CITY OF CLINTON
REGULAR MEETING OF THE MAYOR AND BOARD OF ALDERMEN
TUESDAY, FEBRUARY 19, 2008 - 7:00 P.M.
MUNICIPAL COURTROOM – 305 MONROE STREET

WELCOME AND CALL TO ORDER Mayor Rosemary Aultman

INVOCATION AND PLEDGE OF ALLEGIANCE TO THE FLAG

The invocation was led by Alderman Greer followed by the pledge of allegiance to the flag led by Alderman Bishop.

ROLL CALL City Clerk, Russell Wall

Present: Jehu Brabham – Alderman-at-Large
Tony Hisaw – Alderman Ward 1
Tony Greer – Alderman Ward 2
Mike Bishop – Alderman Ward 3
Mike Morgan – Alderman Ward 5
William Barnett – Alderman Ward 6

Vacant: Alderman Ward 4

Mr. Skip Rhoads of Pioneer Natural Resources made a presentation on seismic exploration operations to be performed this summer in Clinton.

APPROVAL OF AGENDA ITEMS A-N

MOTION made by Alderman Brabham and **SECONDED** by Alderman Barnett to approve the Consent Agenda Items A-N. **MOTION CARRIED UNANIMOUSLY**

Alderman Greer left the meeting after this item was voted on. The time was 7:34 pm. He did not return to the meeting.

CONDITIONAL USE – 103 HAMPSTEAD BOULEVARD – VENTURE CARWASH

Upon presentation by Gary Ward, Community Development Director, **MOTION** made by Alderman Brabham and **SECONDED** by Alderman Barnett the board approved the conditional use request for Venture Carwash. The Planning and Zoning Commission recommended approval. Greg Johnson representing the owners of Arrow Car Wash spoke against granting the conditional use but did not offer any documents or evidence for the minutes. Alderman Greer was not in the meeting and did not vote on this item. A copy of the request is on file in the Community Development Department. **MOTION CARRIED UNANIMOUSLY**

PRELIMINARY SITE PLAN – 1023 HAMPSTEAD BOULEVARD – VENTURE CARWASH

Upon presentation by Gary Ward, Community Development Director, **MOTION** made by Alderman Brabham and **SECONDED** by Alderman Barnett the board approved the preliminary site plan for Venture Car Wash which will be located at 1023 Hampstead Boulevard. The Planning and Zoning Commission recommended approval. Alderman Greer was not in the meeting and did not vote on this item. The site plan is on file with the Community Development Director. **MOTION CARRIED UNANIMOUSLY**

ADJOURN 7: 58 P.M.

MOTION made by Alderman Brabham and **SECONDED** by Alderman Barnett to adjourn until the next regular meeting of the Mayor and Board of Aldermen to be held on March 4, 2008 at 7:00 pm. Alderman Greer was not in the meeting and did not vote on this item. **MOTION CARRIED UNANIMOUSLY**

APPROVED: Rosemary G. Quetman
Rosemary G. Quetman, Mayor

February 21, 2008
Date

ATTEST: Russell L Wall
Russell L. Wall, City Clerk

February 21, 2008
Date

CITY OF CLINTON OFFICIAL SEAL MISSISSIPPI

CITY OF CLINTON AGENDA ITEM FACT SHEET

BOARD MEETING DATE: February 19, 2008 AGENDA ITEM NO. 7A

CONSENT AGENDA:
TO:
FOR:
ACCT. NO :

DISCUSSION/ACTION: Conditional Use – 1023 Hampstead Boulevard
Venture Carwash

INTRODUCED BY: Gary Ward TELEPHONE: 924-2256

EXHIBITS FOR REVIEW:

Minutes	Invoice	Other: _____
Ordinance	Plans, Maps	
Resolution	Contract	

RECOMMENDATION:
BOARD ACTION: MOTION MADE BY: Brabham

SECONDED BY: Barnett

VOTE CAST:	"AYE"	"NAY"	ACTION TAKEN:
Brabham	✓		
Hisaw	✓		
Greer	DID NOT VOTE		
Bishop	✓		
~~Fisher~~			
Morgan	✓		
Barnett	✓		
Mayor Aultman			

AGENDA ITEMS MUST BE TURNED IN TO THE CITY CLERK WITH ALL ATTACHMENTS NO LATER THAN 5 P.M. ON THE WEDNESDAY PRECEEDING THE TUESDAY BOARD MEETING TO BE INCLUDED ON THE AGENDA. THIS DEADLINE WILL BE STRICTLY ENFORCED.

If the business closes sooner rather 90 days would board up and close down by removing outside equipment etc.

RESOLUTION APPROVING A CONDITIONAL USE FOR VENTURE CARWASH TO OPERATE A CAR WASH WITH EXTERIOR VACUUMS AT 1023 HAMP[STEAD BOULEVARD , CLINTON, MISSISSIPPI

WHEREAS, Venture Carwash, did file a request for a conditional use for the property located at 1023 Hampstead Boulevard to operate car wash with exterior vacuums; and

WHEREAS, all notice requirements of the Zoning Ordinance of the City of Clinton were accomplished and a public hearing was held on January 22, 2008, as required; and,

WHEREAS, the Planning and Zoning Commission upon conclusion of the public hearing on January 22, 2008, adopted a motion to approve the request for a conditional use and that the motion be forwarded to the next meeting of the Mayor and Board of Aldermen for their consideration.

WHEREAS, the Mayor and Board of Aldermen of the City of Clinton, Mississippi, have the final authority with regard to all matters involving the Zoning Ordinances; and

WHEREAS, the Mayor and Board of Aldermen are fully familiar with the request and the area involved in the request; and

BE IT RESOLVED by the Mayor and Board of Aldermen of the City of Clinton, Mississippi that the request of Venture Carwash for a Conditional Use of the property located at 1023 Hampstead Boulevard to operate a car wash with exterior vacuums and hereby granted and such action is taken pursuant to the findings of fact set out as follows:

1. The Mayor and Board of Aldermen of the City of Clinton, Mississippi, have the final authority with regard to all matters involving the Zoning Ordinance.

2. The recommendation of the Planning and Zoning Commission is advisory in nature.

3. The Mayor and Board of Aldermen have knowledge of the area involved and are aware of the need for the conditional use.

4. The requested designation meets the definitions of a Conditional Use of the Zoning Ordinance.

5. The Conditional-Use will promote the general welfare of the City of Clinton and will not adversely affect adjacent property. Future projects within the designation area will remain subject to the Zoning Ordinance and approval of site plans or other matter will allow the City to continue to monitor the area.

6. The Mayor and Board of Aldermen find that Section 402 of the Zoning Ordinances has been complied with and that the requirements of Section 2405.01 of the Zoning Ordinances are satisfied based upon the presentation of the applicants and the site plan presented to the Planning Commission and to the Mayor and Board of Aldermen.

7. The granting of this conditional-use does not relieve the requested from compliance with any applicable law, court order, covenants or contracts.

8. The Conditional Use is granted subject to the following conditions:

    a. Exterior to match the Venture Car Wash located at 110 Lake Harbor, Ridgeland, Mississippi (pictures on file).

    b. Install pitched roof on main building.

    c. Install pitched roof on canopy to match main building.

    d. Signs on canopy limited to one sign on north side of canopy (Highway 80) and one sign on west side of canopy (Hampstead Boulevard).

    e. Two employees shall be on-site during hours of operation.

    f. If Venture Car Wash, or any successor, ceases operations at this location, the owner shall properly secure all entrances to the property to prevent vehicles from coming on the property, shall secure the entrances to all buildings and shall remove all exterior equipment from the property.

The foregoing Resolution, having been reduced to writing, Alderman Brabham moved that said Resolution be adopted. Alderman Barnett seconded. The vote was as follows:

Alderman Brabham voted: AYE

Alderman Hisaw voted: AYE

Alderman Greer voted: DID NOT VOTE

Alderman Bishop voted: AYE

Alderman Morgan voted: AYE

Alderman Barnett voted: AYE

Whereupon the Mayor declared the Motion carried and the ordinance approved and adopted.

The foregoing ordinance was approved this the 19th day of February 2008.

CITY OF CLINTON

BY: Rosemary H. Aultman
Rosemary Aultman, Mayor

ATTEST: Russell L Wall
Russell Wall, City Clerk

CITY OF CLINTON OFFICIAL SEAL MISSISSIPPI

CITY OF CLINTON AGENDA ITEM FACT SHEET

BOARD MEETING DATE: February 19, 2008 AGENDA ITEM NO. 7B

CONSENT AGENDA:
TO:
FOR:
ACCT. NO :

DISCUSSION/ACTION: Preliminary Site Plan – 1023 Hampstead Boulevard
Venture Carwash

INTRODUCED BY: Gary Ward TELEPHONE: 924-2256

EXHIBITS FOR REVIEW:

Minutes	Invoice	Other: _____
Ordinance	Plans, Maps	
Resolution	Contract	

RECOMMENDATION:
BOARD ACTION:

MOTION MADE BY: Brabham

SECONDED BY: Barnett

VOTE CAST:	"AYE"	"NAY"	ACTION TAKEN:
Brabham	✓		
Hisaw	✓		
Greer	DID NOT VOTE		
Bishop	✓		
~~Fisher~~			
Morgan	✓		
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Mayor Aultman			

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APPROVED: Rosemary G. Aultman
Rosemary G. Aultman, Mayor

February 21, 2008
Date

ATTEST: Russell L Wall
Russell L. Wall, City Clerk

February 21, 2008
Date

CITY OF CLINTON OFFICIAL SEAL MISSISSIPPI

The

Of

Seismic Exploration

For the

Private Landowner
And
Public Land Administrator

Elements of seismic operations as they may pass through your area...

There are five interrelated elements involved in a seismic survey, each depending upon the completion of the previous operations. The elements are: (1) obtaining permission to operate, (2) surveying the route, (3) laying out geophones, (4) generating energy waves and recording data, and (5) reclamation and cleaning up the site.

Gaining Permission
The first representative of a seismic operation that you may meet is the Permit Agent/Landman, who obtains the permission required to conduct a seismic operation in your area. If this is to be on private land, permission is obtained from the landowner. It's to be along roads or on public lands, permission is obtained from a governmental agency and where appropriate, adjacent landowners. The Permit Agent/Landman will report back general information to the seismic crew and provides them with agreements made in new areas. Sometimes the Permit Agent/Landman travels hundreds of miles a day and may be days or weeks ahead of the actual seismic operation. Any fees paid by seismic companies are to compensate for any disruption of the landowner's activities or for temporary surface disturbance caused by the crew. These fees are negotiated between the two parties.

Surveying


Photo from Omni Energy

Next the survey crew comes and will mark the exact route the seismic line will take. The survey crew also measures surface elevations along the line and specifies the points where sound waves will be generated and listening devices placed.

Laying Out Program
The recording crew lays out sensitive listening devices (geophones) along the seismic line. These geophones pick up the reflected sound waves after they have been weakened by passing through miles of underground rocks. The geophone converts these signals into electric impulses which are transmitted by cable to the recording truck. Inside the truck are delicate electronic instruments which amplify and record the electric impulses for later computer analysis. Geophones and recording instruments are so sensitive they can pick up footsteps scores of feet away.

Energy and Recording
There are several ways to generate seismic sound waves into the ground. Commonly used methods are surface detonations, shot hole detonations, vibroseis and air guns. The special equipment used and the procedures followed for some of these methods are described in the next section of the booklet.

Reclamation and Clean-Up
While seismic crews move rapidly from area to area, they exercise care to clean up along the seismic line so the area is left near to its original condition as possible.

The Permit Agent or another representative of the crew will coordinate this effort to make sure that all the terms of the permit have been satisfied.

SEISMIC ENERGY SOURCES... AND WHY THEY VARY

Generating Energy Waves
Illustrated on these pages are the most common methods for generating sound waves for land seismic exploration: traditional or highland shot hole operations and the vibrating energy source. Factors that influence the selection of a particular method include prior experience, environmental concerns, and economics. Exploration companies must have flexibility in selecting the best method to ensure they obtain the highest quality geophysical data possible.

Shot Hole Operations


Buggy Drill

In this method, a hole is drilled and an explosive charge is buried. Detonation of the buried charge creates a seismic sound wave. The typical seismic shot hole ranges from 10 to 200 feet in depth and is about four inches in diameter.

Detonations are usually contained within the hole to force the energy generated downward through various rock strata, and the only sound heard above ground is a dull thud. This operation involves a drilling crew, motorized vehicles, a crew for detonation, a shot hole plugging crew (Seismic shot holes must be properly plugged in a manner specified by state and or federal government agencies), and clean-up personnel.


Multi-Engine Airboat Drill

Vibrating Energy Source


Vibrator

The vibroseis method involves surface vibration rather than detonations. A specially designed vibrator pad, mounted below a vehicle, is compressed against the ground and vibrated at regular intervals to create sound waves. Damage to the ground by the vibrator pad is minimal. Several of these vehicles operate together to form the energy

source. Difficult terrain often limits the use of this particular seismic energy source.

Heliportable Operations

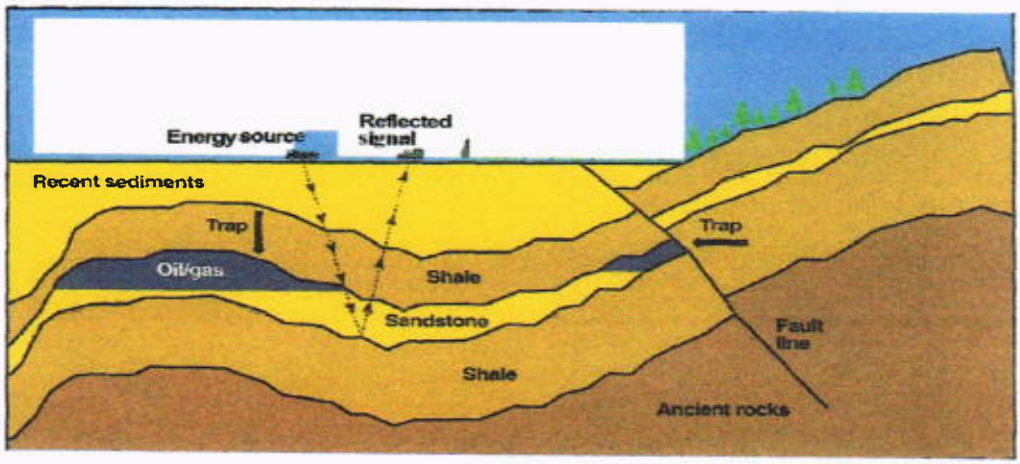
Helicopters are used to transport equipment into areas not accessible with surface vehicles. Heliportable operations use smaller drilling equipment specifically designed for easy separation into component parts and reassembly on-site.

These operations are frequently similar to traditional shot-hole operations but also include Poulter and mini-hole operations. Heliportable activities are used in those areas inaccessible by vehicles and that require a helicopter to move supplies, equipment, and personnel. Such operations and equipment cannot drill holes as deep as those used in the traditional shot-hole method. Heliportable operations are very expensive and may not produce the quality of data needed.

Helicopter moving equipment.

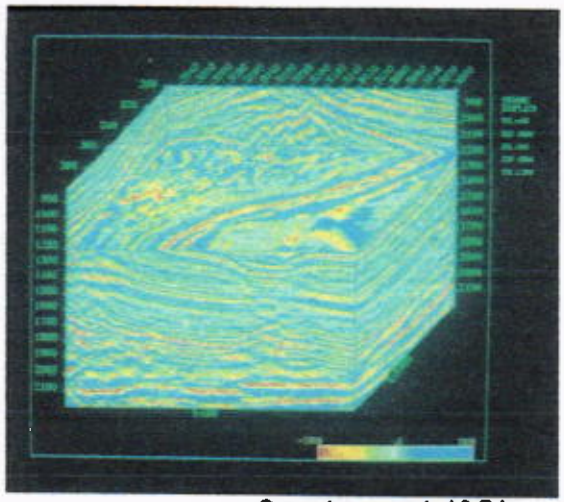
Collecting Data

The following example showing a diagram of the seismic method, a vibrator (depicted on the left) generates energy waves that penetrate the earth far beneath the surface of the ground. These waves pass through the various rock layers and are eventually reflected back to the earth's surface. At the surface, the reflected waves are received by the geophones, converted to electrical impulses and transmitted to a second truck (depicted on the right), which is also referred to as the 'recorder'. The second truck records the electrical impulses on a magnetic tape. After the crews have completed their work, the collected geophysical data are processed and analyzed on computers.



For many years, geophysicists have collected data along linear cross sections of our land. These surveys provided information beneath the survey line, which was usually displayed as a two-dimensional 'slice' of the subsurface.

Now geophysicists distribute geophones over a wider area of the ground and the information is collected throughout a volume of the subsurface – a method called three-dimensional or '3-D' data acquisition. It enables drilling locations to be determined with greater accuracy and for many to be eliminated altogether. Geophysicists use 3-D information not only as a geophysical exploration tool, but also to better delineate known petroleum reservoirs. Computerized display equipment now makes it possible to compress wide areas of seismic exploration into 3-D pictures that can be viewed on desk-top computer.



Computer generated 3-D image

Resource Protection Offsets

The objective of developing the tables below is not to set the conditions for all possible surveys. Rather, it is to establish presumptions for appropriate operating parameters. If the operator proposes to operate closer to a cultural resource or other manufactured facility than the identified distances, the burden should be on the operator to demonstrate the insignificance of effects on the cultural resources that have been identified as existing along the survey route. If the Forest Service or other interested party wants the operator to operate further from an identified cultural resource, the burden should be on the Forest Service or other interested party to demonstrate that the extended distance is necessary to provide adequate protection for the resource in question.

The following tables were derived from studies on effects to commonly investigated contemporary structures (e.g., houses, water wells, pipelines, and springs) and the normal environmental conditions that cultural resources are subjected to on a daily basis (e.g., wind, temperature changes, humidity changes, and vibrations from aircraft, vehicle, and train traffic). It is unnecessary to add additional buffers to the established distances. Distances may need adjustment in saturated soils or extreme weather conditions.

With your cooperation:

At present, our country depends on foreign imports for a significant portion of the oil and gas needed to heat and cool our homes, power our autos, generate our electricity, fuel our factories, and provide the raw material for many chemicals, plastics, fibers for clothes, cosmetics, and other products. This dependence threatens our security and drains dollars from our domestic economy.

We desperately need to find additional domestic crude oil and natural gas to achieve energy independence. We need your help in doing just that. U. S. petroleum companies are conducting an intensive, nationwide search for additional oil and gas - a search that now extends to your area.

This pamphlet contains information about seismic operations, the first step in the exploration process, that are taking place in your area. We ask your patience and cooperation as we visit.

If you have questions about the seismic survey taking place
On or near your property, please contact:

Pioneer Natural Resources
2147 Henry Hill Dr. Suite 106
Jackson, Ms. 39204
601.923.9290

If you wish to have additional information regarding
The geophysical exploration industry,
Please contact: Robert Elmore

Los Angeles 3D survey leads to deep drilling

DALTON LOCKMAN, Plains Exploration & Production Co., Los Angeles, USA

Most 3D seismic surveys are designed and shot with little concern for movie studio lots, 10-lane freeways, or privacy fences. But when Plains Exploration & Production Co. (PXP) decided to acquire seismic data over the 81-year-old Inglewood Field—the first onshore 3D survey ever conducted in the Los Angeles Basin—the company knew it would be anything but a typical seismic shoot. The field is located in the Baldwin Hills area in the heart of one of the nation's largest and most populous metropolitan areas (Figure 1). Oil production was there long before the buildings, streetlights, and asphalt that have since crowded in and around the field. It is now a few square miles of pump jacks and stock tanks surrounded by urban sprawl. Downtown Los Angeles is only six miles to the east, and Los Angeles International Airport is a short drive south.

LA is the place of movie stars and limousines, not seismic crews and vibrator trucks. But when PXP evaluated ways to add value to its 100-percent-owned Inglewood Field, 3D seismic emerged at the top of the list. So in late 2002, the company began planning a 21.3 square-mile 3D survey that stretched over parts of three municipalities, Los Angeles, Inglewood, and Culver City, as well as portions of unincorporated Los Angeles County. In addition, the survey area fell inside the jurisdiction of several state and local regulatory agencies. Within the survey area was a major motion picture studio, a college, two large cemeteries, interstate freeways 10 and 405, condominium complexes, a maze of traffic-congested streets, and thousands of residences and businesses.

Although the Inglewood 3D survey field operation was a major undertaking that was not without numerous technical and cultural challenges, the end results have been very favorable. After acquiring and processing the 3D data, PXP initiated a drilling program in 2004 targeting largely untested deeper Miocene-aged turbidite sands below the shallow main productive intervals. The first of those wells came on line in the first quarter of 2004 averaging an initial daily rate of 800 barrels of oil equivalent. Since then, two dozen additional deep wells have been drilled with a 100 percent success rate, and placed on production making a combined 2500-3000 barrels of oil a day.

Inglewood Field history. The 1200-acre Inglewood Field was discovered in 1924 by Standard Oil of California (Chevron). The primary development focus was on the Vickers and Rindge zones at vertical depths of less than 4000 ft. These distal turbidite reservoirs are water and gravity drainage-driven, with crude oil typically ranging between 14 and 29 degrees API gravity. Waterflooding had been initiated in 1954 targeting the Vickers and Rindge zones. At the time of the 3D survey, 1400 wells had been drilled in the field, with 338 active producing wells and 142 injectors. Before kicking off the deep drilling program, the field had produced 350 million barrels of oil cumulative, with 90 percent coming from the Vickers and Rindge.

Stocker Resources, a predecessor company to PXP, acquired the field in 1990. Oil and gas production had been on a gradual decline throughout the 1980s, but production

(Editor's note: This article is reprinted with permission from the July 2005 issue of The American Oil & Gas Reporter.)

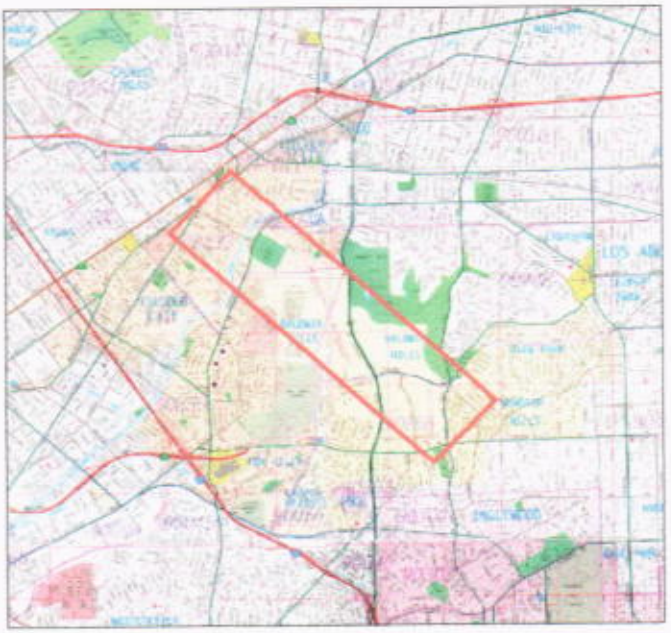


Figure 1. Inglewood Field, Los Angeles Basin.

EPOCH	FORMATION		RESERVOIR	LITHOLOGY	THICKNESS	DESCRIPTION
PLEISTOCENE	SAN PEDRO				0' - 200'	
	INGLEWOOD				150' - 300'	
UPPER PLIOCENE	PICO	Upper			150' - 300'	
		Middle	Investment		200' - 600'	
		Lower	Vickers		1500' - 1700'	
LOWER PLIOCENE	REPETTO	Upper	Rindge		900' - 1000'	
		Middle	U Rubel		250' - 300'	
			L Rubel		600' - 700'	
		Lower	U Moynier		300' - 400'	
			L Moynier		600' - 700'	
UPPER MIOCENE	PUENTE		Bradna		700' - 1800'	
MIDDLE MIOCENE			City of Iwood		0' - 250'	
			Nodular Sh		150' - 175'	
			Sentous		200' -1000'	
	TOPANGA		Topanga		1500'	

Figure 2. Inglewood Field stratigraphic column.

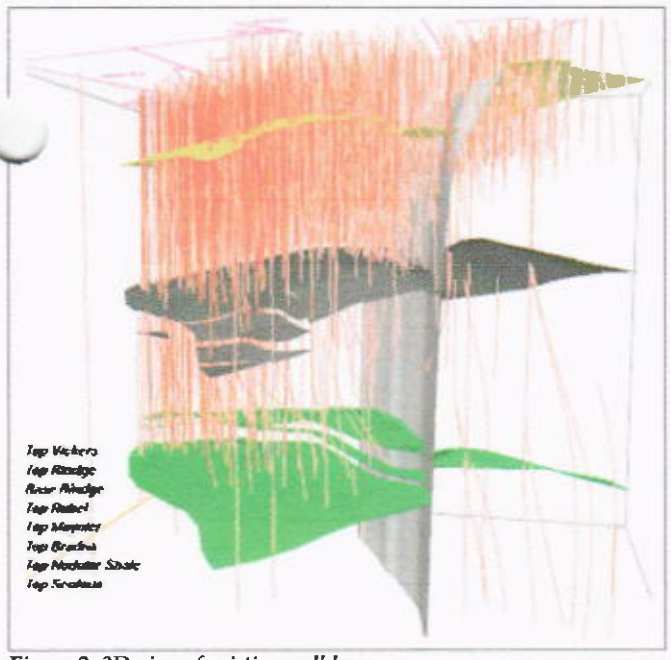


Figure 3. 3D view of existing well bores.

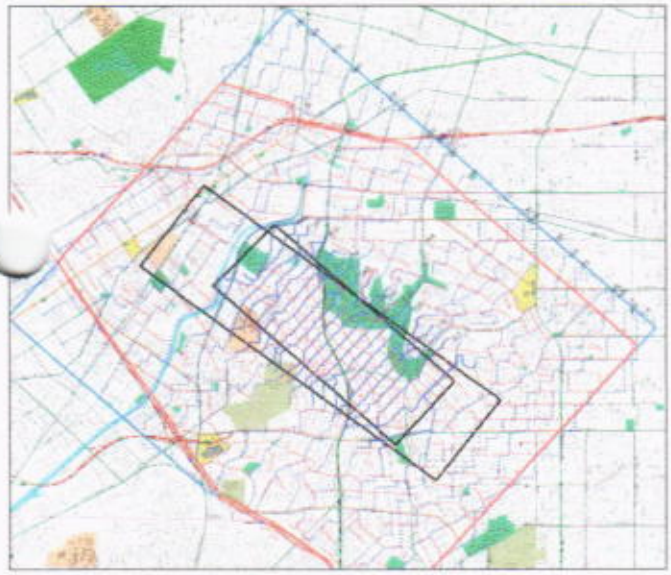


Figure 4. Survey area with source/receiver layout.

rates were improved after Stocker assumed ownership and applied its ingenuity and expertise on production engineering, facilities issues, and hydrocarbon saturation mapping. Subsequent new well drilling indicated that geologic structure was a dominant factor in accurately identifying potential areas in the reservoir with untapped reserves.

In early 2001, PXP undertook a significant effort to resolve the field's structural complexity, including extensive reservoir characterization and 3D geologic modeling to analyze structure and stratigraphy, fault geometries, sealing mechanisms, Vickers/Rindge waterflood conformance, and remaining hydrocarbon potential. Despite the field's age, it was apparent that it held considerable oil potential. In fact, the 350 million barrels of oil the property had produced were estimated to be only 35 percent of the original oil in place.

However, 3D seismic was needed to delineate prospective areas within the complex geology where additional hydrocarbons could be developed. Although a few 2D lines had been shot in the field, 3D data had never been acquired in the LA Basin, except for an offshore survey near the THUMS islands project in Long Beach Harbor. As originally conceived, the Inglewood Field survey was designed to image faulting and compartmentalization in the shallow Vickers and Rindge zones, but the design was ultimately revised to include imaging underlying zones at vertical depths to 10 000 ft.

Romance in the deep. The field contains more than 5000 ft of stacked pay zones in medium- to fine-grained sandstones, siltstones and shales. The geologic structure is a plunging anticline with complex faulting, with most faults acting as seals, creating petroleum traps. Figure 2 shows a stratigraphic column of the field. For depth reference, the bottom of the Rindge is at ±4000 ft, with the bottom of the Sentous at ±10 000 ft.

In the late 1930s and early 1940s, Tidewater Oil (Texaco) successfully drilled 16 deep wells targeting the Sentous zone on a 35-acre lease it owned within the Inglewood Field area. In the 1960s Standard Oil exploited the Moynier zone and conducted a pilot waterflood within the Moynier. Outside of that, however, little effort had been invested historically in testing structures below 6000 ft, as indicated by Figure 3, a 3D rendering of the locations of well bores drilled prior to 2003.

Obviously, drilling over the years had concentrated on the shallow Vickers (1500-1700 ft thick) and Rindge (900-1000 ft thick) reservoirs, but the deep zones provided the romance for the 3D acquisition project. PXP hoped to use the 3D data to not only increase Vickers/Rindge production, but also add reserves and a field development component from the deeper intervals. The green layer in Figure 3, representing the Sentous (200-1000 ft thick), is the primary target for the current deep drilling program.

The first step was conducting a 3D feasibility study, including shooting a new 2D test line in the fall of 2002. The objectives were to determine whether 3D would even work from a geoscientific perspective considering all the topographic factors and subsurface complexities; assess the relative cost-versus-benefit value of acquiring 3D data over the entire field; evaluate potential data quality, surface access and permitting problems; and test acquisition parameters to assist in planning and designing the full-field 3D survey.

Importantly, the feasibility study also provided a test case for resolving access and permitting issues-major concerns given the survey's location and number of governmental and regulatory agencies involved. Fortunately, the results not only indicated encouraging results for 3D data acquisition across the entire stratigraphic section—including the deep Moynier-Sentous zones—but also revealed that permits could be acquired within a reasonable time frame with planning and diligence.

So in late 2002, Trace Energy Services was contracted to acquire the 3D data. The survey design work was started immediately, with the permit process beginning in November and continuing through March 2003. The data were acquired in April and May 2003.

When the feasibility study was initially proposed, the idea was to design the survey to obtain high-quality data in the shallow sections to assist in optimizing waterflooding, but PXP quickly realized the greatest value was in imaging both shallow and deep intervals to fully explore the field's remaining potential. Consequently, the project was redesigned as a "hybrid" 3D survey using different offset geometries to accurately image from the top of the Vickers all the way to the bottom of the Sentous.

Acquisition design. In practice, this meant the survey area had to be several times larger than the actual field area, with vibrators and receivers positioned both inside and outside

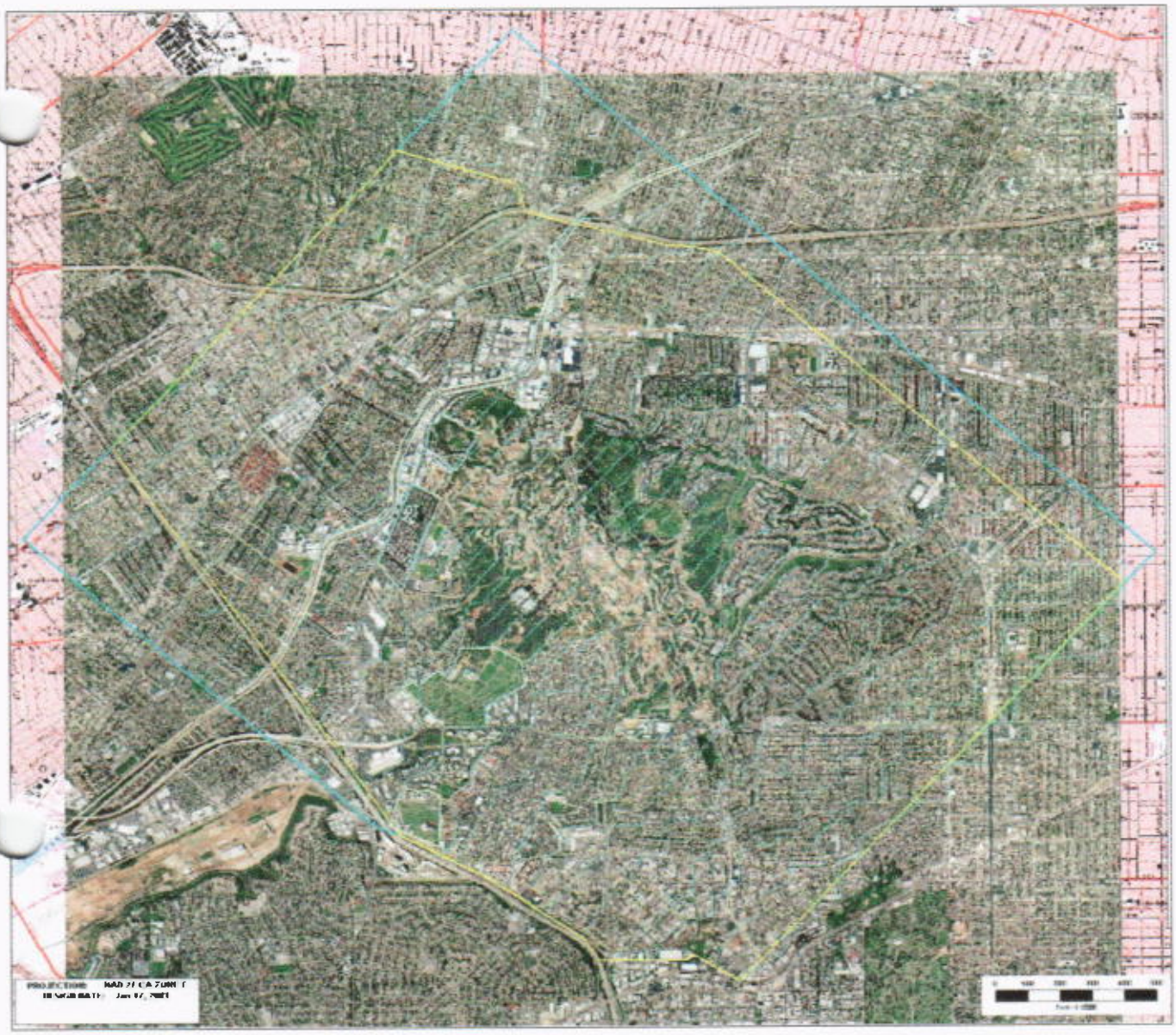


Figure 5. Aerial photo mosaic of 3D survey area.

the field to get the proper shooting geometries and angles, depending on the dips and geometries of the beds (Figure 4). Geophones within the field boundaries were placed at a denser offset line spacing of 600 ft with a 50 × 50-ft bin size to detect faults over the shallow Vickers/Ringe. Outside the field, line spacing was doubled to 1200 ft with a bin size of 100×100 ft to achieve the longer offsets needed to image deep.

The red dots in Figure 4 represent vibration points, and the blue dots represent geophone locations. Figure 5 shows the 3D survey area superimposed over an aerial photo mosaic, with yellow dots denoting vibrator points and blue dots showing geophone/cable lines.

The hybrid swath design included 21.3 square miles of recording layout, with 2269 total vibration (source) points (660 within the field and 1609 in areas surrounding the field), 4600 total receiver positions (1920 in the field and 2680 outside the field), and a 12 000 × 12 000 foot "rolling line" recording patch length with a minimum width of five lines and a maximum width of 15 lines.

There were a few exclusionary zones (two cemeteries, a movie studio, condominiums, etc.) that had to be accommodated in the survey design, and private property was avoided as much as possible. Instead, geophone and vibrator locations were restricted mostly to streets and roads, where the city or county owns the easement rights to the first 10 ft of roadway from the curb, greatly simplifying access and permitting.

In addition to securing permits from three municipal and one county government, other agencies or organizations involved in permitting included the California Air Resources Board (CARB), the California Department of Transportation, the Metro Transit District, West LA College, and public and state parks. PXP also had to secure "private" permits from 20 homeowners and seven business owners whose property had to be used to accommodate cable crossings or geophone positions. Buggy-type vibrators supplied the seismic energy source in the field, but on the truck-mounted vibrators used on city streets, CARB regulations required all source generators to be certified for air quality independent of the trucks' drive-train. Because no CARB-certified, street-legal vibrator trucks could be located, the source generators on all five vibrator trucks had to be modified before CARB permits could be secured.

Public exhibition. In Culver City, PXP held a public exhibition of the 3D technology before the city council on the

The Inglewood Field 3D survey used a hybrid recording layout. The truck-mounted vibrators at left were used on city streets with 1200-ft line spacing to provide longer offsets to image the deep zones, while the buggy-type vibrators at right were used within the field area to image the shallow interval with 600-ft offset line spacing.

A public demonstration was held in Culver City for city council members and other interested parties. Surveying operations were conducted on the street on which the city's mayor lives, and included monitoring vibration and noise levels inside the mayor's house.

et where the city's mayor lives. Geophones and cables re laid along the street, and surface tests were conducted with a train of four vibrator trucks. The city ran pigs in the 100-year-old sewer lines beneath the street both before and after the tests to make sure the vibration would not damage them, and surface waves were monitored at different locations—including inside the mayor's house—to measure vibration and noise levels. The mayor called the demonstration a success, stating, "My dog didn't bark, the chandelier didn't sway and my antique china display was unscathed!" Within a few days of the demonstration, Culver City issued a permit.

Once all necessary permits were obtained, the 55-man survey crew was mobilized to begin acquiring data. Inspection video was recorded of buildings, streets, sidewalks, walls, fences, etc., ahead of the vibrator trucks in the event claims were later filed alleging personal or public property damage from the vibrations. PXP also hired Matheson Mining Co. to monitor peak particle velocities on both sides of the vibrator trucks at all vibration points to make certain vibration levels remained within federal government standards to avoid structural damage.

In all, the survey used 3327 geophone sets (placed either inside sandbags on sidewalks/gutters, or occasionally in lawns within the public easement), 5000 sand bags, 551 data transfer boxes, 31 line collection boxes, 914 batteries, and 769 line cables. Among the operational challenges, one of our biggest issues was preventing street sweepers from grabbing cables in gutters and breaking them. The combination of hot temperatures and heavy traffic also proved too much for standard les, and heavy-duty cables had to be used at major intertions and other high traffic areas. For additional protection, cables were often buried within the road surface when possible.

Some of the work was performed in high crime neighborhoods, and theft of equipment did occur, but it was considerably less than anticipated. The biggest single loss was batteries, all of which were stolen by one individual in a single day. Damage claims (primarily interior and exterior building cracks) were also significantly less than originally estimated.

The vibrator trucks were permitted to vibrate on the streets only between the hours of 9 a.m. and 3 p.m. Monday through Saturday. Acquisition took 60.5 days total: four layout days, 46 vibrator days (the trucks vibrated 46 days on streets, while the buggies vibrated 19 days in the field), 3.5 pick-up days, four nonwork days (Sundays), and three rain-out days.

In terms of total acquisition costs, the largest expenses were attributed to data collection (72.5 percent); additional services such as traffic control, quality control, and particle velocity monitoring (10.2 percent); permit/agent fees and truck retrofits (4.4 percent); and surveying (4.3 percent). Damage and equipment theft each accounted for less than 1 percent of the total acquisition costs.

Deep drilling success. By January 2004, PXP was ready to begin drilling based on the 3D data. The first seven prospects were designed as "concept wells" to test deep fault blocks in the Sentous. The first of those wells was completed in February 2004 with 10-day flow test rates averaging 300 barrels of 43-degree API crude oil and 3000 Mcf of gas a day, easily exceeding the company's preliminary expectations. To date, 30 deep wells have been drilled in the Inglewood Field, and 25 are now on production producing a combined 2500-3000 barrels of oil a day.

There has been a learning curve associated with completing the wells. The first three wells used slotted liner completions, but unfortunately, the liners collapsed, and the completion method had to be revised to running casing/cement and hydraulic fracturing the Sentous. By late summer 2004, production began to ramp quickly as the wells using the new completion strategy came on stream.

By the end of this year, PXP expects to have drilled 36 deep wells in the Inglewood Field, with a number of additional locations already identified for future drilling on the current 10-acre spacing. Because the field has multiple, stacked zones, there is also future uphole recompletion potential in the deep wells targeting the Bradna, Moynier and Rubel zones, as well as the shallow Vickers/Rindge. In fact, the company has already reprocessed the entire data set to enhance faulting detail in the shallow horizon, although drilling will very much remain focused on the deep zones for the foreseeable future.

In the final analysis, challenges certainly were encountered while planning and conducting the Inglewood Field 3D survey, including problems related to topographic variability, fold design for steep dip, layout constraints, theft and traffic, and damage to structures. However, with proper planning and diligence—especially in permitting—the survey operations successfully acquired 21.3 square miles of 3D seismic across the boundaries of four municipalities in a highly urbanized setting, delivering a final data set as designed.

The bottom line is that the real result of the 3D survey is the ongoing deep drilling program. Without the new seismic data, Plains Exploration & Production would not have drilled the deep wells and would today be producing 2500-3000 fewer barrels of oil a day from the Inglewood Field. TLE