



**POTENTIAL AMENDMENTS TO RULES 4401, 4409, 4455, 4623,  
AND 4624— REQUIREMENTS FOR LEAK DETECTION AND  
REPAIR (LDAR) FROM OIL AND GAS PRODUCTION, STORAGE,  
AND TRANSFER OPERATIONS**

**SOCIOECONOMIC IMPACT ANALYSIS**

***Final***

**June 15, 2023**

*Submitted to:*



**San Joaquin Valley Air Pollution Control District  
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## 1 EXECUTIVE SUMMARY

This report contains ERG’s analysis of the socioeconomic impacts of potential amendments to the San Joaquin Valley Air Pollution Control District (SJVAPCD or District):

- Rule 4401: Steam-Enhanced Crude Oil Production Wells;
- Rule 4409: Components at Light Crude Oil Production Facilities, Natural Gas Production Facilities, and Natural Gas Processing Facilities;
- Rule 4455: Components at Petroleum Refineries, Gas Liquids Processing Facilities, And Chemical Plants;
- Rule 4623: Storage of Organic Liquids; and
- Rule 4624: Transfer of Organic Liquids

Potential amendments to Rules 4401, 4409, 4455, 4623, and 4624 would decrease volatile organic compound (VOC) emissions from oil and gas production facilities.

After providing an overview of demographic and economic trends in the District as a whole, ERG estimates the impacts of the potential amendments on entities that would incur costs under the potential amendments by comparing compliance costs to profits.

Table 1 through Table 5 summarize estimated compliance costs and projected impacts for each of the five rules. As shown in Table 1, Rule 4401 compliance costs incurred by companies are estimated to be low (approximately 2 percent of profits). These costs meet the threshold for economic feasibility (annual costs as a percentage of profits are less than 10 percent) used throughout the report. Compliance costs are only incurred by one sector, the crude petroleum and natural gas sector.

**Table 1. Summary of Socioeconomic Impacts due to Potential Amendments to Rule 4401—Steam-Enhanced Crude Oil Production Wells**

Sector	Total Companies	Total Annual Cost	Average Annual Cost per Company	Average Profits per Company	Cost as % Profits
Crude Petroleum and Natural Gas	27	\$3,814,894	\$141,292	\$6,765,731	2.09%
<b>Total/Average</b>	<b>27</b>	<b>\$3,814,894</b>	<b>\$141,292</b>	<b>\$6,765,731</b>	<b>2.09%</b>

Sources: ERG estimates based on SJVAPCD, 2023; IMPLAN, 2023; RMA, 2023; BEA, 2023; U.S. Census Bureau, 2020a.

As shown in Table 2, Rule 4409 compliance costs incurred are estimated to comprise a small percentage of profits across all affected sectors. Of note, profit data from the Risk Management Association (RMA) was unavailable for the Natural Gas Transmission sector. Despite assuming that firms with facilities in this sector generate no profit, the cost impacts of the rule still meet the definition of economic feasibility outlined above.

**Table 2. Summary of Socioeconomic Impacts due to Potential Amendments to Rule 4409—Components at Light Crude Oil Production Facilities, Natural Gas Production Facilities, and Natural Gas Processing Facilities**

Sector	Total Companies [a]	Total Annual Cost	Average Annual Cost per Company	Average Profits per Company [b]	Cost as % Profits
Crude Petroleum and Natural Gas	29	\$5,705,636	\$196,746	\$5,910,293	3.33%
Natural Gas Liquids	11	\$1,651,631	\$150,148	\$4,510,487	3.33%
Natural Gas Transmission	1	\$75,074	\$75,074	\$0	0.00%
<b>Total/Average</b>	<b>33</b>	<b>\$7,432,341</b>	<b>\$225,222</b>	<b>\$6,697,390</b>	<b>3.36%</b>

Sources: ERG estimates based on SJVAPCD, 2023; IMPLAN, 2023; RMA, 2023; BEA, 2023; U.S. Census Bureau, 2020a.

[a] This represents the number of companies with facilities categorized within a given sector. Some companies have facilities categorized in different SIC code sectors. For this analysis, costs and profits for a company that has facilities across two or more SIC codes are split evenly across each SIC for that company's facilities.

[b] RMA does not have financial data available for the Natural Gas Transmission sector. ERG assumed zero percent profit to present an abundantly conservative estimate of impacts.

Table 3 presents the results for Rule 4455; compliance costs incurred by firms are estimated to be low (about one-one hundredth of a percent of profits) across all affected sectors.

**Table 3. Summary of Socioeconomic Impacts due to Potential Amendments to Rule 4455—Components at Petroleum Refineries, Gas Liquids Processing Facilities, and Chemical Plants**

Sector	Total Companies	Total Annual Cost	Average Annual Cost per Company	Average Profits per Company	Cost as % Profits
Natural Gas Liquids	2	\$4,037	\$2,018	\$6,765,731	0.03%
Industrial Organic Chemicals, NEC - Aliphatics	6	\$12,110	\$2,018	\$8,911,265	0.02%
Pesticides and Agricultural Chemicals, NEC	1	\$2,018	\$2,018	\$991,252	0.20%
Petroleum Refining	4	\$8,074	\$2,018	\$37,422,061	0.01%
Chemicals and Allied Products, NEC	1	\$2,018	\$2,018	\$3,209,106	0.06%
<b>Total/Average</b>	<b>14</b>	<b>\$28,257</b>	<b>\$2,018</b>	<b>\$15,777,689</b>	<b>0.01%</b>

Sources: ERG estimates based on SJVAPCD, 2023; IMPLAN, 2023; RMA, 2023; BEA, 2023; U.S. Census Bureau, 2020a.

Rule 4623 compliance costs incurred are estimated to comprise roughly 0.31 percent of profits across all affected sectors. These results are presented in Table 4. Similar to the Natural Gas Transmission sector in-scope of Rule 4409, profit data from RMA was unavailable for the Crude Petroleum Pipelines sector. Even when assuming that companies with facilities in either the Crude Petroleum Pipelines and Natural Gas Transmission sectors generate no profit, the cost impacts of the rule still meet the definition of economic feasibility.

**Table 4. Summary of Socioeconomic Impacts due to Potential Amendments to Rule 4623—Storage of Organic Liquids**

Sector	Total Companies [a]	Total Annualized Cost [b]	Average Annualized Cost per Company	Average Profits per Company [c]	Cost as % Profits
Crude Petroleum and Natural Gas	26	\$716,591	\$27,561	\$6,245,290	0.44%
Natural Gas Liquids	5	\$104,503	\$20,901	\$4,736,011	0.44%
Industrial Organic Chemicals, NEC - Aliphatics	2	\$59,716	\$29,858	\$20,315,583	0.15%
Petroleum Refining	3	\$89,574	\$29,858	\$37,422,061	0.08%
Products of Petroleum and Coal, Not Elsewhere Classified	1	\$29,858	\$29,858	\$37,422,061	0.08%
Crude Petroleum Pipelines	2	\$59,716	\$29,858	\$0	0.00%
Natural Gas Transmission	1	\$14,929	\$14,929	\$0	0.00%
Petroleum Bulk Stations and Terminals	2	\$59,716	\$29,858	\$4,514,480	0.66%
Petroleum and Petroleum Products Wholesalers, Except Bulk Stations and Terminals	1	\$29,858	\$29,858	\$4,514,480	0.66%
Farm Supplies - Lawn and Garden Supplies Sold Via Retail Method	2	\$59,716	\$29,858	\$461,036	6.48%
<b>Total/Average</b>	<b>41</b>	<b>\$1,224,177</b>	<b>\$29,858</b>	<b>\$9,532,744</b>	<b>0.31%</b>

Sources: ERG estimates based on SJVAPCD, 2023; IMPLAN, 2023; RMA, 2023; BEA, 2023; U.S. Census Bureau, 2020a.

[a] This represents the number of companies with facilities categorized within a given sector. Some companies have facilities categorized in different SIC code sectors. For this analysis, costs and profits for a company that has facilities across two or more SIC codes are split evenly across each SIC for that company's facilities.

[b] The total annualized cost is calculated by summing annualized one-time costs (annualized over a 10-year period using a 4 percent discount rate) and annual costs.

[c] RMA does not have financial data available for either the Crude Petroleum Pipelines sector or the Natural Gas Transmission sector. ERG assumed zero percent profit to present an abundantly conservative estimate of impacts.

Table 5 summarizes the results for Rule 4624. Compliance costs incurred by companies are projected to be approximately 0.05 percent of profits, even with some companies assumed to generate zero profit.



**Table 5. Summary of Socioeconomic Impacts due to Potential Amendments to Rule 4624—Transfer of Organic Liquid**

Sector	Total Companies [a]	Total Annual Cost	Average Annual Cost per Company	Average Profits per Company [b]	Cost as % Profits
Crude Petroleum and Natural Gas	7	\$18,990	\$2,713	\$4,832,665	0.06%
Natural Gas Liquids	7	\$18,990	\$2,713	\$4,832,665	0.06%
Industrial Organic Chemicals, NEC - Aliphatics	4	\$15,192	\$3,798	\$11,762,345	0.03%
Nitrogenous Fertilizers	1	\$3,798	\$3,798	\$991,252	0.38%
Petroleum Refining	4	\$13,293	\$3,323	\$32,744,303	0.01%
Products of Petroleum and Coal, Not Elsewhere Classified	1	\$3,798	\$3,798	\$37,422,061	0.01%
Special Warehousing and Storage, Not Elsewhere Classified	1	\$3,798	\$3,798	\$766,972	0.50%
Crude Petroleum Pipelines	6	\$22,788	\$3,798	\$0	0.00%
Transportation Services, Not Elsewhere Classified	1	\$3,798	\$3,798	\$104,762	3.63%
Natural Gas Transmission	2	\$7,596	\$3,798	\$0	0.00%
Chemicals and Allied Products, NEC	1	\$3,798	\$3,798	\$753,420	0.50%
Petroleum Bulk Stations and Terminals	7	\$26,586	\$3,798	\$3,869,554	0.10%
Petroleum and Petroleum Products Wholesalers, Except Bulk Stations and Terminals	2	\$5,697	\$2,848	\$3,385,860	0.08%
<b>Total/Average</b>	<b>39</b>	<b>\$148,120</b>	<b>\$3,798</b>	<b>\$8,194,384</b>	<b>0.05%</b>

Sources: ERG estimates based on SJVAPCD, 2023; IMPLAN, 2023; RMA, 2023; BEA, 2023; U.S. Census Bureau, 2020a.

[a] This represents the number of companies with facilities categorized within a given sector. Some companies have facilities categorized in different SIC code sectors. For this analysis, costs and profits for a company that has facilities across two or more SIC codes are split evenly across each SIC for that company's facilities.

[b] RMA does not have financial data available for either the Crude Petroleum Pipelines sector or the Natural Gas Transmission sector. ERG assumed zero percent profit to present an abundantly conservative estimate of impacts.

As a secondary measure of impacts, ERG also used the IMPLAN (2023) input-output model to assess how firms with costs under the potential amendments might react by reducing employment, as well as a “ripple effect” felt if affected firms reduce purchases from their suppliers, and their suppliers in turn reduce their own purchases. For each of the five rules, these impacts make up less than **0.01 percent** of District-wide revenue and employment.

## **2 INTRODUCTION AND BACKGROUND**

This report provides economic data and analysis in support of the District’s assessment of the socioeconomic feasibility of potential amendments to existing Rules 4401, 4409, 4455, 4623, and 4624 for steam-enhanced crude oil production wells; components at light crude oil production facilities, natural gas production facilities, and natural gas processing facilities; components at petroleum refineries, gas liquids processing facilities, and chemical plants; storage of organic liquids; and transfer of organic liquid. This work was performed by ERG under District Agreement No. 21-4-22.

Gas and oil producing facilities are primarily involved in crude petroleum extraction, natural gas extraction, and oil transportation industries. The potential amendments would revise existing District Rules 4401, 4409, 4455, 4623, and 4624, which limited VOC emissions from oil and natural gas production facilities. The potential amendments to Rules 4401, 4409, 4455, 4623, and 4624 would align gas and oil production facilities with the findings of the District’s expedited review of Best Available Retrofit Control Technology as required by Assembly Bill 617.

This analysis was prepared to meet the requirements of California Health and Safety Code §40728.5, which requires an assessment of the socioeconomic impacts of the adoption, amendment, or repeal of air district rules. It begins by providing an overview of demographic and economic trends in the District, and then estimates the economic impacts on specific entities subject to the potential rule amendments (including small entities), and how those economic impacts might affect the surrounding communities, including at-risk populations.

### **3 REGIONAL DEMOGRAPHIC AND ECONOMIC TRENDS**

In this section ERG considers larger demographic and economic trends in the District, which includes eight counties that are home to over 4 million people.<sup>1</sup> These counties have become more populous over the last decade, and the median income (adjusted for inflation) has also increased. Utilities, wholesale and retail trade, and transportation, along with agriculture and oil and gas extraction, are the predominant industries within the District both in terms of establishments and employment.

#### **3.1 REGIONAL DEMOGRAPHIC TRENDS**

This section presents the demographic shifts within the District’s jurisdiction from 2012 to 2022. At the time of the writing of this report, data are not available at the county level beyond the year 2021 with the exception of population data.<sup>2</sup> The District has experienced a greater population growth rate than the state as a whole and greater income growth than the state. The poverty rate throughout the district, while decreasing over time, is also doing so at a slightly faster pace than California as a whole.

The San Joaquin Valley contains over 11 percent of the state of California’s population. Table 6 shows how this population has changed over the last 10 years. Table 6 also shows the compound annual growth rate (CAGR) between 2013 and 2022. The CAGR is the constant rate at which the population would have changed annually to increase from the 2013 level to the 2022 level.

Overall, the region has seen annual average population growth marginally higher than the state of California. Kings County, the county with the smallest population of the counties in the District, saw little growth in its population from 2013 to 2022. San Joaquin County saw the most growth, increasing at 1.37 percent annually.

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<sup>1</sup> While only part of Kern County falls into the District’s boundaries, all of Kern County is included in the data presented in this section, as the data were only available at the county level.

<sup>2</sup> ERG used one-year estimates to compile this data for other socioeconomic impact reports. Since U.S. Census Bureau announced they would not publish one-year estimates for the 2020 American Community Survey, ERG opted to use five-year estimates for demographic data for this report.

**Table 6. Population Trends by County**

County	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	CAGR 2013-2022
Fresno	951,514	960,567	969,488	976,830	985,238	991,950	999,101	1,009,503	1,012,992	1,015,190	0.72%
Kern [a]	862,000	869,176	876,031	880,856	887,356	893,758	900,202	905,828	912,351	916,108	0.68%
Kings	150,337	149,495	150,085	149,382	149,665	151,382	152,940	152,790	152,679	152,981	0.19%
Madera	151,370	153,456	153,576	153,956	155,423	156,882	157,327	156,343	158,910	160,256	0.64%
Merced	262,026	264,419	266,353	267,628	271,096	274,151	277,680	281,814	284,458	290,014	1.13%
San Joaquin	702,046	711,579	722,271	732,809	743,296	752,491	762,148	780,558	788,140	793,229	1.37%
Stanislaus	523,451	528,015	533,211	539,255	544,717	548,126	550,660	553,217	552,851	551,275	0.58%
Tulare	452,460	455,138	457,161	459,235	462,308	464,589	466,195	473,891	476,946	477,544	0.60%
<b>SJVAPCD [a]</b>	<b>4,055,204</b>	<b>4,091,845</b>	<b>4,128,176</b>	<b>4,159,951</b>	<b>4,199,099</b>	<b>4,233,329</b>	<b>4,266,253</b>	<b>4,313,944</b>	<b>4,339,327</b>	<b>4,356,597</b>	<b>0.80%</b>
<b>California</b>	<b>38,260,787</b>	<b>38,596,972</b>	<b>38,918,045</b>	<b>39,167,117</b>	<b>39,358,497</b>	<b>39,461,588</b>	<b>39,512,223</b>	<b>39,501,653</b>	<b>39,142,991</b>	<b>39,029,342</b>	<b>0.22%</b>

Source: U.S. Census Bureau, 2020b; U.S. Census Bureau, 2023a.

[a] While the SJVAPCD only includes a portion of Kern county, the data shown here are for the whole of the county.

Table 7 shows the median income by county for 2012 through 2021 (U.S. Census Bureau, 2023b). Median income growth rates varied across counties from 2012 to 2021, though the counties in the District as a whole had a CAGR of 1.26 percent overall; this is slightly lower than the growth rate of median income for the state of California (1.58 percent). Kern and Kings counties saw the lowest rates of growth in region (0.40 percent and 0.98 percent, respectively).

Table 7. Median Income by County [a]

County	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	CAGR 2012-2021
Fresno	\$58,194	\$56,970	\$55,479	\$54,969	\$55,302	\$57,538	\$59,105	\$61,131	\$63,855	\$65,569	1.33%
Kern [b]	\$60,720	\$60,707	\$59,619	\$59,578	\$59,904	\$60,013	\$60,510	\$60,430	\$61,330	\$62,945	0.40%
Kings	\$62,036	\$60,183	\$58,106	\$56,485	\$56,839	\$58,733	\$62,108	\$65,525	\$68,827	\$67,699	0.98%
Madera	\$60,987	\$57,047	\$55,834	\$54,774	\$55,036	\$56,924	\$60,977	\$65,227	\$69,238	\$71,382	1.76%
Merced	\$55,425	\$53,254	\$52,859	\$51,601	\$53,417	\$54,713	\$57,800	\$60,795	\$62,984	\$62,984	1.43%
San Joaquin	\$68,567	\$66,743	\$65,362	\$64,740	\$66,229	\$68,262	\$70,502	\$72,983	\$76,734	\$80,213	1.76%
Stanislaus	\$63,442	\$61,638	\$60,845	\$60,914	\$62,073	\$64,067	\$66,169	\$68,760	\$70,299	\$73,157	1.60%
Tulare	\$55,728	\$53,400	\$52,610	\$51,077	\$51,483	\$52,981	\$54,790	\$56,281	\$58,739	\$61,415	1.09%
<b>SJVAPCD [b, c]</b>	<b>\$61,001</b>	<b>\$59,542</b>	<b>\$58,391</b>	<b>\$57,824</b>	<b>\$58,581</b>	<b>\$60,142</b>	<b>\$61,961</b>	<b>\$63,842</b>	<b>\$66,234</b>	<b>\$68,306</b>	<b>1.26%</b>
<b>California</b>	<b>\$78,116</b>	<b>\$76,389</b>	<b>\$75,471</b>	<b>\$75,123</b>	<b>\$76,742</b>	<b>\$79,309</b>	<b>\$82,128</b>	<b>\$85,220</b>	<b>\$87,965</b>	<b>\$89,988</b>	<b>1.58%</b>

Source: U.S. Census Bureau, 2023b.

[a] Inflated values to 2022 dollars using the BEA (2023) GDP deflator.

[b] While the SJVAPCD only includes a portion of Kern county, the data shown here are for the whole of the county.

[c] Median income for SJV is a weighted average by population.

ERG compiled data related to poverty from the U.S. Census Bureau (2023c). The poverty threshold used to determine poverty status varies by family size and composition, and uses pre-tax income (not including capital gains or noncash benefits (U.S. Census Bureau, 2023d).

Poverty rates by county for the last decade are shown in Table 8. The poverty rate decreased in every county in the District in that time frame. The poverty rate within the District is higher than the state average, while declining at effectively the same rate overall compared to the state of California's rate of -2.4 percent. Fresno and Tulare counties have consistently had among the highest poverty rates in the District while Stanislaus and San Joaquin counties have had the two lowest. Stanislaus and San Joaquin counties also saw some of the steepest declines in poverty rates in the region.

Many of the District's leading industries, including agriculture, transportation, and manufacturing, typically employ a higher percentage of low income and less educated employees, and have unstable or seasonal employment needs (Abood, 2014), likely leading to the higher rates of poverty seen in the District.

**Table 8. Poverty Rate by County**

County	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	CAGR 2012 – 2021
Fresno	24.8%	26.0%	27.4%	26.8%	26.9%	25.4%	24.1%	22.5%	20.8%	20.2%	-2.25%
Kern [a]	22.5%	22.9%	23.4%	23.5%	23.1%	22.6%	22.0%	21.0%	20.4%	19.4%	-1.63%
Kings	20.7%	21.0%	22.7%	22.6%	21.6%	20.9%	20.8%	18.2%	16.0%	16.4%	-2.55%
Madera	21.1%	22.8%	23.2%	23.5%	22.1%	22.1%	20.8%	19.9%	19.0%	19.6%	-0.82%
Merced	24.6%	25.4%	25.6%	26.1%	24.2%	23.3%	22.7%	21.2%	18.8%	19.5%	-2.55%
San Joaquin	17.5%	18.2%	19.4%	18.6%	17.8%	17.1%	15.9%	14.5%	13.7%	13.5%	-2.84%
Stanislaus	19.2%	20.3%	20.3%	20.3%	18.2%	17.2%	16.1%	15.1%	13.5%	13.6%	-3.76%
Tulare	24.8%	26.2%	27.4%	28.1%	28.3%	27.1%	25.5%	23.8%	21.8%	19.8%	-2.47%
<b>SJVAPCD [a]</b>	<b>22.0%</b>	<b>22.9%</b>	<b>23.8%</b>	<b>23.6%</b>	<b>23.0%</b>	<b>22.0%</b>	<b>21.0%</b>	<b>19.6%</b>	<b>18.2%</b>	<b>17.7%</b>	<b>-2.38%</b>
<b>California</b>	<b>15.3%</b>	<b>15.9%</b>	<b>16.4%</b>	<b>16.3%</b>	<b>15.8%</b>	<b>15.1%</b>	<b>14.3%</b>	<b>13.4%</b>	<b>12.6%</b>	<b>12.3%</b>	<b>-2.40%</b>

Source: U.S. Census Bureau, 2023c.

[a] While the SJVAPCD only includes a portion of Kern county, the data shown here are for the whole of the county.



Table 9 shows the population below the poverty line from 2012 to 2021. While there has been an overall decline in the number of people below the poverty line from 2012 to 2021, the number has fluctuated during this period. The number of people in poverty grew by nearly 70,000 between 2012 and 2016 but has declined by nearly 180,000 since 2016.

The CAGR of population below the poverty line varies across counties. Fresno County has the largest population below the poverty line as of 2021, which coincides with its large population and relatively higher poverty rate. Stanislaus County had the largest annual decline in population under the poverty line over the ten-year period and had one of the lowest poverty rates in the region in 2021.

Table 9. Population Below Poverty Line by County

County	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	CAGR 2012-2021
Fresno	226,967	239,584	255,019	252,187	254,872	243,040	232,067	218,254	202,296	198,793	-1.46%
Kern [a]	180,779	186,811	192,972	195,744	194,354	191,123	187,232	179,980	175,902	169,289	-0.73%
Kings	27,679	28,019	30,244	29,900	28,661	28,013	28,084	24,725	21,908	22,449	-2.30%
Madera	29,900	32,604	33,290	33,968	32,043	32,244	30,549	29,273	28,062	28,921	-0.37%
Merced	61,914	64,490	65,552	67,417	62,661	60,861	59,660	56,217	50,124	52,771	-1.76%
San Joaquin	117,938	123,115	132,986	129,390	124,587	121,296	114,294	105,461	100,689	101,951	-1.61%
Stanislaus	97,847	104,173	104,786	105,927	95,739	91,210	86,066	81,415	73,072	74,272	-3.02%
Tulare	108,096	115,313	122,044	125,775	127,130	122,724	115,786	108,512	99,610	91,866	-1.79%
<b>SJVAPCD [a]</b>	<b>851,120</b>	<b>894,109</b>	<b>936,893</b>	<b>940,308</b>	<b>920,047</b>	<b>890,511</b>	<b>853,738</b>	<b>803,837</b>	<b>751,663</b>	<b>740,312</b>	<b>-1.54%</b>
<b>California</b>	<b>5,590,100</b>	<b>5,885,417</b>	<b>6,115,244</b>	<b>6,135,142</b>	<b>6,004,257</b>	<b>5,773,408</b>	<b>5,487,141</b>	<b>5,149,742</b>	<b>4,853,434</b>	<b>4,741,175</b>	<b>-1.81%</b>

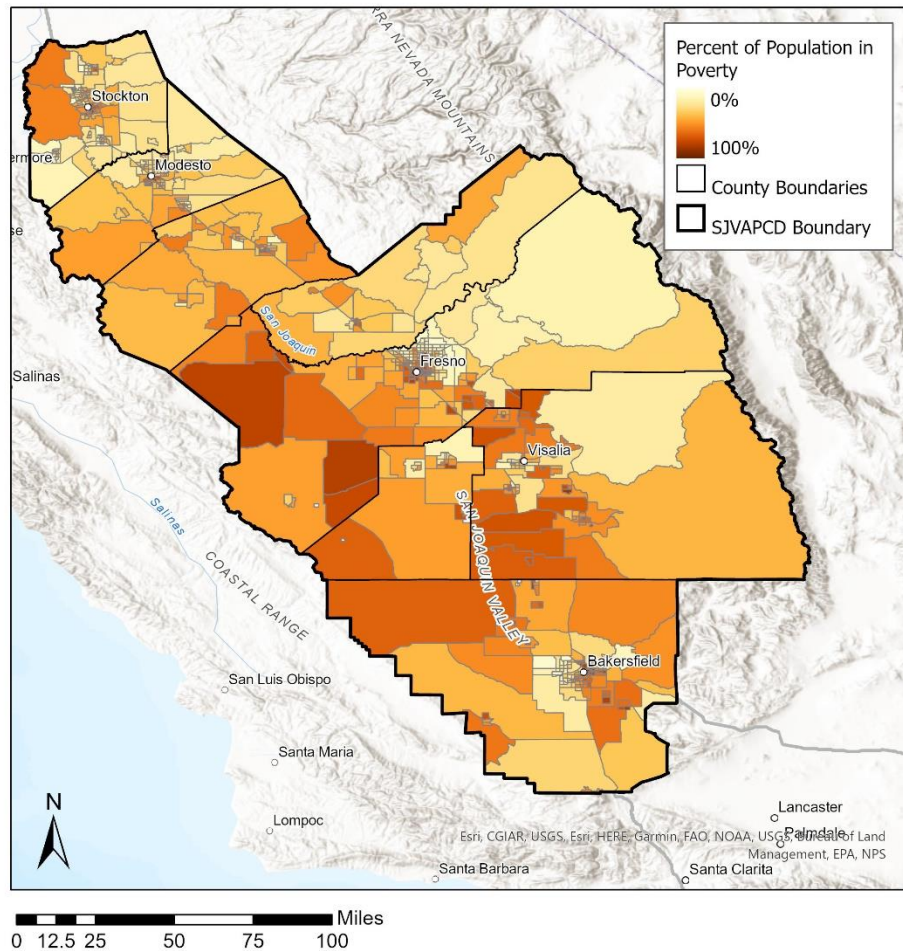
Source: U.S. Census Bureau, 2023c.

[a] While the SJVAPCD only includes a portion of Kern county, the data shown here are for the whole of the county.

Figure 1 shows where the population in poverty or at risk of poverty lives within the District<sup>3</sup> using CalEnviroScreen 4.0 (OEHHA, 2021a) data on the percent of population living below two times the federal poverty limit. CalEnviroScreen poverty data is derived from the US Census Bureau’s American Community Survey 5-year estimates for 2015 to 2019. CalEnviroScreen uses a poverty threshold of two times the federal poverty level to account for the higher cost of living in California compared to other parts of the country (OEHHA, 2021b).

As shown in Table 9 above, roughly 20 percent of the District population is below the federal poverty limit, depending on the year. Using the higher CalEnviroScreen 4.0 threshold, nearly half (44.9 percent) of District residents are below twice the federal poverty limit (OEHHA, 2021a-b), reflected in the high poverty rates in the map in Figure 1 below.

**Figure 1. Percentage of the Population Living Below Two Times the Federal Poverty Level by Census Tract (2015–2019)**



Source: OEHHA, 2021a.  
Map created by ERG using ArcGIS® software by Esri.

<sup>3</sup> Note that only the part of Kern County included in the SJVAPCD is shown. There are four census tracts on the eastern border of Kern County that are in the Eastern Kern Air Pollution Control District. The portions of these census tracts that fall outside of the SJVAPCD border are not shown.

## **3.2 REGIONAL ECONOMIC TRENDS**

This section tracks the economic trends of the District from 2012 to 2021. At the time of the writing of this report, data are not available at the county level beyond the year 2021.<sup>4</sup> The total employment growth rate in the District is slightly higher than that of California. Overall, employment, the number of establishments, and average pay have all increased across the District during that period.

Table 10 presents employment trends over the same 10-year span. During that period, overall employment throughout the District has also increased. The District as a whole saw a CAGR of 1.93 percent in employment over the last decade, slightly higher than that of the entire state of California (1.63 percent). No individual county experienced a decline in employment, although Kern County has a notably lower growth rate (1.39 percent) than the other counties in the region.

All counties in the district experienced an employment growth rate greater than that of California as a whole, and San Joaquin County saw the largest employment growth rate (2.98 percent). This may be in part due to the California Central Valley Economic Development Corporation's (CCVEDC) efforts to encourage companies to locate within the District through tax credits and incentives and grants (CCVEDC, 2023). A few large employers (Amazon, Tesla, etc.) have moved to San Joaquin County in recent years, creating numerous job opportunities within the county. Some people have also moved from the more expensive Bay Area and Los Angeles-San Diego area to the Central Valley, with San Joaquin County being one of the more popular areas to relocate (Lillis, 2019).

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<sup>4</sup> Due to lack of available one-year estimates for the 2020 American Community Survey, this economic trend analysis also looks at data through 2019.

**Table 10. Employment Trends by County**

County	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	CAGR 2012-2021
Fresno	439,605	455,451	465,023	475,905	486,870	496,698	508,801	520,083	506,047	522,348	1.93%
Kern [a]	381,650	393,903	404,213	404,831	406,705	411,621	422,760	429,837	418,395	431,960	1.39%
Kings	56,739	57,519	59,723	60,559	63,263	65,247	65,247	66,542	65,289	66,518	1.78%
Madera	59,606	61,063	62,799	61,468	63,717	64,549	66,067	67,100	66,529	68,862	1.62%
Merced	92,113	94,681	97,907	100,019	100,910	103,851	106,189	106,759	105,330	108,476	1.83%
San Joaquin	276,843	285,334	294,230	310,238	319,425	330,710	339,843	345,677	346,639	360,664	2.98%
Stanislaus	218,345	224,470	230,538	237,560	242,441	246,763	252,924	255,680	249,833	256,489	1.81%
Tulare	183,669	190,415	192,830	200,368	205,208	207,008	210,316	212,280	206,345	213,428	1.68%
<b>SJVAPCD [a]</b>	<b>1,708,570</b>	<b>1,762,836</b>	<b>1,807,263</b>	<b>1,850,948</b>	<b>1,888,539</b>	<b>1,926,447</b>	<b>1,972,147</b>	<b>2,003,958</b>	<b>1,964,407</b>	<b>2,028,745</b>	<b>1.93%</b>
<b>California</b>	<b>20,666,908</b>	<b>21,319,995</b>	<b>21,997,098</b>	<b>22,687,196</b>	<b>23,177,898</b>	<b>23,548,985</b>	<b>24,078,141</b>	<b>24,227,775</b>	<b>23,155,486</b>	<b>23,906,353</b>	<b>1.63%</b>

Source: BEA, 2023b.

[a] While the SJVAPCD only includes a portion of Kern county, the data shown here are for the whole of the county.

Table 11 shows the economic trends by industry in the District by presenting three snapshots from 2011 to 2021 using data from the Bureau of Labor Statistics' (BLS, 2022) Quarterly Census of Employment and Wages. The recent influx of new employers explains the continued growth in the utilities, trade and transportation industries. These industries have been the largest employers in the District for the last 11 years, followed closely by agriculture and oil and gas extraction. The education, health and social services industry has seen the greatest increase of establishments in the District over the past decade, although it is the one industry that has experienced a decrease in average pay over that same time frame. The information sector is the smallest industry in the district and has gotten smaller.

**Table 11. Economic Trends in the San Joaquin Valley, 2011-2021 [a]**

NAICS	Sector	2011			2016			2021		
		Establishments	Employment	Average Annual Pay [c]	Establishments	Employment	Average Annual Pay [c]	Establishments	Employment	Average Annual Pay [c]
11, 21	Agriculture, Oil and Gas Extraction	7,452	201,824	\$35,438	7,271	221,042	\$39,231	7,197	205,981	\$42,965
23	Construction	5,232	45,919	\$61,249	5,599	60,004	\$63,685	6,905	72,945	\$70,245
31-33	Manufacturing	2,466	102,208	\$60,439	2,555	108,755	\$62,715	2,806	110,983	\$66,949
22, 42, 44-45, 48-49	Utilities, Trade and Transportation	13,638	225,476	\$46,463	14,773	264,822	\$47,685	17,465	303,558	\$53,933
51	Information	551	11,679	\$73,825	480	10,395	\$79,196	511	7,614	\$86,468
52-53	Finance Activities	5,335	41,210	\$59,595	5,754	41,888	\$66,585	6,602	40,550	\$74,777
54-56	Profession and Business Services	7,701	96,929	\$52,386	8,332	110,250	\$53,115	9,619	113,986	\$60,306
61-62	Educational, Health and Social Services	7,555	146,642	\$61,492	43,038	196,470	\$55,093	57,592	224,463	\$58,357
71-72	Leisure and Hospitality	5,827	96,872	\$19,523	6,528	119,568	\$21,234	7,660	124,203	\$25,878
81	Other Services	41,302	49,975	\$28,399	5,080	34,044	\$39,416	5,725	35,011	\$43,447
99	Unclassified	3,338	3,312	\$48,350	3,218	4,463	\$36,693	8	10	\$66,224
<b>SJV APCD Total/Average [b]</b>		<b>100,397</b>	<b>1,022,046</b>	<b>\$46,477</b>	<b>102,628</b>	<b>1,171,700</b>	<b>\$48,032</b>	<b>122,090</b>	<b>1,239,304</b>	<b>\$53,397</b>

Source: BLS, 2022.

[a] Includes all of Kern county.

[b] Annual average pay is a weighted average of the eight counties in the SJV APCD weighted by employment in sector.

[c] Annual average pay is adjusted to 2022 dollars using the BEA (2023) GDP deflator.

Table 12 presents the CAGR of the economic data from Table 11. The number of establishments, employment, and average annual pay have all increased over the last 11 years across the District. Health, education, and social services has seen the greatest growth in establishments and employment over that time frame, but it is the one industry that experienced a decrease in average pay (outside of the unclassified businesses). There are fewer establishments in the agriculture, oil, and gas extraction industry today than there were a decade ago, but employment and pay have both increased. The information industry has experienced the greatest decrease in employment across the District.



Table 12. Compound Annual Growth Rate of Establishments, Employment, and Annual Pay

NAICS	Sector	Establishments			Employment			Average Annual Pay		
		2011-2016	2016-2021	2011-2021	2011-2016	2016-2021	2011-2021	2011-2016	2016-2021	2011-2021
11, 21	Agriculture, Oil and Gas Extraction	-0.49%	-0.20%	-0.35%	1.84%	-1.40%	0.20%	2.05%	1.83%	1.94%
23	Construction	1.37%	4.28%	2.81%	5.50%	3.98%	4.74%	0.78%	1.98%	1.38%
31-33	Manufacturing	0.71%	1.89%	1.30%	1.25%	0.41%	0.83%	0.74%	1.32%	1.03%
22, 42, 44-45, 48-49	Utilities, Trade and Transportation	1.61%	3.40%	2.50%	3.27%	2.77%	3.02%	0.52%	2.49%	1.50%
51	Information	-2.72%	1.26%	-0.75%	-2.30%	-6.04%	-4.19%	1.41%	1.77%	1.59%
52-53	Finance Activities	1.52%	2.79%	2.15%	0.33%	-0.65%	-0.16%	2.24%	2.35%	2.30%
54-56	Profession and Business Services	1.59%	2.91%	2.25%	2.61%	0.67%	1.63%	0.28%	2.57%	1.42%
61-62	Educational, Health and Social Services	41.62%	6.00%	22.52%	6.02%	2.70%	4.35%	-2.17%	1.16%	-0.52%
71-72	Leisure and Hospitality	2.30%	3.25%	2.77%	4.30%	0.76%	2.52%	1.69%	4.04%	2.86%
81	Other Services	-34.24%	2.42%	-17.93%	-7.39%	0.56%	-3.50%	6.78%	1.97%	4.34%
99	Unclassified	-0.73%	-69.86%	-45.30%	6.15%	-70.48%	-44.03%	-5.37%	12.53%	3.20%
<b>SJV APCD Total/Average</b>		<b>0.44%</b>	<b>3.53%</b>	<b>1.98%</b>	<b>2.77%</b>	<b>1.13%</b>	<b>1.95%</b>	<b>0.66%</b>	<b>2.14%</b>	<b>1.40%</b>

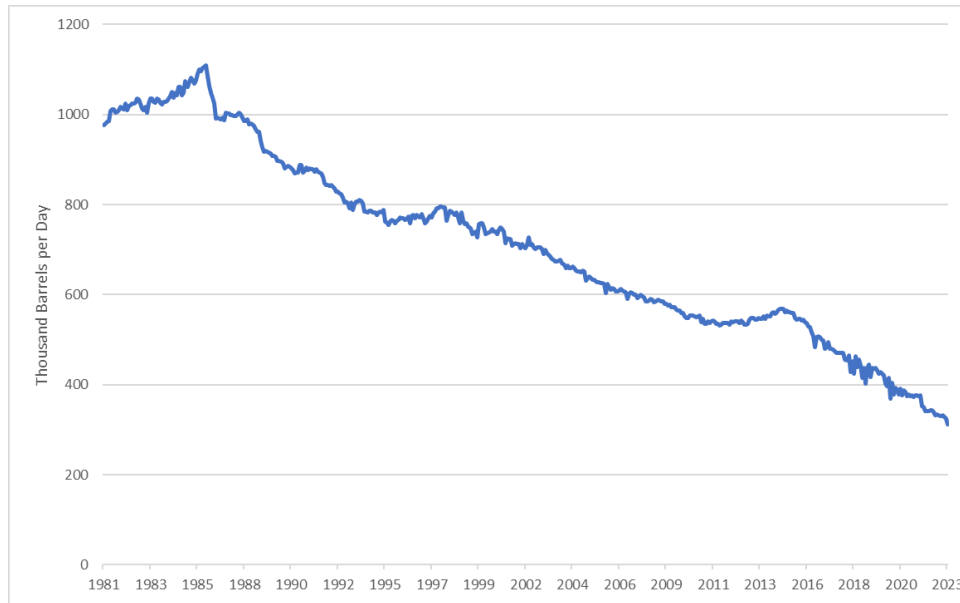
Source: BLS, 2022.

### 3.3 REGIONAL TRENDS IN OIL & GAS PRODUCTION FACILITIES

The five rules considered for amendment, Rules 4401, 4409, 4455, 4623, and 4624, cover firms across many sectors. These sectors are linked, however, in their connection to the production, transportation, and storage of oil and gas. Changes in the oil and gas production industries are likely to lead to changes in the supply of and demand for the production, transportation, and storage services offered by the majority of firms affected by rule amendments.

Oil production rates have increased nationally from 3.4 million barrels of crude oil produced in 2017 to 4.3 million barrels of crude oil produced in 2022, with Texas producing nearly half of all oil production in 2022 (EIA, 2023a). In 2022, California produced 122,400 thousand barrels of oil, significantly lower than their production in 2017, 173,400 thousand barrels of oil (EIA, 2023b). Oil production in California peaked in 1985 and has remained in a pattern of decline since (California Geologic Energy Management Division, 2020). Figure 2 shows the decline in California crude oil production from 1981 to 2021.

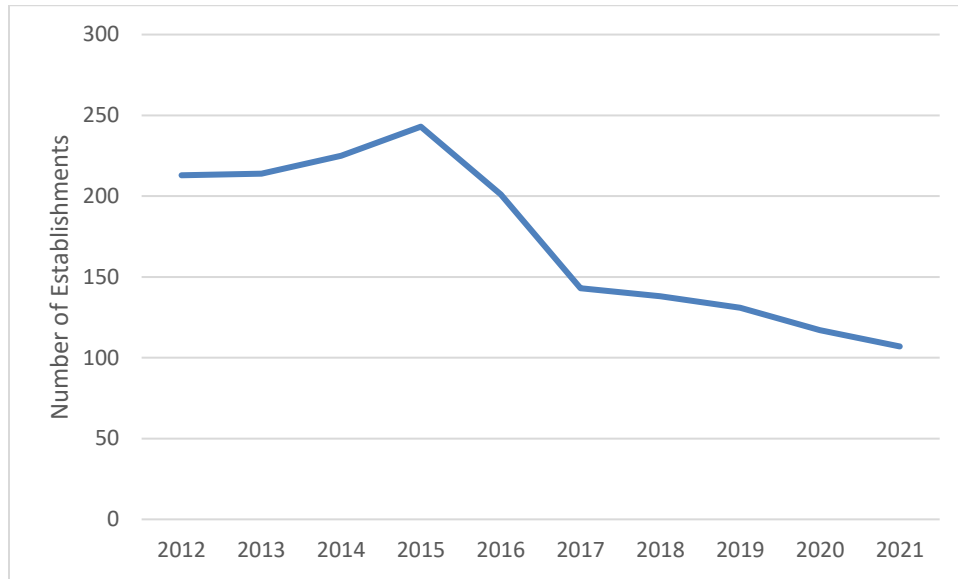
**Figure 2. California Field Production of Crude Oil**



Source: EIA, 2023b

In concurrence with the decline of crude oil production in California, the number of establishments classified as being primarily in the crude petroleum extraction industry has declined from 213 such establishments in 2012 to 117 establishments in 2020.<sup>5</sup> Figure 3 illustrates the decline in crude petroleum extraction establishments from 2012 to 2020.

**Figure 3. Establishments in Crude Petroleum Extraction (NAICS 211120) in California**



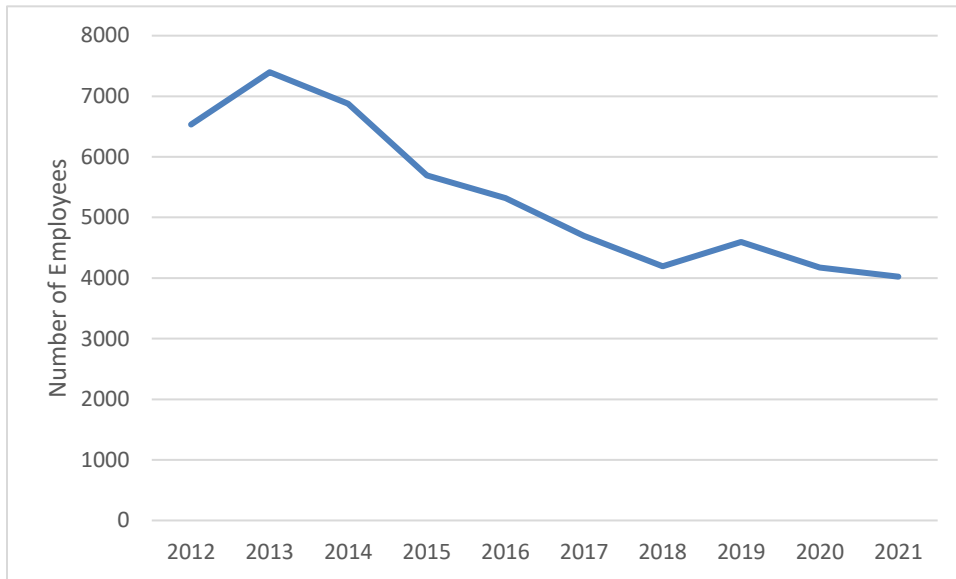
Source: U.S. Census Bureau, 2023e

In addition to declines in oil production and establishments, employment within the crude petroleum extraction industry has declined from 6,536 in 2012 to 4,173 in 2020. The decline in employment is depicted in Figure 4.

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<sup>5</sup> In 2017, some changes were made to NAICS codes. These changes included restructuring of crude petroleum and natural gas extraction. The previous structure included crude petroleum and natural gas extraction under one NAICS code (211111), with natural gas liquid extraction separated into another NAICS code (211112). The 2017 restructuring split crude petroleum extraction (now NAICS 211120) from natural gas extraction (211130). NAICS 211130 also includes natural gas liquid extraction. This restructuring of NAICS codes may also play a role in why crude petroleum establishments and employment have decreased on the surface while natural gas activity has increased.

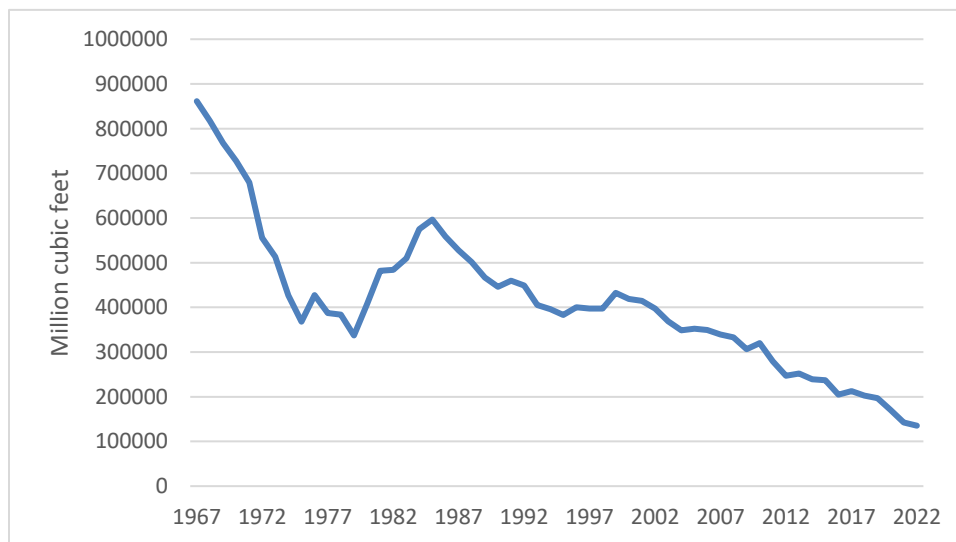
**Figure 4. Employment in Crude Petroleum Extraction (NAICS 211120) in California**



Source: U.S. Census Bureau, 2023e

U.S. natural gas production has increased nationally from 29.5 trillion cubic feet in 2012 to 43.3 trillion cubic feet in 2022 (EIA, 2023g). In 2012, California produced 246.8 billion cubic feet of natural gas. In 2022, California natural gas production decreased to 135.2 billion cubic feet (EIA, 2023c). Figure 5 depicts decreasing natural gas production in California from 1967 to 2022.

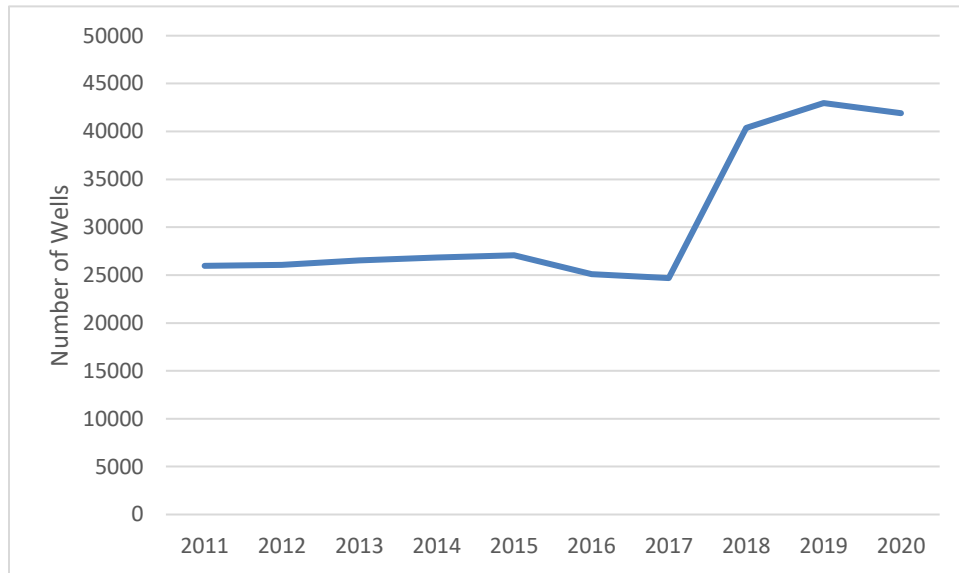
**Figure 5. California Natural Gas Gross Withdrawals**



Source: EIA, 2023c

Despite decreasing natural gas production rates, the number of natural gas wells has increased in California from 24,690 wells in 2017 to 41,923 wells in 2020. Figure 6 shows the increasing number of natural gas wells in California from 2011 to 2020. Between 2017 and 2018, EIA counts of the number of gas producing oil wells increase dramatically for many geographic areas; this could be due to changes in procedures related to data recording or reporting.

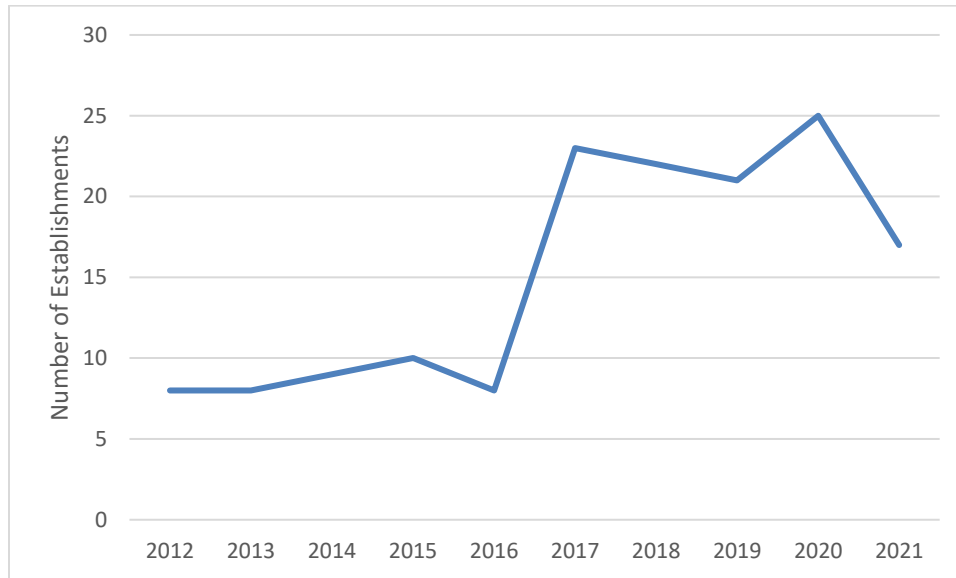
**Figure 6. Number of Natural Gas Producing Wells in California**



Source: EIA, 2023d

The number of establishments classified under the natural gas extraction industry in California has increased from eight establishments in 2012 to 25 establishments in 2020. Changes in the numbers of establishments primarily classified as being part of the natural gas extraction industry in California are depicted in Figure 7. Fluctuations in the number of natural gas extraction establishments in California seem to somewhat mirror patterns in the number of natural gas oil wells in California shown in Figure 6.

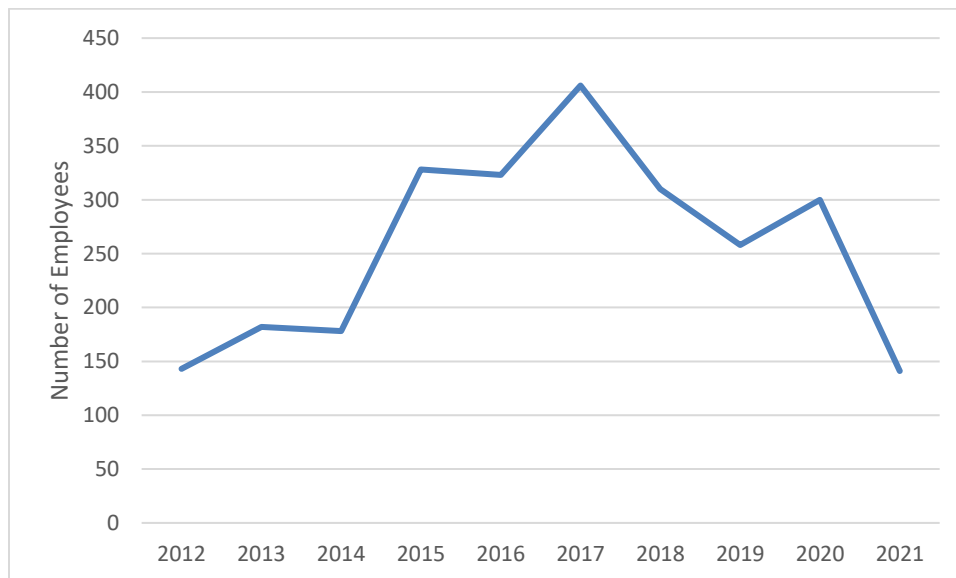
**Figure 7. Establishments in Natural Gas Extraction (NAICS 211130) in California**



Source: U.S. Census Bureau, 2023e

Employment in the natural gas extraction industry in California increased from 143 in 2012 to 406 in 2017 before falling back down to 258 in 2019. In 2020, employment began to increase again, reaching 300. Fluctuations in natural gas extraction employment in California are shown in Figure 8.

**Figure 8. Employment in Natural Gas Extraction (NAICS 211130) in California**



Source: U.S. Census Bureau, 2023e

## 4 SOCIOECONOMIC IMPACT ANALYSIS

ERG calculated the direct impacts of the proposed rule amendments by comparing the costs of compliance to profits of affected companies. ERG estimated potential employment impacts using IMPLAN's (2023) input-output model. Additionally, ERG used the IMPLAN model to capture indirect and induced impacts (i.e., impacts that might arise if directly impacted entities reduce purchases from their suppliers and households adjust their spending as a result of changes in earnings).

### 4.1 DATA SOURCES AND METHODOLOGY

To estimate socioeconomic impacts, ERG compares the costs of compliance with the potential amendments with profits per company. ERG sought to create a profile for each affected sector, including employment, revenue, profits, and average pay per employee. The process of estimating each of these endpoints also requires other data to be used (e.g., company name, address).

This section describes the data sources used to create the baseline industry profile and how socioeconomic impacts were estimated. The sections that follow detail the resulting profile of affected entities and the socioeconomic impacts of compliance with the potential rule amendments.

#### 4.1.1 Baseline Industry Profile Estimates

SJVAPCD (2023) provided ERG with an initial list of affected facilities, including fields for facility ID, facility description, and Standard Industrial Classification (SIC) code. ERG converted the SIC codes to the North American Industry Classification System (NAICS) codes that are used with other sources of economic data used in the analysis using U.S. Census Bureau (2020c) concordances.<sup>6</sup> (See 5APPENDIX A for a list of the NAICS codes that mapped to each SIC code.)

ERG estimated company revenues and profits by dividing industry "sales, value of shipments, or revenues" by "number of firms" taken from the 2017 Economic Census for the relevant NAICS codes in the state of California results in estimated output per firm, where "firm" is assumed to be equivalent to the more generic term "company." This was inflated to represent 2022 dollars using the U.S. Bureau of Economic Analysis (BEA) gross domestic product implicit price deflator (BEA, 2023). Then, firm-level profits were estimated by multiplying estimated average firm revenues by the average profit rate for that NAICS code as derived from the Risk Management Association (RMA, 2023). The profit rate was calculated using net sales data for fiscal years 2016-2017 and 2022-2023 and a combined state and federal corporate tax rate for California of 28 percent (Watson, 2021) to calculate post-tax profits and then a post-tax profit rate. Fiscal year 2016-2017 was chosen because the profit rate calculated for NAICS 2111 (which is the predominant NAICS associated with companies in-scope of these rules) was the lowest of all years available. Fiscal year 2022-2023 represents the most recent data available. The average between these two percentages is used to represent the post-tax profit rate for each NAICS code. RMA does not have financial data available for two NAICS codes (4861, Pipeline Transportation of Crude Oil; and 4862, Pipeline Transportation of Natural Gas) that map to two of the SIC code sectors (SIC

<sup>6</sup> SIC codes were last updated in 1987, and NAICS codes were first issued in 1997. The U.S. Census Bureau's (2020d) concordances map 1987 SIC codes to 1997 NAICS codes, and from there to the NAICS codes that are revised every five years (thus far in 2002, 2007, 2012, and 2017). SIC and NAICS codes are available at different levels of granularity. The SIC codes used in SJVAPCD's (2023) data are 4-digit SIC codes, and ERG mapped these to 6-digit NAICS codes.

4612, Crude Petroleum Pipelines, and 4922, Natural Gas Transmissions, respectively) with companies in scope of some of these rules. For these companies, ERG assumed zero percent profit to present extremely conservative estimates of impacts.

#### **4.1.2 Estimating Impacts on Affected Entities**

Cost estimates (i.e., the aggregated cost of the potential rule amendments to all impacted companies) were provided by SJVAPCD (2023). For Rule 4401, 4409, 4455, and 4624 costs reflect increased ongoing operation and maintenance (O&M) costs. Costs for Rule 4623 were calculated by summing the one-time capital costs (annualized over a 10-year period using a 4 percent discount rate) with annual O&M costs. To estimate impacts, the direct costs of the rule (i.e., the cost of compliance with the rule) are compared to profits for each SIC code. For companies with facilities categorized across two or more SIC codes, ERG evenly distributed the costs to a single company across the number of SIC codes that single company has listed within SJVAPCD's facility list. ERG also assumed even distribution of revenues and profits in these instances.

To estimate both direct employment impacts of the potential rule amendments and indirect and induced effects, ERG used IMPLAN's (2023) input-output model. IMPLAN "is a regional economic analysis software application that is designed to estimate the impact or ripple effect (specifically backward linkages) of a given economic activity within a specific geographic area through the implementation of its Input-Output model" (IMPLAN, 2023).

Based on the calculated costs, the IMPLAN model estimates how many jobs might be lost in reaction to the costs to affected companies. It also estimates indirect costs (i.e., the impact to affected firms' suppliers when the direct cost of rule compliance causes affected firms to reduce their purchases from those companies) and induced impacts (i.e., how households that have lost income in turn adjust their purchases).

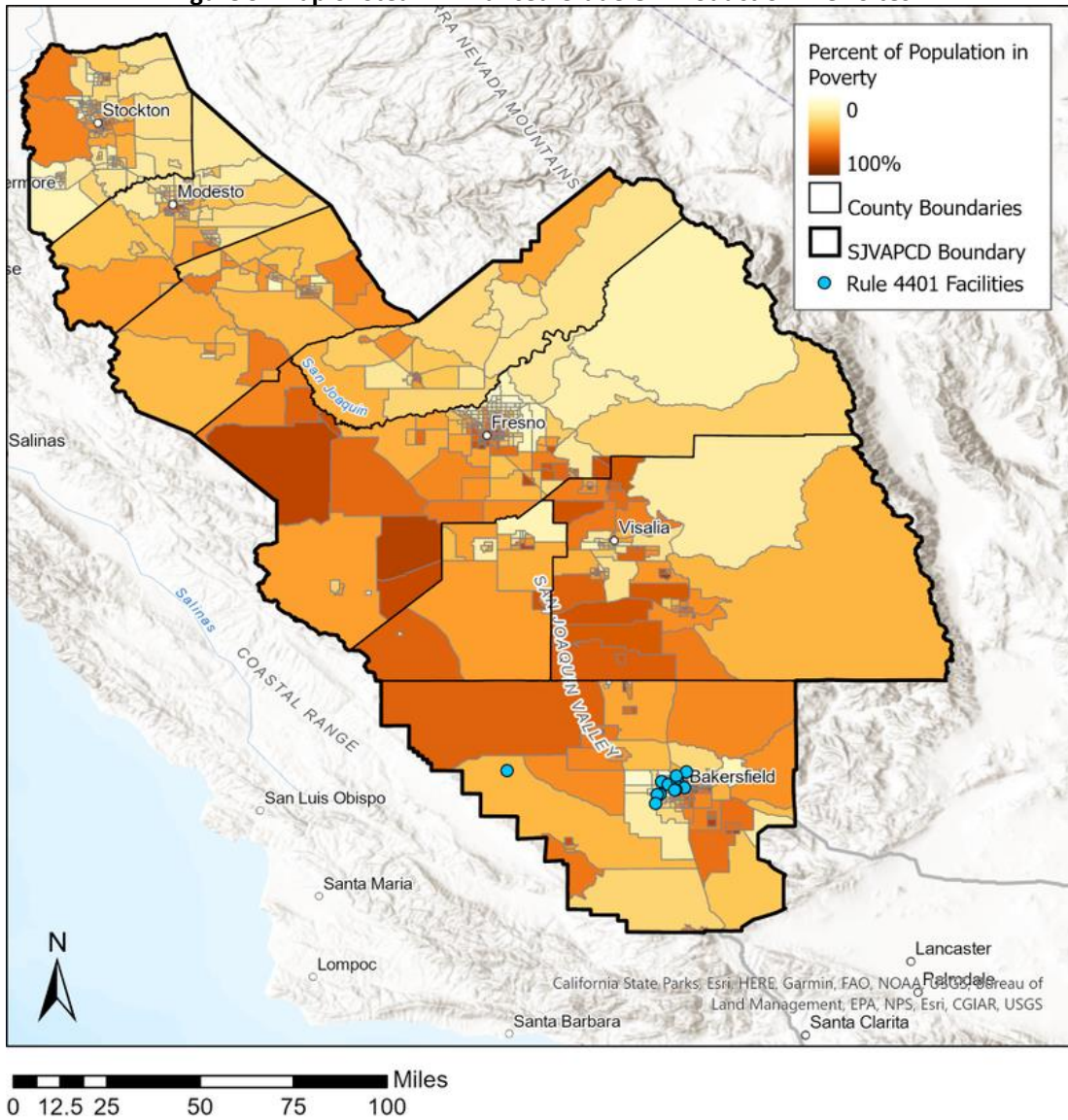


**4.2 RULE 4401 – STEAM-ENHANCED CRUDE OIL PRODUCTION WELLS**

**4.2.1 Profile of Affected Entities**

Figure 9 presents the steam-enhanced crude oil production facilities affected by Rule 4401. Facilities were mapped using ArcGIS Pro 2.6.0 by number of sites occurring per Public Land Survey System (PLSS) Township and Range sector. Out of the 45 facilities provided, 22 had sufficient information to be mapped to a township and range, 14 of which had unique addresses. The majority of facilities are located within Kern County near Bakersfield, and a single facility along the western border of Kern County. There are no facilities in San Joaquin, Stanislaus, Merced, Madera, Kings or Tulare Counties.

**Figure 9. Map of Steam-Enhanced Crude Oil Production Well Sites**



Source data: SJVAPCD, 2023.  
Map created by ERG using ArcGIS® software by Esri.

Table 13 includes a profile of firms affected by the potential amendments to Rule 4401 (i.e., those that will incur compliance costs). A total of 27 companies will incur costs.

**Table 13. Profile of Entities Affected by Potential Amendments to Rule 4401—Steam-Enhanced Crude Oil Production Wells**

Sector	Total Companies	Total, All Companies		
		Employees	Revenue	Profits
Crude Petroleum and Natural Gas	27	1,213	\$2,265,311,582	\$182,674,726
<b>Total</b>	<b>27</b>	<b>1,213</b>	<b>\$2,265,311,582</b>	<b>\$182,674,726</b>

Sources: ERG estimates based on SJVAPCD, 2023; NAICS.com, 2021; U.S. Census Bureau, 2020a; U.S. Census Bureau, 2020c; IMPLAN, 2023; BEA, 2023a.

Table 14 shows the characteristics of the average company affected by the potential amendments to Rule 4401. (The exact characteristics of individual firms could be either larger or smaller than these average estimates.)

**Table 14. Characteristics of Entities with Costs due to the Potential Amendments to Rule 4401—Steam-Enhanced Crude Oil Production Wells**

Sector	Average per Company			Average Annual Pay per Employee
	Employees	Revenue	Profits	
Crude Petroleum and Natural Gas	45	\$83,900,429	\$6,765,731	\$134,134
<b>Average</b>	<b>45</b>	<b>\$83,900,429</b>	<b>\$6,765,731</b>	<b>\$134,134</b>

Sources: ERG estimates based on SJVAPCD, 2023; NAICS.com, 2021; U.S. Census Bureau, 2020a; U.S. Census Bureau, 2020c; RMA, 2023; IMPLAN, 2023.

#### 4.2.2 Compliance Cost Estimates

Compliance costs were estimated by SJVAPCD (2023), and include O&M costs for the units, beginning in 2024 and continuing indefinitely. Table 15 shows the O&M costs incurred by the Crude Petroleum and Natural Gas sector (the only sector affected by this rule). Annual costs would total around **\$3,815,000** per year.

**Table 15. Costs of Compliance with Potential Amendments to Rule 4401—Steam-Enhanced Crude Oil Production Wells**

Sector	Annual O&M Costs [a]	Total Annual Costs
	2024	2024
Crude Petroleum and Natural Gas	\$3,814,894	\$3,814,894
<b>Total</b>	<b>\$3,814,894</b>	<b>\$3,814,894</b>

Source: SJVAPCD, 2023.

[a] Includes the increased costs to inspect, operate, and maintain equipment.

### 4.2.3 Impacts on Affected Entities

This section first discusses our primary impacts test, which compares compliance costs to profits for affected companies. ERG then discusses indirect and induced impacts to related industries.

#### 4.2.3.1 Direct Impacts

The primary measure of economic feasibility used in this analysis is a comparison of total annual costs to affected facilities’ profit and firms’ profit where a threshold of 10 percent of profits indicates a significant adverse impact (Berck, 1995). ERG uses this measurement to inform the District’s determination of economic feasibility of the rule amendments.

As shown in Table 16 overall rule costs comprise approximately **2.1 percent of company profits**.

**Table 16. Economic Impacts for Entities Affected by Potential Amendments to Rule 4401—Steam-Enhanced Crude Oil Production Wells**

Sector	Average Annual Cost per Company	Average Profits per Company	Cost as % Profits
Crude Petroleum and Natural Gas	\$141,292	\$6,765,731	2.09%
<b>Average</b>	<b>\$141,292</b>	<b>\$6,765,731</b>	<b>2.09%</b>

Sources: ERG estimates based on SJVAPCD, 2023; U.S. Census Bureau, 2020a; U.S. Census Bureau, 2020c; NAICS.com, 2021; RMA, 2023; IMPLAN, 2023.

#### 4.2.3.2 Employment, Indirect, and Induced Impacts

In addition to the primary test of direct impacts of costs on revenue, ERG also assessed potential direct impacts on employment, indirect impacts, and induced impacts using IMPLAN’s (2023) input-output model. The IMPLAN model uses the direct costs of the rule to estimate “ripple effects” (specifically backward linkages) of a given economic activity within a specific geographic area through the implementation of its Input-Output model (IMPLAN, 2023).

Outputs from the IMPLAN model include:

- **Direct employment impacts**, if facilities with compliance costs under the potential amendments were to attempt to offset these costs by reducing the number of employees.
- **Indirect revenue and employment impacts** that capture how directly affected firms might react to the direct cost of rule compliance by reducing purchases from their suppliers, and how those suppliers might in turn reduce employees.
- **Induced revenue and employment impacts** that capture how households will adjust their spending as a result of any changes in earnings.

Table 17 summarizes these impacts, which, taken together, may have a total impact on the District economy of less than **\$3.8 million in revenue, with two jobs lost**.

**Table 17. Direct, Indirect, and Induced Impacts of Potential Amendments to Rule 4401—Steam-Enhanced Crude Oil Production Wells**

Sector	Direct		Indirect		Induced		Total	
	Revenue (Costs)	Employment	Revenue	Employment	Revenue	Employment	Revenue	Employment
Crude Petroleum and Natural Gas	\$3,814,894	2	\$6,594	0	\$204	0	\$3,821,692	2
<b>Total</b>	<b>\$3,814,894</b>	<b>2</b>	<b>\$6,594</b>	<b>0</b>	<b>\$204</b>	<b>0</b>	<b>\$3,821,692</b>	<b>2</b>

Sources: ERG estimates based on SJVAPCD, 2023; U.S. Census Bureau, 2020a; U.S. Census Bureau, 2020c; NAICS.com, 2021; RMA, 2023; IMPLAN, 2023.

Note: Totals may not equal presented counts of revenue and employment for each sector due to rounding.

Table 18 compares these impacts to the total size of the District’s economy (as estimated in the IMPLAN model). These impacts represent **just 0.001 percent** of revenue and employment District-wide.

**Table 18. Comparison of Total Impacts against the District-Wide Economy for Potential Amendments to Rule 4401—Steam-Enhanced Crude Oil Production Wells**

	Total Rule Impacts	Size of District Economy [a]	% of District Economy
Revenue	\$3,821,692	\$368,710,597,792	0.001%
Employment	2	1,982,068	0.000%

Source: ERG estimates based on IMPLAN, 2023.

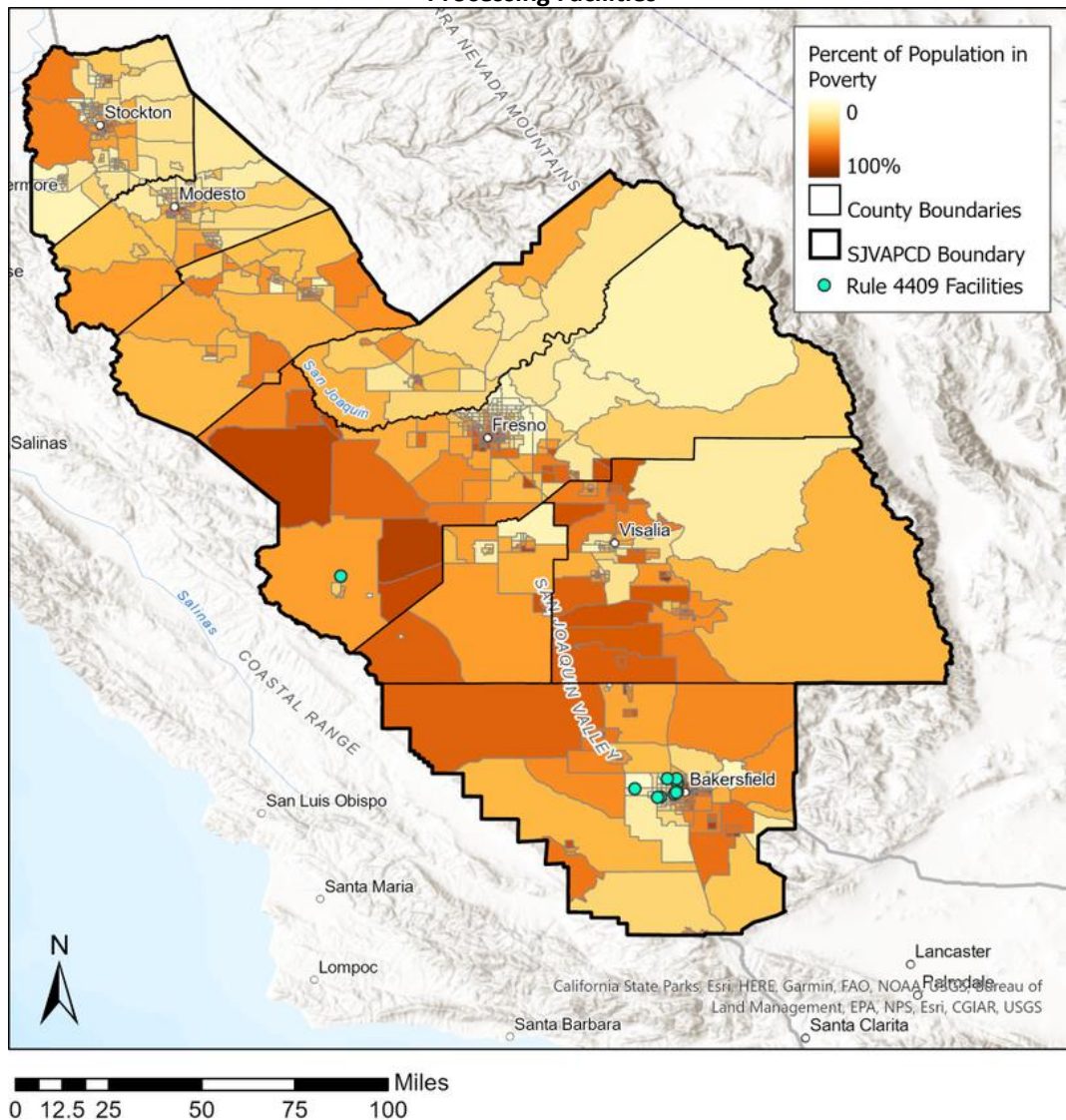
[a] While the SJVAPCD only includes a portion of Kern County, the data shown here include the whole of the county.

### 4.3 RULE 4409 – COMPONENTS AT LIGHT CRUDE OIL PRODUCTION FACILITIES, NATURAL GAS PRODUCTION FACILITIES, AND NATURAL GAS PROCESSING FACILITIES

#### 4.3.1 Profile of Affected Entities

Figure 10 presents the Light Crude Oil Production Facilities, Natural Gas Production Facilities, and Natural Gas Processing Facilities (whether affected by potential rule changes or not). Facilities were mapped using ArcGIS Pro 2.6.0 by number of sites occurring per Public Land Survey System (PLSS) Township and Range sector. Out of 59 facilities provided, 26 had sufficient information to be mapped, although there were only 10 unique addresses between the facilities. The majority of facilities are located outside of major metropolitan areas within Kern County.

**Figure 10. Map of Light Crude Oil Production Facilities, Natural Gas Production Facilities, and Natural Gas Processing Facilities**



Source data: SJVAPCD, 2023.

Map created by ERG using ArcGIS® software by Esri.

Table 19 includes a profile of firms affected by the potential amendments to Rule 4409 (i.e., those that will incur compliance costs). A total of 33 companies will incur costs. Note that some companies have facilities across two or more sectors. For those companies, ERG evenly distributed the number employees, revenues, and profits between the relevant sectors.

**Table 19. Profile of Entities Affected by Potential Amendments to Rule 4409—Components at Light Crude Oil Production Facilities, Natural Gas Production Facilities, and Natural Gas Processing Facilities**

Sector	Total Companies [a]	Total, All Companies		
		Employees	Revenue	Profits [b]
Crude Petroleum and Natural Gas	29	1,138	\$2,125,477,534	\$171,398,508
Natural Gas Liquids	11	329	\$615,269,812	\$49,615,358
Natural Gas Transmission	1	81	\$85,566,822	\$0
<b>Total</b>	<b>33</b>	<b>1,548</b>	<b>\$2,826,314,168</b>	<b>\$221,013,866</b>

Sources: ERG estimates based on SJVAPCD, 2023; NAICS.com, 2021; U.S. Census Bureau, 2020a; U.S. Census Bureau, 2020c; IMPLAN, 2023; BEA, 2023A.

[a] This represents the number of companies with facilities categorized within a given sector. Some companies have facilities categorized in different SIC code sectors. For this analysis, costs and profits for a company that has facilities across two or more SIC codes are split evenly across each SIC for that company's facilities.

[b] RMA does not have financial data available for the Natural Gas Transmission sector. ERG assumed zero percent profit to present an abundantly conservative estimate of impacts.

Table 20 shows the characteristics of the average company affected by the potential amendments to Rule 4409. (Individual companies might be either larger or smaller than these average estimates.)

**Table 20. Characteristics of Entities with Costs due to the Potential Amendments to Rule 4409—Components at Light Crude Oil Production Facilities, Natural Gas Production Facilities, and Natural Gas Processing Facilities**

Sector	Average per Company			Average Annual Pay per Employee
	Employees	Revenue	Profits [a]	
Crude Petroleum and Natural Gas	39	\$73,292,329	\$5,910,293	\$134,134
Natural Gas Liquids	30	\$55,933,619	\$4,510,487	\$134,134
Natural Gas Transmission	81	\$85,566,822	\$0	\$138,000
<b>Average</b>	<b>47</b>	<b>\$85,645,884</b>	<b>\$6,697,390</b>	<b>\$134,336</b>

Sources: ERG estimates based on SJVAPCD, 2023; NAICS.com, 2021; U.S. Census Bureau, 2020a; U.S. Census Bureau, 2020c; RMA, 2023; IMPLAN, 2023.

[a] RMA does not have financial data available for the Natural Gas Transmission sector. ERG assumed zero percent profit to present an abundantly conservative estimate of impacts.

### 4.3.2 Compliance Cost Estimates

Compliance costs were estimated by SJVAPCD (2023), and include O&M costs beginning in 2024 and continuing indefinitely. Table 21 shows the annual costs incurred by sector in 2023 to be compliant with the rule by January 1, 2024. Annual costs would total about **\$7,432,000** per year, with the majority of costs incurred by the “Crude Petroleum and Natural Gas” sector.

**Table 21. Costs of Compliance with Potential Amendments to Rule 4409—Components at Light Crude Oil Production Facilities, Natural Gas Production Facilities, and Natural Gas Processing Facilities**

Sector	Annual O&M Costs [a]	Total Annual Costs
	2024	2024
Crude Petroleum and Natural Gas	\$5,705,636	\$5,705,636
Natural Gas Liquids	\$1,651,631	\$1,651,631
Natural Gas Transmission	\$75,074	\$75,074
<b>Total</b>	<b>\$7,432,341</b>	<b>\$7,432,341</b>

Source: SJVAPCD, 2023.

[a] Includes the increased costs to inspect, operate, and maintain equipment.

### 4.3.3 Impacts on Affected Entities

This section first discusses our primary impacts test, which compares compliance costs to profits for affected companies. ERG then discusses indirect and induced impacts to related industries.

#### 4.3.3.1 Direct Impacts

The primary measure of determining economic feasibility is a comparison of total annual costs to profits for affected firms, with a threshold of 10 percent of profits indicating a finding of significant adverse impact (Berck, 1995). Therefore, ERG uses this comparison to aid in the District’s determination of economic feasibility of the rule amendments.

As shown in Table 22, overall rule impacts are just over **3.3 percent of profits**. Neither sector for which ERG had sufficient profit data faces significant cost impacts as defined above. The Natural Gas Transmission sector would need to have a profit rate lower than 0.9 percent in order to have this rule be economically infeasible for that sector. Even if expenses for this sector were double its revenues, the rule would still be feasible overall.

**Table 22. Economic Impacts for Entities Affected by Potential Amendments to Rule 4409—Components at Light Crude Oil Production Facilities, Natural Gas Production Facilities, and Natural Gas Processing Facilities**

Sector	Average Annual Cost per Company	Average Profits per Company [a]	Cost as % Profits
Crude Petroleum and Natural Gas	\$196,746	\$5,910,293	3.33%
Natural Gas Liquids	\$150,148	\$4,510,487	3.33%
Natural Gas Transmission	\$75,074	\$0	0.00%
<b>Average</b>	<b>\$225,222</b>	<b>\$6,697,390</b>	<b>3.36%</b>

Sources: ERG estimates based on SJVAPCD, 2023; U.S. Census Bureau, 2020a; U.S. Census Bureau, 2020c; NAICS.com, 2021; RMA, 2023; IMPLAN, 2023.

[a] RMA does not have financial data available for the Natural Gas Transmission sector. ERG assumed zero percent profit to present an abundantly conservative estimate of impacts.

#### 4.3.3.2 Employment, Indirect, and Induced Impacts

In addition to the primary test of direct impacts of costs on revenue, ERG also assessed potential direct impacts on employment, indirect impacts, and induced impacts using IMPLAN’s (2023) input-output model. The IMPLAN model uses the direct costs of the rule to estimate “ripple effects” (specifically backward linkages) of a given economic activity within a specific geographic area through the implementation of its Input-Output model (IMPLAN, 2023).

Outputs from the IMPLAN model include:

- **Direct employment impacts**, if facilities with compliance costs under the potential amendments were to attempt to offset these costs by reducing the number of employees.
- **Indirect revenue and employment impacts** that capture how directly affected firms might react to the direct cost of rule compliance by reducing purchases from their suppliers, and how those suppliers might in turn reduce employees.
- **Induced revenue and employment impacts** that capture how households will adjust their spending as a result of any changes in earnings.

Table 23 summarizes these impacts, which, taken together, are estimated to have a total impact on the District economy of approximately **\$7,500,000 in revenue, with 5 jobs lost**.



**Table 23. Direct, Indirect, and Induced Impacts of Potential Amendments to Rule 4409—Components at Light Crude Oil Production Facilities, Natural Gas Production Facilities, and Natural Gas Processing Facilities**

Sector	Direct		Indirect		Induced		Total	
	Revenue (Costs)	Employment	Revenue	Employment	Revenue	Employment	Revenue	Employment
Crude Petroleum and Natural Gas	\$5,705,636	3	\$13,165	0	\$401	0	\$5,719,202	3
Natural Gas Liquids	\$1,651,631	1	\$13,165	0	\$401	0	\$1,665,197	1
Natural Gas Transmission	\$75,074	0	\$14,354	0	\$3,301	0	\$92,728	0
<b>Total</b>	<b>\$7,432,341</b>	<b>5</b>	<b>\$40,684</b>	<b>0</b>	<b>\$4,102</b>	<b>0</b>	<b>\$7,477,128</b>	<b>5</b>

Sources: ERG estimates based on SJVAPCD, 2023; U.S. Census Bureau, 2020a; U.S. Census Bureau, 2020c; NAICS.com, 2021; RMA, 2023; IMPLAN, 2023.

Note: Totals may not equal presented counts of revenue and employment for each sector due to rounding.

Table 24 compares these impacts to the total size of the District’s economy (as estimated in the IMPLAN model). These impacts represent **less than 0.01 percent** of revenue and employment District-wide.

**Table 24. Comparison of Total Impacts against the District-Wide Economy for Potential Amendments to Rule 4409—Components at Light Crude Oil Production Facilities, Natural Gas Production Facilities, and Natural Gas Processing Facilities**

	Total Rule Impacts	Size of District Economy [a]	% of District Economy
Revenue	\$7,477,128	\$368,710,597,792	0.002%
Employment	5	1,982,068	0.000%

Source: ERG estimates based on IMPLAN, 2023.

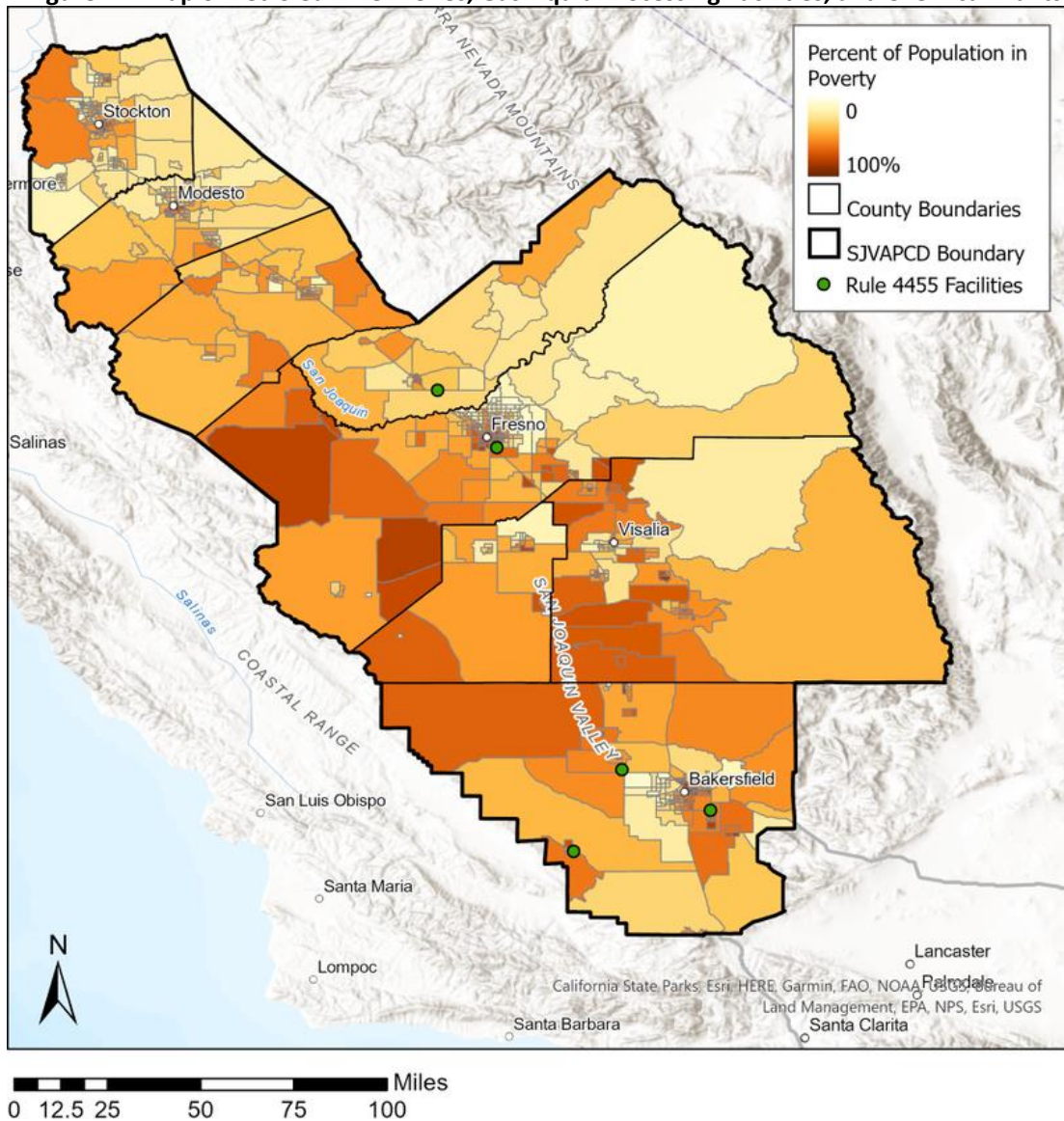
[a] While the SJVAPCD only includes a portion of Kern County, the data shown here include the whole of the county.

#### 4.4 RULE 4455 – COMPONENTS AT PETROLEUM REFINERIES, GAS LIQUIDS PROCESSING FACILITIES, AND CHEMICAL PLANTS

##### 4.4.1 Profile of Affected Entities

Figure 11 presents a map of affected Petroleum Refineries, Gas Liquid Processing Facilities, and Chemical Plants. Facilities were mapped using ArcGIS Pro 2.6.0. Out of the 16 facilities provided, five had sufficient information to be mapped. These facilities are located in Kern, Fresno, and Madera Counties.

Figure 11. Map of Petroleum Refineries, Gas Liquid Processing Facilities, and Chemical Plants



Source data: SJVAPCD, 2023.

Map created by ERG using ArcGIS® software by Esri.

Table 25 includes a profile of firms affected by the potential amendments to Rule 4455 (i.e., those that will incur compliance costs). A total of 14 companies will incur costs.

**Table 25. Profile of Entities Affected by Potential Amendments to Rule 4455—Components at Petroleum Refineries, Gas Liquids Processing Facilities, and Chemical Plants**

Sector	Total Companies	Total, All Companies		
		Employees	Revenue	Profits
Natural Gas Liquids	2	90	\$167,800,858	\$13,531,461
Industrial Organic Chemicals, NEC – Aliphatics	6	363	\$1,001,634,433	\$53,467,590
Pesticides and Agricultural Chemicals, NEC	1	24	\$16,789,494	\$991,252
Petroleum Refining	4	525	\$2,970,004,812	\$149,688,243
Chemicals and Allied Products, NEC	1	46	\$51,826,646	\$3,209,106
<b>Total</b>	<b>14</b>	<b>1,048</b>	<b>\$4,208,056,243</b>	<b>\$220,887,652</b>

Sources: ERG estimates based on SJVAPCD, 2023; NAICS.com, 2021; U.S. Census Bureau, 2020a; U.S. Census Bureau, 2020c; IMPLAN, 2023; BEA, 2023a.

Table 26 shows the characteristics of the average firm affected by the potential amendments to Rule 4455. (Individual firms may be either larger or smaller than these average estimates.)

**Table 26. Characteristics of Entities with Costs due to the Potential Amendments to Rule 4455—Components at Petroleum Refineries, Gas Liquids Processing Facilities, and Chemical Plants**

Sector	Average per Company			Average Annual Pay per Employee
	Employees	Revenue	Profits	
Natural Gas Liquids	45	\$83,900,429	\$6,765,731	\$134,134
Industrial Organic Chemicals, NEC – Aliphatics	61	\$166,939,072	\$8,911,265	\$118,045
Pesticides and Agricultural Chemicals, NEC	24	\$16,789,494	\$991,252	\$78,977
Petroleum Refining	131	\$742,501,203	\$37,422,061	\$136,442
Chemicals and Allied Products, NEC	46	\$51,826,646	\$3,209,106	\$107,644
<b>Average</b>	<b>75</b>	<b>\$300,575,446</b>	<b>\$15,777,689</b>	<b>\$127,280</b>

Sources: ERG estimates based on SJVAPCD, 2023; NAICS.com, 2021; U.S. Census Bureau, 2020a; U.S. Census Bureau, 2020c; RMA, 2023; IMPLAN, 2023.

#### 4.4.2 Compliance Cost Estimates

Compliance costs were estimated by SJVAPCD (2023), and include O&M costs beginning in 2024 and continuing indefinitely. Table 27 shows the annual costs incurred by sector. Annual costs would total about **\$28,000** per year over 10 years.

**Table 27. Costs of Compliance with Potential Amendments to Rule 4455—Components at Petroleum Refineries, Gas Liquids Processing Facilities, and Chemical Plants**

Sector	Annual O&M Costs [a]	Total Annual Cost
	2024	2024
Natural Gas Liquids	\$4,037	\$4,037
Industrial Organic Chemicals, NEC – Aliphatics	\$12,110	\$12,110
Pesticides and Agricultural Chemicals, NEC	\$2,018	\$2,018
Petroleum Refining	\$8,074	\$8,074
Chemicals and Allied Products, NEC	\$2,018	\$2,018
<b>Total</b>	<b>\$28,257</b>	<b>\$28,257</b>

Source: SJVAPCD, 2023.

[a] Includes the increased costs to inspect, operate, and maintain equipment.

#### **4.4.3 Impacts on Affected Entities**

This section first discusses our primary impacts test, which compares compliance costs to profits for affected companies. ERG then discusses indirect and induced impacts to related industries.

##### **4.4.3.1 Direct Impacts**

The primary measure of determining economic feasibility compares total annual costs to profits for affected firms, with a threshold of 10 percent of profits indicating a finding of significant adverse impact (Berck, 1995). Therefore, ERG uses this comparison to aid in the District’s determination of economic feasibility of the rule amendments.

As shown in Table 28, overall rule impacts are around **0.01 percent of profits**. No sector faces significant cost impacts as defined above.

**Table 28. Economic Impacts for Entities Affected by Potential Amendments to Rule 4455—Components at Petroleum Refineries, Gas Liquids Processing Facilities, and Chemical Plants**

Sector	Average Annual Cost per Company	Average Profits per Company	Cost as % Profits
Natural Gas Liquids	\$2,018	\$6,765,731	0.03%
Industrial Organic Chemicals, NEC – Aliphatics	\$2,018	\$8,911,265	0.02%
Pesticides and Agricultural Chemicals, NEC	\$2,018	\$991,252	0.20%
Petroleum Refining	\$2,018	\$37,422,061	0.01%
Chemicals and Allied Products, NEC	\$2,018	\$3,209,106	0.06%
<b>Average</b>	<b>\$2,018</b>	<b>\$15,777,689</b>	<b>0.01%</b>

Sources: ERG estimates based on SJVAPCD, 2023; U.S. Census Bureau, 2020a; U.S. Census Bureau, 2020c; NAICS.com, 2021; RMA, 2023; IMPLAN, 2023.

#### **4.4.3.2 Employment, Indirect, and Induced Impacts**

In addition to the primary test of direct impacts of costs on revenue, ERG also assessed potential direct impacts on employment, indirect impacts, and induced impacts using IMPLAN’s (2023) input-output model. The IMPLAN model uses the direct costs of the rule to estimate “ripple effects” (specifically backward linkages) of a given economic activity within a specific geographic area through the implementation of its Input-Output model” (IMPLAN, 2023).

Outputs from the IMPLAN model include:

- **Direct employment impacts**, if facilities with compliance costs under the potential amendments were to attempt to offset these costs by reducing the number of employees.
- **Indirect revenue and employment impacts** that capture how directly affected firms might react to the direct cost of rule compliance by reducing purchases from their suppliers, and how those suppliers might in turn reduce employees.
- **Induced revenue and employment impacts** that capture how households will adjust their spending as a result of any changes in earnings.

Table 29 summarizes these impacts, which, taken together, may have a total impact on the District economy of **\$29,000 in revenue, with no jobs lost**.

**Table 29. Direct, Indirect, and Induced Impacts of Potential Amendments to Rule 4455—Components at Petroleum Refineries, Gas Liquids Processing Facilities, and Chemical Plants**

Sector	Direct		Indirect		Induced		Total	
	Revenue (Costs)	Employment	Revenue	Employment	Revenue	Employment	Revenue	Employment
Natural Gas Liquids	\$4,037	0	\$371	0	\$2	0	\$4,409	0
Industrial Organic Chemicals, NEC – Aliphatics	\$12,110	0	\$11	0	\$0	0	\$12,121	0
Pesticides and Agricultural Chemicals, NEC	\$2,018	0	\$9	0	\$0	0	\$2,028	0
Petroleum Refining	\$8,074	0	\$202	0	\$7	0	\$8,282	0
Chemicals and Allied Products, NEC	\$2,018	0	\$2	0	\$0	0	\$2,021	0
<b>Total</b>	<b>\$28,257</b>	<b>0</b>	<b>\$595</b>	<b>0</b>	<b>\$9</b>	<b>0</b>	<b>\$28,862</b>	<b>0</b>

Sources: ERG estimates based on SJVAPCD, 2023; U.S. Census Bureau, 2020a; U.S. Census Bureau, 2020c; NAICS.com, 2021; RMA, 2023; IMPLAN, 2023.

Note: Totals may not equal presented counts of revenue and employment for each sector due to rounding.

Table 30 compares these impacts to the total size of the District’s economy (as estimated in the IMPLAN model). These impacts represent **less than 0.001 percent** of revenue and employment District-wide.

**Table 30. Comparison of Total Impacts against the District-Wide Economy for Potential Amendments to Rule 4455—Components at Petroleum Refineries, Gas Liquids Processing Facilities, and Chemical Plants**

	Total Rule Impacts	Size of District Economy [a]	% of District Economy
Revenue	\$28,862	\$368,710,597,792	0.000%
Employment	0	1,982,068	0.000%

Source: ERG estimates based on IMPLAN, 2023.

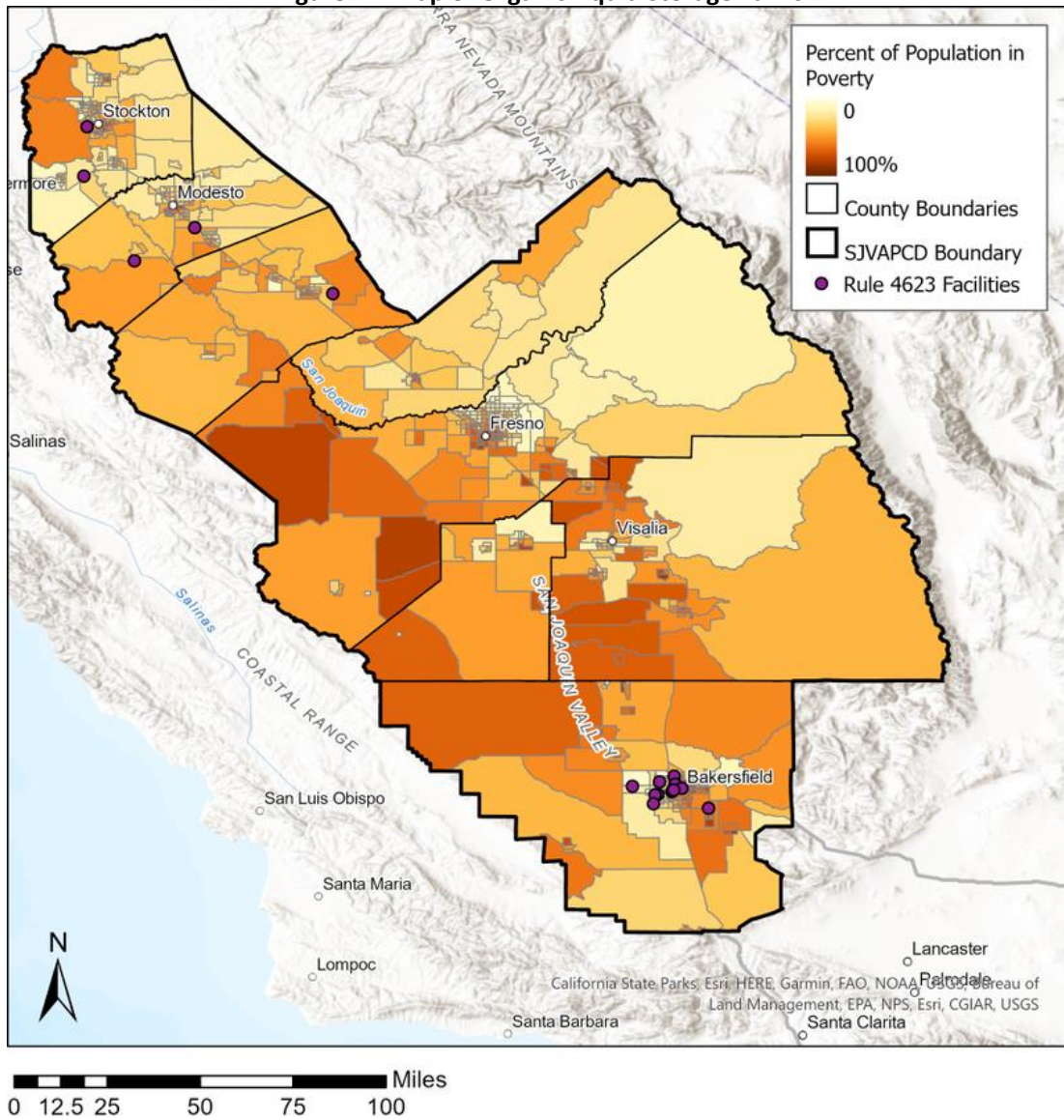
[a] While the SJVAPCD only includes a portion of Kern County, the data shown here include the whole of the county.

**4.5 RULE 4623 – STORAGE OF ORGANIC LIQUIDS**

**4.5.1 Profile of Affected Entities**

Figure 12 presents the in-scope facilities with organic liquid storage tanks. Facilities were mapped using ArcGIS Pro 2.6.0. There were 63 facilities provided, 29 of which provided sufficient information to be mapped. The majority of facilities are located in and around Bakersfield, while a handful of other facilities are located in the three northernmost counties, San Joaquin, Stanislaus, and Merced.

**Figure 12. Map of Organic Liquid Storage Tanks**



Source data: SJVAPCD, 2023.  
Map created by ERG using ArcGIS® software by Esri.

Table 31 includes a profile of firms affected by the potential amendments to Rule 4623 (i.e., those that will incur compliance costs). A total of 41 firms will incur costs. Note that some companies have facilities across two or more sectors. For those companies, ERG evenly distributed the number employees, revenues, and profits between the relevant sectors.

**Table 31. Profile of Entities Affected by Potential Amendments to Rule 4623—Storage of Organic Liquids**

Sector	Total Companies [a]	Total, All Companies		
		Employees	Revenue	Profits [b]
Crude Petroleum and Natural Gas	26	1,078	\$2,013,610,295	\$162,377,534
Natural Gas Liquids	5	157	\$293,651,501	\$23,680,057
Industrial Organic Chemicals, NEC – Aliphatics	2	178	\$794,327,849	\$40,631,167
Petroleum Refining	3	394	\$2,227,503,609	\$112,266,182
Products of Petroleum and Coal, Not Elsewhere Classified	1	131	\$742,501,203	\$37,422,061
Crude Petroleum Pipelines	2	100	\$43,142,673	\$0
Natural Gas Transmission	1	121	\$128,350,233	\$0
Petroleum Bulk Stations and Terminals	2	50	\$456,008,087	\$9,028,960
Petroleum and Petroleum Products Wholesalers, Except Bulk Stations and Terminals	1	25	\$228,004,043	\$4,514,480
Farm Supplies – Lawn and Garden Supplies Sold Via Retail Method	2	23	\$24,393,453	\$922,073
<b>Total</b>	<b>41</b>	<b>2,257</b>	<b>\$6,951,492,947</b>	<b>\$390,842,513</b>

Sources: ERG estimates based on SJVAPCD, 2023; NAICS.com, 2021; U.S. Census Bureau, 2020a; U.S. Census Bureau, 2020c; IMPLAN, 2023; BEA, 2023a.

[a] This represents the number of companies with facilities categorized within a given sector. Some companies have facilities categorized in different SIC code sectors. For this analysis, costs and profits for a company that has facilities across two or more SIC codes are split evenly across each SIC for that company’s facilities.

[b] RMA does not have financial data available for either the Crude Petroleum Pipelines sector or the Natural Gas Transmission sector. ERG assumed zero percent profit to present an abundantly conservative estimate of impacts.



Table 32 shows the characteristics of the average firm affected by the potential amendments to Rule 4623. (Individual firms may be either larger or smaller than these average estimates.)

**Table 32. Characteristics of Entities with Costs due to the Potential Amendments to Rule 4623—Storage of Organic Liquids**

Sector	Average per Company			Average Annual Pay per Employee
	Employees	Revenue	Profits [a]	
Crude Petroleum and Natural Gas	41	\$77,446,550	\$6,245,290	\$134,134
Natural Gas Liquids	31	\$58,730,300	\$4,736,011	\$134,134
Industrial Organic Chemicals, NEC – Aliphatics	89	\$397,163,925	\$20,315,583	\$128,917
Petroleum Refining	131	\$742,501,203	\$37,422,061	\$136,442
Products of Petroleum and Coal, Not Elsewhere Classified	131	\$742,501,203	\$37,422,061	\$136,442
Crude Petroleum Pipelines	50	\$21,571,337	\$0	\$122,460
Natural Gas Transmission	121	\$128,350,233	\$0	\$138,000
Petroleum Bulk Stations and Terminals	25	\$228,004,043	\$4,514,480	\$81,814
Petroleum and Petroleum Products Wholesalers, Except Bulk Stations and Terminals	25	\$228,004,043	\$4,514,480	\$81,814
Farm Supplies – Lawn and Garden Supplies Sold Via Retail Method	11	\$12,196,726	\$461,036	\$64,556
<b>Average</b>	<b>55</b>	<b>\$169,548,608</b>	<b>\$9,532,744</b>	<b>\$131,512</b>

Sources: ERG estimates based on SJVAPCD, 2023; NAICS.com, 2021; U.S. Census Bureau, 2020a; U.S. Census Bureau, 2020c; RMA, 2023; IMPLAN, 2023.

[a] RMA does not have financial data available for either the Crude Petroleum Pipelines sector or the Natural Gas Transmission sector. ERG assumed zero percent profit to present an abundantly conservative estimate of impacts.

#### 4.5.2 Compliance Cost Estimates

Compliance costs were estimated by SJVAPCD (2023), and include:

- One-time capital costs.
- Annual O&M costs beginning in 2024 and continuing indefinitely.

Total costs are calculated by annualizing the one-time capital costs that will be incurred in 2023 (for compliance by January 1, 2024) over a 10-year period using a 4 percent interest rate, and then summing annualized one-time costs and annualized costs to yield the total.

Table 33 shows the one-time, annual, and total annualized costs incurred by sector. Annualized costs would total approximately **\$1,200,000** per year over 10 years, with the majority of costs incurred by the “Crude Petroleum and Natural Gas” sector.

**Table 33. Costs of Compliance with Potential Amendments to Rule 4623—Storage of Organic Liquids**

Sector	One-Time Capital Costs [a]	Annual O&M Costs [b]	Total Annualized Costs (Annualized One-Time + Annual) [c]
	2024	2024	2024
Crude Petroleum and Natural Gas	\$183,161	\$694,878	\$716,591
Natural Gas Liquids	\$26,711	\$101,336	\$104,503
Industrial Organic Chemicals, NEC – Aliphatics	\$15,263	\$57,906	\$59,716
Petroleum Refining	\$22,895	\$86,860	\$89,574
Products of Petroleum and Coal, Not Elsewhere Classified	\$7,632	\$28,953	\$29,858
Crude Petroleum Pipelines	\$15,263	\$57,906	\$59,716
Natural Gas Transmission	\$3,816	\$14,477	\$14,929
Petroleum Bulk Stations and Terminals	\$15,263	\$57,906	\$59,716
Petroleum and Petroleum Products Wholesalers, Except Bulk Stations and Terminals	\$7,632	\$28,953	\$29,858
Farm Supplies – Lawn and Garden Supplies Sold Via Retail Method	\$15,263	\$57,906	\$59,716
<b>Total</b>	<b>\$312,900</b>	<b>\$1,187,083</b>	<b>\$1,224,177</b>

Source: SJVAPCD, 2023.

[a] Includes one-time capital costs in 2024.

[b] Includes the increased costs to inspect, operate, and maintain equipment.

[c] The total annualized cost is calculated by summing annualized one-time costs (annualized over a 10-year period using a 4 percent discount rate) and annual costs.

### 4.5.3 Impacts on Affected Entities

This section first discusses our primary impacts test, which compares compliance costs to profits for affected companies. ERG then discusses indirect and induced impacts to related industries.

#### 4.5.3.1 Direct Impacts

The primary measure of determining economic feasibility compares total annualized costs to profits for affected firms, and, as a sensitivity analysis to firm profits, with a threshold of 10 percent of profits indicating a finding of significant adverse impact (Berck, 1995). Therefore, ERG uses this comparison to aid in the District’s determination of economic feasibility of the rule amendments.

As shown in Table 34, overall rule impacts comprise approximately **0.3 percent of profits**. Every sector for which ERG had sufficient profit data can expect these costs to be economically feasible. The sector with the highest costs as a percent of profits is the “Farm Supplies – Lawn and Garden Supplies Sold Via Retail Method” sector, incurring costs that are approximately **6.5 percent of profits**. As for the “Crude Petroleum Pipelines” and “Natural Gas Transmission” sectors, these sectors would need profit rates of less than 1.4 percent and 0.2 percent, respectively (which are both lower than any other profit rate derived from RMA for this analysis), for their industry-specific impact ratio to exceed 10 percent of profits. Those industries would have to already be losing tens or even hundreds of millions of dollars in order for the rule to be economically infeasible across all impacted companies.

**Table 34. Economic Impacts for Entities Affected by Potential Amendments to Rule 4623—Storage of Organic Liquids**

Sector	Average Annualized Cost per Company	Average Profits per Company [a]	Cost as % Profits
Crude Petroleum and Natural Gas	\$27,561	\$6,245,290	0.44%
Natural Gas Liquids	\$20,901	\$4,736,011	0.44%
Industrial Organic Chemicals, NEC – Aliphatics	\$29,858	\$20,315,583	0.15%
Petroleum Refining	\$29,858	\$37,422,061	0.08%
Products of Petroleum and Coal, Not Elsewhere Classified	\$29,858	\$37,422,061	0.08%
Crude Petroleum Pipelines	\$29,858	\$0	0.00%
Natural Gas Transmission	\$14,929	\$0	0.00%
Petroleum Bulk Stations and Terminals	\$29,858	\$4,514,480	0.66%
Petroleum and Petroleum Products Wholesalers, Except Bulk Stations and Terminals	\$29,858	\$4,514,480	0.66%
Farm Supplies – Lawn and Garden Supplies Sold Via Retail Method	\$29,858	\$461,036	6.48%
<b>Average</b>	<b>\$29,858</b>	<b>\$9,532,744</b>	<b>0.31%</b>

Sources: ERG estimates based on SJVAPCD, 2023; U.S. Census Bureau, 2020a; U.S. Census Bureau, 2020c; NAICS.com, 2021; RMA, 2023; IMPLAN, 2023.

[a] RMA does not have financial data available for either the Crude Petroleum Pipelines sector or the Natural Gas Transmission sector. ERG assumed zero percent profit to present an abundantly conservative estimate of impacts.

#### **4.5.3.2 Employment, Indirect, and Induced Impacts**

In addition to the primary test of direct impacts of costs on revenue, ERG also assessed potential direct impacts on employment, indirect impacts, and induced impacts using IMPLAN's (2023) input-output model. The IMPLAN model uses the direct costs of the rule to estimate "ripple effects" (specifically backward linkages) of a given economic activity within a specific geographic area through the implementation of its Input-Output model" (IMPLAN, 2023). Outputs from the IMPLAN model include:

- **Direct employment impacts**, if facilities with compliance costs under the potential amendments were to attempt to offset these costs by reducing the number of employees.
- **Indirect revenue and employment impacts** that capture how directly affected firms might react to the direct cost of rule compliance by reducing purchases from their suppliers, and how those suppliers might in turn reduce employees.
- **Induced revenue and employment impacts** that capture how households will adjust their spending as a result of any changes in earnings.

Table 35 summarizes these impacts, which, taken together, may have a total impact on the District economy of approximately **\$1,300,000 in revenue, with one job lost**.

**Table 35. Direct, Indirect, and Induced Impacts of Potential Amendments to Rule 4623—Storage of Organic Liquids**

Sector	Direct		Indirect		Induced		Total	
	Revenue (Costs)	Employment	Revenue	Employment	Revenue	Employment	Revenue	Employment
Crude Petroleum and Natural Gas	\$716,591	0	\$8,321	0	\$76	0	\$724,989	0
Natural Gas Liquids	\$104,503	0	\$8,321	0	\$76	0	\$112,900	0
Industrial Organic Chemicals, NEC – Aliphatics	\$59,716	0	\$82	0	\$3	0	\$59,800	0
Petroleum Refining	\$89,574	0	\$4,241	0	\$354	0	\$94,169	0
Products of Petroleum and Coal, Not Elsewhere Classified	\$29,858	0	\$51	0	\$2	0	\$29,912	0
Crude Petroleum Pipelines	\$59,716	0	\$4,600	0	\$37	0	\$64,352	0
Natural Gas Transmission	\$14,929	0	\$5,997	0	\$624	0	\$21,549	0
Petroleum Bulk Stations and Terminals	\$59,716	0	\$4,241	0	\$354	0	\$64,311	0
Petroleum and Petroleum Products Wholesalers, Except Bulk Stations and Terminals	\$29,858	0	\$9,209	0	\$729	0	\$39,796	0
Farm Supplies – Lawn and Garden Supplies Sold Via Retail Method	\$59,716	0	\$833	0	\$713	0	\$61,262	0
<b>Total</b>	<b>\$1,224,177</b>	<b>1</b>	<b>\$45,897</b>	<b>0</b>	<b>\$2,967</b>	<b>0</b>	<b>\$1,273,041</b>	<b>1</b>

Sources: ERG estimates based on SJVAPCD, 2023; U.S. Census Bureau, 2020a; U.S. Census Bureau, 2020c; NAICS.com, 2021; RMA, 2023; IMPLAN, 2023.

Note: Totals may not equal presented counts of revenue and employment for each sector due to rounding.

Table 36 compares these impacts to the total size of the District’s economy (as estimated in the IMPLAN model). These impacts represent **less than 0.001 percent** of revenue and employment District-wide.

**Table 36. Comparison of Total Impacts against the District-Wide Economy for Potential Amendments to Rule 4623—Storage of Organic Liquids Processing Facilities**

	Total Rule Impacts	Size of District Economy [a]	% of District Economy
Revenue	\$1,273,041	\$368,710,597,792	0.000%
Employment	1	1,982,068	0.000%

Source: ERG estimates based on IMPLAN, 2023.

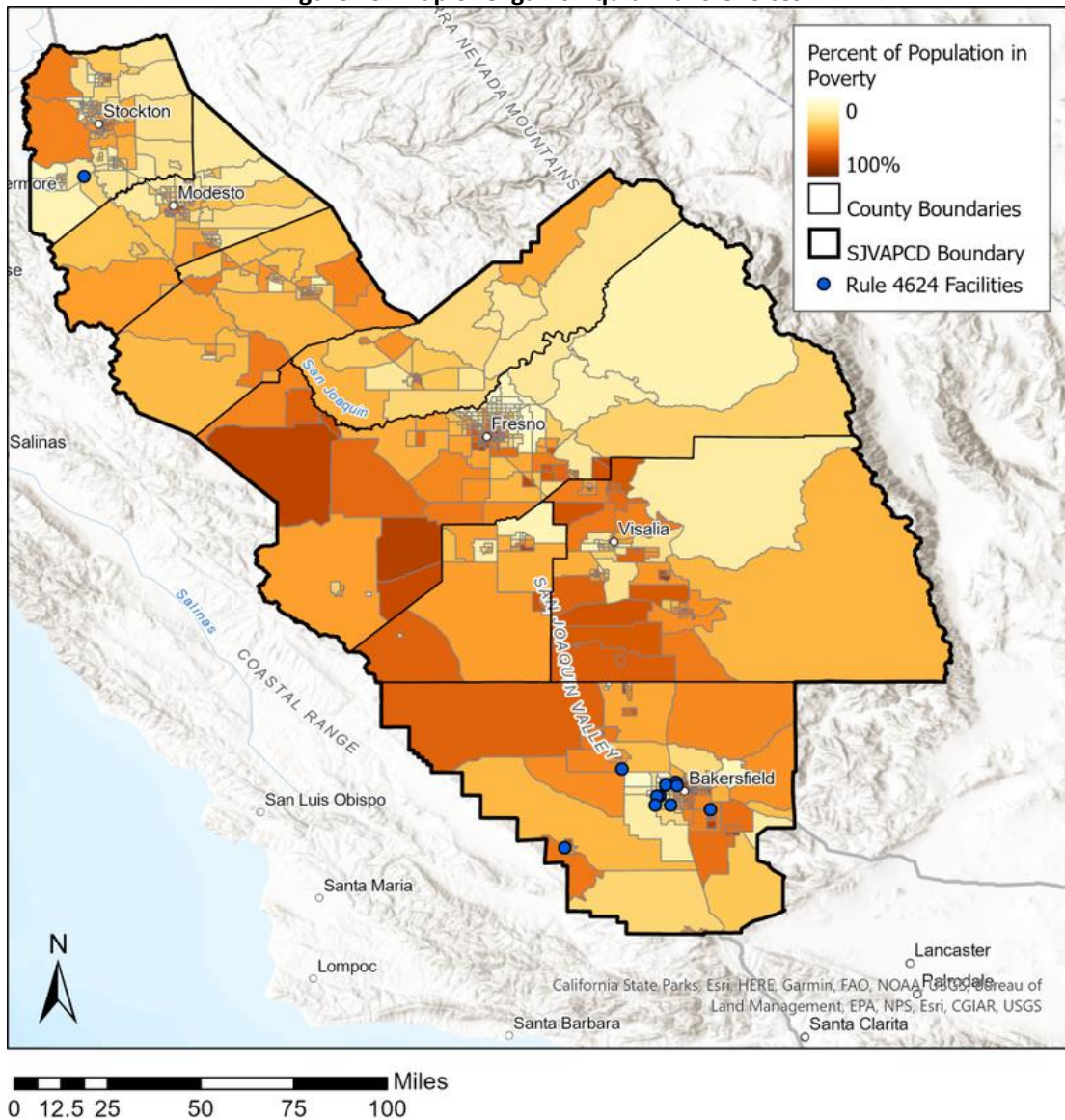
[a] While the SJVAPCD only includes a portion of Kern County, the data shown here include the whole of the county.

**4.6 RULE 4624 – TRANSFER OF ORGANIC LIQUID**

**4.6.1 Profile of Affected Entities**

Figure 13 presents a map of the organic liquid transfer facilities. Facilities were mapped using ArcGIS Pro 2.6.0. Out of 54 facilities provided, only 18 of them provided sufficient information to be mapped, with 11 of unique addresses mapped. The majority of facilities are located in and around Bakersfield. One facility is located on the western border of Kern County, with another located in San Joaquin County.

**Figure 13. Map of Organic Liquid Transfer Sites**



Source data: SJVAPCD, 2023.  
Map created by ERG using ArcGIS® software by Esri.

Table 37 includes a profile of firms affected by the potential amendments to Rule 4624 (i.e., those that will incur compliance costs). A total of 39 firms will incur costs. Note that some companies have facilities across two or more sectors. For those companies, ERG evenly distributed the number employees, revenues, and profits between the relevant sectors.

**Table 37. Profile of Entities Affected by Potential Amendments to Rule 4624—Transfer of Organic Liquid**

Sector	Total Companies [a]	Total, All Companies		
		Employees	Revenue	Profits [b]
Crude Petroleum and Natural Gas	7	225	\$419,502,145	\$33,828,653
Natural Gas Liquids	7	225	\$419,502,145	\$33,828,653
Industrial Organic Chemicals, NEC – Aliphatics	4	271	\$897,981,141	\$47,049,378
Nitrogenous Fertilizers	1	24	\$16,789,494	\$991,252
Petroleum Refining	4	459	\$2,598,754,211	\$130,977,212
Products of Petroleum and Coal, Not Elsewhere Classified	1	131	\$742,501,203	\$37,422,061
Special Warehousing and Storage, Not Elsewhere Classified	1	22	\$12,244,129	\$766,972
Crude Petroleum Pipelines	6	300	\$129,428,020	\$0
Transportation Services, Not Elsewhere Classified	1	9	\$1,573,010	\$104,762
Natural Gas Transmission	2	484	\$513,400,932	\$0
Chemicals and Allied Products, NEC	1	15	\$17,735,877	\$753,420
Petroleum Bulk Stations and Terminals	7	199	\$1,389,595,597	\$27,086,880
Petroleum and Petroleum Products Wholesalers, Except Bulk Stations and Terminals	2	37	\$342,006,065	\$6,771,720
<b>Total</b>	<b>39</b>	<b>2,401</b>	<b>\$7,501,013,969</b>	<b>\$319,580,964</b>

Sources: ERG estimates based on SJVAPCD, 2023; NAICS.com, 2021; U.S. Census Bureau, 2020a; U.S. Census Bureau, 2020c; IMPLAN, 2023; BEA, 2023A.

[a] This represents the number of companies with facilities categorized within a given sector. Some companies have facilities categorized in different SIC code sectors. For this analysis, costs and profits for a company that has facilities across two or more SIC codes are split evenly across each SIC for that company's facilities.

[b] RMA does not have financial data available for either the Crude Petroleum Pipelines sector or the Natural Gas Transmission sector. ERG assumed zero percent profit to present an abundantly conservative estimate of impacts.



Table 38 shows the characteristics of the average firm affected by the potential amendments to Rule 4624. (Individual firms maybe either larger or smaller than these average estimates.)

**Table 38. Characteristics of Entities with Costs due to the Potential Amendments to Rule 4624—Transfer of Organic Liquid**

Sector	Average per Company			Average Annual Pay per Employee
	Employees	Revenue	Profits [a]	
Crude Petroleum and Natural Gas	32	\$59,928,878	\$4,832,665	\$134,134
Natural Gas Liquids	32	\$59,928,878	\$4,832,665	\$134,134
Industrial Organic Chemicals, NEC – Aliphatics	68	\$224,495,285	\$11,762,345	\$121,615
Nitrogenous Fertilizers	24	\$16,789,494	\$991,252	\$78,977
Petroleum Refining	115	\$649,688,553	\$32,744,303	\$136,442
Products of Petroleum and Coal, Not Elsewhere Classified	131	\$742,501,203	\$37,422,061	\$136,442
Special Warehousing and Storage, Not Elsewhere Classified	22	\$12,244,129	\$766,972	\$73,712
Crude Petroleum Pipelines	50	\$21,571,337	\$0	\$122,460
Transportation Services, Not Elsewhere Classified	9	\$1,573,010	\$104,762	\$42,456
Natural Gas Transmission	242	\$256,700,466	\$0	\$138,000
Chemicals and Allied Products, NEC	15	\$17,735,877	\$753,420	\$90,192
Petroleum Bulk Stations and Terminals	28	\$198,513,657	\$3,869,554	\$92,014
Petroleum and Petroleum Products Wholesalers, Except Bulk Stations and Terminals	19	\$171,003,033	\$3,385,860	\$81,814
<b>Average</b>	<b>62</b>	<b>\$192,333,692</b>	<b>\$8,194,384</b>	<b>\$126,594</b>

Sources: ERG estimates based on SJVAPCD, 2023; NAICS.com, 2021; U.S. Census Bureau, 2020a; U.S. Census Bureau, 2020c; RMA, 2023; IMPLAN, 2023.

[a] RMA does not have financial data available for either the Crude Petroleum Pipelines sector or the Natural Gas Transmission sector. ERG assumed zero percent profit to present an abundantly conservative estimate of impacts.

#### 4.6.2 Compliance Cost Estimates

Compliance costs were estimated by SJVAPCD (2023), and include O&M costs beginning in 2024 and continuing indefinitely. Table 39 shows the annual O&M costs incurred by sector. Annual costs would total about **\$150,000** per year.

**Table 39. Costs of Compliance with Potential Amendments to Rule 4624—Transfer of Organic Liquid**

Sector	Annual O&M Costs [a]	Total Annual Costs
	2024	2024
Crude Petroleum and Natural Gas	\$18,990	\$18,990
Natural Gas Liquids	\$18,990	\$18,990
Industrial Organic Chemicals, NEC – Aliphatics	\$15,192	\$15,192
Nitrogenous Fertilizers	\$3,798	\$3,798
Petroleum Refining	\$13,293	\$13,293
Products of Petroleum and Coal, Not Elsewhere Classified	\$3,798	\$3,798
Special Warehousing and Storage, Not Elsewhere Classified	\$3,798	\$3,798
Crude Petroleum Pipelines	\$22,788	\$22,788
Transportation Services, Not Elsewhere Classified	\$3,798	\$3,798
Natural Gas Transmission	\$7,596	\$7,596
Chemicals and Allied Products, NEC	\$3,798	\$3,798
Petroleum Bulk Stations and Terminals	\$26,586	\$26,586
Petroleum and Petroleum Products Wholesalers, Except Bulk Stations and Terminals	\$5,697	\$5,697
<b>Total</b>	<b>\$148,120</b>	<b>\$148,120</b>

Source: SJVAPCD, 2023.

[a] Includes the increased costs to inspect, operate, and maintain equipment.

#### 4.6.3 Impacts on Affected Entities

This section first discusses our primary impacts test, which compares compliance costs to profits for affected companies. ERG then discusses indirect and induced impacts to related industries.

##### 4.6.3.1 Direct Impacts

Our primary measure of determining economic feasibility is a comparison of total annual costs to profits for affected firms; a threshold of 10 percent of profits indicates a finding of significant adverse impact (Berck, 1995). Therefore, ERG uses this comparison to aid in the District’s determination of economic feasibility of the rule amendments.

As shown in Table 40, overall rule impacts are approximately **0.05 percent of profits**. Every sector for which ERG had sufficient profit data can expect these costs to be economically feasible. The sector with the highest costs as a percent of profits is the “Transportation Services, Not Elsewhere Classified” sector, incurring costs that are approximately **3.6 percent of profits**. As for the “Crude Petroleum Pipelines” and “Natural Gas Transmission” sectors, these sectors would need profit rates of less than 0.2 percent and

0.02 percent, respectively (which are both lower than any other profit rate derived from RMA for this analysis), for their industry-specific impact ratio to exceed 10 percent of profits. Those industries would have to be operating at a nearly 50 percent loss in order for the rule to be economically infeasible across all impacted companies.

**Table 40. Economic Impacts for Entities Affected by Potential Amendments to Rule 4624—Transfer of Organic Liquid**

Sector	Average Annual Cost per Company	Average Profits per Company [a]	Cost as % Profits
Crude Petroleum and Natural Gas	\$2,713	\$4,832,665	0.06%
Natural Gas Liquids	\$2,713	\$4,832,665	0.06%
Industrial Organic Chemicals, NEC – Aliphatics	\$3,798	\$11,762,345	0.03%
Nitrogenous Fertilizers	\$3,798	\$991,252	0.38%
Petroleum Refining	\$3,323	\$32,744,303	0.01%
Products of Petroleum and Coal, Not Elsewhere Classified	\$3,798	\$37,422,061	0.01%
Special Warehousing and Storage, Not Elsewhere Classified	\$3,798	\$766,972	0.50%
Crude Petroleum Pipelines	\$3,798	\$0	0.00%
Transportation Services, Not Elsewhere Classified	\$3,798	\$104,762	3.63%
Natural Gas Transmission	\$3,798	\$0	0.00%
Chemicals and Allied Products, NEC	\$3,798	\$753,420	0.50%
Petroleum Bulk Stations and Terminals	\$3,798	\$3,869,554	0.10%
Petroleum and Petroleum Products Wholesalers, Except Bulk Stations and Terminals	\$2,848	\$3,385,860	0.08%
<b>Average</b>	<b>\$3,798</b>	<b>\$8,194,384</b>	<b>0.05%</b>

Sources: ERG estimates based on SJVAPCD, 2023; U.S. Census Bureau, 2020a; U.S. Census Bureau, 2020c; NAICS.com, 2021; RMA, 2023; IMPLAN, 2023.

[a] RMA does not have financial data available for either the Crude Petroleum Pipelines sector or the Natural Gas Transmission sector. ERG assumed zero percent profit to present an abundantly conservative estimate of impacts.

#### **4.6.3.2 Employment, Indirect, and Induced Impacts**

In addition to the primary test of direct impacts of costs on revenue, ERG also assessed potential direct impacts on employment, indirect impacts, and induced impacts using IMPLAN’s (2023) input-output model. The IMPLAN model uses the direct costs of the rule to estimate “ripple effects” (specifically backward linkages) of a given economic activity within a specific geographic area through the implementation of its Input-Output model” (IMPLAN, 2023).

Outputs from the IMPLAN model include:

- **Direct employment impacts**, if facilities with compliance costs under the potential amendments were to attempt to offset these costs by reducing the number of employees.

- **Indirect revenue and employment impacts** that capture how directly affected firms might react to the direct cost of rule compliance by reducing purchases from their suppliers, and how those suppliers might in turn reduce employees.
- **Induced revenue and employment impacts** that capture how households will adjust their spending as a result of any changes in earnings.

Table 41 summarizes these impacts, which, taken together, may have a total impact on the District economy of about **\$160,000 in revenue, with as few as zero jobs lost.**

**Table 41. Direct, Indirect, and Induced Impacts of Potential Amendments to Rule 4624—Transfer of Organic Liquid**

Sector	Direct		Indirect		Induced		Total	
	Revenue (Costs)	Employment	Revenue	Employment	Revenue	Employment	Revenue	Employment
Crude Petroleum and Natural Gas	\$18,990	0	\$1,898	0	\$11	0	\$20,899	0
Natural Gas Liquids	\$18,990	0	\$1,898	0	\$11	0	\$20,899	0
Industrial Organic Chemicals, NEC – Aliphatics	\$15,192	0	\$18	0	\$0	0	\$15,210	0
Nitrogenous Fertilizers	\$3,798	0	\$163	0	\$1	0	\$3,962	0
Petroleum Refining	\$13,293	0	\$805	0	\$52	0	\$14,150	0
Products of Petroleum and Coal, Not Elsewhere Classified	\$3,798	0	\$9	0	\$0	0	\$3,807	0
Special Warehousing and Storage, Not Elsewhere Classified	\$3,798	0	\$274	0	\$60	0	\$4,133	0
Crude Petroleum Pipelines	\$22,788	0	\$756	0	\$5	0	\$23,549	0
Transportation Services, Not Elsewhere Classified	\$3,798	0	\$106	0	\$67	0	\$3,971	0
Natural Gas Transmission	\$7,596	0	\$2,144	0	\$92	0	\$9,832	0
Chemicals and Allied Products, NEC	\$3,798	0	\$9	0	\$0	0	\$3,807	0
Petroleum Bulk Stations and Terminals	\$26,586	0	\$805	0	\$52	0	\$27,443	0
Petroleum and Petroleum Products Wholesalers, Except Bulk Stations and Terminals	\$5,697	0	\$2,124	0	\$107	0	\$7,929	0
<b>Total</b>	<b>\$148,120</b>	<b>0</b>	<b>\$11,010</b>	<b>0</b>	<b>\$460</b>	<b>0</b>	<b>\$159,590</b>	<b>0</b>

Sources: ERG estimates based on SJVAPCD, 2023; U.S. Census Bureau, 2020a; U.S. Census Bureau, 2020c; NAICS.com, 2021; RMA, 2023; IMPLAN, 2023.

Note: Totals may not equal presented counts of revenue and employment for each sector due to rounding.

Table 42 compares these impacts to the total size of the District’s economy (as estimated in the IMPLAN model). These impacts represent **less than 0.001 percent** of revenue and employment District-wide.

**Table 42. Comparison of Total Impacts against the District-Wide Economy for Potential Amendments to Rule 4624—Transfer of Organic Liquid**

	Total Rule Impacts	Size of District Economy [a]	% of District Economy
Revenue	\$159,590	\$368,710,597,792	0.000%
Employment	0	1,982,068	0.000%

Source: ERG estimates based on IMPLAN, 2023.

[a] While the SJVAPCD only includes a portion of Kern County, the data shown here include the whole of the county.

## 5 IMPACTS ON SMALL ENTITIES

The entities affected by the potential amendments may include small entities (i.e., small businesses and/or small government entities).

For private entities, a small business is defined in the California Small Business Procurement and Contract Act (Cal. Gov't Code § 14837) as an independently owned and operated, non-dominant business with principal office located in California, fewer than 100 employees and earning less than \$15 million in revenues.

The average firm revenue and employment figures presented for each rule in Table 14, Table 20, Table 26, Table 32, and Table 38 suggest some affected firms may be small. Although individual firms may be larger or smaller than the averages shown in the tables, there is little information available on which to base a definitive conclusion. Furthermore, even if it is possible to determine a specific firm earns less than \$15 million in revenues and employs fewer than 100 employees, the designation of “small business” not only requires that the firm meets the revenue and employment size standards, but also has its principal office located in California.

To characterize the likelihood of small business impacts:

- Rule 4401 (Steam-Enhanced Crude Oil Production Wells): it is unlikely that firms are small, and firm level impacts are less than 1 percent of revenues.
- Rule 4409 (Components at Light Crude Oil Production Facilities, Natural Gas Production Facilities, And Natural Gas Processing Facilities): while there are some small firms, firm level costs for these firms are expected to be much lower than the average firm.
- Rule 4455 (Components at Petroleum Refineries, Gas Liquids Processing Facilities, and Chemical Plants): it is unlikely that firms are small, and firm level impacts are less than 1 percent of revenues.
- Rule 4623 (Storage of Organic Liquids): it is possible that 2 affected firms in the “Farm Supplies – Lawn and Garden Supplies Sold Via Retail Method” sector are small businesses based on industry average revenues. While estimated average annualized compliance costs are about \$29,900 per firm, costs for small firms will be significantly lower.
- Rule 4624 (Transfer of Organic Liquids): it is possible, based on industry average revenues, that one affected firm in the “Special Warehousing and Storage, Not Elsewhere Classified” sector and one affected firm in the “Transportation Services, Not Elsewhere Classified” sector are small businesses. The estimated annual compliance costs under rule 4624 are a little less than \$3,800 per firm though, and impacts presented in Table 40 for both of those sectors are well under the 10 percent of profits threshold to determine economic feasibility (0.5 percent and 3.6 percent, respectively).

Although economic feasibility is based on an evaluation of overall impacts to all affected firms covered by a rule, to be responsive to California’s Small Business requirements, we more closely examined four potentially small businesses that may incur substantial impacts. Two companies are affected by Rule 4623, the other two by Rule 4624. Both facilities affected by Rule 4623 are captured

within the “Farm Supplies - Lawn and Garden Supplies Sold Via Retail Method” sector. Upon review, they both appear to be connected with other companies through common ownership, which may therefore provide additional resources beyond its immediate revenues to cover expected compliance costs. As for the two companies affected by Rule 4624, one is categorized within the “Special Warehousing and Storage, Not Elsewhere Classified” sector, while the other is in the “Transportation Services, Not Elsewhere Classified” sector. Like the two companies looked at under Rule 4623, the “Warehousing” company is also linked to other companies through common ownership. The “Transportation” company may also have similar linkages to other companies that might provide additional resources beyond its immediate revenues to cover expected compliance costs. Compliance costs were estimated on a pretax basis, but are compared to post-tax profits; adjusting compliance costs for taxes should reduce costs and impacts.

In summary, the District is revising five rules affecting 157 unique facilities owned by 91 unique firms. Rule 4455 and Rule 4624 are expected to impose compliance costs averaging less than 0.1 percent of firm profits. Rule 4623 is expected to impose compliance costs of less than 1 percent of firm profits. The compliance costs for Rule 4401 are expected to average approximately 2 percent of profits for impacted firms, while impacts for Rule 4409 are expected to make up under 4 percent of profits. Based on average firm characteristics, few are likely to be small by California’s definition, and the vast majority of those likely to be small generally show impacts consistent with the overall impacts of the rules.

The analysis of each rule includes a map showing the distribution of affected facilities overlaid on a map showing the percentage of the population living in poverty. The maps demonstrate that a few affected facilities are located in regions with high poverty rates. However, because the analyses demonstrate that the rules are economically feasible, with most facilities incurring costs less than 1 percent of profits, and in many cases negligible costs, there should not be substantial impacts in high poverty areas of the District.





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**APPENDIX A - SECTOR, SIC CODE, AND NAICS CODE CONCORDANCES**

Table A-1 shows the concordance between SIC codes and sectors developed by SJV APCD. (SIC codes that were not in the original concordance but that might have indirect and induced impacts were assigned the sector “Other Industries.”)

**Table A-1. SIC Code to Sector Concordance used to Analyze the Impacts of Rules 4401, 4409, 4455, 4623, and 4624—Steam-Enhanced Crude Oil Production Wells; Components at Light Crude Oil Production Facilities, Natural Gas Production Facilities, and Natural Gas Processing Facilities; Components at Petroleum Refineries, Gas Liquids Processing Facilities, and Chemical Plants; Storage of Organic Liquids; and Transfer of Organic Liquid**

SIC Code	SIC Industry	Rule 4401	Rule 4409	Rule 4455	Rule 4623	Rule 4624
1311	Crude Petroleum and Natural Gas	x	x		x	x
1321	Natural Gas Liquids		x	x	x	x
2869	Industrial Organic Chemicals, NEC – Aliphatics			x	x	x
2873	Nitrogenous Fertilizers					x
2879	Pesticides and Agricultural Chemicals, NEC			x		
2911	Petroleum Refining			x	x	x
2999	Products of Petroleum and Coal, Not Elsewhere Classified				x	x
4226	Special Warehousing and Storage, Not Elsewhere Classified					x
4612	Crude Petroleum Pipelines				x	x
4789	Transportation Services, Not Elsewhere Classified					x
4922	Natural Gas Transmission		x		x	x
5169	Chemicals and Allied Products, NEC			x		x
5171	Petroleum Bulk Stations and Terminals				x	x
5172	Petroleum and Petroleum Products Wholesalers, Except Bulk Stations and Terminals				x	x
5191	Farm Supplies - Lawn and Garden Supplies Sold Via Retail Method				x	

Source: SJVAPCD, 2023.

Table A-2 shows the NAICS codes that map to the SIC codes used in the analysis (limited to the NAICS codes assigned to the facilities in the District that may be affected by the potential amendments). This concordance was primarily developed using the U.S. Census Bureau’s (2020d) SIC to NAICS concordances. Where multiple NAICS codes map to one SIC code, ERG used information on companies’ websites or other search tools about what type of industry they are engaged in to assign a NAICS code.

**Table A-2. SIC to NAICS Concordance for Facilities that may be Affected by Potential Amendments to Rules 4401, 4409, 4455, 4623, and 4624— Steam-Enhanced Crude Oil Production Wells; Components at Light Crude Oil Production Facilities, Natural Gas Production Facilities, and Natural Gas Processing Facilities; Components at Petroleum Refineries, Gas Liquids Processing Facilities, and Chemical Plants; Storage of Organic Liquids; and Transfer of Organic Liquid**

SIC Code	SIC Industry	Corresponding NAICS
1311	211120 (Crude Petroleum Extraction)	211120 (Crude Petroleum Extraction)
1321	211130 (Natural Gas Extraction)	211130 (Natural Gas Extraction)
2869	325110, 325120, 325180, 325193, 325194, 325199, 325998 (Petrochemical Manufacturing, Industrial Gas Manufacturing, Other Basic Inorganic Chemical Manufacturing, Ethyl Alcohol Manufacturing, Cyclic Crude, Intermediate, and Gum and Wood Chemical Manufacturing, All Other Basic Organic Chemical Manufacturing, All Other Miscellaneous Chemical Product and Preparation Manufacturing)	325110, 325120, 325180, 325193, 325194, 325199, 325998 (Petrochemical Manufacturing, Industrial Gas Manufacturing, Other Basic Inorganic Chemical Manufacturing, Ethyl Alcohol Manufacturing, Cyclic Crude, Intermediate, and Gum and Wood Chemical Manufacturing, All Other Basic Organic Chemical Manufacturing, All Other Miscellaneous Chemical Product and Preparation Manufacturing)
2873	325311 (Nitrogenous Fertilizers)	325311 (Nitrogenous Fertilizers)
2879	325320 (Pesticide and Other Agricultural Chemical Manufacturing)	325320 (Pesticide and Other Agricultural Chemical Manufacturing)
2911	324110 (Petroleum Refineries)	324110 (Petroleum Refineries)
2999	324199 (All Other Petroleum and Coal Products Manufacturing)	324199 (All Other Petroleum and Coal Products Manufacturing)
4226	493110, 493120, 493190 (General Warehousing and Storage, Refrigerated Warehousing and Storage, Other Warehousing and Storage)	493110, 493120, 493190 (General Warehousing and Storage, Refrigerated Warehousing and Storage, Other Warehousing and Storage)
4612	486110 (Pipeline Transportation of Crude Oil)	486110 (Pipeline Transportation of Crude Oil)
4789	487110, 488210, 488999, 722310 (Scenic and Sightseeing Transportation, Land, Support Activities for Rail Transportation, All Other Support Activities for Transportation, Food Service Contractors)	487110, 488210, 488999, 722310 (Scenic and Sightseeing Transportation, Land, Support Activities for Rail Transportation, All Other Support Activities for Transportation, Food Service Contractors)
4922	486210 (Pipeline Transportation of Natural Gas)	486210 (Pipeline Transportation of Natural Gas)
5169	424690, 425110, 425120 (Other Chemical and Allied Products Merchant Wholesalers, Business to Business Electronic Markets, Wholesale Trade Agents and Brokers)	424690, 425110, 425120 (Other Chemical and Allied Products Merchant Wholesalers, Business to Business Electronic Markets, Wholesale Trade Agents and Brokers)
5171	424710, 454310 (Petroleum Bulk Stations and Terminals, Fuel Dealers)	424710, 454310 (Petroleum Bulk Stations and Terminals, Fuel Dealers)

**Table A-2. SIC to NAICS Concordance for Facilities that may be Affected by Potential Amendments to Rules 4401, 4409, 4455, 4623, and 4624— Steam-Enhanced Crude Oil Production Wells; Components at Light Crude Oil Production Facilities, Natural Gas Production Facilities, and Natural Gas Processing Facilities; Components at Petroleum Refineries, Gas Liquids Processing Facilities, and Chemical Plants; Storage of Organic Liquids; and Transfer of Organic Liquid**

SIC Code	SIC Industry	Corresponding NAICS
5172	424720, 425110, 425120 (Petroleum and Petroleum Products Merchant Wholesalers (except Bulk Stations and Terminals), Business to Business Electronic Markets, Wholesale Trade Agents and Brokers)	424720, 425110, 425120 (Petroleum and Petroleum Products Merchant Wholesalers (except Bulk Stations and Terminals), Business to Business Electronic Markets, Wholesale Trade Agents and Brokers)
5191	424910, 425110, 425120, 444220 (Farm Supplies Merchant Wholesalers, Business to Business Electronic Markets, Wholesale Trade Agents and Brokers, Nursery, Garden Center, and Farm Supply Stores)	424910, 425110, 425120, 444220 (Farm Supplies Merchant Wholesalers, Business to Business Electronic Markets, Wholesale Trade Agents and Brokers, Nursery, Garden Center, and Farm Supply Stores)

Source: SJVAPCD, 2023.