Sacramento Area Gas Field Selection Criteria

Introduction

The criteria utilized in the selection of the Florin Gas Field for storage are as follow:

- Geological factors
  - Size
  - Depth
  - Formation issues
  - Permeability/Porosity
  - Btu rating
  - Type of drive
- Well construction & abandonments
- Location
- Environmental Factors
- Economic Factors

Each of these criteria is discussed in general terms below. Their application to the seven alternative fields considered by Sacramento Natural Gas Storage, LLC is then presented in a field-by-field review.

Geological Factors

1. Size: There is no industry standard or guideline that specifies a minimum or maximum volumetric size for development as a natural gas storage facility. Basically, the minimum size must be sufficient to generate storage service revenues that support the operating expenses and debt service, and provide an acceptable rate of return on the capital that is invested to develop the project.

   The maximum size that is feasible is driven by a number of factors as well. In general, larger capacity projects typically require more surface equipment and infrastructure. There also must be sufficient "take-away" pipeline capacity in the area such that all of the stored working gas can be transported to the end-users when they need it. More specifically, the size issue requires evaluation of the answers to a variety of questions:

   - How much cushion/pad gas is required to pressure up the reservoir for operations? Cushion gas is expensive, currently about $7,000,000 per Bcf. A depletion drive reservoir requires cushion gas at about a ratio of 1 Bcf of cushion for each 2 Bcf of working gas. Thus a 3 Bcf reservoir would require 1 Bcf of cushion gas and only be able to store about 2 Bcf of working gas. It also means that the project would expend $7,000,000 of capital as an upfront cost. At the other end of the continuum, a 20 Bcf project would require about 7 Bcf of cushion which means an upfront expenditure of about $49,000,000.

On the other hand, a water-drive reservoir requires much less or no cushion gas as the water drive maintains the reservoir pressure. Some reservoirs are depletion drive with a small amount of water drive. While this type of reservoir requires less cushion gas, the disadvantage of the water drive reservoir is that some of the water is produced with the gas on withdrawal. That water must be separated out of the gas and disposed of either by reinjection into the reservoir or by its removal to a proper disposal site. The equipment to accomplish either one of these tasks increases both the initial capital costs and the operating costs of the plant.

- Although not as critical as the volumetric size of the field, the "footprint" or area of the field must be considered. As the area of the field increases, so does the number of wells and the miles of pipe needed to operate the field. As these numbers increase, so do the capital costs and operating costs. Therefore, the number of wells required to operate the field and that size of surface infrastructure required to support the operation are factors in the selection of a geologic formation for development.

2. Depth:

    - The depth of the geologic formation will impact both capital costs and costs of operations. Deeper formations require more compression to inject the gas into storage. Compression is costly in terms of capital, maintenance, and operating expenses (especially energy costs). Typically, the project should be below the water table used for sources of our drinking water, but less than about 5,000 feet below the surface of the earth.

    - Drilling and operational costs. The deeper the formation is under the surface, the deeper the wells. The cost of drilling and maintaining wells increases as the depth of the wells increases.

3. Producing zone characteristics:

    - The producing zone characteristics are a prime consideration in choosing a gas reservoir for gas storage operations. During the injection/withdrawal periods it is imperative that the operator be in a position to exercise the proper control over the movement of gas and water in the reservoir. The ideal gas reservoir for gas storage is either domal or anticlinal in shape and demonstrates good continuity in porosity and permeability in the producing zone throughout the structure. Under those conditions, the wells are all in pressure communication with each other, and there are no isolated sand lenses or "sand pockets" containing gas that are disconnected from the main body of the reservoir. As a result, the operator is able to maintain effective control over fluid movement in the reservoir during the gas injection and withdrawal periods.

A "dry gas" field is significantly preferred to an oil field utilized for storage. An oil reservoir delivers liquids and other impurities along with the gas. These impurities must be separated out after the gas is withdrawn from storage but before its return to the pipeline systems. Gas fields in the Sacramento Basin are typically dry gas fields.

4. Permeability/Porosity:

   - These are measures of the ability of the geological formation to accept and move gas in, through, and out of the formation. Industry standards are typically considered to be that porosity should be at least 28% and permeability should be at least 30 milidarcies.

5. Btu rating/Pressure:

   - PG&E and SMUD each generally require gas to meet a minimum Btu rating of 1000 Btu's per Mcf of gas before it can be accepted into their respective pipeline systems. This is also a requirement for gas moving into California on the interstate systems. Any locally-produced or "native" gas must also be of this Btu rating before it can be allowed to enter into the pipeline systems. Low-Btu-rated gas may be enriched with propane or butane to bring it into compliance; however, there are limitations as to how much may be used as these high-Btu-content "natural gas liquids" cause other problems when used in excess of very small quantities. Because any gas remaining in a "depleted reservoir" will mix with the stored gas to some extent, the closer the Btu content of the remaining gas is to the pipeline quality requirements, the better the depleted reservoir is for conversion into a storage facility. A gas field that produces low-Btu-content gas, and is only partially-depleted, i.e., still producing natural gas, is therefore not a favorable candidate for use as a storage facility.

   - A large differential between the pressures in the gas field at the time of first production versus the time the field is "abandoned" for production implies a depletion drive formation, which will require additional cushion gas and compression for operation. An abandonment pressure above pressures in the pipeline used to carry the gas from storage to the customers allows for free-flow of gas into the pipeline system, and is therefore by far the condition of choice.

6. Formation & Type of Pressure Drive:

   - It is preferred to utilize a field that is free of faults. Faults may be pathways for leakage, and typically cause some environmental and/or safety concerns.

- The structure should be shaped like an upside down saucer to hold the stored gas and keep it from migrating to areas outside the storage facility.

- A thick and impermeable "cap rock" is required to prohibit any upward migration from the field to fresh water tables or to the surface.

- A "dry gas" field is significantly preferred to an oil field utilized for storage. An oil reservoir delivers liquids and other impurities along with the gas when the gas is withdrawn for return to the pipeline systems. These impurities must be separated out and properly disposed of before the gas can be returned to the pipelines for transport to the customers. Gas fields in the Sacramento Basin are typically dry gas fields.

- The drive mechanism of gas reservoirs in the Sacramento Valley is either straight pressure depletion drive with no aquifer support or depletion drive where water influx into the reservoir (partial water drive) provides partial pressure support during the production process. Partial water drive reservoirs exhibit less pressure depletion and require less cushion gas. Compression costs are also reduced

7. Well Construction & Abandonment:

    - It is desirable that the production wells used to deplete the field(s) were drilled in accordance with the strict specifications of the DOGGR (*Division of Oil Gas & Geothermal Resources*[1]). These regulations include the requirement for DOGGR oversight of the drilling and operations of the wells. Wells drilled within the last 20 – 30 years have been very closely regulated & supervised by the DOGGR.

    - Likewise, abandonment of wells should have been made in accordance with current specifications and with close oversight by Division personnel. (Note: Wells drilled and abandoned before about the 1930s were not carefully located and abandonments were frequently haphazard – thus, these are fields of significant concern and should not be considered as top prospects for development as new storage facilities. Such fields are subject to higher risks of leakage of gas from storage.

8. Location:

    - A gas storage project requires the ability to receive and to deliver gas into the pipeline distribution system at acceptably high rates. This requires access to pipelines with large capacity availability.

[1] The DOGGR was established by the Legislature in the early 1900s to protect the fresh water table and the environment.

- A storage project should be located as close as possible to the pipeline distribution systems that serve end-of-pipeline storage customers. As an example, with respect to the SNGS project objective, the storage facility needs to be in juxtaposition to the main SMUD and PG&E pipelines in the Sacramento area. This is because the reliability of the storage as an alternative source of fuel supply to an end-of-pipeline customer during a system disruption tends to decrease with pipeline distance from the storage facility.

9. Environmental Factors:

   - The field characteristics should be such that the storage project can be developed without causing environmental impacts that cannot be mitigated to less-than-significant levels.

   - The field characteristics should be such that the storage project can be developed without posing a significant risk to public health or safety.

10. Economic Issue:

    - The project must demonstrate a reasonable return on investment for the investors.

Alternative Project Location Screening

SNGS considered seven gas fields in Sacramento County for its proposed storage project. A matrix showing a summary comparison of the characteristics of the seven fields considered is provided on the next page. Following that matrix is a map of the Sacramento area showing the SMUD Pipeline and the location of the fields considered as possible alternatives. The seven fields are then discussed, beginning with the four smallest fields. Those fields were eliminated from further consideration primarily on the basis of inadequate size, as they could not satisfy the basic project objective, although there were other factors impinging on their consideration that would eliminate them as possible storage sites. A few comments are provided about each of these fields to elaborate on the chart. DOGGR data sheets are appended for all of the fields except Snodgrass Slough for which DOGGR does not have any data sheets.

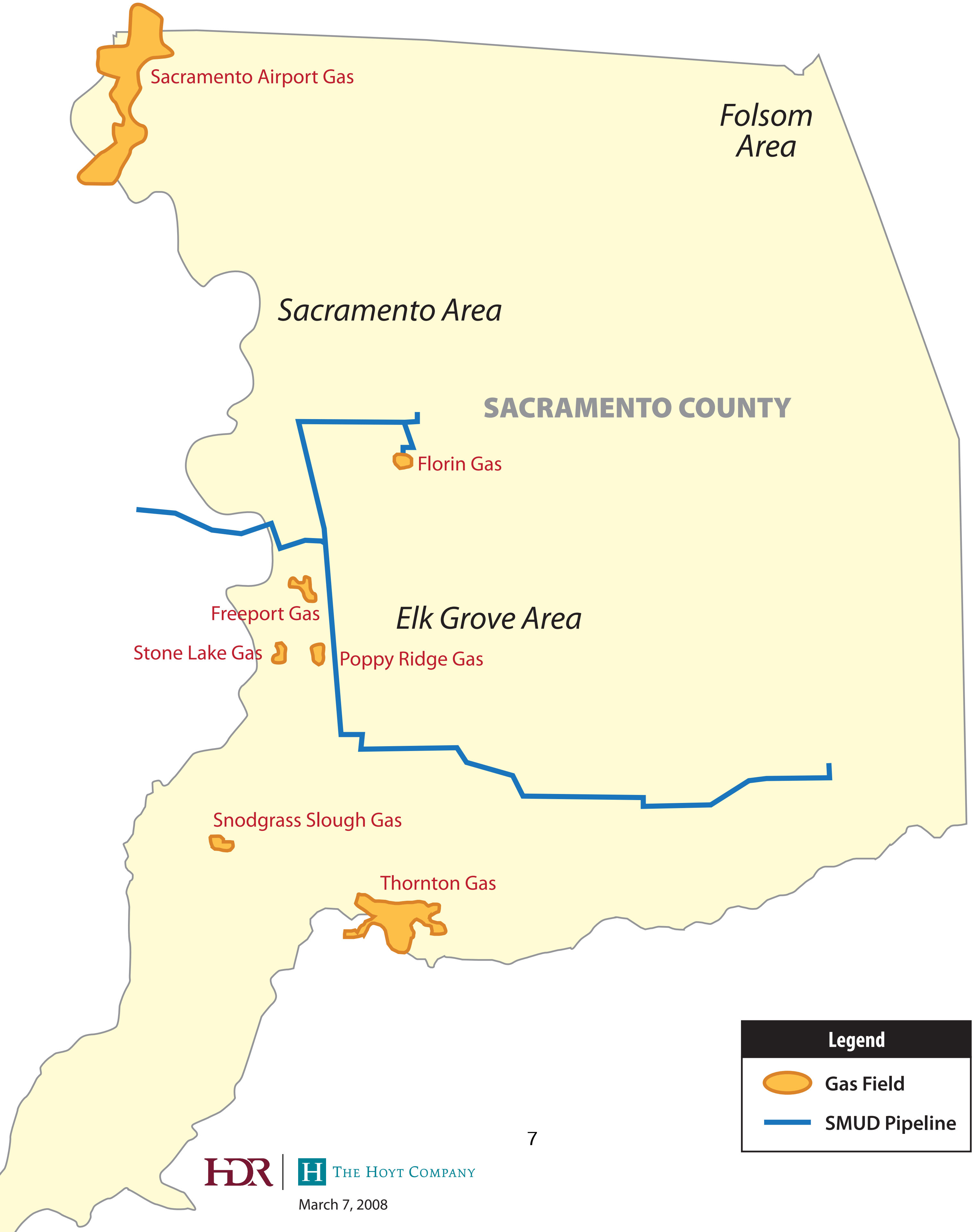
Next, the three larger fields are arrayed. The comment presentation on these fields is more extensive as each was given greater consideration as a possible viable project. The first two were eliminated and the Florin project was selected. The rationale is included in the discussion of each alternative.

Sacramento Area Gas Fields

	Snodgrass Slough	Freeport	Stone Lake	Poppy Ridge	Sacramento Airport	Thornton	Florin
Size							
Production	4.8	2.8	1.2	0.2	15.3	54	8.2
Cushion Required	1.6	9	0.4	N/A	5	18	0
Depth (subsea)	8505	5800	5400	7200	2100-2800	3200	3800
Formation							
Faults	*nk	1	3	None	4	None	None
Shape	*nk	Stringer (2 zones)	Stringer	Stringer	Stringer	Lens	Lens
Caprock	*nk					Shale	Thick shale
Drive	*nk	Depletion	Depletion	Depletion	Depletion	Depletion	Water
Permeability	*nk	60	Unknown	Unknown	50	50	27
BTU	*nk	910	900	827	620-820	960	904
Pressure (PSI)	*nk						
Beginning	*nk	3000	2750	3220	1000-1250	1500	1518
End	*nk	2510	975	2300	110-800	650	1115
Wells							
Total	5	2	4	4	25	7	6
Abandoned	5	2	4	4	16	7	6

*nk = not known

SACRAMENTO
Natural Gas Storage



HDR | THE HOYT COMPANY

March 7, 2008

Freeport Gas Field

- The field was produced from 2 minor geologic formations known as “stringers,” which are thin, horizontal sandstone formations. The nature of the means of closure or trapping of the gas of the stringers is unknown.
- The stringers are slightly over a mile subsurface (-5800+ feet).
- The size of the 2 separate formations would permit about 1+ Bcf of working gas storage capacity.

With an estimated capital cost of $60+ million and projected annual revenue of $2.2 million, this field is not economically viable for development as a gas storage project.

Stone Lake Gas Field

- This field is set in the middle of the Stone Lake Refuge, an extremely environmentally-sensitive area..
- The field produced approximately 1.2 Bcf of natural gas and rapidly dropped in pressure. This suggests that, if converted to storage, the field would likely be a depletion drive field and could perhaps accommodate ¾ Bcf of working gas storage.

In addition to being located in an environmentally-sensitive area that would make development doubtful, at best, the project would carry an estimated capital cost of $65+ million and a projected annual revenue of $1.7 million; thus this field is not economically viable for development as a gas storage project.

Poppy Ridge Gas Field

- This field only produced 0.2 Bcf of natural gas
- The field rapidly dropped in pressure during production, indicating a depletion drive formation.
- A working gas storage capacity of less than 0.12 Bcf would be anticipated.

With an estimated capital cost of $45+ million and projected annual revenue of less than $300 thousand, this field is not economically viable for development as a gas storage project.

Snodgrass Slough

- The Field produced 4.8 Bcf of gas and is reportedly a depletion drive.
- Storage capacity is probably about 3.6 Bcf
- The field is deep – The first well was over 8,000 ft sub sea.
- The location is in an environmentally sensitive area and not close to any pipelines.

The size of the field, location, environmental issues and cost make it unacceptable as a Storage facility.

Sacramento Airport Gas Field

SNGS tasked two independent consultants to provide their evaluations of the prospect of utilizing this field as a gas storage project. John Matthews, a previous State Supervisor of DOGGR, and Robert Mannon, PhD, are both Reservoir Engineers with many years of experience in reservoir evaluation. Their respective evaluations and resumes are appended to this report with salient features highlighted for the reader's quick attention; both found the reservoir to be inappropriate for storage. Mr. Matthews focused on the Btu quality of gas in place and Dr. Mannon gave his principle attention to the geologic characteristics of the reservoir.

The following is a summary evaluation of the field taking into consideration the issues raised by Matthews and Manning.

This Field covers an area of about 11 square miles centered under the Sacramento airport (see following figure). Issues that militate against utilization of this field for gas storage include:

- The quality and Btu content of the gas in this field is low, between 600 and 800 Btu per Mcf. Without further investigation of the volume of gas remaining, it cannot be determined whether the mixture of remaining gas and injected gas would have a sufficient Btu level to be to meet the pipeline standards for either PG&E or SMUD after enrichment.

- It is a complex field of "stringers" holding small quantities of gas separated by 4 faults that are not contiguous in structure. Thus, utilization of the field would involve the development and coordination of up to 5 small gas storage reservoirs. This would require significant capital expense and is a major, and perhaps prohibitive, operational problem.

- Separation of the stringers is questionable but must be determined prior to the development of the field into a storage project. This would involve first locating and reentering the 16 abandoned wells. Then, gas would have to be injected into wells within a given sector with studies done in the adjacent sectors to determine if gas is moving between stringers in one fault block and another. This would require utilization of all 25 wells in the field to accomplish this study. (At least one of these wells is located under the eastern runway and several are adjacent to runways [see well location map on next page]).

- Each of the 5 fault blocks would require cushion gas to bring them up to and maintain them at operational pressure. It is estimated that this would require perhaps 4+ Bcf of gas at a present cost of about $28,000,000. A minimum 2 additional Bcf of gas (for a total of 6 Bcf of "pad gas") is estimated to be required to complete the field evaluation of the extent of communication between the fault blocks.

- This field would likely require the use of 4 of the 5 fault blocks or stringers to create 7.5 Bcf of working gas storage capacity. It is also likely that 4 drill sites would be required, in that the stringers are scattered over more than 10 square miles. Each would likely require independent water separation facilities.

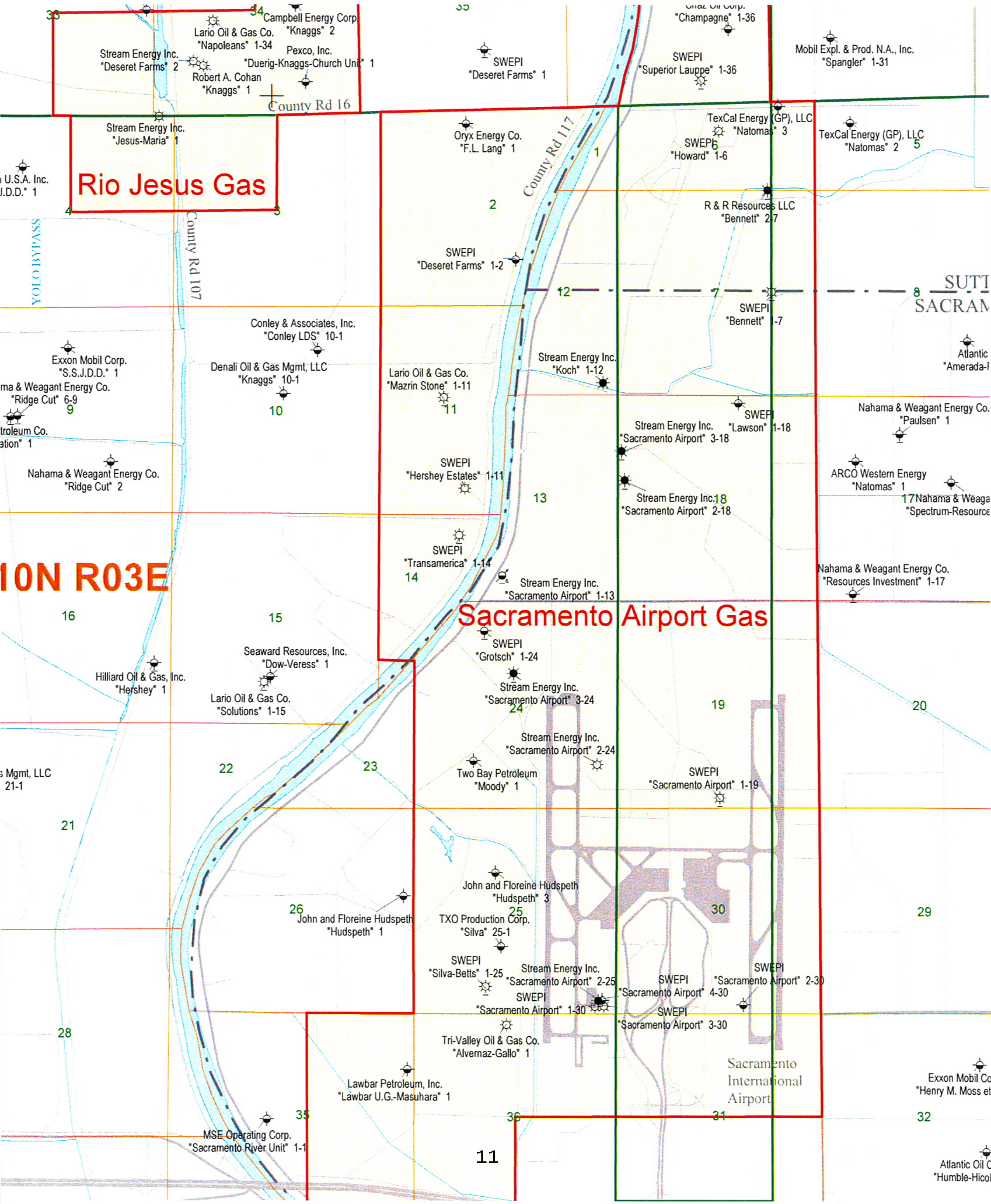
- In that the field is along and straddles the Sacramento River, and is under rice fields and the Airport, there would be major environmental issues to contend with in the location of drill sites and the construction of pipelines to the compressor station, probably south of the airport. It is also likely that there would be a problem locating drilling and compression facilities close to active airport runways.

- After the evaluation of the "field", which is 5 fault blocks or stringers, the nine un-abandoned but mostly inactive wells would require abandonment. The 16 abandoned wells should be located, re-opened for the field evaluation, and then re-abandoned, and monitored.

- Use of the Airport Gas Field would require 13+ miles of 16" pipeline through Yolo County to tie into PG&E and SMUD pipelines, in the Yolo Causeway.

- A preliminary budget has been prepared for this project. The total cost would be approximately $161,000,000., the budget being shown on the next page. As indicated in the letter from Wells Fargo Energy Capital, LLC, (attached), such a project is not economically viable, i.e., it cannot be financed.

In summary, the geology of the field and associated reservoir engineering indicates it is extremely unlikely that this series of fault blocks could be successfully completed as a natural gas storage facility. In addition, the Btu quality of gas remaining in the reservoir is too low to mix with stored gas and produce pipeline quality gas that could be removed from storage and transported to its place of use. Given all of the factors, he project is economically not feasible.



Rio Jesus Gas
Sacramento Airport Gas
10N R03E
Campbell Energy Corp.
"Knaggs" 2
Lario Oil & Gas Co.
"Napoleans" 1-34
Pexco, Inc.
"Duerig-Knaggs-Church Unit" 1
Stream Energy Inc.
"Deseret Farms" 2
Robert A. Cohan
"Knaggs" 1
County Rd 16
SWEPI
"Deseret Farms" 1
"Champagne" 1-36
SWEPI
"Superior Lauppe" 1-36
Mobil Expl. & Prod. N.A., Inc.
"Spangler" 1-31
Stream Energy Inc.
"Jesus-Maria" 1
Oryx Energy Co.
"F.L. Lang" 1
County Rd 117
TexCal Energy (GP), LLC
"Natomas" 3
SWEPI
"Howard" 1-6
TexCal Energy (GP), LLC
"Natomas" 2
R & R Resources LLC
"Bennett" 2-7
YOLO BYPASS
County Rd 107
SWEPI
"Deseret Farms" 1-2
SWEPI
"Bennett" 1-7
Conley & Associates, Inc.
"Conley LDS" 10-1
Exxon Mobil Corp.
"S.S.J.D.D." 1
Denali Oil & Gas Mgmt, LLC
"Knaggs" 10-1
Lario Oil & Gas Co.
"Mazrin Stone" 1-11
Stream Energy Inc.
"Koch" 1-12
"Ridge Cut" 6-9
Nahama & Weagant Energy Co.
"Paulsen" 1
SWEPI
"Lawson" 1-18
Stream Energy Inc.
"Sacramento Airport" 3-18
Nahama & Weagant Energy Co.
"Ridge Cut" 2
SWEPI
"Hershey Estates" 1-11
ARCO Western Energy
"Natomas" 1
Stream Energy Inc.
"Sacramento Airport" 2-18
SWEPI
"Transamerica" 1-14
Stream Energy Inc.
"Sacramento Airport" 1-13
Nahama & Weagant Energy Co.
"Resources Investment" 1-17
SWEPI
"Grotsch" 1-24
Seaward Resources, Inc.
"Dow-Veress" 1
Hilliard Oil & Gas, Inc.
"Hershey" 1
Stream Energy Inc.
"Sacramento Airport" 3-24
Lario Oil & Gas Co.
"Solutions" 1-15
Stream Energy Inc.
"Sacramento Airport" 2-24
Two Bay Petroleum
"Moody" 1
SWEPI
"Sacramento Airport" 1-19
John and Floreine Hudspeth
"Hudspeth" 3
John and Floreine Hudspeth
"Hudspeth" 1
TXO Production Corp.
"Silva" 25-1
SWEPI
"Silva-Betts" 1-25
Stream Energy Inc.
"Sacramento Airport" 2-25
SWEPI
"Sacramento Airport" 4-30
SWEPI
"Sacramento Airport" 2-30
SWEPI
"Sacramento Airport" 1-30
SWEPI
"Sacramento Airport" 3-30
Tri-Valley Oil & Gas Co.
"Alvernaz-Gallo" 1
Lawbar Petroleum, Inc.
"Lawbar U.G.-Masuhara" 1
Sacramento
International
Airport
MSE Operating Corp.
"Sacramento River Unit" 1-1

The Airport Field Facility	Four Fault Blocks				All Numbers in $1,000s
Wells					
Injection/Withdrawal	18	@	$1,000	=	$18,000
Monitoring wells	4	@	$600	=	$2,400
Water disposal wells	4	@	$600	=	$2,400
					$22,800
Pipelines					
Collection Pipelines	6 miles	@	$500	=	$3,000
1 Plant/SMUD Interconnect	13 miles	@	$1,500	=	$19,500
1 SMUD/PG&E Interconnect					$1,300
					$23,800
Compressor Station					
Same as Florin + escalation					$32,000
Wellhead Site					$1,300
					$33,300
Field Evaluation					
15 Redrill					$9,000
3 P&As					$300
Temporary Compressor					$200
6 Bcf pad					$42,000
Pipeline					$3,000
					$54,500
Reservoir Engineering					$300
Phase I & II					$6,700
					$7,000
Leasing of Storage Rights					
4800 acres x $2,000					$9,600,000
Wetlands Mitigation					
WH	12 acres				
CS	5 acres				
MS	3 acres				
	20 acres	@	$500	=	$10,000
				TOTAL	**$161,000**

Thornton Gas Field

The Thornton Gas Field is located on the Mokulumne River bridging Sacramento and San Joaquin Counties. It is in a large conservation area, much of which is only accessible by wooden walkways. The field is large and produced gas from the 1940s to the 1980s.

- The field has 2 lenses that are in communication. The tops of these lenses are at 3300 feet subsurface, and located approximately one mile apart.

- The field produced 54 Bcf of good quality gas. It would require about 18 Bcf of cushion gas to develop the field into a viable storage project. This would cost some over $126,000,000 for cushion gas.

- Some of the good features of the field are that it has a good inverted lens shaped structure; it is at a reasonable depth; it appears to be a combination water/depletion drive reservoir; and there are no faults in the field.

- The location is such that there are no pipelines that can supply or receive significant amounts of gas at this location. It is also in the Mokulumne Natural Reserve, creating considerable risk that construction of the facilities and pipelines would be prohibited for environmental reasons.

With an estimated capital cost of $186 million and projected annual gross revenue of less than $15 million; this field is not economically viable for development as a gas storage project.

Florin Gas Field

- 8.2 Bcf of gas was produced in this field. The reservoir is estimated to have originally contained about 13 Bcf in total. This means that the requisite cushion gas for operation is already is in place. The field is thus of the "right" size for storage.

- Production of gas ceased as water produced was being trucked to a disposal site and the cost of water separation and trucking was exceeding the value of the gas produced. The gas was being utilized by Proctor & Gamble as they could use lower than pipeline standard gas in processing at their plant about a mile north of the field.

- The structure of the field is a single lens (inverted saucer) under a thick impermeable cap rock (shale), from about 150 to 300 feet thick.

- Pressure is maintained by a strong water drive so that when production was begun the pressure was 1518 Psi and when ended 1115 Psi. The pressure is estimated to be 1200 to 1300 Psi at the present time, but may have reverted to its natural pressure. It would return to its original “natural” pressure under storage operations.

- The reservoir depth is reasonable.

- There are no faults in the field to contend with.

- A small amount of enrichment may be required in the first cycle. This enrichment would be accomplished at the compressor station by injecting a small spray of propane into the gas to bring it to the correct Btu rating.

- There are no potential environmental impacts that cannot be mitigated to less-than-significant levels at the field’s location.

- The location of the field is such that the project requires only about a mile of pipeline to interconnect into a pipeline that has the capacity to transport gas both into and out of the project (the SMUD pipeline).

- Both the well site and the compressor station are located within an enterprise zone designated for industrial projects and emphasizing energy efficiency in development. This project meets those goals.

- With an estimated project construction cost of approximately $40 million and projected revenues of $15 million, this is an economically feasible project.

The Florin Gas Field has therefore been proposed by SNGS for storage development.

ATTACHMENT 1

DOGGR RECORDS FOR GAS FIELD ALTERNATIVES – DISCOVERY WELL AND DEEPEST WELL

COUNTY: **SACRAMENTO**

FREEPORT GAS FIELD

DISCOVERY WELL AND DEEPEST WELL

	Present operator and well designation	Original operator and well designation	Sec. T. & R.	B.&M.	Total depth (feet)	Pool (zone)	Strata & age at total depth
Discovery well	Chevron U.S.A. Inc. "Sims Community" 1	Standard Oil Company of California "Sims Community" 1	19 7N 5E	MD	7,000	Sims	
Deepest well	Chevron U.S.A. Inc. "Sims Community" 2	Standard Oil Co. of Calif. "Sims Community" 2	18 7N 5E	MD	9,419		basement pre-Lt. Cret.

POOL DATA

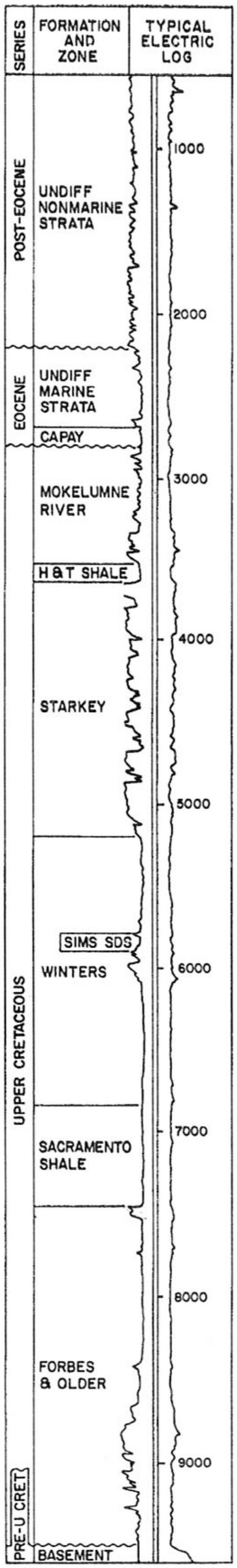
ITEM	SIMS	UNNAMED				FIELD OR AREA DATA
Discovery date	May 1952	May 1962				
Initial production rates						
Oil (bbl/day)						
Gas (Mcf/day)	9,784	17,300				
Flow pressure (psi)	1,582	1,000				
Bean size (in.)	1/2	1				
Initial reservoir pressure (psi)	2,710	3,600				
Reservoir temperature (°F)	124	126				
Initial oil content (STB/ac.-ft.)						
Initial gas content (MSCF/ac.-ft.)	1,500-1,800	1,300				
Formation	Winters	Forbes				
Geologic age	Late Cretaceous	Late Cretaceous				
Average depth (ft.)	5,780	8,040				
Average net thickness (ft.)	20	50				
Maximum productive area (acres)						
RESERVOIR ROCK PROPERTIES						
Porosity (%)	28-32 †	22*				
So_i (%)						
Sw_i (%)	30-35 †	40*				
Sg_i (%)	65-70 †	60*				
Permeability to air (md)						
RESERVOIR FLUID PROPERTIES						
Oil:						
Oil gravity (°API)						
Sulfur content (% by wt.)						
Initial solution GOR (SCF/STB)						
Initial oil FVF (RB/STB)						
Bubble point press. (psia)						
Viscosity (cp) @ °F						
Gas:						
Specific gravity (air = 1.0)	.606††	.670††				
Heating value (Btu/cu. ft.)	910	735				
Water:						
Salinity, NaCl (ppm)						
T.D.S. (ppm)						
R_w (ohm/m) (77°F)						
ENHANCED RECOVERY PROJECTS						
Enhanced recovery projects						
Date started						
Date discontinued						
Peak oil production (bbl)						
Year						
Peak gas production, net (Mcf)						614,927
Year						1953

Base of fresh water (ft.): 650-1,450

Remarks: Commercial gas deliveries began in January 1953 and ceased in 1976. The field was abandoned in May 1977. The field was reactivated July 1981. Two wells were completed and cumulative gas production was 2,647,000 Mcf.

Selected References:

FREEPORT GAS FIELD



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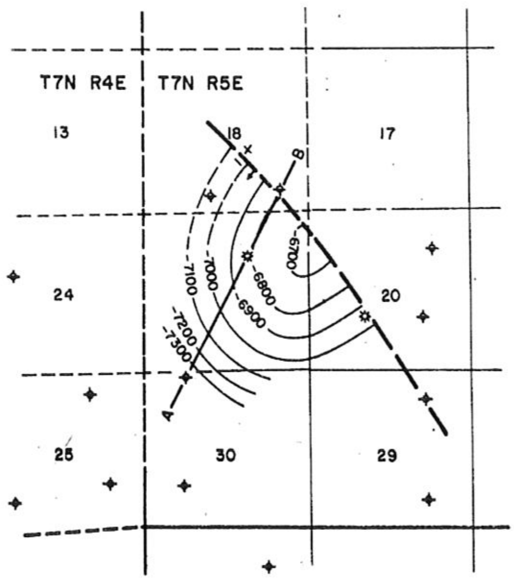
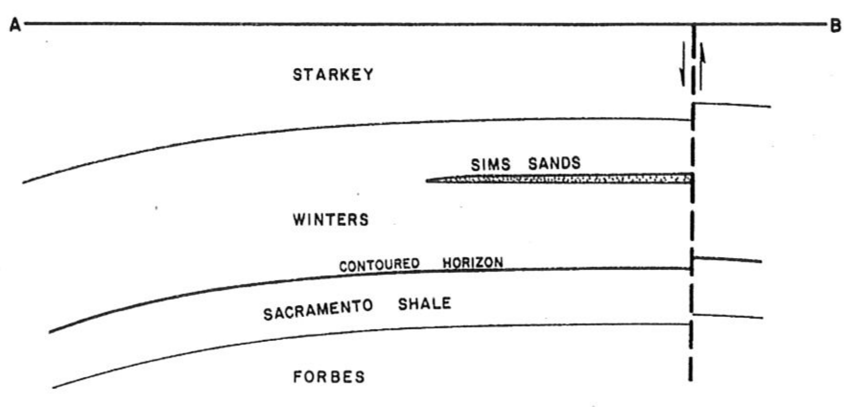


CONTOURS ON TOP OF SACRAMENTO SHALE



COUNTY: SACRAMENTO

STONE LAKE GAS FIELD

DISCOVERY WELL AND DEEPEST WELL

	Present operator and well designation	Original operator and well designation	Sec. T. & R.	B.&M.	Total depth (feet)	Pool (zone)	Strata & age at total depth
Discovery well	Atlantic Oil Co. "Elliott Ranch" 3	Same as present	1 6N 4E	MD	7,430	Winters	
Deepest well	Cities Service Oil Co. "McKeon Const." 1	Cities Service Oil Co. "Costello" 1	6 6N 5E	MD	8,590		Forbes Late Cretaceous

POOL DATA

ITEM	WINTERS					FIELD OR AREA DATA
Discovery date	November 1974					
Initial production rates						
Oil (bbl/day)						
Gas (Mcf/day)	7,700					
Flow pressure (psi)	2,680					
Bean size (in.)	3/8					
Initial reservoir pressure (psi)	3,246					
Reservoir temperature (°F)	128					
Initial oil content (STB/ac.-ft.)						
Initial gas content (MSCF/ac.-ft.)	1,700-2,100					
Formation	Winters					
Geologic age	Late Cretaceous					
Average depth (ft.)	7,072					
Average net thickness (ft.)	20					
Maximum productive area (acres)	90					
RESERVOIR ROCK PROPERTIES						
Porosity (%)	28-32***					
S_{oi} (%)						
S_{wi} (%)	30-35***					
S_{gi} (%)	65-70***					
Permeability to air (md)						
RESERVOIR FLUID PROPERTIES						
Oil:						
Oil gravity (°API)						
Sulfur content (% by wt.)						
Initial solution GOR (SCF/STB)						
Initial oil FVF (RB/STB)						
Bubble point press. (psia)						
Viscosity (cp) @ °F						
Gas:						
Specific gravity (air = 1.0)	.605					
Heating value (Btu/cu. ft.)	900					
Water:						
Salinity, NaCl (ppm)						
T.D.S. (ppm)						
R_w (ohm/m) (77°F)						
ENHANCED RECOVERY PROJECTS						
Enhanced recovery projects						
Date started						
Date discontinued						
Peak oil production (bbl)						
Year						
Peak gas production, net (Mcf)	183,361					
Year	1979					

Base of fresh water (ft.): 800

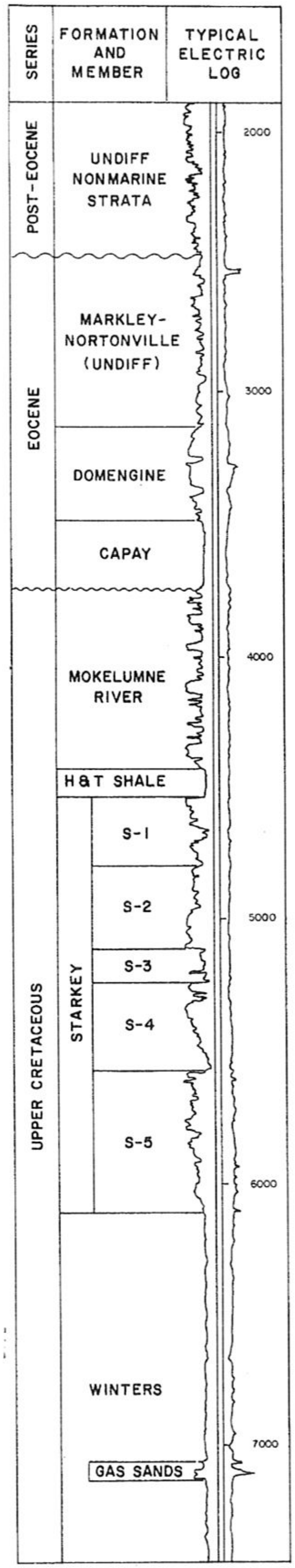
Remarks: Commercial gas deliveries began in May 1978.

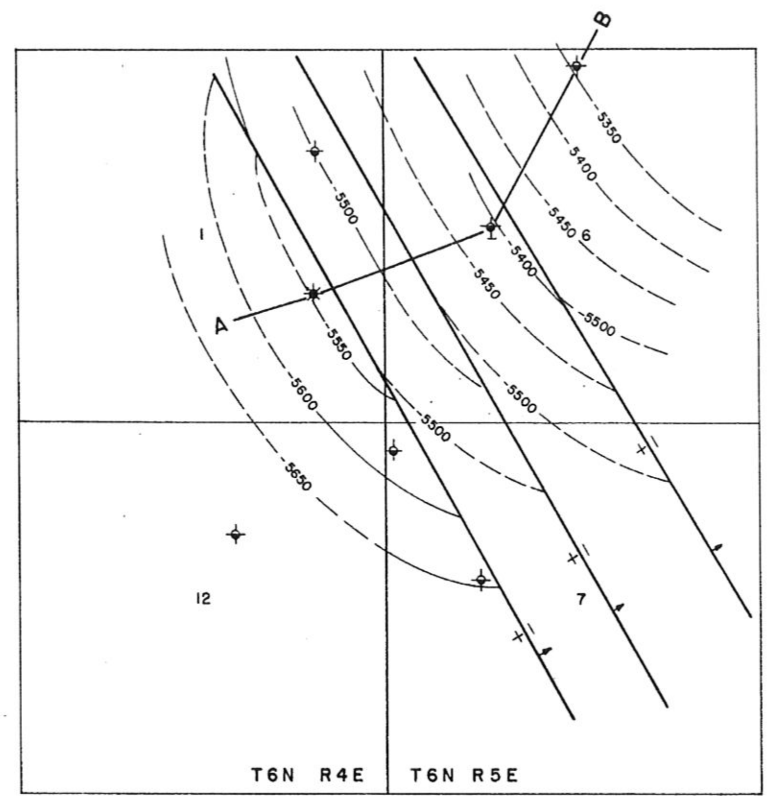
Selected References:

DATE: January 1981 ***Representative values for area, formation, and depth.

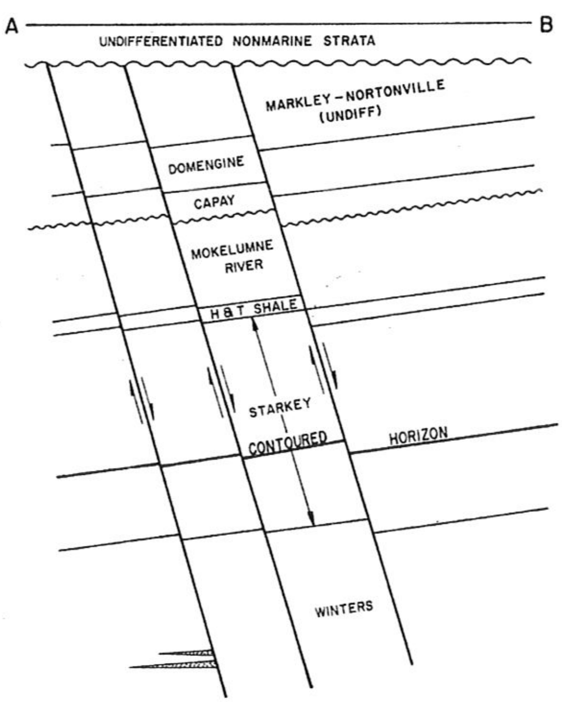
CALIFORNIA DIVISION OF OIL AND GAS

STONE LAKE GAS FIELD





CONTOURS ON TOP OF S-5 SAND



DECEMBER 1979

COUNTY: SACRAMENTO

POPPY RIDGE GAS FIELD

DISCOVERY WELL AND DEEPEST WELL

	Present operator and well designation	Original operator and well designation	Sec. T. & R.	B.&M.	Total depth (feet)	Pool (zone)	Strata & age at total depth
Discovery well	Milon L. Johnston "Atkinson" 1	Same as present	10 6N 5E	MD	7,460	Atkinson	
Deepest well	Milon L. Johnson "Jillson" 1	Same as present	9 6N 5E	MD	8,118		basement pre-Lt. Cret.

POOL DATA

ITEM	ATKINSON					FIELD OR AREA DATA
Discovery date	March 1962					
Initial production rates						
Oil (bbl/day)						
Gas (Mcf/day)	4,500					
Flow pressure (psi)	2,575					
Bean size (in.)	17/64					
Initial reservoir pressure (psi)	3,220					
Reservoir temperature (°F)	138					
Initial oil content (STB/ac.-ft.)						
Initial gas content (MSCF/ac.-ft.)	1,200-1,600					
Formation	Forbes					
Geologic age	Late Cretaceous					
Average depth (ft.)	7,270					
Average net thickness (ft.)	9					
Maximum productive area (acres)	100					
RESERVOIR ROCK PROPERTIES						
Porosity (%)	23-27					
S_{oi} (%)						
S_{wi} (%)	35-40***					
S_{gi} (%)	60-65***					
Permeability to air (md)						
RESERVOIR FLUID PROPERTIES						
Oil:						
Oil gravity (°API)						
Sulfur content (% by wt.)						
Initial solution GOR (SCF/STB)						
Initial oil FVF (RB/STB)						
Bubble point press. (psia)						
Viscosity (cp) @ °F						
Gas:						
Specific gravity (air = 1.0)	.634					
Heating value (Btu/cu. ft.)	826					
Water:						
Salinity, NaCl (ppm)						
T.D.S. (ppm)						
R_w (ohm/m) (77°F)						
ENHANCED RECOVERY PROJECTS						
Enhanced recovery projects						
Date started						
Date discontinued						
Peak oil production (bbl)						
Year						
Peak gas production, net (Mcf)						
Year						

Base of fresh water (ft.): 1,700

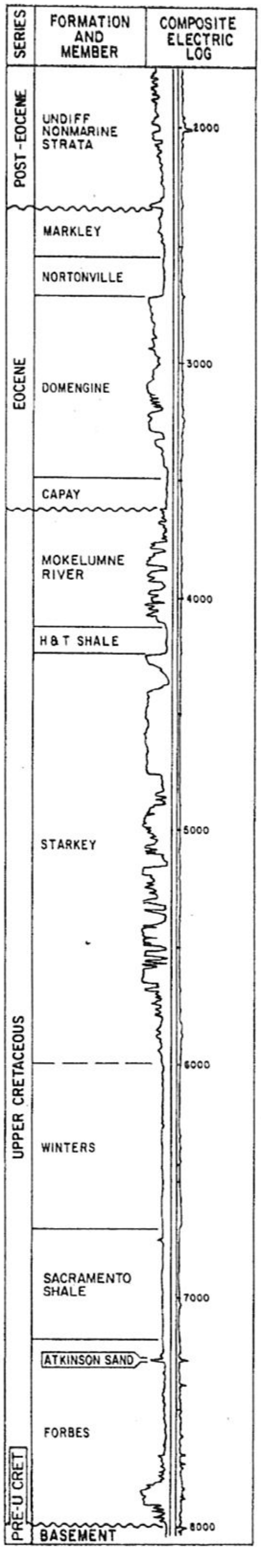
Remarks: Commerical gas deliveries havo not yet begun

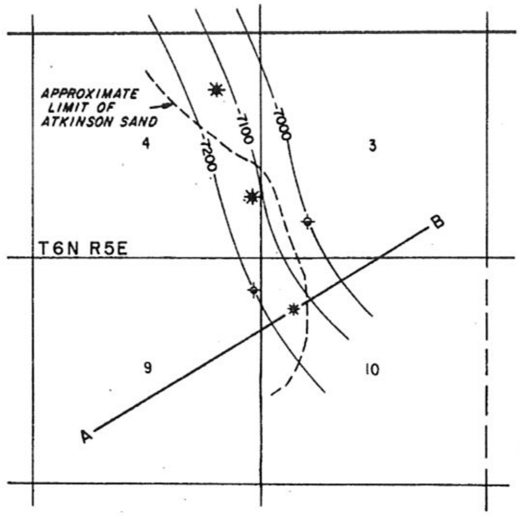
Selected References:

DATE: November 1980 ***Representative values for area, formation, and depth.

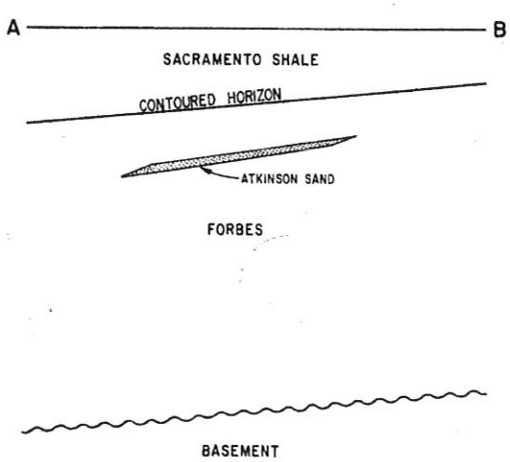
CALIFORNIA DIVISION OF OIL AND GAS

POPPY RIDGE GAS FIELD





CONTOURS ON TOP OF FORBES



FEBRUARY 1980

COUNTY: SACRAMENTO, SUTTER and YOLO

SACRAMENTO AIRPORT GAS FIELD

DISCOVERY WELL AND DEEPEST WELL

	Present operator and well designation	Original operator and well designation	Sec. T. & R.	B.&M.	Total depth (feet)	Pool (zone)	Strata & age at total depth
Discovery well	Shell Oil Co. "Silva-Betts" 1-25	Same as present	25 10N 3E	MD	3,062 a/	Mokelumne River	
Deepest well	Buttes Resources Co. "Natomas" 3	Buttes Gas and Oil Co. "Natomas" 3	6 10N 4E	MD	4,500		Forbes Late Cretaceous

POOL DATA

ITEM	MOKELUMNE RIVER	STARKEY				FIELD OR AREA DATA
Discovery date	November 1973	January 1974				
Initial production rates						
Oil (bbl/day)						
Gas (Mcf/day)	235	170-210				
Flow pressure (psi)	1,000	1,080-1,250				
Bean size (in.)						
Initial reservoir pressure (psi)	1,080	1,200-1,330				
Reservoir temperature (°F)	96	101-104				
Initial oil content (STB/ac.-ft.)						
Initial gas content (MSCF/ac.-ft.)	460-850	600-910				
Formation	Mokelumne River	Starkey				
Geologic age	Late Cretaceous	Late Cretaceous				
Average depth (ft.)	2,200	2,600-2,900				
Average net thickness (ft.)	23	12-15				
Maximum productive area (acres)						1,620
RESERVOIR ROCK PROPERTIES						
Porosity (%)	29-35†	28-33†				
S_{oi} (%)						
S_{wi} (%)	26-50†	24-45†				
S_{gi} (%)	50-74†	55-76†				
Permeability to air (md)		50-100				
RESERVOIR FLUID PROPERTIES						
Oil:						
Oil gravity (°API)						
Sulfur content (% by wt.)						
Initial solution GOR (SCF/STB)						
Initial oil FVF (RB/STB)						
Bubble point press. (psia)						
Viscosity (cp) @ °F						
Gas:						
Specific gravity (air = 1.0)	.617-.717	.632-.720				
Heating value (Btu/cu. ft.)	619-863	611-827				
Water:						
Salinity, NaCl (ppm)						
T.D.S. (ppm)						
R_w (ohm/m) (77°F)						
ENHANCED RECOVERY PROJECTS						
Enhanced recovery projects						
Date started						
Date discontinued						
Peak oil production (bbl)						
Year						
Peak gas production, net (Mcf)						1,808,396
Year						1978

Base of fresh water (ft.): 1,400-1,700

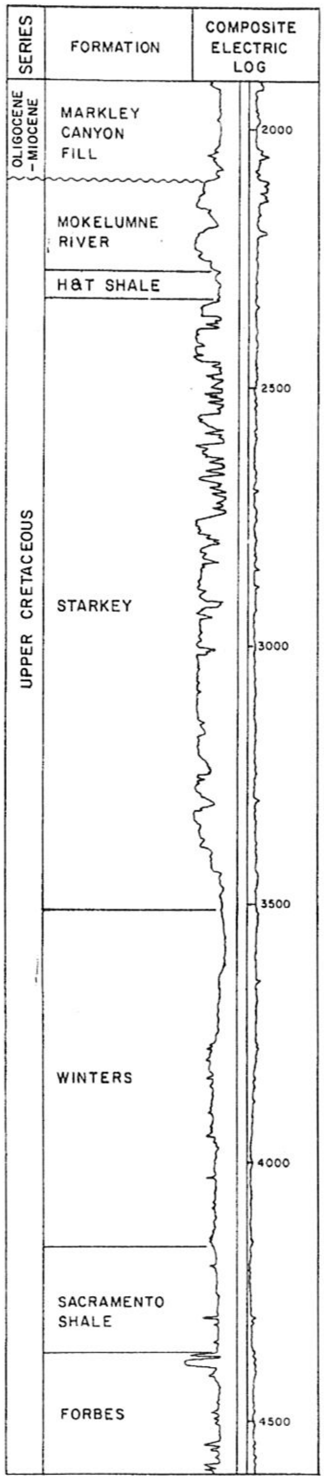
Remarks: Commercial gas deliveries began in January 1977.
a/ Directional well; true vertical depth is 2,998 feet.

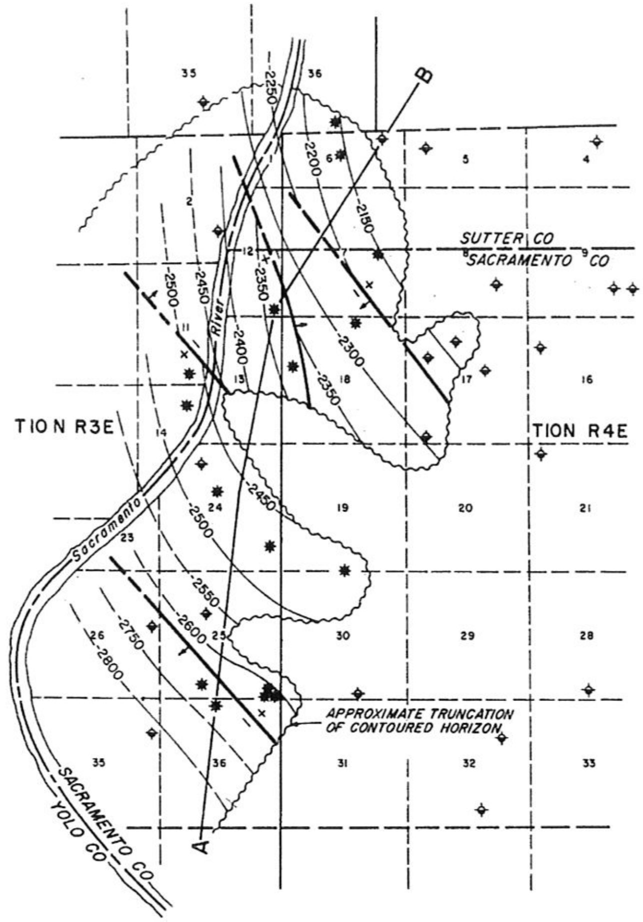
Selected References:

DATE: December 1980 † Log derived value.

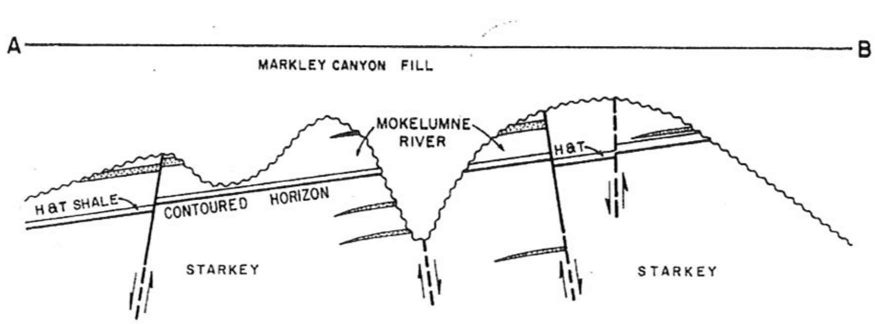
CALIFORNIA DIVISION OF OIL AND GAS

SACRAMENTO AIRPORT GAS FIELD





CONTOURS ON TOP OF STARKEY



DECEMBER 1979

COUNTY: **SACRAMENTO** and **SAN JOAQUIN**

THORNTON GAS FIELD

DISCOVERY WELL AND DEEPEST WELL

	Present operator and well designation	Original operator and well designation	Sec. T. & R.	B.&M.	Total depth (feet)	Pool (zone)	Strata & age at total depth
Discovery well	Amerada Hess Corp., Opr. "Capital Co." 1	Amerada Petroleum Co. "Capital Co." 1	36 5N 5E	MD	8,387	Capital	
Deepest well	Chevron U.S.A. Inc. "Dinelli-Blossom-McGillivray" 1	Standard Oil Company of California "Dinelli-Blossom-McGillivray" 1	29 5N 5E	MD	11,000		Forbes Late Cretaceous

POOL DATA

ITEM	UNNAMED a/	UNNAMED a/	CAPITAL			FIELD OR AREA DATA
Discovery date	May 1961 b/	May 1970 b/	July 1943			
Initial production rates						
Oil (bbl/day)						
Gas (Mcf/day)	900	810	6,900			
Flow pressure (psi)	1,000	640	805			
Bean size (in.)	5/16	1/4	3/8			
Initial reservoir pressure (psi)	750	1,130	1,500			
Reservoir temperature (°F)	104	108	118			
Initial oil content (STB/ac.-ft.)						
Initial gas content (MSCF/ac.-ft.)	270-380	420-590	780-970			
Formation	Markley-Nortonville	Markley-Nortonville	Mokelumne River			
Geologic age	Eocene	Eocene	Late Cretaceous			
Average depth (ft.)	2,315	2,580	3,300			
Average net thickness (ft.)	15	25	30			
Maximum productive area (acres)						3,160
RESERVOIR ROCK PROPERTIES						
Porosity (%)	27-31	27-31	31-35			
S_{oi} (%)						
S_{wi} (%)	45-55	45-55	40-45			
S_{gi} (%)	45-55	45-55	55-60			
Permeability to air (md)						
RESERVOIR FLUID PROPERTIES						
Oil:						
Oil gravity (°API)						
Sulfur content (% by wt.)						
Initial solution GOR (SCF/STB)						
Initial oil FVF (RB/STB)						
Bubble point press. (psia)						
Viscosity (cp) @ °F						
Gas:						
Specific gravity (air = 1.0)	.571††	.571††	.575††			
Heating value (Btu/cu. ft.)	985	985	960			
Water:						
Salinity, NaCl (ppm)			14,379			
T.D.S. (ppm)						
R_w (ohm/m) (77°F)						
ENHANCED RECOVERY PROJECTS						
Enhanced recovery projects						
Date started						
Date discontinued						
Peak oil production (bbl)						
Year						
Peak gas production, net (Mcf)						4,063,765
Year						1957

Base of fresh water (ft.): 600

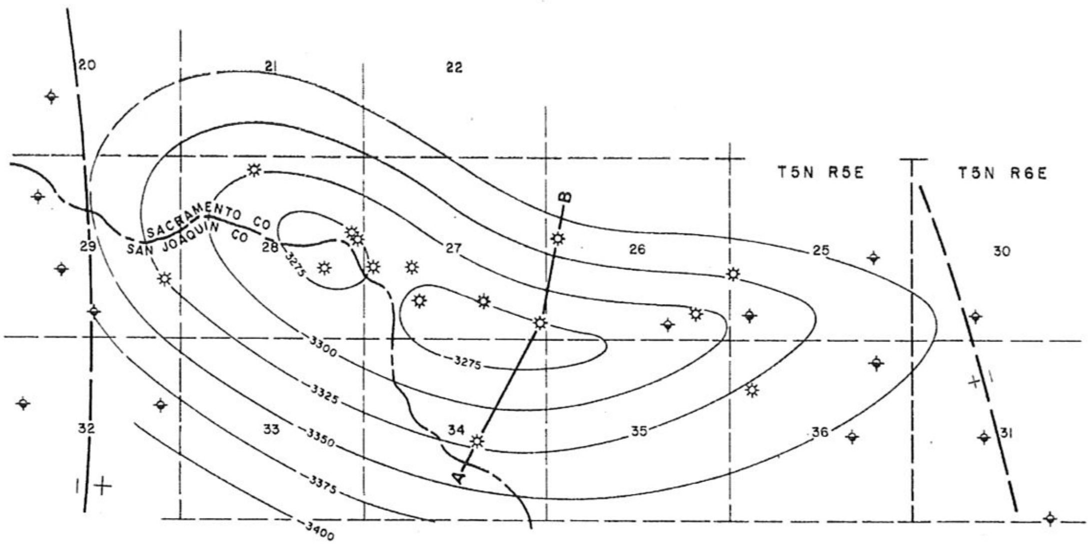
Remarks: Commercial gas deliveries began in December 1946. Abandoned September 1975. Reactivated June 1976. Abandoned October 1979. Reactivated June 1980. Cumulative gas production 53,641,219 Mcf. No condensate production. There were 14 completed wells.

a/ Locally referred to as Deadhorse sand stringers.
b/ Date of recompletion; originally completed in the Capital zone.

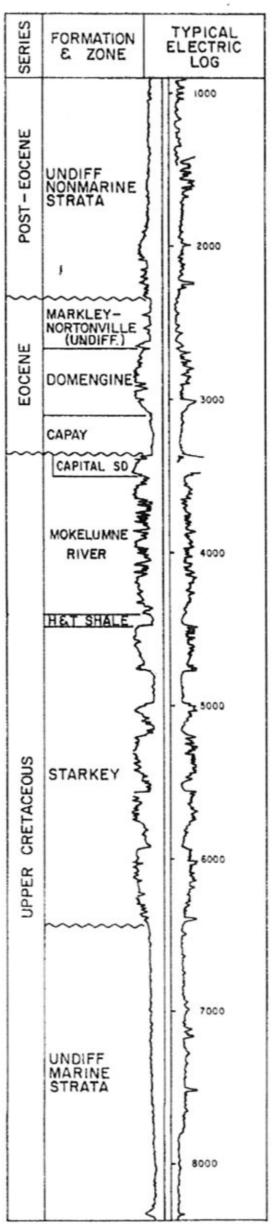
Selected References: Loken, K. P., 1957, Thornton Gas Field: Calif. Div. of Oil and Gas, Summary of Operations -- Calif. Oil Fields, Vol. 43, No. 1.

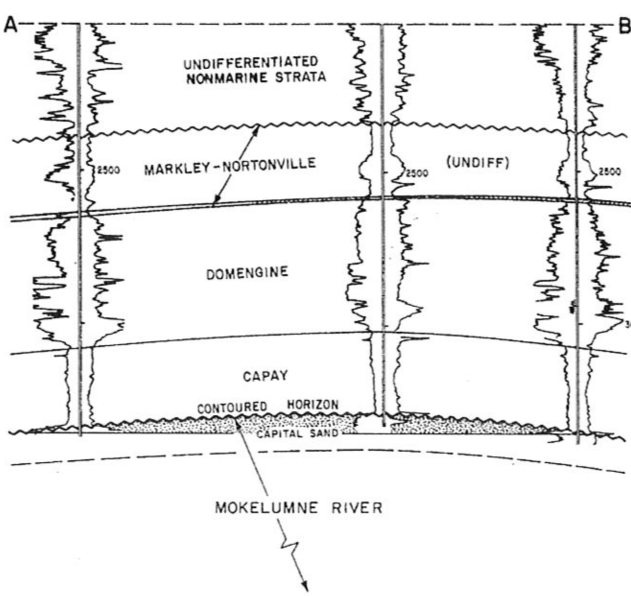
DATE: November 1980 †† Calculated value.

THORNTON GAS FIELD



CONTOURS ON TOP OF CAPITAL SAND





DECEMBER 1979

COUNTY: **SACRAMENTO**

FLORIN GAS FIELD

DISCOVERY WELL AND DEEPEST WELL

	Present operator and well designation	Original operator and well designation	Sec. T. & R.	B.&M.	Total depth (feet)	Pool (zone)	Strata & age at total depth
Discovery well	Union Oil Company of California "Florin" 1	Same as present	35 8N 5E	MD	4,921 a/	Winters	Winters Late Cretaceous
Deepest well	Same as above	"	"	"	"	"	"

POOL DATA

ITEM	WINTERS					FIELD OR AREA DATA
Discovery date	December 1977					
Initial production rates						
Oil (bbl/day)						
Gas (Mcf/day)	2,326					
Flow pressure (psi)	1,102					
Bean size (in.)						
Initial reservoir pressure (psi)	1,518					
Reservoir temperature (°F)	94					
Initial oil content (STB/ac.-ft.)						
Initial gas content (MSCF/ac.-ft.)	890-1,000					
Formation	Winters					
Geologic age	Late Cretaceous					
Average depth (ft.)	3,800					
Average net thickness (ft.)	30					
Maximum productive area (acres)	40					
RESERVOIR ROCK PROPERTIES						
Porosity (%)	29-33					
So_i (%)						
Sw_i (%)	30-35***					
Sg_i (%)	65-70***					
Permeability to air (md)	10-27					
RESERVOIR FLUID PROPERTIES						
Oil:						
Oil gravity (°API)						
Sulfur content (% by wt.)						
Initial solution GOR (SCF/STB)						
Initial oil FVF (RB/STB)						
Bubble point press. (psia)						
Viscosity (cp) @ °F						
Gas:						
Specific gravity (air = 1.0)	.598					
Heating value (Btu/cu. ft.)	904					
Water:						
Salinity, NaCl (ppm)						
T.D.S. (ppm)						
R_w (ohm/m) (77°F)						
ENHANCED RECOVERY PROJECTS						
Enhanced recovery projects						
Date started						
Date discontinued						
Peak oil production (bbl)						
Year						
Peak gas production, net (Mcf)						
Year						

Base of fresh water (ft.): 1,300

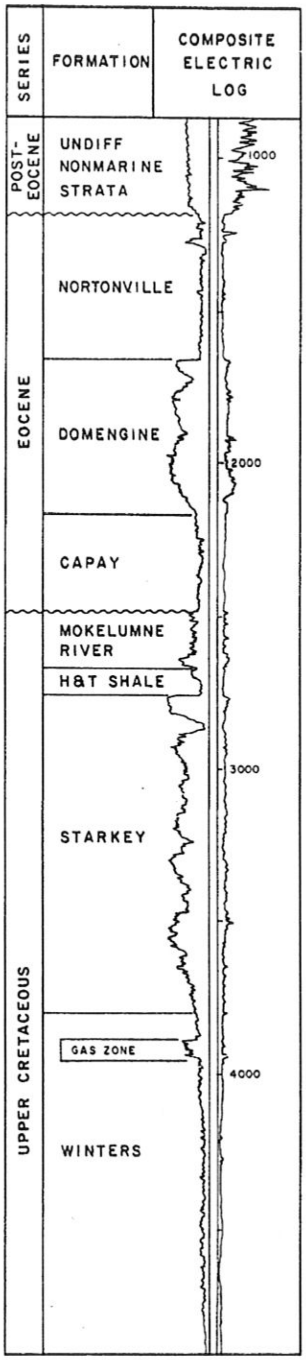
Remarks: The gas is being purchased by a nearby manufacturing plant. Commerical gas deliveries began in July 1980.
a/ Directional well, true vertical depth is 4,807 feet.

Selected References:

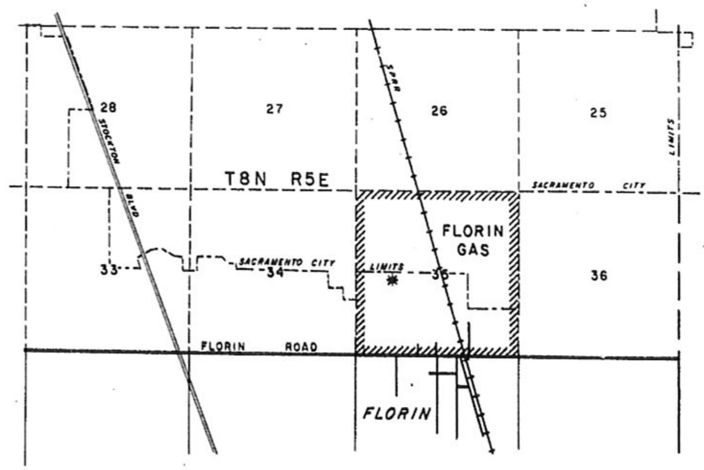
DATE: November 1980

***Representative values for area, formation, and depth.

FLORIN GAS FIELD



JULY 1980



SUBSURFACE DATA NOT AVAILABLE

ATTACHMENT 2

SACRAMENTO AIRPORT GAS FIELD
EVALUATION BY ROBERT W. MANNON, Ph.D

Mannon Associates
Petroleum Consultants

Robert W. Mannon, Ph.D.
President

1045 Via Tranquila
Santa Barbara, CA 93110
(805) 682-8480 FAX: (805) 687-7787

Mr. James Fossum
Sacramento Natural Gas Storage, LLC.
8031 Fruitridge Road, Suite B
Sacramento, CA 95820

March 18, 2008

Dear Mr. Fossum:

This letter is in response to your request to analyze the viability of the Sacramento Airport Gas Field as a candidate for use as a gas storage reservoir to provide gas reserve capacity to SMUD to satisfy certain potential heating and electric power generation requirements. In order to qualify as a candidate for conversion to a gas storage operation a given gas pool must pass the test in three broad categories. These three categories or areas of concern are all encompassing. Virtually all the factors to be considered in the evaluation process can be placed into at least one of these categories. The three factors are:

1. The geological and engineering characteristics of the gas reservoir
2. Environmental concerns
3. Economic issues

All three factors are equally important. Failure in one area will doom the project. In the evaluation process, these three factors can be best analyzed in the order listed. The initial testing is with the nature of the reservoir itself – the geological and engineering criteria. Then comes the environmental issues, and it is only when these issues have been satisfied that the bottom line factor of economics is considered. It can happen, however, that complexities in factors (1) or (2) may dictate remedial or mitigation measures so extravagant that the project becomes economically infeasible prior to any overall formal economic analysis.

Accordingly, with respect to the analysis of the Sacramento Airport Gas Field for gas storage, the first step is to examine its geological and engineering characteristics and parameters. The operation of a gas storage reservoir involves seasonal and at times unseasonal periods of either withdrawal or injection of gas to meet certain requirements. Gas is either being injected into the reservoir and being withdrawn from the reservoir most of the time during the year. Then, there are periods in which the wells are idle and there is no flow in either direction. During the injection/withdrawal periods it is imperative that the operator be in a position to exercise reasonable control over the movement of gas and water in the reservoir. The ideal situation is the case of a gas reservoir where the gas is trapped in an unfaulted anticlinal or domal shaped structure in which the producing zone is continuous across the structure. In this case the wells are all in communication with either other. As a result the operator is able to exercise maximum control over fluid movement in the reservoir by appropriate monitoring of well pressures and gas flow rates and whatever water is produced. The Florin Gas Field has the characteristics of this ideal field. As an example, in the case of Florin, there are no isolated sand lenses or "sand pockets" that contain gas that are disconnected from the main reservoir body that are not continuous throughout the reservoir. Instances where reservoir discontinuity of this type occurs serve to severely limit the ability of the operator to maintain control of fluid movement in the reservoir.

Unfortunately, the Sacramento Airport Gas Field by its very nature exhibits massive discontinuity in the producing zones throughout the field. Unlike the ideal gas reservoir for gas storage where the trapping mechanism for the gas is structural in the form of a dome or anticline, this field is a classic example of a stratigraphic trap. As shown in Figure 1, the reservoir is located on a faulted homocline dipping generally to the southwest with an absence of structural closure. The gas traps in the two producing horizons in the Mokelumne River sands and Starkey sands were caused by a truncation of the producing measures on the eastern edge of the accumulation as indicated in the figure. Indications are that there are at least five separate producing entities or pools in the field. To attempt to utilize the field for gas storage would require a monumental effort of well interference testing and other types of well tests. The purpose of the testing would be to determine patterns of wells that were in pressure communication with each other and instances where wells were not in pressure communication. This information would hopefully lead to identifying an isolated pool within the field that would be suitable for gas storage. The existence of faults, the discontinuous sand lenses, and the erratic nature of the producing zone truncations to the east dictate such a procedure to determine the important factor of reservoir size and insure that there is no leakage of gas beyond the indicated limits of the gas storage area. The testing process could involve many if not all of the original producing wells in the field, which stretches over a distance of some six miles. It appears that the field is so complex that even if an isolated pool is found to be appropriate for gas storage some measure of uncertainty may still exist.

In conclusion, it is clear that the geological and engineering factors associated with the Sacramento Airport Gas Field give rise to uncertainties of a degree that preclude its consideration as a gas storage reservoir. The indicated geological and engineering factors of this field are so adverse to the prospect of the field's conversion to gas storage that a discussion of the environmental and economic factors seems moot and for this reason has not been included.

If you have any questions, please advise.

Sincerely,

Robert W. Mannon

RWM/jm

Resume of Robert W. Mannon

Robert W. Mannon has over forty years worldwide experience in the oil and gas industry divided almost equally between employment with major and independent oil and gas companies and consulting and teaching. His specialties are production and reservoir engineering, enhanced oil recovery, and oil and gas reserve estimation and economic analysis.

His has been previously employed by the Southern California Petroleum Corp. as a drilling and production engineer in California, New Mexico and Texas, and Egypt, by Gulf Oil Corp. in California as a reservoir engineer, by Buttes Gas and Oil as Division Engineer International, by Allied Chemical Company's petroleum division as Manager, Drilling and Production International, and by Ogle Petroleum Inc. as Vice President of the company's consulting services for the California offshore operations.

In October 1983 he founded Mannon Associates, Inc to specialize in petroleum and natural gas reservoir engineering, oil and gas reserve estimation and economic analysis, enhanced oil recovery, and offshore project analysis.

He has taught petroleum engineering at the University of Southern California, the Montana College of Mineral Science and Technology, and the University of Louisiana-Lafayette where he served as department head. He has authored numerous articles, reports and professional papers, and a textbook in his specialties. He has a B.S. in petroleum engineering from Stanford University, and M.S. and Ph.D. degrees in petroleum engineering from the University of Southern California.

Dr. Mannon is a member of the Society of Petroleum (SPE), the Society of Petroleum Evaluation Engineers (SPEE), the American Association of Petroleum Geologists (AAPG), and the National Panel of Arbitrators of the American Arbitration Association (AAA). He is past chairman of the Los Angeles Petroleum Forum of SPE and is a registered petroleum engineer in California.

History and Capabilities of Mannon Associates, Inc.

Mannon Associates, Inc. was founded in October, 1983 by R. W. Mannon, Ph.D. and provides comprehensive geologic and petroleum engineering services to the oil and gas industry. The firm specializes in petroleum and natural gas reservoir engineering, oil and gas reserve estimation and economic analysis and enhanced oil recovery.

Partial List of Major Consulting Assignments Involving Oil and Gas Fields in California

- Consultant to Texaco Harvest Partners – Point Arguello Field, Offshore California
- Consultant to Torch Energy Advisors – Point Pedernales Field, Offshore California
- Consultant to Chevron USA for the Stevens Reservoirs, Elk Hills Field, Kern County California
- Testimony before California Public Utilities Commission for Southern California Edison Company concerning sale of interests in gas properties
- Estimation of Proved Developed and Proved Undeveloped oil and gas reserves and economic analysis for interest unit owners in the Pt. Pedernales, Gato Canyon, Lion Rock, Purisima Pt., Pt. Sal, Bonito, Cavern Pt., Sword, Sacate, and Pescado Federal OCS Units, Offshore California
- Testimony before the U.S. Department of Justice for Texaco, Inc. related to heavy oil properties in California
- Consultant to Aera Energy on Santa Maria Basin Federal Units, Offshore California
- Consultant to Dames and Moore for the California Offshore Oil and Gas Energy (COOGER) Study.
- Consultant to Samedan Oil Corp. on Monterey pool performance
- Monterey Reservoir Study Project of selected Monterey pools in California for an oil company consortium of six major oil companies.
- Study of the performance of the South Elwood, Casmalia, and Pt. Pedernales heavy oil pools in California for independent oil companies.
- Testimony in U.S. Federal Court re: Home-Stake Production Co. securities litigation
- In-depth studies of performance of various reservoirs in the Midway-Sunset Field for major and independent oil companies.
- An in-depth study of reservoir performance in the North and South Belridge Fields for a major company
- An in-depth study of reservoir performance in the Monarch Sand of the Central Midway-Sunset field for a large independent.
- Reservoir study of the Oxnard field for a major company

Partial Client List of Mannon Associates

Amber Resources Co.
Aminoil, USA
AMOCO Production Company
ANR Storage Co.
ARCO Oil and Gas Co.
ASC Consultants
Aspen Energy Co.
Atwater Consultants, Ltd.
BDM-Oklahoma
Bechtel Petroleum Operations, Inc.
Black & Associates
Bow Valley Industries, Ltd.
BP Exploration (USA)
BT Operating
John Brown E & C, Inc.
Cairn Energy
California Division of Oil and Gas
California Public Utilities Commission
Caltex Resources
Canadian Hunter Exploration Ltd. (Canada)
Cawley, Gillespie, & Associates, Inc.
Chevron Oil Co.
CNG Producing Co.
Coastal Oil & Gas Corp.
Colorado Interstate Gas Co.
Columbia Gas Development Corp.
Conoco, Inc.
Continental Reserves Oil Company
Delta Petroleum Corp.
Devon Energy Group
Dolan & Associates (UK)
Dowell Schlumberger
Dutcher & Company
Herman Dykstra, Consultant
Eastern States Exploration Co., Inc.
Elf Aquitaine, Inc.
Enron Oil and Gas Co.
Exxon Corp.
Dames & Moore
Fall Line Energy, Inc.
First City National Bank of Houston
Forrest A. Garb & Associates
Freeport-McMoran Oil & Gas Co.
Frontier Engineering
Getty Oil Co.
Golden Engineering Co.
Grace Petroleum Co.
Gulf Oil Corp.
Gulf Canada Resources Ltd. (Canada)
Hardy Oil and Gas USA, Inc.
S. A. Holditch & Associates
Home Oil Co. Ltd. (Canada)
Husky Oil Operations Ltd.
J. M. Huber Corp.
ICF Resources Inc.
Imperial Oil Resources Ltd.
Jacat Oil Co.
Keystone Oil Corporation
Kerr-McGee (USA)
KN Energy
Lonestar Gas Co.
Mariner Energy
Maxus Energy Corp.
Michigan Consolidated Natural Gas
Mobil E & P Services
Mobil Oil Corp.
Mountain Operating, Inc.
Navidata Systems, Inc.
Neste Oil Exploration (UK)
Netherland, Sewell, & Associates, Inc.
New England Energy Corp.
Niper
Norcen Explorer, Inc.
Novalta Resources, Inc.
Nuevo Energy Company
Nycal Corp.
Ogle Petroleum, Inc.
ORYX Energy Co.
Pacific Gas and Electric
Pacific Enterprises Oil Co.
PanCanadian Petroleum, Ltd.
Pembina Corp. (Canada)
Petro-Canada Inc.
Petro-Hunt Corp.
Petrobras America, Inc.
Petsec Energy
Phillips Petroleum Co.
Pogo Producing Co.
Prairie Producing Co.
Pueblo Oil and Gas Co.
Quaker State Corp.
Richardson Supply Co. (UK)
Sabine Corp.
Samedan Oil Corp.
Santa Fe Energy Resources, Inc.
Scarth Oil & Gas Co.
Scientific Software – Intercomp
SCMK Development and Engineering, Ltd.
The Scotia Group
Seagull
Security Pacific National Bank
Seneca Resources Co.
Shell Oil Co.
Southern California Edison Co.
Snyder Oil Co.
Star-Tek, Inc.

Taylor – McIlhenny Operating Company
Tenneco Oil Corp.
Texaco, Inc.
Texas Eastern Transmission Co.
Torch Energy Advisors
Total Minatone Corp.
Trinity Resources, Inc.
UNOCAL Corp.
U.S. Bureau of Land Management
U.S. Department of Energy
U.S. Geological Survey
U.S. Mineral Management Service
Vance Production Co.
Washington Energy Resources
Western Gas Processors, Ltd.
Williamson Petroleum Consultants, Inc.
Wilson, Aluko & Locke
Wolverine Exploration Co.
Zilkha Energy

ATTACHMENT 3

SACRAMENTO AIRPORT GAS FIELD
EVALUATION BY JOHH F. MATTHEWS JR.

John F. Matthews Jr.
Consulting Petroleum Engineer
5120 Whisper Oaks Lane
Carmichael, CA. 95608
(916)481-7471
petrengr4u@SBCglobal.net
February 5, 2008

Feasibility Study Sacramento Airport Gas Field

Sacramento Natural Gas Storage, LLC.
2981 Gold Canal Drive
Rancho Cordova, CA 95670

Dear Jim::

This report is specific to the Sacramento Airport in regards to the quality of the reservoir as to converting the field to gas storage for servicing the Sacramento Municipal Utilities District (SMUD) needs for a gas back up.

In a review of an abandoned gas field (Sacramento Airport Field at present has five wells which are either capable of production or which are classified as idle) for use as a gas storage facility there are several general items that are pertinent. Location, cap rock, depth of zone, structure volume , quality of gas produced from the field, cushion gas needed and proper abandonment procedures of abandoned wells.

In regards to location the purpose of the back up is to supply gas if the main line is out of service. There would in the case of Sacramento Airport a need for a gas line from the field to near the SMUD facility. Such a line would be in excess of ten miles and permitting would be an environmental nightmare. The line would have to cross Highway I-5. cross the Sacramento River. cross the American River and cross Highway I-50 plus traverse through inhabited areas of the City. All of this renders this a severe negative factor.

The caprock at Sacramento Airport field is supplied by the Markely Fill. It is quite thick and supplied the closure of the Mokelumne River zone. It will be assumed that it is continuos
but further study ould be needed to approve it for a storage project.

The best depth for a storage project is from to 2,000 feet to 4,500 feet. The depth of the Mokelumne River interval is 2,200 feet.

The volume of the reservoir based on gas produced to date is 11 bcf . This is an acceptable number except that the Mokelumne River is not that number in one structure but rather in five separate structures which would require additional expensive surface facilities spread over five miles. The added cost of facilities renders the Sacramento

Airport field low in this aspect.

Cushion gas is gas added ahead of storage gas to establish pressure to enable to storage project to function. Cushion gas for five structures adds appreciably to the cost.

The quality of gas supplied to the Sacramento area is 960 btu. All household utilities are only prepared to use 960 btu gas. The gas at Sacramento Airport was of the low 600 btu content. To attempt to inject 960 btu gas into the Mokelumne River zone and to withdraw gas in a time of disruption would result in lower btu gas be supplied to customers in the area for at least several cycles. This renders the Sacramento Airport field useless

All of the 22 abandoned wells were abandoned recently under the more stringent regulations then in place.

Taking these various factors in to account places the Sacramento Airport field at the bottom of acceptable list when reviewing fields as candidates for storage possibilities.

Yours truly,

John F. Matthews, Jr.
California Registered
Petroleum Engineer P-1226

Enclosures: Well Data Sheets for abandoned wells
Data Sheets and additional data for wells not abandoned

RESUME

JOHN F.MATTHEWS, JR.

1975-Present Petroleum Consultant, Joint Venturer, and General Partner for Limited Partnerships.

Partner in a data based production information service for California oil and gas operations.

Operate as a consulting service, which includes economic evaluations of producing properties, reservoir engineering studies, reserve estimates, subsurface reviews, development of drilling programs and AFE's plus supervision of operations relating to drilling and completion of exploratory and development wells, advising investors and/or their attorneys and brokers, environmental impact reports, permits, and review and formulation of secondary recovery, unitization, and underground injection programs. Presentation of seminars to technical staffs on oil and gas procedures and equipment and to nontechnical groups on oil and gas operations. Interface with governmental agencies, operational personnel and consultants. Act as expert witness on any of the above subjects.

Have functioned as joint venturer in programs for investment in oil and gas operations. This consisted of developing a geologic prospect, leasing of needed mineral rights, involvement of industry companies and/or individuals in the investment of funds, and acting as the general partner if required. As such supervised operational functions, permitting, record filing, bids, contracts, tax preparation, billings, and disbursement of funds.

STATE OF CALIFORNIA - DIVISION OF OIL AND GAS

1971-1975 **Chief of Division of Oil and Gas, (State Oil and Gas Supervisor)**

Responsible for developing and directing the States Regulatory Program for oil, gas and geothermal, both onshore and offshore. This program for 60,000 wells producing 830,000 B/D of oil and 1,000,000 Mcf/day of natural gas covered geologic and engineering reviews, publications, statistics, and environmental protection. Staff of 150 engineers, geologists and support personnel. Acted as State Fuel Allocation Officer during periods of energy crisis as declared by the Federal government.

Personal activities included: Representing Administration policies at state legislative hearings, at Federal Senate committee hearings and to the Federal Energy Department. Budget preparation and presentation. Represented the State and the Governors office at oil spill contingency meetings and conferences and at actual oil spills at Santa Barbara, San Diego, and San Francisco. Represented the Governor at Interstate Oil Compact Commission meetings. Interfaced with public groups, operators, and company personnel, industry organizations, and City, County, State and Federal agencies and legislative representatives.

1970-1971 **Chief Deputy State Oil and Gas Supervisor**

In charge of Division operations, responsible for statutory regulations at the district level and for specific projects, final reviewer of written reports, prepared administrative reports and represented the Division at hearings and meetings.

1952-1970 **Supervising, Senior, Associate, Assistant and Junior Engineer**

Increasing responsibility in field operations, engineering reviews, and report writing, followed by being in charge of a special group monitoring secondary recovery projects and finally, total responsibility for the operations in a large district with a staff of 40.

1950-1952 Employed by a consulting engineering firm with emphasis on evaluations and drilling programs and operations. By Baroid Sales as a logging engineer and by a drilling contractor as a rotary helper.

EDUCATION

University of Southern California, Masters of Science Degree in Petroleum Engineering, 1970. Program emphasis on advanced reservoir engineering, secondary recovery programs and management development. Thesis: *Oil and Gas Conservation Practices in California*. Bachelor of Engineering Degree in Petroleum Engineering,1950. Basic petroleum engineering and geology.

PROFESSIONAL AFFILIATIONS AND LICENSE

American Petroleum Institute, Woodland, CA.
Sacramento Petroleum Association, Sacramento, CA.
Society of Petroleum Engineers, Dallas, TX.
Society of Petroleum Evaluation Engineers, Houston, TX
Underground Injection Practices Council, Okla City, OK.
Registered Petroleum Engineer in California, P-1226.

PUBLISHED REPORTS

Twelve (12) individual reports on California Oil and Gas Fields, (each contains the history of development, geologic interpretations, engineering and drilling practices, and production characteristics)- Summary of Operations-California Oil Fields, Division of Oil and Gas:

Volume 39, No. 1, *Honor Rancho Oil Field,* 1953
Volume 39, No. 1, *Castaic Hills Oil Field,* 1953
Volume 40, No. 2, *Howard Townsite Oil Field,* 1954
Volume 41, No. 2, *Edison Oil Field, Edison Groves Area,* 1955
Volume 42, No. 2, *Edison Oil Field, Portals-Fairfax Area,* 1956
Volume 43, No. 1, *Poso Creek Oil Field, McVan Area,* 1957
Volume 44, No. 2, *Canfield Ranch Oil Field,* 1958
Volume 46, No. 1, *Strand Oil Field,* 1960
Volume 47, No. 1, *Mountain View Oil Field-Arvin & Vacarro Areas,* 1961

Volume 48, No. 1, *Mountain View Oil Field-West Arvin Area,* 1962
Volume 49, No. 1, *Los Medanos Gas Field,* 1963
Volume 49, No. 1, *Willows Pass Gas Field,* 1963

Offshore Petroleum Resource, Resources Agency of California,1972

Energy in California, Resources Agency of California, 1972

Legal Problems for States Participating in the Federal Mandatory Allocation Program, National American Bar Association, 1973

The Energy Crisis in California, American Institute of Professional Geologists, 1973

All the Things You Wanted to Know About the Division of Oil and Gas But Were Afraid to Ask, American Petroleum Institute, 1974

California Offshore Regulations, Offshore Technology Conference, 1974

California Oil and Gas Regulations, Interstate Oil Compact Commission, 1974

Technical Reviewer of *Oil, Gas, Uranium and Thorium Supply and Depletion*, Lawrence Livermore Laboratory, Livermore, CA, 1976

How to Drill an Oil Well, Oil and Gas Conference, California Certified Public Accountants, 1983

Emission Characteristics of Crude Oil Production Operations in California, in conjunction with KVB, Inc., CARB Contract No. A-8-127-31, 1983

ATTACHMENT 4

WELLS FARGO LETTER DATED MARCH 25, 2008

Michael W. Nepveux
Senior Vice President
Wells Fargo Energy Capital

MAC C7300-061
1700 Lincoln, 6th Floor
Denver, CO 80274
303.863.5589
303.863.5196 Fax

WELLS FARGO

March 25, 2008

Mr. Donald B. Russell
President
Sacramento Natural Gas Storage, LLC
8031 Fruitridge Road
Sacramento, CA 95820

Re: Opinion on Feasibility of Financing Alternative Project

Dear Mr. Russell:

Regarding your recent inquiry concerning the feasibility of financing an alternative project using the Sacramento Airport Gas field you defined, including the following parameters:

Project Parameters Provided by SNGS:
Working Gas Storage Capacity: 7.5 billion cubic feet
Capital Budget: $161 million
Revenue Projections: $15.12 million
Operating Expenses: $5 million
Construction Start Date: June 2010
Operations Start Date: March 2011
Percentage of storage capacity to be pre-leased: 60% minimum

Wells Fargo Energy Capital Response on Financing Feasibility:
All comments on financing feasibility are based upon assumptions of future market conditions, which are subject to a high degree of variability. However, given the significant disparity between revenue projections and the cost of operations (including debt service), our opinion regarding financing feasibility is not difficult. The obvious problem is that there is no way the revenue stream of $15.12 million will support the development of a $161 million project. Given the rate of return requirements of the equity market for investment in the energy industry, the project would be wholly unattractive. Similarly, even with a 60% lease-up and a 30% equity investment (which would be virtually impossible to attract), the relatively small revenue stream would not provide sufficient funds to support the operating expenses and debt service for the project.

In simplest terms, the project described is not financeable. Thank you for your inquiry.

Sincerely,

Michael Nepveux
Senior Vice President