Q.1 INTRODUCTION

The following appendix includes information required by Title 14 CCR 817.02 that has not been addressed in Sections One and Two and Appendices A through P of this Plan. A cross-reference index (Table CR-2) is included at the front of the plan that identifies the location of information required by the above-mentioned regulations. OSPR regulations apply to the following Venoco Inc. South Ellwood Field facilities: Platform Holly, Beachfront Lease, Ellwood Pier, and Ellwood Onshore Facility; and to the Ellwood Pipeline Inc. – Line 96 Pipeline. Beachfront Lease is currently shut in. Future operations for the lease include modifications to the existing facilities. This plan will be modified when startup of Beachfront Lease is approved. The Ellwood Marine Terminal has been taken out of service, loading lines removed, offshore pipeline evacuated of oil and onshore storage tanks emptied.

Q.2 CERTIFICATE OF FINANCIAL RESPONSIBILITY (COFR)

The certificates of financial responsibility are provided in the front of this plan.

Q.3 RISK AND HAZARD ANALYSIS

Q.3.1 Significant Spill History

Section 817.02(c)(1)(A) of the California Code of Regulations, Title 14, Division 1, Subdivision 4, Chapter 2 defines a significant spill as one that had a deleterious impact on the local environment, or caused the physical layout of the facility or the facility's operations procedures to be modified.

Facility	Spill History
Ellwood Onshore Facility	No reportable spill reaching marine waters in over 10 years.
Ellwood Pier	No reportable spill reaching marine waters in over 10 years.
Platform Holly	1 reportable spill reaching marine waters occurred June 2009.
Beachfront Lease	No reportable spill reaching marine waters in over 10 years.
Ellwood Pipeline Inc. – Line 96 Pipeline	No reportable spill reaching marine waters in over 10 years.

Q.3.2 Methodology

A number of risk analyses have been conducted on the South Ellwood Field facilities. These are listed below.

- Quantitative Risk Assessment (QRA) for Venoco's Platform Holly and Ellwood Facility, June 2000.
- Process Hazards Analysis (PHA) for Ellwood Facilities, February 2000.
- Revalidation of the Hazard and Operability Study of the Ellwood Onshore Facility, May 2014.
- Revalidation of the Hazard and Operability Study of the Holly Offshore Platform, June 2004.
- Risk Assessment of the Ellwood Liquid Pipeline Operations, August 2004.

The 2000 PHA and subsequent revalidations of the Ellwood and Platform Holly HAZOPs was conducted in accordance with OSHA PSM (29 CFR 1910.119). The analysis utilized both the "Checklist" and "Hazard Operability (Hazop)" methodologies in accordance with the American Institute of Chemical Engineers "Guidelines for Hazard Evaluation Procedures," Second Edition. An experienced team from Venoco, the consultants hired to assist in the conduct of the analysis (Arthur D. Little and ioMosaic), and State Lands took part in the analysis.

The equipment was divided into nine categories: pipelines, loading hose, pumps, pressure vessels, tanks/containers, pig receivers, loading rack, crane, and containment/drain system; and the nodes, as categorized for analysis purposes, are listed in Table Q 2.

A unique Hazard Analysis Checklist was developed for each category. The checklist form (worksheet) provided for three responses to each question: yes, no, or not applicable and contained boxes for each question to record the following information: potential hazard, safeguards in place to prevent the potential hazard from occurring, any remaining hazards after considering the safeguards, recommendations to mitigate any remaining hazards, and remarks. Information available and utilized during the conduct of the risk and hazard analysis included P&IDs and plot plans.

All personnel participating in the risk and hazard analysis visited the facility during the conduct of the risk and hazard analysis. A summary of the experience of the participants follows.

Q.3.3 Analysis

Q.3.3.1 Hazards Identified

Potential impacts were classified as defined below.

Risk Category	Impact and Required Action
1	Severe injury, significant property damage, offsite impacts imminent, mitigation required immediately
2	Severe injury, engineering controls required, mitigate within six months
3	Operating problem, acceptable with administrative controls in place
4	No mitigation required

The 2000 PHA identified a number of potential impacts, with 12 being Risk Category 1. The revalidation conducted in 2004 identified a few additional potential impacts but verified that there were no Risk Category 1 impacts remaining.

Q.3.3.2 Mitigation Plan

The recommendations listed in the PHA and Revalidation formed the basis for the plan for mitigating the potential impacts identified.

Q.3.3.3 Remaining Risk

Ellwood Pier

The potential for a spill cannot be completely eliminated. The most likely remaining risk is from the loss of a container being loaded onto the crew boat. The largest reasonable worst case spill is 11.9 bbl of diesel.

Platform Holly

The potential for a release cannot be completely eliminated, even with the implementation of the recommended mitigation measures. The platform is equipped with adequate containment to prevent leaks from reaching the ocean. It is possible, although unlikely, that a process upset or leak of the subsea pipeline to shore could occur.

Ellwood Pipeline Inc. – Line 96 Pipeline

Although it is felt that the potential for a leak or rupture has been mitigated to the maximum extent feasible, a small potential for a release exists. The greatest remaining risk to the Line 96 Pipeline is from third party damage. Venoco belongs to Underground Service Alert and patrols the pipeline route on a frequent basis; however, it is still possible that a third party could damage the pipeline, resulting in a leak.

Q.3.4 Documentation

The documentation and materials (P&IDs, diagrams, etc.) used in the risk and hazard analysis are maintained at Venoco's offices. The point of contact and mailing address are:

Walt McCarty
Venoco, Inc.
7979 Hollister Ave.
Goleta, CA 93117

(805) 961-2312

Q.4 OFFSITE CONSEQUENCE ANALYSIS

Q.4.1 Trajectory Analysis

A 1000-bbl/day spill trajectory analysis was conducted for Platform Holly and has been assumed to be representative of this worst case spill. The following is a brief discussion of this trajectory analysis.

An envelope of possible spill trajectories was calculated for the near shore facility located offshore of Coal Oil Point. The trajectory analysis considered oil transport by the wind and tidal currents, and spreading of the oil by physical processes such as gravity, surface tension, and tidal dispersion. Immediately after release of the oil, spreading of the spill would occur primarily from physical spreading processes. Within the first 12 hours, the 500 bbls would be expected to occupy a patch approximately 1 nautical mile in diameter. By three days, the spill patch would be approximately 5 nautical miles in diameter.

Transport of the spill away from the source would be due primarily to longshore coastal currents and wind-induced surface drift. The direction and strength of this transport varies seasonally and with the direction, strength, and persistence of local winds. Westward transport, which would be expected when the westward flowing coastal current is strongest (spring and summer) and/or when the winds are from the east and southeast, could move the spill within 5 miles of Point Conception after one day and to Point Arguello after two days. At this point, the spill would either move northward, reaching Purisima Point after three days, or move southward away from the coastline. During periods when the westward coastal current is weak (fall and winter) and when westerly winds are present, the spill would move eastward along the coast, reaching Rincon after one day and Port Hueneme after three days. Santa Ana wind conditions combined with weak coastal currents would cause spill transport to the south, across the Santa Barbara Channel.

Within three days, the spill could move across the channel to the islands of San Miguel, Santa Rosa, Santa Cruz, and Anacapa.

These spill trajectory envelopes represent the outer perimeter of shoreline areas that could receive oil in the event of any spill. The envelopes are based on regional extremes of climate, tide, current, and wind and assume pessimistic dispersion and other adverse weather conditions. These trajectory envelopes do not represent the trajectory of any one spill.

Q.5 GENERAL TOXICITY, PERSISTENCE, AND SEASONAL EFFECTS OF CRUDE OIL

Q.5.1 Toxicity

In general, oil can be toxic to biological resources. Oil contamination of intertidal areas, waterfowl, and fur-bearing mammals can be severe. The following summarizes the potential toxicity from the oil to biological resources:

Wildlife

Wildlife is susceptible to significant injury and mortality from contact with oil spills. In general, the degree of sensitivity to oil spills is based on habitat location and behavioral characteristics. For example, most waterfowl and shorebirds, particularly diving birds are very sensitive to oil spills due to their extensive use of the water, whereas terrestrial birds may nest near the water but have a low sensitivity to oil spills if they do not frequent shoreline areas. Similarly, animals that frequent coastal areas or stream beds may be impacted by oil spills if they feed on vegetation or dead animals along the shoreline or upland areas that could become oiled.

Wildlife impacts may result from the physical effects of the oil on their fur or feathers or through ingestion during preening or scavenging. Selected marine mammals (e.g. sea otters and fur seals) and birds (primarily waterfowl) rely on their fur or feathers for insulation and buoyancy, which can be adversely affected if they become oiled. Significantly oiled sea otters, fur seals, or birds can perish from hypothermia and exhaustion, or may become sick from ingestion of the oil while preening. The effects of ingestion vary depending on the toxicity of the oil. In general, the lighter the crude oil or petroleum product, the more toxic it is to wildlife.

Finfish and Shellfish

The sensitivity of various fish species to oil spills typically depends on their growth stage (juveniles are generally much more sensitive than adults), their feeding or migration habits, and the type of oil. Species that frequent shallow or near-surface areas are often exposed to higher concentrations of dissolved hydrocarbons than those that reside primarily in deeper waters. Lighter crude oils and refined petroleum products have a greater impact on fish than heavier oils due to their generally greater solubility and higher concentrations of toxic compounds.

Kelp and Eelgrass Beds

Kelp and eelgrass beds are valuable habitats for numerous finfish and shellfish. Eelgrass is much less abundant than kelp but is used as spawning grounds for some fish and as an important sanctuary for a number of planktonic organisms. Eelgrass is very susceptible to the toxic and physical effects of oil spills. Kelp beds serve as habitats and sanctuaries for a number of finfish, shellfish, and other marine organisms but are less susceptible to the effects of oil spills. Kelp fronds and blades are covered with mucous that inhibits the oil from sticking; although a kelp forest canopy can trap substantial quantities of oil, resulting in the mortality of many its inhabitants. The effect of the oil is generally short-term due to kelp's rapid growth rate.

Q.5.2 Persistence

In general, the longer the oil is expected to persist on a shoreline, the higher the priority for protection. Long-term oil persistence can present chronic toxicity effects, as well as affecting the natural sediment erosional and depositional processes. The potential persistence or residence time of stranded oil on a shoreline is primarily dependent on the:

- Degree of impact.
- Type of shoreline sediments.
- Level of exposure to the elements.

In general, higher degrees of impact, coarser, well-sorted sediments, and lower levels of exposure to wind, waves, currents, and tidal flushing will increase the residence time of the oil on the shoreline. Coarser-grained sediments usually permit the oil to penetrate deeper into the shoreline but can also allow for greater tidal flushing and natural degradation. Finer-grained sediments typically inhibit penetration, but if oil does become incorporated into the sediments, residence time will increase.

Lower level of exposure, such as in protected inlets of bays, will increase the residence time due to the decreased natural abrasion caused by sediment movements and flushing action by wind, waves, and tides. Protected areas may also be shaded and calm, which could inhibit evaporation and photo-oxidation. A general guideline on the potential persistence of oil on various shoreline types is shown in Table I-2.

Q.5.3 Seasonal Effects

The primary seasonal effect on biological resources is whether the specific resource is present at the time of the spill. This is especially true of birds and mammals. Seasonal distribution of wildlife along the coast is provided for the ESI maps. Plants may be affected differently depending on the timing of the spill relative to the plant's growing season. In general, oiling during the dormant winter season has the lowest impact; whereas oiling of vegetation during the summer growing season has longer effects.

Q.6 ON-WATER CONTAINMENT AND RECOVERY

Q.6.1 Reasonable Worst Case Discharge

Ellwood Pipeline Inc. – Line 96 Pipeline

Basis for the reasonable worst case discharge assumes the rupturing of the pipeline between Dos Pueblos Canyon and Las Llagas Canyon during transfer of oil. The proposed pipeline flow rate is 271 bph. Pipeline mainline valves will fully close in 90 seconds and inline check valve will prevent backflow. An additional 3.13 BBLS will flow in the 90 seconds it takes to fully close the valves.

Given:

- $Tmax_{discover} + Tmax_{ESD}$ = 1.5 min = 0.025 hr
- Q max = 271 bph
- Line Segment = 6-in line for 4,551 ft at 0.0357 bbl/ft.

Calculation:

Worst-Case Discharge = $(Tmax_{discover} + Tmax_{ESD})$ (Qmax) + Vol_{pipe}

(0.025 hr) (271 bph) + (4,551 ft) (0.0357 bbl/ft) = ***169 bbl***

Worst Case Discharge: 169 bbl. (Group 3).

Ellwood Onshore Facility

Basis for the reasonable worst case discharge assumes the rupturing of the oil shipping tank and failure of the containment area resulting in the loss of the entire contents of the 3,000-bbl tank.

Given: shipping tank is 3,000 bbl (Group 3).

Worst Case Discharge: 3,000 bbl.

Ellwood Pier

The worst case discharge from Ellwood Pier assumes the rupture of the largest container loaded onto the crewboat and 100% loss of its contents.

Given: largest container loaded is 500 gallons of diesel.

Worst Case Discharge: 11.9 bbl (Group 1).

Platform Holly

Calculation of the reasonable worst-case discharge for Platform Holly takes into consideration:

- total tank storage and flow line capacity; plus
- that portion of the total flowline capacity which could be lost during a spill, taking into account the availability and location of the emergency shut-off controls and the effect of hydrostatic pressure. Basis for the reasonable worst-case discharge includes the rupturing of the 16,010-foot pipeline from Platform Holly to the Ellwood Onshore Facility; plus
- the amount of additional spillage that could reasonably be expected to enter marine waters during emergency shut-off, transfer or pumping operations if a hose or pipeline ruptures or becomes disconnected, or some other incident occurs which could cause or increase the size of an oil spill. The calculation may take into consideration other safety devices, emergency reaction times and maximum transfer rates; plus
- the daily production volume for 30 days from an uncontrolled blowout of the highest capacity well associated with the marine facility. In determining the daily discharge rate, the reservoir characteristics, casing/production tubing sizes, and historical production and reservoir pressure data shall be taken into consideration..
- Additionally, during active well drilling the daily volume for 30 days from an uncontrolled blowout of a well is considered for the marine facility. In determining the daily discharge rate, the reservoir characteristics, casing/production tubing sizes, and historical production and reservoir pressure data shall be taken into consideration.

Tank/vessel storage – The total capacity of all tanks and vessels on the platform is 716 bbl (see Table Q-1).

Table Q-1. Platform Holly Tank and Vessel Volumes.

Vessel	Orientation		Dimensions		Flammable Liquid			
			Diameter	Length	Working Height	Max Volume	Working Volume	
		Contents	Ft	Ft	Ft	Ft^3	Ft^3	BBL
V-103	Horizontal	O.O.S	4.0	20.0	2.0	251.3	125.7	22.4
V-104	Horizontal	Emulsion	4.0	20.0	2.0	251.3	125.7	22.4
V-105	Horizontal	Emulsion	4.0	20.0	2.0	251.3	125.7	22.4
V-106	Horizontal	Emulsion	4.0	15.0	2.0	188.5	94.2	16.8
V-107	Horizontal	Emulsion	6.5	20.0	3.3	663.7	331.8	59.1
V-108	Horizontal	Emulsion	6.5	20.0	3.3	663.7	331.8	59.1
V-109	Horizontal	Emulsion	6.0	20.0	3.0	565.5	282.7	50.4
V-110	Horizontal	Emulsion	6.0	20.0	3.0	565.5	282.7	50.4

V-100	Vertical	Condensate	3.0	12.0	1.0	84.8	7.1	1.3
V-101	Vertical	Condensate	3.0	12.0	1.0	84.8	7.1	1.3
V-123	Vertical	Condensate	4.0	2.0	1.0	25.1	12.6	2.2
V-113	Vertical	Condensate	4.0	9.5	1.0	119.4	12.6	2.2
V-114	Vertical	Condensate	3.5	8.3	1.0	79.4	9.6	1.7
V-117	Vertical	Condensate	3.0	11.0	1.0	77.8	7.1	1.3
V-118	Vertical	Condensate	2.0	11.0	1.0	34.6	3.1	0.6
V-119	Vertical	Condensate	2.0	11.0	1.0	34.6	3.1	0.6
V-120	Vertical	Condensate	2.0	11.0	1.0	34.6	3.1	0.6
V-121	Vertical	Condensate	2.0	8.0	1.0	25.1	3.1	0.6
V-111A	Vertical	Condensate	1.5	6.0	1.0	10.6	1.8	0.3
V-111B	Vertical	Condensate	1.5	6.0	1.0	10.6	1.8	0.3

TOTAL **716 bbl**

Flowline capacity – The total flowline capacity has been estimated to be equal to 10% of the 716 bbl storage capacity which equals 72 bbls.

Pipeline worst-case discharge considering shutdown time, pumping losses, and draindown – The worst-case discharge for the pipeline to shore was calculated using the MMS Pipeline Oil Spill Volume Estimator. The default values for pipeline roughness (0.00015 ft.), and heat transfer coefficient (10 BTU/ft^3/hr/°F) were used in the modeling. The temperature of the seawater was assumed to be 50°F. The diameter of the release point was assumed to be equal to the diameter of the pipeline. In all cases it was assumed that the release would be detected and the pumps shutdown within two minutes. This allots 1 minute 15 seconds for detection and 45 seconds for closure.

The pipeline was separated into the following three segments for modeling purposes: Platform Holly riser bottom, the mid-point at sea bottom, and at near-shore location of the pipeline. All pipeline segments have an inside diameter (ID) of 6 in. Each segment is described below.

- Platform Holly Riser has a total length of 230 ft, with 23 ft being above sea level.
- Platform Holly Riser to the shoreline, a total length of 16,010 ft.
- Shoreline to the pig catcher at the Ellwood Onshore Facility, at total length of 940 ft. The pig catcher is at an elevation of 23 ft.

The fluid properties used in the modeling are as follows:

- Flow rate – 7500 bbl/day
- Gas density – 0.07 lb/scf (default)
- Oil density – 7.67 lb/gal
- Gas-to-oil ratio (GOR) – 0

- Water cut – 25%
- MAOP – 650 psi
- Temp of oil when leaving Platform Holly - 130°F

The model calculated the worst case pipeline release to be approximately 23 bbls.

Uncontrolled release from well during production – Platform Holly production includes one or more flowing wells. In the event of a catastrophic well failure of the highest capacity well, this would result a release of approximately 1000 bbls/day for 30 days. This would result in a total release of 30,000 bbls.

Uncontrolled release from well during active drilling – In the event of a catastrophic well failure (blowout) during current active drilling a release from the well bore will result in an approximate release of 1000 bbls/day for thirty (30) days. For the purposes of response planning this will result in a total release of 30,000 bbls.

Hence, the worst-case release from Platform Holly is the sum of the following:

Total vol of platform tanks/vessels	716 bbl
Total vol of flowlines	72 bbl
Worst-case release from pipeline	23 bbl
Worst-case release from production well	30,000 bbl
Worst case release during active drilling	30,811 bbl
Worst Case Discharge (sum)	**30,811 bbl**

Q.6.2 Persistence And Emulsification Factors

Group 3 Crude – Shipping Tank at Ellwood Onshore Facility

Persistence Factor

= (Reasonable Worst Case Spill Volume) x (Persistence for Group 3 Crude)
= (3,000) x (0.5)
= 1,500 bbl

Emulsification Factor

= (Persistence Factor Volume) x (Emulsification Factor for Group 3 Crude)

= (1,500) x (2.0)

= 3,000 bbl

Group 1 Diesel – Ellwood Pier

Persistence Factor

= (Reasonable Worst Case Spill Volume) x (Persistence for Group 1 Diesel)

= (11.9) x (0.2)

= 2.4 bbl

Emulsification Factor

= (Persistence Factor Volume) x (Emulsification Factor for Group 1 Diesel)

= (2.4) x (1.0)

= 2.4 bbl

Group 3 Crude – Platform Holly

Persistence Factor

= (Reasonable Worst Case Spill Volume) x (Persistence for Group 3 Crude)
= (30,811) x (0.5)
= 15,405 bbl

Emulsification Factor

= (Persistence Factor Volume) x (Emulsification Factor for Group 3 Crude)

= (15,405) x (2.0)

= 30,811 bbl

Q.6.3 On-Water Response Planning Volume

The OSPR Response Planning Volume is 30,811 bbl which is used to determine the amount of response equipment and services that must be under contract for the near-shore/inland environment.

Q.6.4 Response Capability Standard

According to the regulations, the total amount of on-water containment and recovery equipment and services required shall be the lesser amount necessary to address the response planning volume determined in Section 817(d)(2)(c) or the Daily Recovery Rate established in Section 817.02(d)(3)(B). With respect to the Santa Barbara Channel Area risk zone, the daily recovery rate is 3,125 bbl/day which is greater than 10% of Venoco's worst case discharge. Venoco must have 3,081 bbl/day of on-water containment capability mobilized and on-scene within two hours of notification.

Q.6.5 Non-Cascadable Equipment For On-Water Recovery

The amount of equipment that is non-cascadable outside of the Santa Barbara Channel for the Facilities and Pipelines is defined as: the total amount required will be the lesser of the amount necessary to address the Response Planning Volume or 10,000 bbl/day for the Santa Barbara Channel risk zone day (mobilized within 2 hours and on-scene within 12 hours). Clean Seas has nominated specific equipment to meet this requirement for its members and contract associates.

Q.7 SHORELINE PROTECTION AND CLEAN-UP

Q.7.1 Response Planning Volume

Persistence Factor
= (Reasonable Worst Case Spill Volume) x (Persistence for Group 3 Crude)
= (30,811) x (0.5)
= 15,405 bbl

Emulsification Factor
= (Persistence Factor Volume) x (Emulsification Factor for Group 3 Crude)
= (15,405) x (2.0)
= 30,811 bbl

The OSPR Shoreline Response Planning Volume is 30,811 bbl.

Q.8 RESPONSE RESOURCES

Table Q-2. Planning Volumes and Resources Required For OSPR Worst Case Discharge.

Factors	Values		
Worst Case Discharge Volume of Oil	30,811 bbl		
Type of Petroleum Handled	Group III		
Facility-Specific Operating Area	Nearshore		
Emulsification Factor (EF)	2.0		
Percent Recovered Floating Oil	50		
Percent Oil Onshore	50		
Percent Lost To Natural Dissipation	30		
Mobilization Factors (MFs)	.15 (Tier 1); .25 (Tier 2); .40 (Tier 3)		
Planning Volumes For On-Water Recovery (OWP)			
(Worst Case Discharge)(Percent Recovered Floating Oil)(Emulsification Factor)			
(30,811)(.50)(2.0) = 30,811 bbl			
Planning Volume For Onshore Recovery			
(Worst Case Discharge)(Percent Oil Onshore)(Emulsification Factor)			
(30,811)(.50)(2.0) = 30,811 bbl			
Necessary Resources For On-Water Recovery			
(OWP)(MF) = (3,000)(MF)	Tier 1 (.15)	Tier 2 (.25)	Tier 3 (.40)
bbl/day	4622	7703	12324
Conclusions: Venoco has contracted with response resources capable of handling a 30,811bbl shoreline cleanup. Venoco has contracted and identified response resources for 4622 bpd for Tier 1; 7703 bpd for Tier 2; and 12324 bpd for Tier 3. Venoco has contracted and identified temporary storage resources for 9244 bpd for Tier 1; 15,406 bpd for Tier 2; and 24,648 bpd for Tier 3.			

Venoco will rely on Clean Seas for on-water containment and recovery of all spills. All of Clean Seas' response equipment, including the derated recovery capability, the amount of boom feet, and the temporary storage capability, is provided in Appendix F. Clean Seas has demonstrated in its ability to meet the OSPR daily recovery capability standards for the Santa Barbara Channel of 19,531 bbl/day within 12 hours, 35,156 bbl/day within 36 hours, and 66,406 bbl/day within 60 hours. Onshore oil spill response and cleanup will be provided by NRC Environmental Services. A copy of NRC's equipment list is provided in Appendix F.

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