



CITY OF LOS ANGELES OIL AND GAS DRILLING ORDINANCE

STUDY 25: AMORTIZATION OF CAPITAL INVESTMENT STUDY FOR LOS ANGELES CITY OIL FIELD PATEL LEASE

PREPARED FOR:

The City of Los Angeles Board of Public Works Office of Petroleum and Natural Gas Administration and Safety

DATE: January 27, 2025

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1. LEGAL NOTICE

- The City of Los Angeles (the "City"), through its Board of Public Works' Office of Petroleum and Natural Gas Administration and Safety ("OPNGAS"), has retained Baker & O'Brien, Inc. ("Baker & O'Brien") to conduct this Amortization of Capital Investment Study under Contract Number C-142695.
- This Amortization of Capital Investment Study for Los Angeles City Oil Field Patel Lease (the "Study") presents the basis and conclusions for our determination of the time required to amortize capital investment for this group of oil wells and surface facilities. The Effective Date for this Study is December 31, 2022 (the "Study Effective Date").
- 3. Baker & O'Brien prepared this Study for the sole benefit of the City. Baker & O'Brien makes no warranty, either express or implied, and assumes no liability with respect to the use of any information or methods disclosed herein. Any use, reproduction, or distribution of this information by others requires Baker & O'Brien's prior written consent. Baker & O'Brien expressly disclaims all liability for the use, reproduction, distribution, or disclosure of this information to or by any third party.
- 4. The analysis, opinions, and findings presented in this Study are based on the experience, expertise, and skills of Baker & O'Brien consultants, as well as their research, analysis, discussions, and related work in preparing this study. In preparing this Study, Baker & O'Brien has relied upon public and proprietary information available for use in this assignment. All conclusions, forecasts, and projections presented in this Study represent Baker & O'Brien's best judgment based upon information available as of the Study Effective Date. Forecasts, backcasts, and projections prepared for this Study are inherently uncertain due to the potential impact of factors or events that are unknowable, unforeseeable, or beyond Baker & O'Brien's control. Baker & O'Brien reserves the right to supplement or amend this Study if additional information should subsequently become available that is material to the conclusions presented herein.

2. EXECUTIVE SUMMARY

- <u>Location</u>: The Los Angeles City Oil Field Patel Lease ("Site") is located at 316 N. Firmin St. in the Westlake area of Los Angeles. The Site is located just west of the US-101 (Hollywood Freeway) and I-110 (Harbor Freeway) interchange between Filipinotown and Chinatown.
- <u>Zoning</u>: The Site is within Council District 1 and the Westlake Community Plan area. The Site is zoned R4(CW)-75/3-O, Central City West Specific Plan Multiple Dwelling Category, having height limitations in an Oil Drilling District.^{1,2}
- 7. <u>*History*</u>: The original well at the Site was likely drilled in the late 1890s. The Patel Lease well records started in 1968 when that well was transferred to Mary Pietrzyk. Production was restarted in 1979. The Site transferred to new owners in 1981 and 2003 before being taken over by Vida Resources LLC ("Vida") in 2012, which owned the Site on the Study Effective Date.
- 8. <u>Site Status:</u> One production well operated at the Site during 2022. Surface facilities at the Site include lease equipment and various site improvements.
- <u>Capital Investment</u>: The original cost for drilling and completing wells and installing lease facilities was \$68,000. In addition to the original capital investment, sustaining capital investment in wells and lease equipment was \$174,000. As of December 31, 2022, the cumulative estimated capital investment in the Site from 1979 to 2022 was \$242,000.
- 10. <u>Site Income</u>: The Site generated revenue from selling crude oil and natural gas. Production of crude oil from the Site peaked in 2015 at about 817 barrels annually or 2 barrels per day. No natural gas production has been reported at the Site. Crude oil produced at the Site is a heavy-sour crude with a market value comparable to Kern crude oil. After deductions for payments of royalties, operating costs, income taxes, and sustaining capital investment, the Site generated a cumulative negative net cash flow of about \$28,000 from 1979 to 2022.

¹ Central City West Specific Plan, <u>https://planning.lacity.gov/odocument/22b92dbb-bf78-4dc3-8c86-650491e5e3e4/Specific Plan Document.pdf</u>

² City zone definitions are found at <u>https://planning.lacity.gov/odocument/eadcb225-a16b-4ce6-bc94-c915408c2b04/Zoning_Code_Summary.pdf</u>

- 11. <u>Base Case Conclusion</u>: In the Base Case, the original capital investment at the Site was never amortized. The total capital investment between 1979 and 2022 of \$242,000 generated a \$28,000 negative net cash flow over this period. The cumulative internal rate of return for the Site in 2022 is less than the market rate of return of 8%.
- 12. <u>Sensitivity Case Conclusions</u>: Sensitivity cases were prepared to consider reasonable ranges in alternative assumptions in the income analysis, including a higher market rate of return, a lower value received for crude oil, and a more significant capital investment. The sensitivity cases failed to amortize since the Site base case failed to amortize.

3. INTRODUCTION

- 13. The production of oil and gas has played a major role in the history and development of the City of Los Angeles (the "City"). The legacy of more than 100 years of oil and gas production can be counted in 26 oil and gas fields and more than 5,000 oil and gas wells throughout the City.
- 14. The Los Angeles City Council passed Oil and Gas Drilling Ordinance 187709³ (the "Ordinance") that prohibits new oil and gas extraction facilities and makes existing extraction activities in the City a nonconforming land use, with an Ordinance Effective Date of January 18, 2023.
- 15. The City, through its Board of Public Works' Office of Petroleum and Natural Gas Administration and Safety ("OPNGAS"), retained Baker & O'Brien, Inc. ("Baker & O'Brien") to determine the time required for amortization of capital investment in oil and gas production facilities located within the City under Contract Number C-142695. This *Amortization of Capital Investment Study for Los Angeles City Oil Field Patel Lease* (the "Study") presents the basis and conclusions for Baker & O'Brien's determination of the time required to amortize capital investment for the Los Angeles City Oil Field Patel Lease (the "Site"), which is an oil well and surface facility located at 316 N. Firmin St. in the Westlake area of Los Angeles.
- 16. This Study is incorporated into a larger amortization study that addresses all of the active and idle wells in the City, which is presented in Baker & O'Brien's *Summary Report on the Amortization of Capital Investment Study* (the "Summary Report"). The Summary Report presents Baker & O'Brien's scope of work and qualifications, the methodology used in the amortization analysis, and other reference information that is generally common to analyzing the various drill sites.
- 17. This Study presents a detailed economic analysis for the Site that considers capital investment in existing wells and surface facilities, revenues produced from sales of oil and gas, operating costs associated with oil and gas production, and determination of year-to-year financial returns for the Site. Financial returns for the Site are compared to market returns on invested capital achieved by oil and gas production companies to

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³ City of Los Angeles Ordinance No. 187709; <u>https://clkrep.lacity.org/onlinedocs/2017/17-0447-S2_ord_187709_1-18-23.pdf</u>

determine the time required for amortization of capital investment. A Base Case determines the time required to amortize capital investment at the Site based on historical data and reasonable estimates of capital investment, revenues, and operating costs. The sensitivity cases consider the extent to which alternative assumptions that may be used in the income analysis, including a higher market rate of return, a lower oil price, and more significant capital investment, might change the Base Case amortization period.

- 18. This Study refers to various abbreviations and terms used in the oil and gas industry. These abbreviations, terms, and a brief definition for each item are listed for convenience in Exhibit 1 of the Summary Report.
- 19. The Study Effective Date for this Study is December 31, 2022. The Study Effective Date represents the cut-off date for historical information that was considered to represent historical capital investment, production volumes, and operating costs used in this Study. In preparing this Study, Baker & O'Brien has relied upon public and proprietary information about the Site that was available at the Study Effective Date. Reference materials that have been considered in preparing this Study are listed in **Exhibit A**.



4. ABOUT THE SITE

4.1 LOCATION

20. The Site is located at 316 N. Firmin St. in the Westlake area of Los Angeles. The Site is located just west of the US-101 (Hollywood Freeway) and I-110 (Harbor Freeway) interchange between Filipinotown and Chinatown. Aerial photographs of the Site are presented in **Exhibit B**.⁴ Additional location-specific details are provided in **Exhibit 5** of the Summary Report.

4.2 HISTORY

- 21. The well at the Site is believed to have been drilled during the late 1890s when the Los Angeles City Oil Field was initially developed; however, no records exist before 1968 when the California Department of Conservation's California Geologic Energy Management Division ("CalGEM") first provided a well file for the well.
- 22. The first CalGEM record for the Site was dated in 1968 with the report of a transfer to Mary Pietrzyk. Mrs. Pietrzyk's estate was transferred to B.G. Patel in 1981. The well had been in disrepair and idle during most of Mrs. Pietrzyk's ownership until a small amount of production was reported in August 1979. This Study assumes workover capital and lease expenses were spent to return the well to service when production was reported in August 1979. Manley Energy Resources, LLC, took over the well in 2003. The well was transferred to Vida in 2012, which was still the owner in 2022.⁵

4.3 LEASES

23. The Site operates a well that produced oil and gas from the Patel Lease during 2022. The lease appears to have production facilities located on-site. The status of the Site's well in 2022 is listed in Exhibit C.

⁴ Google Earth.

⁵ See CalGEM records for each of the wells at the Site, which are listed in **Exhibit** C.

4.4 SURFACE FACILITIES

- 24. The surface facilities at the Site include tanks, pumps, and pipes used for collecting and processing well fluids (the "lease equipment"), as well as various site improvements.
- 25. The wellhead at the Site is generally located at grade, and a pump jack lifts oil from the well. No records are available to document the methods or costs associated with the disposal of produced water.⁶
- 26. For this Site, some lease equipment (mainly storage tanks) is visible in **Exhibit B**. While the equipment shown in the aerial photographs appears to be typical, it is not possible to determine the condition of the equipment, nor which equipment remains in operation or has been abandoned in place. No records are available that document the size, capacity, or cost of lease equipment when it was installed.
- 27. No buildings are visible in the aerial photos of the Site. The Site is surrounded by chainlink fencing with gates to control access.

4.5 HISTORICAL OIL AND GAS PRODUCTION

28. Overall oil and gas production from the Site is shown below in **Figure 1.**⁷

⁶ See waste disposal definition in Exhibit 1 of the Summary Report.

⁷ See CalGEM records for each of the wells at the Site, which are listed in **Exhibit** C.



Figure 1 - Site Oil and Gas Production

29. The Site's production peaked at 2 B/D in 2015 after being offline the prior year. Production has varied over the years, generally spiking after periods of inactivity and then producing at a lower rate in subsequent years. Since 1977, the Site has averaged about 1 B/D of oil and produced no natural gas.

4.6 OIL AND GAS QUALITY

- 30. Crude oil produced at the Site is heavy-sour crude, averaging about 15.7 degrees API ("°API") since 1977.⁸ While the sulfur content of the crude oil produced at the Site is not documented, crude oil produced from the Los Angeles City Oil Field is reported to have a sulfur content of approximately 1.1%.⁹ The quality of crude oil produced at the Site is comparable to Kern River ("Kern") crude oil, which has market specifications of 13.3°API and a sulfur content of 1.10%.
- 31. No natural gas is documented as having been produced over the life of the Site.

⁸ CalGEM Production Records.

⁹ Petroleum in Southern California, Prutzman, Paul W. (1913), California State Mining Bureau. pp. 207-210.

4.7 LOGISTICS

- 32. No record is available to confirm how crude oil was delivered from the Site to local refineries or costs actually paid to third parties for delivery of crude oil. The Los Angeles Municipal Code requires that all oil produced from wells in the City will be transported by underground pipeline.¹⁰ This Study assumes that crude oil is injected into a common carrier pipeline for delivery to customers through a custody transfer meter at the Site's boundaries. This Study estimates that transportation costs to deliver crude oil from the Site to Long Beach by a common carrier pipeline were \$1.50 per barrel ("/B") in 2022.¹¹
- 33. No natural gas is documented as having been produced over the life of the Site.

¹¹ Crimson California Pipeline L.P. trunkline tariff, August 1, 2022; Crimson California Pipeline L.P. gathering line tariff, August 1, 2022.



¹⁰ Los Angeles Municipal Code Section 13.01.F.2 and 54.

5. CAPITAL INVESTMENT

34. The capital investment at the Site to be amortized is the total investment in the plant, property, and equipment used to produce income from the Site. For this Study, the total capital investment to be amortized includes the original capital investment, sustaining capital investment in well equipment, and sustaining capital investment in lease equipment.¹²

5.1 ORIGINAL CAPITAL INVESTMENT

- 35. Original capital investment is an operator's investment to acquire lease rights, drill new wells, construct new surface facilities, and commence oil and gas production. Capital investment that adds production capacity to an existing facility (such as the drilling and completion of a new production well) is also considered an original investment. Records of capital investment at the Site are not available, and this Study estimates original capital investment for wells, lease equipment, and site improvements.
- 36. The original capital investment is included in the income analysis in the appropriate year of the cash flow analysis, corresponding to when new facilities were completed.

5.1.1 PRODUCTION AND INJECTION WELLS

37. Original capital investment for production wells at the Site was estimated based on drilling and completion costs reported by California operators. Berry Corporation ("Berry") reported a range of drilling and completion costs in California during 2019, and California Resources Corporation ("CRC") reported drilling and completion costs for its Lost Hills developments in 2016, which are summarized below in Table 1. Costs reported by Berry and CRC were normalized to the Study Effective Date using the U.S. Bureau of Labor Statistics ("BLS") Producer Price Index ("PPI") Oil and Gas Drilling cost index ("PPI-OGD").¹³

¹² Capital investment does not include operating costs or termination costs. See Section 5.4 of the Summary Report.

¹³ U.S. Bureau of Labor Statistics, Producer Price Index by Industry: Drilling Oil and Gas Wells [PCU213111213111], retrieved from FRED, Federal Reserve Bank of St. Louis.

Original Cost to Drill and Complete a New Well							
			Repo	rted	Normalized to 2022		
Operator	Location	Year	PPI-OGD ¹	Cost, \$/Well	Year	PPI-OGD ¹	Cost, \$/Well
Berry	Elk Hills ²	2019	337.4	\$300,000	2022	371.8	\$330,581
CRC	Lost Hills ³	2016	316.7	\$150,000	2022	371.8	\$176,094
	Average			\$225,000			\$253,337
Cost Use	ed In Model				2022		\$250,000

Table 1 – Drilling and Completion Costs

Notes:

1. PPI OGD is BLS Series ID PCU213111213111. June index values are used to reflect mid-year costs.

3. California Resources Corp. 2017 Analyst Day Presentation, p. 36.

- 38. The developments listed in **Table 1** use steam flood operations to produce heavy crude oil from oil fields in the San Joaquin Basin. Although steam flood operations are much different than the primary recovery used at the Site, drilling and completion costs for shallow steam flood wells are comparable to the costs to drill wells at the Site. Like steam flood wells, the wells at the Site are shallow, averaging 1,200 feet in depth, and pump jacks are used to lift crude oil from the wells. Most wells in the City use a higher average cost per well than \$250,000, however, Los Angeles City Oil Field wells are shallower and, therefore, less expensive than other wells in the City.¹⁴
- 39. Original drilling costs for the wells completed at the Site during the 1890s are not included in the income analysis. As noted above, capital investment at the Site is considered from Mrs. Pietrzyk's acquisition of operating interests in 1968. Moreover, capital investment in wells drilled during the 1890s is not material to the income analysis since drilling and completion costs in the Los Angeles City Oil Field were reported to have been less than \$1,500 per well.¹⁵ Sustaining capital investment is included in the income analysis to maintain these wells in service.¹⁶
- 40. CalGEM records do not identify any wells drilled and completed at the Site after 1968. Therefore, the original capital investment for new wells after those dates at the Site amounted to \$0.

^{2.} Berry Corp. 2020 Investor Presentation, p. 12.

¹⁴ Because they are shallower, the Site's well is estimated to cost roughly 20% of the other wells in the City.

¹⁵ The Los Angeles City Oil Field, Stephen M. Testa, 2005, p. 85.

¹⁶ See Section 5.2.2 below.

5.1.2 LEASE EQUIPMENT

- 41. Lease equipment generally includes the flowlines, separators, pumps, and metering equipment used to: separate well fluids into oil, gas, and water; treat crude oil and natural gas for sale; and treat water for reinjection or disposal.
- 42. The U.S. Department of Energy's Energy Information Administration ("EIA") published annual estimates of capital investment for lease equipment between 1976 and 2009.¹⁷ These estimates included representative costs for lease equipment used in primary recovery operations. Lease equipment is typically sized to accommodate the anticipated production rates of well fluids. The EIA costs for lease equipment were adjusted to account for the peak well fluid rates produced at the Site by applying a standard costcapacity relationship.¹⁸ The original capital investment in lease facilities was allocated in the cash flow analysis in 1979 when the old well was reactivated.¹⁹ The original capital investment for lease equipment at the Site amounted to about \$65,000.

5.1.3 SITE IMPROVEMENTS

- 43. Site improvements include permanent buildings, perimeter fences or walls, electrical distribution equipment, safety, and security facilities.
- 44. For this Study, the original investment in site improvements was estimated as 5% of the cost for lease facilities.²⁰ The original site improvements are allocated to the years when the wells were reactivated. The original capital investment for site improvements amounted to about \$3,000.

5.2 SUSTAINING CAPITAL INVESTMENT

45. Sustaining capital is invested from time to time to maintain the productive capacity of an oil and gas development to produce income. Sustaining capital investment for the Site includes well modifications, replacement of well equipment, and lease equipment that reaches end-of-life. Routine maintenance, testing expenses, and maintenance of site

²⁰ See Section 5.2 of the Summary Report.



¹⁷ See Section 5.2.2 of the Summary Report.

¹⁸ This relationship, commonly referred to as the Rule of Six-Tenths, is an empirical relationship between a manufacturing facility's cost and capacity. The estimated cost = $((capacity) / (base capacity))^{0.6} x$ (base cost).

¹⁹ Since the Site was initially composed of one well, drilled in the 1890s, capital was allocated under the well modification category when this well began producing for this Study 1979.

improvements are considered operating costs and are not included in sustaining capital investment.²¹

46. The income analysis considers sustaining capital investment in two ways. First, sustaining capital is deducted from income to calculate the net cash flow available for amortizing capital investment. Second, sustaining capital investment is added to the original capital investment to determine the total capital investment to be amortized. Sustaining capital investment is recorded in the cash flow analysis in the year that well modifications were completed and annually for capital replacement of well equipment and lease equipment.

5.2.1 WELL MODIFICATIONS

- 47. Modifications to wells generally include redrill, rework, recompletion, and casing alterations. These activities require a permit from a California regulator and are documented in CalGEM records. Well modifications often restore or increase production rates that characteristically decline over time by opening wells to different productive zones, converting wells from one use to another, or correcting mechanical issues.
- 48. CalGEM records present a history of well modifications for each well at the Site from 1968 to the present.²² These records may include the nature of the work, the time when the work was done, and changes in production rates and crude oil quality. However, CalGEM records indicate little sustaining capital was invested in well modifications at the Site.
- 49. California operators have reported the costs for well modifications and those costs that are relevant to the Site are listed below in **Table 2**. CRC reported the costs for three types of well modifications,²³ while Sentinel Peak Resources ("SPR") reported an average cost for these activities.²⁴ Costs reported by CRC and SPR were normalized to 2022 and averaged \$207,734 per activity, rounded to \$210,000 per activity in 2022.

https://www.culvercity.org/files/assets/public/v/1/documents/city-attorney/writtenpubliccomments_2021-6-17_citycouncil-p.pdf.



²¹ Operating costs are discussed below in Section 6.3.

²² See CalGEM records for the well at the Site, which are listed in **Exhibit C**.

²³ California Resources Corp. 2017 Analyst Day Presentation, p. 67,

https://www.sec.gov/Archives/edgar/data/1609253/000160925317000055/crc2017analystday032017.htm. ²⁴ Sentinel Peak Resources, Report of Robert Lang, Alvarez & Marsal, June 17, 2021, Exhibit 1.

50. This Study uses 20% of the \$210,000 estimated well modification cost, or \$42,000.²⁵ This 20% is the same percentage used for drilling and completion costs, as discussed in Section 5.1.1.

Capital Workover and Modification Costs for an Existing Well								
		Reported Normalized			Normalized	to 2022		
Activity	Year	PPI-0GD	Cost, \$/Activity	Year	PPI-0GD ¹	Cost, \$/Activity		
Convert to Injection ²	2016	316.7	\$150,000	2022	371.8	\$176,094		
Addpay ²	2016	316.7	\$200,000	2022	371.8	\$234,792		
Deepening ²	2016	316.7	\$200,000	2022	371.8	\$234,792		
Recompletion ³	2021	321.06	\$160,000	2022	371.8	\$185,280		
Average			\$177,500	2022		\$207,740		
Cost Reduction Factor ⁴ \$250,000 LA City Oil Field Well Cost / \$1,400,000 Standard City Well Cost ⁵ =						20%		
Cost Used In Model 2022 \$4					\$42,000			
	Activity Convert to Injection ² Addpay ² Deepening ² Recompletion ³ Average ion Factor ⁴ \$250,000 LA Cit In Model	Activity Year Convert to Injection ² 2016 Addpay ² 2016 Deepening ² 2016 Recompletion ³ 2021 Average ion Factor ⁴ \$250,000 LA City Oil Fiel In Model	Report Report Activity Year PPI-0GD Convert to Injection 2 2016 316.7 Addpay 2 2016 316.7 Deepening 2 2016 316.7 Recompletion 3 2021 321.06 Average Verage Verage ion Factor 4 \$250,000 LA City Oil Field Well Cost /	Reported Reported Activity Year PPI-0GD ¹ Cost, \$/Activity Convert to Injection ² 2016 316.7 \$150,000 Addpay ² 2016 316.7 \$200,000 Deepening ² 2016 316.7 \$200,000 Recompletion ³ 2021 321.06 \$160,000 Average \$250,000 LA City Oil Field Well Cost / \$1,400,000 Stand In Model	Reported Reported Activity Year PPI-0GD ¹ Cost, \$/Activity Year Convert to Injection ² 2016 316.7 \$150,000 2022 Addpay ² 2016 316.7 \$200,000 2022 Deepening ² 2016 316.7 \$200,000 2022 Recompletion ³ 2021 321.06 \$160,000 2022 Average \$250,000 LA City Oil Field Well Cost / \$1,400,000 Standard City \$2022 In Model 2022 2022	Reported Normalized 1 Reported Normalized 1 Activity Year PPI-OGD Convert to Injection 2 2016 316.7 \$150,000 2022 371.8 Addpay 2 2016 316.7 \$200,000 2022 371.8 Deepening 2 2016 316.7 \$200,000 2022 371.8 Recompletion 3 2021 321.06 \$160,000 2022 371.8 Average \$177,500 2022 ion Factor 4 \$250,000 LA City Oil Field Well Cost / \$1,400,000 Standard City Well Cost 5 = In Model 2022		

Table 2 – Well Modification Costs

Notes

PPI OGD is BLS Series ID PCU213111213111. June index values are used to reflect mid-year costs.
 California Resources Corp. 2017 Analyst Day Presentation, p. 67. Additional pay zone work is abbreviated "Addpay."
 Sentinel Peak Resources, Report of Robert Lang, Alvarez & Marsal, June 17, 2021, Exhibit 1.

4 The cost reduction factor is multiplied by the standard City workover cost of \$210,000 found in other Studies.

5 The Standard City Well cost can be found in Section 5.2.1 of the Summary Report.

CalGEM records identify the completion dates for modifications to wells.²⁶ Sustaining 51. capital investment in well modifications is recorded in the cash flow analysis during the year in which the modification is completed. The total sustaining capital investment for well modifications amounted to about \$5,000.27

5.2.2 WELL EQUIPMENT

52. Sustaining capital investment is needed to replace well equipment, such as pumps and wellheads when the original equipment reaches the end of its mechanical life. The Study estimates that 10% of the original capital investment to drill and complete production wells and 5% of the original capital investment to drill and complete injection wells is for well equipment subject to capital replacement. The remainder of drilling and completion costs result from drill rig and casing costs. Well equipment has an average mechanical life of 30 years with proper maintenance.

²⁵ Because it is shallower, the Site's well is estimated to cost roughly 20% of the other wells in the City. The 20% factor comes from the average difference in cost for LA City Oil Field wells as compared to the Standard City Well cost in the City, as discussed in Section 5.1.1.

²⁶ See CalGEM records for the well at the Site, which are listed in **Exhibit** C.

²⁷ Although this well was likely drilled in the 1890s, the initial capital was modeled using records from 1968. Capital workover costs were allocated in 1979.

53. This Study allows for 3.33% of the replacement cost of well equipment as sustaining capital investment each year.²⁸ This sustaining capital investment is based on the cost to drill and complete wells, which is adjusted annually for changes in the costs of these activities. The total sustaining capital investment for well equipment amounted to about \$9,000 between 1979 and 2022.

5.2.3 LEASE EQUIPMENT

- 54. Sustaining capital investment is needed to replace original lease equipment that reaches the end of its mechanical life. In addition, capital investment related to new regulatory mandates for site improvements, safety, and environmental equipment is considered as sustaining capital investment. Lease equipment has an average mechanical life of 30 years with proper maintenance.
- 55. The Study allows for replacement of an average of 3.33% of the original capital investment for lease equipment each year. This sustaining capital investment is adjusted for changes in lease equipment costs.²⁹ The total sustaining capital investment for lease equipment amounted to about \$160,000 between 1979 and 2022.

5.3 SUMMARY OF CAPITAL INVESTMENT

56. The total capital investment at the Site to be amortized is about \$242,000, as summarized below in **Table 3**. This amount includes about \$68,000 of original capital investment that occurred in 1979 and about \$174,000 of sustaining capital investment that occurred between 1979 and 2022. These dollar amounts represent the capital investment incurred by operators from 1979 to 2022.

²⁸ Oil fields typically have longer economic lives than the original equipment. Theoretically, to maintain operations, 3.33% of the cost of the equipment will be replaced each year over a 30-year life. See Section 5.3.2 of the Summary Report.

²⁹ See Section 5.2.4 of the Summary Report.

Summary of Site Capital Investment					
	Investment	Time			
Original Capital Investment					
New Wells	\$0	1979-1979			
Lease Equipment	\$65,113	1979-1979			
Site Improvements	\$3,256	1979-1979			
Subtotal	\$68,369				
Sustaining Capital Investment					
Well Modifications	\$4,858	1979-1979			
Well Equipment	\$8,829	1979-2022			
Lease Equipment	\$159,991	1979-2022			
Subtotal	\$173,678				
Capital Investment to be Amortized	\$242,047				

Table 3 – Summary of Site Capital Investment

6. INCOME ANALYSIS

- 57. Capital investment is amortized by the net cash flow generated from the sale of oil and gas. This Study prepared an income analysis that calculates the annual net cash flow beginning with the commencement CalGEM records at the Site. In the income analysis, gross revenues are realized from the sale of crude oil and natural gas. Net income is calculated by deducting gross revenues from royalties, operating costs, and income taxes. Finally, annual net cash flow is determined by deducting capital investment from net income.
- 58. The income analysis calculates net cash flow by considering revenues, operating costs, and capital investment each year in nominal dollars. Nominal dollars (or "dollars of the day") represent the amount of money spent or earned in a particular year. This Study uses nominal dollar amounts in the income analysis to illustrate the amounts that an operator spent for capital investment and received as income during each year of the income analysis.

6.1 **REVENUES**

59. Revenues from oil and gas operations are realized as sales volumes of crude oil and natural gas valued at market prices. Sales volumes of crude oil and natural gas from the Site are the production volumes reported by CalGEM or estimated as discussed below. Market prices for crude oil and natural gas, net of quality adjustments and delivery costs, are the value that the operator of the Site receives for these sales, which are referred to as "netback" prices.

6.1.1 PRODUCTION VOLUMES

Operators in California are required to report production volumes of crude oil and natural gas to CalGEM, which maintains records of production rates for individual wells from 1977 to the present. This information is available for the well at the Site.³⁰

³⁰ CalGEM Production Records.

61. Annual production volumes of crude oil and natural gas from individual wells are aggregated for the Site to determine income. Annual production volumes from the Site are summarized above in **Figure 1**, **Section 4.5**.

6.1.2 NETBACK PRICES FOR CRUDE OIL

- 62. Netback prices for crude oil represent the market price the operator receives for the sale of crude oil produced at the Site, net of quality adjustments and transportation costs. The netback price is generally determined as the market price for a benchmark crude, plus a quality adjustment, less delivery costs from the drill site to the consumer. Netback prices for crude oil depend upon market values for crude oil of similar quality available in southern California, the quality of crude oil, and transportation costs to move crude oil to a Los Angeles area refinery.
- 63. No records document netback prices received for the Los Angeles City Oil Field crude oil.³¹ However, Los Angeles City Oil Field crude oil is typically 15.7°API with a sulfur content of about 1.10%, which is comparable in quality to Kern crude oil, which is 13.3°API and 1.10% sulfur.³²
- 64. This Study estimated netback prices for Los Angeles City Oil Field crude oil based on market prices for Kern crude oil delivered to Long Beach,³³ plus a quality adjustment, less delivery costs from the Site to Long Beach. Historical price assessments for Kern crude were used as a benchmark for the value of Los Angeles City Oil Field crude from 1988. Since Kern price assessments were not available before 1988, Los Angeles City Oil Field crude prices were estimated by applying a market differential to Brent crude oil between 1979 and 1987 and by applying a market differential to West Texas Intermediate ("WTI") crude oil between 1947 and 1978.³⁴
- 65. A quality adjustment to the benchmark price assessment reflects the difference in refining value between Los Angeles City Oil Field crude oil and the benchmark.³⁵ As noted above, Los Angeles City Oil Field crude oil is higher in API Gravity than Kern crude, which would result in a higher value to a refiner. The sulfur content of the Los Angeles City Oil Field crude oil is about the same as Kern crude, which would result in no

³¹ "Los Angeles City Oil Field" crude oil is used in this Study to refer to crude oil produced from the Site.

³² The Los Angeles City Oil Field crude oil quality is compared to Kern crude oil in Section 4.8.

³³ Kern crude is delivered by pipeline to Long Beach.

³⁴ See Section 6.3 of the Summary Report.

³⁵ See Section 6.3 of the Summary Report.

difference in value. Based on reasonable adjustments for API Gravity, a quality premium of \$0.84/B reflects the higher market value of Los Angeles City Oil Field crude oil.³⁶

- 66. The Site is assumed to deliver crude oil to customers by a common carrier pipeline for delivery to terminals in Long Beach. Transportation costs to deliver crude oil from the Site to Long Beach were estimated at \$1.50/B in 2022, based on common carrier tariffs.³⁷
- 67. Annual average netback prices for Los Angeles City Oil Field crude oil are shown below in **Figure 2**.



Figure 2 - Netback Prices for Crude Oil and Natural Gas

6.1.3 NETBACK PRICES FOR NATURAL GAS

68. Netback prices for natural gas represent the market price that an operator receives for natural gas produced at the Site, less delivery costs. The Site is assumed to have a connection for natural gas sales to the SoCalGas system or another local distribution company that serves the Los Angeles area. Natural gas must meet pipeline quality before it can be injected into a local distribution system.³⁸

³⁶ Chevron Crude Oil Marketing, Posted Pricing – California, California – Bulletin 2023-CA176, <u>https://crudemarketing.chevron.com/crude/north_american/california.aspx</u>.

³⁷ Crimson California Pipeline L.P. trunkline tariff, August 1, 2022; Crimson California Pipeline L.P. gathering line tariff, August 1, 2022.

³⁸ https://www.socalgas.com/documents/news-room/fact-sheets/PipelineBasics.pdf

- 69. This Study estimated netback prices for natural gas based on market prices for delivery to the SoCalGas "City Gate," which is a virtual Los Angeles-area trading location. Historical City Gate price assessments for natural gas were used as a benchmark from 1989 to the present. Since City Gate price assessments were not available before 1989, the natural gas prices of the Los Angeles area were estimated by applying a historical market differential to Henry Hub natural gas price assessments between 1964 and 1988.³⁹ No discount for transportation costs was applied to these sales, which would be delivered into a pipeline.
- 70. Annual average netback prices for Los Angeles City Oil Field natural gas are shown above in **Figure 2**.⁴⁰

6.2 ROYALTIES

- 71. Owners of mineral rights earn a royalty on commercial volumes of oil and gas produced from their property.⁴¹ These arrangements are set out in lease agreements between the mineral rights owner and the operator, which can vary from lease to lease. The operator pays royalties to the owner of the mineral rights out of revenues and this cash is not available to amortize the operator's capital investment. No records are available to document royalty rates paid on leases at the Site.
- 72. The income analysis deducts royalties and other land lease costs equal to 16.660% of revenues. This is the same royalty rate that applies to oil and gas extraction leases on California state lands.⁴²

6.3 **OPERATING COSTS**

73. Lease operating costs generally include labor, utilities, operating materials, maintenance materials, spare parts, general and administrative expenses, insurance, and permits. Direct operating costs include costs for operations to: separate well fluids into oil, gas, and produced water; treat crude oil and natural gas to market specifications; and treat produced water for reinjection or disposal.

³⁹ See Section 6.4 and Exhibit 1 of the Summary Report.

⁴⁰ "Los Angeles City Oil Field" natural gas is used in this Study to refer to natural gas produced from the Site.

⁴¹ Owners of mineral rights and landowners may or may not be the same person/entity.

⁴² Report on the Federal Oil and Gas Leasing Program, U.S. Department of the Interior, November 2021.

- 74. The EIA published annual estimates of oil lease operating costs between 1976 and 2009.⁴³ The Site's operating costs were estimated by normalizing EIA operating costs for its design production rate of well fluids and applying these costs to the reported production of well fluids from the Site. Before 1976 and after 2009, the EIA operating costs were adjusted for historical changes in operating costs.⁴⁴
- 75. The annual Site's operating costs are summarized below in **Figure 3**.



Figure 3 – Site Operating Costs

6.4 INCOME TAXES

- 76. The income analysis deducts income taxes from revenues to determine the net cash flow available for amortizing capital investments. Income before taxes is adjusted for depreciation of capital investments and for tax loss carry-forward (where applicable) to calculate taxable income.
- Federal and state income taxes on taxable income are calculated using the highest corporate tax brackets in effect each year. Federal income tax rates range from 21% to 46%, and California state income tax rates range from 8.8% to 9.6%.⁴⁵

⁴³ See Section 6.6 of the Summary Report.

⁴⁴ See Section 5.2.4 of the Summary Report.

⁴⁵ See Section 6.7 of the Summary Report.

6.5 NET CASH FLOW FOR AMORTIZATION

- 78. Annual net income is calculated by deducting royalties, operating costs, and income taxes from revenues. Annual net cash flow is determined by deducting capital investment from net income. Annual negative net cash flows from the Site averaged \$600 during the years that the Site produced oil, with a cumulative negative net cash flow of about \$28,000. These dollar amounts represent the cash flow generated from 1979 to 2022.
- 79. The annual and cumulative net cash flow from the Site are shown in **Figure 4**.



Figure 4 – Site Net Cash Flow

7. MARKET RATE OF RETURN ON INVESTMENT

- 80. The tests for amortization of capital investment use a "market" rate of return on investment characteristic of oil and gas production companies.⁴⁶ The market rate of return on investment is the total rate of return realized by public companies in this industry sector.
- 81. This Study refers to an analysis of the Weighted Average Cost of Capital ("WACC") for public companies published annually since 1998.⁴⁷ For each year, the cost of equity, cost of debt, capital structure, and WACC are reported for companies in the oil and gas industry sector that are mainly structured as corporations. The number of oil and gas production companies in the annual report varied from 92 to 411 firms. For this group, the WACC has ranged between 6% and 10% since 1998, as shown in **Exhibit 4** of the Summary Report.
- 82. The income analysis for this Study assumes a market rate of return of 8%, which is near the median of companies engaged in oil and gas production from 1998 through 2022. This industry rate of return is characteristic of returns on capital investment to a corporation that pays income taxes on net operating income.

⁴⁷ See Section 7.1 of the Summary Report



⁴⁶ See Section 4.3 of the Summary Report.

8. CONCLUSIONS

83. The income analysis was used in the amortization model to determine the time required to achieve amortization of capital investment using the Base Case assumptions discussed above. The income analysis was also used to test the impact of alternative assumptions on the time needed to achieve amortization.

8.1 BASE CASE AMORTIZATION OF CAPITAL INVESTMENT

- 84. In the Base Case, capital investment in wells and lease facilities at the Site was never amortized.
- 85. The results of the Base Case income analysis are summarized in **Exhibit E**.⁴⁸ The Internal Rate of Return ("IRR") test for amortization was never achieved, as the cumulative IRR never exceeded the 8% market rate of return. The Net Present Value ("NPV") test for amortization was also never achieved, as the cumulative net present value did not exceed zero.
- 86. The total capital investment of \$242,000 was not amortized due to \$28,000 negative net cash flow between 1979 and 2022. The cumulative IRR was below zero and remained at that level through 2022.

8.2 SENSITIVITY CASE A: MARKET RETURN ON CAPITAL INVESTMENT

87. This sensitivity analysis over a reasonable range of assumptions in the market rate of return also failed to show that the Site is amortized. The results of the Sensitivity Case A income analysis are summarized in **Exhibit F**.

⁴⁸ Exhibits E, F, G, and H provide the calendar year when the Site amortizes for the Base Case and the Sensitivity Cases. If the Site's cash flows do not return a positive IRR or NPV result, then these results are not applicable which is designated by "#N/A" which indicates that the Site never amortizes.

88. In Sensitivity Case A, the Base Case market rate of return of 8% was replaced with a rate of return of 12%. This alternative assumption was selected as the highest cost of equity for oil and gas companies reported since 1998 and is the upper limit of a reasonable range of market rates of return.⁴⁹

8.3 SENSITIVITY CASE B: COMMODITY PRICE

- 89. This sensitivity analysis, conducted over a reasonable range of assumptions related to the price of crude oil, also failed to show that the Site is amortized as in the base case. The results of the Sensitivity Case B income analysis are summarized in **Exhibit G**.
- 90. In Sensitivity Case B, the Base Case quality premium of \$0.84/B for Los Angeles City Oil Field crude oil was changed to a premium of \$0.34/B. This assumption reduces the netback price received by the operator by \$0.50/B, which is a lower limit for a reasonable range of values for the Los Angeles City Oil Field crude oil.

8.4 SENSITIVITY CASE C: ORIGINAL CAPITAL INVESTMENT

- 91. This sensitivity analysis with a larger original capital investment also failed to show that the Site is amortized as in the base case. The results of the Sensitivity Case C income analysis are summarized in **Exhibit H**.
- 92. In Sensitivity Case C, the Base Case cost to drill and complete a well of \$250,000 was increased by 50% to \$375,000. This cost is within the range of costs reported by Berry for production wells and is an upper limit for a reasonable range of original capital costs for wells at the Site.

8.5 INCOME ANALYSES SUMMARY

93. The Base Case and three sensitivity cases are summarized in Table 4 below. The sensitivity cases are calculated to test the potential impact of alternative assumptions on the Base Case conclusion of the time required to achieve amortization of capital investment. As discussed in Section 8 of the Summary Report, the alternative

⁴⁹ See **Exhibit 4** of the Summary Report.

assumptions include a 4% higher market return on capital investment, a \$0.50/B lower price of crude oil, and an increase of 50% to the costs to drill and complete the wells. The alternative assumptions used in each of the sensitivity cases are highlighted in **Table 4**.

Model Assumptions	Base Case	Case A	Case B	Case C
Market Return on Capital Investment, %				
Oil and Gas Production Companies	8.00%	12.00%	8.00%	8.00%
Commodity Price Factors, 2022 (\$/B)				
Crude Oil Transportation - Site to Long Beach	1.50	1.50	1.50	1.50
Crude Oil Quality Adjustment	0.84	0.84	0.34	0.84
Royalty and Lease Costs, % Revenue				
Royalty Rate	16.660%	16.660%	16.660%	16.660%
Site Operating Costs, 2022 (\$/B)				
Basis: Total Produced Liquids	0.71	0.71	0.71	0.71
Capital Expenditures, 2022 (\$ Thousands)				
Drilling and Completion Cost per Well	250	250	250	375
Well Modification Cost per Event	42	42	42	42
Results, 2022				
IRR, %	Never	Never	Never	Never
NPV, (\$ Thousands)	-40	-40	-40	-40
Years to Amortization, IRR	Never	Never	Never	Never
Years to Amortization, NPV	Never	Never	Never	Never

Table 4 - Income Analyses Assumptions

EXHIBIT A: LIST OF REFERENCE DOCUMENTS

Title	Date
Petroleum in Southern California, P.W. Prutzman	March 27, 1905
The Los Angeles City Oil Field, S.M Testa	June 27, 2005
Bureau of Mines Information Circular 8676, Sulfur Content of Crude Oils	January 1, 1975
Central City West Specific Plan, Ordinance #s: 166,704, 167,944. 169,110, 176,519, 179,420, 180,983 and 186,370	April 3, 1991
Costs and Indices for Domestic Oil and Gas Field Equipment and Operations, DOE/EIA-0185(95)	August 1, 1996
2010 EIA Lease Equip Cost Cost Study Data File	September 28, 2010
Oil and Gas Lease Equipment and Operating Costs 1994 through 2009, DOE/EIA	September 28, 2010
California Resources Corporation 2017 Analyst Day Presentation	March 22, 2017
Report of R Lang, Alvarez & Marsal, for Sentinel Peak Resources	June 17, 2021
US. Department of the Interior, Report on the Federal Oil and Gas Leasing Program	November 1, 2021
California Resources Corporation Investor Presentation	June 1, 2022
Crimson California Pipeline L.P. Local Tariff for Gathering of Crude Petroleum	August 1, 2022
Crimson California Pipeline L.P. Local Tariff for Transportation of Crude Petroleum	August 1, 2022
https://crudemarketing.chevron.com/crude/north_american/california.aspx	September 14, 2023
Official City of Los Angeles Municipal Code	45107
CalGEM Records for API 403718961, File 03718961_2019-05-15_DATA	Various
CalGEM Production Records, File CALGEMs_Well_Data_Formatting_LAC_All	Various

EXHIBIT B: AERIAL PHOTOGRAPH OF THE SITE



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EXHIBIT C: WELL AT THE SITE

Well API No.	Lease Name	Well Designation	Spudded	Complete	Current Type	Current Status
403718961	Patel	2	N/A	N/A	Oil & Gas	Active

Source: CalGEM Well Finder and CalGEM Records.

* No Record found, date is an approximation

Note: "Spudded" refers to the start of drilling operations. "Complete" refers to completion of drilling operations such that the well is ready to be placed into production.



EXHIBIT D: LOCATION OF WELL AT THE SITE



Source: CalGEM Well Finder website

The CalGEM website indicates the well status as follows:

- Wells indicated in green are active;
- Wells indicated in purple are idle;
- Wells indicated in grey are plugged; and
- Injection wells are indicated with an arrow.
- Blue squares and light blue diamonds indicate surface facilities.

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EXHIBIT E: BASE CASE AMORTIZATION OF CAPITAL INVESTMENT⁵⁰

	Μ	odel Output Summary							
Start Year 1979									
Amortization Year (IRR) #N/A									
Amortization Year (NPV) #N/A Years for Amortization of Capital Investment #N/A									
reals for Amortization of Capital investment #N/A									
Capital Investment, \$thousands 242									
	G	ross Revenues, \$thousands 368							
		BIIDA, \$thousands 216 et Cash Flow \$thousands (28)							
	С	umulative IRR at 2022 N/A							
		IRR Test for Amortization of Capital Investment							
	10%								
NN NN	8%								
RETUI	6%								
E OF I	4%								
RAT	2%								
	0%								
	2970	1984 1989 1994 1999 2004 2009 2014 2019							
		Internal Rate of Return Industry Rate of Return							
		NPV Test for Amortization of Capital Investment							
ST 0									
סטררק	(20)								
S 0F 1	(40)								
SAND	(60)								
NOH									
F	(80) مر	P 4/2 Po 4/2 Po 4/2 P							
	291	29° 29° 29° 29° 20° 20° 20°							
		Net Present Value							

⁵⁰ Exhibits E, F, G, and H provide the calendar year when the Site amortizes for the Base Case and the Sensitivity Cases. If the Site's cash flows do not return a positive IRR or NPV result, then these results are not applicable which is designated by "#N/A." which indicates that the Site never amortizes.

EXHIBIT F: SENSITIVITY CASE A-MARKET RETURN ON CAPITAL INVESTMENT

Model Output Summary	
Start Year	1979
Amortization Year (IRR)	#N/A
Amortization Year (NPV)	#N/A
Years for Amortization of Capital Investment	#N/A
Capital Investment, \$thousands	242
Gross Revenues, \$thousands	368
EBITDA, \$thousands	216
Net Cash Flow, \$thousands	(28)

N/A Cumulative IRR at 2022 IRR Test for Amortization of Capital Investment 14% 12% RATE OF RETURN 10% 8% 6% 4% 2% 0% 2014 2029 29719 2984 2989 2999 2004 2994 2009 Industry Rate of Return Internal Rate of Return _ NPV Test for Amortization of Capital Investment 0 THOUSANDS OF DOLLARS (10)(20) (30) (40)(50)(60)(70)2984 2029 2989 2994 2009 29719 2999 2004 2014 Net Present Value

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EXHIBIT G: SENSITIVITY CASE B-COMMODITY PRICE

Model Output Summary	
Start Year	1979
Amortization Year (IRR)	#N/A
Amortization Year (NPV)	#N/A
Years for Amortization of Capital Investment	#N/A
Capital Investment, \$thousands	242
Gross Revenues, \$thousands	364
EBITDA, \$thousands	213
Net Cash Flow, \$thousands	(30)



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EXHIBIT H: SENSITIVITY CASE C-ORIGINAL CAPITAL INVESTMENT

Model Output Summary	
Start Year	1979
Amortization Year (IRR)	#N/A
Amortization Year (NPV)	#N/A
Years for Amortization of Capital Investment	#N/A
Capital Investment, \$thousands	246
Gross Revenues, \$thousands	368
EBITDA, \$thousands	216
Net Cash Flow, \$thousands	(31)

N/A Cumulative IRR at 2022 IRR Test for Amortization of Capital Investment 10% 8% RATE OF RETURN 6% 4% 2% 0% 2024 2019 29719 2984 2989 2994 2999 2004 2009 Industry Rate of Return Internal Rate of Return _ NPV Test for Amortization of Capital Investment 0 THOUSANDS OF DOLLARS (20) (40)(60) (80) 2984 2989 2994 2029 2004 2009 29719 2014 2999 Net Present Value

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