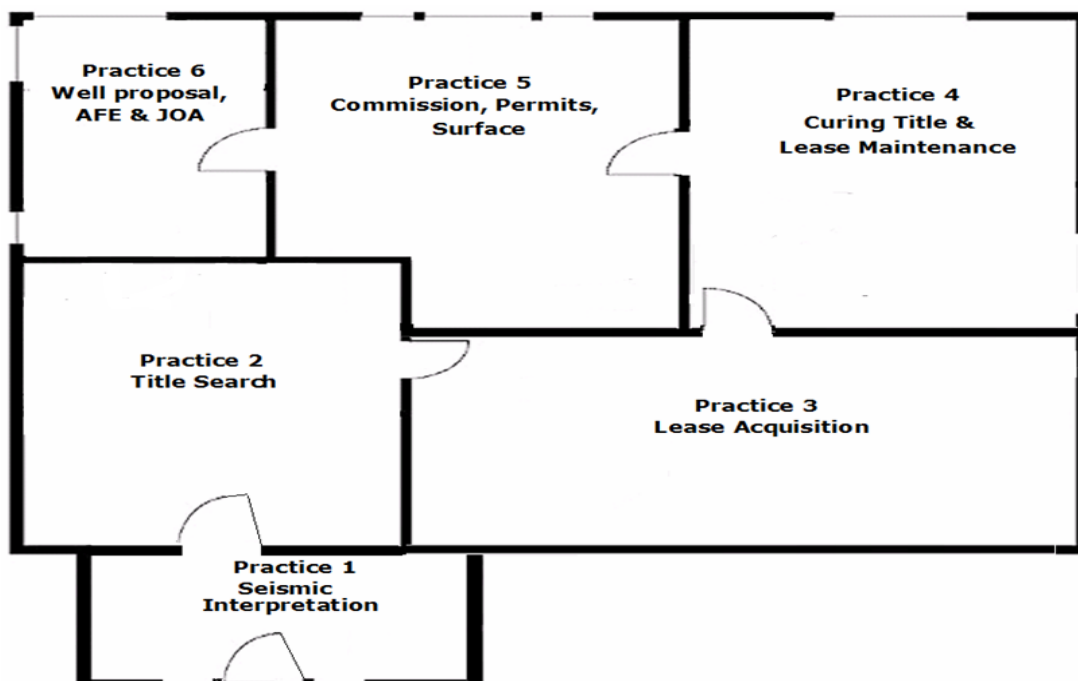
This publication is designed to help identify the prevailing guidelines that surround the disposition of the subject matter covered. It is; however, not intended to substitute for any specific legal advice or opinion. Since state rulings in the matter of law are defined by the courts and can change at any time, no portion of this publication is a substitute for legal advice. Since state statutes are voluminous and vary from state to state, this course does not purport to be a complete or definitive volume on the subject. In many cases, topics covered have been summarized in order to relate to the layman. As with all condensed statements, they are incomplete in their substance. Where these statements are expressed, they are designed only as a guideline and not as a legal opinion on any one specific matter. The publisher and/or authors are not engaged in rendering any legal, accounting or other professional service and do not purport to offer any legal opinion on any one specific matter. If legal advice or other expert assistance is required, the service of a competent professional person should be sought.

Class Objective

The land management professional plays an essential role in the success of oil and gas development. The tasks he or she is called upon to accomplish are often varied but each is vital.

Picture all of the functions in *Land Management* as being a house. The house contains several rooms. In the analogy, each room represents a specific land practice.

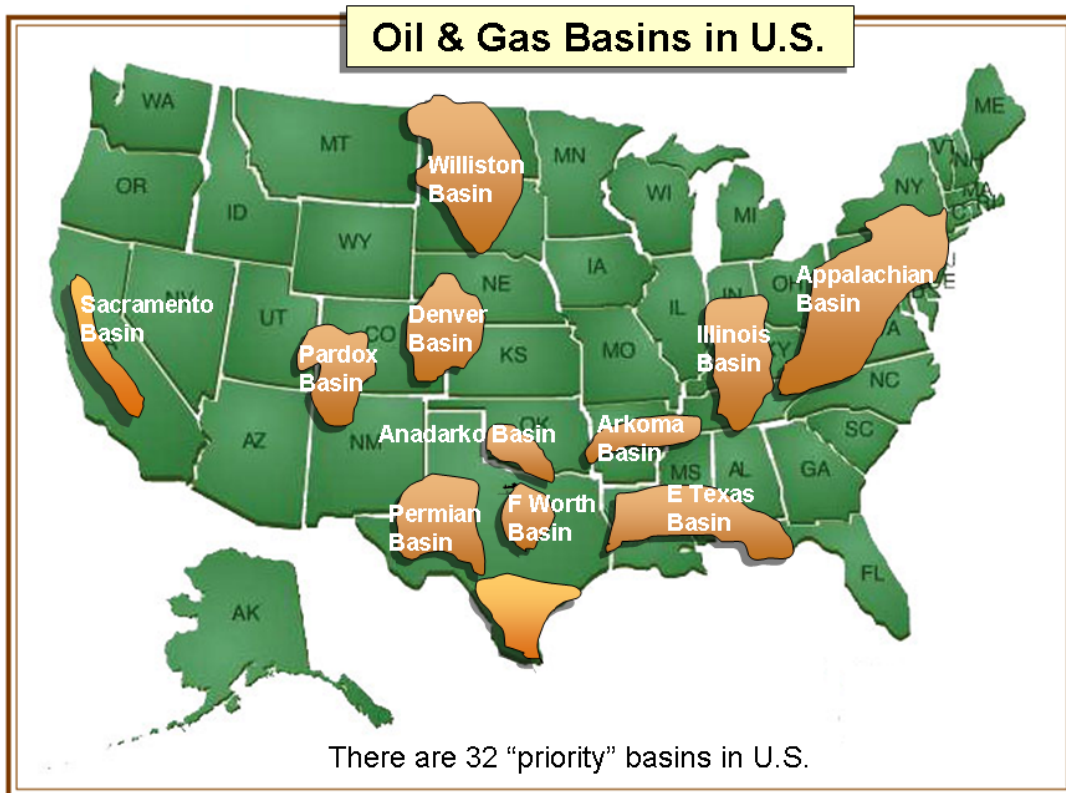
The objective of this class is to take the land management professional on a journey through each of the rooms in the house. This trip will enable each participant to engage in the land practices conducted in each of the rooms and will provide an opportunity for hands-on experience through varied activities and projects.



Introduction

Oil and Gas Basins in the United States

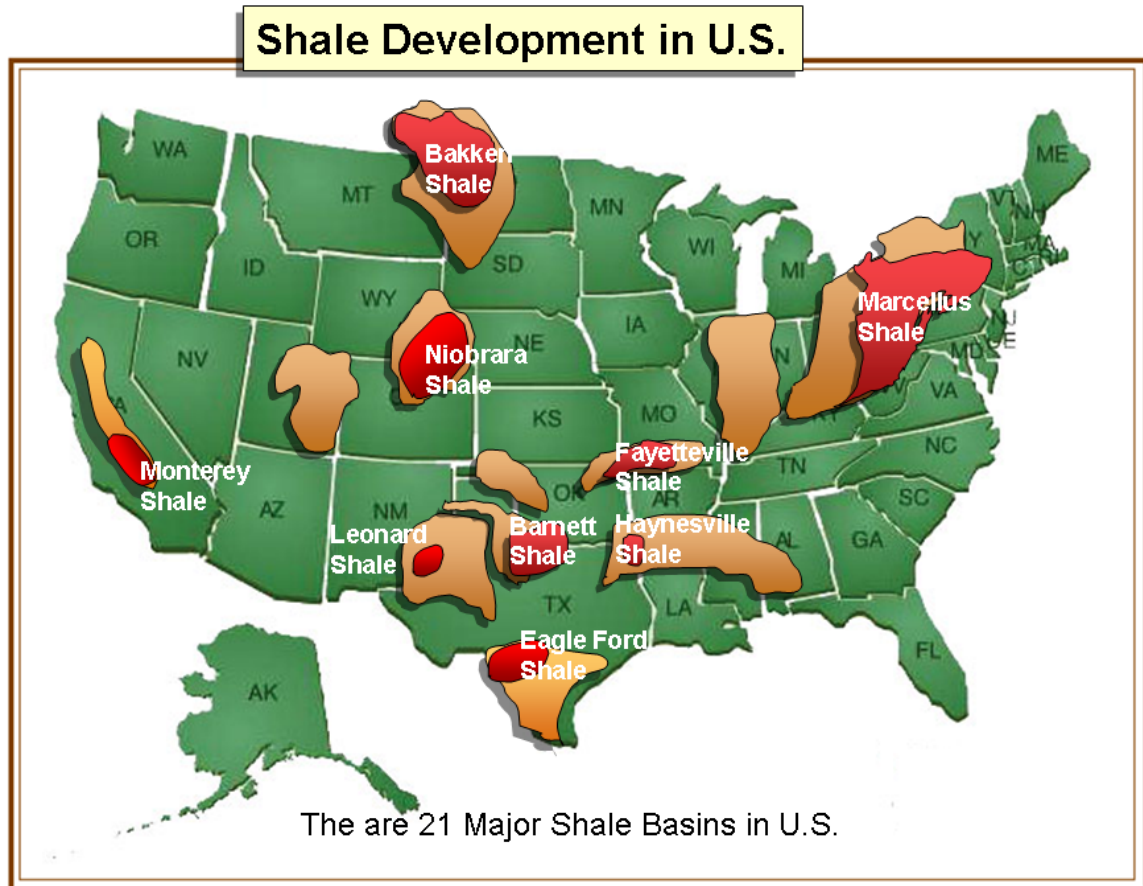
There are 32 primary oil and gas basins located in the United States. The following map depicts the location of several of those basins. It is estimated that these basins contain nearly 1.9 trillion cubic feet (Tcf) of undeveloped natural gas that can be recovered and from 400 to 1,200 billion barrels of undeveloped recoverable oil.



Shale Development

Within several of those basins, the industry has located either oil or natural gas shale formations. In recent years, the development of four of these shale fields has been a primary focus in the industry.

Horizontal drilling is the method being used in order to develop these fields. This drilling technique was not available to the industry a few years ago.

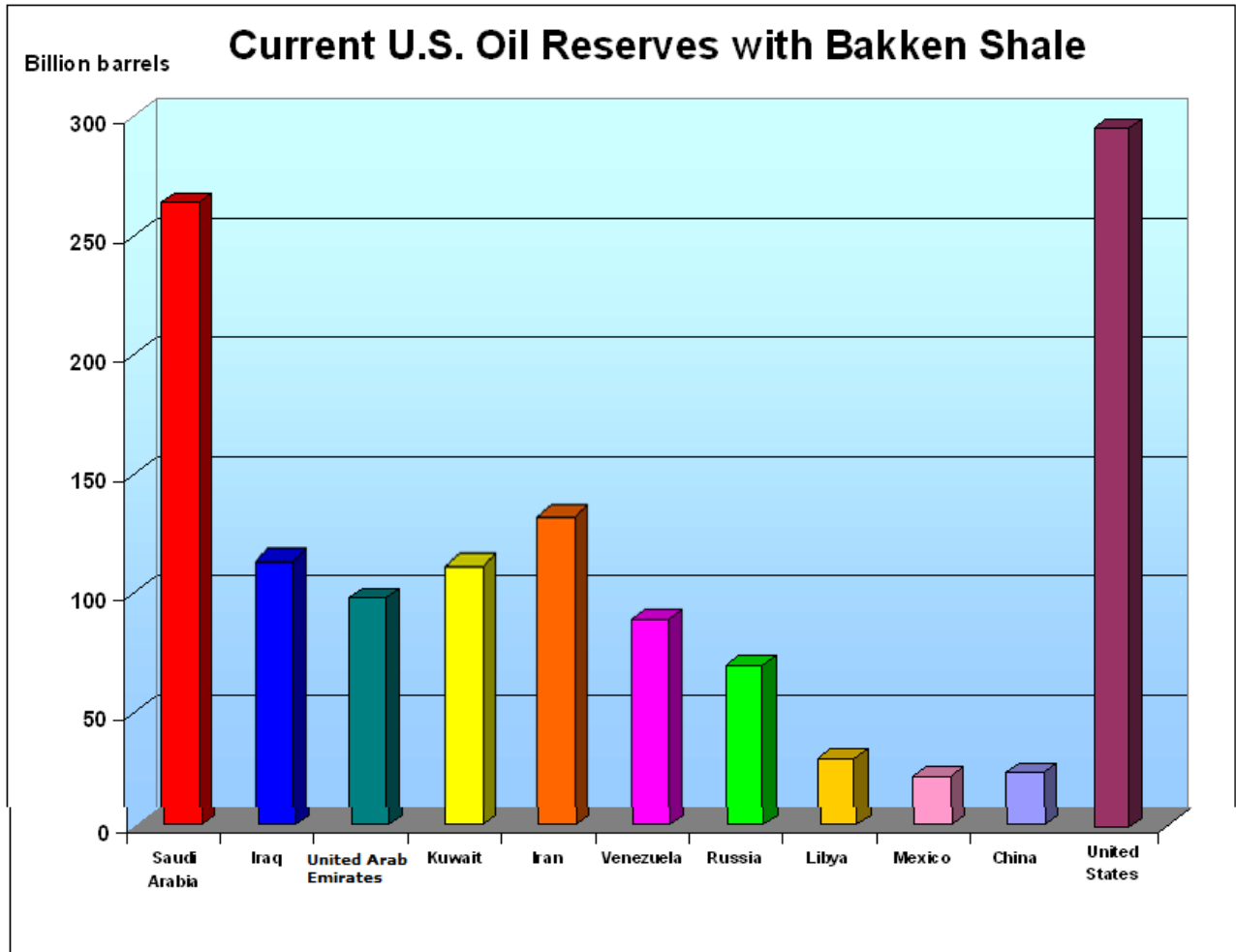


The shale in these fields is often very compacted and the rock is often described as “concrete like.” Without our ability to fracture this rock through hydraulic fracturing techniques, producing oil or gas from these formations would be almost impossible. Certainly, it would be uneconomical.

Although hydraulic fracturing takes place several thousand feet below the surface of the earth, many have placed this technique under scrutiny. There is a belief that what is being forced into the well bore hole contains contaminants that would be harmful to fresh water sources. Actually, fracturing fluids are comprised of 99.5% water and sand. There are other additives included that help the rock to fracture, but oil companies protect the freshwater aquifers from contamination by pumping the fracturing solution into the well bore hole which has been sheathed with steel pipe, casing and cement.

Bakken Shale

Bakken Shale development has been one of the great growth areas for oil and gas in recent days. Prior to our ability to produce this shale formation, the U.S. oil reserves which totaled around 21 BBbls of recoverable oil did not even rate among the top ten oil producing countries in the world. Today, with the Bakken reserves, the U.S. boasts between 271-503 BBbls of oil. As can be seen from the graph, currently the U.S. oil reserves are significant.



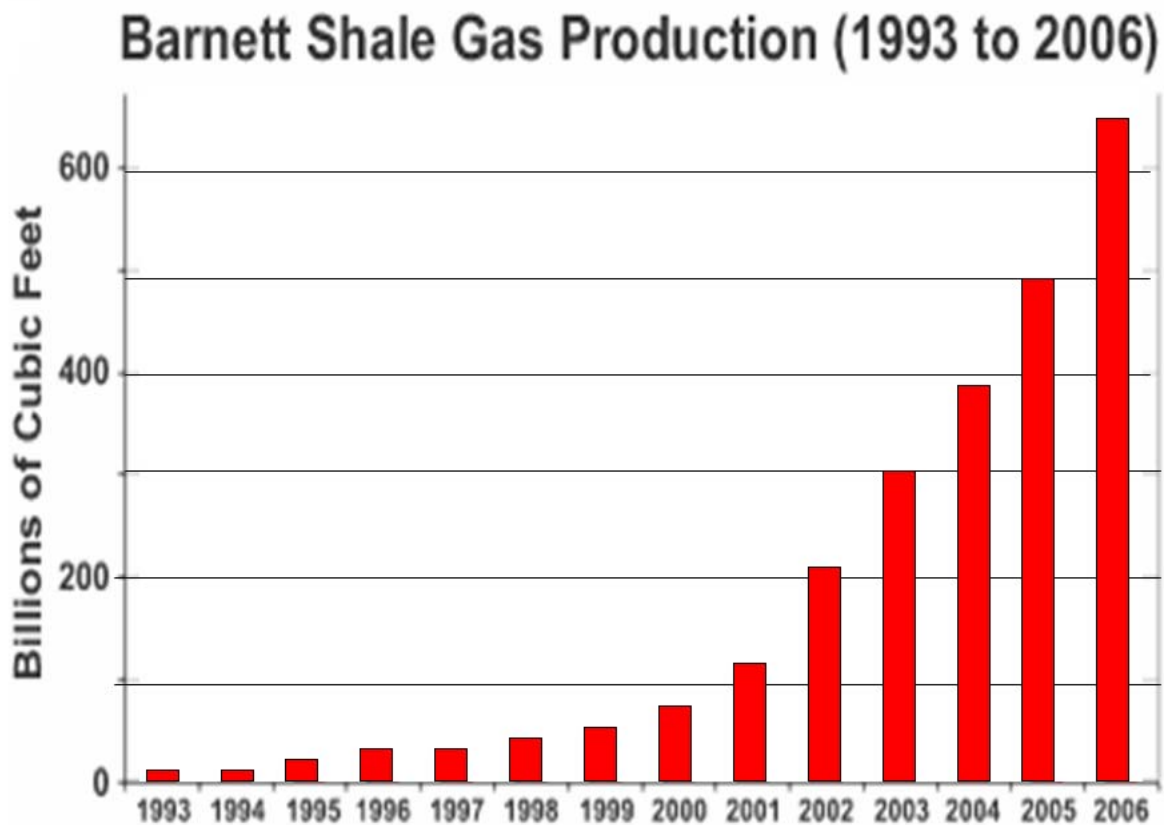
One of the major issues facing producers in the Bakken formation is the need for and lack of water. It is estimated that over a million barrels of water is needed for fracturing each well.

Barnett Shale

Currently, the Barnett Shale region, located in Texas, is one of the largest natural gas fields in the United States. The area extends to over 13,000 square miles. Producers boast that the area contains over 30 tcf of natural gas. The thickness of the producing zone ranges from 30 to over 1,000 feet.

As can be seen from the following graph, production of natural gas has increased steadily and dramatically since 1993. This has brought not only a boost to the oil and gas economy but has also helped to create hundreds of jobs.

Several issues that face those who produce from this field include environmental concerns over fracturing, the quick decline in production from the wells, over production of natural gas in the United States, and the costs associated with drilling and producing these wells. Currently, to make a profit, the break even point is between \$4 to \$7.90 an Mcf.



Marcellus Shale

Located primarily in New York, Pennsylvania, West Virginia and Ohio, the Marcellus Shale field extends to over 54,000 square miles. It is estimated that reserves total between 168 and 516 tcf of natural gas. This shale is located between 3,000 and 9,000 feet below the surface and boasting of a 200 to 800 foot thickness.

Haynesville Shale

A movie was recently produced highlighting this field and the wealth associated with oil and gas development. The film focused on a handful of land owners whose lives were changed when oil companies began to develop this area. The Haynesville area is located in Louisiana and eastern Texas and contains nearly 20 tcf of natural gas.

Fayetteville Shale

Located in over 4,000 square miles of northern Arkansas, the Fayetteville Shale boasts of being the fourth largest natural gas field in the United States. Many believe this area holds over 39 tcf of natural gas. The zone is between 50 and 575 feet thick at depths of 10,000 to 14,000 feet.

Issues facing shale development in the United States

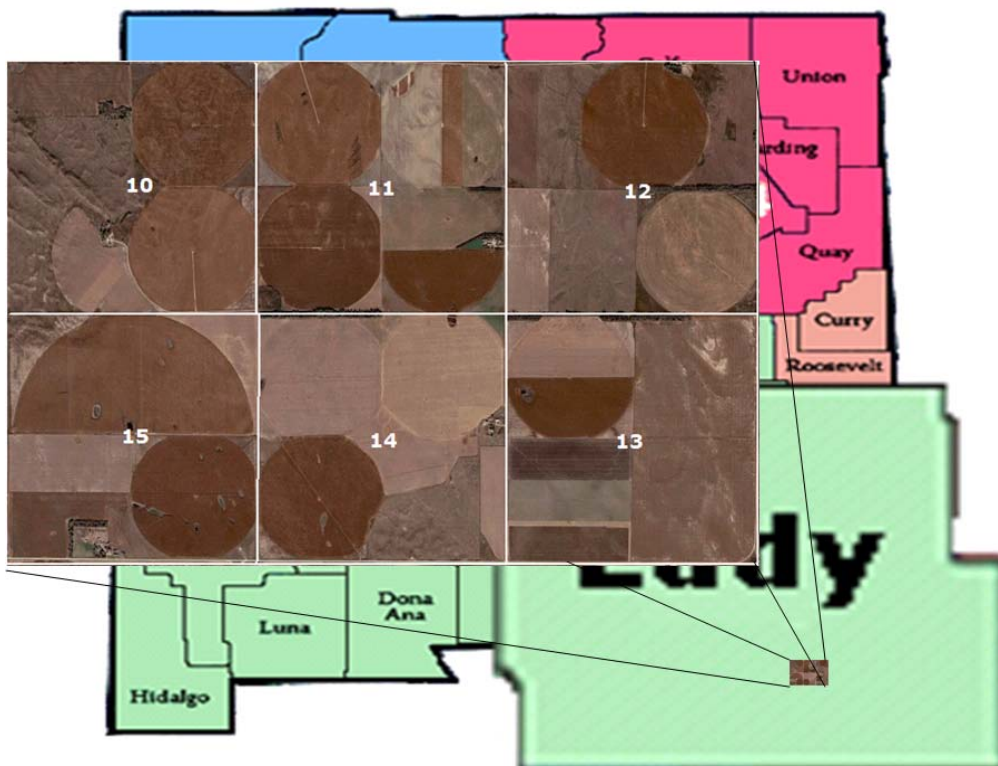
The primary issue facing oil and gas producers who are using horizontal fracturing methods are the concerns over environmental contamination through the fracturing operations. Currently, the state of New York has issued a moratorium on horizontal drilling fracturing operations. Among many in the country, there is a belief that oil and gas development “endangers” health and the environment at large! In 2009, both the United States House of Representatives and the United State Senate introduced matching bills that would impose federal regulations on hydraulic fracturing. The Environmental Protection Agency recently said, “There is compelling reasons to believe that hydraulic fracturing may impact ground water and surface water quality in ways that threaten human health and the environment which demands further study.” Several legislators have made statements like the following from Representative Diana DeGette, “There is certainly a growing nationwide concern about what’s in these chemicals, and growing support for our legislation.”

Type of Well	Bakken Well	Barnett Shale Well	Marcellus Shale Well	Fayetteville Well	Haynesville Well
Claim to fame	Oil Well	Natural Gas	Natural Gas	Natural Gas	Natural Gas
Reserves	Largest Oil Shale in US 271-503 BBbls	Biggest Natural Gas field in US 30 tcf	Enough gas to supply US for 2 yrs 168-516 tcf	4th largest Natural Gas field in World 29-39 tcf	20 tcf
Comparisons	US had 21 BBbls			could become biggest field in US	
Comparisons	Saudi Arabia has 267 BBbls				
Location	ND, MT, SD, Canada	Texas	NY, PA, WV, OH, other states	LA, AR, TX	N Arkansas & adjacent states
Recoverable Rate	1-50%	10-18%	10% or 50 tcf		2%
	3.65 BBbls				
	1.85 tcf natural gas				
	148 MBbls natural gas liquids				
Depths	7,500-10,000'	6,000' - 8,000'	3,000-9,000+ feet	10,000-14,000 feet deep	1,450-6,700'
Thickness of zone	140'	30 - 1,000' (so thick frac in stages)	200'-800'	60'-575' thick	475'
Extent of area		15,000 square miles	54,000 square miles	4,000 square miles	
Type of well	Horizontal	Horizontal	Horizontal	Horizontal	Horizontal
Fracing	Water	Water	Water	Water	Water
	Vertical fracing	Vertical fracing	Vertical fracing	Vertical fracing	Vertical fracing
Economic Viability	\$50-\$60+ a barrel	\$6-\$9 Mcf	\$6-\$9 Mcf	\$6-\$9 Mcf	\$6-\$9 Mcf
Break even point		\$4 -\$7.5 Mcf	\$4 -\$7.5 Mcf	\$4 -\$7.5 Mcf	\$4 -\$7.5 Mcf
Issues	Available Water	Concrete like shale	Environmental fracing issues	Low price of Natural Gas	Low price of Natural Gas
	Up to 1 MBW per well	Quick decline within 12-18 months	Up to 5 Million gallons water per well		
	Transported in tankers	Low price of Natural Gas	Low price of Natural Gas		
	Tight porosity				

Where Shall We Drill?

The "Crimson Ranch Prospect"

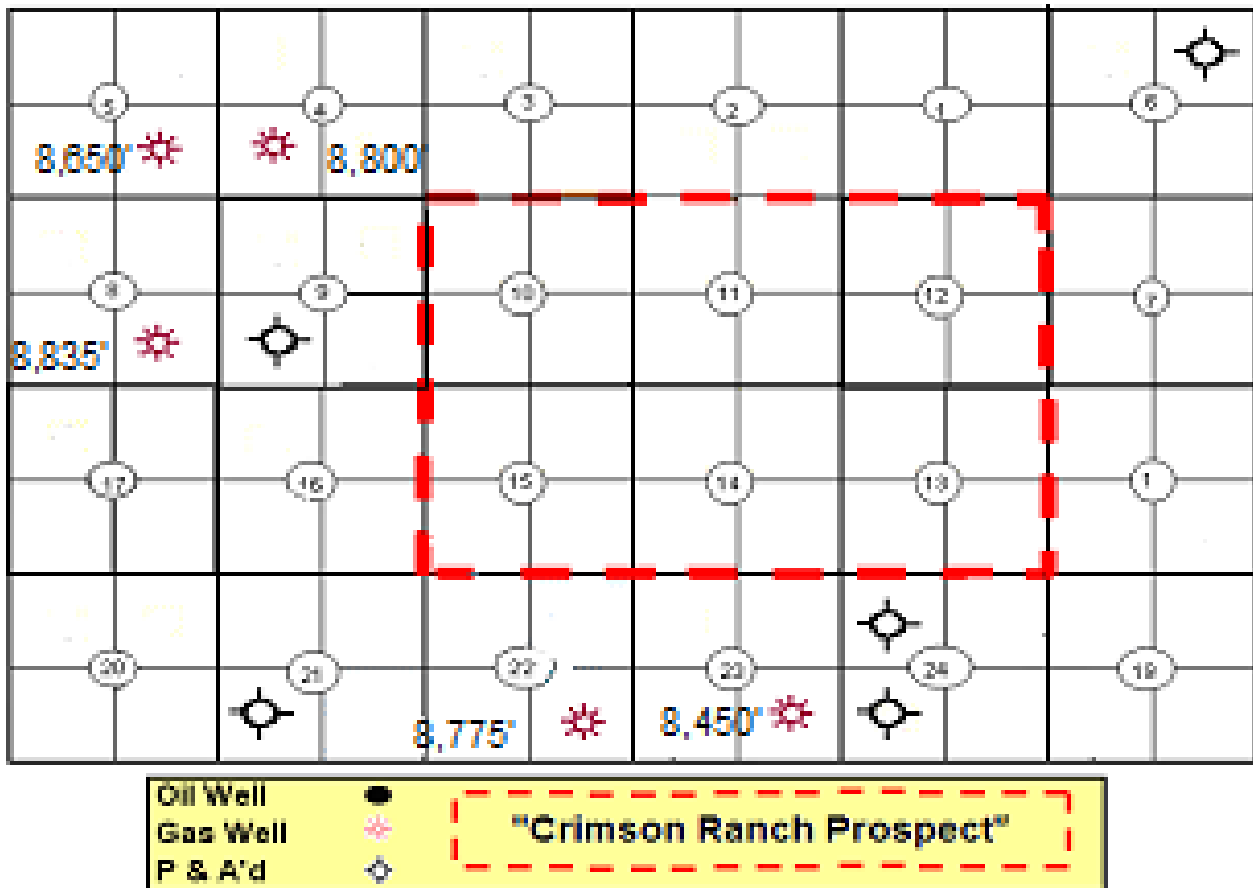
The Crimson Ranch Prospect is a six section area located in the Southeastern corner of Eddy County, New Mexico. The legal description is Township 3 North, Range 5 West of the 2nd P.M., Section 10, 11, 12, 13, 14 and 15. It is in this area that we will focus our attention and drill our wells.



The Crimson Ranch Area

Assume that in the last few months, a handful of very successful natural gas wells have been drilled in this area of Eddy County, New Mexico. These wells were discovery wells (wild cat wells). They cost between \$3.5 million to \$4.5 million and completed as vertical wells between 8,000 and 9,000 feet.

As can be seen in the plat, not every well drilled was successful. For every well capable of producing in commercial quantities, a drill hole was drilled.



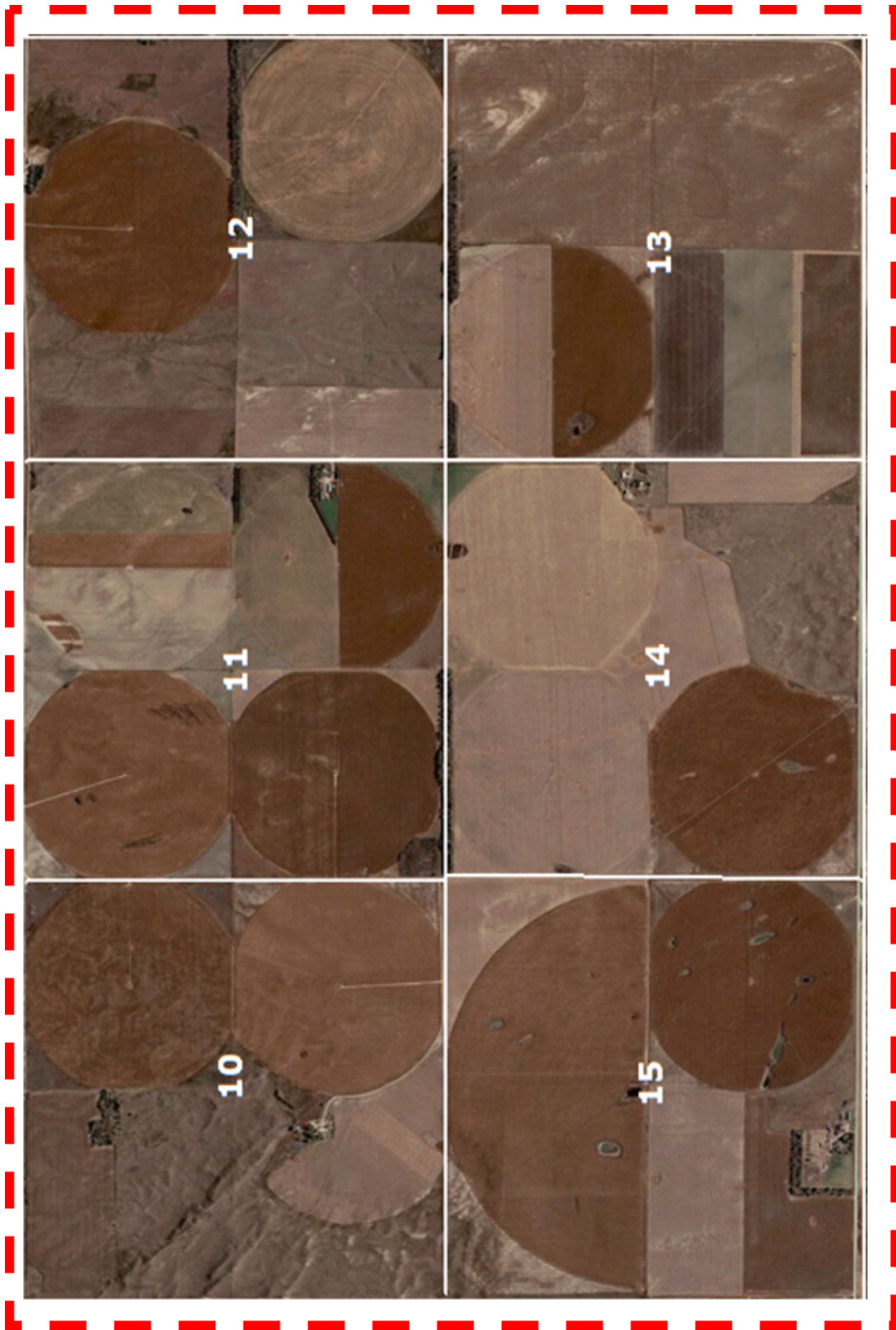
Discovery Gas Wells near Crimson Ranch Prospect

Developing the Crimson Ranch Prospect

In order to develop the Crimson Ranch Prospect, participants will be responsible for accomplishing each of six “land management practices” or tasks. Each of these tasks simulates a practice that must be accomplished in order to develop real life oil and gas projects.

Each task will be assigned a date and will follow in a chronological order. As participants move from room to room, the dates will signify when the tasks are taking place. As in real life, dates may signal obligations due or conditions that must be met from contracts or leases. Participants are responsible to meet any such obligation prior to the due date of such obligation.

- Practice 1: Participants must interpret a seismic survey study and then sketch a “Structure Map” for the “Crimson Ranch Prospect.”
- Practice 2: Participants will examine title for six sections of land. “Ownership Reports” for each tract must be drafted and a “Title Review Report” must be completed for the entire Crimson Ranch Prospect.
- Practice 3: Participants will acquire the leases necessary in order to drill a well in the Wolfcamp formation in Eddy County, New Mexico.
- Practice 4: Participants must successfully cure title issues and maintain leases within the Crimson Ranch Prospect.
- Practice 5: Participants will choose a drill site location, acquire state permits, and file other pertinent documents with the New Mexico Oil Division in order to drill a well in the Wolfcamp formation. In order to do this, participants must find out the New Mexico spacing rules and forced pooling rules for wells in Eddy County, New Mexico.
- Practice 6: Participants must prepare a “Well Proposal Package” including the JOA cover page, Exhibit A to the Operating Agreement and an Authorization for Expenditure (AFE).



Crimson Ranch Prospect



“Practice 1”
**3-D Seismic
Interpretation**

Date: December 1, 2009

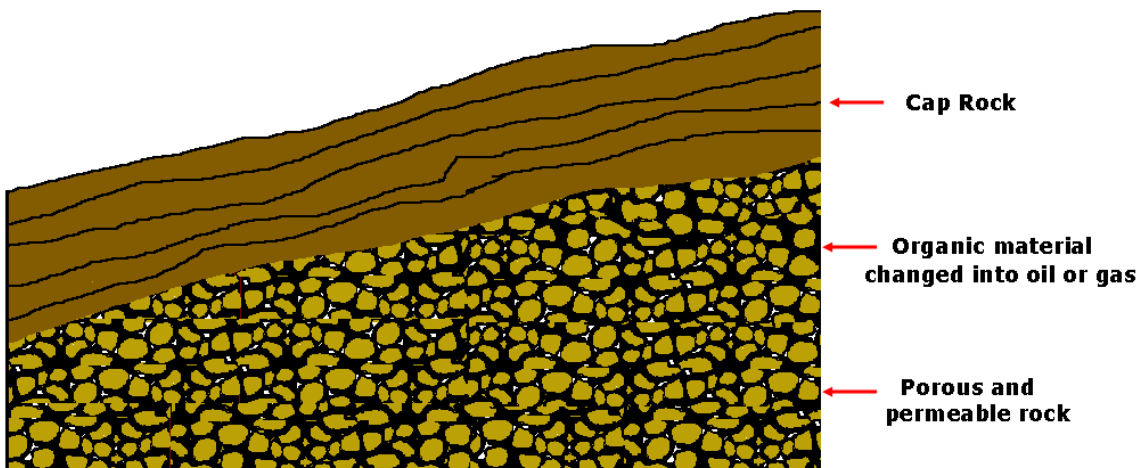
Assume that the date is December 1, 2009. On this date, participants have entered the first of six rooms where land practices take place. Above this door is a sign which simply states, “3-D Seismic Interpretation.” Clearly, it is the company geologist rather than any land personnel that examines and interprets seismic survey studies. However, land personnel are called upon to attend most project meetings where the results of seismic studies are discussed. Therefore, an understanding of the geological basics is important to landmen.

During the 3-D Seismic Interpretation Phase of this class, participants will be responsible for completing the following tasks:

- Participants will make an examination of a 3-D seismic study.
- As the result of the examination, participants will locate any optimal drilling locations within the Crimson Ranch Prospect.
- Participants must then draw or sketch a **“Structure Map”** of the Crimson Ranch Prospect. A structure map will show the following:
 - Highest and lowest elevations of the possible structures
 - Fault lines
 - Anticlines
 - Optimal drill site location (s)

Searching for oil and gas

There are a handful of scientific methods used to search for oil and gas. For our purposes, we will be using 3-D seismic. Once the study has been done, a geologist examines the findings in an attempt to locate the best possible drill site locations. Generally, the geologist will be looking for areas where reservoir rock has become trapped beneath *cap rock*. Cap rock is non-porous in nature (*impermeable*) and creates a solid mass above the reservoir rock. The rock will also have a distinctive shape that will prevent crude oil or natural gas from any further movement or migration towards the surface of the earth.

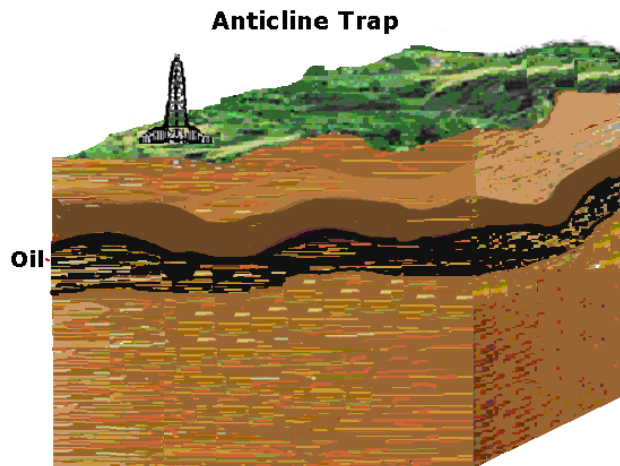


A structural trap occurs when some type of movement in the earth has taken place that has caused the migration of hydrocarbons to stop. There are three basic forms of a structural trap:

1. Anticline Trap
2. Fault Trap
3. Salt Dome Trap

Anticline Traps

This illustration of an Anticline Trap depicts rocks that were previously flat but, over time, have folded or become bent into an arch. Oil and gas migrate upward through the porous rocks into the crest of the arch. Here the hydrocarbons become trapped beneath the impermeable cap rock. These arches that are not

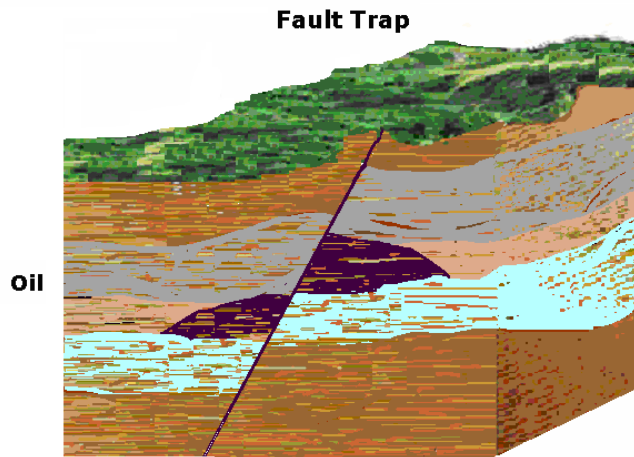


completely filled with oil will also contain large amounts of salt water.

Fault Trap

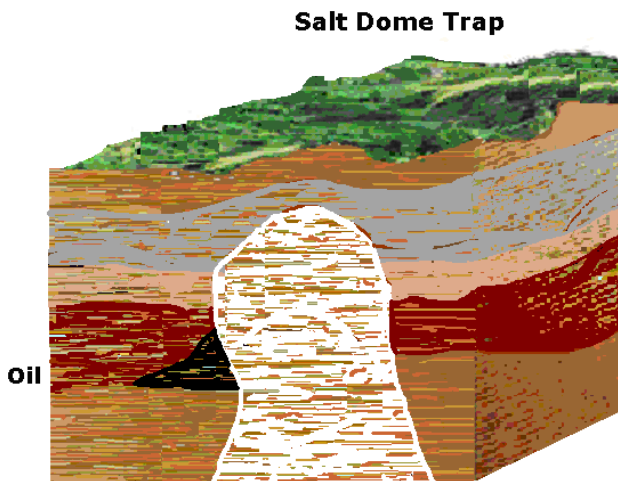
This illustration shows a break in the layers of rock (fault). A trap occurs when the formation of rock on either side of the fault moves. The formations create a natural trap for oil and gas because impermeable rock on one side of the fault will not allow the oil to escape.

In some cases, the fault is layered with substances that block oil from moving from one side of the fault to the other. This is known as a *fault gouge*.



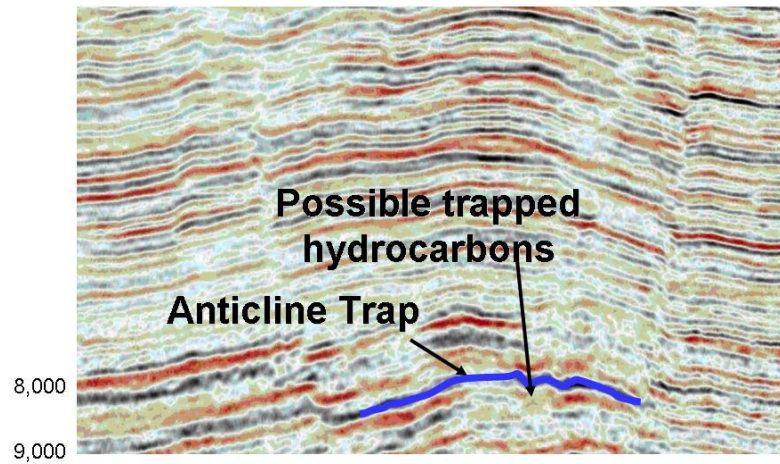
Salt Dome Trap

Salt is an interesting substance. Given enough heat and pressure, it will act similar to that of a glacier. Although glaciers move downhill seeking their lowest elevation, salt actually moves upward seeking the surface of the earth. On this journey, thousands of feet of rock formations are dislodged, bent or moved out of the salt's path. The movement of these rock formations is what creates a salt dome trap.

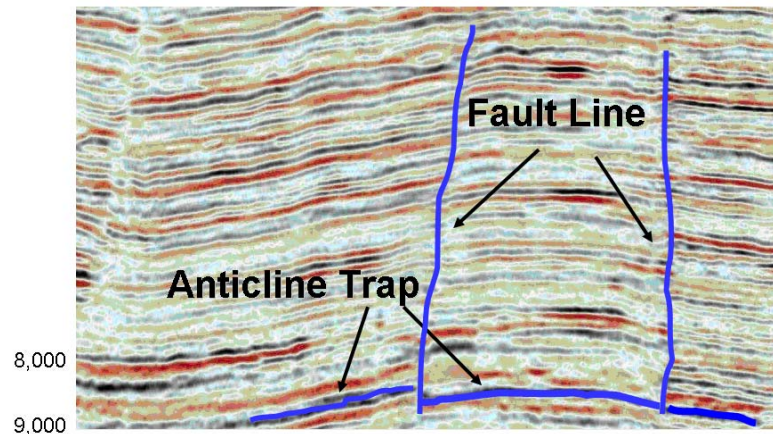


Looking for Traps

Examine the following. Between 8,000 and 9,000 feet there appears to be a significant Anticline Trap.



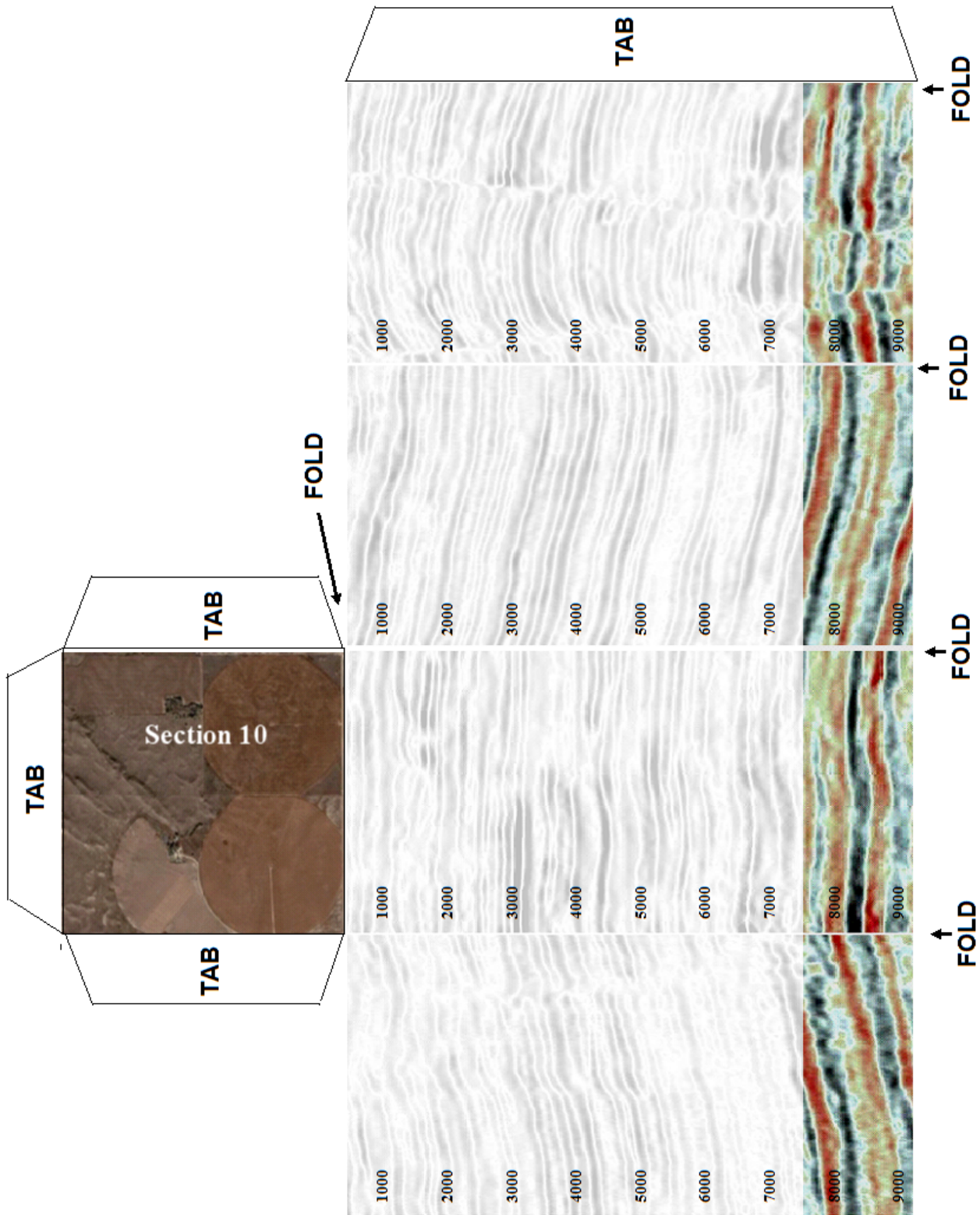
Examine the following. Between 8,000 and 9,000 feet there appears to be significant faulting with possible anticline traps and fault traps.

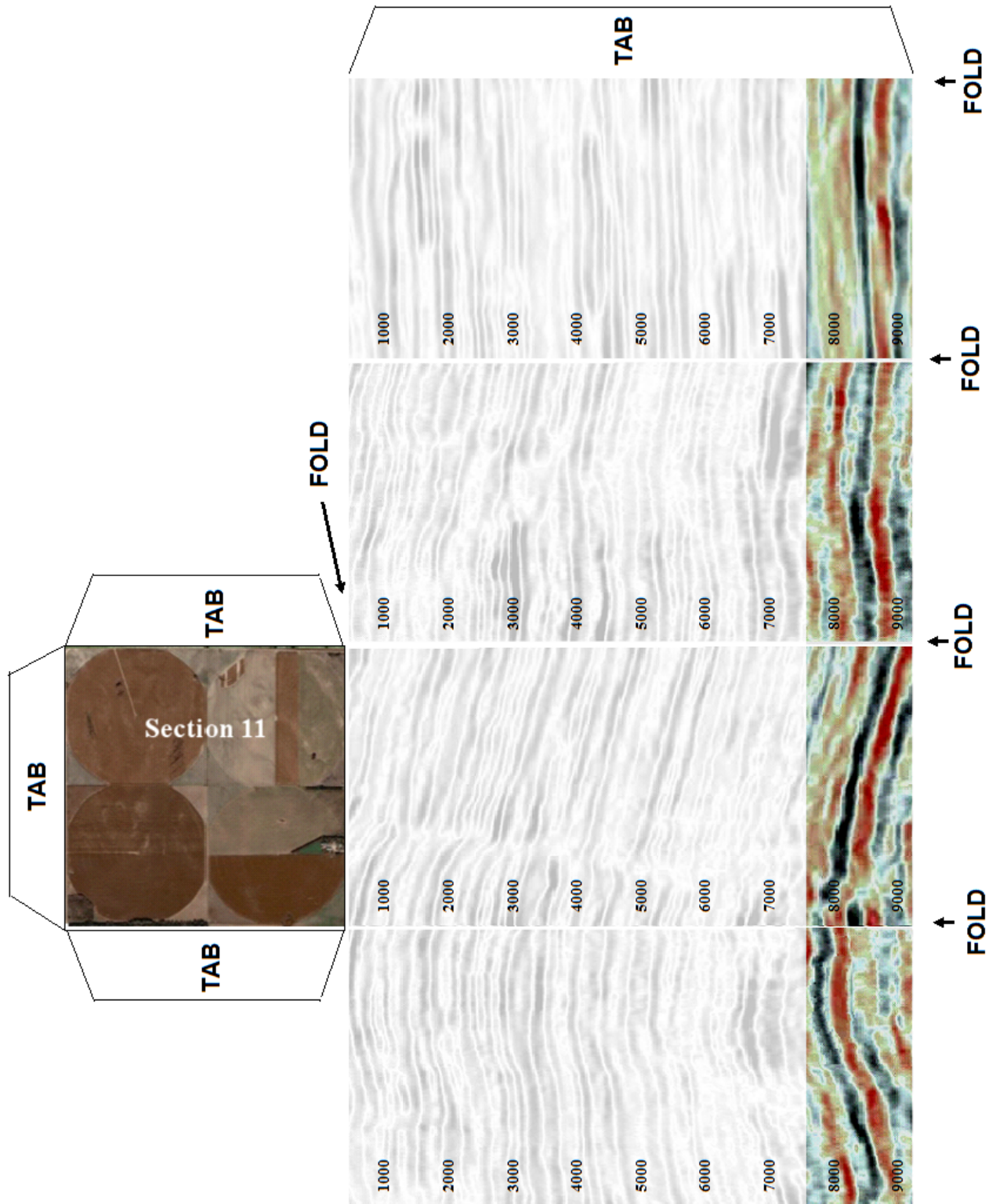


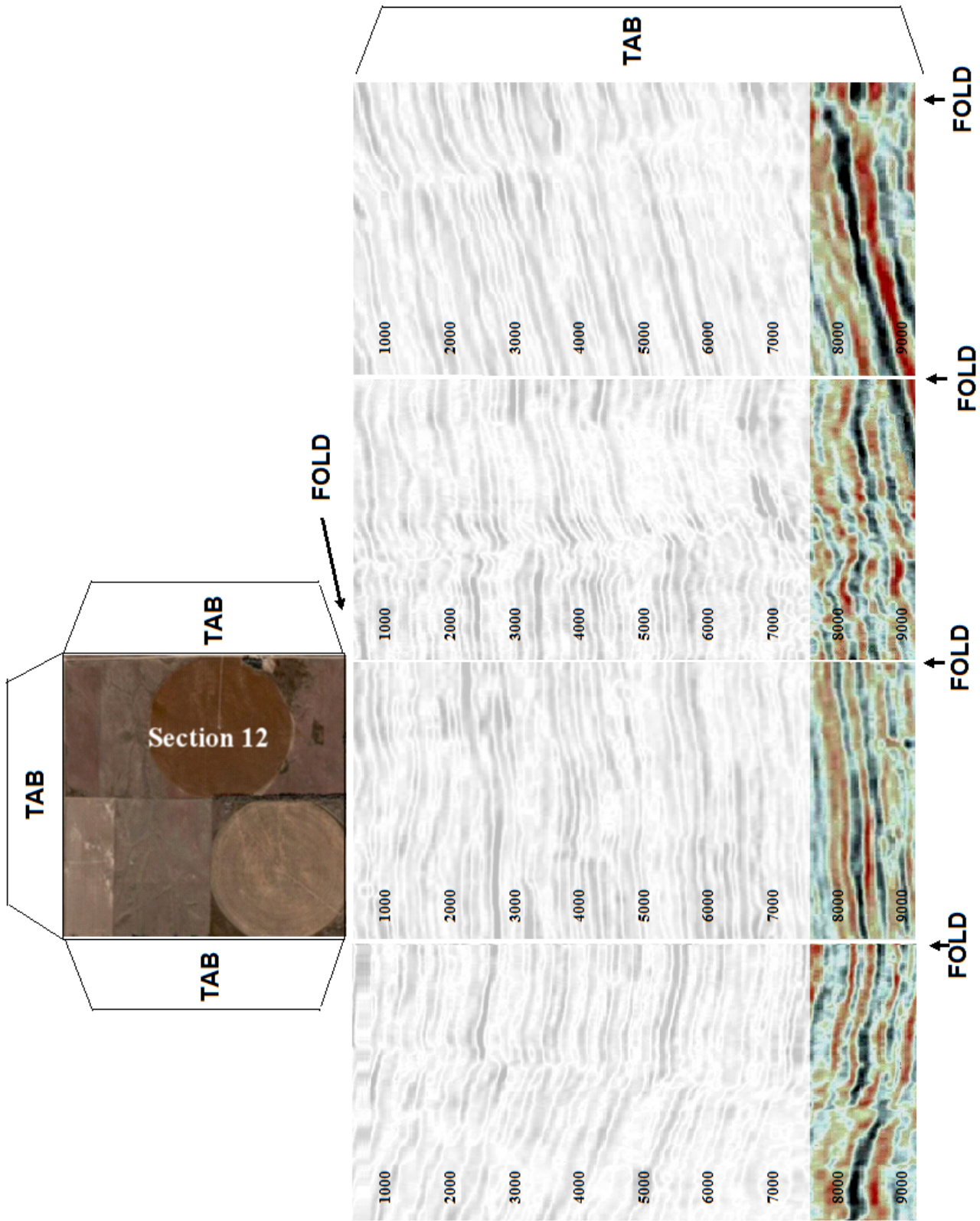
Creating 3-D seismic blocks for the Crimson Ranch Project

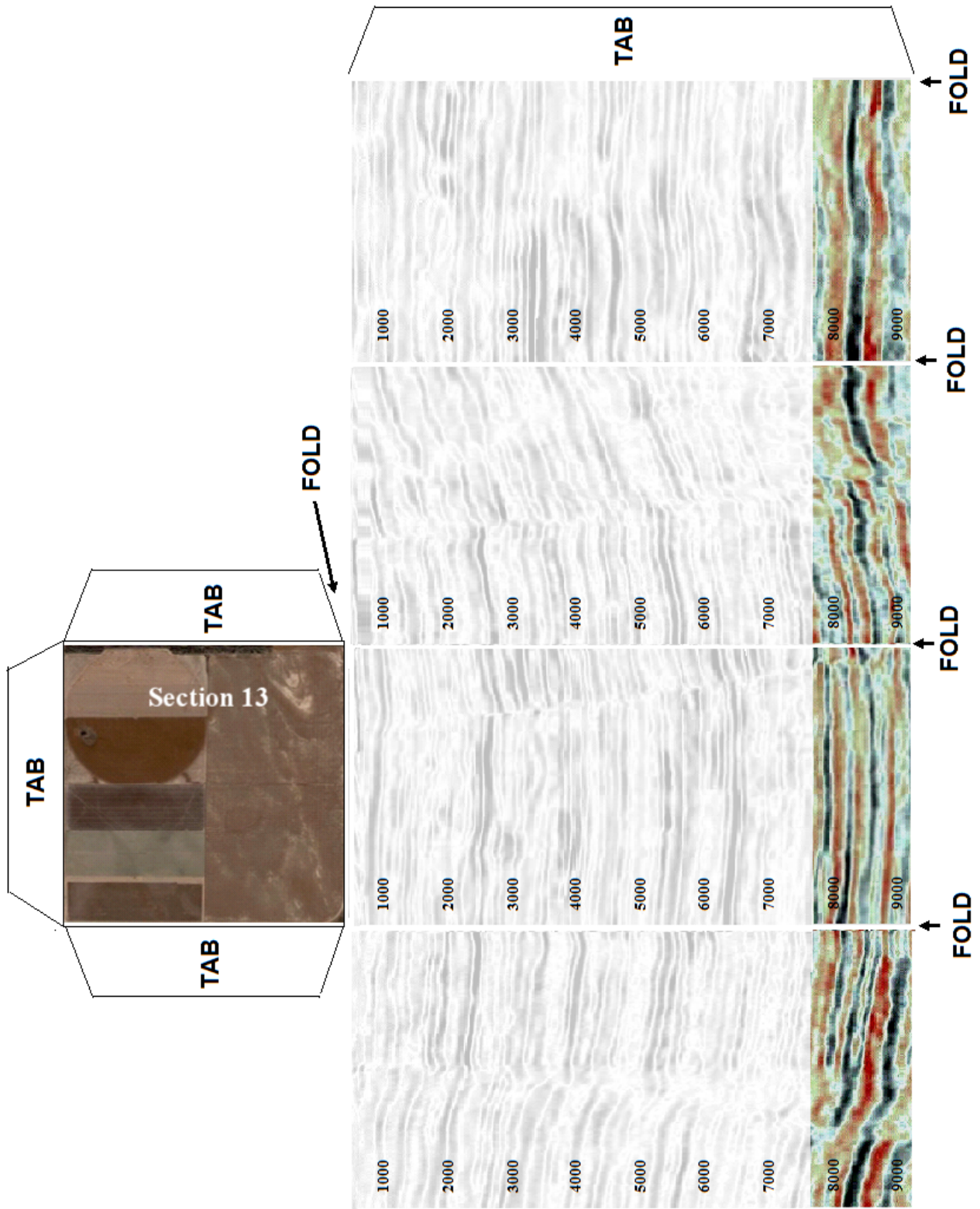
Each of the following pages contains six "cut out blocks" for each of the six sections of land in the Crimson Ranch Project. Cut out each of the blocks. Fold each of the tabs and the block as shown. Tape or paste the block together and then place all six blocks in their appropriate legal position. Since this project only focuses on structures between 8,000 and 9,000 feet, the shallower depths are whitewashed. Focus on any anticlines or faults that can be seen in the Crimson Ranch area between 8,000 to 9,000 feet. Examine the blocks separately or together. Examine two or three blocks together. Determine where the optimal drill site locations might be.

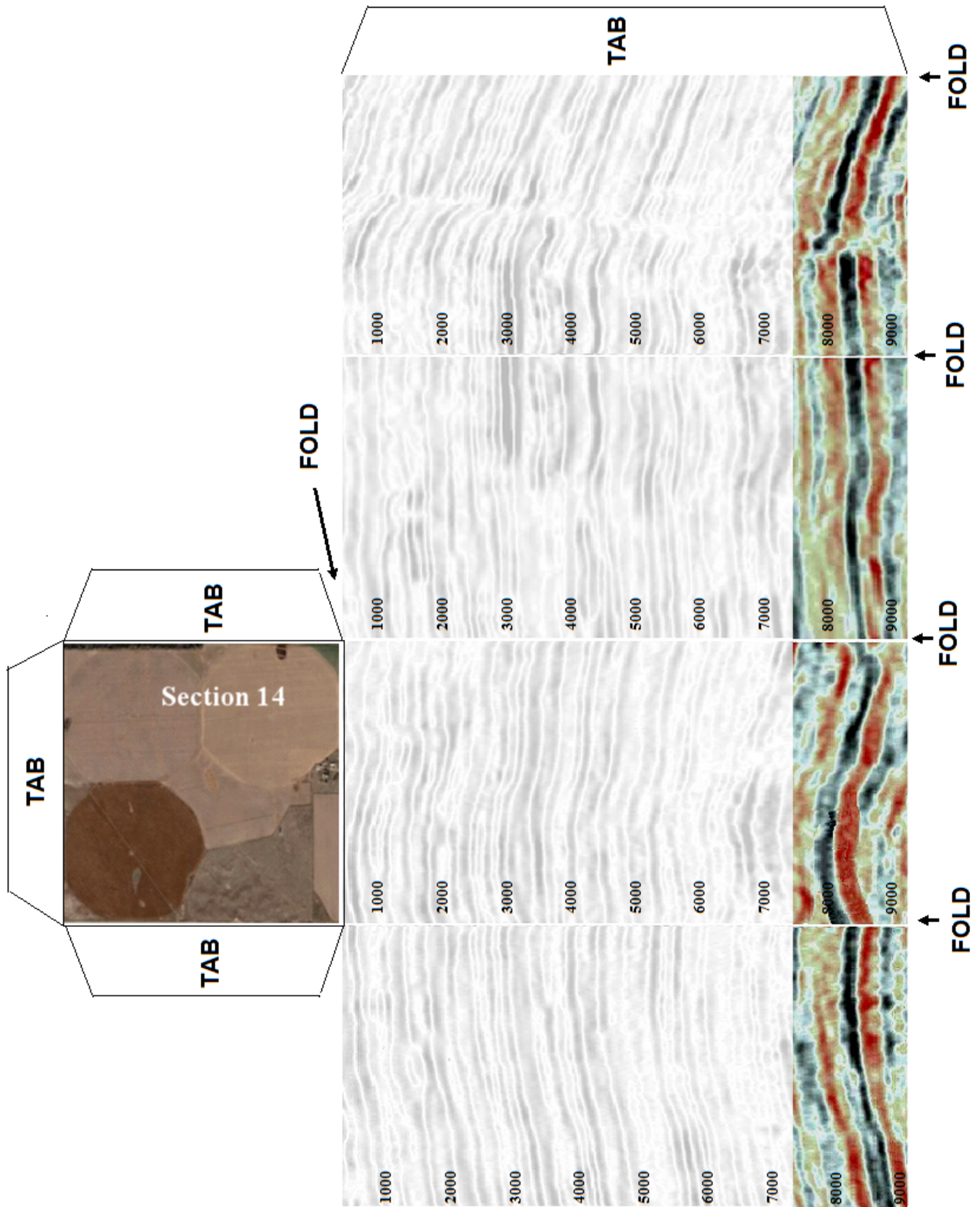
Assume that the darker color represents cap rock. Look for possible traps below this cap rock.

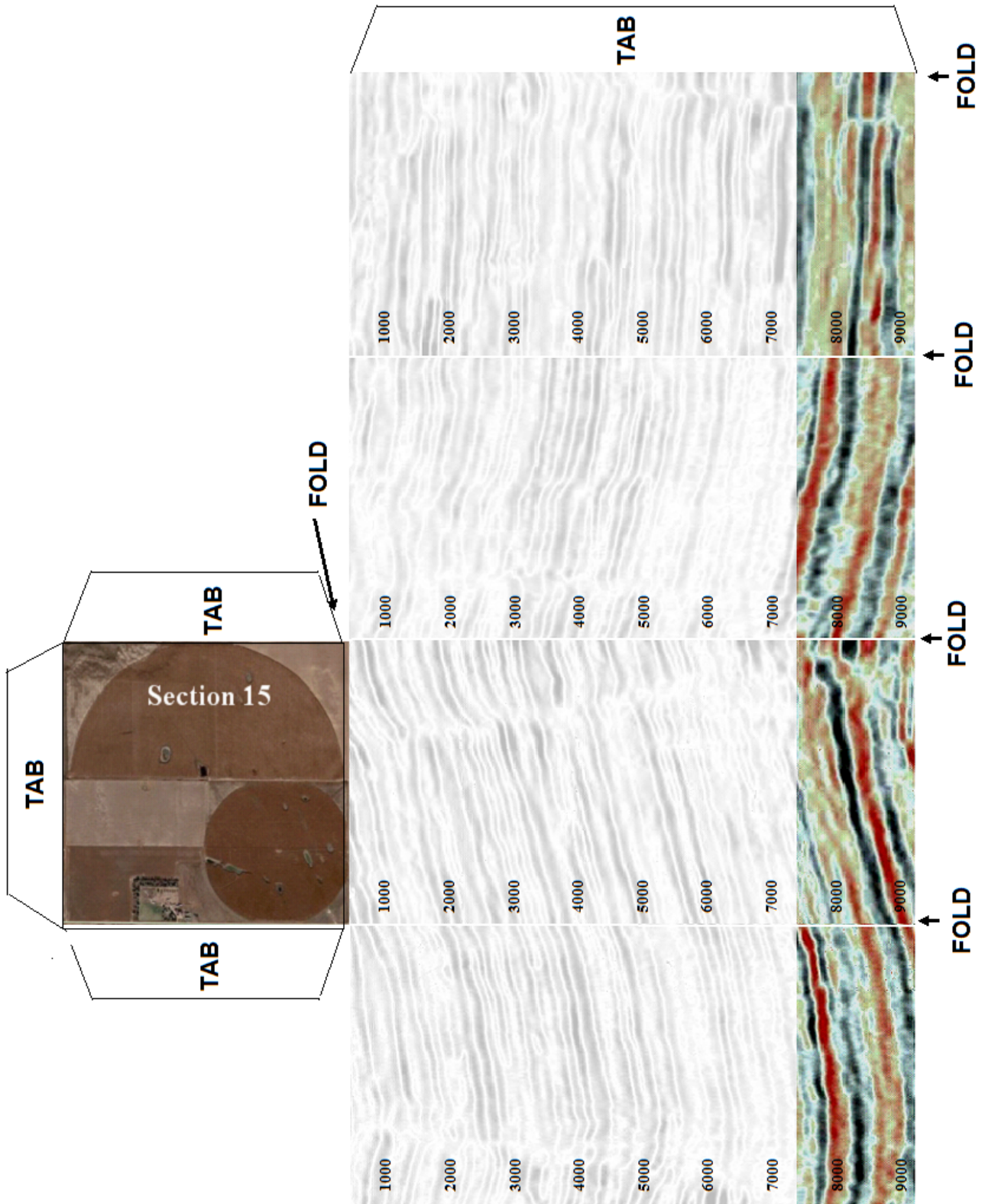












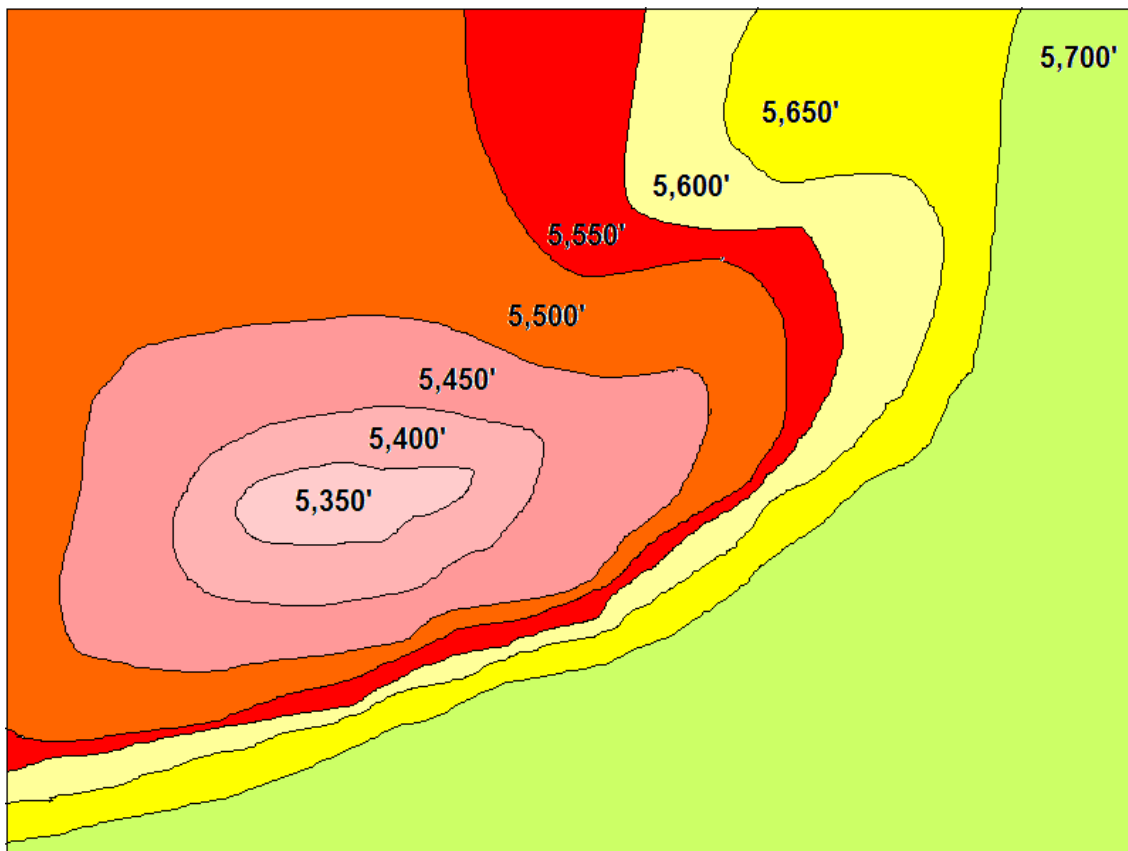
Sketching a Structure Map

Structure maps are simply an interpretation of the contours of subsurface structures. They are similar to topographical maps used to show hills or valleys on the surface of the earth. The only difference is that the hills and valleys shown on a structure map are located below the surface of the earth. Since the Crimson Ranch Prospect is looking at possible drilling locations between 8,000 and 9,000 feet, the structures to be sketched are at that depth.

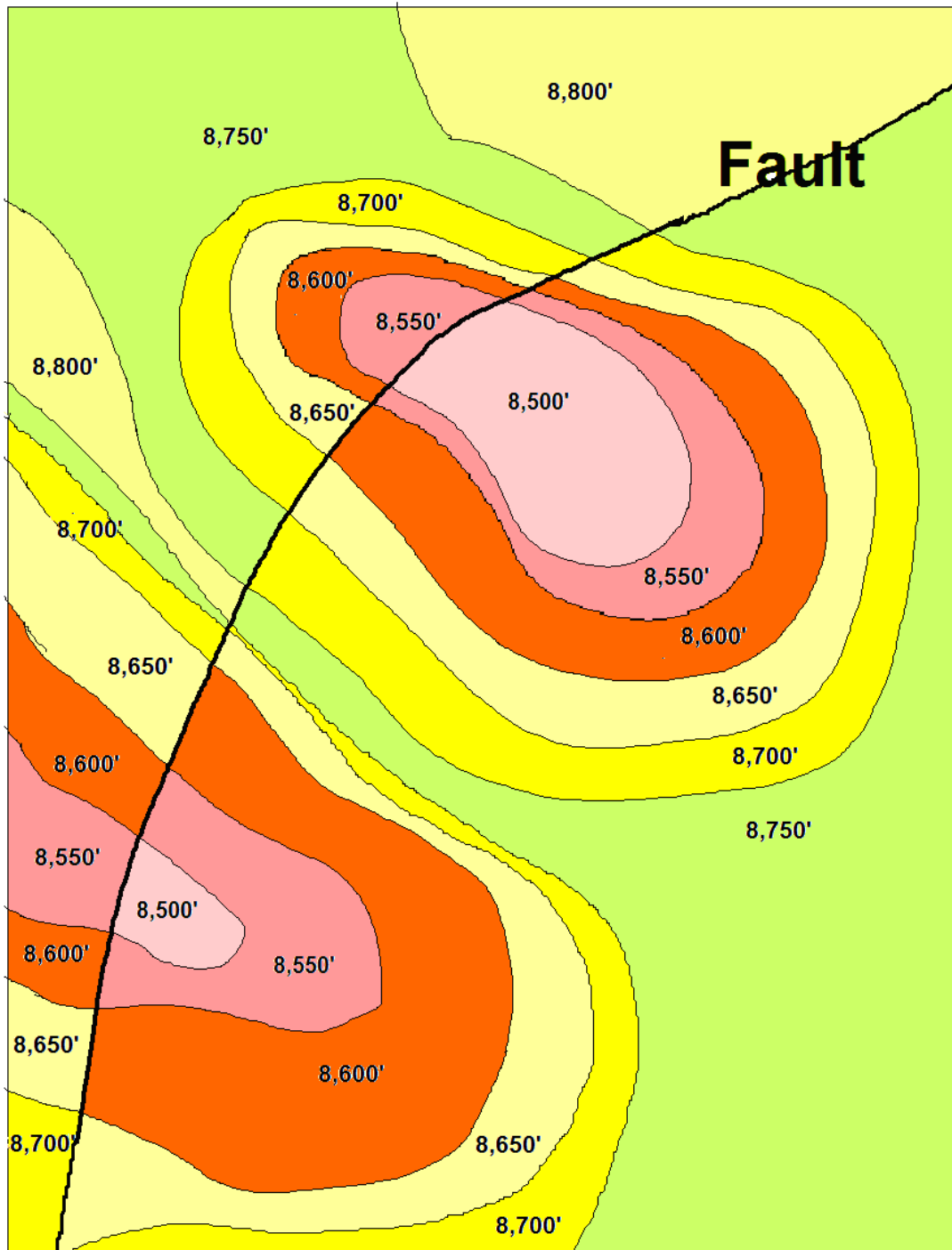
Drawing or sketching a structure map can be confusing because one is called upon to take 3-D images and transpose them into flat 2-D images.

Structure Map examples:

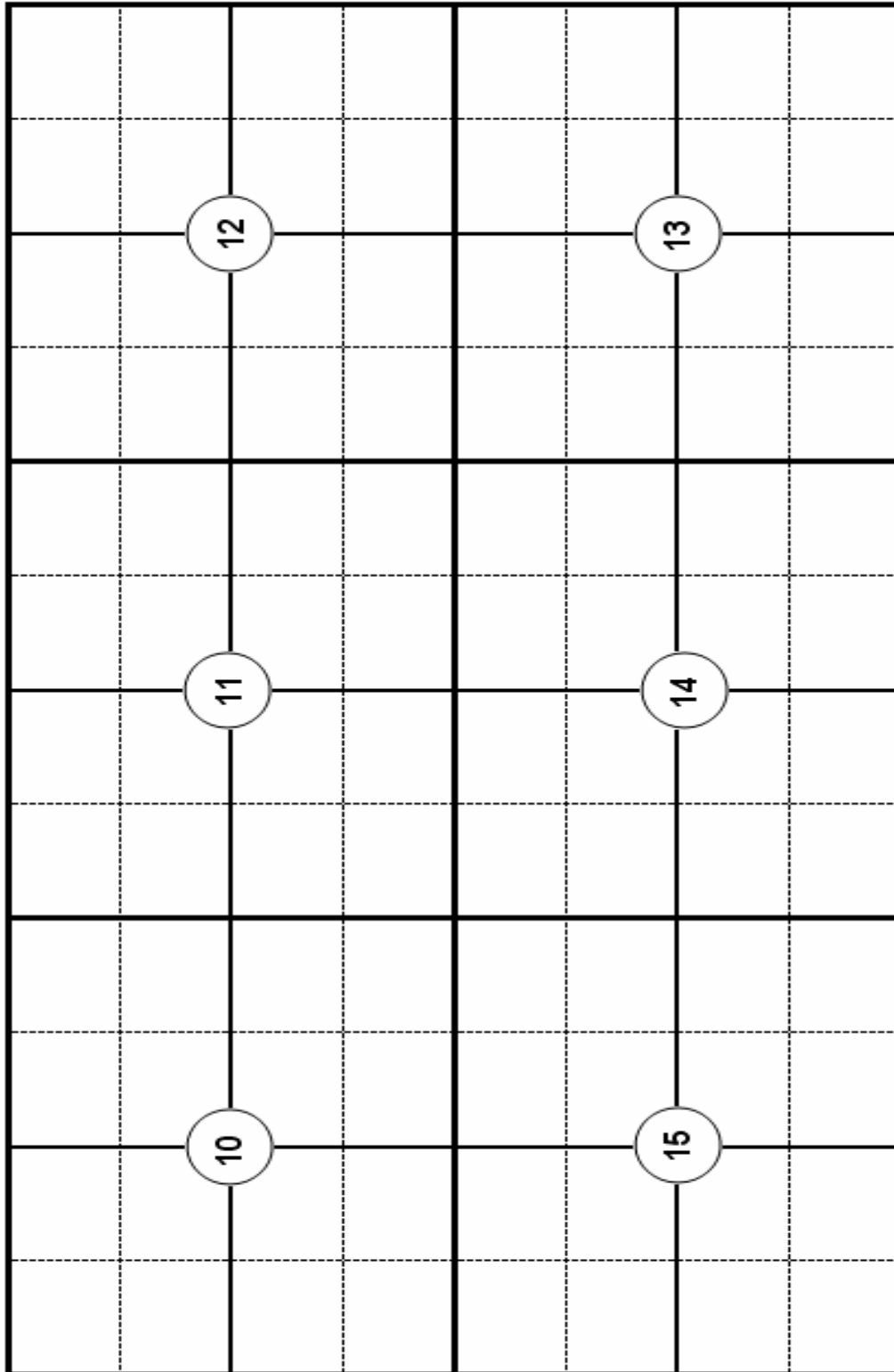
The following are two examples of Structure Maps. Again, these sketches depict the structures at a certain depth based upon 3-D images. The first map shows the highest elevation of 5,350' below the surface. This would appear to be the top of an anticline with a possible trap beneath. As can be seen, the elevation of this mound tapers off. The deepest elevation is 5,700' below the surface. If someone were to consider drilling an oil and gas well, the ideal location would be directly above the anticline penetrating the 5,350' mark.



The following structure map shows not only the high and low elevations of the subsurface but also indicates a fault that runs through the area. Note the elevation changes on either side of the fault. There appears to be two anticlines. Both have a top elevation between 8,500' and 8,550'. Ideal drilling locations might be on both sides of the fault into these anticlines.



Using the 3-D cut outs for each of the six sections, interpret and draw your Structure Map for the Crimson Ranch Prospect.



**State of New Mexico
Energy Minerals and Natural Resources**

Form C-101

APPLICATION FOR PERMIT TO DRILL, RE-ENTER, DEEPEN, PLUGBACK, OR ADD A ZONE

Operator Name and Address		API Number N/A	
Property Code N/A	Property Name		Well NO
Proposed Pool No 1 Wolfcamp		Proposed Pool #2 N/A	

Surface Location

UL or Lot #	Section	Twp	Rge	Lot Idn	Ft from the	N/S Line	Feet from the	E/W Line	County
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Proposed Bottom Hole Location if Different from Surface

UL or Lot #	Section	Twp	Rge	Lot Idn	Ft from the	N/S Line	Feet from the	E/W Line	County
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Additional Well Information

Work Type Code	Well Type Code	Cable/Rotary	Lease Type Code
Multiple N/A	Proposed Depth	Formation	Spud Date

Describe the proposed program. Describe the blowout prevention program, if any. Use additional sheets if necessary.

I hereby certify that the information given above is true and complete to the best of my knowledge and belief.	OIL CONSERVATION DIVISION
Printed Name:	Approved by:
Title	Title:
Date:	Phone:
Conditions of Approval Attached:	

On-Line Classes

Critical Legal Concepts Related to the Land Profession

Crucial information dealing with a myriad of critical concepts surrounding the land profession and the oil and gas industry are covered in this class. Subject matter covers state specific title issues and statutes that impact how oil and gas interests are interpreted, calculated and maintained; specific language in conveyances and how each word or the placement of the words impact the conveyance outcome; and state specific legal concepts surrounding doctrines of oil, gas, royalty, trespass, pooling, types of ownerships, and ownership theories.

A Comprehensive Study of the Oil & Gas Lease, Lease Obligations and Lease Clauses

This class is perhaps the best resource available for those wanting to learn about the management of a company's oil and gas lease assets. It is designed to offer specialized instruction for the landman, land tech. and lease or title analyst as they deal with particular lease and lease related issues.

A Comprehensive Study of Property Ownership and Transferring Title

This course takes an in-depth and thorough look at property ownership beginning with the origins of ownership in the United States. Other topics include: differing types of property ownership such as real property, personal property, community property, separate property, homestead laws or dower estates; the rules surrounding mineral and royalty ownership including surface, divided and undivided interests; the rules for conveying property; varying types of conveyances, testate and intestate succession laws and the many types of title transfers that result from court actions.

Contracts Used by Petroleum Land Management

Contracts are the heart and soul of the oil and gas industry which uses a number of unique agreements in order to explore for, develop, produce, and market oil and gas. This course will provide an understanding of contract law and is designed for all oil and gas professionals or those having a desire to work directly or indirectly in land or land administration. Contracts examined will include the Joint Venture Agreement, Area of Mutual Interest Agreement, Seismic Agreements, Surface Agreements, unit operating agreements, unit agreements, the AAPL Joint Operating Agreement and the Farmout Agreement.

An Introduction to Petroleum Land Management

Choosing a career as an oil and gas landman or land administration professional is a job path that is highly sought by many individuals. These types of jobs can be rewarding both personally and financially, offering an income that can be substantially greater than many other professions that require far more training. This class is excellent for those wishing to examine the subjects and tasks the land professional is called upon to manage, including: land and mineral ownership in the United States, leasing available minerals, land strategies, pooling, unitization, and searching for and drilling for oil and gas.

Calculating your Division of Interest

This on-line class comes with both a textbook and the Calculating Your Division of Interest Workbook and will be of tremendous value in helping the land professional calculate all types of interests, including net mineral acres, royalty, net revenue, gross working, and overriding royalty interest. Chapters also include unit calculations, calculating payouts, non-consents, farmouts, and calculating overrides based on farmout language.

Mastering Lease Obligations

This class provides the most practical, applicable, hands-on instruction available for those who administer the oil and gas lease and whose jobs are affected by the lease. The class will deal with several lease clauses including: the granting clause, habendum clause, Pugh clause, force majeure clause, operations clause, shut-in clause and rental clause.

Critical Legal Concepts

Crucial information dealing with a myriad of critical concepts surrounding the land profession and the oil and gas industry are covered in this class. Subject matter covers state specific title issues and statutes that impact how oil and gas interests are interpreted, calculated, and maintained; specific language in conveyances and how each word or the placement of the words impact the conveyance outcome; and state-specific legal concepts surrounding doctrines of oil, gas, royalty, trespass, pooling, types of ownerships, and ownership theories.

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