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**Findings from the  
Napa County Cancer Concern Evaluation**

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**Prepared for  
Napa County Public Health Division  
by  
The Cancer Registry of Greater California**

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**June 1, 2016**

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# Background

In February 2016, Dr. Jennifer Henn, Public Health Manager of the Coordinated Chronic Disease Prevention Program of Napa County, contacted the Cancer Registry of Greater California (CRGC) regarding a cancer concern in Napa County. Napa community members had raised concerns about a proposed expansion of the Syar quarry in the city of Napa. This community group presented multi-site cancer data in Napa County for adults and children. They wanted to know why Napa County has one of the highest rates of cancer in children, highest rates of cancer for non-Hispanic whites, and why Napa County cancer trends are higher than other counties. Other concerns included the large amount of dust present in the areas surrounding the quarry as well as poor water quality.

## Cancer Registry of Greater California

The CRGC is designated by the California Department of Public Health to collect cancer incidence data for over 90% of the state's geography. CRGC is one of three registries in California (CA) that supports and collects population-based data for the California Cancer Registry (CCR). This population-based database contains data on all California residents diagnosed with any reportable cancer since 1988. CRGC is responsible for checking accuracy of the data collected, including identifying and collecting missing data. Quality control checks are performed at the CRGC before data are submitted to CCR's statewide cancer database.

Treatment facilities, hospitals, and health professionals are required to report any diagnosis of cancer. These reports include demographics, diagnosis, treatment information, and tumor characteristics. To ensure current follow up for vital status and cause of death, the CCR database is linked annually to death certificates, hospital discharge data, Medicare files, the Department of Motor Vehicles, Social Security, and other administrative databases. Linkage to the National Death Index ensures capture of deaths occurring outside California as well as cause of death, and follow up is over 96% for patients diagnosed since 2000. The CCR is a participant in both the Centers for Disease Control National Program of Cancer Registries and the National Cancer Institute's Surveillance Epidemiology and End Results (SEER) program, which requires the highest standards of data quality, as judged by completeness, accuracy, and timeliness.

The mission of CRGC is to record timely and quality cancer information from all cancer patients in 48 California counties, and to utilize this information to help prevent cancer and reduce cancer morbidity and mortality. The data from CRGC are used by internal and external researchers, clinicians, cancer registrars, public health officials, policy makers, community groups, health educators, and the general public.

Regional epidemiologists at CRGC will also respond to questions and concerns from residents and organizations regarding cancer in their communities. Thus, CRGC responded to the concerns from Napa County regarding cancer rates in the area surrounding the Syar quarry.

“Cancer cluster” is defined as an aggregation of cancer cases of the same type of cancer, determined to be unusual when compared to cancer cases that would be expected if the group or location in question had the same cancer rates as the underlying population. The number of

cancer cases observed must differ substantially from the expected pattern in number, type, or age of the cases and be statistically significant to be considered a cluster.

## Methods and Results

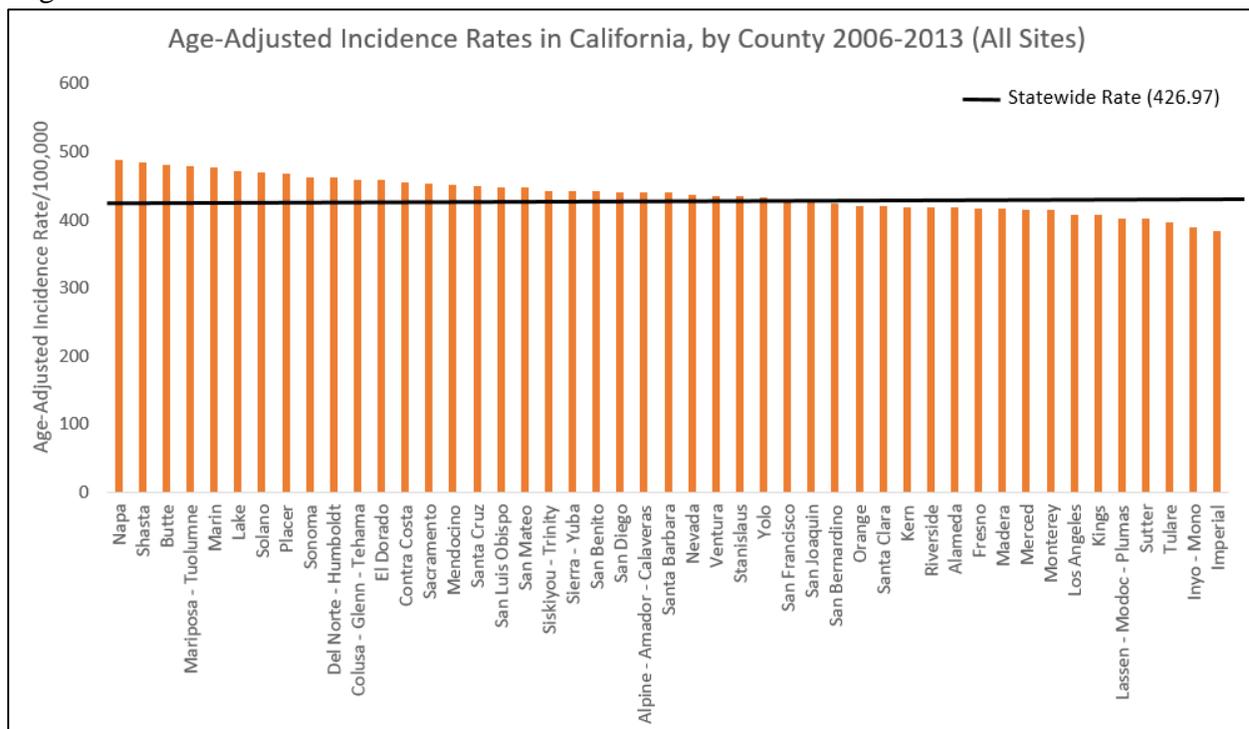
Epidemiologists at CRGC used three different methods to address these cancer concerns: 1) calculated cancer incidence and mortality for Napa County, 2) calculated annual percent change (APC) for cancer incidence in Napa County, and 3) conducted a formal analysis to evaluate any cancer excess of childhood cancer and lung cancer in the area surrounding the quarry.

### 1. Napa County Cancer Incidence and Mortality

#### Incidence:

CRGC used CCR data to calculate age-adjusted incidence rates for all counties in CA. Incidence rates were calculated by dividing the number of new cases of cancer by the total population at risk for cancer. When comparing age-adjusted incidence rates by county for 2006-2013 (all ages), Napa County ranks at the top of CA counties for cancer incidence<sup>1</sup> (Figure 1). The county ranks at the top for all sites combined as well as for colorectal cancer, female breast cancer, pancreatic cancer, and prostate cancer, but ranks among the lowest risk counties for cervical cancer. The distribution by county for the site specific incidence rates can be found by going to <http://www.cancer-rates.info/ca/index.php>.

Figure 1

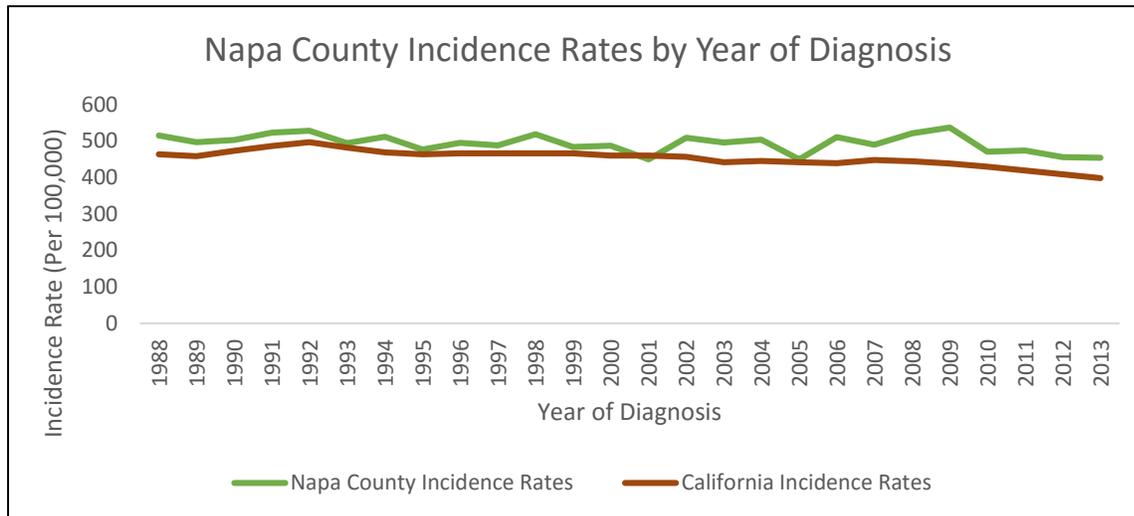


Age-Adjusted Invasive Cancer Incidence Rates by County in California, 2006 - 2013. Based on December 2015 Extract. California Cancer Registry. Cancer-Rates.info, from <http://cancer-rates.info/ca/>

Since 1988, the age-adjusted incidence rates for Napa County have vacillated, similarly to CA statewide rates, but appear to be relatively stable with a more recent decrease in rates beginning

in 2010<sup>1</sup> (Figure 2). The difference in rates is small and should not be interpreted as a meaningful difference, since these figures are estimates.

Figure 2



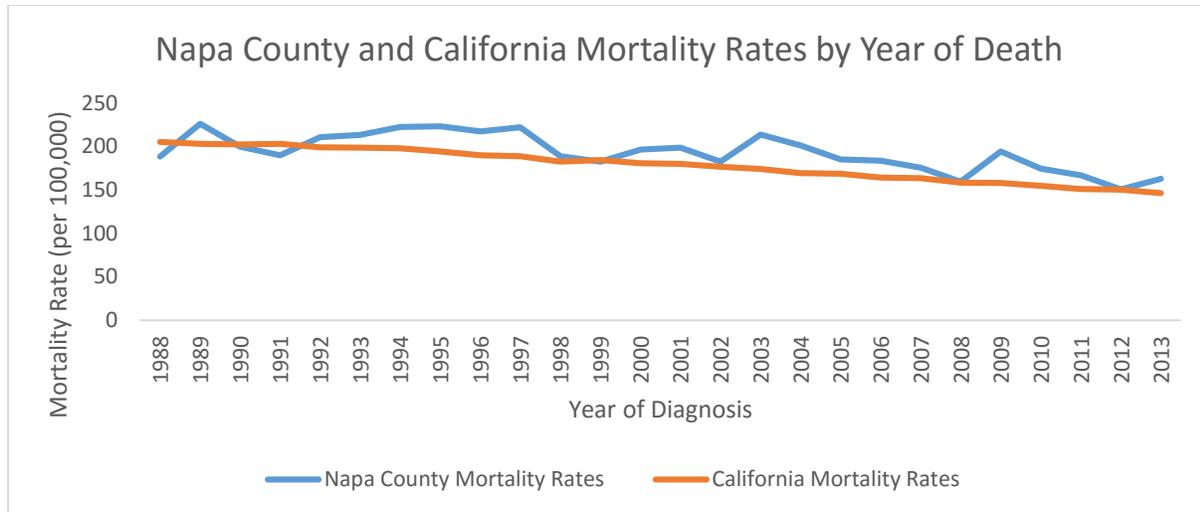
*Age-Adjusted Invasive Cancer Incidence Rates by County in California, 1988 - 2013.* Based on December 2015 Extract. California Cancer Registry. Cancer-Rates.info, from <http://cancer-rates.info/ca/>

### Mortality:

In regards to risk of death for 2006-2013 (all ages), Napa County ranks among the lowest counties in California for age-adjusted mortality rates for liver cancer and cervical cancer. Although Napa County ranks high in regards to incidence for both colorectal and female breast cancer, it ranks among the lowest for age-adjusted mortality for both cancers. The risk of death of all sites combined was slightly higher than the average risk among the counties. The risk of death from lung cancer was among the average risk counties in California for age-adjusted mortality rates<sup>2</sup>.

Similarly to what was seen for the age-adjusted incidence rates, Napa County ranks among the highest risk of death for prostate and pancreatic cancer. The age-adjusted mortality rate trends for Napa County are consistently slightly higher than California since 1992, but overall have been decreasing since 1988 (Figure 3)<sup>2</sup>.

Figure 3



### Summary:

Overall, the patterns found in the incidence and mortality rates of Napa County were consistent with what would be expected for a higher than average socioeconomic status (SES) population receiving better than average cancer screening and access to care. Please see the following resources for more information.

Reynolds, Tom. Report Examines Association Between Cancer and Socioeconomic Status. *JNCI*. (2003).

<http://jnci.oxfordjournals.org/content/95/19/1431.full>

Cancer Research UK. Policy Statement: Socioeconomic inequalities in Cancer. April 2008.

[http://www.cancerresearchuk.org/prod\\_consump/groups/cr\\_common/@nre/@pol/documents/generalcontent/crukmig\\_1000ast-3347.pdf](http://www.cancerresearchuk.org/prod_consump/groups/cr_common/@nre/@pol/documents/generalcontent/crukmig_1000ast-3347.pdf)

Ward, Elizabeth et al. Cancer Disparities by Race/Ethnicity and Socioeconomic Status. *Cancer Journal for Clinicians*. (2008).

<http://onlinelibrary.wiley.com/doi/10.3322/canjclin.54.2.78/pdf>

Parrish, Amanda et al. Low Socioeconomic status and cancer prevention in the American Cancer Society of Great West Division. Health Promotion Research Center, University of Washington School of Public Health. (2013)

[https://depts.washington.edu/hprc/docs/Low\\_SES\\_and\\_Cancer\\_Prevention\\_in\\_the\\_ACS\\_GWD.pdf](https://depts.washington.edu/hprc/docs/Low_SES_and_Cancer_Prevention_in_the_ACS_GWD.pdf)

## **2. Calculated Annual Percent Change (APC) for Cancer Incidence in Napa County**

To detect trends during a defined time period, the Joinpoint regression program of the National Cancer Institute was utilized to calculate the Annual Percent Change (APC). The APC looks at

trends over several years and measures change in rates over time<sup>3,4</sup>. From 1988-2013, the APC in Napa County was -0.27% (p-value ( $p$ ) = 0.03786) for all cancer incidence. During 2006-2013, the APC was -1.87% ( $p=0.0483$ ) for all cancer incidence. This is indicative that cancer incidence has been on a statistically significant ( $p < 0.05$ ) decreasing trend since 1988, especially from 2006-2013.

From 1988-2013, the APC in Napa County was -1.05% ( $p < 0.0001$ ) for all cancer mortality and during 2006-2013, the APC was -1.87%, but not statistically significant ( $p=0.1417$ ). Similar to incidence, cancer mortality has been declining.

### **3. Formal analysis to evaluate cancer excess**

In response to the concern that there may be an excess of cancer in the area surrounding Syar quarry, CRGC performed an analysis to evaluate the possibility of a higher number of cancer cases in the area around surrounding the Syar quarry than would generally be expected. Based on the concerns presented, the analysis was focused on lung cancer and childhood cancer. The analysis was conducted on the most current data we have available. Because of the detailed processing involved in the data collection and preparation, the most up-to-date accurate and complete data available is through 2013. The census tracts used in this analysis were selected based on the proximity to the quarry with guidance from Dr. Jennifer Henn. The census tracts used were: 2002.03, 2003.01, 2003.02, 2008.02, 2009, and 2010.03. As the census tracts have changed between the 2000 and 2010 census, only the 2010 census was used to evaluate this concern. It would not be appropriate to compare the 2000 and 2010 census due to these changes, thus the years used were 2006-2013.

We calculated the observed number of cancer incidence of lung cancer and childhood cancer based on the above census tracts and the expected number of cancer incidence was calculated based on the overall cancer incidence in Napa County. Confidence intervals were calculated around the observed numbers to provide reasonable margins of error for these estimates resulting from variation due to chance alone. Lastly, the standardized incidence ratio (SIR) was calculated to statistically test if the difference between the observed and expected is statistically significant. An SIR determines if the number of observed cancer cases in an area is higher or lower than expected. The SIR takes into account the population of interest and allows comparison of two different populations, even if their age distributions differ. Two different analyses, all ages and children only, were done.

Conducting a formal analysis calculating the observed/expected and standardized incidence ratios (SIRs) for all of Napa County in comparison to California would not be methodologically appropriate as the demographics of Napa County are dramatically different than the rest of California counties in regards to race and socioeconomic status. As the concern was about the expansion of Syar quarry in Napa County, and specifically lung cancer and childhood cancer, a formal analysis on specific census tracts surrounding the quarry was more appropriate. This type of analysis will help constituents determine if the health of the population surrounding the quarry should be investigated further.

In regards to lung cancer, no statistically significant results were found in the census tracts surrounding the quarry. The childhood cancer analysis found that there was no statistically significant childhood cancer incidences in the area surrounding the quarry, as the observed count was less than the expected count and the SIR was less than 1.

## Conclusion

There are common limitations with cancer analyses, including delays in reporting, resulting in recently diagnosed cases missing from the most current version of our database. Address at diagnosis may not be the address of exposure, and a person with cancer may no longer reside in the area of interest. The populations of these census tracts may have increased since 2010, and this would increase the number of cancer cases expected.

Many may think cancer is uncommon, but in fact, one in two men and one in three women will develop cancer in their lifetime. Cancer is not one disease, but a general term for many diseases-most with different etiologies. Cancer is not caused by a single factor, but caused by a combination of environmental and hereditary factors and unfortunately, many times we are not able to link individual cancer diagnoses to specific factors. Cancer is a composite of over 80 different diseases with many different causes and risk factors. Lastly, knowledge of several cancer cases in a defined area does not always indicate a cluster. Certain numbers and types of cancer are expected in any neighborhood or defined geographic area.

There are concerns with the expansion of the Napa County Syar quarry, excess dust in the area, and quality of drinking water in this neighborhood. Although CRGC cannot address those concerns directly, there was insufficient evidence that these exposures were directly related to excess cancer. CRGC did not find a statistically significant excess of lung cancer and childhood cancer; a further environmental investigation is not warranted. Although exposure to environmental factors increases risk to some cancers, there are other risk factors that could reduce risk of cancer that can be controlled on a public health, community, and individual level.

The risk of cancer increases with advancing age, life-style behaviors (obesity, smoking, alcohol abuse, diet low in fruits and vegetables, lack of exercise, etc.), genetic factors, and environmental risk factors<sup>5,6</sup>. About 40% of cancers have been found to be associated with these life-style behaviors; especially poor diet, obesity, inactivity, and alcohol consumption<sup>5</sup>. Additionally, smoking is the leading risk factor for lung cancer and has been shown to be associated with almost 80% of all lung cancer deaths<sup>7</sup>. Over the last two decades, childhood obesity rates have doubled. Being obese as a child increases the risk of being an obese adult, thus having an effect on cancer risk<sup>5,6</sup>. Focusing on tobacco and alcohol cessation programs, increasing intake of fruits and vegetables, promoting more physical activity, and making efforts to reduce obesity rates can all help lessen the risk of some cancers. These changes can all be done at the individual and group level.

CRGC acknowledges the great impact that cancer has on families and the community. It is recommended that people concerned about cancer have a discussion with their personal physician about their individual risks, including genetic risks, life-style behaviors, and other factors of concern. Although CRGC does not have data regarding environmental exposures, we will continue to monitor the cancer incidence and trends in Napa County as well as the area surrounding the Syar quarry.

## References:

1. *Age-Adjusted Invasive Cancer Incidence Rates by County in California, 2009 - 2013*. Based on December 2015 Extract. California Cancer Registry. Cancer-Rates.info. Retrieved Mar 4, 2016, from <http://cancer-rates.info/ca/>
2. *Age-Adjusted Cancer Mortality Rates by County in California, 2006 - 2013*. Based on December 2015 Extract. California Cancer Registry. Cancer-Rates.inf, from <http://cancer-rates.info/ca/>
3. Kim HJ, Fay MP, Feuer EJ, Midthune DN. "Permutation tests for joinpoint regression with applications to cancer rates" *Statistics in Medicine* 2000; 19:335-351: (correction: 2001;20:655)
4. Joinpoint Regression Program, Version 4.3.1.0 - 2016; Statistical Methodology and Applications Branch, Surveillance Research Program, National Cancer Institute.
5. Morris CR, Epstein J, Nassere K, Hofer BM, Rico J, Bates JH, Snipes, KP. Trends in Cancer Incidence, Mortality, Risk Factors, and Health Behaviors in California. Sacramento, CA: California Department of Public Health, Cancer Surveillance Section, January 2010.
6. American Cancer Society, California Department of Public Health, California Cancer Registry. California Cancer Facts and Figures 2013. Oakland, CA: American Cancer Society, Inc. California Division, October 2012.
7. American Cancer Society. Lung Cancer Prevention and Early Detection. February 2016. <http://www.cancer.org/cancer/lungcancer-non-smallcell/moreinformation/lungcancerpreventionandearlydetection/lung-cancer-prevention-and-early-detection-risk-factors>