



**Economic and Fiscal Impacts of Governor Schwarzenegger's  
Proposal To Impose A 9.9 Percent Tax on the Market Value of  
Oil Produced in California**

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The conclusions and opinions expressed in this study are those of the authors and do not necessarily reflect the opinions of LECG, Inc. We thank Azucena Monroy for Research Assistance.



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## **Executive Summary**

To help reduce California's General Fund budget deficit, Governor Arnold Schwarzenegger has recommended imposing a 9.9 percent severance tax on oil production. The proposal assumes that the tax will generate \$855 million during the fiscal year 2009-2010.

Our analysis indicates that the proposed oil severance tax will reduce the supply of oil produced in California because, as economics has demonstrated repeatedly, a tax discourages the activity being taxed.

We find that, as a result of the severance tax:

- California oil wells will lose their economic viability quicker and be shut down earlier.
- The expected return from exploration and drilling will be reduced, making investment in new wells less attractive, thus decreasing the number of new wells drilled every year.
- Oil production will decrease by between 54,706 and 80,636 barrels a day during the next 30 years.
- If there is no corresponding reduction in the demand for petroleum products, California's dependency on oil imports will have to increase to offset lost production. The cost of such imports can top \$1.3 billion dollars a year.
- Because the transportation, distribution, and refining cost of importing oil are greater than the corresponding costs associated with California oil production, consumers will pay higher gasoline prices as a result of the severance tax.
- The introduction of the severance tax would result in the loss of close to 9,850 jobs in California.

- While the severance tax is expected to generate additional revenues amounting to \$855 million during the fiscal year 2009-2010, this amount will decline as oil production diminishes; by 2039, it will be \$240 million.
- The proposed severance tax will induce decreases in revenue collections under the Corporation Tax, the Personal Income Tax, and the Sales Tax, amounting to at least 14 percent of the initial revenue yielded by the severance tax.
- Given the volatility of oil prices, revenues from the severance tax could vary up to 30 percent a year, thus increasing the instability of state revenues.
- The fair market value of oil-producing properties will decline and, thus, so will property tax revenues. We expect the loss in local property tax revenues to range from \$23.1 million to \$28.9 million. Kern County could expect to lose between \$12.7 and \$15.9 million annually, most of which would be lost to local schools. Other oil producing counties like Los Angeles, Ventura and Santa Barbara will also suffer revenue losses.

## **I. Introduction**

The Governor's Budget Summary 2009-2010 submitted to the California Legislature on January 9 2009,<sup>1</sup> proposes a number of actions to help reduce the State's General Fund budget deficit. One of his proposals is "to impose an oil severance tax upon any oil producer extracting oil from the earth or water in California"<sup>2</sup>. The tax would be "applied to the gross value of each barrel of oil at a rate of 9.9 percent. Any oil produced by a stripper well, in which the average value of oil as of January 1 of the prior year is less than thirty dollars (\$30) per barrel", would be exempt from the tax.<sup>3</sup> The Governor's proposal assumes that the tax will generate \$855 million during the 2009-2010 fiscal year.

As economics has demonstrated repeatedly, a tax discourages the activity being taxed. The Governor's proposed tax will have the same effect. A severance tax will reduce the supply of oil produced in California. Other things equal, the reduction in oil production will increase gasoline prices, increase the state's dependency on foreign oil sources, decrease employment in California, reduce the yield of other General Fund taxes, and cut property tax revenues in Kern, Los Angeles, and other oil production counties.

## **B. Purpose of the Report**

This report analyzes the economic and revenue effects that will result from the proposed severance tax on oil produced in California. Our objective in preparing this analysis is to assist interested parties in determining how adoption of the Governor's severance tax proposal would affect the welfare of Californians. We take no position on the merits of the proposed tax.

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<sup>1</sup> <http://www.ebudget.ca.gov/pdf/BudgetSummary/FullBudgetSummary.pdf>

<sup>2</sup> *Ibid.*

<sup>3</sup> *Ibid.*

We prepared this report at the request of the Western States Petroleum Association (WSPA), and we were compensated for doing so by WSPA. We were given complete control of the report's contents. The views expressed in the report are the product of independent and objective analysis, and do not necessarily reflect the views of WSPA.

### **C. Organization of the Report**

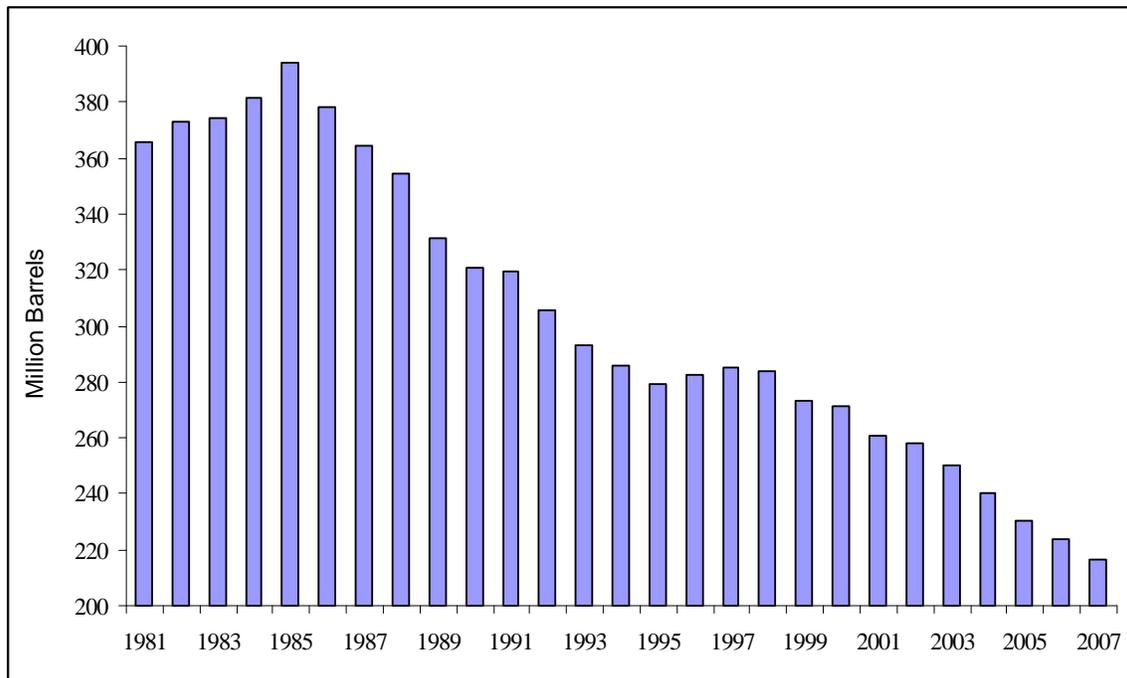
The balance of this report is divided into four parts. Part II provides background information on oil production and taxation in California. It also provides a description of the Governor's severance tax proposal. In Part III, we analyze the economic impacts of the measure on oil production and imports, employment, and gasoline prices. Part IV provides estimates of the measure's fiscal impact on state and local government. It also analyzes the impact of the proposed tax on the volatility of General Fund revenues.

## II. Background

### A. Oil Production in California

As Chart 1 illustrates, annual oil production in California has declined almost 45 percent from its peak of 394 million barrels in 1985. The rate of decline accelerated from -1.3 percent in 2002 to -3.7 percent in 2005, as Table 1 shows, but then slowed-down in 2006 and 2007, as the price of oil increased.

**Chart 1: Annual Oil Production in California 1981-2007<sup>4</sup>**



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<sup>4</sup> <http://tonto.eia.doe.gov/dnav/pet/hist/mcrfpca1a.htm>

**Table 1: Oil production in California**  
(Million barrels a year)<sup>5</sup>

	2001	2002	Growth Rate	2003	Growth Rate	2004	Growth Rate	2005	Growth Rate	2006	Growth Rate	2007*	Growth Rate
State Onshore	243.6	241.1	-1.0%	232.6	-3.5%	224.5	-3.5%	214.0	-4.6%	208.2	-2.7%	206.0	-1.1%
State Offshore	17.0	16.3	-4.0%	15.9	-2.2%	15.7	-1.8%	15.3	-2.0%	15.1	-1.6%	13.6	-9.9%
Federal OCS Offshore	33.2	32.1	-3.4%	29.7	-7.3%	27.5	-7.5%	26.4	-3.9%	26.3	-0.4%	24.6	-6.5%
Stripper Wells	35.1	35.0	-0.3%	36.0	2.8%	35.0	-2.9%	35.6	1.7%	37.5	5.5%	37.5	0.0%
Total	328.9	324.5	-1.3%	314.2	-3.2%	302.6	-3.7%	291.3	-3.7%	287.1	-1.5%	281.7	-1.9%

\* Estimates based on ten months of production data. Stripper well production during 2007 assumed to be at its 2006 level.

More than 60 percent of California’s oil is heavy crude (20° API gravity and below). Heavy crude requires the use of enhanced recovery techniques that are energy intensive and costly. Indeed, 58 percent of current production results from different well stimulation techniques, two-thirds of which involve thermal methods.<sup>6</sup> These methods often entail injecting steam produced by cogeneration facilities that burn natural gas.

The yield from these methods is falling. Extraction operations that originally were designed to lift mostly oil and some water are now producing primarily water and little oil. So much water has been injected into the fields to increase oil recovery that the ratio of water to oil is now 10:1. In 2006, for example, extraction yielded 2.4 billion barrels of water along with 223.1 million barrels of oil.<sup>7</sup> Because a considerable amount of power is needed to lift the oil and water from the ground and dispose of the water, the profitability of oil extraction in California is sensitive to changes in natural gas prices.<sup>8</sup> As the cost of natural gas goes up, the volume of oil that is economically feasible to extract from California oil fields goes down.

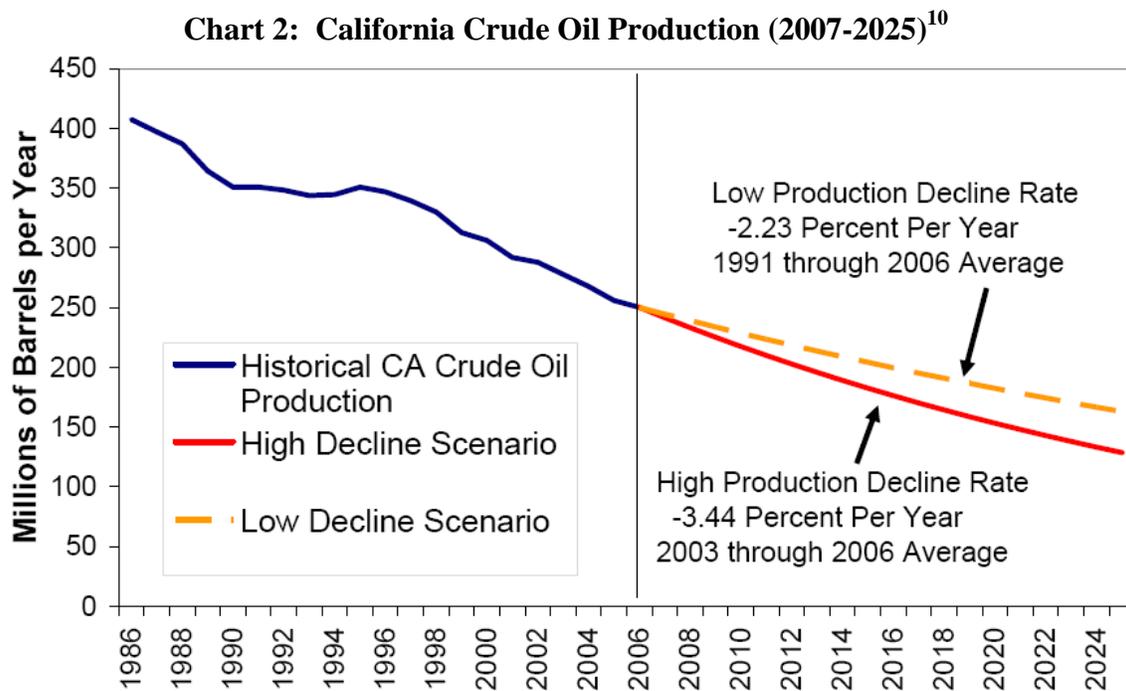
<sup>5</sup> 2007 PRELIMINARY REPORT OF CALIFORNIA OIL AND GAS PRODUCTION STATISTICS, Issued January 2008 (Revised April 2008) Publication No. PR03, DEPARTMENT OF CONSERVATION, DIVISION OF OIL, GAS, AND GEOTHERMAL RESOURCES, p. 6.  
[ftp://ftp.consrv.ca.gov/pub/oil/annual\\_reports/2007/PR03\\_2007.pdf](ftp://ftp.consrv.ca.gov/pub/oil/annual_reports/2007/PR03_2007.pdf)

<sup>6</sup> 2006 ANNUAL REPORT OF THE STATE OIL & GAS SUPERVISOR, CALIFORNIA DEPARTMENT OF CONSERVATION, DEPARTMENT OF CONSERVATION DIVISION OF OIL, GAS, AND GEOTHERMAL RESOURCES, p. 3. Oil production resulting from direct intervention that is unlikely to have been produced otherwise is called “incremental production.”  
[ftp://ftp.consrv.ca.gov/pub/oil/annual\\_reports/2006/0101summary1\\_06.pdf](ftp://ftp.consrv.ca.gov/pub/oil/annual_reports/2006/0101summary1_06.pdf)

<sup>7</sup> *Ibid*, p. 70.

<sup>8</sup> “When Oilfields Become Water Fields, the Saga of Small Producers in California”, Iraj Ershaghi1, University of Southern California, Los Angeles, CA, 2003.

Given the 23-year downtrend in California production and projected oil prices, extraction is expected to continue falling at an average annual rate between 2.2 and 3.4 percent per year, as shown in Chart 2. The rate of decline will be significantly greater if a 9.9 percent severance tax is imposed on California oil producers.<sup>9</sup>



Source: California Energy Commission, May 8, 2007.

## B. Overview of the Governor’s Severance Tax Proposal

The Governor’s proposal would “impose an oil severance tax upon any oil producer extracting oil from the earth or water in California.” The tax would “be applied to the gross value of each barrel of oil at a rate of 9.9 percent. Any oil produced by a

<sup>9</sup> This is consistent with some recent estimates: “Outlook for Crude Oil Imports into California”, Gordon Schremp, California Energy Commission, July 2007.

<sup>10</sup> [http://www.energy.ca.gov/2007\\_energypolicy/documents/2007-05-08\\_workshop/presentations/Crude%20Import%20Forecast%20-%20Final%205-8-07.ppt](http://www.energy.ca.gov/2007_energypolicy/documents/2007-05-08_workshop/presentations/Crude%20Import%20Forecast%20-%20Final%205-8-07.ppt)

stripper well,<sup>11</sup> in which the average value of oil as of January 1 of the prior year is less than thirty dollars (\$30) per barrel” would be exempt from this tax.

### **C. Taxation of Oil Production in California**

Oil companies pay taxes to the State and to local governments, including the Corporation Tax (“CT”), the Sales and Use Tax, and local property taxes. Considering all forms of taxation, California oil production bears the sixth heaviest tax burden among the 10 largest producing states in the U.S. The severance tax proposed by the Governor would make the tax burden on California oil production significantly heavier than the burden imposed on oil producers in any of the other nine largest oil producing states.<sup>12</sup>

## **III. Economic Impact of the Severance Tax**

If approved by the Legislature, the severance tax would reduce the supply of oil produced in California. Absent a corresponding reduction in Californians’ demand for gasoline and other petroleum products, the reduced supply would require an increase in oil imports to make-up the shortfall. The resulting rise in imports would increase the price that consumers pay for gasoline and other distillates (diesel, fuel and jet fuel). In this section, we consider the short-run direct and indirect effects of the proposal on oil production, employment, and prices.

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<sup>11</sup> In California, stripper wells are those producing 10 or fewer barrels per day.

<sup>12</sup> Comparison of state and local oil production taxes (property, state sales tax, corporate income and severance taxes) on a hypothetical company producing 100,000 barrels of oil a day in each of the nation’s top ten oil-producing states. The price of oil is assumed to be \$58/barrel.

## **A. Impact of the Proposed Tax on Oil Production**

The severance tax would reduce oil production relative to what it would have been in the absence of the tax, for two reasons: (1) existing oil wells will be shut-down sooner, and (2) investment in new wells will decrease. We analyze each effect separately, after briefly describing the status of stripper oil wells in California.

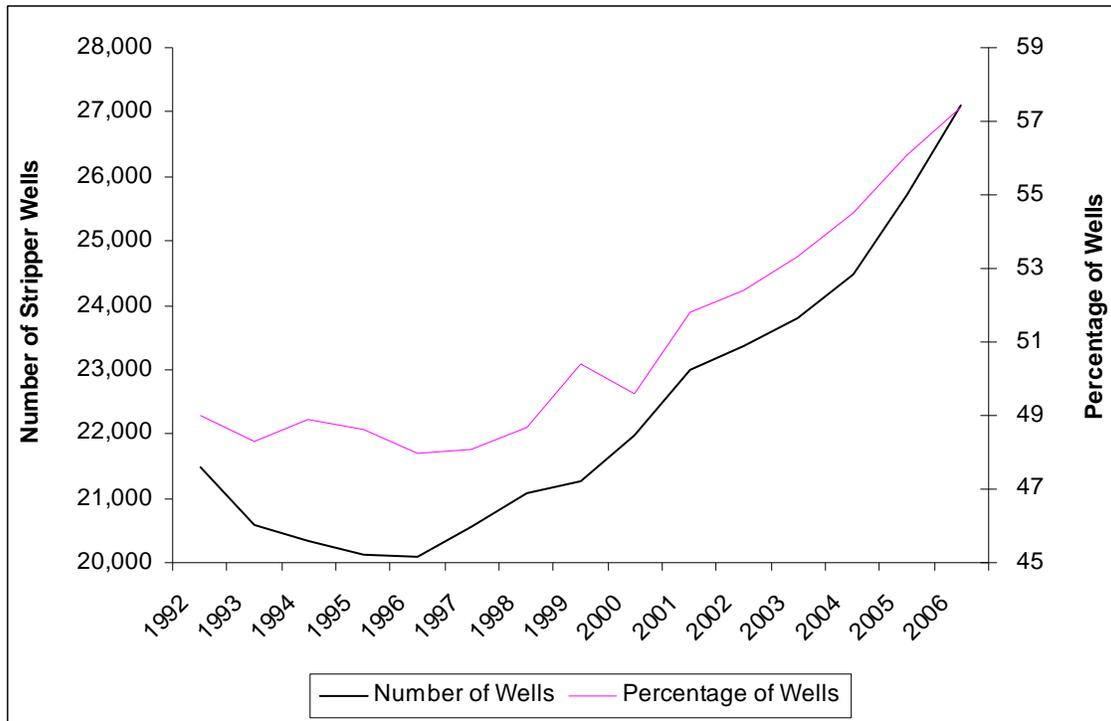
### ***1. Stripper Oil Wells***

As shown in Chart 3, during the last decade the number of stripper oil wells in California increased, as did the percentage of total oil wells represented by stripper wells. Indeed, while there were 21,495 stripper oil wells in California in 1992, there were 27,090 in 2006. These wells represented 49.0 percent and 57.4 percent of the total number of oil wells in 1992 and 2006, respectively. They produced 37.5 million barrels a year in 2007 or 13.3 percent of the oil produced in California that year. Production from stripper wells increased by 1.5 percent a year during the period 1992-2006.<sup>13</sup>

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<sup>13</sup> [http://www.eia.doe.gov/pub/oil\\_gas/petrosystem/ca\\_table.html](http://www.eia.doe.gov/pub/oil_gas/petrosystem/ca_table.html).

**Chart 3: Stripper Oil Wells (1992-2006)**



## **2. *Premature Abandonment***

Oil is a non-renewable resource. As a result, after a well has reached maximum production, it yields less and less oil over time. As a well ages, the net cash flow from a well falls for two reasons: (1) production declines as reservoirs get depleted, and (2) lifting costs increase as more and more water or steam must be used to extract the oil.<sup>14</sup> Indeed typical lifting costs for heavy oil in Kern County can be two to three times higher

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<sup>14</sup>Deacon, Robert, Stephen DeCanio, H.E.Frech, III, M. Bruce Johnson, Taxing Energy Oil Severance Taxation and the Economy, Holmes and Meier, 1990.

than the costs for lighter crudes from conventional land wells.<sup>15</sup> The impact of lifting costs on net cash flows becomes increasingly important as oil wells age.<sup>16</sup>

When the discounted value of future oil revenues becomes smaller than the present value of future extraction cost, the well is shut-down.<sup>17</sup> As Chart 1 illustrates, an increasing number of oil wells are reaching the point where the value of future extraction costs exceeds the value of the remaining oil, explaining why oil production in California has decreased during recent decades. In 2007, oil firms operating in California plugged and abandoned 4.3 percent of the producing wells. To compensate for these shut-downs, they drilled one new well for each plugged well. Only 73 percent of those new wells, however, were brought into production, reflecting the fact that California oil fields are rapidly becoming depleted.<sup>18</sup> The introduction of a severance tax will accelerate this process by increasing the costs of extraction.

The impact of a severance tax will be felt more heavily by old wells and by stripper wells. As of December 31, 2007, approximately 14,000 wells, or 29 percent of active oil wells,<sup>19</sup> have been in existence for at least 30 years. These wells account for only about 20 percent of production because almost 75% of them are stripper wells producing 10 or fewer barrels a day. Additionally, there are about 20,000 stripper wells that have been active for less than 30 years.<sup>20</sup>

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<sup>15</sup> Jean Paul Chalot, *The New Heavy-Oil Economics*, OIL AND GAS INVESTOR, November 2006.

<sup>16</sup> Define NCF to be Net Cash Flow from an oil well, Q to be its production, P to be the exogenous price of oil, DLC to be Direct Lifting Costs which increase with the age of the well, and OC to be all other costs. If  $\Gamma_X$  is the rate of growth of variable X, and we assume  $\Gamma_P = 0$  and  $\Gamma_{OC} = 0$ ,  $\Gamma_{NCF} = \alpha * \Gamma_{DLC} + \Gamma_Q$ , where  $\alpha = DLC / (P - DLC - OC) > 1$  (initially). Thus lifting costs increasingly choke net cash flows as these costs increase.

<sup>17</sup> Gerkin, Shelby, William Morgan, Mitch Kunce and Joe Kerkvliet MINERAL TAX INCENTIVES, MINERAL PRODUCTION AND THE WYOMING ECONOMY (2000) and Pindyck, Robert S. 1978. "The Optimal Exploration and Production of Nonrenewable Resources," *Journal of Political Economy*, 86:841-61.

<sup>18</sup> 2007 PRELIMINARY REPORT OF CALIFORNIA OIL AND GAS PRODUCTION STATISTICS Issued January 2008 (Revised April 2008) Publication No. PR03, DEPARTMENT OF CONSERVATION DIVISION OF OIL, GAS, AND GEOTHERMAL RESOURCES.

[ftp://ftp.consrv.ca.gov/pub/oil/annual\\_reports/2007/PR03\\_2007.pdf](ftp://ftp.consrv.ca.gov/pub/oil/annual_reports/2007/PR03_2007.pdf)

<sup>19</sup> Active or new oil wells which production is higher than zero.

<sup>20</sup> Source: DOGGR 2007 and 1997 production data. Calculations by LECG.

A severance tax affects the economics of oil production by increasing lifting costs without increasing the value of the output. As a result, the tax will cause a producing well to become unprofitable more quickly, thereby inducing the owner to shut it down sooner than otherwise. Under current conditions, total California crude oil production can be expected to decline at a rate between 2.2 and 3.4 percent per year through 2025.<sup>21</sup> Imposition of a severance tax will accelerate the rate of decline. In fact, three of California's five largest fields are so mature that production has decreased between 17.3 percent and 20.9 percent during the period 2003-2007.<sup>22</sup> Many of the older wells are nearing the end of their useful life. During the decade following approval of the Governor's tax proposal, the severance tax is likely to have the greatest effect on these wells.

A common misconception is that the effects of a severance tax are reversible, because oil left behind remains available for production at a later date if and when the price of oil increases, so that the State could boost production by decreasing the tax. This, however, is often not the case: when marginal fields are abandoned, the surface infrastructure – the pumps, piping, storage vessels, and other processing equipment – is removed and the lease is forfeited. Replacing this equipment, which probably was installed over many years, in the immediate aftermath of a severance tax decrease would be expensive. As a result, once a marginal field is abandoned, the oil that remains behind is often lost because the costs of re-drilling a plugged well may be as much as, or more than, the cost of drilling a new well.<sup>23</sup>

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<sup>21</sup> California Energy Commission.  
[http://www.energy.ca.gov/2007\\_energy\\_policy/documents/2007-05-08\\_workshop/presentations/Crude%20Import%20Forecast%20-%20Final%205-8-07.ppt](http://www.energy.ca.gov/2007_energy_policy/documents/2007-05-08_workshop/presentations/Crude%20Import%20Forecast%20-%20Final%205-8-07.ppt)

<sup>22</sup> *Ibid.*

<sup>23</sup> <http://fossil.energy.gov/programs/oilgas/marginalwells>

### ***3. Decrease in Drilling Efforts***

In 2007, 70 percent of wells producing oil in California had been brought into production during the previous thirty years, and 80 percent of the total amount of oil extracted came from these wells.<sup>24</sup> Investment in new wells is thus crucial to sustaining California's oil production.

The decision to invest in a new well also depends on a comparison of projected revenues with projected costs. Because a severance tax would increase projected costs without increasing projected revenues, it will reduce the expected profitability of both exploratory wells that increase the amount of oil reserves, and development wells that extend production from known fields. Consequently, a severance tax will deter drilling efforts and future production.

### ***4. Conclusion***

Researchers have estimated the effect of a 6 percent severance tax on oil production in California.<sup>25</sup> The effect increases through time, due to the cumulative effect resulting from diminished investment in new wells.<sup>26</sup>

As noted earlier, oil production in California is expected to decrease between 2.2 percent and 3.4 percent a year. Using the lower end of this range, as shown in Table 2, we estimate that during the thirty years following the introduction of a severance tax, oil production in California will, on average, decrease by an additional 54,706 barrels a day.

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<sup>24</sup> Source: DOGGR 2007 and 1997 production data. Calculations by LECG.

<sup>25</sup> Deacon, Robert, Stephen DeCanio, H.E.Frech, III, M. Bruce Johnson, *Taxing Energy Oil Severance Taxation and the Economy*, Holmes and Meier, 1990. These estimation are conservative because they were done almost 20 years ago when oil production had just started declining in California

<sup>26</sup> Even though the current proposal calls for a larger tax (9.9 percent instead of 6 percent) the authors of the study state that "the effects on accelerated shut-ins are very close to being linear".

**Table 2: Estimated Oil Production Shortfall Resulting from the 9.9% Severance Tax (Low-Decline Scenario)**

<b>Year range</b>	<b>Barrels per day</b>	<b>Accumulated amount</b>
2009-2018	30,066	109,740,525
2019-2028	59,838	218,409,640
2029-2038	74,213	270,875,793
2007-2036	54,706	599,025,958

These estimates are consistent with recent oil supply price estimates published by the Energy Information Administration for the 48 lower states.<sup>27</sup> They are also consistent with a study recently released by the Library of Congress which surveyed 20 studies to develop its assumptions about the price elasticity of the crude oil supply curve.<sup>28</sup>

If, on the contrary, we assume that oil production without a severance tax will decline at a rate of 3.44 percent, oil production would, on average, decrease 47 percent more, as illustrated in Table 3, averaging 80,636 barrels per year during the following 30 years.

**Table 3: Estimated Oil Production Shortfall Resulting from the 9.9% Severance Tax (High-Decline Scenario)**

<b>Year range</b>	<b>Barrels per day</b>	<b>Accumulated amount</b>
2009-2018	53,794	196,346,458
2019-2028	91,654	334,537,168
2029-2038	96,461	352,084,436
2007-2036	80,636	882,968,062

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<sup>27</sup> *Documentation of the Oil and Gas Supply Module (OGSM)*, Energy Information Administration, Oil and Gas Division, Office of Integrated Analysis and Forecasting. DOE/EIA-M063(2005), May 2005.

<sup>28</sup> *The Crude Oil Windfall Profit Tax of the 1980s: Implications for Current Energy Policy*, Congressional Research Service, March 9, 2006.

## **B. Impact on Oil Imports and Gasoline Prices**

California currently imports crude from Alaska, Saudi Arabia, Mexico, Ecuador, and Iraq to cover the majority of its needs.<sup>29</sup> If there is no change in the demand for petroleum products, production shortfalls resulting from the imposition of a severance tax on production in California would have to be met by increasing imports. The increase will have to come from the Middle East, West Africa and Canada, because Mexico's oil production is decreasing and domestic production is expected to continue to fall. For example, Alaska North Slope production is declining and is expected to decay at 4.2 percent per year until 2016.<sup>30</sup>

Some have argued that the proposed severance tax will not affect the price of gasoline in California because oil prices are set in global markets. This argument is incorrect because it ignores the additional transportation, infrastructure and refining costs that suppliers will have to incur in order to replace the lost oil production caused by the tax. While the severance tax proposal may have little or no impact on the price of oil in world markets, the cost of *supplying* oil to California residents will increase because production from almost all sources that are geographically close to the State is decreasing, meaning that additional imports will have to come from distant supply sources, resulting in transportation and distribution costs that exceed the cost of obtaining oil from, say, Midway-Sunset or Kern County.

Since there are no oil-transporting pipelines connecting California to major oil production regions, additional imports will have to come by ship. A trip from the Middle East or the Pacific Rim takes two-to-three times longer than the trip from the Gulf of Mexico, implying higher transportation costs. Furthermore, the additional imports will increase port traffic at both refining centers in California: Los Angeles and the San Francisco Bay Area. The increase in port traffic has significant economic implications,

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<sup>29</sup> <http://www.gao.gov/new.items/d07315.pdf>

<sup>30</sup> [http://www.eia.doe.gov/oiaf/aeo/excel/aeotab\\_14.xls](http://www.eia.doe.gov/oiaf/aeo/excel/aeotab_14.xls)

particularly in the San Francisco Bay, where the draft of vessels is limited. Restrictions on the size of ships that can berth at the area's terminals increase oil transportation costs, which can run from \$2.26 to \$4.01 a barrel, depending on the origin of the crude and the ship size used to transport it.<sup>31</sup> Indeed, a recent California Energy Commission study came to the conclusion that declining crude oil production in California has already resulted in higher crude oil costs, due to reliance on higher-priced imported crude oils.<sup>32</sup>

California's marine petroleum infrastructure is already significantly constrained in key areas. Consequently, even without a severance tax on California oil production, it is likely that future demand will outstrip infrastructure capacity.<sup>33</sup> The proposed tax would exacerbate the problem. The additional transportation and infrastructure costs will add to the cost of a barrel of oil delivered to the refinery, and refiners will pass along these costs to consumers at the gas pump. In short, the proposed severance tax would cause gasoline prices to rise.

Furthermore, it is likely that the additional imported oil needed to replace the production loss in California would be high in naphthenic acids or sulfur. Oil with these characteristics is more expensive to refine than the oil currently processed by California refineries, further increasing the cost of producing gasoline.

California could not avoid an increase in gasoline prices by importing refined products, rather than crude oil, because bringing gasoline into California from refineries outside of the state would also involve significant transportation costs. The State of California operates its own reformulated gasoline program (called CARB), with more stringent requirements than those imposed by the Federal Government. CARB-grade gasoline is not available at a "world price"; it has to be produced in specially configured

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<sup>31</sup> *California's Uncertain Oil Future*, Los Angeles County Economic Development Corporation, March 2008.

<sup>32</sup> *CALIFORNIA CRUDE OIL PRODUCTION AND IMPORTS*, California Energy Commission, April 2006, CEC-600-2006-006.

<sup>33</sup> *CALIFORNIA MARINE PETROLEUM INFRASTRUCTURE*, CALIFORNIA ENERGY COMMISSION, APRIL 2003 P600-03-008D.

refineries. Of the 22 refineries located in California, only thirteen are equipped to produce CARB-grade gasoline, and they run at full capacity in order to meet the State's fuel demands.

### **C. Impact on Employment**

The decline in oil production caused by the severance tax would reduce employment in California. According to the latest Department of Labor statistics (2007), 23,940 Californians are directly employed in oil and gas extraction.<sup>34</sup> Using a model of inter-industry relationships in California, we estimate that the number of jobs supported by this production – indirect and induced jobs created by direct employment – is 104,620.<sup>35</sup>

We have used a quantitative model of the California economy to estimate the economic effects of imposing a severance tax. This model was developed at the University of California/Berkeley, in cooperation with the California Department of Finance, and was designed to yield dynamic estimates of the economic impact of different public policy changes.<sup>36</sup> “Dynamic” estimates of the economic impact reflect changes in the behavior of all economic agents induced by changes in incentives. The model takes into account some (but not all) of these behavioral changes, and therefore is able to capture at least part of the decrease in jobs and business investment that would result from adoption of the proposed severance tax. The model divides the California economy “into 75 distinct sectors: 28 industrial sectors, two factor sectors (labor and capital), seven household sectors, one investment sector, 36 government sectors, and one that represents the rest of the world.”<sup>37</sup>

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<sup>34</sup> <http://www.bea.gov/bea/regional/spi/action.cfm>

<sup>35</sup> Estimates from LECG's proprietary input-output model of the California economy using an Input/Output/Social Accounting Matrix model with the industry-standard IMPLAN software and databases.

<sup>36</sup> The model is available to the public at the Department's web site at [www.dof.ca.gov](http://www.dof.ca.gov).

<sup>37</sup> Berck, P., E. Golan and B. Smith, “Dynamic Revenue Analysis for California”, Summer, 1996, p. 1.

The severance tax would reduce employment for four reasons:

- As production decreases, so does the number of jobs in the oil sector.
- As those jobs disappear, so do indirect and induced jobs that depend on the oil sector.
- Oil is an important intermediate input used in numerous other sectors; the imposition of a severance tax will increase the cost of doing business in California, thus driving investment to other destinations.
- When households face higher costs of goods and services, they consume less.

Using this model, we estimate that the proposed severance tax would result in the loss of approximately 9,850 jobs in California. The model also suggests that the return to capital will decrease by almost one tenth of one percent, and that investment will fall by about 200 million dollars.

## **IV. Impact of the Governor's Severance Tax Proposal on State & Local Governments**

### **A. Impacts on State Revenues**

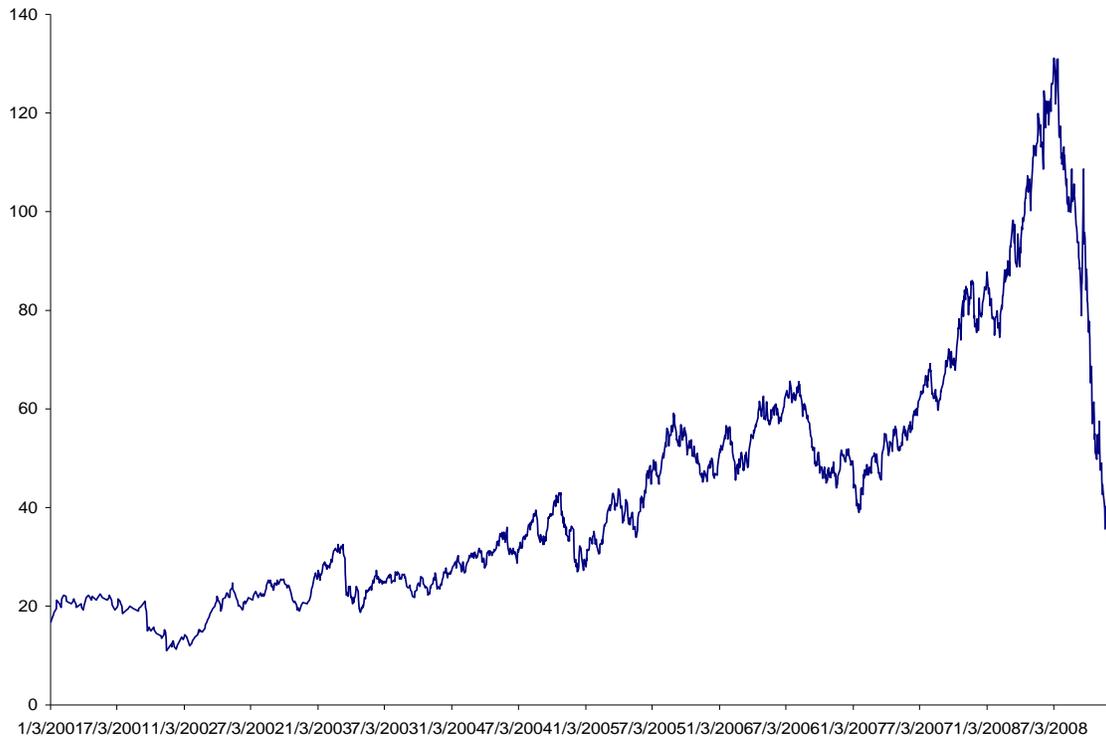
#### ***1. Estimated Special Fund Revenues Yielded by the Proposed Severance Tax***

Two factors determine the amount of revenue that would be raised by the proposed severance tax: (1) the volume of oil production in California subject to the tax, and (2) the market price of oil. We analyze each of these components separately, in order to estimate the revenues that the tax would raise.

##### **a. Oil prices**

Oil prices have been highly volatile during the last few years, complicating the task of estimating the potential revenues from the proposed severance tax. The historic recent trend was upwards up to July 2008, but since then prices have decreased substantially, as illustrated in Chart 4. The average crude oil posted price for Midway Sunset for 2008 was \$86.85 per barrel, the highest in three decades.

**Chart 4: Crude Oil Posted Prices, Midway Sunset**<sup>38</sup>



NYMEX future oil prices for the next several years suggest that spot oil prices are likely to increase. Indeed, as can be seen in Chart 5, the current price of a future contract consistently increases from \$42.07 for January 2009 delivery to \$75.32 for December 2014 delivery.<sup>39</sup> The wellhead price in California will be lower because NYMEX future contracts refer to low-sulfur intermediate grade oil (like the West Texas Intermediate) that usually trades at a price that is \$6 above average per-barrel price of California crudes.<sup>40</sup>

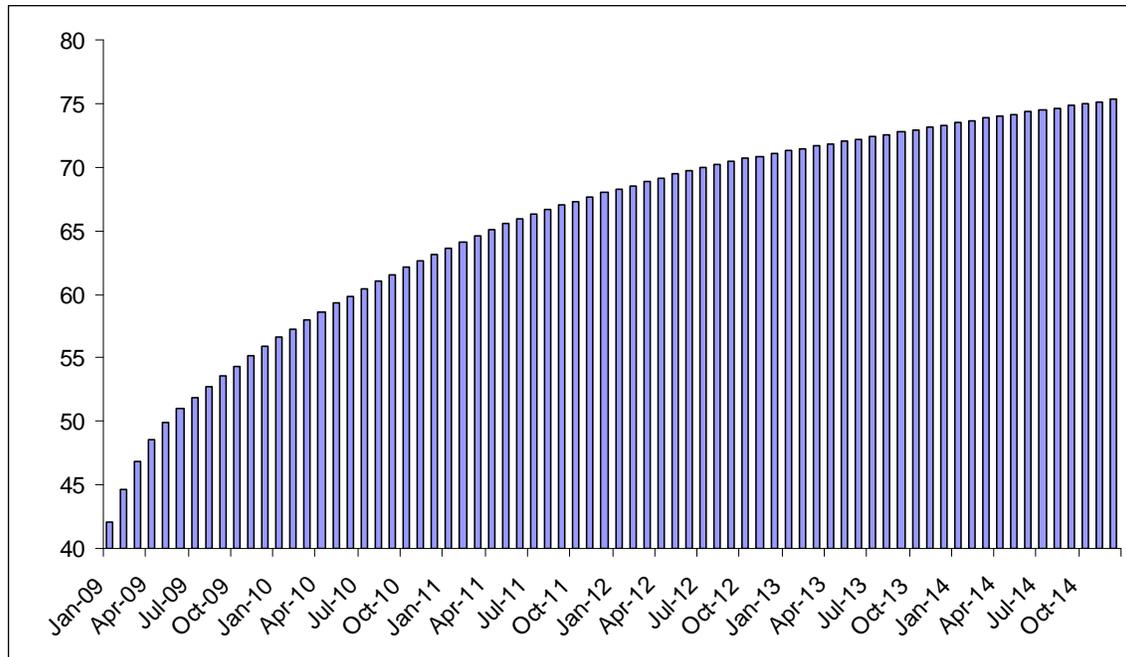
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<sup>38</sup> Source: [http://crudemarketing.chevron.com/posted\\_archive.asp?namerica&2001](http://crudemarketing.chevron.com/posted_archive.asp?namerica&2001)

<sup>39</sup> [http://www.nymex.com/lsc0\\_fut\\_psf.aspx](http://www.nymex.com/lsc0_fut_psf.aspx).

<sup>40</sup> Period considered was January 1986 to September 2008.  
[http://tonto.eia.doe.gov/dnav/pet/hist/f005006\\_\\_3m.htm](http://tonto.eia.doe.gov/dnav/pet/hist/f005006__3m.htm) and  
<http://tonto.eia.doe.gov/dnav/pet/hist/rwtcM.htm>

**Chart 5: NYMEX Oil Futures**  
(Dollars per barrel)



Thus, it is virtually impossible to estimate, with any confidence, the future price of oil. In our analysis, we assume that the average price of oil will be \$37.0 a barrel, which corresponds to a WTI around \$43.0 a barrel.

**b. Production subject to the tax**

In 2007, California produced roughly 281.7 million barrels of oil. Of the total, 24.6 came from federal offshore wells, 13.6 came from state offshore wells, and almost 37.5 represented stripper production.<sup>41</sup> The Governor’s tax proposal exempts oil produced by stripper wells, as long as the average value of oil on January 1 of the prior year is less than thirty dollars (\$30) per barrel. Since the average price of oil for 2008 was \$86.85 per barrel, we include production from stripper wells in our estimate for the coming year.

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<sup>41</sup> 2007 PRELIMINARY REPORT OF CALIFORNIA OIL AND GAS PRODUCTION STATISTICS Issued January 2008 (Revised April 2008) Publication No. PR03, DEPARTMENT OF CONSERVATION DIVISION OF OIL, GAS, AND GEOTHERMAL RESOURCES.

Assuming that oil production decreases 3.44 percent during both 2008 and 2009, we expect additional tax revenues to equal \$855 million in 2009-2010.

As noted earlier, the proposed severance tax will accelerate the rate at which oil production in California declines and its revenues to the state will decrease *pari passu*. Table 4 projects the yield from the proposed tax, assuming that output declines by 4.27 percent annually. As Table 4 shows, the average annual estimated yield from the tax is 35.0 percent smaller in the second decade and 58.0 percent smaller in the third.

**Table 4: Severance Tax Yield**  
(Million dollars)

	<b>Average Annual Yield</b>
2009-2018	\$712
2019-2028	\$460
2029-2038	\$298
2009-2038	\$490

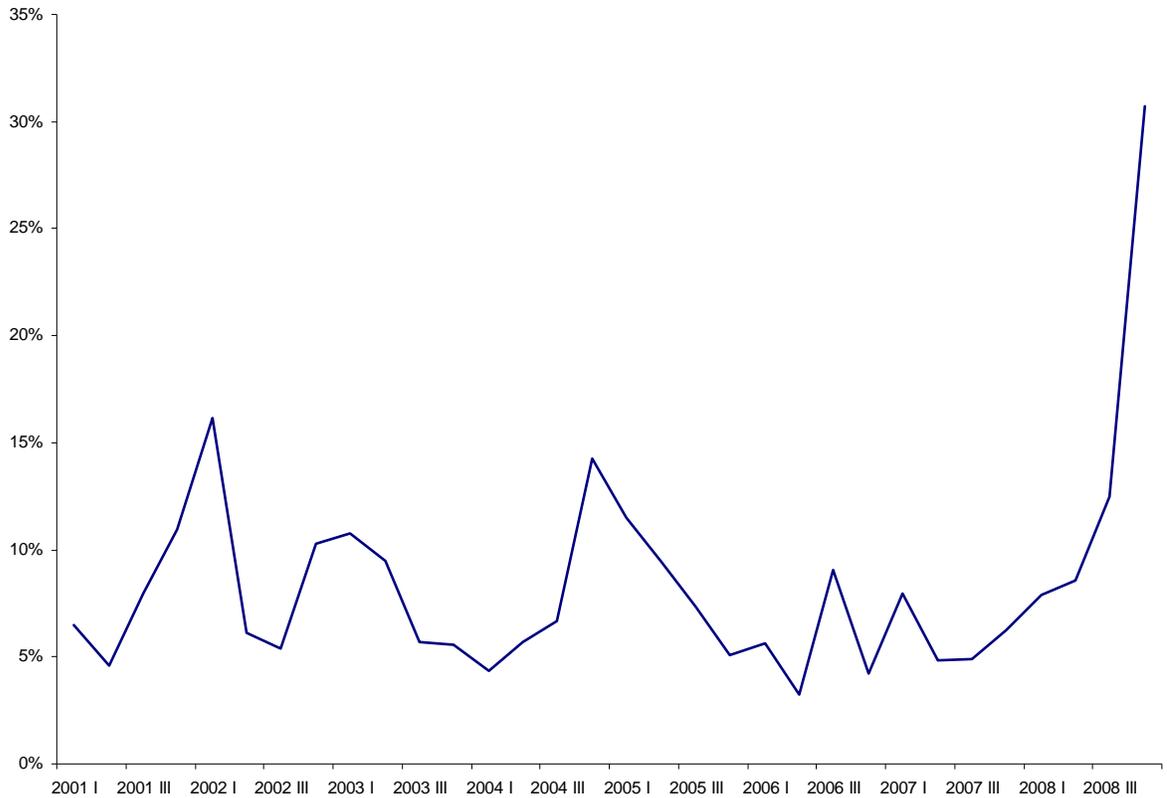
## **2. Oil Price Volatility and Stability of State Revenues**

Oil prices have been increasingly volatile in the past few years. During the last six months of 2008, the price of oil in California went from \$131.15 a barrel in early July to \$37.05 at the end of December. In fact, as can be seen in Chart 6, the volatility of oil prices has increased significantly, going from about 5-10 percent in 2006 to 30 percent more recently.<sup>42</sup>

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<sup>42</sup> Volatility is defined to be the monthly coefficient of variation of the series.

**Chart 6: Volatility of crude Oil Posted Prices, Midway Sunset**



Governor Schwarzenegger and legislative leaders recently announced appointments to the Commission on the 21<sup>st</sup> Century Economy. The Commission is charged with recommending measures to restructure and modernize California's revenue system. One of the most criticized features of the current system that the Commission will address is revenue volatility. Given the volatility of the price of oil, a severance tax will tend to increase revenue volatility in California. Indeed, given the volatility of oil prices, one could expect annual revenues from the severance tax to vary by up to 30%.

### ***3. Tax liabilities offsets caused by the proposed severance tax***

The proposed severance tax would modify the tax bases of other levies imposed by the state, thereby affecting revenues to the State's General Fund, in particular the Corporation Tax (CT), the Personal Income Tax (PIT) and the Sales Tax (ST)<sup>43</sup>.

Under current law, oil producers can deduct severance tax payment from their earnings, thereby reducing the amount of corporate income subject to tax in California. Consider, for example, an oil company producing 100,000 barrels of oil daily that has California taxable income of \$520.4 million (we assume the price of oil to be \$37.0 a barrel). This company would pay a CT of \$46.0 million.<sup>44</sup> Under the Governor's proposal, the company would pay severance taxes of \$133.7 million. As a result, its taxable income would drop to \$386.7 million (= \$520.4 - \$133.7), thereby reducing CT tax collections by \$11.8 million (8.84 percent of the severance tax payment).

In reality, the decrease in CT collections would depend on a number of factors, the most important being the amount of the corporation's income apportioned to California and the effective tax rate applied to that income. If we assume that 100 percent of California oil producers' net income is apportioned to California, the drop in General Fund revenue yielded by the CT would be \$75.6 million.<sup>45</sup> Because some California oil producers have multi-state and international operations, the average apportionment percentage for these companies is less than 100 percent. Assuming the average is 55 percent and taxable income is uncorrelated with the apportionment percentage, the potential loss of CT collections is \$41.6 million.

The 9,850 jobs lost as a result of the proposed severance tax will bring about a decrease in the personal income tax liabilities. Using the quantitative model of the

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<sup>43</sup> By depressing economic activity in general, the proposed severance tax could have an impact on ST liabilities but quantifying that amount is very difficult to estimate.

<sup>44</sup> To simplify the example we assume that 100 percent of corporate income is apportioned in California. The CT rate is set at 8.84 percent. [http://www.lao.ca.gov/2001/tax\\_primer/0101\\_taxprimer\\_chapter4.html](http://www.lao.ca.gov/2001/tax_primer/0101_taxprimer_chapter4.html)

<sup>45</sup> These estimates are obtained by multiplying the likely state revenues by 8.84 percent.

California economy previously mentioned, we estimate that the proposed severance tax would result in lower PIT collections of \$74.9 million. Thus, we estimate the tax liabilities offsets to sum \$116.5 million, or about 14 percent of the static severance tax revenue estimate.

## **B. Effects on Local Government Property Taxes**

Property tax rates and assessed values in California are limited by Proposition 13. In the case of properties with oil and gas reserves, property values are reassessed as oil prices change. If, for example, oil prices rise, the County Assessor assumes that more oil is economically recoverable. The value of the “new” oil (the additional oil now recoverable at the higher price) is then assessed at current market prices for oil, while the “old” oil remains at its prior value (under the terms of Proposition 13). If, however, oil prices fall, some of the “old” oil is assumed to be no longer economical, and the value of the assessment decreases accordingly.

The proposed severance tax would reduce the amount of oil that is economically recoverable. It would also reduce the fair market value of oil-producing properties. As a consequence, the tax would reduce oil-producing counties’ assessed valuation, thereby reducing their property tax collections.

As of December 31, 2006, estimated oil reserves in California amount to 3.2 billion barrels.<sup>46</sup> Assuming that economically recoverable reserves will decline 3.44% per year for the next 25 years without a severance tax on oil, that the imposition of the tax will cause the rate of decline to accelerate to 4.27 percent, that the price of oil for the next 25 years will be \$37.0 a barrel, that 12% is the appropriate discount rate, and that property taxes are 1.0-1.25% percent, we expect the loss in local property tax revenues to range from \$23.1 to \$28.9 million. The top five producing fields in the state are in Kern

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<sup>46</sup> 2006 REPORT OF CALIFORNIA OIL AND GAS PRODUCTION STATISTICS, DEPARTMENT OF CONSERVATION DIVISION OF OIL, GAS, AND GEOTHERMAL RESOURCES.

County, which could expect to lose between \$12.7 and \$15.9 million annually, most of which would be lost to local schools. Under current law, the State would have to replace the losses with money from the General Fund, in order to maintain funding for K-14. This would require reallocation of funds away from other State programs.