

## **Appendix C**

### **SAFETY**

**MEMORANDUM****DRAFT**To: Paul Mount  
Chief, MRMD

Date: October \_\_, 2006

From: Jeffrey W. Adams  
Petroleum Reservoir Engineer

File: PRC 421.1

Subject: **Review of PRC 421 Ellwood Field Vaqueros Reservoir Re-pressurization****Purpose**

This memo was compiled to summarize various historical events related to Lease PRC 421 and past efforts to determine the cause of re-pressurization in the Vaqueros reservoir of the Ellwood Oil Field and whether certain wells are in communication. This memo also discusses possible testing procedures to resolve the issue(s). Actual recommendations will follow the review of a procedure that Venoco will be sending to MRMD very soon. According to Venoco's reservoir engineer Steve Horner, they have retained Dr. Iraj Ershaghi for consultation on a long-term test procedure.

**Background**

The Ellwood Oil Field is located in Santa Barbara County near Goleta. The east-west trending field lies mostly offshore, and is approximately 4 miles by ½ mile in area. The field consists of eastern and western structural highs separated by a saddle. The highs are in the form of ovate domes or doubly-plunging anticlines. The main oil reservoir is primarily within the 350-400 ft thick Vaqueros sandstone formation. A structure map of the field is attached (see Page 8).

The field was discovered in 1928. In 1929 the State issued offshore Oil and Gas Lease Nos. 88, 89, 90, 91, 92, 93, 94, and 98, primarily covering the eastern high. Piers were constructed from shore and 74 wells were drilled from the piers from 1929 through the early 1940s. The State later issued Leases PRC 129 and 208 covering the western high, where approximately 35 wells were drilled from onshore drill sites. In 1949, State Lease PRC 421 was issued as a renewal of Lease No. 89. In that same year, Lease No. 91 became PRC 424 and Lease No. 98 became PRC 428. On the lease of interest, PRC 421, a total of nine wells were drilled, all during the 1930s.

Wells on the onshore portion of the field were all abandoned by the mid 1930s. By the mid 1950s, more than half the offshore wells in the field had already watered-out and were plugged and abandoned. By the early 1970s, only PRCs 129, 208, and 421 remained active. On PRC 421, all but two wells were plugged and abandoned. The two wells that remained were 421 #2, a producer, and 421 #1, a producer that was converted to injection in 1973. An attached graph (see Page 9) shows the production history of the leases that have produced from the field.

Further offshore from the Ellwood field, but still in State waters, is a separate structure known as the South Ellwood Oil Field, where Leases PRC 3120 and 3242 are located. Platform Holly was constructed in the late 1960s to develop the two leases. Development of the prolific Monterey

Shale reservoir necessitated a new well for disposal of Holly's produced water. Well WD #1 was drilled in 1973 for that purpose into a down-structure portion of the Vaqueros. The well was drilled at the Ellwood Onshore Facility, about 2,500 feet northwest of the PRC 421 wells. The location was chosen partly because the Vaqueros there is thought to be isolated from the oil-bearing part of the Vaqueros (the Ellwood Field) by an east-west trending, high-angle reverse fault. The fault is called the La Vigia Fault, and it is situated roughly mid-way between WD #1 and PRC 421 wells.

By the end of 1993, production from PRC 129 and 208 had ceased, and 421 #2 became the only producing well in the Ellwood field. Mobil Oil was the lessee at this time, having acquired the lease from ARCO. In March 1994, Mobil discovered a leak in its oil transfer pipeline from 421 #2, and the well was immediately shut-in. Well 421 #1, which was being used to dispose of produced water from 421 #2, was also shut-in. In 1997, Venoco acquired the shut-in lease from Mobil. In late 2000, Venoco discovered minor leaks in both wellheads. A temporary pipeline was installed, and when well 421 #2 was opened it flowed a total of 17,000 bbls of nearly pure oil over the next ten months. 421 #1 produced only a little gas. Subsurface safety valves and packers were then installed in the wells and they have remained shut-in since.

The fact that 421 #2 flowed after being shut-in for six years suggested the Vaqueros reservoir had re-pressurized. The re-pressurization of the Ellwood field was a concern because a number of the offshore wells in the area may not have been properly plugged and abandoned in the 1930s, 40s, and 50s. According to a review done by MRMD's Dan Dudak in 2001, at least 20 of the 72 wells drilled into the Vaqueros reservoir from offshore piers had potential deficiencies in their abandonment procedures.

Two possible causes for re-pressurization were suggested – natural aquifer influx, and injection into well WD #1. Although available evidence, as discussed in more detail below, indicated that injection was most likely not the cause, the MRMD in 2001 requested Venoco conduct some type of interference test to see if WD #1 was in communication with the PRC 421 wells. This was done in an effort to rule out injection as a cause, since such a test would confirm or refute the previously-held notion that the La Vigia fault was a barrier that isolated WD #1 from the wells on PRC 421. But because Venoco was prohibited from flowing 421 #2, a conventional interference test was not possible. A pressure fall-off test of WD #1 was suggested as an alternative. A fall-off test could confirm the presence of the La Vigia fault as a no-flow boundary. However, that test was also not possible at the time because WD #1 was needed for continuous disposal of Platform Holly's produced water.

In lieu of well testing, a suggestion was made that material balance calculations and/or reservoir simulation might help determine the cause of re-pressurization. In early 2002, Venoco proposed a joint study to estimate remaining oil and the magnitude of water influx since the 1994 field shut-in. But detailed material balance calculations and/or reservoir simulation efforts were never pursued, possibly because sufficient pressure data was not available, and data on actual production and injection from the early years was considered unreliable.

In late 2002, an opportunity for a fall-off test on WD #1 finally arose when Platform Holly was scheduled for maintenance. The fall-off test was performed Dec. 4, 2002. Although pressure data

suggested some type of barrier was detected, calculations showed that the 4-hour injection period and the 37-hour fall-off period were inadequate to investigate the reservoir to the suspected distance of the La Vigia fault.

In early 2003, MRMD advised Venoco that the question of communication remained unresolved, and that a new test should be designed and conducted with sufficiently long injection and fall-off periods. Venoco never proposed another test, so in early 2004, MRMD had to remind Venoco again of its obligation to find out if the pressure continues to rise, and what is causing that rise. Venoco finally submitted a new interference test design in late 2004.

Venoco's 2004 test design was for a longer duration fall-off test for WD #1 with simultaneous pressure monitoring in 421 #2. The producer would require approximately 48 hours of cleanup prior to installing pressure gauges and performing the test. Injection into WD #1 would occur for 7 days at 10,000 b/d then halted for 7 days to create a pulse and to measure fall-off pressures. Injection would resume for 30 days at 10,000 b/d, then be reduced to 2,000 b/d for 30 more days. Then the gauges would be recovered from 421 #2 for analysis and the well would be placed on normal production. Venoco's proposed test assumed WD #1 would no longer be in continual use because produced water from Platform Holly would be disposed of into the Monterey via a Holly well, and that Venoco would have permission from all applicable agencies to return 421 #2 to production. Neither of these assumptions came to be during 2005, so the test was never conducted.

In March 2006, Paul Mount reminded MRMD staff of the need to determine if pressure is still building in the Vaqueros reservoir, its cause, and what test or tests should be performed. There remains a concern as to whether any older abandoned wells might leak, or if they might require re-abandonment.

### **Re-Pressurization of Vaqueros Reservoir**

In addition to the 2000 leakage incident and subsequent flowing of 421 #2, other evidence shows that pressure in the Vaqueros reservoir has been rising for many years, even prior to the 1994 shut-in of 421 #2. Fluid level data from 421 #2 from late 1987 through 2001 shows a steadily increasing bottomhole pressure, from about 690 psi to 1,350 psi over the 13-year period. A graph of the pressure data is attached (see Page 9). Assuming a 0.433 psi/ft pure water gradient, hydrostatic pressure at the 3,322 ft vertical subsea datum would be 1,439 psi. In addition to re-pressurization, the crest of the structure appears to have been re-saturated with oil through gravity segregation. This is evident in the production performance of well 421 #2. During the mid 1960s through 1994, the oil rate increased while the water cut decreased, and then the well produced nearly pure oil during the temporary production period in 2000-01. A performance plot of 421 #2 is attached (see Page 10).

### **Evidence WD #1 is Not Cause**

Both geologic data and cumulative production and injection data suggest WD #1 is not the cause of re-pressurization in the Vaqueros reservoir, and that WD #1 and the wells on PRC 421 penetrate separate fault blocks that are not in communication.

Exploratory and development drilling in the Ellwood field revealed a subsurface geologic structure that includes the east-west trending La Vigia fault. Drilling showed the fault to be a trapping mechanism for the oil accumulation in the Vaqueros sand on the northern flank of the eastern high, as there was no oil found in the Vaqueros sand north of the fault. This is the reason WD #1 was drilled there.

An examination of cumulative production and injection data for the Ellwood field suggests that the volume of injection was insufficient to cause an increase in pressure throughout the Vaqueros, even if there was communication. Cumulative production from the Vaqueros includes 104 E6 bbl of oil, 148 E6 bbl water, and 93 E6 mcf gas. Approximately 75% of the cumulative gross production, or 189 E6 bbl, came from the eastern high where PRC 421 is located. About 25%, or 63 E6 bbl, came from the western high where PRC 208 and PRC 129 were located. An attached diagrammatic cross-section (see Page 10) shows the approximate relative magnitudes of production and injection into the two highs.

Excluding injection into WD #1, cumulative injection into the Vaqueros from wells drilled into the Ellwood Field totaled only 37 E6 bbl. This represents only 25% of the produced water, or 15% of the total gross production. Further, the vast majority of the injection (35 E6 bbl) was put into the western high. The cumulative injection-to-gross ratio for the western high is 0.55, while the ratio for the eastern high is only 0.01, meaning hardly any of the 189 E6 bbl of gross production taken from the eastern high was replaced. This is because during the 1930s through 1960s, most of the produced water from leases on the eastern high was simply dumped into the ocean.

Injection of Platform Holly's produced water into WD #1 has totaled 60 E6 bbls for 1973 through 2005. The injection was placed into the Vaqueros sand, but north of the La Vigia fault, and roughly 2,000 ft structurally lower than the crestal wells 421 #1 and #2. If WD #1 is in communication with the Vaqueros reservoir south of the fault, and not in an isolated block, then cumulative injection to gross ratio would still be only  $(37+60) \div (104+148) = 0.38$ . Ignoring gas, there is a net voidage of nearly 155 E6 bbls for the Ellwood Field. In a closed system, this would certainly result in a decrease in reservoir pressure. Therefore, injection into well WD #1 cannot be responsible for the pressure increase evidenced in well 421 #2. Iraj Ershaghi reached the same conclusion in 2003.

In addition to the net voidage argument, Ershaghi performed some calculations to estimate the time necessary to see a measurable pressure response between WD #1 and the 421 wells. He calculated dimensionless pressure  $P_D = [(k)(h)(\Delta p)/(141.2)(q)(\mu)(B)]$  for an assumed  $\Delta p$ , then used Theis' type curve to obtain  $t_D/r_D^2$  from  $P_D$ . The  $t_D/r_D^2$  was then used to estimate the time required for that pressure response from  $\Delta t = [(t_D/r_D^2)(\phi)(\mu)(c_t)(r_w^2(r/r_w)^2)/(0.000264)(k)]$ . The calculations, which are detailed in an attachment (see Page 11), show that  $\Delta t$  would be quite large, on the order of months or years depending on the assumptions used. This was further evidence that injection into WD #1 could not have been responsible for the magnitude of the pressure increase seen at well 421 #2.

### **Evidence Aquifer Influx is Cause**

Several lines of evidence suggest that aquifer influx (natural water drive) is the cause of re-pressurization in the Vaqueros reservoir of the Ellwood Field. First, geologic data from exploratory

and development drilling showed the oil accumulation lies atop an extensive aquifer. Second, an active water drive was suspected early in the field's development, as most initial wells flowed, and many experienced rapid water encroachment. And third, evidence of pressure support from aquifer influx, as well as gravity segregation, can be seen in the production performance of 421 #2. As previously mentioned, a plot of recent performance for 421 #2 is attached (see Page 10).

Well 421 #2, after flowing initially at more than 1,000 b/d oil, experienced a steep decline from 1930 to 1940. The water rate increased steadily during that time. But between the early 1940s to mid 1960s, its oil rate held steady at 20-30 b/d, with about 90% water cut. Then oil rate increased, gradually but steadily, to nearly 60 b/d in 2000. The incline began more than a decade prior to commencement of injection into WD #1. In fact, the production performance of 421 #2 seems completely unaffected by the onset of injection in WD #1. Instead, the gradual increase in oil rate in 421 #2 appears to be the result of the well's position at the crest of the structure, the elimination of competing wells in the field, and the combined effect of both natural aquifer influx and produced water re-injection into nearby well 421 #1. By mid 1960s to the early 1970s, most producers in the eastern part of the field were plugged and abandoned due to uneconomic production. At the same time, injection into the reservoir was initiated for the first time. From the 1930s through the 1960s, most produced water from the Ellwood field was simply disposed of in the ocean. Well 421 #1 was converted from producer to injector in the early 1970s, and it appears to have increased the oil rate in 421 #2 by at least 10 bopd. Thus, natural aquifer influx and gravity segregation seems to have caused both the re-pressurization in the crestal portion of the Vaqueros reservoir and the improvement in oil rate in 421 #2.

### **Discussion of Test Options**

In early 2003, after the inconclusive fall-off test, Ershaghi stated there are basically two test options left if the question of communication was to be answered. The first option would be to install gauges into shut-in well 421 #2 and continue injection into WD #1. The second would be to shut-in WD #1 and monitor pressure there while putting 421 #2 on production. Of the two options, Ershaghi recommended halting injection into WD #1 and producing 421 #2. He believed this would not only allow any interference to be seen, but would also immediately help offset any natural aquifer re-pressurization, thus minimizing the risk of leaks in older abandoned wells. However, the need for continuous disposal of produced water from Holly prohibited shutting-in WD #1. Installing gauges into 421 #2 would have required cleaning out the mud placed in the well in 2001.

In 2004, Ershaghi again raised the idea of a material balance study to quantify the natural aquifer influx. To get the reservoir pressures needed for the study, a concurrent fall-off test in WD #1 and build-up test in 421 #2 could be conducted. Of course, the buildup test would require some period of production. As an alternative, Ershaghi suggested simply installing quartz pressure gauges (with a sensitivity of 0.01 psi and surface recording capability) in 421 #2, so that minute pressure changes from aquifer influx could be detected. Again, the problem with this idea was that injection into WD #1 would have to be curtailed indefinitely, and 421 #2 would require cleanout.

Further discussion during 2004 between MRMD's Iraj Ershaghi and John Yu, and Venoco's Steve Horner, eventually led to Venoco's August 2004 test proposal. As described previously, that test would involve a longer duration fall-off test for WD #1 with simultaneous pressure monitoring in 421

#2. After producing 421 #2 for about 48 hours, pressure gauges would be installed. Approximately 10,000 b/d of water would be injected into WD #1 for 7 days, then halted for 7 days to measure pressures, then injection would resume for 30 days at 10,000 b/d, then another 30 days at 2,000 b/d. If communication existed, the pressure pulses created by the various injection rates would be detected at 421 #2. Again, this test assumed WD #1 would no longer be in continual use because Venoco would be injecting Holly's produced water into the Monterey, and permission would be given to produce 421 #2. Since neither of these assumptions came to be during 2005, the test was never conducted.

In April 2006, in a letter signed by SLC's Dwight Sanders, Venoco was advised that the *No Project Alternative* of the PRC 421 Recommissioning Project EIR should include a program to test the reservoir pressure, and that the results of that test would form the basis for recommendations as to the ultimate disposition of the wells on PRC 421. Venoco was told that the testing program would allow a predetermined level of production from the wells for a specified period of time (six months to one year).

### **May 2006 Proposed Design**

In May 2006, Venoco's Steve Horner emailed to MRMD staff (Alex Reid and Jeff Adams) a preliminary design for a new interference test. In light of the April 2006 letter mentioned above, Horner designed a test where 421 #2 would be on production and WD #1 would be an observation well while shut-in. Horner used commercial pressure transient analysis software to model a test with 421 #2 producing for one year at 700 b/d and then shut-in for one year. The test was modeled for two possibilities – with aquifer influx, and without aquifer influx. The aquifer influx was modeled as injection equivalent to 5,000 b/d. The model suggests the proposed test should be able to distinguish between the two possibilities, and that the effect of 421 #2 production on WD #1 should also be obvious if communication exists.

With no aquifer influx, the model predicts that the initial pressure of 1400 psi at WD #1 will fall to 1398 psi after one month and to 1390 psi after one year. The pressure falls as long as production continues in 421 #2. When production stops after one year, the pressure slowly recovers over the next year to about 1396 psi. With aquifer influx, the model predicts that the initial pressure of 1400 psi at WD #1 will fall for about 2-1/2 months, to about 1397 psi or so. Then the pressure would slowly increase in response to aquifer influx, which is assumed to be stronger than the production at 421 #2. The pressure might rise at 2 psi per month. Then when 421 #2 ceases production, the pressure in WD #1 will increase at a slightly faster rate, perhaps 3 psi per month according to the model. The model runs Steve Horner prepared did not include one for the pressure at WD #1 if is isolated from 421 #2 by the La Vigia Fault.

### **July 2006 Meeting with Iraj Ershaghi**

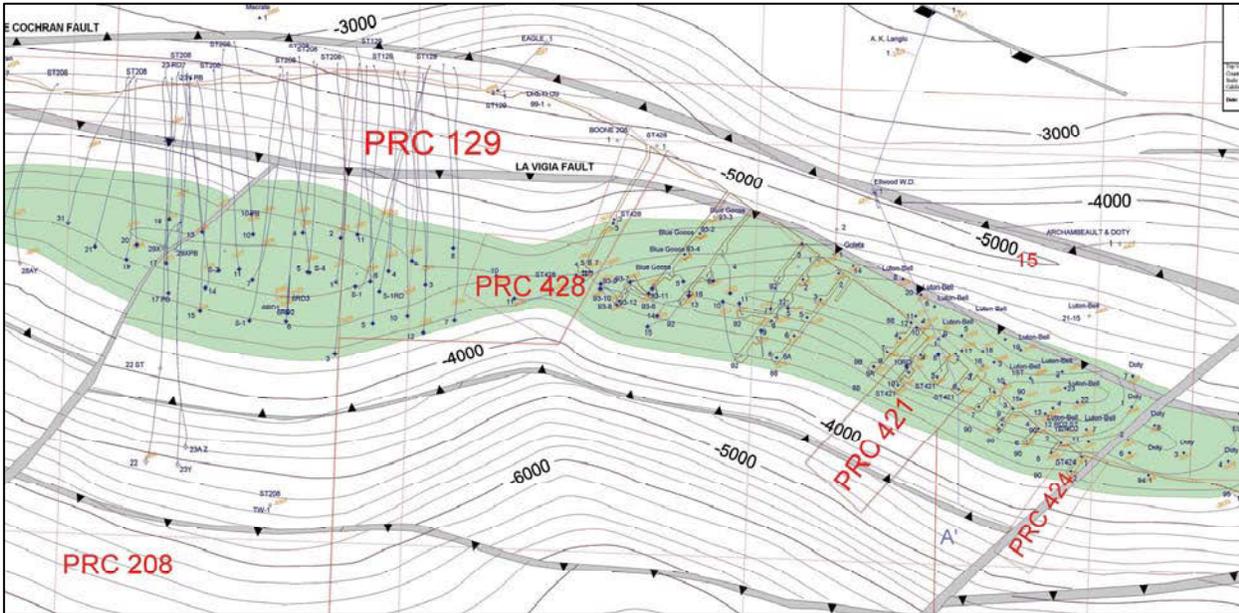
On July 27<sup>th</sup>, MRMD staff (Alex Reid and Jeff Adams) met with Steve Horner and Iraj Ershaghi to discuss possible testing procedures to address the concerns of MRMD. We briefly reviewed the bases for concluding that WD #1 could not have caused re-pressurization of Ellwood Vaqueros reservoir – namely, the fault that was a barrier to oil accumulation, and the fact there has been far too little injection relative to withdrawal to cause the pressure to increase. We agreed that re-pressurization must be due to natural aquifer influx. Regarding the question as to how high the

pressure can get, Ershaghi confirmed our view that because there is no artesian effect from Vaqueros outcrops in the mountain range north of the field, pressure in the Ellwood reservoir can rise no higher than hydrostatic.

With respect to possible tests, Ershaghi reiterated what he recommended in 2003, that putting 421 #2 on production for a period of time will have an immediate benefit of reducing reservoir pressure. And together with idling WD #1, or at least minimizing its use as an injector, producing 421 #2 will allow for a variety of testing types. We discussed the following tests: a fall-off test on WD #1 (longer than the 2002 test), a draw-down on 421 #2 when it is put on production, followed by a build-up test, plus monitoring the pressure in both WD #1 and 421 #2 during a full year of production followed by a year of shut-in. The results from the test should allow an estimation of the extent of aquifer influx by detecting the current oil-water interface, and confirm the sealing nature of the La Vigia fault. Horner will prepare a detailed test procedure, have it reviewed by Ershaghi, and then send it by letter to James Hemphill as soon as possible.

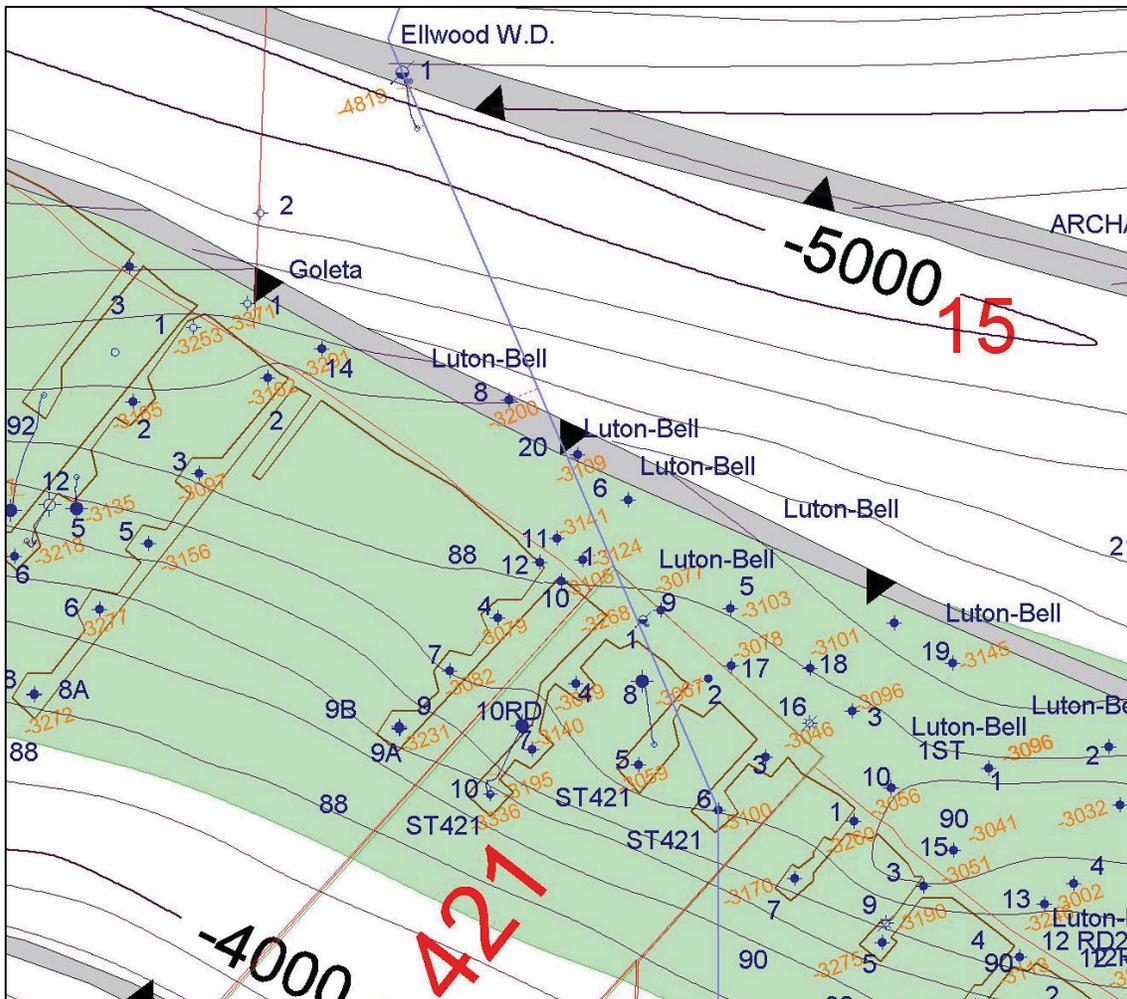
**Jeffrey W. Adams**  
Petroleum Reservoir Engineer

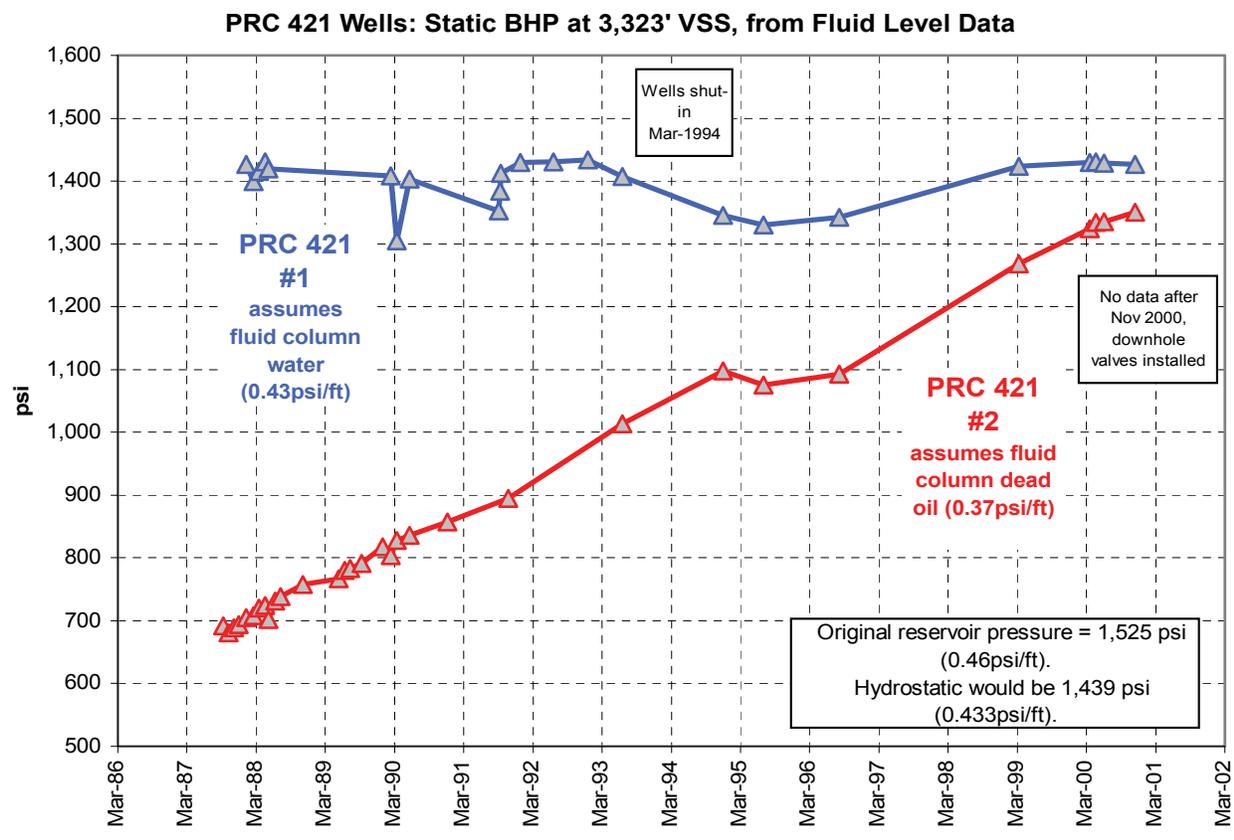
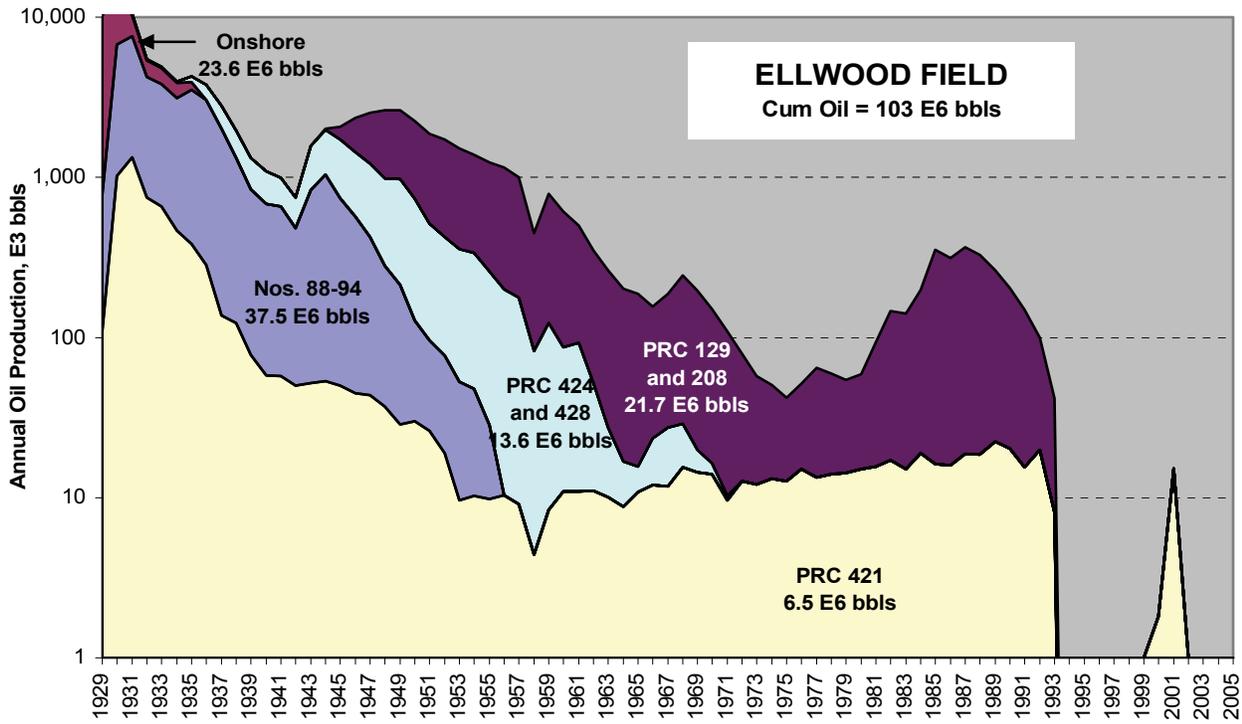
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James Hemphill  
Marina Voskanian  
Alex Reid

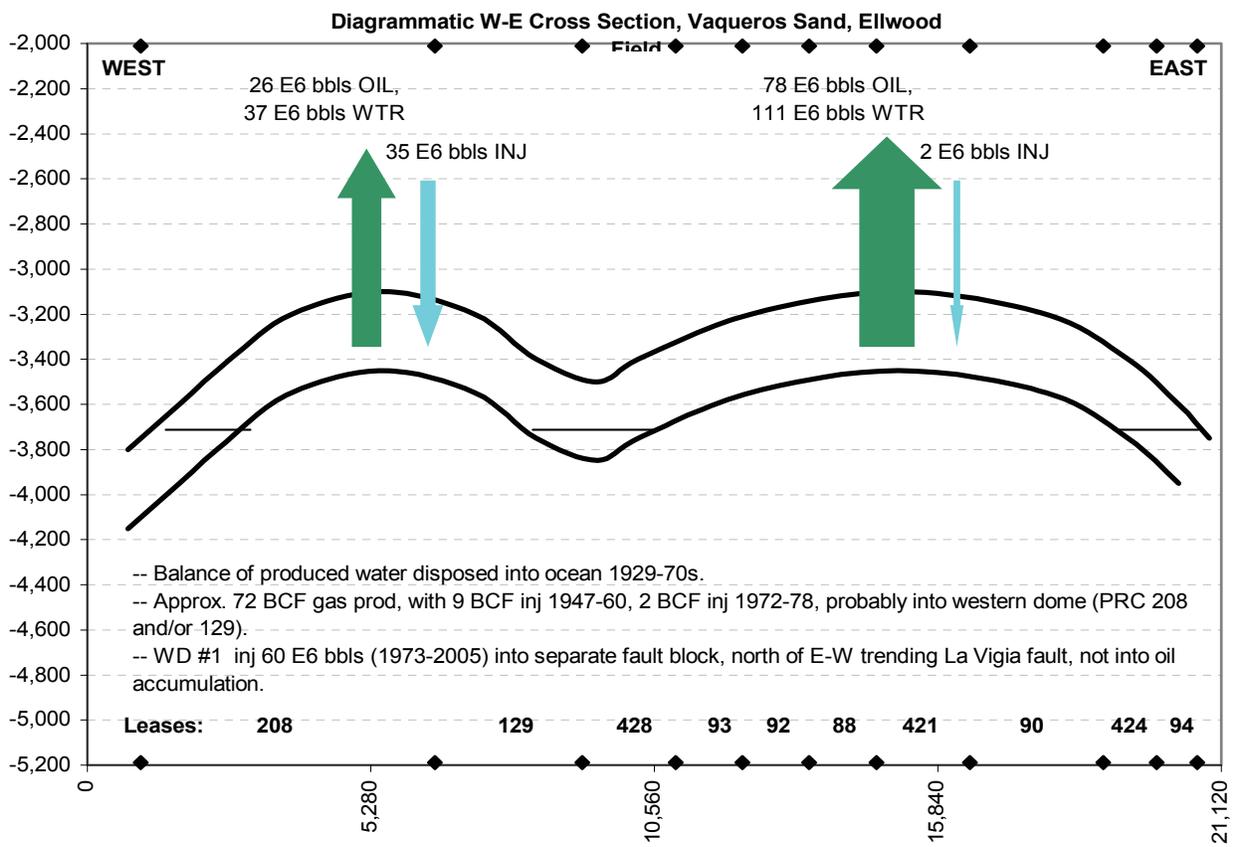
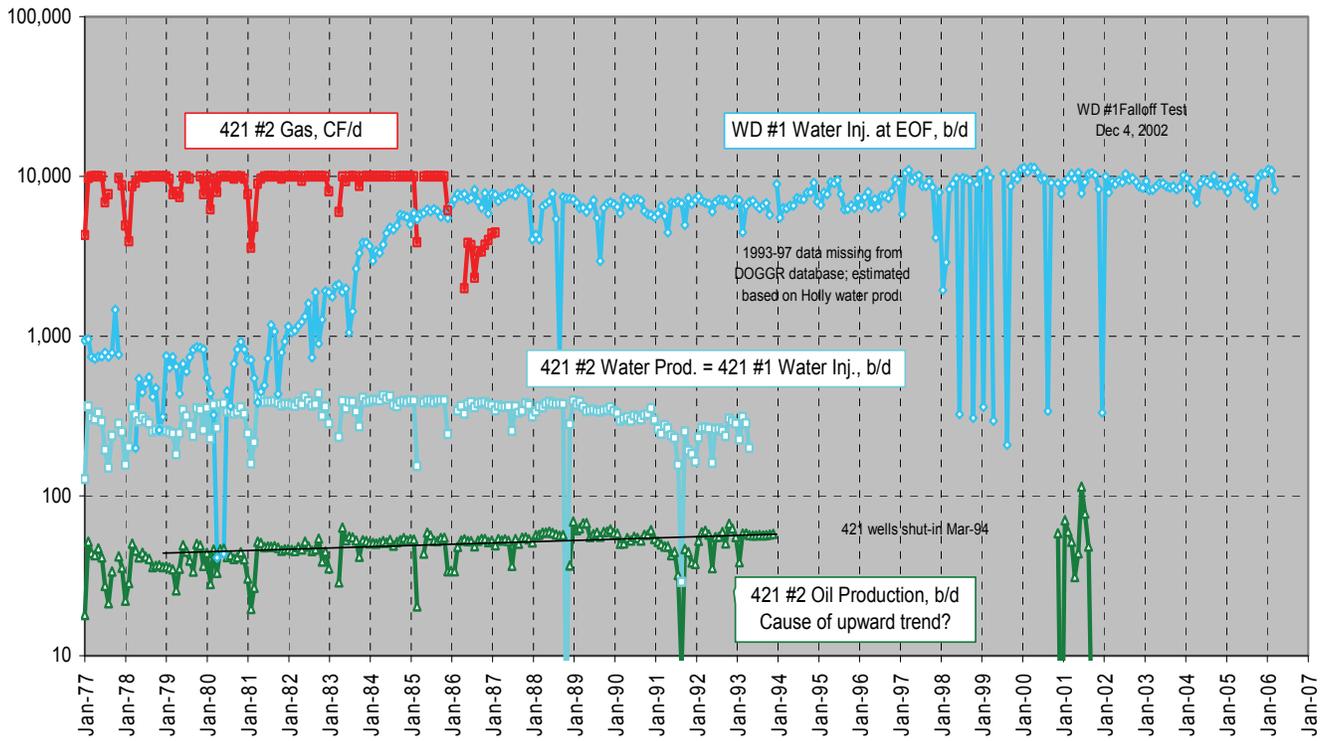


Above: Venoco's Structure Map of Ellwood Oil Field, 2004, contours on top of Vaqueros.

Below: Excerpt from same map showing relative locations of WD #1 and 421 wells.







### Estimated Time to see Pressure Response via Interference Testing

Calculations use following relationships, and assume no wellbore storage or skin.

$$P_D = [(k)(h)(\Delta p)/(141.2)(q)(\mu)(B)] \rightarrow t_D/r_D^2$$

$$\Delta t = [(t_D/r_D^2)(\phi)(\mu)(c_i)(r_w^2(r/r_w)^2)/(0.000264)(k)]$$

$t_D/r_D^2$  from Theis type curve, Fig.C.2 in SPE Monograph 5, Advances in Well Test Analysis

### Ershaghi's 2003 Calculations (adjusted for 2,500 ft instead of 1,000 ft)

Basic assumptions:  $k = 40$  md,  $h = 350$  ft,  $q = 1,000$  b/d,  $B = 1.1$ ,  $\phi = 0.25$ ,  $r_w = 0.5$  ft,  $r = 2,500$  ft

For  $\mu = 2$  cp and  $c_i = 4 \text{ E-6 psi}^{-1}$

$\Delta p$ , psi	$P_D$	$t_D/r_D^2$	$\Delta t$ , hrs	$\Delta t$ , days	$\Delta t$ , wks	$\Delta t$ , mos	$\Delta t$ , yrs
100	<b>4.51</b>	<b>4,000</b>	<b>4.73E+06</b>	197,285	28,184	6,490	541
10	<b>0.45</b>	<b>0.88</b>	<b>1,042</b>	43	6	1.4	0.12

For  $\mu = 10$  cp and  $c_i = 40 \text{ E-6 psi}^{-1}$

$\Delta p$ , psi	$P_D$	$t_D/r_D^2$	$\Delta t$ , hrs	$\Delta t$ , days	$\Delta t$ , wks	$\Delta t$ , mos	$\Delta t$ , yrs
100	<b>0.90</b>	<b>2.4</b>	<b>142,045</b>	5,919	846	195	16.2
10	<b>0.09</b>	<b>0.24</b>	<b>14,205</b>	592	85	19	1.62

Months or years required to see response of 10 psi or more.

Using Venoco's assumptions for  $k = 44$  md and  $c_i = 5.8 \text{ E-6 psi}^{-1}$

For  $\mu = 10$  cp

$\Delta p$ , psi	$P_D$	$t_D/r_D^2$	$\Delta t$ , hrs	$\Delta t$ , days	$\Delta t$ , wks	$\Delta t$ , mos	$\Delta t$ , yrs
100	<b>0.99</b>	<b>2.90</b>	<b>22,625</b>	943	135	31	2.58
10	<b>0.10</b>	<b>0.24</b>	<b>1,833</b>	76	11	3	0.21

For  $\mu = 2$  cp

$\Delta p$ , psi	$P_D$	$t_D/r_D^2$	$\Delta t$ , hrs	$\Delta t$ , days	$\Delta t$ , wks	$\Delta t$ , mos	$\Delta t$ , yrs
100	<b>4.96</b>	<b>8,000</b>	<b>1.25E+07</b>	520,116	74,302	17,109	1,425
10	<b>0.50</b>	<b>0.93</b>	<b>1.45E+03</b>	60	9	2.0	0.2

Similar results to above.

### Additional Calculations (based on Venoco's PTA modeling)

Assumes:  $k = 92$  md,  $h = 400$  ft,  $q = 700$  b/d,  $B = 1.1$ ,  $\phi = 0.257$ ,  $r_w = 0.5$  ft,  $r = 2,500$  ft,  $c_i = 5.8 \text{ E-6 psi}^{-1}$

For  $\mu = 1$  cp

$\Delta p$ , psi	$P_D$	$t_D/r_D^2$	$\Delta t$ , hrs	$\Delta t$ , days	$\Delta t$ , wks	$\Delta t$ , mos	$\Delta t$ , yrs
10	<b>3.38</b>	<b>350</b>	<b>134,251</b>	5,594	799	184	15.3

For  $\mu = 2$  cp

$\Delta p$ , psi	$P_D$	$t_D/r_D^2$	$\Delta t$ , hrs	$\Delta t$ , days	$\Delta t$ , wks	$\Delta t$ , mos	$\Delta t$ , yrs
10	<b>1.69</b>	<b>13.0</b>	<b>9,973</b>	416	59	14	1.1
2	<b>0.34</b>	<b>0.58</b>	<b>445</b>	19	3	0.6	0.05

Close to Venoco's model prediction: Approx. 1 month for 2 psi response; 1 year for 10 psi response.

## **TECHNICAL REVIEW OF VENOCO'S PROPOSAL TO CRUDE OIL PRODUCTION THE BEACHFRONT LEASE LOCATED ON STATE LEASE PRC-421**

### **1.0 INTRODUCTION**

The Beachfront Lease is located on State Lease PRC 421, adjacent to the Sandpiper Golf Course, near Hollister Avenue and Highway 101. The facilities occupy approximately 10,000 square feet of pier space. The well is not currently producing. Venoco is proposing to return these facilities to production. This would entail removal of old production equipment from Oil Piers 421-1 and 421-2, reactivation of the oil well on Pier 421-2 with the capacity of producing up to 500 BPD of Crude oil, installation of supporting pipeline and electric infrastructure between Pier 421-2 and the Ellwood Onshore Facility (EOF), and modification of facilities at the EOF to manage PRC 421 production.

### **2.0 SCOPE OF REVIEW**

This review is to be limited to the oil and gas production facilities required to lift the produced fluid to the surface, separate the oil water and gas, dispose of the water and gas and to transport the crude oil to existing Line 96. Decommissioning of Pier 421-1 and eventual decommissioning of Pier 421-2 are not included. Venoco's proposed production plan was reviewed along with two alternate plans.

#### **2.1 Proposed Project Key Components**

- Well 421-2 will be used as the production well for an estimated 20 years. (This is the projected time required to produce the recoverable reserves.)
- Electric Submersible Pump (ESP) to lift the Crude Oil.
- Transportation of the crude oil/gas/water in a 3" flow line protected inside an existing 6" line to the EOF
- Separation of oil/gas/water emulsion at the EOF.
- Mixture of PRC 421 production with that of Platform Holly for transport through Line 96 to the Plains All American Pipeline, LLC Coastal Pipeline.
- Rejection of the produced water and gas down injection well WD-1 at the EOF.

#### **2.2 Recommissioning Using Historic Methods Key Components**

- Well 421-2 will be used as the production well for an estimated 12 years. (This is the projected time required to produce the recoverable reserves.)
- Place a Gas Engine Powered Sucker Rod (similar to the original) to lift the Crude Oil.
- Transportation of the combined stream of oil, water and gas via 2" flow line, protected inside the 6" line to the Ellwood Onshore Facilities for Separation and water disposal.
- Crude oil and gas would be mixed with the Holly crude oil and gas streams.

## **2.3 Oil Processing on Pier 421-2 Key Components**

- Well 421-2 will be used as the production well for an estimated 20 years. (This is the projected time required to produce the recoverable reserves.)
- ESP to lift the Crude Oil.
- Cyclone separation of the Crude oil from the water and gas located at Pier 421-2.
- Rejection of the produced water and gas down Well 421-1.
- Transportation of the crude oil in a 2" flow line protected inside an existing 6" line to Line 96 and water/gas in a 2" flow line to well 421-1 inside the same 6" line.

## **3.0 DISCUSSION OF PROPOSED PLAN**

### **3.1 Electric Submersible Pump (ESP)**

Electric Submersible Pump (ESP) to lift the produced fluids is a proven technology that has been used for a number of years in the oil and gas industry. A multistage pump is placed in the casing below the liquid level. The variable speed electric motor use is to driver the pump. The pressure and flow rate is controlled by changing the speed of the pump. The pump is protected by a number of safety devices including under current, over current, RPM and down hole pressure.

The pump is designed to pump 1000BPD of well head fluid at 978 psig discharge pressure. With the pump placed at -2000 feet, the estimated Tubing Shut in Pressure is 415 psig at current frequency of 60 Hz.

The Production tubing, well head and valves through the Surface Safety Valve (SSV) are all rated at 3000 pisp, well above the 978 pumping down hole pressure and 415 psig SITP.

The SSSV and the SSV provide over pressure protection if required.

With the ESP installed down hole inside the casing there are the advantages of the equipment not being exposed to any wave action or potential noise pollution.

Venoco repaired the casing during the work over in 2002 and currently do not plan to do any additional testing prior to startup. The potential for leakage may be remote but a retest of existing casing would be prudent.

### **3.2 Transportation of the Crude Oil**

Transportation of the crude oil is in a 3" flow line protected inside an existing 6" line to the EOF. The existing 6" flow line is of unknown condition. It is planned to repair a segment of the line, clean the line, pressure test it, install a plastic liner and install the 3" flow lines inside the 6" line. The 6" line will provide mechanical protection for the 2" flow lines and containment should a leak develop in the flow line. The installation of a single line inside the 6" protective casing has the

advantage of either of the flow line coating being damaged during installation. This would mean a better corrosion protection.

The line will be monitored by a Pressure Switch High on the annulus. Electrical short tests are planned to ensure isolation between the 3" flow line and the 6" protective casing. If a leak developed in the 6" casing prior to a leak developing in the 3" flow line, the PSH would not trip.

The flow line could contain approximately 300 gallons of fluid when completely liquid packed. Consideration should be given to charging the annulus with 20 psig of nitrogen This would provide a means of monitoring both the 2" flow line leak by high pressure trip and a leak in the 6" casing by a low pressure trip.

Line 96 has a reported design pressure of 285 psig. The proposed production equipment and piping has a design pressure of 740 psig. The well SITP is 415 psig. Over pressure protection will need to be considered for Line 96.

#### **4.0 RECOMMISSIONING USING HISTORIC METHODS**

Well 421-2 will be used as the production well for an estimated 20 years (This is the projected time required to produce the recoverable reserves). A gas engine power sucker rod pump would be used to lift the crude oil to the surface. The technology is prove and was used in the early days of oil and gas production. It is still used in many oil fields throughout the world. This alternate proposal is being considered because it was used prior to production shut in.

It would require a fuel gas line to be laid from EOF to supply fuel for the Gas engine. There would be an increase in noise 24/7. The equipment would be exposed to the environment and the potential of wave forces during a storm.

Combined production of oil, water, and gas would be transported via 3" flow line, protected inside the 6" line to the EOF for separation and water disposal.

The line will be monitored by a Pressure Switch High on the annulus. Electrical short tests are planned to ensure isolation between the 2" flow lines and the 6" protective casing. If a leak developed in the 6" casing prior to a leak developing in the 2" flow line, the PSH would not trip.

The flow line could contain approximately 300 gallons of fluid when completely liquid packed. Consideration should be given to charging the annulus with 20 psig of nitrogen This would provide a means of monitoring both the 2" flow line leak by high pressure trip and a leak in the 6" casing by a low pressure trip.

## **5.0 OIL PROCESSING ON PIER 421-2**

### **5.1 Cyclone Separation**

Cyclone separation of the Crude oil from the water and gas is located at Pier 421-2 and would be exposed to the weather and potential wave forces. Cyclone separation is a proven technology and been used for a number years in the oil and gas industry. Cyclone liquid gas separation has been used well over 40 years and the liquid- liquid hydro-cyclone separation has been used for nearly 20 years.

The operating pressure of the separators is approximately 200 psig and the design pressure is 740 psig. Both Vessels will be designed and fabricated in accordance with ASME VIII pressure vessel code. Venoco has advised that they plan to install pressure safety valves (PSV) on each vessel to ensure thermal and fire over pressure protection.

It is planned to allow the PSV to discharge to the atmosphere with any liquids being collected in the open well cellar. Thermal or fire PSV normally do not need to operate. In this case, three conditions must exist, the vessel must contain liquids, the manual valves on the vessel which are normally opened for the system to operate must be closed and a heat source must be present such as a fire or the sun.

If the vessel were completely full of liquid, the volume would be approximately 270 gallon.

The separators and associated instruments, valves and equipment will be connected either with flanges, hubs, screwed connections which provide potential crude oil and gas leakage points. Equipment such as this would normally be located in an area where it would not be exposed to potential wave action.

### **5.2 Rejection of the Produced Water and Gas Down Well 421-1**

Rejection of the produced water and gas down Well 421-1 is located within a few hundred yards of the producing well. As with 421-2, the injection well's casing was repaired and tested as part of the 2002 work over. The required injection pressure is outside the scope of this review, but with 3000 psig well head tubing design pressure the system is capable of containing the ESP pump pressure.

### **5.3 Transportation of the Crude Oil**

Transportation of the crude oil is in a 2" flow line protected inside an existing 6" line to line 96 and water/gas in a 2" flow line to well 421-1 inside the same 6" line. The existing 6" flow line is of unknown condition. It is planned to clean the line, pressure test it, install a plastic liner and install two 2" flow lines inside the 6" line. The 6" line will provide mechanical protection for the 2" flow lines and containment should a leak develop in the flow line.

**Section 9812 – Santa Barbara County  
ACP5**



Map of Santa Barbara County Showing Three Coastal Reaches and Included Ecologically Sensitive Sites

## Section 9812 - Santa Barbara County

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Section 9812.3 Economic Sites

Section 9812.4 Shoreline Operational Divisions

Section 9812.5 Shoreline Access

## 9812.1 Environmentally Sensitive Sites

The purpose of this section is to provide background, definitions, and philosophy behind the Site Summary and Strategy Sheets in ACP Section 9800. Both Federal and State laws require that sites having special ecological sensitivity be identified and provisions be made to protect or otherwise mitigate for the site impacts from spills. In California these locations are termed "Sensitive Sites". A narrative and diagram of each site with specific ecological and operational information has been developed.

The development of specific protection strategies to meet the site specific needs was conducted using a standardized protocol to ensure consistency for California's entire coast. The process of site visits, training exercises, and discussions allows trustees and response experts to exchange concerns and feasibility limitations in forming protection strategies. Using this approach, the local area committee incorporates input of State and Federal trustees, and stakeholders (industry, spill response co-ops and contractors, non-governmental environmental groups, and other agencies) to form consensus on the appropriate site protection strategies and response resources. The committee will revise strategies based on new knowledge and to adapt to changing conditions.

The environmental sensitivity differs by location or season depending on conditions or the presence of species. A ranking index was developed in order to identify the relative protection priority of sites. These ranks define the environmental sensitivity of the area and its resources at risk. Accordingly each site is ranked A, B, or C based on the following definitions:

**Category A - Extremely Sensitive** - first priority for protection:

Wetlands, estuaries and lagoons with emergent vegetation (marsh-riparian ESI 10) Sheltered tidal flat (ESI 9); and Habitats for rare, threatened or endangered species (State or Federal); Sites of significant concentrations of vulnerable and sensitive species (e.g. pinniped pupping)

**Category B - Very Sensitive** - second priority for protection

Major pinniped haulout areas during non-pupping seasons; Moderate concentrations of vulnerable and sensitive species; other low energy habitats (ESI types 8A, 8B, 7 and 6B)

**Category C - Sensitive** - third priority for protection

Higher energy habitats (ESI 6A through 1) for example: *Habitats important to large numbers of species of sport, commercial value, and scientific interest or species experiencing significant population declines though not yet threatened.*

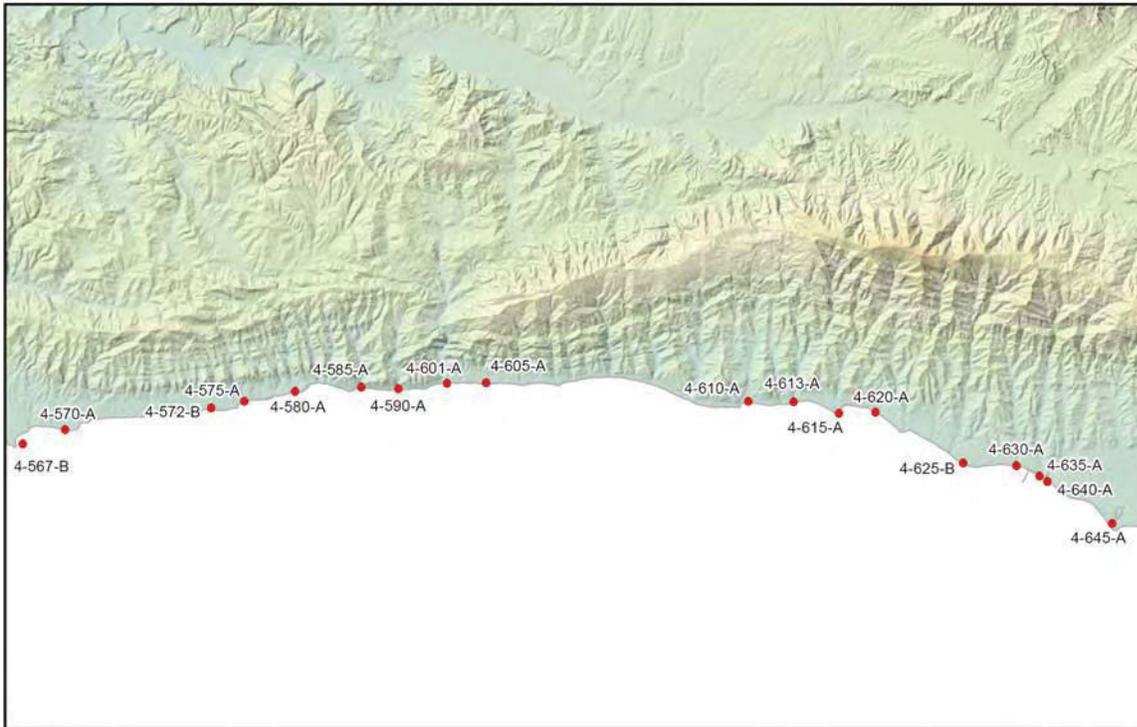
This section provides detailed information on Environmentally Sensitive Sites in Santa Barbara County. Each site is described on three sections: Site Summary, Site Strategy, and Diagram. The Site Summary page provides a brief description of the site including location, access, specific concerns, agency contacts, etc. The Site Strategy page provides specific information on response strategies to be implemented to protect the site from marine oil spills as well as recommended resources, site logistics, and access

information. These Site Strategies are intended as guidelines to assist responders during the initial hours of a spill response. The Diagram page shows the protection strategies, topography and roads.

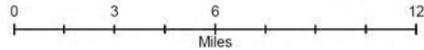
The intent of the site strategies is to provide initial recommendations to protect the site until actual conditions and needs at sensitive sites can be determined to provide appropriately modified strategies. In other words, strategies presented here are flexible and may require modification in real response situations. The strategies provided here are the best available response options for foreseeable typical wind and current conditions at the respective sites. Those conditions may not prevail at the time of the spill. Responders and planners may need to adjust strategies to meet the needs presented by prevailing conditions; following the initial emergency response many sites may have alternative strategies to accommodate differences in conditions.

Most sites have more than one protection strategy. These additional strategies may be used as back-ups to the primary protection strategy or as alternatives to accommodate prevailing conditions. It should be understood that the described strategies are intended as initial protection strategies for the first 24 hours of a spill. Additional or modified protection measures should also be considered.

## Santa Barbara County West – Sensitive Sites



● Sensitive Site



Source: K. Wilson, J. Curtis

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4-590-A	Canada Del Agua Caliente	75
4-601-A	Gaviota Creek	79
4-605-C	Canada Del Alcatraz & Cementario Creeks	83
4-610-A	Refugio Creek	87
4-613-A	Corral-Las Flores Creeks	91
4-615-A	El Capitan Creek	95
4-620-A	Las Llagas (El Capitan Ranch Beach)	99
4-625-B	Naples	103
4-630-C	Eagle Canyon Creek	107
4-635-A	Tecolote Creek	111
4-640-A	Bell Canyon Creek	115
4-645-A	Devereaux Slough	119

County	USGS Quad	Thomas Guide Location	NOAA Chart	Latitude N	Longitude W
Santa Barbara	Dos Pueblos Cany	993 D-E x 2-3	18721	34.4267	119.9083
<b>Last Page Update:</b>					10/1/2005

**SITE DESCRIPTION:**

Bell canyon creek is a moderate sized creek with a well developed lagoon just west of sandpiper golf course; the sand berm which develops during summer is usually relatively low and the lagoon is subject to wash over especially during high tides. The creek flow during winter is usually enough to breach the berm. The beaches to the east and west are of fine to medium-grained sand, and often have very high volumes of debris (mostly wood and kelp) especially after rains. The Venoco oil facility lies 1/4 mile inland (see remarks).

**SEASONAL and SPECIAL RESOURCE CONCERNS**

Whenever lagoon mouth is open or subject to high tide wash over wetland biota are at risk.

**RESOURCES OF PRIMARY CONCERN**

Wetland biota: including Tidewater goby and possibly Steelhead trout; plus waterfowl and marsh vegetation

Waterfowl, seabirds (including Brown pelicans) and various shorebirds.

Sea otters have been known to pass through the area.

**CULTURAL, HISTORIC, and ARCHEOLOGICAL SENSITIVITIES**

Cultural, Historical, and Archeological sites are known to exist in the area, however, the exact locations of these sites must be ascertained by contacting the Native American Heritage Commission at (916) 653-4082 and State Office of Historical Preservation (916) 653-6624, and/or the Central Coast Archeological Information Center (805) 893-2474.

**KEY CONTACTS: Trustee (T); Entry/Owner/Access (E); Cultural (C); or Other Assistance (O)**

Type	Name and Title	Organization	Phone (1st)	Phone (2nd)
	Mike Glassow	Central Coast Archeological Information Center	(805) 893-2474	
	Dave Ono Marine Biologist	DFG - Marine Region (Fisheries)	(805) 569-1221	
	Kristine Barsky Marine Biologist	DFG - Marine Region (Nearshore Species)	(805) 985-3114	
	Maurice Cardenas Fisheries Biologist	DFG - South Coast Reg 5 (Freshwater Species)	(805) 640-1852	
	Morgan Wehtje Wildlife Biologist	DFG - South Coast Reg 5 (Habitat)	(805) 491-3571	
	Stan Glowacki	NMFS - Steelhead	(562) 980-4061	(562) 980-4000
	Greg Villeneuve Vice Pres Golf Operation	Sandpiper Golf Course (Access)	(805) 968-1541	(805) 698-8332
		USFWS Ventura Office - Federally listed T/E species	(805) 644-1766	
		Venoco - Ellwood Plant (Emergency Numbers)	(805) 961-2339	(805) 961-2375
	Tony Martinez	Venoco (Ellwood Plant & Platform Gilda)	(805) 961-2301	
	Jeff MacDonald Ellwood Ops Supervisor	Venoco (Ellwood Plant & Platform Holly)	(805) 961-2301	(805) 455-9666

**ADDITIONAL SITE SUMMARY COMMENTS:**

Excellent aerial photo of site can be found on the California Coastal Records Project website (<http://www.californiacoastline.org/>). Image number of site: 200404648

**REFERENCES:**

1. RPI-ESI MAPS SOUTHERN CAL ATLAS
2. INVENTORY OF COASTAL WETLANDS IN SANTA BARBARA COUNTY - INTERIM REPORT. R. AMBROSE. 1993.

<b>County</b>	<b>USGS Quad</b>	<b>Thomas Guide Location</b>	<b>NOAA Chart</b>	<b>Latitude N</b>	<b>Longitude W</b>
Santa Barbara	Dos Pueblos Cany	993 D-E x 2-3	18721	34.4267	119.9083

<b>Last Page Update:</b>	10/1/2005
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**CONCERNS and ADVICE to RESPONDERS:**

Primary spill threats from inland and marine sources. The primary objectives are to exclude oil from lagoon, pre-clean debris, and clean oil from shorelines. The lagoon is habitat for a Threatened/Endangered fish and other sensitive species. Animals and habitat can be injured by oil and response/cleanup activities unless responders minimize disturbance in stream, lagoon, and associated vegetation; avoid trampling oil into sediments; and follow protective conditions from IC and resource biologists.

**HAZARDS and RESTRICTIONS:**

Water Contamination - Unhealthy levels of coliform bacteria have been found intermittently in streams and on beaches in the Santa Barbara County area. Check with the Santa Barbara Ocean Quality Hotline, 805-681-4949, regarding health conditions prior to engaging in any activities which would require direct water contact. Use appropriate PPE, safety procedures, and include reference to potential health problems in any site safety plan.

**SITE STRATEGIES**

In the event of an inland spill it is important to control, confine, and recover as much of the oil as close to the source of discharge as possible using off-stream containment and collection methods. Unless otherwise stated, the strategies and equipment described below are for marine spills. However, they can be adapted for inland spills when the need arises. Resource needs will vary depending upon the location of the spill source, topography, existing habitat and biota, stream flows, and weather conditions.

**Strategy 4-640.01 Objective: Berming - Prevent oil from contaminating the inlet when it is subject to tidal influence, low flows are present, and/or wave washover could occur if berm materials are present.**

Berming - First, consult with resource trustees regarding wildlife issues before undertaking this activity. Build an earthen berm across the mouth of the inlet using onsite materials obtained from unvegetated areas below the high tide line to minimize damage to wildlife and habitat. Install under flow pipes in the berm to allow through flows and/or a spillway with a filter barrier to accommodate flow increases as weather conditions dictate. Cover the berm with sheet plastic to minimize erosion. Second, back the berm with swamp and sorbent booms to prevent contamination from entrainment, leakage and or washover. If there is skimmable oil present, deploy sorbents and contact the IC immediately regarding the use of skimmers and or other mechanical means for collecting oil. Monitor berm and associated features to maintain their integrity and effectiveness.

**Strategy 4-640.02 Objective: Booming - Deploy exclusion booms across the inlet entrance to protect sensitive species and habitats when suitable berm building materials are unavailable, water flows are too great, or water depths are too great for berming.**

Booming - Deploy exclusion booms across the inlet to minimize the likelihood of oiling the estuary. Place the booms in a configuration which forms an oil collection pocket which can be adjusted to accommodate changes in flow direction. Back exclusion booms with sorbent booms to minimize leakage. Line the shorelines and any side channels within the inlet to prevent collateral oiling. If there is skimmable oil present, deploy sorbents and contact the IC immediately regarding the use of skimmers and or other mechanical means for collecting oil. Monitor, adjust, and replace booms at least 2 x per day to maintain their integrity and effectiveness.

**Strategy 4-640.03 Objective: Shoreline Precleaning - Prevent oiling of kelp, driftwood, vegetative debris, trash, and other materials to reduce collateral contamination and disposal problems.**

Shoreline Precleaning - Consult with resource trustees regarding wildlife issues before undertaking this activity. Remove and store kelp, driftwood, vegetative debris, trash, and other materials which could become oiled and create environmental hazards and disposal problems. Pre-cleaning of debris from shorelines will be conducted by hand crews to the greatest practical extent to minimize disturbance to wildlife and their habitats. If heavy equipment or vehicles are required for this operation, request consultation from resource trustees and contact the IC for authorization. Segregate and dispose trash. Replace unoiled debris in its former location once the threat of oiling is past.

**Table of Response Resources**

Strategy Number	Harbor Boom	Swamp Boom	Other Boom Amount and Type	Sorb Boom	Anchoring Systems		Boom Boats	Skiffs	Skimmers		Staff	
					Num	Type and Gear			Num and Type	Deploy	Tending	

4-640.01		400		400	4							
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**Special Equipment:** 1 Front End Loader, 1 Roll Plastic, 3 Culvert Pipes, 20 Sand Bags, 15 Stakes (metal), 1 Stake Driver, 10ft Construction Fencing, 1 Hand Tools

4-640.02		400		400	8			1	1		5	2
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**Special Equipment:** 1 Waste Bin (20 yd), 1 Portable Oil Storage Tank OR Vacuum Truck

4-640.03

5

Special Equipment: 1- Vehicle (4wd), 100 Trash Bags, 1 Hand Tools

### LOGISTICS

**DIRECTIONS: to site (by land and/or by water, to nearest launch ramp and are access permits required.)**

From us 101 (west of S.B.) take Hollister Ave. Exit, towards ocean; turn right into Sandpiper Golf Course and continue right to the Ellwood plant. Good access from the Ellwood plant.

### LAND ACCESS:

A. Access - Shorelines and streams in this site are accessible only through private property. Contact the landowner for permission to enter and information on road conditions. Beach access roads may require regrading before vehicles can enter or exit beaches. Barriers to longshore movement are variable according to tide and sand levels. Area may not be accessible in wet weather.

B. Access for ATV, 4-WD, and Heavy Equipment on beach.

### WATER LOGISTICS:

Limitations: depth, obstructions:

Launching, Loading, Docking and Services Available: Santa Barbara Harbor is the nearest full service civilian harbor for full service berthing, launching and fueling. Response vessels could be loaded and small boats can be launched at Gaviota Pier with permission from State Beaches and Parks. Larger vessels can be loaded at Ellwood Pier with permission from Venoco and at Goleta Pier with permission from Santa Barbara County Parks.

### FACILITIES, STAGING AREAS, POSSIBLE FIELD POSTS AND EQUIPMENT AVAILABLE:

LOGISTICS:

Potential Staging Area: Ellwood Plant

Potential Command Post: Ellwood Plant

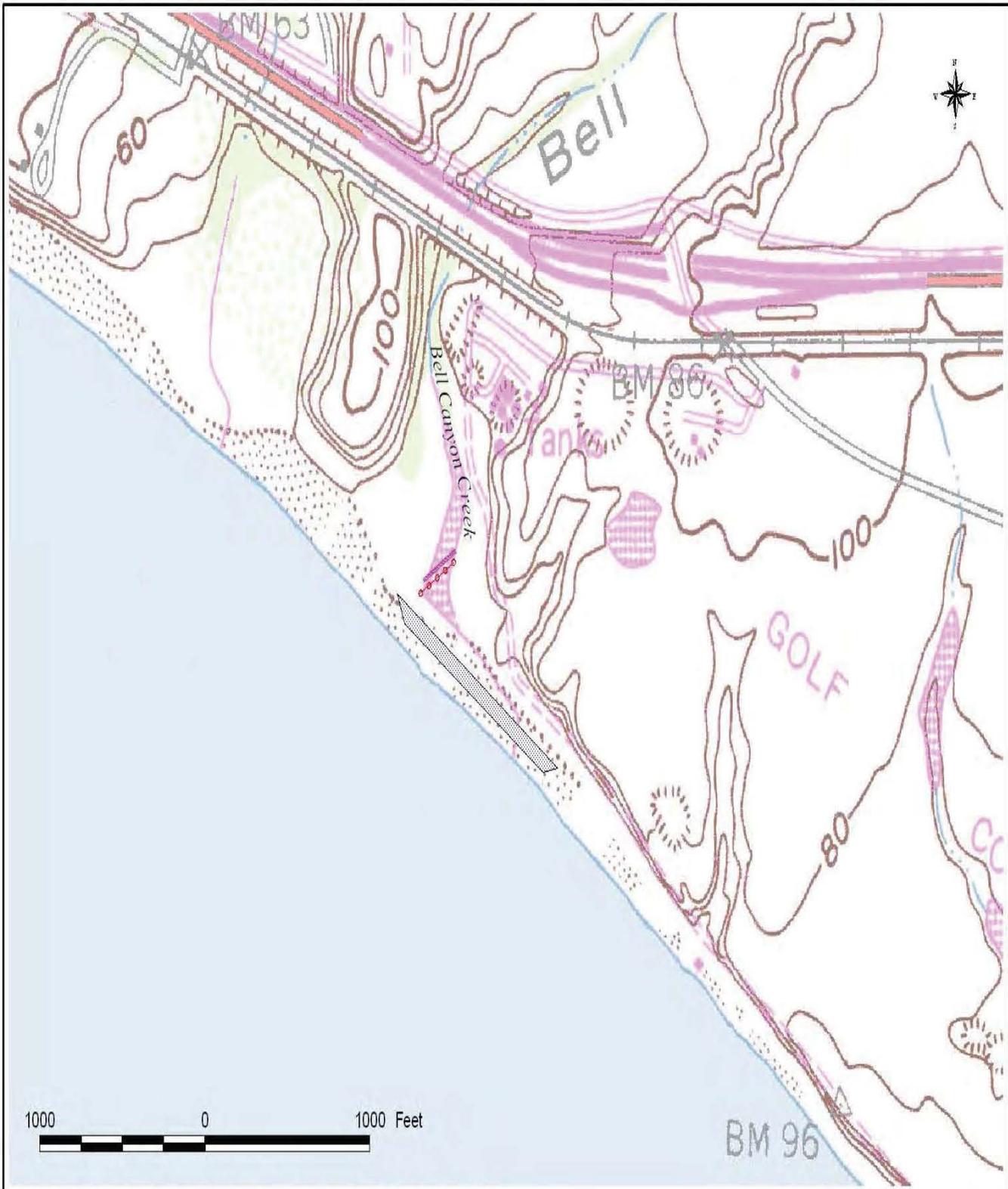
Closest Airport: Santa Barbara AP is 5 miles east.

### COMMUNICATIONS PROBLEMS:

### ADDITIONAL OPERATIONAL COMMENTS:

REMARKS CONT=D.

1. MONITOR STATUS OF BELL CANYON CREEK MOUTH - NATURAL SAND BERM DEVELOPMENT IS OFTEN POOR, OFFERING LITTLE PROTECTION.
2. THE VENOCO (formerly MOBIL) ELLWOOD ONSHORE FACILITY PROCESSES AND TRANSFERS OIL AND SOME NATURAL GAS FROM OFFSHORE THE PLATFORM, HOLLY. THE PLANT HAS SEVERAL TANKS BUT IS NOT AN OIL STORAGE FACILITY. VENOCO ALSO HAS A MARINE TERMINAL LOCATED APPROXIMATELY 2 MILES EAST OF THE OIL AND GAS PROCESSING FACILITY WHICH HAS TWO 65,000 BBL TANKS.
3. THIS SITE IS A REMOTE BEACH AND SO HAS RELATIVELY LOW PUBLIC RECREATIONAL USE (primary uses are surfing, and walking), HOWEVER, THE SANDPIPER GOLF COURSE AND THE BACARA SPA AND RESORT ARE LOCATED IN THE IMMEDIATE VICINITY THE ONSHORE FACILITY AND THE MARINE TERMINAL AND SHOULD BE CONSIDERED DURING ANY RESPONSE ACTIVITIES.



CALIFORNIA DEPARTMENT OF FISH & GAME (OSPR) and UNITED STATES COAST GUARD  
 Site Number: 4-640-A Site Name: BELL CANYON CREEK

Ken Wilson (OSPR) & MSTC Seibel USCGR  
 Date: 04/MAY/05

- Harbor Boom
- Swamp Boom
- Other Boom
- Dike or Berm
- Excelsior Fence
- sss / sfs
- tsa / sps
- tba/voo

County	USGS Quad	Thomas Guide Location	NOAA Chart	Latitude N	Longitude W
Santa Barbara	Hurricane Deck	993 H x 4-5	18721	34.7500	119.8783
<b>Last Page Update:</b>					10/1/2005

**SITE DESCRIPTION:**

Lies just north of Coal Oil point. This 45 acre slough contains freshwater emergent vegetation, salt marsh, tidal flats and sand dune habitats. The mouth is generally cut off from the ocean by a well developed sand berm except during heavy rainfall. East and West of the slough are extensive medium-grained sand beaches backed by vegetated dunes. Large surf and strong winds are common, especially in winter. The slough is part of the larger coal oil point natural reserve, managed by the University of California at Santa Barbara.

**SEASONAL and SPECIAL RESOURCE CONCERNS**

Whenever the slough is open to the ocean, typically only during heavy rainfall, wetlands biota are at risk.

**RESOURCES OF PRIMARY CONCERN**

Intermittent coastal wetlands.

Western snowy plovers (all year), California least terns (Apr-Sep), American coot, American wigeon, Black-crowned night heron, Canvasback, Green winged teal (Mar-Jul), Mallard, Pintail, Red-breasted merganser.

Sea otters have been known to move through the area.

California spiny lobster.

Tidewater goby (Aug-Nov).

Eelgrass, Surfgrass.

**CULTURAL, HISTORIC, and ARCHEOLOGICAL SENSITIVITIES**

Cultural, Historical, and Archeological sites are known to exist in the area, however, the exact locations of these sites must be ascertained by contacting the Native American Heritage Commission at (916) 653-4082 and State Office of Historical Preservation (916) 653-6624, and/or the Central Coast Archeological Information Center (805) 893-2474.

**KEY CONTACTS: Trustee (T); Entry/Owner/Access (E); Cultural (C); or Other Assistance (O)**

Type	Name and Title	Organization	Phone (1st)	Phone (2nd)
	Mike Glassow	Central Coast Archeological Information Center Devereux Foundation	(805) 893-2474 (805) 968-2525	
	Dave Ono Marine Biologist	DFG - Marine Region (Fisheries)	(805) 569-1221	
B	Kristine Barsky Marine Biologist	DFG - Marine Region (Nearshore Species)	(805) 985-3114	
B	Maurice Cardenas Fisheries Biologist	DFG - South Coast Reg 5 (Freshwater Species)	(805) 640-1852	
	Morgan Wehtje Wildlife Biologist	DFG - South Coast Reg 5 (Habitat)	(805) 491-3571	
	UCSB	UCSB (Environmental Health and Safety) UCSB Campus Police - Dispatch 24 Hr #	(805) 893-3194 (805) 893-3447	(805) 448-4089
	Cristina Sandoval Director - COP Reserve	UCSB Natural Reserve Sys. (Coal Oil Point) USFWS Ventura Office - Federally listed T/E species	(805) 451-2403 (805) 644-1766	(805) 893-4127

**ADDITIONAL SITE SUMMARY COMMENTS:**

Excellent aerial photo of site can be found on the California Coastal Records Project website (<http://www.californiacoastline.org/>). Image number of site: 200404680 to 200404683

REFERENCES: 1. "CALIFORNIA COASTAL RESOURCE GUIDE" AND "CALIFORNIA COASTAL ACCESS GUIDE" BY THE CALIFORNIA COASTAL COMMISSION. 2. "INVENTORY OF COASTAL WETLANDS IN SANTA BARBARA COUNTY". INTERIM REPORT. BY: R. AMBROSE. 1993. 3. PROPOSED "WESTERN SNOWY PLOVER CRITICAL HABITAT". BY: USFWS - VENTURA FIELD OFFICE. 4. "COASTAL INLET PROTECTION STRATEGIES FOR OIL SPILL RESPONSE - VOLUME 1." BY: RESEARCH PLANNING INC. 1993. 5. A\*TIDEWATER GOBY 1996 DRAFT RECOVERY PLAN.

<b>County</b>	<b>USGS Quad</b>	<b>Thomas Guide Location</b>	<b>NOAA Chart</b>	<b>Latitude N</b>	<b>Longitude W</b>
Santa Barbara	Hurricane Deck	993 H x 4-5	18721	34.7500	119.8783

<b>Last Page Update:</b>	10/1/2005
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**CONCERNS and ADVICE to RESPONDERS:**

Primary spill threat from marine source. The primary objectives are to exclude oil from lagoon, pre-clean debris, and clean oil from shorelines. The lagoon is habitat for a Threatened/Endangered (T/E) fish. Two T/E birds nest in the dunes and upper beaches south of the River from Mar-Sept. Animals and habitat can be injured by oil/response activities unless responders minimize disturbance in lagoon, and associated vegetation; avoid disturbing the dunes and upper beaches; and only drive vehicles on wet sand; avoid trampling oil into sediments and follow protective conditions from IC and resource biologists.

**HAZARDS and RESTRICTIONS:**

Water Contamination - Unhealthy levels of coliform bacteria have been found intermittently in streams and on beaches in the Santa Barbara County area. Check with the Santa Barbara Ocean Quality Hotline, 805-681-4949, regarding health conditions prior to engaging in any activities which would require direct water contact. Use appropriate PPE, safety procedures, and include reference to potential health problems in any site safety plan.

**SITE STRATEGIES**

**Strategy 4-645.01 Objective: Booming - Deploy exclusion booms across the inlet entrance to protect sensitive species and habitats when suitable berm building materials are unavailable, water flows are too great, or water depths are too great for berming.**

Booming - Deploy exclusion booms across the inlet to minimize the likelihood of oiling the estuary. Place the booms in a configuration which forms an oil collection pocket which can be adjusted to accommodate changes in flow direction. Back exclusion booms with sorbent booms to minimize leakage. Line the shorelines and any side channels within the inlet to prevent collateral oiling. If there is skimmable oil present, deploy sorbents and contact the IC immediately regarding the use of skimmers and or other mechanical means for collecting oil. Monitor, adjust, and replace booms at least 2 x per day to maintain their integrity and effectiveness.

**Strategy 4-645.02 Objective: Berming - Prevent oil from contaminating the inlet when it is subject to tidal influence, low flows are present, and/or wave washover could occur if berm materials are present.**

Berming - First, consult with resource trustees regarding wildlife issues before undertaking this activity. Build an earthen berm across the mouth of the inlet using onsite materials obtained from unvegetated areas below the high tide line to minimize damage to wildlife and habitat. Install under flow pipes in the berm to allow through flows and/or a spillway with a filter barrier to accommodate flow increases as weather conditions dictate. Cover the berm with sheet plastic to minimize erosion. Second, back the berm with swamp and sorbent booms to prevent contamination from entrainment, leakage and or washover. If there is skimmable oil present, deploy sorbents and contact the IC immediately regarding the use of skimmers and or other mechanical means for collecting oil. Monitor berm and associated features to maintain their integrity and effectiveness.

**Strategy 4-645.03 Objective: Shoreline Precleaning - Prevent oiling of kelp, driftwood, vegetative debris, trash, and other materials to reduce collateral contamination and disposal problems.**

Shoreline Precleaning - Consult with resource trustees regarding wildlife issues before undertaking this activity. Remove and store kelp, driftwood, vegetative debris, trash, and other materials which could become oiled and create environmental hazards and disposal problems. Pre-cleaning of debris from shorelines will be conducted by hand crews to the greatest practical extent to minimize disturbance to wildlife and their habitats. If heavy equipment or vehicles are required for this operation, request consultation from resource trustees and contact the IC for authorization. Segregate and dispose trash. Replace unoiled debris in its former location once the threat of oiling is past.

**Table of Response Resources**

Strategy Number	Harbor Boom	Swamp Boom	Other Boom Amount and Type	Sorb Boom	Anchoring Systems		Boom Boats	Skiffs	Skimmers		Staff	
					Num	Type and Gear			Num and Type	Deploy	Tending	
4-645.01		600		600	6			1	1		5	2
Special Equipment: 1 Stake Driver, 40 Stakes, 1 Waste Bin (20 yd), 1 Portable Oil Storage Tank OR Vacuum Truck												
4-645.02		400		400	4							
Special Equipment: 1 Front End Loader, 1 Roll Plastic, 3 Culvert Pipes, 20 Sand Bags, 15 Stakes (metal), 1 Stake Driver, 10ft Const. Fencing, 1 Waste Bin (20 yd), 1 Portable Oil Storage Tank, 1 Hand Tools												
4-645.03											5	
Special Equipment: 1- Vehicle (4wd), 100 Trash Bags, 1 Hand Tools												

**LOGISTICS**

**DIRECTIONS:** to site (by land and/or by water, to nearest launch ramp, and are access permits required.)

ACP 4 - LALB North

Section 9812.1-120

From U.S. 101, North of Santa Barbara, take Storke road exit - south to Isla Vista (residential district for UCSB). At the corner of storke and el colegio roads, take slough road, south west to the reserve area parking lot (see map page 144-a).

**LAND ACCESS:**

A. Access - Shorelines and streams in this site are accessible only through private property. Contact the landowner for permission to enter and information on road conditions. Beach access roads may require regrading before vehicles can enter or exit beaches. Barriers to longshore movement are variable according to tide and sand levels. Area may not be accessible in wet weather.

B. Access for ATV, 4-WD, and Heavy Equipment on beach.

**WATER LOGISTICS:**

Limitations: depth, obstructions:

Launching, Loading, Docking and Services Available: Santa Barbara Harbor is the nearest full service civilian harbor for full service berthing, launching and fueling. Response vessels could be loaded and small boats can be launched at Gaviota Pier with permission from State Beaches and Parks. Larger vessels can be loaded at Ellwood Pier with permission from Venoco and at Goleta Pier with permission from Santa Barbara County Parks.

**FACILITIES, STAGING AREAS, POSSIBLE FIELD POSTS AND EQUIPMENT AVAILABLE:**

Staging area: Coal Oil Point Reserve parking

Potential command post sites: Contact Devereux Foundation or UCSB. Also, UCSB Cliff House: operated by university center, 805-893-3961, is a potential on site command post.

Closest airport is in Santa Barbara, 2.5 miles east.

**COMMUNICATIONS PROBLEMS:****ADDITIONAL OPERATIONAL COMMENTS:**

Due to the probable occurrence of Snowy plovers and/or Least terns at this site, please review the Sandy Beach Site Summary and Strategies (Site 4-000-A) for information on response operations when dealing with these sensitive species.

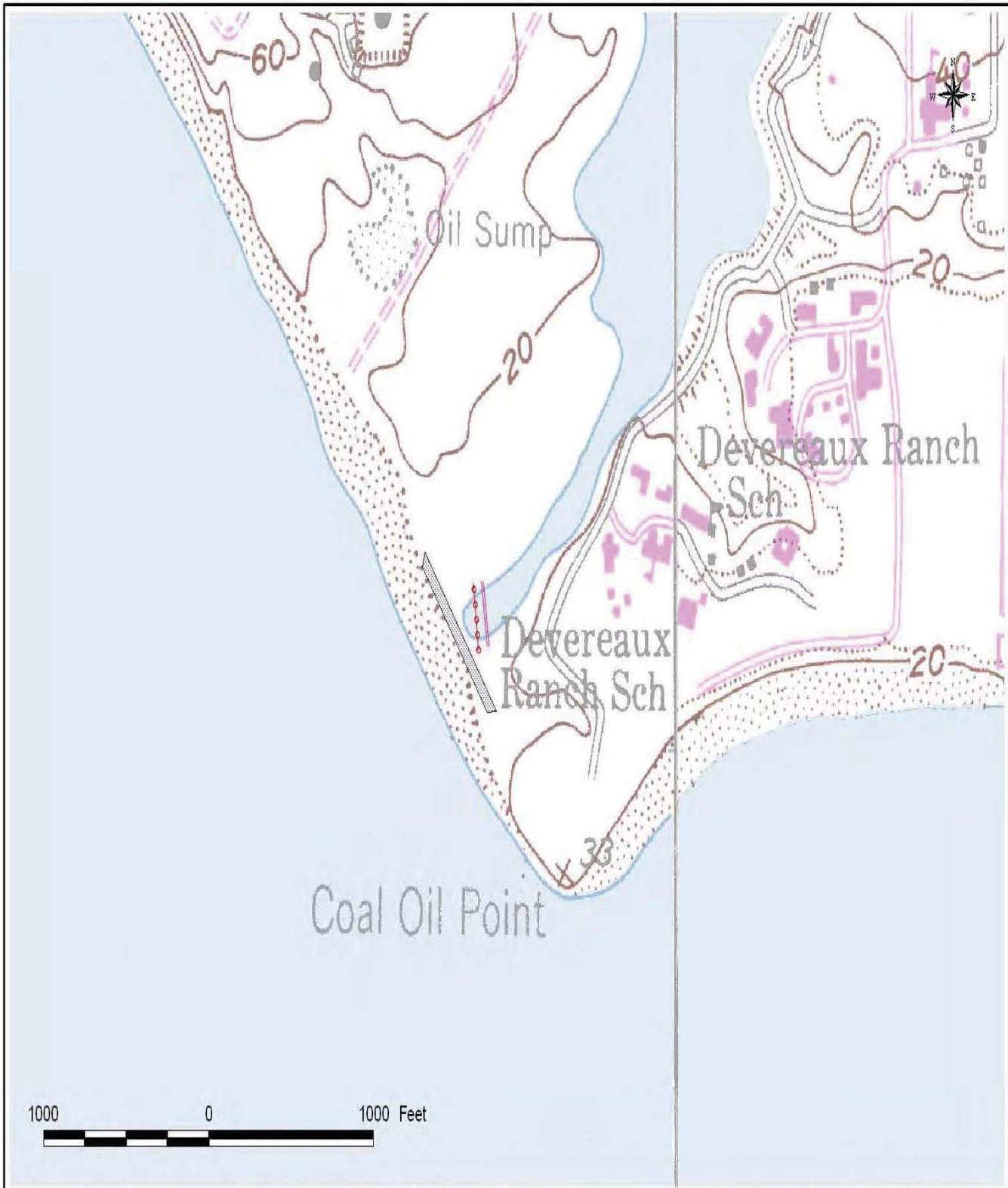
1. MONITOR STATUS OF MOUTH.
2. RESPONSE ACTIVITIES SHOULD AVOID IMPACTING FRAGILE DUNE VEGETATION.
3. UCSB HAS A WETLAND MANAGEMENT PLAN FOR DEVEREAUX SLOUGH.
4. MODERATE RECREATIONAL USE (primarily surfing) ESPECIALLY DURING SUMMER.
5. KNOWN OIL PIPELINES: Undetermined
6. KNOWN ARCHAEOLOGICAL SITES: Undetermined

**FOR ADDITIONAL INFORMATION:**

1. ENVIRONMENTAL SENSITIVITY INDEX (ESI) MAPS: SOUTHERN CALIF ATLAS. RPI

**SPECIAL CONSIDERATIONS:**

1. Federal and State Emergency permits may be required.
2. All cleanup operations in the general area should be conducted with the advice and cooperation of DFG, U.S. Fish and Wildlife Service and the Reserve Manager.
3. Aircraft Restrictions: Santa Barbara airport traffic patterns



CALIFORNIA DEPARTMENT OF FISH & GAME (OSPR) and UNITED STATES COAST GUARD  
 Site Number: 4-645-A Site Name: DEVEREAUX SLOUGH

Ken wilson (OSPR) & MSTC Seibel USCGR  
 Date: 04/MAY/05

- |   |             |   |              |   |                 |
|---|-------------|---|--------------|---|-----------------|
|  | Harbor Boom |  | Sorbent Boom |   | Dike or Berm    |
|  | Swamp Boom  |  | Other Boom   |   | Excelsior Fence |
|  | sss / sfs   |  | tsa / sps    |  | tba/voo         |