Attachment G – Oil Spill Risk Calculations

Oil Spill Risk Calculations
Point Arguello Unit Western Half NW/4 OF LEASE OCS-P 0450

Table 1 US OCS Spill Historical Spill Data

US OCS Spills	Number of Spills	Median Spill Size (bbls)	Spill Rate (spills per 10^9 bbls)
Platforms, >1,000 bbls	-	7,000	0.4
Pipelines, >1,000 bbls	-	1,720	0.9
Small Spills, 50-1000 bbls	-	-	13.0
Small Spills, 1-50 bbls	-	-	75.0

Source: Comparative Occurrence Rate for Offshore Oil Spills, Anderson and La Belle, MMS.
Source: BOEM, 2012-2017 OCS Oil and Gas Leasing Program Draft Programmatic EIS Table 4.4.2-1

Table 2 Calculation of Spill Probabilities for Point Arguello Field Only

Location	Spill Rate (spills per 10^9 bbls)	Total Oil Production (10^9 bbls)	Duration of Total Oil Production (years)	Estimated Number of Spills During the Duration	Probability of Zero Spills Occurring (P(0))	Probability of One or More Spills Occurring
All Platforms, spills >1,000 bbls	0.4	0.012	7	0.005	99.5%	0.5%
PAPCO Pipeline, spills >1,000 bbls	0.9	0.012	7	0.011	98.9%	1.1%
Small Spills, 50-1000 bbls	13.0	0.012	7	0.156	85.6%	14.4%
Small Spills, 1-50 bbls	75.0	0.012	7	0.900	40.7%	59.3%

Notes:
The platform numbers may not add-up due to rounding.
Duration of production is from the beginning of 2013 through the end of 2019.
Pt Arguello Production without Electra, bbls 12,000,000
Production from Hermosa and Harvest based upon data in Reservoir Evaluation.
Estimated number of spills during the duration=spill rate*total oil production.
$P(0)=(\text{number of spills during duration})^0 * e^{(-\text{number of spills during duration})}/1$
The probability of one or more spills=1-P(0).

Table 3 Calculation of Spill Probabilities for Western Half NW/4 OF Lease OCS-P 0450 (Electra production only)

Location	Spill Rate (spills per 10^9 bbls)	Total Oil Production (10^9 bbls)	Duration of Total Oil Production (years)	Estimated Number of Spills During the Duration	Probability of Zero Spills Occurring (P(0))	Probability of One or More Spills Occurring
All Platforms, spills >1,000 bbls	0.4	0.0035	7	0.001	99.9%	0.1%
PAPCO Pipeline, spills >1,000 bbls	0.9	0.0035	7	0.003	99.7%	0.3%
Small Spills, 50-1000 bbls	13.0	0.0035	7	0.046	95.6%	4.4%
Small Spills, 1-50 bbls	75.0	0.0035	7	0.263	76.9%	23.1%

Notes:
The platform numbers may not add-up due to rounding.
Duration of production is from beginning of 2013 through the end of the four quarter 2019.
Estimated number of spills during the duration=spill rate*total oil production.
$P(0)=(\text{number of spills during duration})^0 * e^{(-\text{number of spills during duration})}/1$
The probability of one or more spills=1-P(0).

Table 4 Calculation of Spill Probabilities for Point Arguello Field and Western Half NW/4 of Lease OCS-P 0450

Location	Spill Rate (spills per 10^9 bbls)	Total Oil Production (10^9 bbls)	Duration of Total Oil Production (years)	Estimated Number of Spills During the Duration	Probability of Zero Spills Occurring (P(0))	Probability of One or More Spills Occurring
All Platforms, spills >1,000 bbls	0.4	0.0155	7	0.006	99.4%	0.6%
PAPCO Pipeline, spills >1,000 bbls	0.9	0.0155	7	0.014	98.6%	1.4%
Small Spills, 50-1000 bbls	13.0	0.0155	7	0.202	81.8%	18.2%
Small Spills, 1-50 bbls	75.0	0.0155	7	1.163	31.3%	68.7%

Notes:
The platform numbers may not add-up due to rounding.
Duration of production is from the beginning of 2013 through the end of 2019.
Pt Arguello Production without Electra, bbls 12,000,000
Electra production total, bbls 3,500,000
Pt Aguello non-Electra production assumed to be spread evenly between 3 platforms
Production from additional 2 wells at hidalgo assumed to be a total of 3.5 million bbls
Production from Hermosa and Harvest assumed to be the same as in the 2003 DPP
Estimated number of spills during the duration=spill rate*total oil production.
$P(0)=(\text{number of spills during duration})^0 * e^{(-\text{number of spills during duration})}/1$
The probability of one or more spills=1-P(0).