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WORSENING NEWBORN/INFANT HEALTH IN SAN LUIS OBISPO COUNTY AND THE DIABLO CANYON NUCLEAR REACTORS

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EXECUTIVE SUMMARY

The two Diablo Canyon nuclear reactors in San Luis Obispo County CA began operations in 1984 and 1985. They have generated enormous amounts of highly radioactive waste. Most is stored at the site, but some is routinely released into the environment – and into humans through breathing, food, and water. However, no studies on health effects to the local population have been done.

Exposure to radiation is especially harmful to the fetus and infant. This report analyzes trends and current patterns of newborn and infant health in San Luis Obispo County, compared to the state of California. Results show that county rates have shifted from below to above the state:

Infant Deaths. Before Diablo Canyon opened (1968-1984), the county death rate under one year was 16% below the state. Most recently (2010-2024), the county was 1% above the state, including 11% and 23% higher for white non-Hispanics and white Hispanics.

Premature Births. In the earliest period available (1995-1999), the county rate of premature births (<36 weeks gestation) was 21% below the state. Most recently (2020-2024), the rate was 3% above the state (8% and 31% higher for white non-Hispanics and white Hispanics).

Birth Defects. In the period 2016-2024, the county rate of 12 types of birth defects was 114% greater than (more than double) the state, 3rd highest among the 35 largest California counties.

Other Newborn Health Measures. In addition, the county also has higher current (2016-2024) rates of common newborn risk factors, including those requiring assisted ventilation, those with low five-minute Apgar scores (a measure of infant health), and newborns transferred to another facility.

Child Cancer. Child cancer is believed to often be an adverse outcome that began in pregnancy. Early in Diablo Canyon's operation (1988-1992), county cancer incidence 0-19 was 26% below the state; in the 30 years since then (1993-2022), the county rate was just 2% below the state.

No explanation for these findings is apparent, as risk factors in the county are not elevated. Compared to the state, the county has low rates of minorities, uninsured, foreign born, and languages other than English spoken at home; and similar rates of income, education, and poverty. The county rate of the most common maternal birth risk factors are below the state (overweight/obese mothers, mothers <20 or >35, mothers on WIC or Medicaid, and previous Cesarean section).

Further review of county health patterns is warranted to assess what role exposures to radioactivity from Diablo Canyon has played in these trends. Results should be made available to officials and the public. No major decision on the future of the plant should be made without a thorough understanding of the impact exposures have had on local health.

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WORSENING INFANT HEALTH IN SAN LUIS OBISPO COUNTY AND THE DIABLO CANYON NUCLEAR REACTORS

Introduction

The Diablo Canyon 1 and 2 nuclear reactors in Avila Beach, are situated on the Pacific coast in southern California. The two units achieved initial criticality (generating radioactivity) on April 29, 1984 and August 19, 1985, respectively. Each is a pressurized water reactor, with a capacity of generating over 1100 megawatts of electricity (U.S. Nuclear Regulatory Commission, 2025).

Diablo Canyon is the last nuclear power plant operating in the state of California. Previously, three reactors at the San Onofre plant, and one each at the Rancho Seco and Humboldt plants were closed permanently.

Diablo Canyon is in San Luis Obispo County, 12 miles from San Luis Obispo city. In 2010, an estimated 465,521 persons lived within 50 miles of the reactors (Dedman, 2011). The site is about 160 miles north of Los Angeles and 200 miles south of San Francisco.

San Luis Obispo County's 2025 population was 282,367, after sustaining rapid growth since the World War II era. Its population consists mostly of Caucasians, with about 24% Hispanic, 6% Asian, and 3% black. The county's current rates of the uninsured, foreign born, and persons speaking languages other than English at home are below the state; and high school/college graduates, income, and poverty rate are roughly equal to the state. Based on these demographic metrics, the county is not at risk for high morbidity and mortality rates. See Appendix 1 (U.S. Census Bureau, 2026).

Reactors were originally granted 40-year licenses by the U.S. Nuclear Regulatory Commission, the expected period of safe operation. After 2000, as many reactors approached their 40-year mark, the Commission began granting 20-year license extensions. To date, 84 of the 92 U.S. reactors have received extensions (U.S. Nuclear Regulatory Commission, 2025).

In 2016, Pacific Gas and Electric, which owns and operates the plant, joined environmental and labor groups in an agreement to shut Diablo Canyon in 2024 and 2025, after 40 years of operation, and not pursue an extended license. The state of California approved the agreement in 2018 (Nikolewski, 2018).

In 2022, however, the state legislature voted to allow the plant to operate five years beyond the slated closure dates, allocating a $1.4 billion forgivable loan to the utility (Rott, 2022). Subsequently, the Biden Administration gave permission to operate for another five years, approving $1.1 billion to make needed upgrades (Gardner, 2022). Pacific Gas and Electric is now pursuing a 20-year license extension.

The current consideration over Diablo Canyon's future should include a review of historical radioactive emissions into the environment, and health trends among the local population.

Diablo Canyon Health Risks

Electric power from Diablo Canyon units 1 and 2 involves splitting uranium atoms to generate high heat, which is converted into electricity. This process, known as fission, is the same used in detonating nuclear weapons. It creates over 100 chemicals not found in nature, each of which is carcinogenic, in the form of gases and tiny metal particles.

Most of these radioactive chemicals are stored at reactors as high-level waste. At Diablo Canyon, the amount of waste is roughly equivalent to 2-3 times the amount released after the 1986 catastrophic meltdown at Chernobyl (Alvarez, 2011).

However, some of these chemicals are routinely released into the environment. They enter human bodies through breathing, food, and water. Each chemical, also referred to as isotopes, affects human biology differently. For example, radioactive iodine seeks out the thyroid gland, and radioactive strontium seeks out bone and teeth.

All radioactive isotopes damage DNA in cells or kills them outright, leading to an elevated risk of disease and death. Several major findings are clear after decades of study:

1. All humans are affected negatively by radiation exposure, even at the lowest doses (BEIR V, 1990).

2. The most severe effects of a dose are borne by the fetus and infant (United Nations Environment Programme, 2016; Kumar, 2023), whose immune systems are immature; by the frail elderly, whose immune systems are failing; and by those who are immunocompromised.

3. The lag time between exposure and onset of disease or death may take several years, or even decades.

4. While some cancers are known to be especially sensitive to radioactivity, such as thyroid cancer or bone cancer, the risk of all cancers are increased after radiation exposure

Numerous articles have appeared in the medical literature, documenting the excess in cancers after relatively low-dose exposures. A recent article in the Journal of the National Cancer Institute found 21 of the 26 studies determined an excess of cancer from low-level radiation (Gonzalez, 2020).

The federal government has conducted just one study of cancer near nuclear plants, performed at the insistence of Senator Edward Kennedy. The study looked at cancer mortality from 1950 to 1984 and found no consistent link between cancer and proximity to nuclear plants. However, no updated study from the federal government has been forthcoming (National Cancer Institute, 1990).

The National Cancer Institute study only included nuclear plants that had started operations by 1981. Thus, Diablo Canyon was not part of this study, and health patterns in the area most proximate to the reactors remain unstudied by officials.

Adverse health outcomes for infants exposed to radioactivity have been documented in scientific journal articles. A total of 590 excess early neonatal deaths (under age seven days) occurred from 2012-2019, or 6.4% above the expected, in 12 Japanese prefectures near the Fukushima nuclear plant, site of the 2011 meltdown; an excess of 13.6% occurred in the four closest prefectures (Korblein, 2022). During the first five years after the 1986 meltdown at the Chernobyl plant, an unexpected excess of first-week neonatal mortality in heavily-contaminated southern Germany was observed (Scheer, 1992), similar to trends in U.S. first-day mortality after the start of atmospheric nuclear weapons testing (Whyte, 1992). An excess of 7,284 (9.4%) perinatal deaths was identified in the Ukraine in the 25 years after Chernobyl (Korblein, 2024). Other reports showed a single diagnostic pelvic X-ray administered to pregnant women elevated risk of the child dying of cancer by age ten (Giles, 1956; Stewart, 1958; MacMahon, 1962). These and subsequent findings documented the vulnerability of the fetus to ionizing radiation exposure, even at low doses.

The Radiation and Public Health Project (RPHP), a non-profit research and educational organization, has published 43 articles in peer-reviewed medical journals, mostly on health patterns and trends near nuclear plants. Unexpectedly high rates of cancer closest to nuclear plants have often been documented (Radiation and Public Health Project, 2025).

The operation of the Diablo Canyon nuclear reactors for over 40 years, coupled with a lack of health studies in the area, indicates a need to study trends in local health rates, which are presented in this report.

Study Methods

San Luis Obispo County will be the focus of this report. The 1990 National Cancer Institute study selected the home county of each nuclear plant, sometimes adding an adjoining county. Almost all San Luis Obispo County residents live within 20 miles of Diablo Canyon.

The 1990 study selected the U.S. cancer rate as the control for each county and calculated a county vs. national ratio for cancer mortality, before and after startup of each plant. This report will follow the same approach, only using the state of California as the control group.

Because no official health study on Diablo Canyon's health impact on San Luis Obispo County has ever been conducted, infant health will be the focus of this report, due to the greater sensitivity to radioactive exposures to the fetus and infant. The Centers for Disease Control and Prevention's "CDC Wonder" data base will be used, as it contains county-specific and state-specific rates for:

- Deaths, each year from 1968 to 2024; infant mortality (under one year) and neonatal mortality (under 28 days) will be expressed as deaths per 1000 persons
- Births, each year from 1995 to 2024; premature births, low-weight births, and birth defects will be expressed as cases per 1000 births

In addition, the report will include county and state trends in cancer incidence (rate of new cases) for children age 0-19, based on the understanding that child cancer is largely an outcome of harm to the fetus. The California Cancer Registry (2025) provides statistics on cancer incidence for each year from 1988 to 2022; rates are cases per 100,000 persons age 0-19, adjusted for age.

Statistical significance calculations for the difference between state and county rates were made for each measure. A p-value less than .05 represents significant differences, which is the standard used in health statistics.

Results – Radioactive Emissions from Diablo Canyon

Studies assessing the relationship between radiation exposure and health effects typically consist of a "dose" and a "response." It is not feasible to precisely measure total in-body exposures to a population for various reasons:

1. Measurement is an involved process, sometimes involving autopsies.
2. Reactors produce over 100 radioactive chemicals; it is impossible to measure each one.
3. Some chemicals decay quickly and are impossible to measure in the body.
4. All persons in a population cannot feasibly be measured.
5. No regulatory body requires in-body measurements of persons living near nuclear plants.

The U.S. Nuclear Regulatory Commission requires each company that operates a nuclear plant to measure and report environmental emissions each year. The Commission's web site makes quarterly emissions data from each U.S. nuclear plant available, for each year from 2005 to 2024. Results for two types of radioactivity (tritium, and fission and activation products), both in gaseous and liquid form, are given in Appendix 2.

Annual levels often do not follow a typical pattern. However, some years show unusually high levels from Diablo Canyon, including:

- For liquid tritium releases, high levels were reported in 2005, 2007, 2012, 2020, 2022, and 2024, well above the 20-year annual median of 2225 curies a year. The highest was 2012 (3675 curies); and **the 2020 release of 2782 curies of liquid tritium made Diablo Canyon the second highest of 56 U.S. nuclear plants** (Appendix 3).

- For gaseous fission and activation products, the 17-year annual median was 1.092 curies. But unusually high emissions occurred in 2008 (53.8), 2011 (10.1), 2014 (8.1), 2022 (8.8), and 2024 (6.1); in no other year did emissions exceed 3.0.

Results – Strontium-90 Levels in Baby Teeth Near Diablo Canyon

Another way to measure exposure from nuclear plants is to analyze levels in bodies. The Radiation and Public Health Project (RPHP) has conducted the only study of in-body radioactivity near U.S. nuclear power plants. The "Tooth Fairy Project" measured Strontium-90 levels in 5,000 baby teeth, as did 1960s studies of fallout from above-ground atomic bomb tests.

Results of the RPHP tooth study, which were published in five medical journal articles, showed a 30-50% greater average concentration of Strontium-90 in areas closest to six nuclear plants; increases through the 1980s and 1990s, and a matching of trends of Strontium-90 and cancer incidence in children under age five (Mangano et al., 2003; Mangano et al., 2006).

Among 138 baby teeth from persons born in California, those born in the late 1990s had a 50% higher concentration of Strontium-90 than those born in the late 1980s. Moreover, those born in San Luis Obispo and Santa Barbara Counties had a 31% greater concentration than those born elsewhere in California (Mangano et al., 2003). These findings are another indication that radioactivity released from Diablo Canyon entered bodies of persons living close to the plant.

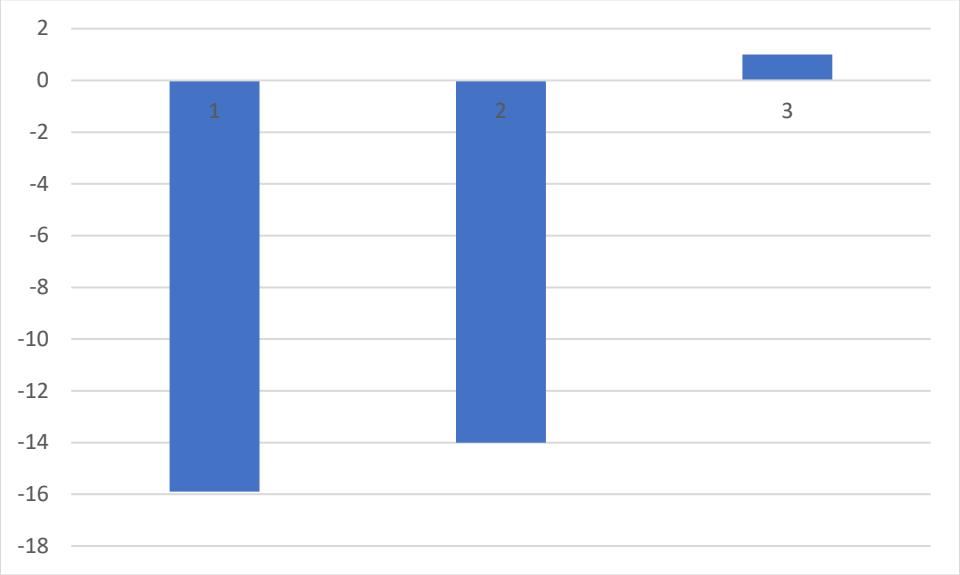
Results – Trends in Infant Mortality

The CDC Wonder site includes mortality data beginning in 1968, and thus, a comparison of the ratio of county/state rates before vs. after Diablo Canyon startup is possible. These ratios are given below, for infant mortality (deaths <1 year) and neonatal mortality (<28 days, when about 70% of infant deaths occur).

	Infant Mortality	**Neonatal Mortality**
1968-1984 (before startup)	**-15.9%**	**-22.8%**
1985-2009 (after startup)	**-14.0%**	**-14.0%**
2010-2024 (most recent)	**+ 1.0%**	**+ 0.7%**

Both infant and neonatal death rates in San Luis Obispo County were well below state rates before reactor startup (-15.9% and -22.8%). But by the most recent period (2010-2024), the county rate has exceeded the state (+1.0% and +0.7%), a significant change (see Figure 1 and Appendix 4). The recent county infant mortality rates for white non-Hispanics and white Hispanics (+11.1% and +23.0%) are significantly greater than state rates.

Figure 1
% San Luis Obispo County Rate is +/- California Rate
Infant Mortality (Death Rate < 1 Year), by Period



1 = 1968-1984 (before Diablo Canyon startup)
2 = 1985-2009 (early Diablo Canyon operation)
3 = 2010-2024 (later Diablo Canyon operation)

Infant deaths are much more common than deaths to young children. About one-third of deaths to children age 1-9 are due to non-medical causes, namely suicide, accidents, and homicide. Data from the CDC web site shows that the rate of deaths 1-9 from all "medical causes" (excluding suicide, accidents, and homicide) in San Luis Obispo County were lower than the state rate from 1968-1984 (18.6% lower) and from 1985-2009 (21.3% lower). But in 2010-2024, the county rate moved to 7.6% above California, based on 34 that deaths occurred to young children in these years.

Appendix 4 provides detailed data on infant and neonatal mortality (all cause), along with medical causes among children 1-9.

Results – Trends in Premature Births

The CDC Wonder data base makes statistical information available on births for each county in each state, each year from 1995 to 2024. As 1995 represents a time after Diablo Canyon began operating, no comparison before and after startup can be made. However, trends over time as the reactor aged and cumulative exposures increased can be analyzed.

A premature birth is at elevated risk for various health conditions. Professional sources differ on the definition of a full-term pregnancy, ranging from 37 and 40 weeks of gestation. In this review, premature births are defined as less than 36 weeks, which include about 5-6% of live births in California with a known length of gestation. Since the late 1990s, the premature birth rate in San

Luis Obispo, which once was well below the state, now exceeds the state rate for white Hispanics and white non-Hispanics.

For all races and ethnicities combined, in 1995-2004, the county rate was 20.2% below the state (20.8% lower in 1995-1999). But the gap has closed. By 2015-2024, the county rate was just 2.0% below the state, and 3.1% above the state in 2020-2024, when excesses were 7.9% and 31.1% above the state for white non-Hispanics and white Hispanics.

If the 1995-1999 county/state ratio had remained unchanged, a total of 397 fewer premature births – 182 white non-Hispanic, and 215 white Hispanic – would have occurred, or 12.7% of the 3,126 premature births in San Luis Obispo during 2000-2024. Details are in Appendix 5.

The table below shows the trend in the percent of newborns born prematurely in the county (vs. California), by 10-year period, for all, white non-Hispanics, and white Hispanics.

Period	All Races/Ethnicities	White non-Hispanics	White Hispanics
1995-2004	**-20.2%**	**-18.1%**	**-12.9%**
2005-2014	**-15.1%**	**-12.5%**	**- 5.5%**
2015-2024	**- 2.0%**	**+ 3.6%**	**+16.8%**
2020-2024	**+ 3.1%**	**+ 7.9%**	**+31.1%**

Results – Trends in Low-Weight Births

Another measure that indicates the newborn may be at higher risk for certain health conditions is low-weight births. The standard measure of low-weight births is less than 2500 grams, or 5.5 pounds.

The percent of births to San Luis Obispo County mothers that are underweight has shifted from much lower than the state in the late 1990s, to a much smaller current deficit. In 1995-1999, the county rate was 18.8% below the state – a gap that closed to 10.6% below the state in 2020-2024.

The 2020-2024 county rate was 0.4% below the state for white non-Hispanics, and 7.3% above the state for white Hispanics; these changes mean 264 “excess” low-weight births for the 25-year period 2020-2024. See Appendix 6 for detailed data.

Results – Current Rates of Birth Defects

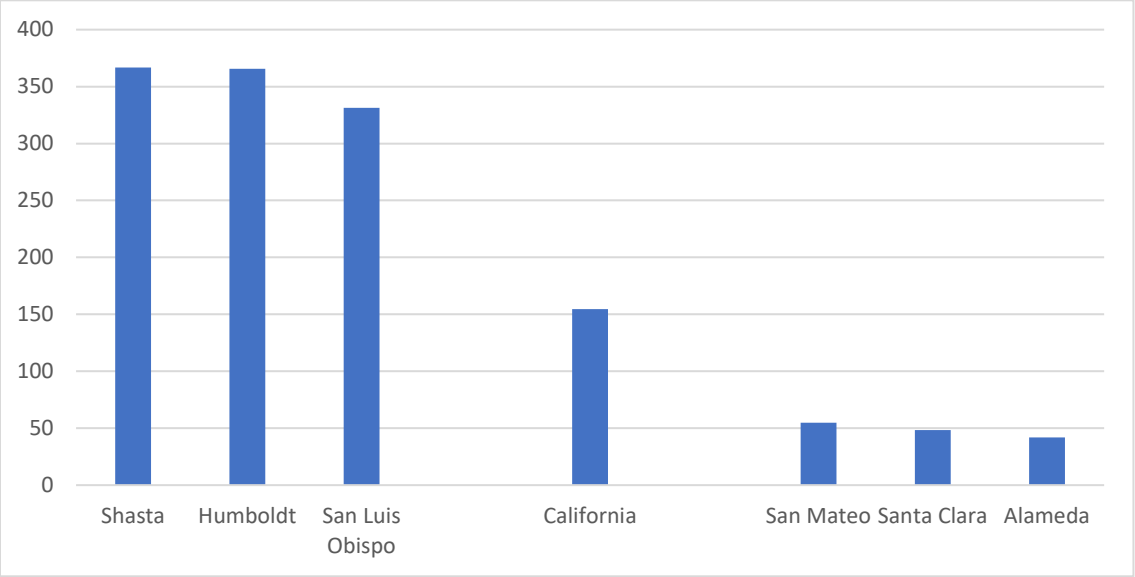
The CDC Wonder system provides county-specific data on birth defects for the years 2016-2024. Birth defects are defined as any of 12 congenital anomalies; about three-fourths of these are cleft lip, cleft palate, Down syndrome, spina bifida, and gastroschisis. In California, about 1 of every 1500 newborns were born with one of these 12 defects.

Appendix 7 shows the rates for each of the largest 35 counties in California, which account for about 98% of all births in the state. **The 2016-2024 birth defect rate for San Luis Obispo County was 114.2% above the state, the 3rd highest of the 35 counties**, which is highly significant.

A total of 73 babies were born to San Luis Obispo County mothers in this nine-year period with a defect; if the county rate had equaled the state rate, the number would have been 34, or 39 fewer babies with birth defects.

The San Luis Obispo County birth defect rate was more than triple the rate for seven California counties, including San Mateo, Santa Clara, and Alameda Counties (6-8 times higher). The only other counties with rates more than twice the state rate are Shasta, Humboldt, and Ventura Counties. Figure 2 shows the counties with the three highest and three lowest county rates, along with the California rate.

Figure 2
Highest and Lowest Birth Defect Rates
Cases per 100,000 Births
California Counties, 2016-2024



Counties with Highest Rates			
County	Cases	Births	Rate (% vs. state)
Shasta	62	16909	366.67* (+137.0%)
Humboldt	42	11490	365.54* (+136.3%)
San Luis Obispo	**73**	**22029**	**331.38* (+114.2%)**
California	6057	3915525	**154.69**
Counties with Lowest Rates			
San Mateo	39	71146	54.82 (-64.6%)
Santa Clara	88	182445	48.23 (-68.9%)
Alameda	66	157933	41.79 (-73.0%)

Results – Trends in Child Cancer Incidence

California's Cancer Registry receives reports for each newly-diagnosed case of cancer to state residents. The Registry makes county-specific age-adjusted incidence rates available for each year from 1988 to 2022.

This report compares the ratio of San Luis Obispo County vs. California rates of new cancer cases diagnosed in children age 0-19. Five-year periods are used, starting with 1988-1992 serving as a baseline, as Diablo Canyon had only been operating for several years. Ratios are in Appendix 8.

In the baseline period 1988-1992, the county cancer incidence rate age 0-19 was 25.9% below the state, based on 34 diagnosed cases. Thereafter, the gap between county and state rates closed; during the following 30 years (1993-2022), the county rate was just 2.1% below the state. Of the 324 cases diagnosed to county residents in those 30 years, 79 can be considered "excess."

Potential Factors in Worsening Local Newborn Health – Socioeconomic or Health Practices

Multiple risk factors can adversely affect infant health. The Centers for Disease Control and Prevention includes statistical data on maternal risk factors for some socioeconomic measures or health practices on its web site, for the years 2016-2024. The table below compares the rate for San Luis Obispo County and California. Appendix 9 provides more detailed data.

Factor	% County vs. State Rate
MOST COMMON MATERNAL RISK FACTORS	
Mother Obese (pre-pregnancy BMI > 30)	**- 13.9**
Mother Abnormal Weight (BMI not 18.5-24.9)	**- 8.4**
Mother Age < 20	**- 6.8**
Mother Age >35	**- 5.3**
Mother Received Food From WIC	**- 34.4**
Source of Payment is Medicaid or Self Pay	**- 3.9**
Previous Cesarean Delivery	**- 0.6**
LESS COMMON MATERNAL RISK FACTORS	
Previous Preterm Birth	+ 9.6
Use of Infertility Treatment	+ 12.2
Fertility Enhancing Drug	- 31.2
Assisted Reproductive Technology	+ 18.0
Tobacco Use During Pregnancy	+108.7
Tobacco Use Before Pregnancy	+157.0
Multiple Birth	+ 7.4
Mother Received No/Late Prenatal Care	- 4.2

For each of the most common risk factors (mother obese/abnormal weight, mother age <20 or >35, mother received food from WIC, mother on Medicaid/self-pay, previous Cesarean delivery), the county rate falls below the state, with most differences being statistically significant. The county rate varies (is above or below the state) for less common factors, with differences mostly not statistically significant.

One less-common factor is whether the mother used tobacco before or during pregnancy. County rates exceed the state by 157.0% (815 cases) and 108.7% (465 cases), respectively. The 815 mothers who used tobacco before and/or during pregnancy represent 3.72% of county births, versus 1.45% for state births. Smoking during pregnancy has been estimated to raise risk of premature birth by 21%, and low-weight birth by 95% (Delcroix, 2023). But due to the low percentages, elevated smoking rates could only explain a small portion of worsening infant health in the county.

Other Indicators Potentially Explaining Worsening Local Newborn Health

Common maternal and infant conditions that raise the risk of adverse outcomes at birth that are included in the CDC web site for the period 2016-2024 include the following (see Appendix 10):

Factor	% County vs. State Rate
MATERNAL	
Pre-pregnancy diabetes	**+29.8**
Gestational diabetes	**+12.4**
Pre-pregnancy hypertension	**+26.0**
Gestational hypertension	**+20.5**
INFANT	
Assisted Ventilation	**+189.6**
Assisted Ventilation > 6 Hours	**+ 67.2**
Apgar score 0-7	**+ 69.3**
Infant transferred	**+ 66.3**
Neonatal ICU admissions	**- 1.7**

The county rate exceeds the state rate for all but one of nine maternal and infant health measures. The exception is admissions to neonatal intensive care, which is the only measure in which the county-state gap that is not statistically significant because of the large numbers involved.

Discussion

The two Diablo Canyon nuclear reactors have released radioactive materials into the environment since their startup in 1984 and 1985. For various types of radioactivity, reported levels of emissions show the reactors have been among the highest in the U.S. in certain years. In addition, levels of radioactive Strontium-90 in baby teeth of children living near the plant are 31% higher than elsewhere in California, and rose 50% from the late 1980s to the late 1990s.

Just one nationwide study by government on health near U.S. nuclear plants has ever been conducted. The study only used data for plants in operation by 1981, and thus Diablo Canyon was not included. This report addresses trends in various measures of infant health in San Luis Obispo County. Infant health was selected, as the fetus and infant are more susceptible to a dose of radiation than other age groups.

Findings on infant health trends of county infants are as follows:

1. In the period before Diablo Canyon began operating, the county rate of infant deaths was well below the state rate. The gap has closed since, and in the most recent 15 years, the county rate exceeds the state by 1% (11% for Caucasians, 23% for Hispanics).

2. In the late 1990s, county rates of premature and low-weight births were well below the state rate. Like infant mortality, the county-state gap has gradually closed. By 2020-2024, county rates exceeded the state for premature births by 3% (8% for Caucasians, 31% for Hispanics).

3. The county rate of birth defects in 2016-2024 was 114% higher (more than double) than the state, and the 3rd highest of any California county.

4. The rate of cancer cases diagnosed in county children age 0-19 was 26% below the state rate soon after the reactors began operating. Since then, the county rate was just 2% below the state.

An assessment of demographic and lifestyle factors that can adversely affect health of infants shows that rates in San Luis Obispo County are consistently less than or equal to the state for common factors. Thus, the significantly worsening trends in local infant health are unexpected.

One or more factors that have been introduced or increased over time in San Luis Obispo County are likely to have caused the decline in infant health. Exposure to radioactive releases from Diablo Canyon should be considered one of them. The introduction of pollution from Diablo Canyon in 1984, which produces and releases over 100 radioactive chemicals into the local environment, represents a health risk not seen since above-ground nuclear weapons tests were banned in 1963.

This report indicates several actions are warranted. More detailed studies should be conducted to understand health status of persons living near Diablo Canyon. County residents and public officials need to be educated about health trends. The reactors have now operated for over 40 years, and regulators are considering extending the plant's license for 20 additional years. The public discussion over Diablo Canyon's future must consider the health of the local population before any such decision is made.

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Appendix 1
Selected Demographic Data
San Luis Obispo County vs. California

Year, Measure	San Luis Obispo	California
2025 Population	282,367	39,355,309
2024 % White	87.9	69.8
2024 % Black	1.8	6.4
2024 % Asian	4.6	17.0
2024 % Hispanic	25.8	40.8
2024 % White Non-Hispanic	65.3	33.6
2024 % w.o. health insurance <65	6.3	6.9
2020-24 % high school grad >25	92.2	84.7
2020-24 % bachelor's degree >25	39.8	37.1
2020-24 per capita income	$51,592	$49,513
2024 % below poverty	12.6	11.8
2020-24 % foreign born	9.9	27.0
2020-24 % language other than English spoken at home, >5	17.5	44.4

Source: U.S. Census Bureau. Quick Facts, United States. https://www.census.gov/quickfacts/. Accessed April 10, 2026.

Appendix 2
Trends in Gaseous and Liquid Releases of Tritium and Fission Products
Diablo Canyon Nuclear Plant, by Year, 2005-2021 (in curies)

	Tritium		Fission/Activation Products	
Year	Gaseous	Liquid	Gaseous	Liquid
2005	245.9	**2951**	0.931	**0.118**
2006	235.5	1496	0.278	0.047
2007	203.7	**3204**	1.610	0.056
2008	159.5	2406	**53.812**	0.029
2009	196.7	2100	2.801	0.043
2010	153.1	2176	1.263	0.049
2011	120.9	1506	**10.124**	0.048
2012	115.1	**3675**	1.390	0.033
2013	90.1	2420	0.942	0.021
2014	113.2	2236	**8.128**	0.028
2015	113.1	1868	0.137	0.022
2016	73.7	1378	0.160	0.031
2017	79.0	1909	0.700	0.024
2018	79.6	1085	1.107	0.020
2019	73.2	2213	1.092	0.033
2020	43.5	**2782**	0.340	0.007
2021	34.8	1079	0.366	0.012
2022	55.0	**2593**	**8.776**	0.017
2023	51.1	**2531**	0.834	0.017
2024	39.9	1582	**6.071**	0.023
Median	101.6	2225	1.100	0.029

BOLDFACE represents unusually high emissions

Source: U.S. Nuclear Regulatory Commission. Radioactive Effluent and Environmental Reports.
https://www.nrc.gov/reactors/operating/ops-experience/tritium/plant-info.html.

Appendix 3
Liquid Releases of Tritium, 2020
U.S. Nuclear Plants (in curies)

Rank	Plant	Curies	Rank	Plant	Curies
1	Watts Bar	5988	29	Arkansas	436
2	**Diablo Canyon**	**2782**	30	Millstone	326
3	Comanche Peak	2735	31	Ginna	314
4	D.C. Cook	2648	32	Harris	210
5	Vogtle	1885	33	Davis Besse	204
6	North Anna	1825	34	Browns Ferry	198
7	South Texas Project	1609	35	Edwin Hatch	95
8	Callaway	1456	36	Grand Gulf	85
9	Sequoyah	1452	37	Brunswick	78
10	Catawba	1439	38	St. Lucie	64
11	Byron	1405	39	Susquehanna	32
12	Wolf Creek	1393	40	Cooper	6
13	Indian Point	1391	41	Duane Arnold	4
14	Joseph Farley	1259	42	Limerick	4
15	Calvert Cliffs	1244	43	Peach Bottom	2
16	McGuire	1170	44	Quad Cities	1
17	Waterford	1083	45	Dresden	.007
18	Prairie Island	1063	46	Perry	.003
19	Oconee	1018	47	Clinton	0
20	Braidwood	903	47	Columbia	0
21	Seabrook	870	47	Fermi	0
22	Surry	839	47	LaSalle	0
23	Palisades	821	47	Monticello	0
24	Turkey Point	751	47	Nine Mile Point	0
25	Salem/Hope Creek	638	47	Palo Verde	0
26	H.B. Robinson	597	47	Point Beach	0
27	Summer	587	47	River Bend	0
28	Beaver Valley	499	47	James Fitzpatrick	0

Source: U.S. Nuclear Regulatory Commission. Radioactive Effluent and Environmental Reports.
https://www.nrc.gov/reactors/operating/ops-experience/tritium/plant-info.html.

Appendix 4
Trend in Infant and Neonatal Mortality (All Causes)
And Mortality Age 1-9 (All Medical Causes)
San Luis Obispo County vs. California
Before and After Diablo Canyon Startup
All Races, By Period, 1968-2024

	Deaths		Population < 1		Death Rate		% County
Period	SLO	Calif,	SLO	Calif.	SLO	Calif.	vs. State
Infant Mortality (< 1 year)							
1968-1984	334	80479	30475	6172954	10.96	13.04	**- 15.9%**
1985-2009	374	88399	65573	13334267	5.70	6.63	**- 14.0%**
2010-2024	163	29932	38121	7068287	4.28	4.23	**+ 1.0%**
2010-2024							
W, Non-Hisp	81	7057	20304	1963515	3.99	3.59	**+11.1%**
W, Hispanic	73	14645	13118	3238465	5.56	4.52	**+23.0%**
Neonatal Mortality (< 28 days)							
1968-1984	211	55338	30475	6172954	6.92	8.96	**- 22.8%**
1985-2009	236	56635	65573	13334267	3.60	4.25	**- 15.3%**
2010-2024	114	20991	38121	7068287	2.99	2.97	**+ 0.7%**
Mortality in Young Children (1-9 Years)							
1968-1984	54	13605	257200	52725660	21.00	25.80	**- 18.6%**
1985-2009	68	15547	614015	110505882	11.07	14.07	**- 21.3%**
2010-2024	34	5681	366529	65884741	9.28	8.62	**+ 7.6%**

Infant mortality rates are deaths < 1 year/live births x 1000
Neonatal mortality rates are deaths < 28 days/live births x 1000
Young children mortality are deaths 1-9/population x 100,000
Mortality for young children excludes accidents, suicide, and homicide
*County rate significantly different from baseline ($p < .05$)
Source: U.S. Centers for Disease Control and Prevention, https://wonder.cdc.gov

Appendix 5
Trend in Premature Birth Rate
% of births born at <36 weeks gestation
San Luis Obispo County vs. California
By Race/Ethnicity, by 5-Year Periods, 1995-2024

	Births <36 weeks		All Live Births		% <36 weeks		% County	Excess
Period	SLO	Calif,	SLO	Calif.	SLO	Calif.	vs. State	Cases
All Races								
1995-1999	613	162176	12041	2522913	5.09	6.43	**-20.8%**	**---**
2000-2004	628	161716	12110	2504252	5.19	6.46	**-19.7%**	**7**
2005-2009	763	178172	13502	2706351	5.65	6.58	**-14.2%**	**51**
2010-2014	637	144478	13176	2501533	4.83	5.75	**-16.0%**	**31**
2015-2019	640	129136	12680	2351893	5.05	5.49	**- 8.1%***	**81**
2020-2024	790	131499	12015	2061044	6.58	6.38	**+ 3.1%***	**188**
Tot. 2000-24	**3458**							**358**
White non-Hispanic								
1995-1999	365	47216	8155	867161	4.48	5.44	**-17.8%**	**---**
2000-2004	356	45023	7640	787776	4.66	5.72	**-18.5%**	**- 2**
2005-2009	411	44691	7945	758864	5.17	5.89	**-12.2%**	**23**
2010-2014	351	36677	7880	720379	4.45	5.09	**-12.5%**	**19**
2015-2019	333	30372	7095	646059	4.69	4.70	**- 0.2%***	**59**
2020-2024	326	28317	5848	548284	5.57	5.16	**+ 7.9%***	**84**
Tot. 2000-24	**1777**							**182**
White Hispanic								
1995-1999	191	78071	3286	1181015	5.81	6.61	**-12.1%**	**---**
2000-2004	214	80802	3752	1223714	5.70	6.60	**-13.6%**	**- 3**
2005-2009	305	91920	4757	1385379	6.41	6.64	**- 3.4%**	**27**
2010-2014	235	70011	4381	1204269	5.36	5.81	**- 7.7%**	**10**
2015-2019	213	59306	3961	1055158	5.38	5.62	**- 4.3%**	**16**
2020-2024	382	63291	4321	938827	8.84	6.74	**+31.1%***	**165**
Tot. 2000-24	**1349**							**215**

Percentages are live births <36 weeks gestation/all live births with known gestation x 100
Single maternal race, 1995-2006 and 2016-2023; bridged race 2007-2015
*County rate significantly different from baseline ($p < .05$)
Source: U.S. Centers for Disease Control and Prevention, https://wonder.cdc.gov.

Appendix 6
Trend in Low-Weight Birth Rate
% of births weighing <2500 grams (5.5 pounds)
San Luis Obispo County vs. California
By Race/Ethnicity, by 5-Year Period, 1995-2024

	Births <2500 g		All Live Births		% <2500 g		% County	Excess
Period	SLO	Calif,	SLO	Calif.	SLO	Calif.	vs. State	Cases
All Races								
1995-1999	616	162856	12368	2656192	4.98	6.13	**-18.8%**	**---**
2000-2004	712	172046	12558	2674573	5.67	6.43	**-11.9%**	**49**
2005-2009	843	188328	13628	2755410	6.19	6.83	**- 9.5%***	**78**
2010-2014	752	169581	13188	2513107	5.70	6.75	**-15.5%**	**25**
2015-2019	763	163037	12683	2353047	6.02	6.93	**-13.2%**	**43**
2020-2024	785	150566	12021	2061704	6.53	7.30	**-10.6%***	**64**
Tot. 2000-24	**3855**							**259**
White non-Hispanic								
1995-1999	379	50831	8354	909362	4.54	5.59	**-18.8%**	**---**
2000-2004	438	49919	7883	832637	5.56	6.00	**- 7.3%***	**50**
2005-2009	456	49277	8009	771619	5.69	6.39	**-10.8%**	**36**
2010-2014	427	43060	7884	720967	5.42	5.97	**- 9.3%**	**41**
2015-2019	393	37599	7098	646317	5.54	5.82	**- 4.8%***	**55**
2020-2024	341	32114	5848	548284	5.83	5.86	**- 0.4%***	**63**
Tot. 2000-24	**2055**							**245**
White Hispanic								
1995-1999	188	68352	3390	1241916	5.55	5.50	**+ 0.8%**	**---**
2000-2004	216	76183	3911	1313293	5.52	5.80	**- 4.8%**	**- 12**
2005-2009	333	87354	4811	1411954	6.92	6.19	**+11.9%**	**37**
2010-2014	262	74775	4386	1205492	5.97	620	**- 3.7%**	**- 12**
2015-2019	245	69267	3961	1055703	6.19	6.56	**- 5.7%**	**- 16**
2020-2024	324	65614	4321	939125	7.50	6.99	**+ 7.3%**	**21**
Tot. 2000-24	**1349**							**19**

Percentages are live births weighing <2500 grams/all live births with known weight x 100
*County rate significantly different from baseline ($p < .05$)
Source: U.S. Centers for Disease Control and Prevention, https://wonder.cdc.gov.

Appendix 7
Rate of Newborns with Birth Defects
35 Largest California Counties, 2016-2024 (* = significant)

County	Births w/defects	All Live Births	Defects 100,000 Births
Shasta	62	16909	366.67*
Humboldt	42	11490	365.54*
San Luis Obispo	**73**	**22029**	**331.38* (+114.2% vs. state)**
Ventura	256	79035	323.91*
Madera	58	19163	302.67*
El Dorado	40	13943	286.88*
Santa Barbara	133	49141	270.65*
Merced	85	34824	244.08*
Monterey	110	50827	216.21*
Butte	42	19465	215.77
Placer	71	33558	211.57
Yolo	37	18435	200.71
Sacramento	327	166365	196.56*
Fresno	236	126105	187.15*
Napa	20	11091	180.33
Santa Cruz	37	21278	173.89
Riverside	423	249466	169.56
Kern	190	133601	167.25
Orange	499	299722	166.49
Solano	73	44492	164.07
San Diego	555	346056	160.38
California	**6057**	**3915525**	**154.69**
Sonoma	61	40575	150.34
San Bernardino	364	247153	147.28
Los Angeles	1318	926634	142.24*
San Joaquin	126	88724	142.01
Tulare	75	61172	122.61
Kings	23	19619	117.23
Marin	22	19529	112.65
Imperial	25	22675	110.25
Contra Costa	97	105496	91.95*
San Francisco	65	71141	90.98*
Stanislaus	54	64965	83.12*
San Mateo	39	71146	54.82*
Santa Clara	88	182445	48.23*
Alameda	66	157933	41.79*
Other 23 counties	265	88973	297.84*

Rates are births with defects/all live births x 100,000; Counties listed account for 98% of California births
Defects include anencephaly, meningomyelocele/spina bifida, cyanotic congenital heart disease, congenital diaphragmatic hernia, omphalocele, gastroschisis, limb reduction defect, cleft lip with or without cleft palate, cleft palate alone, Down syndrome, suspected chromosomal disorders, hypospadias.
*County rate significantly different from state ($p < .05$)
Source: U.S. Centers for Disease Control and Prevention, https://wonder.cdc.gov.

Appendix 8
Cancer Incidence, Age 0-19
San Luis Obispo County vs. California
By Five-Year Periods, 1988-92 to 2018-22

	Cases 0-19		Population 0-19		Rate/100,000		% County	Excess
Period	SLO	Calif.	SLO	Calif.	SLO	Calif.	vs. State	Cases
1988-1992	34	7043	282523	44052381	11.7	15.8	**-25.9**	---
1993-1997	49	7527	308474	48619560	15.6	15.4	+ 1.3	12
1998-2002	61	8314	323379	51155458	19.1	16.3	+17.2	26
2003-2007	53	8873	319588	52138276	16.7	16.9	- 1.2	14
2008-2012	50	9270	318228	52023551	15.2	17.6	- 13.6	6
2013-2017	58	9409	321437	51171672	17.4	18.3	- 4.9	12
2018-2022	53	8883	315564	49400267	16.3	18.0	- 9.5	9
Tot. 1993-2022	324				16.7	17.1	**- 2.1**	79

Notes: Ages adjusted for 2000 U.S. standard population
Source: California Cancer Registry, August 2025

Appendix 9
Selected Maternal Factors Raising Risk of Adverse Birth Outcomes
San Luis Obispo County vs. California, 2016-2024

	Cases		All Live Births		Rate/1000		% County
Risk Factor	SLO	Calif,	SLO	Calif.	SLO	Calif.	vs. State
MOST COMMON FACTORS							
Previous C-section	3533	632533	22043	3922730	160.28	161.25	- 0.6
Mother obese	5131	1050992	21611	3813521	237.43	265.60	- 13.9*
Mother abnormal wt.	11565	2227668	21611	3813521	535.14	584.15	- 8.4*
Mother age < 20	707	134943	22048	3924038	32.07	34.39	- 6.8
Mother age >35	5219	981046	22048	3924038	236.71	250.01	- 5.3*
On WIC	5611	1558131	21391	3895899	292.31	399.94	- 34.4*
Medicaid/Self Pay	9308	1730478	21904	3914723	424.95	442.04	- 3.9*
LESS COMMON FACTORS							
Previous Preterm Birth	386	62686	22043	3922730	17.51	15.98	+ 9.6
Infertility Treatment	522	82784	22043	3922730	23.68	21.10	+ 12.2
Fert. Enhancing Drug	74	19127	22043	3922730	3.36	4.88	- 31.2
Assisted Reproduction	473	71326	22043	3922730	21.46	18.18	+ 18.0*
Tobacco use during preg.	465	39754	21895	3907113	21.24	10.17	+108.7*
Tobacco use before preg.	815	56585	21895	3907113	37.22	14.48	+157.0*
Multiple birth	712	117987	22048	3924038	32.29	30.07	+ 7.4
No/late prenatal care	739	137980	21580	3861455	34.24	35.73	- 4.2

Notes:
Fertility enhancing drug data represent when reported as maternal risk factor
Maternal obesity defined as pre-pregnancy Body Mass Index >30
Maternal normal weight defined as pre-pregnancy Body Mass Index <18.5 or >24.9
Multiple birth includes twins, triples, and more
Late prenatal care begins in months 7-9 of pregnancy
*County and state rates significantly different ($p < .05$)
Source: U.S. Centers for Disease Control and Prevention, https://wonder.cdc.gov

Appendix 10
Common Infant Conditions Raising Risk of Adverse Birth Outcomes
San Luis Obispo County vs. California
All Races, 2016-2024

Condition	Cases SLO	Cases Calif.	All Live Births SLO	All Live Births Calif.	Rate/1000 SLO	Rate/1000 Calif.	% County vs. State
MATERNAL							
Diabetes:							
-Pre-pregnancy	245	33587	22043	3922730	11.11	8.56	+29.8*
-Gestational	1900	300906	22043	3922730	86.20	71.71	+12.4*
Hypertension:							
-Pre-pregnancy	396	55932	22043	3922730	17.96	14.26	+26.0*
-Gestational	1669	246482	22043	3922730	75.72	62.83	+20.5*
INFANT							
Assisted Ventilation	2207	135454	22029	3915532	100.19	34.59	+189.6*
Assisted Vent >6 Hr	250	26580	22029	3915532	11.35	6.79	+ 67.2*
Apgar score 0-7	1345	141030	21940	3895337	61.30	36.20	+ 69.3*
Infant transferred	291	31096	22029	3915532	13.21	7.94	+ 66.3*
Neonatal ICU admits	1686	304862	22029	3915532	76.54	77.86	- 1.7

Notes:
Apgar scores are a measure of the baby's health five minutes after delivery. A score of 8-10 is considered normal.
Infant transfers include to other facilities.
*County and state rates significantly different ($p < .05$)
Source: U.S. Centers for Disease Control and Prevention, https://wonder.cdc.gov