Bickmore

California Safety Officer Workers' Compensation Cancer Presumption - DRAFT

Department of Industrial Relations

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I. Executive Summary

The purpose of this report is to discuss our findings regarding the potential impact of Assembly Bill 1373 (AB 1373). AB 1373 proposes to increase the statute of limitations for public safety officer workers' compensation death benefits for specific causes of death. For the most part, AB 1373 pertains to death benefits associated with cancer claims. Our goal is to investigate the financial impact of extending the statute of limitations.

A. Summary of our Findings

The current statute of limitations for cancer death benefits affected by AB 1373 is 240 weeks, and AB 1373 proposes to increase that to 480 weeks. This statute of limitations applies to workers' compensation benefits for certain active employees. Using these parameters, we estimate AB 1373 would add approximately of $4,750,000 to statewide workers' compensation death benefits annually. The following table summarizes our findings.

Table 1
Estimated Annual Impact of Increasing
Statute of Limitations to 480 Weeks

	Annual Impact		
	Fire	**Police**	**Total**
Claims	6	13	19
Cost per Claim	250,000	250,000	250,000
Total Annual Cost	1,500,000	3,250,000	4,750,000

We calculated the impact of the proposed changes using several different sets of assumptions, and the estimated total annual costs varied from $4,250,000 to $5,000,000. The results in the preceding table rely on elevated firefighter cancer risk factors and the distribution of different types of cancers reported in a study released by NIOSH in 2013[1]. That study applied only to firefighters and we assumed police do not have an elevated risk of cancer.

Note that a key assumption in this study is that the average cost per claim is $250,000. In reality the cost will vary based on the number of dependents, but due to lack of information pertaining to dependents, we were not able to factor this into our estimates.

[1] Daniels RD, Kubale TL, Yiin JH, et al. Occup Environ Med Published Online First Oct. 14, 2013, "Mortality and cancer incidence in a pooled cohort of US firefighters from San Francisco, Chicago, and Philadelphia (1950-2009)."

II. Background

Under certain conditions, illnesses for California public safety officers are presumed to be occupational and thus eligible for workers' compensation benefits. These workers' compensation benefits include death benefits and AB 1373 proposes to increase the statute of limitations for these death benefits.

The conditions under which certain illnesses and diseases are presumed to be occupational and the death benefits are defined in Labor Code (LC) 5406. They are summarized as follows.

1. Statute of Limitations: Proceedings must commence within 240 weeks from the date of injury and within one year of the date of death, whichever is earlier. In this report we refer to this as the "statute of limitations." It is important to note that the "date of injury" described in LC 5406 may not be the same as the date of injury as defined in the workers' compensation system and coded in the WCIS database. The date of injury referred to in LC 5406 is most akin to the date of diagnosis. However, if a cancer diagnosis occurs after a safety officer is no longer active, then it is common practice for the workers' compensation date of injury to be the last date of employment. This is because the workers' compensation system is designed to cover injuries which occur while people are employed. Within that definition, it makes little sense to have a date of injury after employment has ceased. As a result, the date of injury described in LC 5406 could be subsequent to the date of injury in the workers' compensation system.

2. Cancer and Leukemia (Section 3212.1): Illnesses from cancer and leukemia are presumed to be occupationally caused, provided the worker can show that he or she was exposed to a known carcinogen during his or her period of employment, and the following conditions are met. This presumption is rebuttable.

    a. Eligible Occupations: The benefit applies to all active firefighters, including those that are paid and volunteers. This includes firefighters for cities, counties, the University of California, California State University, and the Department of Forestry and Fire Protection. Also included are firefighters serving the U.S. Department of Defense and the National Aeronautics and Space Administration (NASA). Certain rescue personnel and peace officers - mostly California Highway Patrol and arson investigators - are also included. The benefit applies to deaths caused by cancer and leukemia.

    b. Period of Eligibility: The date of injury must have occurred during the course of employment or during a specified period of time after becoming inactive. This window is three months for every full year of active service, not to exceed 120 months. The provisions in AB 1373 only apply to active personnel.

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3. Tuberculosis (3212.6): Instances of tuberculosis are presumed to be occupationally caused, provided that the following conditions are met. This presumption is rebuttable.

    a. Eligible Occupations: The benefit applies to those in a city or county police department, county sheriff's office, and members of the California Highway Patrol (CHP). It also includes prison and jail guards, as well as public agency correctional officers. Certain inspectors, investigators, most firefighters, and first aid responders are also eligible.

    b. Period of Eligibility: The date of injury must have occurred during the course of employment or during a specified period of time after becoming inactive. This window is three months for every full year of active service, not to exceed 60 months. The provisions in AB 1373 only apply to active personnel.

4. Blood-borne Infectious Disease or Methicillin-Resistant Staphylococcus Aureus Skin Infection (Section 3212.8): Instances of these illnesses are presumed to be occupationally caused, provided that the following conditions are met. This presumption is rebuttable.

    a. Eligible Occupations: The benefit applies to those in a city or county police or fire department, as well as firefighters for the Department of Forestry and Fire Protection, or of any county forestry or firefighting department or unit.

    b. Period of Eligibility: The date of injury must have occurred during the course of employment or during a specified period of time after becoming inactive. This window is three months for every full year of active service, not to exceed 60 months for blood-borne infectious diseases and 90 days for methicillin-resistant Staphylococcus aureus skin infections. The provisions in AB 1373 only apply to active personnel.

For the purposes of this study we concentrated only on cancer claims for firefighters and police officers, including sheriffs and CHP. We realize this does not encompass all of the illnesses and personnel that would be impacted by AB 1373; however, we feel it does cover the vast majority of workers' compensation cases that would be impacted by AB 1373.

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III. Methodology

Our approach is based on the following six steps which are summarized in Exhibits 2 and 3 for firefighters and police, respectively.

1. Estimate the Number of Active California Firefighters and Police by Age Grouping (Exhibits 2 & 3): We based the total number of California active firefighters and police on data from the U.S. Bureau of Labor and Statistics (BLS), which estimates the number of employees by state and occupation (released May 2012). We matched the BLS occupation descriptions to those addressed in AB 1373. The BLS also reports the number of employees by occupation and age grouping on a nationwide basis but not by state. Therefore we used national statistics to estimate the age groupings of the California safety officers.

2. Estimate Cancer Incidence Rates of Active California Firefighters and Police by Age Grouping (Exhibit 4): The incidence rates for police are based on statistics from the Surveillance Epidemiology and End Results (SEER). These rates are relevant to the general population and are not specific to safety officers.

   For firefighters we adjusted the incidence rates based on the Standardized Incidence Ratios (SIRs) reported in Table 2 of the NIOSH study. The standardized incidence ratio (SIR) represents the ratio of observed to expected incidences of cancer. We utilized the SIRs for all cancers (not just first cancers), and adjusted the predicted incidences for each of the following types of cancer: brain, lung, mesothelioma, non-Hodgkins Lymphoma, colon/rectum, leukemia, pancreas, esophagus, kidney, stomach, and prostate. We assumed that the SIRs for all other types of cancer are the same as the overall SIR for all cancers included in the NIOSH study.

   Since the great majority of safety officers are male, we used cancer incidence rates specific to males.

3. Estimate Number of Active California Safety Officers Diagnosed with Cancer (by Age Grouping): This is derived from the previous steps #1 and #2.

4. Estimate Cancer Mortality Between 240 and 480 Weeks After Diagnosis (by Age Grouping): This is derived from SEER survival rates. Since survival rates vary by type of cancer, we estimated the overall mortality rates using three different assumptions.

   a. California Workers' Compensation Information Systems (WCIS): We utilized the mix by type of cancer that we were able to ascertain from the WCIS (Page 1 of Exhibits 2 & 3).

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b. NIOSH: We utilized the mix by type of cancer reported in Table 2 of the NIOSH study. This is probably weighted towards younger people since the study included firefighters who are still active. This may be appropriate since the proposed statute of limitations applies to active employees (Page 2 of Exhibits 2 & 3).

c. General U.S. Population: We used the mix of cancers of the U.S. population, as reported in SEER data (Page 3 of Exhibits 2 & 3).

5. Estimate Number of Active California Firefighters and Police with Cancer Deaths 240 to 480 Weeks After Diagnosis (by Age Grouping): This is derived from the previous steps #3 and #4.

6. Estimate Total Value of Benefits: We multiplied the total cancer deaths derived in step #5 times a benefit amount of $250,000. We recognize that the benefit amount is affected by additional factors such as the number dependents, and that adds further uncertainty to our estimates.

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IV. Key Data Sources

The following is a discussion of key data sources used in this study.

A. WCIS Data

All insured and self-insured employers in California are required to report certain workers' compensation claims and other information to the California Department of Industrial Relations (DIR). The DIR stores the data it receives in its WCIS database. The DIR provided us with summary information of all 927 WCIS claims associated with safety officers with dates of injury between 2000 and 2012. Of these 927 claims we identified 174 in which the cause of death was cancer.

First we analyzed the demographics associated with the 174 WCIS cancer claims. As expected, the vast majority of the claimants (over 95%) were male. Regarding age at the identified date of injury, 20% were 45 or younger; 37% were between ages 46 and 55; 34% were between ages 56 and 65; and 9% were older than 65. Half had dependents and half did not.

Type of Injury

One of the key demographic items we attempted to identify was the type of cancer. This is critically important because different types of cancer have different survival patterns, and thus they would be impacted differently by the statute of limitations changes proposed in AB 1373. We used a combination of WCIS fields, including type of injury, body part, cause of injury and injury description, and ICD-9 codes in order to classify the claims by type of injury. However, using those fields we were only able to identify the type of cancer for about 60% of the claims. The following chart shows the distribution of claims by type of cancer.

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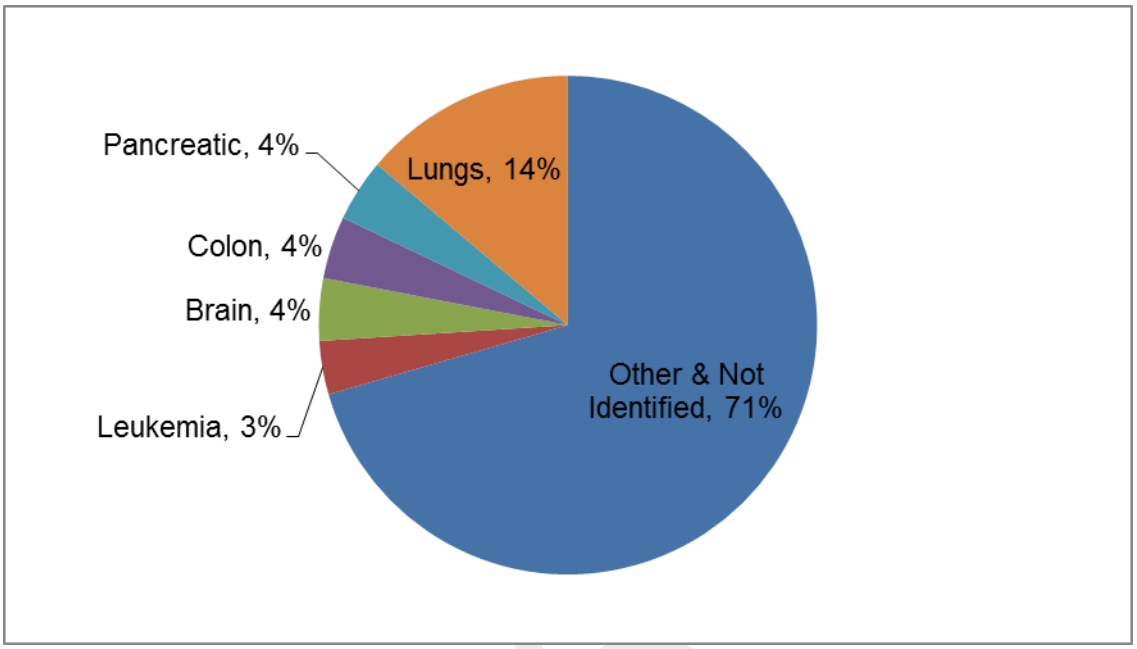
Chart 1
Percentage Distribution of WCIS Public Safety Cancer Death Claims
By Type of Cancer



Since we were unable to identify the type of cancer for so many claims in the study, our conclusions regarding the mix of cancer type from WCIS data are quite weak.

Date of Injury

As described in the Background section, the date of injury identified in AB 1373 is not necessarily identical to the date of injury in the WCIS database. The date of injury referred to in AB 1373 (LC 5406) is most akin to the date of diagnosis. However, if a cancer diagnosis occurs after a safety officer is no longer active, then it is common practice for the workers' compensation date of injury to be the last date of employment. So the date of injury in WCIS may precede the actual date of diagnosis.

In order to address this issue we analyzed the WCIS claims using two different methods of assigning date of diagnosis (i.e. AB 1373 "date of injury"). For the first method, we assumed the date of diagnosis was identical to the date of injury as reported in WCIS. Recognizing there may some cases in which the WCIS date of injury is the last date of employment rather than true date of injury, we utilized a second method in which we assumed that the date of diagnosis was the latter of the date of injury and the date the claim was reported to the employer.

Percentage of Claims Impacted by Extending State of Limitations (per AB 1373)

We evaluated the survival period between the date of diagnosis and the date of death for the 174 public safety workers' compensation cancer death claims identified in WCIS. We evaluated these claims under both definitions of "date of diagnosis" described in the preceding section. We then calculated the percentage of additional claims that would have been eligible for death benefits if the statute of limitations had been extended beyond the current limit of 240 weeks. The following table summarizes our results.

Table 2
WCIS Claims
Percentage Increase in Cancer Deaths Impacted by Extending Statute of Limitations

Assumption Regarding Definition of Date of Diagnosis	Statute of Limitations in Weeks			
	300	360	420	480
Date of Diagnosis = Date of Injury	3.2%	5.7%	7.0%	7.0%
Date of Diagnosis = Latter of Date of Injury & Date Reported to Employer	3.1%	5.0%	6.3%	6.3%

B. SEER Data

Nationwide historical cancer survival rates based on survey data are publicly available through SEER's website (http://seer.cancer.gov/faststats). Survival rates are available by type of cancer, age, and by gender. Since males compose the vast majority of the cancer fatalities identified in the WCIS of this analysis, we limited our analysis of SEER data to males.

Survival and Mortality Rates

The following chart shows cancer mortality rates for males with all types of cancer combined based on SEER data. This chart illustrates two things. First, on average the majority of people diagnosed with cancer survive 11 or more years. A relatively small percentage die during the period six to ten years after diagnosis, which is roughly the time period being considered in the AB 1373 statute of limitations (480 weeks). Second, on average the age of diagnosis does not have a significant impact on the mortality rates.

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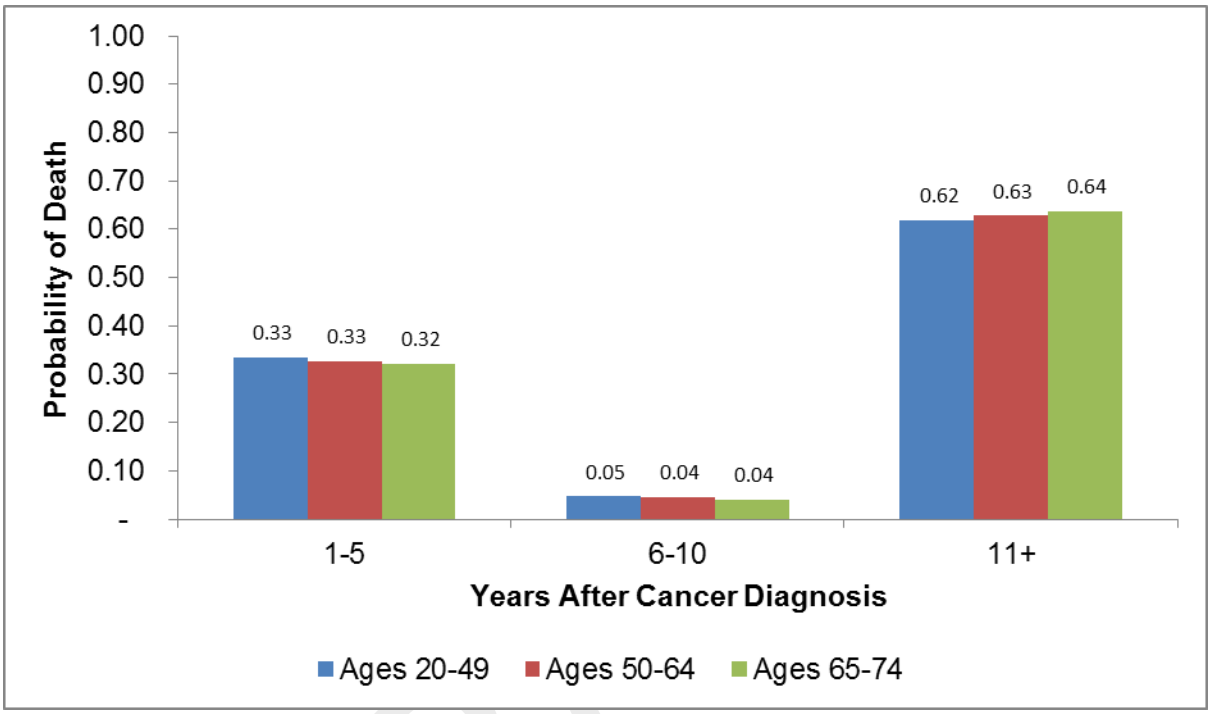
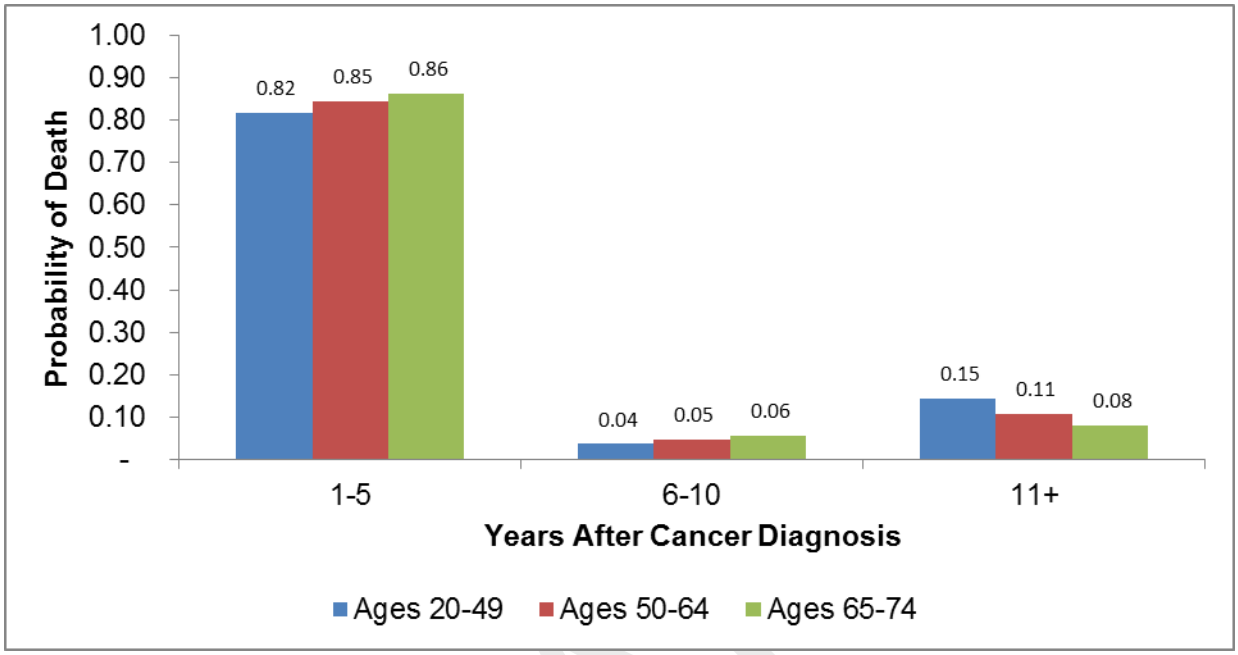
Chart 2
SEER Data: Cancer Mortality Rates by Age (Males Only)
All Types of Cancer



The following chart shows cancer mortality rates for males with lung cancer based on SEER data. By comparing the mortality rates in the prior and current charts, it should be clear that the type of cancer can have a major impact on mortality rates. This chart illustrates shows that compared with averages for all types of cancer; victims of lung cancer are much less likely to survive five years.

Chart 3
SEER Data: Cancer Mortality Rates by Age (Males Only)
Lung Cancer



Since it is clear the type of cancer has a major impact on mortality rates, we consider the mix of cancer type to be a key component in estimating the potential impact of AB 1373.

The following chart shows cancer mortality rates for males with brain cancer based on SEER data. While Chart 2 shows that, on average, age does not significantly impact cancer mortality rates, the following chart shows that for brain cancer age plays a significant role. This is yet more evidence that the mix of cancer type is a critical part of quantifying the impact of AB 1373.

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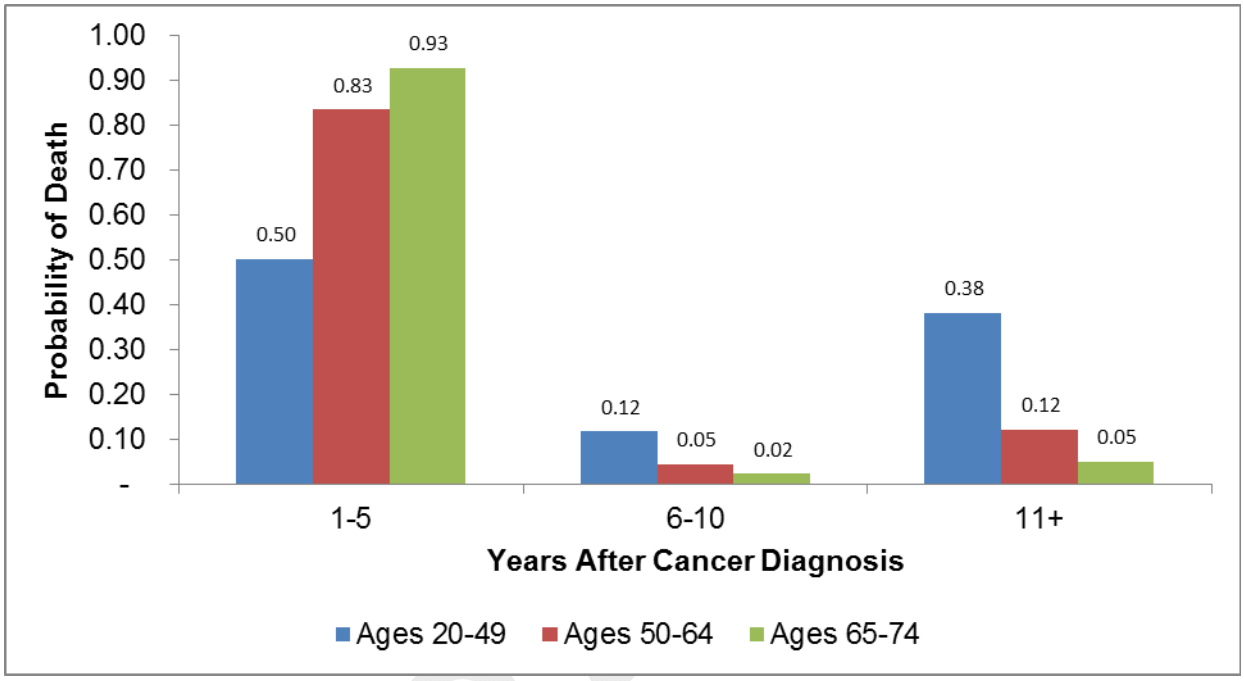
Chart 4
SEER Data: Cancer Mortality Rates by Age (Males Only)
Brain Cancer



Percentage of Claims Impacted by Extending State of Limitations (per AB 1373)

Based on SEER data, we evaluated the survival period between the date of diagnosis and the date of death for cancer claims. The SEER survival and mortality statistics are only available at annual intervals (years 1-10), and so we had to interpolate to estimate the time periods impacted by AB 1373 (240 weeks and 480 weeks).

As we have discussed previously, the assumption regarding the mix of type of cancer is an important element in estimating the potential impact of AB 1373. Since the SEER data is nationwide and includes both occupational and non-occupational forms of cancer, we calculated three sets of estimates using SEER data. In the first method we adjusted the SEER data for the type of cancer mix from the WCIS data we were provided. Our concern with this method is that the WCIS had a relatively small number of claims we could use for this study, and we were not able to identify the type of cancer for 40% of those claims. In the second method we used SEER data without adjusting for type of cancer. In other words, we assumed that the mix of cancer for AB 1373 is the same as for national cancer rates.

V. Discussion of NIOSH Study

We have reviewed the results of the NIOSH study "Mortality and cancer incidence in a pooled cohort of US firefighters from San Francisco, Chicago and Philadelphia (1950–2009)" and incorporated the findings into our report. The study was released in October 2013.

The NIOSH Study is directly relevant to the issues addressed in AB 1373 because it specifically analyzed the cancer incidence and mortality rates for firefighters. The study followed a cohort of 29,993 firefighters employed between 1950 and 2009, including 5,313 from San Francisco. Firefighter job classifications included in the study were as follows: "general classifications of firefighters, firefighter paramedics, and fire department arson investigator" (Page 2). The study cites concerns related to cancer risk for firefighters, because firefighters are potentially "exposed to many known carcinogens (e.g., polycyclic aromatic hydrocarbons (PAHs), formaldehyde, benzene, 1,3-butadiene, asbestos, and arsenic) in volatilized combustion and pyrolysis products or debris" (Page 1). The study did not analyze cancer rates related to police.

The study did not find elevated mortality rates for firefighters in general; however, it did find elevated incidence and mortality due to specific types of cancer. It is possible that the elevated rate of cancer is offset by the fact that firefighters are typically healthier than the general population, thus their overall mortality is not elevated. For example, the study cites that firefighters are less likely to smoke than the general population.

The key findings of the NIOSH study are summarized in the following table (Page 4 of NIOSH). This shows that the firefighters in this study had higher mortality rates than the general U.S. population for cancer in general and for most specific types of cancer. However, only eight of the nineteen types of cancer included in the study had at least a 95% confidence of elevated cancer mortality.

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Table 3
Key Findings of NIOSH Study

Underlying Cause (Cancer)	# of Observations (Deaths)[1]	% of Observations Above/ (Below) Expected[2]	Range of 95% Confidence Level[3]	Likelihood That Cancer is Elevated, Based on LeMasters *et al*[4]
	(A)	(B)	(C)	(D)
All Cancers	3,285	14%	10% to 18%	Unlikely
Oesophagus	113	39%	14% to 67%	Unlikely
Stomach	110	10%	-9% to 33%	Possible
Intestine	326	30%	16% to 44%	NA
Large intestine	264	31%	16% to 48%	Possible
Small intestine	8	66%	-28% to 227%	NA
Rectum	89	45%	16% to 78%	Possible
Lung	1,046	10%	4% to 17%	Unlikely
Breast	8	39%	-40% to 173%	NA
Prostate	282	9%	-4% to 22%	Probable
Other male genital	<5	-53%	-87% to 20%	NA
Testes	<5	-27%	-85% to 114%	Possible
Kidney	94	29%	5% to 58%	Unlikely
Bladder	84	-1%	-21% to 22%	Unlikely
Brain	73	1%	-21% to 27%	Possible
Non-Hodgkin lymphoma	123	17%	-3% to 40%	Probable
Leukaemia	122	10%	-9% to 31%	Possible
Multiple myeloma	42	-11%	-36% to 20%	Probable
Mesothelioma	12	100%	3% to 249%	NA
Buccal and pharynx	94	40%	13% to 72%	Possible

[1] The number of deaths of those included in the study.

[2] The percentage that the observed number of deaths was greater (or less) than expected. The expected number of deaths was based on mortality assumptions from the general U.S. population. The NIOSH study calculates Standardized Mortality Ratios (SMRs), which represents the number of observed divided by expected mortalities. Therefore, the SMR minus one equals the percentage that observed mortality is above or below expected mortality.

[3] This is the statistical range in which one can be 95% sure that cancers of firefighters are above or below the general population. For example, the range for all cancers is 10% to 18%. This means that based on the findings in this report, one can be 95% confident that firefighters such as those included in this study have a risk of mortality due to cancer that is between 10% and 18% above that of the general U.S. population.

[4] Prior to the release of the NIOSH article, LeMasters et al released a meta-analysis, which is essentially a review of other studies. The findings of this meta-analysis are summarized in this column.

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In addition to the issue of whether firefighters generally have an elevated risk of cancer, there are several other issues discussed in the NIOSH study that are relevant to AB 1373.

1. Gender: About 3.3% of the firefighters included in the NIOSH study were female (Page 3). Females did not show an elevated risk for mortality due to cancer, but females did have a slightly elevated risk of the incidence of cancer (Page 5). However, it should be emphasized that females made up a relatively small sample size.

2. Race: About 16.7% of the firefighters included in the NIOSH study were non-Caucasian (Page 3). Non-Caucasians had a decreased risk of overall mortality and mortality due to cancer (Page 5). The incidence of cancer among non-Caucasians was close to expected levels.

3. Regional Differences: Since CHSWC is specifically interested in the experience of firefighters in California, it is important to examine if the results varied by location. The NIOSH study did not find significant differences in cancer rates between the three locations analyzed: San Francisco, Chicago, and Philadelphia (Page 8).

4. Age Groups: The NIOSH study did not find substantial differences in the amount that firefighter cancer mortality varied from general U.S. cancer mortality by age group.

5. Amount That Observed Mortality Exceeds Expected: We believe the NIOSH study could be helpful to public policymakers in evaluating workers' compensation presumptions. For example, the NIOSH study recorded 3,285 firefighter cancer death observations, which was 14% higher than would have been expected using the general U.S. population as a reference. This means that if the group in the study had been the general U.S. population, then one would have expected about 2,880 cancer deaths. The additional 405 deaths (3,285 minus 2,880) are associated with risks and exposures faced by firefighters. For some types of cancer the firefighter mortality was slightly higher than expected, whereas for other types it was much higher than expected.

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VI. Limitations

There are several limitations in extrapolating the findings of this report to the impact of AB 1373. These key limitations are described in the Summary section of this report, and they are elaborated on below.

1. Benefits per Claim: We have assumed an average death benefit of $250,000 per claim. In reality death benefits vary depending on the claimant's number of dependents, and the average number of dependents per claimant may change with the extension of the death benefit statute of limitations. If AB 1373 extends the statute of limitations for death benefits, those who are newly eligible based on this extension are likely not (on average) the same age as those who are eligible under the current law. Since the number of dependents is most likely highly correlated with age, it is likely that extending the death benefit would have an impact on the average number of dependents per claimant, and thus is would affect the average cost per claim. We did not have enough information to reflect this consideration in our interim analysis.

2. Utilization: The results in this report relate to cancer deaths but not necessarily to workers' compensation claims. It is unclear what percentage of deaths will result in workers' compensation claims even if they are eligible to do so.

3. Low Volume of WCIS Claims Data: As discussed earlier, the WCIS database showed only 174 cancer-related death claims with dates of injury between 2000 and 2012. We are extremely wary of trying to extrapolate the statewide impact of a statute change from 174 claims.

4. SEER Cancer Survival/Mortality Rates: It should be noted the SEER mortality rates are based on people who are diagnosed with cancer but who die of any cause, not just cancer. This is a mismatch with the death benefits addressed in AB 1373. Those death benefits relate primarily to deaths caused by cancer. In addition, the SEER data is based on the general population, and we have assumed the cancer survival periods reported by SEER are applicable to safety officers.

5. Employees Affected by AB 1373: This study concentrates only on cancer claims for firefighters and police officers. In reality this does not encompass all of the illnesses and personnel that would be impacted by AB 1373; however, we feel it does cover the vast majority of workers' compensation cases that would be impacted by AB 1373.

6. NIOSH Study: We have incorporated the results of the NIOSH study to adjust our expectation of firefighter cancer incidence and mortality. Since the study only applied to firefighters, we did not adjust police cancer rates.

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7. Changes in Exposures, Demographics, Safety Methods, and Cancer Treatment: Our results are based primarily on analyzing historical results. However, many important factors leading to cancer change over time, including exposures to carcinogenic materials, the age and gender of safety officers, safety methods used to protect safety officers from exposure to carcinogens, and medical treatment for cancer. Changes in any of these factors will cause future cancer incidence and mortality to vary from the projections in our report.

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Exhibits

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Cost of Presumption Claims Exhibit 1

Assumption Regarding Mix of Cancers	Fire (1)	Police (2)	Total (3)
WCIS Distribution	1,500,000	3,500,000	5,000,000
NIOSH	1,500,000	3,250,000	4,750,000
SEER	1,250,000	3,000,000	4,250,000

(1) Exhibit 2
(2) Exhibit 3

Annual Cancer Deaths and Death Benefits Exhibit 2

Firefighters: California Page 1

Impact of Statute of Limitations Extension Based on SEER Data with WCIS Weights

Age Grouping	Firefighters # of Nationwide Active (000's) (1)	% of Nationwide Active (2)	California Active (3)	Cancer Incidence Rate (4)	# of Cancer Incidence (5)	% die 240-480 weeks after diagnosis (6)	# of Cancer Deaths 240-480 weeks after diagnosis (7)
16-19years	2	0.5%	164	20	0	4.4%	0
20-24years	23	5.4%	1,885	121	2	6.1%	0
25-34years	138	32.2%	11,271	121	14	6.1%	1
35-44years	127	29.8%	10,410	121	13	6.1%	1
45-54years	99	23.2%	8,115	535	43	6.0%	3
55-64years	33	7.6%	2,664	950	25	5.9%	1
65 years and over	6	1.3%	451	2,489	11	5.5%	1
Total	427	100.0%	34,960		108		6
Cost per Claim							250,000
Total Cost = # of Claims x Cost per Claim							1,500,000

(1) From BLS
(2) Based on (1)
(3) Total Firefighters & Police/Sheriffs based on BLS
Spread by age grouping according to (2)
(4) From SEER data (all cancer, male), rate per 100,000
(5) = (3) x (4) / 100,000
(6) Based on SEER data, with weighting of cancer type based on WCIS data
(7) = (5) x (6)

Annual Cancer Deaths and Death Benefits Exhibit 2

Firefighters: California Page 2

Impact of Statute of Limitations Extension Based on SEER Data with NIOSH Weights

Age Grouping	Firefighters # of Nationwide Active (000's) (1)	% of Nationwide Active (2)	California Active (3)	Cancer Incidence Rate (4)	# of Cancer Incidence (5)	% die 240-480 weeks after diagnosis (6)	# of Cancer Deaths 240-480 weeks after diagnosis (7)
16-19years	2	0.5%	164	20	0	3.1%	0
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35-44years	127	29.8%	10,410	121	13	5.0%	1
45-54years	99	23.2%	8,115	535	43	5.4%	2
55-64years	33	7.6%	2,664	950	25	5.8%	1
65 years and over	6	1.3%	451	2,489	11	6.1%	1
Total	427	100.0%	34,960		108		6
Cost per Claim							250,000
Total Cost = # of Claims x Cost per Claim							1,500,000

(1) From BLS
(2) Based on (1)
(3) Total Firefighters & Police/Sheriffs based on BLS
Spread by age grouping according to (2)
(4) From SEER data (all cancer, male), rate per 100,000
(5) = (3) x (4) / 100,000
(6) Based on SEER data, with weighting of cancer type based on NIOSH data
(7) = (5) x (6)

Annual Cancer Deaths and Death Benefits Exhibit 2

Firefighters: California Page 3

Impact of Statute of Limitations Extension Based on SEER Data with SEER Weights

Age Grouping	Firefighters # of Nationwide Active (000's) (1)	% of Nationwide Active (2)	California Active (3)	Cancer Incidence Rate (4)	# of Cancer Incidence (5)	% die 240-480 weeks after diagnosis (6)	# of Cancer Deaths 240-480 weeks after diagnosis (7)
16-19years	2	0.5%	164	20	0	3.2%	0
20-24years	23	5.4%	1,885	121	2	5.1%	0
25-34years	138	32.2%	11,271	121	14	5.1%	1
35-44years	127	29.8%	10,410	121	13	5.1%	1
45-54years	99	23.2%	8,115	535	43	5.0%	2
55-64years	33	7.6%	2,664	950	25	4.9%	1
65 years and over	6	1.3%	451	2,489	11	4.4%	0
Total	427	100.0%	34,960		108		5
Cost per Claim							250,000
Total Cost = # of Claims x Cost per Claim							1,250,000

(1) From BLS
(2) Based on (1)
(3) Total Firefighters & Police/Sheriffs based on BLS
Spread by age grouping according to (2)
(4) From SEER data (all cancer, male), rate per 100,000
(5) = (3) x (4) / 100,000
(6) Based on SEER data, with weighting of cancer type based on SEER data
(7) = (5) x (6)

Annual Cancer Deaths and Death Benefits Exhibit 3

Police: California Page 1

Impact of Statute of Limitations Extension Based on SEER Data with WCIS Weights

Age Grouping	Police # of Nationwide Active (000's) (1)	% of Nationwide Active (2)	California Active (3)	Cancer Incidence Rate (4)	# of Cancer Incidence (5)	% die 240-480 weeks after diagnosis (6)	# of Cancer Deaths 240-480 weeks after diagnosis (7)
16-19years	2	0.2%	156	18	0	4.2%	0
20-24years	25	2.5%	1,948	111	2	5.8%	0
25-34years	270	27.4%	20,998	111	23	5.8%	1
35-44years	334	34.0%	26,023	111	29	5.8%	2
45-54years	221	22.5%	17,219	491	84.57	5.7%	5
55-64years	109	11.0%	8,454	872	74	5.7%	4
65 years and over	23	2.3%	1,753	2,283	40	5.3%	2
Total	983	100.0%	76,550		252		14
Cost per Claim							250,000
Total Cost = # of Claims x Cost per Claim							3,500,000

(1) From BLS
(2) Based on (1)
(3) Total Firefighters & Police/Sheriffs based on BLS
Spread by age grouping according to (2)
(4) From SEER data (all cancer, male), rate per 100,000
(5) = (3) x (4) / 100,000
(6) Based on SEER data, with weighting of cancer type based on WCIS data
(7) = (5) x (6)

Annual Cancer Deaths and Death Benefits Exhibit 3

Police: California Page 2

Impact of Statute of Limitations Extension Based on SEER Data with NIOSH Weights

Age Grouping	Police # of Nationwide Active (000's) (1)	% of Nationwide Active (2)	California Active (3)	Cancer Incidence Rate (4)	# of Cancer Incidence (5)	% die 240-480 weeks after diagnosis (6)	# of Cancer Deaths 240-480 weeks after diagnosis (7)
16-19years	2	0.2%	156	18	0	3.0%	0
20-24years	25	2.5%	1,948	111	2	4.8%	0
25-34years	270	27.4%	20,998	111	23	4.8%	1
35-44years	334	34.0%	26,023	111	29	4.8%	1
45-54years	221	22.5%	17,219	491	85	5.2%	4
55-64years	109	11.0%	8,454	872	74	5.5%	4
65 years and over	23	2.3%	1,753	2,283	40	5.8%	2
Total	983	100.0%	76,550		252		13
Cost per Claim							250,000
Total Cost = # of Claims x Cost per Claim							3,250,000

(1) From BLS
(2) Based on (1)
(3) Total Firefighters & Police/Sheriffs based on BLS
Spread by age grouping according to (2)
(4) From SEER data (all cancer, male), rate per 100,000
(5) = (3) x (4) / 100,000
(6) Based on SEER data, with weighting of cancer type based on NIOSH data
(7) = (5) x (6)

Annual Cancer Deaths and Death Benefits Exhibit 3

Police: California Page 3

Impact of Statute of Limitations Extension Based on SEER Data with SEER Weights

Age Grouping	Police # of Nationwide Active (000's) (1)	% of Nationwide Active (2)	California Active (3)	Cancer Incidence Rate (4)	# of Cancer Incidence (5)	% die 240-480 weeks after diagnosis (6)	# of Cancer Deaths 240-480 weeks after diagnosis (7)
16-19years	2	0.2%	156	18	0	3.1%	0
20-24years	25	2.5%	1,948	111	2	4.9%	0
25-34years	270	27.4%	20,998	111	23	4.9%	1
35-44years	334	34.0%	26,023	111	29	4.9%	1
45-54years	221	22.5%	17,219	491	85	4.8%	4
55-64years	109	11.0%	8,454	872	74	4.7%	3
65 years and over	23	2.3%	1,753	2,283	40	4.2%	2
Total	983	100.0%	76,550		252		12
Cost per Claim							250,000
Total Cost = # of Claims x Cost per Claim							3,000,000

(1) From BLS
(2) Based on (1)
(3) Total Firefighters & Police/Sheriffs based on BLS
Spread by age grouping according to (2)
(4) From SEER data (all cancer, male), rate per 100,000
(5) = (3) x (4) / 100,000
(6) Based on SEER data, with weighting of cancer type based on SEER data
(7) = (5) x (6)

Incidence of Cancer by Age Grouping Exhibit 4

Adjustment for Elevated Risk Found in NIOSH Study

Age Grouping	Incidence of Cancer General Population (1)	Increased Firefighter Incidence (2)	Incidence of Cancer Adjusted (3)
WCIS Distribution			
Ages < 20	18	1.09	20
Ages 20-49	111	1.09	121
Ages 50-64	872	1.09	950
Ages 65-74	2,283	1.09	2,489
Ages 75+	2,847	1.09	3,103

(1) Incidence from SEER Data (male only)

(2) From NIOSH Study (Table 2): Increased incidence = 1.09, increased mortality=1.14
Increased mortality given an incident = 1.05 (=1.14/1.09)

(3) Equals (1) x (2)

Percent of Cancer Deaths Between 240 & 480 Weeks
Based on Nationwide Data

Exhibit 5

Age Grouping	Survival Rates by Time after Diagnosis			Survival Rates by Time after Diagnosis			Mortality 240-480 weeks after diagnosis
	4 years (209 weeks) (1)	5 years (261 weeks) (2)	240 weeks (3)	9 years (470 weeks) (4)	10 years (522 weeks) (5)	480 weeks (6)	(7)
WCIS Distribution							
Ages < 20	27.5%	27.9%	27.7%	31.5%	33.9%	32.0%	4.2%
Ages 20-49	65.7%	67.8%	67.0%	72.7%	73.3%	72.8%	5.8%
Ages 50-64	72.4%	74.6%	73.7%	79.2%	80.0%	79.4%	5.7%
Ages 65-74	76.7%	78.5%	77.8%	82.9%	83.7%	83.1%	5.3%
Ages 75+	81.9%	83.4%	82.8%	87.1%	87.8%	87.3%	4.4%
NIOSH Distribution							
Ages < 20	30.2%	30.5%	30.4%	32.9%	35.4%	33.4%	3.0%
Ages 20-49	54.1%	55.9%	55.2%	59.9%	60.5%	60.0%	4.8%
Ages 50-64	55.7%	57.8%	56.9%	62.3%	63.1%	62.4%	5.5%
Ages 65-74	58.3%	60.3%	59.5%	65.1%	66.0%	65.3%	5.8%
Ages 75+	64.4%	66.1%	65.4%	70.8%	71.8%	71.0%	5.6%
SEER Distribution							
Ages < 20	20.1%	21.5%	20.9%	23.9%	24.3%	24.0%	3.1%
Ages 20-49	30.4%	32.0%	31.3%	36.1%	36.8%	36.2%	4.9%
Ages 50-64	30.8%	32.4%	31.8%	36.3%	37.0%	36.4%	4.7%
Ages 65-74	31.6%	32.9%	32.4%	36.5%	37.2%	36.6%	4.2%
Ages 75+	41.3%	42.8%	42.2%	47.6%	48.8%	47.8%	5.6%

(1) From SEER Data, 90% Male/10% Female
(2) From SEER Data, 90% Male/10% Female
(3) Interpolated from (1) and (2)
(4) From SEER Data, 90% Male/10% Female
(5) From SEER Data, 90% Male/10% Female
(6) Interpolated from (4) and (5)
(7) = (6) - (3)

Percent of Cancer Deaths Between 240 & 480 Weeks Exhibit 6

Adjustment for Elevated Risk Found in NIOSH Study

Age Grouping	Mortality 240-480 weeks after diagnosis Unadjusted (1)	Increased Firefighter Incidence (2)	Mortality 240-480 weeks after diagnosis Adjusted (3)
WCIS Distribution			
Ages < 20	4.2%	1.05	4.4%
Ages 20-49	5.8%	1.05	6.1%
Ages 50-64	5.7%	1.05	5.9%
Ages 65-74	5.3%	1.05	5.5%
Ages 75+	4.4%	1.05	4.7%
NIOSH Distribution			
Ages < 20	3.0%	1.05	3.1%
Ages 20-49	4.8%	1.05	5.0%
Ages 50-64	5.5%	1.05	5.8%
Ages 65-74	5.8%	1.05	6.1%
Ages 75+	5.6%	1.05	5.8%
SEER Distribution			
Ages < 20	3.1%	1.05	3.2%
Ages 20-49	4.9%	1.05	5.1%
Ages 50-64	4.7%	1.05	4.9%
Ages 65-74	4.2%	1.05	4.4%
Ages 75+	5.6%	1.05	5.9%

(1) From Exhibit 5

(2) From NIOSH Study (Table 2): Increased incidence = 1.09, increased mortality=1.14
Increased mortality given an incident = 1.15 (=1.14/1.09)

(3) Equals (1) x (2)