OLIVER WYMAN

# ANALYSIS OF THE POTENTIAL COST IMPACT OF INCLUDING ADDITIONAL CANCERS AND PTSD AS PRESUMPTIVE CONDITIONS FOR CERTAIN PUBLIC SAFETY OFFICERS

JOINT LEGISLATIVE AUDIT AND REVIEW COMMISSION
GENERAL ASSEMBLY
COMMONWEALTH OF VIRGINIA

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# Introduction

## Scope

Oliver Wyman Actuarial Consulting, Inc. (Oliver Wyman) has been engaged by the Joint Legislative Audit and Review Commission (JLARC) of the General Assembly, Commonwealth of Virginia, to estimate the potential cost impact of adding certain cancers and Post Traumatic Stress Disorder (PTSD) to the list of conditions presumed to be occupational diseases[1] as respect to public safety officers.

HB1804[2] and SB1465[3] (hereafter referred to as the "proposed legislation") outline the specific conditions to be covered along with the types of public safety officers to be covered, as follows:

- Including colon, brain, and testicular cancers as presumptive diseases of firefighters and hazardous duty materials officers.
- Including PTSD as a presumptive condition for firefighters, hazardous materials officers, and law enforcement officers.

The addition of these items to the list of conditions presumed to be occupational diseases will increase the number of workers compensation (WC) claims and therefore increase WC costs for the various governmental jurisdictions that employ[4] public safety officers. This includes the various villages, municipalities, counties, as well as the Commonwealth itself as an employer. For the purpose of this report, these various governmental jurisdictions are referred to as "municipalities."

Specifically, Oliver Wyman has been engaged to provide the following work products to JLARC:

***Task 1***
If colon, brain, and testicular cancer are added to Virginia's list of disease presumptions for firefighters and hazardous materials officers, over a one-, five-, and ten-year period:

1. What is the estimated change in the number of newly compensable WC claims?

[1] § 65.2-402, Code of Virginia, defines those conditions that are presumed to be occupational diseases for certain occupations. See Section 7 of this report.

[2] See Section 8 of this report. HB1804 introduces the expansion of the cancer presumption.

[3] See Section 8 of this report. SB1465 introduces PTSD as an occupational disease.

[4] The term "employ" is intended to include volunteer firefighters.

2. What is the estimated change in the costs of medical, indemnity, and death benefits associated with newly compensable WC claims?
3. What is the estimated change in employer premiums for medical, indemnity, and death benefits associated with newly compensable WC claims?

For each question, JLARC will need cost estimates for:

(i) each type of cancer by each individual occupation,

(ii) each type of cancer aggregated across the two occupations, and

(iii) the three cancers aggregated across the two occupations.

***Task 2***

If PTSD is added to Virginia's list of disease presumptions for firefighters, law enforcement officers, and hazardous materials officers, over a one-, five-, and ten-year period:

1. What is the estimated change in the number of newly compensable WC claims?
2. What is the estimated change in the costs of medical, indemnity, and death benefits associated with newly compensable WC claims?
3. What is the estimated change in employer premiums for medical, indemnity, and death benefits associated with newly compensable WC claims?

For each question, JLARC will need cost estimates for:

(i) PTSD by each individual occupation, and

(ii) PTSD aggregated across the three occupations.

# 2

## Executive Summary

The following series of charts display the principal results of this study. Each is discussed individually below.

**Chart 1** displays the expected one-year cost of benefits (indemnity and medical) and loss adjustment expense (claim related expenses) per employee, by individual occupation.[5] Loss adjustment expense (LAE) refers to non-benefit claim related expenses and is more fully explained later in this report. The chart also presents a range of potential values, as opposed to a single value, due to the scarcity of useable data as well as the uncertainty of data that is available for analysis. The cost of benefits and LAE are generally referred to as a loss cost. Loss costs provide only for the cost of benefits and LAE and do not include provisions for insurance company expenses and profit. Loss costs are useful because they reflect the full cost of claims, prior to consideration of any other risk management or insurance premium costs. Loss costs are especially useful for self-insured entities, given that self-insured entities generally fund the cost of their own claims, up to some claim value, above which the self-insured entity will generally have insurance protection.

**Chart 2** displays the expected one-year cost of premium per employee. The difference between the values in Chart 2 from the values in Chart 1 is that the values in Chart 2 include provisions for loss costs (benefits and LAE) as well as insurance company expenses and profit. Premium is calculated by multiplying loss costs by a flat factor to include insurance company expenses and profit. A factor of 1.304, based on general industry expectations, was used. This factor will vary within a wide range of values depending on the individual insurer, the individual insured, and other considerations.

**Chart 3** displays the total expected number of additional annual compensable workers compensation claims per year, by occupation.

**Chart 4** displays the total expected additional workers compensation costs, by occupation, for benefits (indemnity and medical) and LAE.

**Chart 5** presents a rough estimate of the impact on workers compensation loss costs for specific classes of employees.

[5] The occupational data used in this analysis is from the Virginia Employment Commission and is discussed in greater detail later in this report.

**CHART 1**

## Estimated Cost of Indemnity Benefits, Medical Benefits, and LAE One Year per Employee

### Brain Cancer

| OCCUPATION | LOW | HIGH |
|---|---|---|
| Animal Control Workers and Caretakers | $0 | $0 |
| Police, Fire, and Ambulance Dispatchers | $0 | $0 |
| All Police, Sheriff Officers, Detectives & Investigators | $0 | $0 |
| First-Line Supervisors of Police and Detectives | $0 | $0 |
| First-Line Supervisors of Fire Fighting and Prev. Workers | $12 | $45 |
| Firefighters | $12 | $38 |
| Fire Inspectors and Investigators | $12 | $38 |

### Testicular Cancer

| OCCUPATION | LOW | HIGH |
|---|---|---|
| Animal Control Workers and Caretakers | $0 | $0 |
| Police, Fire, and Ambulance Dispatchers | $0 | $0 |
| All Police, Sheriff Officers, Detectives & Investigators | $0 | $0 |
| First-Line Supervisors of Police and Detectives | $0 | $0 |
| First-Line Supervisors of Fire Fighting and Prev. Workers | $3 | $29 |
| Firefighters | $3 | $22 |
| Fire Inspectors and Investigators | $3 | $22 |

### Colon Cancer

| OCCUPATION | LOW | HIGH |
|---|---|---|
| Animal Control Workers and Caretakers | $0 | $0 |
| Police, Fire, and Ambulance Dispatchers | $0 | $0 |
| All Police, Sheriff Officers, Detectives & Investigators | $0 | $0 |
| First-Line Supervisors of Police and Detectives | $0 | $0 |
| First-Line Supervisors of Fire Fighting and Prev. Workers | $63 | $167 |
| Firefighters | $63 | $140 |
| Fire Inspectors and Investigators | $63 | $143 |

### PTSD

| OCCUPATION | LOW | HIGH |
|---|---|---|
| Animal Control Workers and Caretakers | $95 | $468 |
| Police, Fire, and Ambulance Dispatchers | $95 | $476 |
| All Police, Sheriff Officers, Detectives & Investigators | $95 | $593 |
| First-Line Supervisors of Police and Detectives | $95 | $754 |
| First-Line Supervisors of Fire Fighting and Prev. Workers | $91 | $486 |
| Firefighters | $91 | $418 |
| Fire Inspectors and Investigators | $91 | $425 |

## CHART 2

### Estimated Premium Cost
### One Year per Employee

**Brain Cancer**

| OCCUPATION | LOW | HIGH |
|---|---|---|
| Animal Control Workers and Caretakers | $0 | $0 |
| Police, Fire, and Ambulance Dispatchers | $0 | $0 |
| All Police, Sheriff Officers, Detectives & Investigators | $0 | $0 |
| First-Line Supervisors of Police and Detectives | $0 | $0 |
| First-Line Supervisors of Fire Fighting and Prev. Workers | $16 | $59 |
| Firefighters | $16 | $49 |
| Fire Inspectors and Investigators | $16 | $50 |

**Testicular Cancer**

| OCCUPATION | LOW | HIGH |
|---|---|---|
| Animal Control Workers and Caretakers | $0 | $0 |
| Police, Fire, and Ambulance Dispatchers | $0 | $0 |
| All Police, Sheriff Officers, Detectives & Investigators | $0 | $0 |
| First-Line Supervisors of Police and Detectives | $0 | $0 |
| First-Line Supervisors of Fire Fighting and Prev. Workers | $4 | $38 |
| Firefighters | $4 | $28 |
| Fire Inspectors and Investigators | $4 | $29 |

**Colon Cancer**

| OCCUPATION | LOW | HIGH |
|---|---|---|
| Animal Control Workers and Caretakers | $0 | $0 |
| Police, Fire, and Ambulance Dispatchers | $0 | $0 |
| All Police, Sheriff Officers, Detectives & Investigators | $0 | $0 |
| First-Line Supervisors of Police and Detectives | $0 | $0 |
| First-Line Supervisors of Fire Fighting and Prev. Workers | $82 | $218 |
| Firefighters | $82 | $183 |
| Fire Inspectors and Investigators | $82 | $187 |

**PTSD**

| OCCUPATION | LOW | HIGH |
|---|---|---|
| Animal Control Workers and Caretakers | $123 | $610 |
| Police, Fire, and Ambulance Dispatchers | $123 | $621 |
| All Police, Sheriff Officers, Detectives & Investigators | $123 | $773 |
| First-Line Supervisors of Police and Detectives | $123 | $984 |
| First-Line Supervisors of Fire Fighting and Prev. Workers | $119 | $634 |
| Firefighters | $119 | $545 |
| Fire Inspectors and Investigators | $119 | $555 |

## CHART 3

The charts below display the low-end and high-end estimates of the expected number of additional compensable workers compensation claims per year.

| LOW ESTIMATE<br>Expected Additional Compensable WC Claims Per Year | Brain Cancer | Test. Cancer | Colon Cancer | All Cancer | PTSD | All |
|---|---|---|---|---|---|---|
| Animal Control Workers and Caretakers | - | - | - | - | 3.2 | 3.2 |
| Police, Fire, and Ambulance Dispatchers | - | - | - | - | 12.0 | 12.0 |
| All Police, Sheriff Officers, Detectives & Investigators | - | - | - | - | 91.2 | 91.2 |
| First-Line Supervisors of Police and Detectives | - | - | - | - | 11.4 | 11.4 |
| First-Line Supervisors of Fire Fighting and Prev. Workers | 0.1 | 0.1 | 0.6 | 0.8 | 27.0 | 27.9 |
| Firefighters | 0.6 | 0.6 | 2.9 | 4.1 | 133.0 | 137.2 |
| Fire Inspectors and Investigators | 0.0 | 0.0 | 0.1 | 0.1 | 2.4 | 2.4 |
| TOTAL | 0.7 | 0.7 | 3.6 | 5.1 | 280.2 | 285.3 |

| HIGH ESTIMATE<br>Expected Additional Compensable WC Claims Per Year | Brain Cancer | Test. Cancer | Colon Cancer | All Cancer | PTSD | All |
|---|---|---|---|---|---|---|
| Animal Control Workers and Caretakers | - | - | - | - | 6.7 | 6.7 |
| Police, Fire, and Ambulance Dispatchers | - | - | - | - | 25.4 | 25.4 |
| All Police, Sheriff Officers, Detectives & Investigators | - | - | - | - | 192.6 | 192.6 |
| First-Line Supervisors of Police and Detectives | - | - | - | - | 24.1 | 24.1 |
| First-Line Supervisors of Fire Fighting and Prev. Workers | 0.2 | 0.2 | 0.7 | 1.1 | 57.1 | 58.2 |
| Firefighters | 0.9 | 0.9 | 3.4 | 5.3 | 281.1 | 286.4 |
| Fire Inspectors and Investigators | 0.0 | 0.0 | 0.1 | 0.1 | 5.0 | 5.1 |
| TOTAL | 1.1 | 1.1 | 4.1 | 6.4 | 592.0 | 598.5 |

## CHART 4

The charts below display the low-end and high-end estimates of the expected additional cost of indemnity benefits, medical benefits, and LAE per year. The estimates are at a 2020 cost level.

| LOW ESTIMATE<br>Expected Additional WC Costs per Year | Brain Cancer | Test. Cancer | Colon Cancer | All Cancer | PTSD | All |
|---|---|---|---|---|---|---|
| Animal Control Workers and Caretakers | - | - | - | - | 60,578 | 60,578 |
| Police, Fire, and Ambulance Dispatchers | - | - | - | - | 228,114 | 228,114 |
| All Police, Sheriff Officers, Detectives & Investigators | - | - | - | - | 1,731,208 | 1,731,208 |
| First-Line Supervisors of Police and Detectives | - | - | - | - | 216,756 | 216,756 |
| First-Line Supervisors of Fire Fighting and Prev. Workers | 43,293 | 10,174 | 220,578 | 274,046 | 506,354 | 780,400 |
| Firefighters | 212,464 | 49,923 | 1,082,713 | 1,345,101 | 2,492,822 | 3,837,923 |
| Fire Inspectors and Investigators | 3,764 | 884 | 19,179 | 23,828 | 44,144 | 67,971 |
| TOTAL | 259,522 | 60,982 | 1,322,471 | 1,642,975 | 5,279,977 | 6,922,952 |

| HIGH ESTIMATE<br>Expected Additional WC Costs per Year | Brain Cancer | Test. Cancer | Colon Cancer | All Cancer | PTSD | All |
|---|---|---|---|---|---|---|
| Animal Control Workers and Caretakers | - | - | - | - | 299,300 | 299,300 |
| Police, Fire, and Ambulance Dispatchers | - | - | - | - | 1,147,233 | 1,147,233 |
| All Police, Sheriff Officers, Detectives & Investigators | - | - | - | - | 10,840,708 | 10,840,708 |
| First-Line Supervisors of Police and Detectives | - | - | - | - | 1,727,392 | 1,727,392 |
| First-Line Supervisors of Fire Fighting and Prev. Workers | 157,454 | 101,388 | 584,533 | 843,376 | 2,709,854 | 3,553,230 |
| Firefighters | 646,639 | 370,717 | 2,412,130 | 3,429,485 | 11,455,937 | 14,885,423 |
| Fire Inspectors and Investigators | 11,707 | 6,821 | 43,643 | 62,170 | 206,622 | 268,792 |
| TOTAL | 815,800 | 478,926 | 3,040,306 | 4,335,031 | 28,387,046 | 32,722,077 |

## CHART 5

The following chart provides the low-end and high-end estimates of the percentage impact on WC loss costs if the bills under examination become law. There are material concerns with the information in the chart. An explanation of the chart, as well as a discussion of the concerns, follow.

| WC Classification Code | Description | VA Loss Cost | Low PTSD | Low Cancer | Low Total | Low Impact |
|---|---|---|---|---|---|---|
| 7720 | Police Officers & Drivers | $1.56 | $0.20 | $0.00 | $0.20 | 13% |
| 7710, 7711 | Firefighters & Drivers (employed and vol. | $4.17 | $0.15 | $0.17 | $0.33 | 8% |

| WC Classification Code | Description | VA Loss Cost | High PTSD | High Cancer | High Total | High Impact |
|---|---|---|---|---|---|---|
| 7720 | Police Officers & Drivers | $1.56 | $1.03 | $0.00 | $1.03 | 66% |
| 7710, 7711 | Firefighters & Drivers (employed and vol. | $4.17 | $0.73 | $0.46 | $1.19 | 29% |

The chart above compares the expected additional cost of indemnity benefits, medical benefits, and LAE combined per $100 of payroll (loss costs), if the proposed legislation under examination becomes law, to Virginia loss costs[6] for two workers compensation classifications, 7720 (police officers and drivers) and 7710/7711 (firefighters and drivers). 7710 are employed firefighters and 7711 are voluntary firefighters. 7710 and 7711 are presented as a single classification because the published loss costs in Virginia are the same for both classifications. These two classifications were selected because specific loss costs for the other classifications presented in the previous charts do not exist. This is a function of material differences between the workers compensation employee classification system in Virginia and the employee classification system used by the United States Department of Labor and the Virginia Employment Commission. These differences contribute to the concerns with the above comparison.

Based on the information in the chart, the impact on loss costs for 7720, police officers, is an increase of $0.20 per $100 payroll to $1.03 per $100 payroll. This translates to an impact of +13% to +66%.

Similarly, the impact on loss costs for 7710/7711, firefighters, is an increase of $0.33 per $100 payroll to $1.19 per $100 payroll. This translates to an impact of +8% to +29%.

A fundamental issue the comparison displayed on the previous charts is that the percentage impact is critically dependent on the starting point, that is, the Virginia loss cost for these classifications. The Virginia loss costs for these classifications is based only on data from municipalities that are in the insurance system, that is, they purchase insurance from insurance carriers licensed to write direct WC insurance policies in Virginia. Information from self-insured municipalities and self-insured groups is not collected by the insurance industry and is therefore not included in published insurance industry loss costs. In fact, for police officers, it is clear from published data that the insurance system captures loss experience from only 10% to 15% of all police officers in

[6] The loss costs are those proposed to take effect April 1, 2020.

Virginia, at most. Therefore, the benchmarks in the above chart are likely not representative of the loss cost of all police officers in Virginia. The same issue applies to firefighters, where data within the insurance system appears to be capturing the loss experience of less than a few percent of all firefighters in the state.

Another equally important issue is the definition of the employees that are included in classifications 7720 and 7710/7711. There are strict definitions that are used for underwriting purposes within the insurance system. For example, 7720 applies to every employee of a police department except clerical workers.

Finally, loss costs are expressed as a cost per $100 payroll. Therefore, the actual loss cost is going to depend on the annual compensation of the public safety officers in a specific municipality. To the extent that compensation is smaller or larger in one municipality relative to another, loss costs will be larger or smaller, respectively, in that municipality.

Similar concerns would apply if the loss costs derived from the loss experience of a self-insured group were used for this measurement as opposed to the published insurance industry loss costs.

***Given the above, the expected costs per employee are likely the best benchmarks to use to determine the cost impact of the proposed legislation.***

# 3

# Considerations Regarding Data Limitations

The availability and consistency of data has proven to be a material constraint to the accuracy and precision underlying the results of this study. The following is a list of issues regarding the data (or lack thereof) used for this study, assumptions, as well as other concerns.

## Expansion of the Cancer Presumption

1. The frequency of additional claims due to expansion of the cancer presumption is a critical data element for this analysis. Research on the part of Oliver Wyman, supplemented by additional information provided by Johns Hopkins University[7] for the purpose of this study, showed that there is limited data available for these measurements and that data which is available has a wide range of values. Therefore, frequency is best expressed by a range of results based on low-end and high-end frequency measurements based on data from available research and studies. Results are therefore presented in terms of a low-end estimate based on the selected low-end frequency, and a high-end estimate based on the selected high-end frequency. ***It would be inappropriate to average the low-end and high-end estimates and call that an "average." There is no information available on the relative probability of results within the range. For example, if probabilities are higher near the low-end of the range, then the average result would be closer to the low-end than the high-end of the range, and vice versa. For the purpose of this report, the low-end and high-end estimates should be viewed as reasonable limits on the potential impact, with no information on what the average impact might be.***
2. The proposed expansion of the cancer presumption applies to firefighters, hazardous duty materials officers, as well as to other public safety officers afforded this presumption under §65.2-402 of Virginia law.[8] Available studies and data related to cancer incidence (which are limited to begin with, as mentioned above) are published only in terms of "firefighters" with minimal or no information on differences in frequency between different classes of firefighters (e.g., voluntary versus professional, supervisory versus non-supervisory, urban versus rural, etc.). Additionally, information regarding the differential in cancer frequency between the numerous job

[7] Johns Hopkins University was engaged by JLARC to provide additional information on the frequency of cancer claims and PTSD claims for the respective occupations.

[8] The specific wording of §65.2-402 is "…any volunteer or salaried firefighter, Department of Emergency Management hazardous materials officer, commercial vehicle enforcement officer or motor carrier safety trooper employed by the Department of State Police, or full-time sworn member of the enforcement division of the Department of Motor Vehicles having completed 12 years of continuous service…". HB1804 simply expands the list of cancers to include brain, colon, and testicular cancer.

classifications that would be affected by the proposed expansion of the cancer presumption under §65.2-402 of Virginia law is not available. Therefore, this analysis assumes that frequency of disease for each individual cancer is the same for each affected occupation under §65.2-402 of Virginia law.

3. Frequency assumptions do not consider the potential impact of challenges to the compensability of filed claims. To the extent that employers successfully defend against potential claims, should the proposed legislation become law, actual frequency may be less than the frequency used in this analysis, all else being equal. This study assumes that any individual who meets the requirements of Virginia law to file a claim for occupational disease due to the three additional cancers will do so successfully.
4. The occupational data used for this analysis is from the Virginia Employment Commission. The following occupations, with number of employees, were included in this analysis:

| | |
|---|---|
| Animal Control Workers | 390 |
| Detectives and Criminal Investigators | 1,280 |
| Fire Inspectors and Investigators | 170 |
| Firefighters | 9,600 |
| First-Line Supervisors of Fire Fighting and Prevention Workers | 1,950 |
| First-Line Supervisors of Police and Detectives | 2,290 |
| Nonfarm Animal Caretakers | 250 |
| Police and Sheriff's Patrol Officers | 16,860 |
| Police, Fire, and Ambulance Dispatchers | 2,410 |
| Transit and Railroad Police | 150 |

Note that the number of employees for the three fire related occupations are employed individuals only and do not include volunteer firefighters.

Security guards, Correctional Officers and Jailers, and Emergency Medical Technicians and Paramedics were excluded because these occupations are not explicitly included in the list of occupations within the law that may benefit from the proposed legislation. Emergency Management Directors were excluded because the law specifically states that these individuals must be hazardous materials officers and available data is not sufficiently specific to identify these individuals.

5. We assume that medical costs for each cancer do not to vary between occupations.
6. WC coverage provides for the cost of lost wages due to injury. This is generally referred to as the indemnity benefit. The amount of the indemnity benefit will depend on the number of lost work weeks and the pre-injury wages of the claimant. On an individual claimant basis, the number of lost work weeks due to cancer will depend on the type of cancer, severity of the disease (e.g., stage 1 versus stage 4, type of cancer, etc.), the general health of the claimant, the required duration of treatments, the

availability of restricted duty work,[9] etc. The pre-injury wages will vary from employee to employee within the same occupation (e.g., supervisory versus non-supervisory, experienced versus unexperienced, etc.) as well as between employees with different occupations. Given the large number of sources of variability and the unavailability of data from which to measure the potential lost work weeks, the following assumptions were made regarding lost work weeks:

| Type of Cancer | Brain | Testicular | Colon |
|---|---|---|---|
| Minimum Weeks | 4 | 1 | 4 |
| Maximum Weeks | 500 | 500 | 500 |

The selected minimum values are judgmental and reflect the difference between the gravity of brain and colon cancers relative to testicular cancer, which has a very high survival rate. The selected high values reflect the maximum number of weeks of temporary disability benefits in Virginia. As with frequency, the selected values are intended to define a range of possible results.

With respect to the pre-injury weekly wage, an active employee will receive compensation based on 2/3 of the pre-injury wage, subject to statutory maximum and minimum benefits. The weekly benefit rate by occupation is based on wage data from the Virginia Employment Commission. A volunteer employee will not have a pre-injury wage. Compensation for a volunteer employee is based on the minimum weekly benefit in Virginia, currently $275.50 (effective July 1, 2019).

7. The distribution of employees in the affected professions by age and gender is critical data for this analysis. National data was obtained by Oliver Wyman through general research, Virginia specific data was provided by the Virginia Department of Fire Programs (through JLARC), and several municipalities in Virginia provided data directly to Oliver Wyman at our request. For the purpose of this analysis, Oliver Wyman relied primarily on the data provided directly to Oliver Wyman from the municipalities for distributions by age, which was consistent with national data. For distributions by gender, we relied on the data provided by the municipalities directly to Oliver Wyman as well as national data obtained by Oliver Wyman through general research. 10% of firefighters were assumed to be female.
8. Estimates of brain cancer and colon cancer costs are gender weighted averages of the estimated medical costs for males and females, using the distribution of membership by gender based on national data obtained by Oliver Wyman through general research. For testicular cancer, the gender weighted average is the estimated medical cost multiplied by the portion of employees expected to be male plus zero cost multiplied by the portion of employees expected to be female.

[9] For example, a firefighter under treatment may be able to continue to work on a restricted duty basis, which will reduce the cost of indemnity benefits. The availability of such work will impact the WC cost of a claim.

## Addition of PTSD as an Occupational Disease

1. The frequency of additional claims due to including PTSD as an occupational disease is a critical data element for this analysis. Research on the part of Oliver Wyman, supplemented by additional information provided by Johns Hopkins University for the purpose of this study, showed that there is limited data available for these measurements and that data which is available has a wide range of values. Therefore, frequency is best expressed by a range of results based on low-end and high-end frequency measurements from available data. Results are therefore presented in terms of a low-end estimate based on the selected low-end frequency, and a high-end estimate based on the selected high-end frequency.
2. The proposed addition of PTSD (as stated in SB1465) to the list of conditions presumed to be occupational disease applies to numerous occupations associated with firefighters, hazardous duty materials officers, and law enforcement officers. As with cancer, available data is limited and does not distinguish between occupations. The analysis therefore assumes that all affected occupations will have the same frequency with respect to PTSD.
3. Frequency assumptions do not consider the potential impact of challenges to the compensability of filed claims. To the extent that employers successfully defend against these claims should the proposed bills become law, actual frequency may be less than the frequency used in this analysis, all else being equal. This study assumes that any individual who meets the requirements of Virginia law to file a claim for occupational disease will do so successfully.
4. The occupational data used for this analysis is from the Virginia Employment Commission and was discussed earlier under the cancer presumption.
5. Medical costs are assumed to be the same for each occupation.
6. As with a WC claim, the amount of indemnity benefits will depend on the number of lost work weeks and the pre-injury wages of the claimant. As respect to PTSD, the number of lost work weeks will depend on the severity of the condition, the length of treatment, the amount of lost time during treatment, the availability of restricted duty work, etc. Pre-injury wages will vary from employee to employee within the same occupation (e.g., supervisory versus non-supervisory, experienced versus unexperienced) as well as between employees with different occupations. Given the large number of sources of variability and the unavailability of data from which to measure the potential lost work weeks, we assumed a minimum of no lost time and a maximum of 39 weeks.

   With respect to the pre-injury weekly wage, an active employee will receive compensation based on 2/3 of the pre-injury wage, subject to statutory maximum and minimum benefits. The weekly benefit rate by occupation is based on wage data from the Virginia Employment Commission. A volunteer employee will not have a pre-injury wage. Compensation for a volunteer employee is based on the minimum weekly benefit in Virginia, currently $275.50 (effective July 1, 2019).

7. The distribution of employees in the affected professions by gender is critical data for this analysis. National data was obtained by Oliver Wyman through general research, Virginia specific data was provided by the Virginia Department of Fire Programs (through JLARC), and several municipalities in Virginia provided data directly to Oliver Wyman at our request. For distributions by gender, we relied on the data provided by the municipalities directly to Oliver Wyman as well as national data obtained by Oliver Wyman through general research. Females are assumed to represent 10% of all firefighter and 15% of all police officers.
8. Estimates of PTSD costs are gender weighted averages for medical costs.

## Voluntary Firefighter Counts

Assumptions were required to consider the portion of all firefighters in Virginia that are voluntary. Available data from the Virginia Employment Commission and other official sources are for employed firefighters. Nationally, the percentage of firefighters that are voluntary is quite high. For Virginia, an article was found that quoted the value at 65%.[10] Therefore, for the purpose of estimating PTSD costs, the percentage of firefighters in Virginia that are voluntary was assumed to be 65%. Data from the Virginia Employment Commission was increased accordingly. The 65% number is consistent with information from the Virginia Department of Fire Programs.

The situation in estimating cancer costs is different because of the 12-year vesting requirement. Analysis of data provided by several Virginia municipalities showed that the average age and the number of years of experience of volunteers is materially less than professional firefighters. General information supports this observation. This has a material impact on estimating cancer costs because if, on average, volunteers are younger, then on average the portion of volunteers meeting the 12-year vesting requirement will be less than that for professional firefighters. Therefore, for the purpose of examining the impact of expanding the cancer presumption, data from the Virginia Employment Commission was increased, but by an amount lower than that used for PTSD, to reflect that the portion of volunteer firefighters that meet the 12-year vesting requirement will be less than that for professional firefighters.

[10] https://wtvr.com/2018/02/22/virginia-teenagers-may-rescue-volunteer-fire-departments/

# 4

# WC Rate Development and Liabilities

## Components of WC Rates

1. The three key components of the cost of a specific WC claim are medical, indemnity, and loss adjustment expense (claim related expenses). A discussion of each component and concerns regarding the estimation of each component for the specific purpose of this study follows:

   ***Medical Costs***: WC provides for the cost of all related medical costs. The expected medical cost of a specific claim will be the same regardless of the type of employment and employment status of the claimant. Employment status refers to active employees versus volunteer employees.

   ***Indemnity Costs***: WC provides for the cost of lost wages due to injury. The amount of indemnity benefits will depend on the duration of injury, the pre-injury wages of the claimant, as well as the employment status of the claimant. Considering employment status first, an active employee will receive compensation based on 2/3 of the pre-injury wage, subject to statutory maximum and minimum benefits. A volunteer employee will not have a pre-injury wage. Compensation for a volunteer employee is based on the minimum weekly benefit in Virginia, currently $275.50 (effective July 1, 2019). The number of weeks of lost work time will depend on the nature and severity of the cancer or PTSD, the availability of light duty work (for employees who can work despite the condition, but cannot work at full capacity), as well as other issues that are specific to each individual case along with the specific municipality for which the claimant worked or volunteered. These issues, combined with the general lack of data with respect to the expected duration of disability for the individual cancers and PTSD, as well as the general uncertainty of other parameters, required general assumptions regarding the amount of indemnity benefits payable, as discussed in prior sections.

   ***Loss Adjustment Expense***: LAE refers to expenses other than benefit costs that are required to administer and adjudicate a WC claim. There are two components of LAE: Defense and Cost Containment Expenses (DCCE) and All Other Expenses (AOE). The following is a discussion of each component:

      ***DCCE***: DCCE was known as allocated loss adjustment expense prior to 1998[11] and includes expenses that may be allocated to a specific individual claim. Typically, DCCE includes expenses due to surveillance, cost containment, case management (such as nurse case management), litigation costs, expert witness costs, attorney fees, court costs, etc. Defense and litigation costs are usually the primary components of DCCE. Note that with respect to a specific municipality, the

[11] As defined for the purpose of statutory reporting of an insurance carrier's annual results.

effective definition of DCCE for a specific municipality is determined by what specific costs that municipality's claims administrator categorizes as DCCE. The specific costs categorized as DCCE may vary between entities.

***AOE***: Prior to 1998, AOE was known as unallocated loss adjustment expense. AOE includes expenses associated with claims administration and management that are not typically allocated to individual claims. AOE typically includes salaries, overhead, and other non-specific costs associated with claims management.

LAE data is available as an industry average for specific states, such as Virginia. LAE data is generally not available for specific individual claims and was not available for the purpose of this study. Therefore, general assumptions were made, based on industry specific data for Virginia.

2. WC costs may be expressed as the cost of benefits and LAE per unit exposure,[12] also known as a loss cost, or as a premium amount per unit exposure, also known as the premium rate. The loss cost is the starting point for creating a premium rate. Insurance carriers will start with the published loss cost for a specific employee classification (such as "firefighter") and subsequently load the loss cost for insurance company general expenses, commission, taxes, licenses, other expense, and profit. Municipalities that self-insure (i.e., act as their own insurance company) are interested in the underlying loss cost. Self-Insured municipalities create their own "premium rate" which they charge to themselves (and possibly allocate to different departments and agencies) to provide for the cost of WC claims incurred during a 12-month period. Municipalities that purchase insurance are more interested in the premium rate they will be charged by their insurance carriers. This study publishes both an estimate of the expected additional loss cost as well as an estimate of the expected additional premium rate that would be generated if the three cancers and PTSD were added to the list of presumptive conditions.

3. WC loss costs and premium rates are typically published as costs or rates per $100 payroll. If a specific employee classification has a published WC loss cost of $2.50 per $100 payroll, then the expected annual cost of benefits and LAE for a single employee with $40,000 of annual wages is $1,000 (= $40,000/100 X $2.50). The results of this study are not published as a cost per $100 payroll. Rather, results are published as costs per employee per year, or a per capita loss cost or premium rate. Using the example above, the per capita loss cost presented in this study for the same employee would be $1,000 (per employee per year). This approach was taken because while annual compensation for a specific public safety offer will vary with position, experience, municipality, as well as other items, cancer frequency and PTSD frequency bear no relationship to compensation, nor do medical costs. It is, however,

[12] Typically, WC costs are published in terms of a cost per $100 payroll. If a specific employee classification has a published WC loss cost of 2.50 then a self-insured employer with a single employee earning $40,000 a year will generate an additional $1,000 ( = 40,000/100 X 2.50 ) of WC benefit and LAE cost over the course of a year. Given the same example, except the employer is insured and the premium rate is 3.60, then that employer will pay an additional $1,440 ( = 40,000/100 X 3.60 ) in premium charges over the course of a year. Note that the loss cost charge of $1,000 provides only for the cost of benefits and LAE. The premium charge of $1,440 provides for the cost of benefits, LAE, and insurance company expenses and profit.

straightforward to convert the results of this study to loss costs and premium rates per $100 payroll. Simply divide the per employee per year published loss cost or rate in this study by the annual compensation for a specific employee and multiply the result by 100. Using the above example and starting with the $1,000 per employee per year loss cost:

($1,000 / $40,000 ) X 100 = $2.50

For the purpose of simplicity, per employee per year is shortened to per employee.

## Unfunded Liability

1. Discussion of Unfunded Liability
   The single year estimates presented in this report will provide for the cost of claims due to brain cancer, colon cancer, testicular cancer, and PTSD for a policy period with length equal to one year. For example, consider a policy period effective January 1, 2020 through December 31, 2020. The single year estimate will provide for the cost of the following claims:

   - Claims filed in 2020 by public safety officers who are actively employed during 2020; and
   - Claims filed by public safety officers terminated during 2020, provided that the claims are filed within five years of termination (2020 through 2025).

   Continuing the illustration, consider a policy period effective January 1, 2021 through December 31, 2021. The single year estimate will provide for the cost of the following claims:

   - Claims filed in 2021 by public safety officers who are actively employed during 2021; and
   - Claims filed by public safety officers terminated during 2021, provided that the claims are filed within five years of termination (2021 through 2026).

   This pattern will continue and illustrates that the estimated single year cost provides for the cost of claims filed by active employees during the policy period, as well as by employees terminated during the policy period, provided that the claims are filed within five years of termination. The following illustrative table shows the distribution of claim filings by calendar year (CY) associated with the policy period effective January 1, 2020 through December 31, 2020 (PP 2020):

| | PP 2020 |
|---|---|
| CY 2020 | 80 |
| CY 2021 | 4 |
| CY 2022 | 4 |
| CY 2023 | 4 |
| CY 2024 | 4 |
| CY 2005 | 4 |

The illustrative chart shows that for public safety officers actively employed at some point during 2020 and/or terminated during 2020, we can expect 80 claims filed by active employees during 2020, and 4 claims per year from 2021 through 2025 for employees terminated during 2020, but who develop one of the covered diseases/conditions within five years of termination and file a claim.

The chart above shows that claims funded by premium paid for policy period 2020 coverage may be reported up to five years after the policy period ends (December 31, 2020 in this example). [13] Claims reported during the policy period are due to active employees, claims filed in the five subsequent years are due to employees terminated during the policy period.

A similar illustrative chart shows when claims associated with the policy period effective January 1, 2021 through December 31, 2021 (PP2021), are expected to be filed:

| | PP 2021 |
|---|---|
| CY 2021 | 80 |
| CY 2022 | 4 |
| CY 2023 | 4 |
| CY 2024 | 4 |
| CY 2025 | 4 |
| CY 2006 | 4 |

The illustrative chart shows that for public safety officers actively employed at some point during 2021 and/or terminated during 2021, we can expect 80 claims filed by active employees during 2021, and 4 claims per year from 2022 through 2026 for employees terminated during 2021, but who develop one of the covered diseases/conditions within five years of termination and file a claim.

This discussion lays the groundwork to understanding that should the proposed legislation become law on January 1, 2020 (continuing the example), the single year cost estimates presented in this analysis will fund only those claims filed by employees that are active as of January 1, 2020 and only those claims filed by employees terminated during 2020. Employees terminated prior to January 1, 2020 may still file claims under the proposed law, provided the claim is filed within five years of termination. However, premium was never collected to fund the cost of these claims because the claims are due to employees terminated prior to the effective date of the proposed legislation. This is illustrated in the following chart:

| | PP 2015 | PP 2016 | PP 2017 | PP 2018 | PP 2019 | PP 2020 | PP 2021 | PP 2022 |
|---|---|---|---|---|---|---|---|---|
| **CY 2016** | 4 | 80 | | | | | | |
| **CY 2017** | 4 | 4 | 80 | | | | | |
| **CY 2018** | 4 | 4 | 4 | 80 | | | | |
| **CY 2019** | 4 | 4 | 4 | 4 | 80 | | | |
| **CY 2020** | **4** | **4** | **4** | **4** | **4** | 80 | | |
| **CY 2021** | | **4** | **4** | **4** | **4** | 4 | 80 | |
| **CY 2022** | | | **4** | **4** | **4** | 4 | 4 | 80 |
| **CY 2023** | | | | **4** | **4** | 4 | 4 | 4 |
| **CY 2024** | | | | | **4** | 4 | 4 | 4 |
| **CY 2025** | | | | | | 4 | 4 | 4 |
| **CY 2026** | | | | | | | 4 | 4 |
| | | | | | | | | 4 |

[13] The chart implies that terminated employees file claims only in the years following the termination year. In reality, terminated employees may file a claim at any point within the five-year period following termination, including the year of termination. For example, an individual terminated on March 31, 2020 could file a claim on April 12, 2020, if he is diagnosed with one of the cancers or PTSD on that date.

The horizontal blue line shows the effective date of the proposed legislation, January 1, 2020. Funding begins with policy period 2020, where sufficient funds are collected to provide for the cost of 80 claims filed by active employees in CY 2020, and 20 claims filed by terminated employees over the five-year period from CY 2021 through CY 2025. Funded claims are highlighted in yellow. However, there are 20 claims expected to be filed during CY 2020 through CY 2024 by employees terminated in 2019. Premium was never collected to fund these claims. Additionally, there are 16 claims expected to be filed during CY 2020 through CY 2023 by employees terminated in 2018, 12 claims expected to be filed during CY 2020 through CY 2022 by employees terminated in 2017, 8 claims expected to be filed during CY 2020 through CY 2021 by employees terminated in 2016, and 4 claims expected to be filed in CY 2020 by employees terminated in 2015. Premium was never collected to fund any of these claims. Claims expected to be filed by employees terminated prior to the effective date of the proposed laws, January 1, 2020 in this example, are highlighted in red.

Claims filed by employees terminated prior to January 1, 2020 create an unfunded liability in the sense that premium was never collected to fund the cost of these claims. Statutory changes, changes in case law, or changes to rules/regulations that create an opportunity for claims that are unfunded or only partially funded (because premium was never collected to fund the new costs) is common in workers compensation. In fact, situations where the opposite occurs, that is a change in statute, case law, or rules/regulations reduces the cost of claims associated with older insurance policies are commonplace as well. An example of each situation follows:

- ***Implementation of the Virginia Medical Fee Schedule***
  Implementation of the Virginia Medical Fee Schedule created a slight premium savings on insurance policies effective on or after January 1, 2018. However, it also created a savings on the future medical costs associated with claims covered by older insurance policies. In this sense, self-insureds and insurers benefited on older polices where the premium charges reflected medical costs prior to implementation of the fee schedule did not reflect the savings generated by the fee schedule.

- ***Florida: Castellanos Decision in 2016***
  On April 28, 2016, the Florida Supreme Court issued a ruling in *Marvin Castellanos v. Next Door Company* finding the attorney fee provisions in Florida law to be unconstitutional. The initial estimated impact on new policies was a 15% increase to costs. This cost increase was factored into Florida workers compensation rates for new policies. However, the impact of the court decision also affected claims from older policies, increasing their costs as well. Premium collected in the past to fund these claims assumed that the attorney fee provisions in Florida law would remain intact. As such, the Castellanos decision created an unfunded liability because premium was never collected to fund the cost impact of the decision on claims from older policies.

The magnitude of the unfunded liability is best expressed as a percentage of the one-year cost estimate. For cancer claims, the cost of claims filed by employees terminated prior to the effective date of the law is expected to be equal to approximately 18% of the one-year cost estimate presented in Chart 4 previously. For PTSD claims, the impact is expected to be approximately 43% of the one-year cost estimate presented in Chart 4 previously. The PTSD impact is higher because PTSD claims are not subject to the 12-year continuous duty requirement. Chart 4 is repeated below for ease of reading:

| LOW ESTIMATE<br>Expected Additional WC Costs per Year | Brain Cancer | Test. Cancer | Colon Cancer | All Cancer | PTSD | All |
|---|---|---|---|---|---|---|
| Animal Control Workers and Caretakers | - | - | - | - | 60,578 | 60,578 |
| Police, Fire, and Ambulance Dispatchers | - | - | - | - | 228,114 | 228,114 |
| All Police, Sheriff Officers, Detectives & Investigators | - | - | - | - | 1,731,208 | 1,731,208 |
| First-Line Supervisors of Police and Detectives | - | - | - | - | 216,756 | 216,756 |
| First-Line Supervisors of Fire Fighting and Prev. Workers | 43,293 | 10,174 | 220,578 | 274,046 | 506,354 | 780,400 |
| Firefighters | 212,464 | 49,923 | 1,082,713 | 1,345,101 | 2,492,822 | 3,837,923 |
| Fire Inspectors and Investigators | 3,764 | 884 | 19,179 | 23,828 | 44,144 | 67,971 |
| TOTAL | 259,522 | 60,982 | 1,322,471 | 1,642,975 | 5,279,977 | 6,922,952 |

| HIGH ESTIMATE<br>Expected Additional WC Costs per Year | Brain Cancer | Test. Cancer | Colon Cancer | All Cancer | PTSD | All |
|---|---|---|---|---|---|---|
| Animal Control Workers and Caretakers | - | - | - | - | 299,300 | 299,300 |
| Police, Fire, and Ambulance Dispatchers | - | - | - | - | 1,147,233 | 1,147,233 |
| All Police, Sheriff Officers, Detectives & Investigators | - | - | - | - | 10,840,708 | 10,840,708 |
| First-Line Supervisors of Police and Detectives | - | - | - | - | 1,727,392 | 1,727,392 |
| First-Line Supervisors of Fire Fighting and Prev. Workers | 157,454 | 101,388 | 584,533 | 843,376 | 2,709,854 | 3,553,230 |
| Firefighters | 646,639 | 370,717 | 2,412,130 | 3,429,485 | 11,455,937 | 14,885,423 |
| Fire Inspectors and Investigators | 11,707 | 6,821 | 43,643 | 62,170 | 206,622 | 268,792 |
| TOTAL | 815,800 | 478,926 | 3,040,306 | 4,335,031 | 28,387,046 | 32,722,077 |

For example, referring to the above Chart, the expected additional low-end cost of PTSD claims due to the proposed legislation is $5.28 million. Then the low-end expected cost of the unfunded liability is 43% of $5.28 million, or $2.27 million. Similarly, the expected additional high-end cost of PTSD claims due to the proposed legislation is $28.4 million. Then the high-end expected cost of the unfunded liability is 43% of $28.4 million, or $12.2 million.

The same approach applies to cancer claims. The expected additional low-end cost of cancer claims due to the proposed legislation is $1.6 million. Then the low-end expected cost of the unfunded liability is 18% of $1.6 million, or $0.29 million. Similarly, the expected additional high-end cost of cancer claims due to the proposed legislation is $4.3 million. Then the high-end expected cost of the unfunded liability is 18% of $4.3 million, or $0.77 million.

Finally, the creation of an unfunded liability is a one-time event. Given that the going forward cost estimates provide for the cost of claims from both active employees and employees terminated after the effective date of law, within five years, all new claims will be funded.

# 5

# Study Results

## One-year Forecasts

The tables on the following pages provide the requested metrics for a single year, 2020. Metrics are provided on a per employee basis. The following is a brief description of the metrics presented on the following pages, in order of presentation. The following definitions are provided as background to the tables:

All Cancers Combined: This is the combined impact of all three cancers. For example, on the chart for Expected Number of Claims per 100,000 Employees, it is clear that the entry for all cancers combined is the sum of the entries for each individual cancer. The combined impact is calculated slightly differently when considering costs per claim or costs per employee, because then the entry for all cancers combined is a weighted average of the cost of the individual cancers.

Both Occupations Combined (PTSD): This is the average impact over all public safety officers. For example, on the chart for Expected Number of Claims per 100,000 employees, the low-end frequency for law enforcement officers is 498.4 claims per 100,000 law enforcement officers. The low-end frequency for firefighters is 485.1 claims per 100,000 firefighters. The average low-end frequency for both occupations combined is 492.1 claims per 100,000 law enforcement officers and firefighters combined. The value of 492.1 is a weighted average value that reflects both the individual frequencies per occupation, as well as the number of employees in each occupation. The same concept applies to the rest of the charts.

***Expected Number of Claims per 100,000 Employees***
This is the frequency measurement expressed in terms of the expected number of claims per 100,000 employees in a single year (2020). The metric is in terms of per 100,000 employees because frequencies are so low for cancer that values per employee would not be viewed as meaningful. Values are published for a low-end estimate, and a high-end estimate.

***Estimated Cost of Indemnity Benefits per Claim***
This is the indemnity severity, or estimated cost of indemnity benefits per claim, in 2020. A low-end estimate and a high-end estimate are provided.

***Estimated Cost of Medical Benefits per Claim***
This is the medical severity, or estimated cost of medical benefits per claim, in 2020. A low-end estimate and a high-end estimate are provided.

***Estimated Cost of Indemnity and Medical Benefits per Employee***

This is the estimated benefit cost per year per employee, in 2020. It is calculated as the sum of the indemnity severity and the medical severity, multiplied by the expected number of claims per 100,000 employees, divided by 100,000 to obtain a per employee cost per year.

***Estimated Cost of Indemnity Benefits, Medical Benefits, and LAE per Employee***

This is the estimated benefit cost per year per employee with LAE, in 2020. As previously noted, this value is also known as the loss cost. It is calculated as the sum of the estimated cost of indemnity benefits and medical benefits per employee, multiplied by the factor to include LAE. This factor is 1.162 and is based on the most recent WC filing by the National Council on Compensation Insurance (NCCI) for loss costs effective April 1, 2020. The 1.162 factor means that for every dollar of benefit cost, there is an additional cost of 16.2 cents of LAE. The values in this table are the additional loss costs expected if the three additional cancers and PTSD are added to the list of occupational diseases in Virginia, measured on a per employee basis, for 2020.

***Estimated Premium Cost per Employee***

This is the estimated additional premium cost per employee in 2020. It is calculated as the loss cost (presented in the immediately prior table) multiplied by a factor to include insurance company expenses (other than LAE) and profit. This factor is 1.305 and is based on information published by NCCI.[14] The 1.305 factor means that for every dollar of benefit cost and LAE costs, there is an additional cost of 30.5 cents to provide for insurance company expenses and profit. The values in this table are estimates of the additional premium costs expected if the additional cancers and PTSD are added to the list of occupational diseases in Virginia, measured on a per employee basis, for 2020.

[14] This is an estimate based on aggregated insurance industry data. The actual factor used by an individual insurer will reflect that specific insurer's expense need and profit target. Additionally, insurers may vary the premium charge to an individual insured using schedule rating, which allows for a +/-15% variance around the premium rate. One consideration is that insurers tend to charge additional premium for higher risk loss exposures, which is the case for firefighters specifically and public safety officers in general. High risk is illustrated by the cancer presumptions. The actual estimated average costs are rather low and reflect a very low frequency of potentially high cost claims. From an insurer's perspective, should that single large claim occur, the loss associated with that claim will negate many years of premium. Insurer's will increase the premium charge for high risk loss exposures to reflect that contingency. This contingency is not reflected in the estimates of premium provided in this report. The amount of any additional charge, if any, is going to be a function of the loss experience of a specific insured, the willingness of the insurer to write the business, insurance market conditions, as well as other issues.

## Expected Number of Claims per 100,000 Employees One Year

### All Cancers Combined

| | LOW | HIGH |
|---|---|---|
| Law Enforcement | 0.0 | 0.0 |
| Firefighter | 24.1 | 30.6 |

### Brain Cancer

| | LOW | HIGH |
|---|---|---|
| Law Enforcement | 0.0 | 0.0 |
| Firefighter | 3.6 | 5.5 |

### Testicular Cancer

| | LOW | HIGH |
|---|---|---|
| Law Enforcement | 0.0 | 0.0 |
| Firefighter | 3.5 | 5.4 |

### Colon Cancer

| | LOW | HIGH |
|---|---|---|
| Law Enforcement | 0.0 | 0.0 |
| Firefighter | 17.0 | 19.7 |

### PTSD

| | LOW | HIGH |
|---|---|---|
| Law Enforcement | 498.4 | 1,053.1 |
| Firefighter | 485.1 | 1,024.9 |
| Both Occupations Combined | 492.1 | 1,039.8 |

## Estimated Cost of Indemnity Benefits per Claim
## One Year

### All Cancers Combined

| | LOW | HIGH |
|---|---|---|
| Law Enforcement | $0 | $0 |
| Firefighter | $1,926 | $270,174 |

### Brain Cancer

| | LOW | HIGH |
|---|---|---|
| Law Enforcement | $0 | $0 |
| Firefighter | $2,161 | $270,174 |

### Testicular Cancer

| | LOW | HIGH |
|---|---|---|
| Law Enforcement | $0 | $0 |
| Firefighter | $540 | $270,174 |

### Colon Cancer

| | LOW | HIGH |
|---|---|---|
| Law Enforcement | $0 | $0 |
| Firefighter | $2,161 | $270,174 |

### PTSD

| | LOW | HIGH |
|---|---|---|
| Law Enforcement | $0 | $29,396 |
| Firefighter | $0 | $17,225 |
| Both Occupations Combined | $0 | $23,668 |

## Estimated Cost of Medical Benefits per Claim
## One Year

### All Cancers Combined

| | LOW | HIGH |
|---|---|---|
| Law Enforcement | $0 | $0 |
| Firefighter | $277,506 | $309,289 |

### Brain Cancer

| | LOW | HIGH |
|---|---|---|
| Law Enforcement | $0 | $0 |
| Firefighter | $295,980 | $342,881 |

### Testicular Cancer

| | LOW | HIGH |
|---|---|---|
| Law Enforcement | $0 | $0 |
| Firefighter | $70,797 | $89,987 |

### Colon Cancer

| | LOW | HIGH |
|---|---|---|
| Law Enforcement | $0 | $0 |
| Firefighter | $316,170 | $360,510 |

### PTSD

| | LOW | HIGH |
|---|---|---|
| Law Enforcement | $16,343 | $19,070 |
| Firefighter | $16,125 | $18,815 |
| Both Occupations Combined | $16,240 | $18,950 |

## Estimated Cost of Ind. and Med. Benefits, & LAE
## One Year Per Claim

### All Cancers Combined

| | LOW | HIGH |
|---|---|---|
| Law Enforcement | $0 | $0 |
| Firefighter | $324,700 | $673,336 |

### Brain Cancer

| | LOW | HIGH |
|---|---|---|
| Law Enforcement | $0 | $0 |
| Firefighter | $346,440 | $712,370 |

### Testicular Cancer

| | LOW | HIGH |
|---|---|---|
| Law Enforcement | $0 | $0 |
| Firefighter | $82,893 | $418,506 |

### Colon Cancer

| | LOW | HIGH |
|---|---|---|
| Law Enforcement | $0 | $0 |
| Firefighter | $369,901 | $732,854 |

### PTSD

| | LOW | HIGH |
|---|---|---|
| Law Enforcement | $18,991 | $56,317 |
| Firefighter | $18,737 | $41,879 |
| Both Occupations Combined | $18,871 | $49,522 |

## Estimated Cost of Ind. and Med. Benefits, & LAE One Year per Employee

### All Cancers Combined

| | LOW | HIGH |
|---|---|---|
| Law Enforcement | $0 | $0 |
| Firefighter | $78 | $206 |

### Brain Cancer

| | LOW | HIGH |
|---|---|---|
| Law Enforcement | $0 | $0 |
| Firefighter | $12 | $39 |

### Testicular Cancer

| | LOW | HIGH |
|---|---|---|
| Law Enforcement | $0 | $0 |
| Firefighter | $3 | $23 |

### Colon Cancer

| | LOW | HIGH |
|---|---|---|
| Law Enforcement | $0 | $0 |
| Firefighter | $63 | $145 |

### PTSD

| | LOW | HIGH |
|---|---|---|
| Law Enforcement | $95 | $593 |
| Firefighter | $91 | $429 |
| Both Occupations Combined | $93 | $515 |

## Estimated Premium Cost
## One Year per Employee

### All Cancers Combined

| | LOW | HIGH |
|---|---|---|
| Law Enforcement | $0 | $0 |
| Firefighter | $102 | $269 |

### Brain Cancer

| | LOW | HIGH |
|---|---|---|
| Law Enforcement | $0 | $0 |
| Firefighter | $16 | $51 |

### Testicular Cancer

| | LOW | HIGH |
|---|---|---|
| Law Enforcement | $0 | $0 |
| Firefighter | $4 | $30 |

### Colon Cancer

| | LOW | HIGH |
|---|---|---|
| Law Enforcement | $0 | $0 |
| Firefighter | $82 | $189 |

### PTSD

| | LOW | HIGH |
|---|---|---|
| Law Enforcement | $123 | $773 |
| Firefighter | $119 | $560 |
| Both Occupations Combined | $121 | $671 |

## Five-year Forecasts

The tables on the following pages provide the requested metrics for the five-year period from 2020 through 2024. Metrics are provided on a per employee basis. The following is a brief description of the metrics presented on the following pages, in order of presentation.

***Expected Number of Claims per 100,000 Employees***
This is the frequency measurement expressed in terms of the expected number of claims per 100,000 employees during the five-year period from 2020 through 2024. Values are published for a low-end estimate, and a high-end estimate. These estimates are exactly equal to five times the frequencies for the one-year forecast.[15]

***Estimated Cost of Indemnity Benefits per Claim***
The average indemnity cost per claim during the five-year period from 2020 through 2024 is equal to the average indemnity cost per claim in 2020 adjusted for 2.5 years of inflation. The inflation adjustment reflects that the average date of loss during the five-year period from 2020 through 2024 is exactly 2.5 years from the start of 2020. The inflation adjustment ensures that the estimated indemnity cost per claim represents the average indemnity cost **for all claims occurring during this five-year period**.

***Estimated Cost of Medical Benefits per Claim***
The average medical cost per claim during the five-year period from 2020 through 2024 is equal to the average medical cost per claim in 2020 adjusted for 2.5 years of inflation. The explanation is analogous to the discussion above for the average indemnity cost per claim.

***Estimated Cost of Indemnity and Medical Benefits per Employee***
This is the estimated benefit cost per employee during the five-year period from 2020 through 2024. It is calculated as the sum of the indemnity severity and the medical severity, multiplied by the expected number of claims per 100,000 employees during this period, divided by 100,000 to obtain a per employee cost. Note that this is the total cost of indemnity and medical benefits per employee during this five-year period.

***Estimated Cost of Indemnity Benefits, Medical Benefits, and LAE per Employee***
This is the estimated benefit cost per employee with LAE during the five-year period from 2020 through 2024. It is calculated as the sum of the estimated cost of indemnity benefits and medical benefits per employee, multiplied by the factor to include LAE, discussed previously. The values in this table are the additional loss costs expected during this five-year period if the three additional cancers and PTSD are added to the list of occupational diseases in Virginia, measured on a per employee basis.

[15] This statement illustrates that the final measurements per employee in this section reflect the total expected cost during the five-year period from 2020 through 2024.

***Estimated Premium Cost per Employee***

This is the estimated additional premium cost per employee during the five-year period from 2020 through 2024. It is calculated as the loss cost (presented in the immediately prior table) multiplied by a factor to include insurance company expenses (other than LAE) and profit. The values in this table are estimates of the additional premium costs expected during this five-year period if the additional cancers and PTSD are added to the list of occupational diseases in Virginia, measured on a per employee basis.

## Expected Number of Claims per 100,000 Employees
## Five Year

### All Cancers Combined

| | LOW | HIGH |
|---|---|---|
| Law Enforcement | 0.0 | 0.0 |
| Firefighter | 120.4 | 153.2 |

### Brain Cancer

| | LOW | HIGH |
|---|---|---|
| Law Enforcement | 0.0 | 0.0 |
| Firefighter | 17.8 | 27.3 |

### Testicular Cancer

| | LOW | HIGH |
|---|---|---|
| Law Enforcement | 0.0 | 0.0 |
| Firefighter | 17.5 | 27.2 |

### Colon Cancer

| | LOW | HIGH |
|---|---|---|
| Law Enforcement | 0.0 | 0.0 |
| Firefighter | 85.1 | 98.7 |

### PTSD

| | LOW | HIGH |
|---|---|---|
| Law Enforcement | 2,492.1 | 5,265.6 |
| Firefighter | 2,425.3 | 5,124.4 |
| Both Occupations Combined | 2,460.6 | 5,199.1 |

## Estimated Cost of Indemnity Benefits per Claim
## Five Year

### All Cancers Combined

| | LOW | HIGH |
|---|---|---|
| Law Enforcement | $0 | $0 |
| Firefighter | $2,049 | $287,421 |

### Brain Cancer

| | LOW | HIGH |
|---|---|---|
| Law Enforcement | $0 | $0 |
| Firefighter | $2,299 | $287,421 |

### Testicular Cancer

| | LOW | HIGH |
|---|---|---|
| Law Enforcement | $0 | $0 |
| Firefighter | $575 | $287,421 |

### Colon Cancer

| | LOW | HIGH |
|---|---|---|
| Law Enforcement | $0 | $0 |
| Firefighter | $2,299 | $287,421 |

### PTSD

| | LOW | HIGH |
|---|---|---|
| Law Enforcement | $0 | $31,272 |
| Firefighter | $0 | $18,325 |
| Both Occupations Combined | $0 | $25,178 |

## Estimated Cost of Medical Benefits per Claim
## Five Year

### All Cancers Combined

| | LOW | HIGH |
|---|---|---|
| Law Enforcement | $0 | $0 |
| Firefighter | $302,401 | $337,034 |

### Brain Cancer

| | LOW | HIGH |
|---|---|---|
| Law Enforcement | $0 | $0 |
| Firefighter | $322,531 | $373,640 |

### Testicular Cancer

| | LOW | HIGH |
|---|---|---|
| Law Enforcement | $0 | $0 |
| Firefighter | $77,147 | $98,059 |

### Colon Cancer

| | LOW | HIGH |
|---|---|---|
| Law Enforcement | $0 | $0 |
| Firefighter | $344,533 | $392,850 |

### PTSD

| | LOW | HIGH |
|---|---|---|
| Law Enforcement | $17,809 | $20,781 |
| Firefighter | $17,571 | $20,503 |
| Both Occupations Combined | $17,697 | $20,650 |

## Estimated Cost of Ind. and Med. Benefits, & LAE Five Year per Claim

### All Cancers Combined

| | LOW | HIGH |
|---|---|---|
| Law Enforcement | $0 | $0 |
| Firefighter | $353,770 | $725,617 |

### Brain Cancer

| | LOW | HIGH |
|---|---|---|
| Law Enforcement | $0 | $0 |
| Firefighter | $377,453 | $768,153 |

### Testicular Cancer

| | LOW | HIGH |
|---|---|---|
| Law Enforcement | $0 | $0 |
| Firefighter | $90,313 | $447,928 |

### Colon Cancer

| | LOW | HIGH |
|---|---|---|
| Law Enforcement | $0 | $0 |
| Firefighter | $403,019 | $790,475 |

### PTSD

| | LOW | HIGH |
|---|---|---|
| Law Enforcement | $20,694 | $60,485 |
| Firefighter | $20,418 | $45,118 |
| Both Occupations Combined | $20,564 | $53,253 |

## Estimated Cost of Ind. and Med. Benefits, & LAE Five Year per Employee

### All Cancers Combined

| | LOW | HIGH |
|---|---|---|
| Law Enforcement | $0 | $0 |
| Firefighter | $426 | $1,112 |

### Brain Cancer

| | LOW | HIGH |
|---|---|---|
| Law Enforcement | $0 | $0 |
| Firefighter | $67 | $209 |

### Testicular Cancer

| | LOW | HIGH |
|---|---|---|
| Law Enforcement | $0 | $0 |
| Firefighter | $16 | $122 |

### Colon Cancer

| | LOW | HIGH |
|---|---|---|
| Law Enforcement | $0 | $0 |
| Firefighter | $343 | $780 |

### PTSD

| | LOW | HIGH |
|---|---|---|
| Law Enforcement | $516 | $3,185 |
| Firefighter | $495 | $2,312 |
| Both Occupations Combined | $506 | $2,769 |

## Estimated Premium Cost
## Five Year per Employee

### All Cancers Combined

| | LOW | HIGH |
|---|---|---|
| Law Enforcement | $0 | $0 |
| Firefighter | $555 | $1,450 |

### Brain Cancer

| | LOW | HIGH |
|---|---|---|
| Law Enforcement | $0 | $0 |
| Firefighter | $88 | $273 |

### Testicular Cancer

| | LOW | HIGH |
|---|---|---|
| Law Enforcement | $0 | $0 |
| Firefighter | $21 | $159 |

### Colon Cancer

| | LOW | HIGH |
|---|---|---|
| Law Enforcement | $0 | $0 |
| Firefighter | $447 | $1,018 |

### PTSD

| | LOW | HIGH |
|---|---|---|
| Law Enforcement | $672 | $4,153 |
| Firefighter | $646 | $3,015 |
| Both Occupations Combined | $660 | $3,610 |

## Ten Year Forecasts

The tables on the following pages provide the requested metrics for the ten-year period from 2020 through 2029. Metrics are provided on a per employee basis. The following is a brief description of the metrics presented on the following pages, in order of presentation.

***Expected Number of Claims per 100,000 Employees***
This is the frequency measurement expressed in terms of the expected number of claims per 100,000 employees during the ten-year period from 2020 through 2029. These estimates are exactly equal to ten times the frequencies for the one-year forecast.[16]

***Estimated Cost of Indemnity Benefits per Claim***
The average indemnity cost per claim during the ten-year period from 2020 through 2029 is equal to the average indemnity cost per claim in 2020 adjusted for 5 years of inflation. The inflation adjustment reflects that the average date of loss during the ten-year period from 2020 through 2029 is exactly 5 years from the start of 2020. The inflation adjustment ensures that the estimated indemnity cost per claim represents the average indemnity cost **for all claims occurring during this ten-year period**.

***Estimated Cost of Medical Benefits per Claim***
The average medical cost per claim during the ten-year period from 2020 through 2029 is equal to the average medical cost per claim in 2020 adjusted for 5 years of inflation. The explanation is analogous to the discussion above for the average indemnity cost per claim.

***Estimated Cost of Indemnity and Medical Benefits per Employee***
This is the estimated benefit cost per employee during the ten-year period from 2020 through 2029. It is calculated as the sum of the indemnity severity and the medical severity, multiplied by the expected number of claims per 100,000 employees during this period, divided by 100,000 to obtain a per employee cost. Note that this is the total cost of indemnity and medical benefits per employee during this ten-year period.

***Estimated Cost of Indemnity Benefits, Medical Benefits, and LAE per Employee***
This is the estimated benefit cost per employee with LAE during the ten-year period from 2020 through 2029. It is calculated as the sum of the estimated cost of indemnity benefits and medical benefits per employee, multiplied by the factor to include LAE, discussed previously. The values in this table are the additional loss costs expected during this ten-year period if the three additional cancers and PTSD are added to the list of occupational diseases in Virginia, measured on a per employee basis.

[16] This statement illustrates that the final measurements per employee in this section reflect the total expected cost during the ten-year period from 2020 through 2029.

***Estimated Premium Cost per Employee***

This is the estimated additional premium cost per employee during the ten-year period from 2020 through 2029. It is calculated as the loss cost (presented in the immediately prior table) multiplied by a factor to include insurance company expenses (other than LAE) and profit. The values in this table are estimates of the additional premium costs expected during this ten-year period if the additional cancers and PTSD are added to the list of occupational diseases in Virginia, measured on a per employee basis.

## Expected Number of Claims per 100,000 Employees
## Ten Year

### All Cancers Combined

| | LOW | HIGH |
|---|---|---|
| Law Enforcement | 0.0 | 0.0 |
| Firefighter | 240.8 | 306.4 |

### Brain Cancer

| | LOW | HIGH |
|---|---|---|
| Law Enforcement | 0.0 | 0.0 |
| Firefighter | 35.7 | 54.5 |

### Testicular Cancer

| | LOW | HIGH |
|---|---|---|
| Law Enforcement | 0.0 | 0.0 |
| Firefighter | 35.0 | 54.5 |

### Colon Cancer

| | LOW | HIGH |
|---|---|---|
| Law Enforcement | 0.0 | 0.0 |
| Firefighter | 170.2 | 197.5 |

### PTSD

| | LOW | HIGH |
|---|---|---|
| Law Enforcement | 4,984.2 | 10,531.2 |
| Firefighter | 4,850.5 | 10,248.8 |
| Both Occupations Combined | 4,921.3 | 10,398.3 |

## Estimated Cost of Indemnity Benefits per Claim
## Ten Year

### All Cancers Combined

| | LOW | HIGH |
|---|---|---|
| Law Enforcement | $0 | $0 |
| Firefighter | $2,179 | $305,770 |

### Brain Cancer

| | LOW | HIGH |
|---|---|---|
| Law Enforcement | $0 | $0 |
| Firefighter | $2,446 | $305,770 |

### Testicular Cancer

| | LOW | HIGH |
|---|---|---|
| Law Enforcement | $0 | $0 |
| Firefighter | $612 | $305,770 |

### Colon Cancer

| | LOW | HIGH |
|---|---|---|
| Law Enforcement | $0 | $0 |
| Firefighter | $2,446 | $305,770 |

### PTSD

| | LOW | HIGH |
|---|---|---|
| Law Enforcement | $0 | $33,268 |
| Firefighter | $0 | $19,495 |
| Both Occupations Combined | $0 | $26,786 |

## Estimated Cost of Medical Benefits per Claim
## Ten Year

### All Cancers Combined

| | LOW | HIGH |
|---|---|---|
| Law Enforcement | $0 | $0 |
| Firefighter | $329,528 | $367,269 |

### Brain Cancer

| | LOW | HIGH |
|---|---|---|
| Law Enforcement | $0 | $0 |
| Firefighter | $351,464 | $407,158 |

### Testicular Cancer

| | LOW | HIGH |
|---|---|---|
| Law Enforcement | $0 | $0 |
| Firefighter | $84,068 | $106,856 |

### Colon Cancer

| | LOW | HIGH |
|---|---|---|
| Law Enforcement | $0 | $0 |
| Firefighter | $375,440 | $428,091 |

### PTSD

| | LOW | HIGH |
|---|---|---|
| Law Enforcement | $19,407 | $22,645 |
| Firefighter | $19,148 | $22,342 |
| Both Occupations Combined | $19,285 | $22,503 |

## Estimated Cost of Ind. and Med. Benefits, & LAE Ten Year per Claim

### All Cancers Combined

| | LOW | HIGH |
|---|---|---|
| Law Enforcement | $0 | $0 |
| Firefighter | $385,444 | $782,071 |

### Brain Cancer

| | LOW | HIGH |
|---|---|---|
| Law Enforcement | $0 | $0 |
| Firefighter | $411,244 | $828,422 |

### Testicular Cancer

| | LOW | HIGH |
|---|---|---|
| Law Enforcement | $0 | $0 |
| Firefighter | $98,398 | $479,471 |

### Colon Cancer

| | LOW | HIGH |
|---|---|---|
| Law Enforcement | $0 | $0 |
| Firefighter | $439,103 | $852,746 |

### PTSD

| | LOW | HIGH |
|---|---|---|
| Law Enforcement | $22,551 | $64,971 |
| Firefighter | $22,250 | $48,615 |
| Both Occupations Combined | $22,409 | $57,273 |

## Estimated Cost of Ind. and Med. Benefits, & LAE Ten Year per Employee

### All Cancers Combined

| | LOW | HIGH |
|---|---|---|
| Law Enforcement | $0 | $0 |
| Firefighter | $928 | $2,396 |

### Brain Cancer

| | LOW | HIGH |
|---|---|---|
| Law Enforcement | $0 | $0 |
| Firefighter | $147 | $452 |

### Testicular Cancer

| | LOW | HIGH |
|---|---|---|
| Law Enforcement | $0 | $0 |
| Firefighter | $34 | $261 |

### Colon Cancer

| | LOW | HIGH |
|---|---|---|
| Law Enforcement | $0 | $0 |
| Firefighter | $747 | $1,684 |

### PTSD

| | LOW | HIGH |
|---|---|---|
| Law Enforcement | $1,124 | $6,842 |
| Firefighter | $1,079 | $4,982 |
| Both Occupations Combined | $1,103 | $5,955 |

## Estimated Premium Cost
## Ten Year per Employee

### All Cancers Combined

| | LOW | HIGH |
|---|---|---|
| Law Enforcement | $0 | $0 |
| Firefighter | $1,210 | $3,125 |

### Brain Cancer

| | LOW | HIGH |
|---|---|---|
| Law Enforcement | $0 | $0 |
| Firefighter | $191 | $589 |

### Testicular Cancer

| | LOW | HIGH |
|---|---|---|
| Law Enforcement | $0 | $0 |
| Firefighter | $45 | $341 |

### Colon Cancer

| | LOW | HIGH |
|---|---|---|
| Law Enforcement | $0 | $0 |
| Firefighter | $974 | $2,196 |

### PTSD

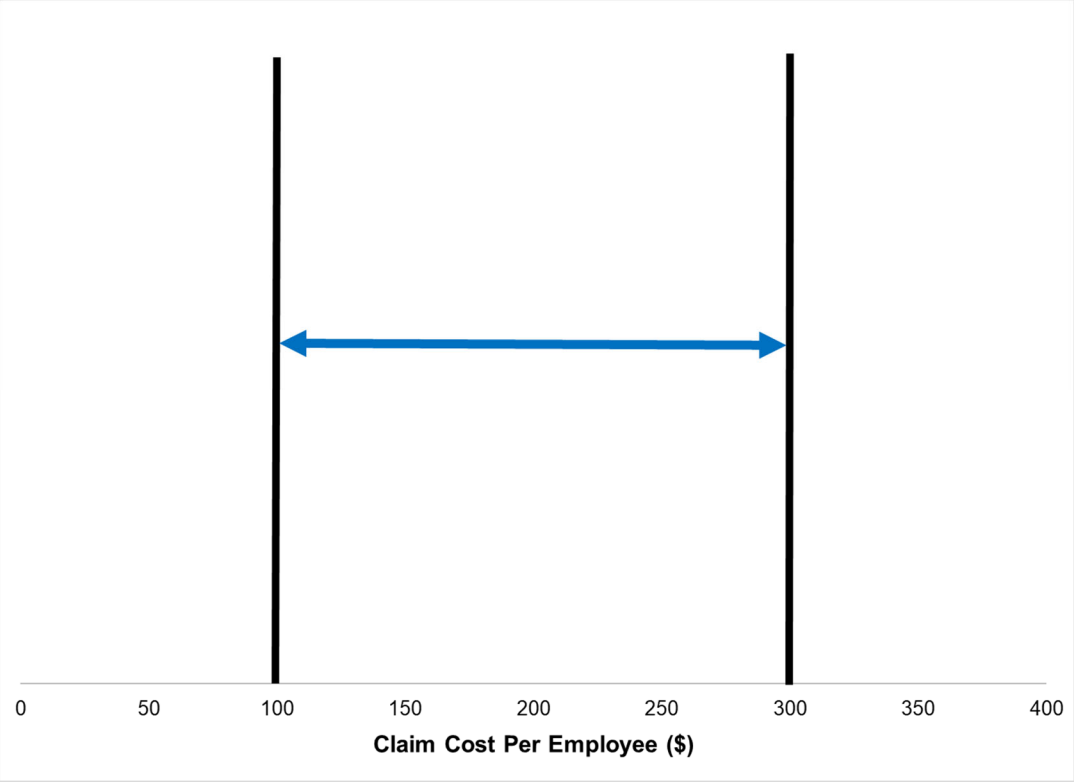
| | LOW | HIGH |
|---|---|---|
| Law Enforcement | $1,466 | $8,922 |
| Firefighter | $1,407 | $6,497 |
| Both Occupations Combined | $1,438 | $7,765 |

# 6

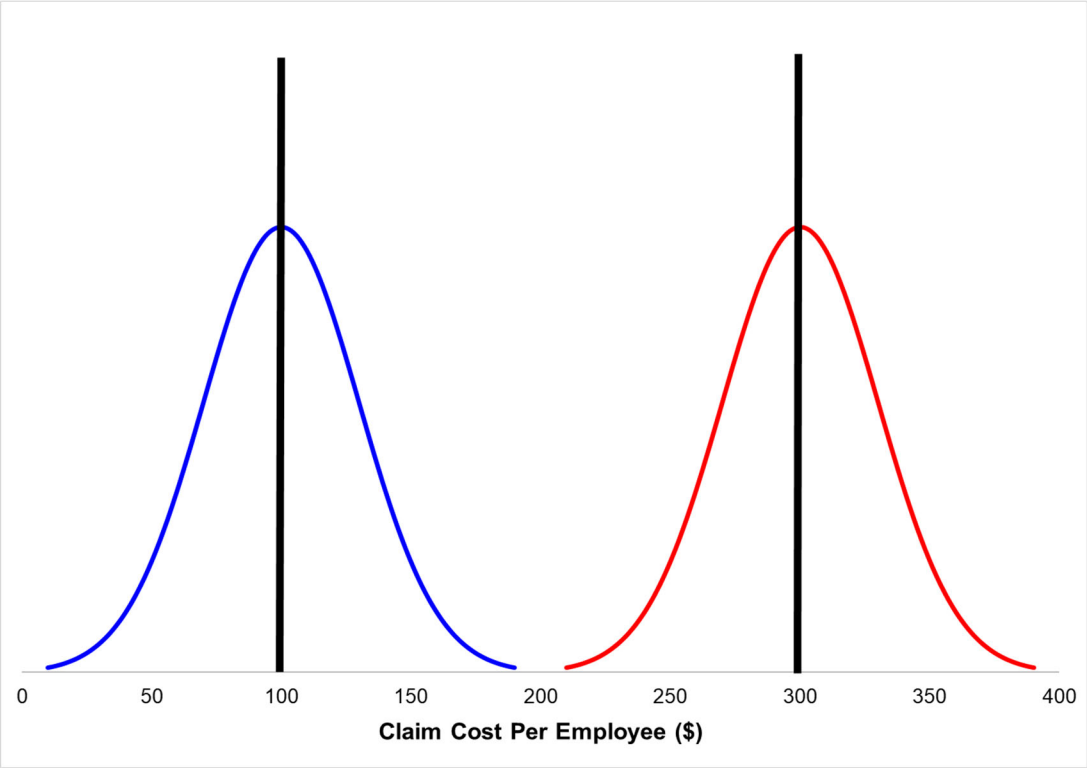
# Discussion of Risk

## Parameter and Process Risk

This report presents low-end and high-end estimates, which define a range of results, as illustrated below:




This chart shows a hypothetical low-end estimate of $100 per employee (per year) and a hypothetical high-end estimate of $300 per employee (per year). The chart implies that values outside this range are not possible, however this is not correct. The ranges presented in this report represent the range of potential mean results. Given a specific range, the low-end estimate represents the lowest likely value of the mean, and the high-end estimate represents the highest likely value of the mean. However, there is another range, or distribution, of results associated with each potential value of the mean. This is illustrated in the chart on the following page:




If the mean were known, then there would be only one vertical line and one distribution in the chart. However, the mean is uncertain and there is a range of possible means, with a bell curve (distribution of potential results) around every possible value of the mean. The uncertainty associated with the value of mean is referred to as parameter risk. In this example, the parameter risk is that we do not know what mean (and the associated bell curve) to use. The mean could be $100 per employee, $300 per employee, or any value in between. The second area of uncertainty are the bell curves themselves. Even if we knew the mean with certainty, there is still additional uncertainty because given a specific mean, there is a statistical distribution of potential results around the mean, illustrated by the bell curves. The uncertainty associated with statistical variation around the mean is referred to as process, or statistical risk. In this situation, not only is there statistical variation about the mean, but we do not know the mean.

In the simplest sense, if there was sufficient data to identify a mean value, then there would be a single bell curve and the range of potential costs would be limited to the width of a single bell curve. However, we do not know the mean and only have a range of potential values for the mean. The impact is that the range of potential values of the claim cost per employee in the above example extends from the far left side of the bell curve on the left to the far right side of the bell curve on the right.

This lays the foundation for a discussion of the underlying risk associated with claims due to cancer, presented in the following section.

## Risk Associated with Cancer Claims

The relatively low values of the cost estimates for expanding the list of occupational diseases to include brain, testicular, and colon cancer are potentially misleading as respect to understanding the risk that insurance carriers and self-insured municipalities assume when insuring this type of loss exposure. The relatively low values are a direct result of the very low frequency of these types of claims. However, as discussed above, there is a distribution of potential results due to both parameter risk (not knowing which bell curve to use) and process risk (the potential range of results for a specific bell curve). The uncertainty of the potential cost of expanding the presumption (discussed above) as well as the very high cost of these claims when they do occur, represents a material concern to insurance carriers and self-insured employers. Given the relatively low estimates of loss costs and premium costs for cancer claims, it is possible that a single large cancer claim would negate many years of premium payments by the insured municipality. Oliver Wyman's experience with this issue in other jurisdictions shows that insurance carriers will demand higher deductibles or self-insured retentions[17] for police and firefighters relative to other employees or may limit the demand only to claims filed under the presumptive portion of the WC statute. For example, we have seen situations where there is a $500,000 deductible or self-insured retention for typical WC claims, but a $1,000,000 deductible or retention for claims filed as presumptive under applicable statutes.[18] Regardless of the insurance programs that may be in place, the risk of a very large cancer claim is non-zero, and while infrequent, they will occur. When these claims do occur, the potential financial impact on a municipality could be significant.

The risk of a very large cancer claim already does exist due to the cancers already included as occupational diseases in Virginia. The purpose of this discussion is to alert and/or remind the readers of this report to this risk.

[17] In large deductible programs, there is an insurance contract with a carrier where the municipality agrees to reimburse the carrier for all costs below a stated deductible, such as $500,000. For self-insured municipalities, the same level of protection is achieved through an excess WC insurance contract, where the carrier agrees to reimburse the municipality for all claim costs above a stated limit, or retention, such as $500,000. The point of this discussion is that insurance carriers may demand a higher deductible or retention, such as $1,000,000, for all claims from public safety officers, or for specific claims due to occupational diseases.

[18] Oliver did not research this issue. The information in this section is presented to inform the reader that this situation does occur. Current insurance programs in Virginia may be affected due to the list of cancers already presumed to be occupational diseases under Virginia statute.

# 7

## Summary of Key Assumptions and Parameters

1. The estimates of loss costs presented in this report provide for the additional WC benefit (indemnity and medical) costs and LAE if the proposed legislation is enacted into law. The cost of any other benefit (such as those that might be available under the Virginia Line of Duty Act) is not considered in this report.
2. The estimates of premium presented in this report provide for the additional WC benefit costs and LAE if the proposed legislation is enacted into law, as well as the additional insurance company expenses and profit included in premium rates. Expenses other than LAE and insurance company expenses and profit are not considered in this report.
3. Claim frequency of a specific cancer is assumed to be the same for all occupations that would be eligible to file such a claim. Additionally, claim frequency of a specific cancer is assumed to be the same between volunteer firefighters and professional firefighters as there was no information available to distinguish frequency differentials between these occupations.
4. The medical cost (severity) of claims due to a specific cancer is assumed to be the same for all occupations that would be eligible to file such a claim.
5. Frequency of PTSD is assumed to be the same for all occupations that would be eligible to file such claim. Note that Johns Hopkins University found a slight difference in the range of potential PTSD prevalence between firefighters and police officers. However, given that the volume of data on PTSD frequency is very low, that the range of potential results for both firefighters and police officers is as large as it is, that we have no information on the relative likelihood of values within the ranges, and that the two ranges significantly overlap one another, the decision was made to use the same range for all covered occupations. Additionally, frequency of PTSD claims is assumed to be the same between volunteer firefighters and professional firefighters as there was no information available to distinguish frequency differentials between these occupations.
6. The medical cost of PTSD claims is assumed to be the same for all occupations that would be eligible to file such a claim.
7. Frequency assumptions do not consider the potential impact of challenges to the compensability of filed claims. To the extent that employers successfully defend against these claims should the proposed legislation become law, actual frequency may be less than the frequency used in this analysis, all else being equal. This study assumes that any individual who meets the requirements of Virginia law to file a claim for occupational disease due to the three additional cancers and PTSD will do so successfully.

8. The low-end and high-end estimates presented in this analysis are not absolute bounds on potential costs if the proposed legislation is enacted into law, as stated in the section on Discussion of Risk.
9. General assumptions were made regarding indemnity, or wage replacement, benefits based on discussions with representatives of municipalities in Virginia as well as general information regarding the severity and duration of treatment of PTSD. Credible quantitative data was not available.
10. The ratio of LAE to Loss is assumed to be 1.162 and is based on the application for revised WC voluntary loss costs and assigned risk rates effective April 1, 2020 filed by the NCCI.
11. Indemnity claim cost inflation is assumed to be 2.51% per year and is based on increases to the maximum weekly WC benefit in Virginia over the past 15 years.
12. Annual medical cost inflation is assumed to be 3.3%, and is based on the average of the two amounts below:
    a. Average of the 2016-2018 December South region CPI-U 12-month change from the BLS, which is the annual trend which will be applied to the Virginia Workers' Compensation Medical Fee Schedule.[19]
    b. The median annual medical trend as reported in the Oliver Wyman Carrier Trend Survey[20].
13. Annual drug cost inflation is assumed to be 6.1% and is based on the Oliver Wyman Carrier Trend Survey.
14. The portion of active professional employees that meet the 12 years of continuous service requirement is assumed to be 41%. The portion of volunteer firefighters that meet the 12 years of continuous service requirement is assumed to be 17.5%. This value is based on data provided by municipalities in Virginia at Oliver Wyman's request.
15. The factor to provide for the cost of inactive employees is 1.226 for all cancers. This value is based on an assumed 11% annual turnover rate and the assumption that 41% of active employees meet the 12 years of continuous service requirement. This calculation assumes that the average annual rate of cancer occurrence calculated for the assumed population of firefighters will apply during the five years following termination. This is a rational assumption, given that rates of cancer will vary by age, but not dramatically for ages within a five-year window. Additionally, the value reflects the five-year time limit on claim filing in Virginia from the date of last injurious exposure, generally the last date worked.[21] The factor to provide for the cost of inactive employees is 1.555 for PTSD as there is no 12-year continuous service requirement for PTSD. This calculation assumes that the average annual rate of PTSD calculated

[19] https://www.bls.gov/regions/southeast/news-release/2019/pdf/consumerpriceindex_south_20190111.pdf

[20] https://www.oliverwyman.com/our-expertise/insights/2019/sep/Carrier_Trend_Report_July_2019.html

[21] § 65.2-406. Limitation upon claim; diseases covered by limitation. 6. For all other occupational diseases, two years after a diagnosis of the disease is first communicated to the employee or within five years from the date of the last injurious exposure in employment, whichever first occurs.

for public safety officers will apply during the five years following termination. This assumption is likely conservative given that the probability of a retired public safety officer developing PTSD five years removed from employment is likely less than the probability only one year removed from employment. However, no information on this consideration was found to be available, and we have therefore made the same assumption for PTSD as for cancer.

16. 65% of firefighters are assumed to be voluntary.
17. A loss and LAE ratio of 0.66 is used to convert loss costs to premium rates.
18. Cancers and PTSD claims were identified by the presence of the following ICD-10 codes on a claim:
    a. Brain cancer is identified by ICD-10 codes beginning with C71
    b. Colon cancer is identified by ICD-10 codes beginning with C18
    c. Testicular cancer is identified by ICD-10 codes beginning with C62
    d. PTSD is identified by ICD-10 codes beginning with F43.1
19. Members in the IBM Watson MarketScan Research Database (MarketScan), used as the primary source for developing expected medical claims costs, were assigned only one disease; members with ICD-10 codes falling into multiple disease categories (e.g., brain cancer and PTSD) were assigned to the disease category with the highest allowed dollars.
20. Numerous other judgments and assumptions apply to the analysis underlying the cost estimates presented in this report.

# 8

## Documentation and Information

The following is list of documents and data utilized for the purpose of this report. In addition to documents listed below, Oliver Wyman may have relied on internal data sources, insurance industry data sources, or other information not specifically listed below.

1. Senate Bill No. 1465, 2019, Commonwealth of Virginia
2. House Bill 1804, 2019, Commonwealth of Virginia
3. § 65.2-402 of Virginia Law
4. Surveillance, Epidemiology, and End Results Program https://seer.cancer.gov/explorer/application.php
5. Relative incidence of cancer by state from the National Cancer Institute
6. https://www.ncci.com/Articles/Documents/AIS2019-SOTL-Presentation.pdf
7. https://www.ncci.com/SecureDocuments/SOLGuide2019.html
8. NCCI Annual Statistical Bulletin 2019 Edition
9. https://www.valoda.org/benefits/
10. http://www.vwc.state.va.us/sites/default/files/documents/Rates-Min-Max-COLA-Mileage.pdf
11. https://datausa.io/profile/soc/332011/
12. Medical CPI-U 12-month changes from Bureau of Labor Statistics
13. Medical and prescription drug claim costs from the IBM Watson MarketScan Research Database
14. CPI All Items - Washington-Arlington-Alexandria, DC-VA-MD-WV BLS USDOL[22]
15. Medical Care - Washington-Arlington-Alexandria, DC-VA-MD-WV BLS USDOL
16. BLS US DOL Quarterly Census of Employment and Wages
    - Courts – Local Government NAICS 92211
    - Courts – State Government NAICS 92211
    - Police Protection – Local Government NAICS 92212
    - Police Protection – State Government NAICS 92212
    - Correctional Institutions – Local Government NAICS 92214
    - Correctional Institutions – State Government NAICS 92214
    - Parole Offices and Probation Offices – Local Government NAICS 92215

[22] Bureau of Labor Statistics, United States Department of Labor

- Parole Offices and Probation Offices – State Government NAICS 92215
- Fire Protection – Local Government NAICS 92216
- Fire Protection – State Government NAICS 92216
- Other Justice and Safety Activities – Local Government NAICS 92219
- Other Justice and Safety Activities – State Government NAICS 92219

17. Arias, Elizabeth and Xu, Jiaquan. “United Sates Life Tables, 2015,” National Vital Statistics Reports, November 2018, Volume 67, Number 7. https://www.cdc.gov/nchs/data/nvsr/nvsr67/nvsr67_07-508.pdf

18. Jalilian H., et al. “Cancer Incidence and Mortality Among Firefighters,” International Journal of Cancer.

19. Smith, T., et al. “New Onset and Persistent Symptoms of Post-Traumatic Stress Disorder Self Reported after Deployment and Combat Exposures; Prospective Population Based US Military Cohort Study,” BMJ, January 2008. https://www.bmj.com/content/bmj/336/7640/366.full.pdf

20. Tanielian, Terri and Jaycox, Lisa. “Invisible Wounds of War.” https://www.rand.org/content/dam/rand/pubs/monographs/2008/RAND_MG720.pdf

21. “Mental Health Challenges for First Responders,” University of Phoenix, February 2017. https://www.phoenix.edu/content/dam/uopx/img/articles/First-Responder-Mental-Health_Full.png

22. Heyman, M., et al. “Mental Health and Suicide of First Responders,” Ruderman Family Foundation, April 2018. https://rudermanfoundation.org/white_papers/police-officers-and-firefighters-are-more-likely-to-die-by-suicide-than-in-line-of-duty/

23. “PTSD and Cancer: Growing Number of Fire Fighters and Paramedics at Risk,” International Association of Fire Fighters, August 2016. https://www.fireengineering.com/wp-content/uploads/content/dam/fe/online-articles/documents/2016/iaff-ptsd-cancer-8-16.pdf

24. https://www.ptsd.va.gov/understand/common/common_veterans.asp

25. Virginia Employment Commission data base.

26. Miscellaneous other data.

# 9

# Methodology

## General Approach

The general approach used in this analysis is termed a frequency-severity method. This is a commonly applied actuarial approach and requires an estimate of the frequency of claims and an estimate of the average cost per claim, or severity, as discussed earlier in this report. Frequency is a measure of the number of claims expected during a specified period, per unit exposure. The periods under consideration in this report are one-year, five-year, and ten-year periods measured as 2020, 2020 through 2024, and 2020 through 2029, respectively. The unit of exposure in this report is per employee. The frequency per employee multiplied by the average cost per claim yields the expected average cost per employee, during the specified time period.

### *Volunteer versus Active Employees*

The fundamental difference, with respect to cost, between volunteer and active employee firefighters is the potential value of indemnity benefits. Medical benefits are the same for all employees. Oliver Wyman relied on publicly available information to determine the portion of firefighters that are volunteer, and the portion that are active employees. This data is required for the analysis of including brain, colon, and testicular cancers as occupational diseases.

As noted earlier, no information was available to distinguish between the frequency of PTSD claims for volunteer firefighters and professional firefighters. Additionally, no information was available to distinguish between the frequency of cancer claims between volunteer firefighters and professional firefighters.

### *Age Distribution*

The distribution of employees in the affected professions by age and gender is critical data for this analysis. National data was obtained through research by Oliver Wyman, Virginia specific data was provided by JLARC, and several municipalities in Virginia provided data at Oliver Wyman's request. For the purpose of this analysis, Oliver Wyman relied primarily on the data obtained directly from the municipalities.

### *Vesting and Latent Exposure*

Virginia has a 12-year requirement for continuous service in order to file a claim for cancer as an occupational disease. The data obtained from municipalities in Virginia was provided with hire date so that Oliver Wyman could assess the portion of public safety employees that would be eligible to file a claim as an occupational disease. That

percentage is approximately 41% for individuals employed as firefighters, and 17.5% for volunteer firefighters. This vesting requirement does not apply to PTSD claims.

Additionally, Virginia has a limit on the time during which a claim may be filed. §65.2-406 states that for all other occupational diseases (which would include the cancers and PTSD) claims must be filed within two years after a diagnosis of the disease is first communicated to the employee or within five years from the date of the last injurious exposure in employment, whichever occurs first. The five-year window creates an exposure for municipalities in that upon termination[23] (generally, the date of the last injurious exposure), an employee has up to five years to file a claim, if that employee should develop one of the conditions under consideration. The cost of claims generated by terminated employees must be funded by premium collected while the employee was active.[24] To account for this, Oliver Wyman measured an 11% turnover rate using data provided by the municipalities. Given that 41% of active employees will meet the 12-year requirement at any given point in time, then 41% of the 11% of employees who leave the workforce in any given year would be eligible to file a claim should they develop any of the conditions under consideration. This will happen each year for five years. Using this information, a factor to provide for the cost of inactive employees was calculated to be 1.226 for all cancers, and 1.555 for PTSD as there is no vesting requirement. These factors were applied in the development of the frequencies in order to account for expected claims from terminated employees. For volunteer firefighters, 17.5% will meet the vesting requirement. Appropriate adjustments to calculations were made to account for the different percentages.

## Frequency

The starting point for the frequency calculation is the incidence rate, which represents the number of individuals newly diagnosed with cancer or PTSD in a given year. The Surveillance, Epidemiology, and End Results (SEER) Program data was utilized as the basis for the incidence rate estimates for brain, colon, and testicular cancer.[25] The SEER data contains incidence rates by age bands and gender, as well as incidence rate trends by age bands and gender, based on historical data for each type of cancer. Delay-adjusted rates were used where possible as these rates account for the reporting delay present in the more recent data. However, while delay-adjusted rates were available for brain and testicular cancer, only observed rates were available for colon cancer. In addition, all stages of cancer and all races were included as the distribution of these variables was assumed to be the same for firefighters as is present in the population underlying the SEER data.

[23] Termination refers to all reasons for leaving the workforce, including retirement.

[24] Consider a population of active employees in 2020. 11% of these employees are expected to terminate during the year. The terminated employees will have the opportunity to file a claim within five years of termination. The 22.6% additional funding requirement provides for the cost of cancer claims that may be filed during the five years following termination.

[25] https://seer.cancer.gov/explorer/application.php

The SEER incidence rates were trended forward to the base period, 2020, if there was a credible and statistically significant trend rate determined by SEER. No adjustment was applied to the initial SEER incidence rates if there was no credible or statistically significant trend rate available. These incidence rates were then adjusted to Virginia levels based on the relativity of Virginia incidence to United States incidence using National Cancer Institute data.[26] A final adjustment made was to reflect any difference in firefighter incidence rates for each cancer type, when compared to the general population. The source for this adjustment was a Jalilian, et al. meta-analysis focused on firefighters.[27] Oliver Wyman assumed that these relativities by cancer type applied to all public safety officers as studies specific to each type of profession were not available. The study provided a range for each cancer type for the incidence risk estimates for firefighters. The low-end and high-end incidence rate estimates used in our analysis correspond to the low-end and high-end of the range in the study.

The resulting incidence rates that were utilized in the analysis are provided in the table below for brain, colon, and testicular cancer. The values displayed are weighted average incidence rates for each age band and gender combination, per 100,000 vested public safety officers.

**Average Incidence Rates by Age Band, Gender, and Cancer Type**
**Per 100,000 Vested Public Safety Officers**

| | | Brain Cancer | | Colon Cancer | | Testicular Cancer | |
|---|---|---|---|---|---|---|---|
| Gender | Age Band | Low | High | Low | High | Low | High |
| Female | < 40 | 2.4 | 3.7 | 13.3 | 15.5 | 0.0 | 0.0 |
| Female | 40 – 49 | 3.1 | 4.7 | 16.2 | 18.8 | 0.0 | 0.0 |
| Female | 50 – 59 | 5.8 | 8.9 | 33.2 | 38.5 | 0.0 | 0.0 |
| Female | 60+ | 9.6 | 14.7 | 53.2 | 61.8 | 0.0 | 0.0 |
| **Female** | **Total[1]** | **4.5** | **6.9** | **25.1** | **29.1** | **0.0** | **0.0** |
| Male | < 40 | 3.2 | 4.9 | 7.5 | 8.7 | 15.1 | 23.4 |
| Male | 40 – 49 | 4.2 | 6.4 | 15.8 | 18.3 | 8.0 | 12.5 |
| Male | 50 – 59 | 7.6 | 11.7 | 40.5 | 47.0 | 4.8 | 7.5 |
| Male | 60+ | 14.3 | 21.8 | 75.6 | 87.7 | 1.9 | 3.0 |
| **Male** | **Total[1]** | **7.0** | **10.7** | **33.3** | **38.7** | **7.2** | **11.2** |
| | **Total[1]** | **6.9** | **10.5** | **32.8** | **38.0** | **6.7** | **10.5** |

[1] Totals based on the projected distribution by age and gender

Incidence rate data for PTSD was not as readily available as it was for cancer, especially when focusing on public safety officers. Several PTSD prevalence studies (i.e., percentage of individuals with PTSD at a given time) centered around public safety officers showed a prevalence rate which was similar to that of veterans and had a general

[26] https://statecancerprofiles.cancer.gov/incidencerates/index.php

[27] https://onlinelibrary.wiley.com/doi/abs/10.1002/ijc.32199

range of 10% to 20%.[28, 29, 30] Incidence rates were calculated assuming the range represented the likelihood of a public safety officer developing PTSD at some point over the length of their career, which was assumed to be 25 years. A gender differential was applied based on a study published by the BMJ comparing PTSD incidence rates by gender for veterans, which was assumed to be the same for public safety officers.[31] These amounts were then adjusted downward by 25% to reflect that not all individuals with PTSD will seek treatment, based on a University of Phoenix analysis.[32] No age adjustments and no Virginia-specific adjustments were applied due to the limited availability of data.

The resulting PTSD incidence rates which were utilized in the analysis are provided in the table below and are presented per 100,000 vested public safety officers.

**Average Incidence Rates by Gender - PTSD**
**Per 100,000 Vested Public Safety Officers**

| | Firefighters | | Police Officers | |
|---|---|---|---|---|
| Gender | Low | High | Low | High |
| Female | 467 | 986 | 467 | 986 |
| Male | 295 | 623 | 295 | 623 |
| **Total[1]** | **312** | **659** | **320** | **677** |

[1] Totals based on the projected distribution by age and gender

Please note that the incidence rates above are per 100,000 vested public safety officers. The study results outlined in Section 1 show the incidence rate per 100,000 employees (i.e., active public safety officers). The difference between these numbers is a result of the impact of the latent exposures (i.e., retirees) previously described. All public safety officers are considered vested for the PTSD benefits as there is no vesting requirement. As an example, if the incidence rate per 100,000 vested public safety officers was 5.0, there were 250 vested public safety officers (including retirees), and 200 total employees. The incidence rate per 100,000 employees would be 6.25 (= 5.0 X 250 / 200).

The next step in the process was to incorporate the impact of year-over-year survival, which is measured by a survival rate. The survival rate represents the probability that an individual will survive to a given point in the future (e.g., 1 year, 5 years). The starting point for survival rates was the general United States population and the information utilized was 2015 data from the Center for Disease Control (CDC).[33]

[28] https://www.rand.org/pubs/monographs/MG720.html

[29] https://rudermanfoundation.org/white_papers/police-officers-and-firefighters-are-more-likely-to-die-by-suicide-than-in-line-of-duty/

[30] https://www.fireengineering.com/content/dam/fe/online-articles/documents/2016/iaff-ptsd-cancer-8-16.pdf

[31] https://www.bmj.com/content/bmj/336/7640/366.full.pdf

[32] https://www.phoenix.edu/about_us/media-center/news/uopx-releases-first-responder-mental-health-survey-results.html

[33] https://www.cdc.gov/nchs/data/nvsr/nvsr67/nvsr67_07-508.pdf

The SEER data provided relative survival rates by gender and age bands, as well as relative survival rate trends by gender and age bands, based on historical data for each type of cancer. The survival rates for each type of cancer were calculated using the SEER relative survival rates combined with the general United States population data, while removing the impact of deaths for each cancer in the general United States population data.

Similar to how incidence rates were calculated, the survival rates were then trended forward to the base period, 2020, if there was a credible and statistically significant trend rate determined by SEER. No adjustment was applied to the survival rates if there was no credible or statistically significant trend rate available. This resulted in the final survival rates for brain, colon, and testicular cancer.

Relative survival rates were only available from the SEER data for 10 years. It was assumed that the survival rates for later years will be the same as the general population and the projected number of life years after year 10 of treatment was based on data from the CDC.

Due to the unavailability of data, survival rates for those with PTSD were assumed to be the same as the general population. The resulting survival rates which that utilized in the analysis are provided in the following tables. The values displayed are weighted average 1, 5, and 10-year rates for each age band and gender combination.

### Relative Survival Rates by Age Band, Gender, and Cancer Type/PTSD

| | | Brain Cancer | | | Colon Cancer | | |
|---|---|---|---|---|---|---|---|
| **Gender** | **Age Band** | **1-Year** | **5-Year** | **10-Year** | **1-Year** | **5-Year** | **10-Year** |
| Female | < 40 | 93% | 76% | 65% | 94% | 74% | 67% |
| Female | 40 – 49 | 67% | 31% | 24% | 88% | 67% | 60% |
| Female | 50 – 59 | 62% | 23% | 17% | 86% | 64% | 57% |
| Female | 60+ | 56% | 19% | 14% | 85% | 61% | 52% |
| **Female** | **Total[1]** | **69%** | **36%** | **29%** | **88%** | **67%** | **59%** |
| Male | < 40 | 93% | 71% | 56% | 89% | 64% | 57% |
| Male | 40 – 49 | 62% | 24% | 17% | 85% | 62% | 54% |
| Male | 50 – 59 | 55% | 16% | 11% | 83% | 59% | 50% |
| Male | 60+ | 43% | 10% | 6% | 82% | 57% | 43% |
| **Male** | **Total[1]** | **62%** | **28%** | **21%** | **85%** | **60%** | **51%** |
| | **Total[1]** | **62%** | **28%** | **21%** | **85%** | **61%** | **52%** |

| | | Testicular Cancer | | | PTSD[2] | | |
|---|---|---|---|---|---|---|---|
| Gender | Age Band | 1-Year | 5-Year | 10-Year | 1-Year | 5-Year | 10-Year |
| Female | < 40 | 100% | 99% | 99% | 100% | 100% | 99% |
| Female | 40 – 49 | 100% | 99% | 97% | 100% | 99% | 97% |
| Female | 50 – 59 | 100% | 98% | 94% | 100% | 98% | 94% |
| Female | 60+ | 99% | 95% | 87% | 99% | 95% | 87% |
| **Female** | **Total[1]** | **100%** | **98%** | **95%** | **100%** | **99%** | **98%** |
| Male | < 40 | 98% | 95% | 93% | 100% | 99% | 98% |
| Male | 40 – 49 | 97% | 93% | 90% | 100% | 98% | 95% |
| Male | 50 – 59 | 92% | 86% | 79% | 99% | 96% | 90% |
| Male | 60+ | 90% | 79% | 65% | 98% | 90% | 76% |
| **Male** | **Total[1]** | **94%** | **89%** | **82%** | **100%** | **97%** | **94%** |
| | **Total[1]** | **95%** | **89%** | **83%** | **100%** | **98%** | **94%** |

[1] Totals based on the projected distribution by age and gender

[2] The relative survival rates are the same for firefighters and police officers when rounded to two decimal places

The incidence rates and survival rates were then combined to determine the projected number of vested public safety officers that are expected to receive treatment for each disease in each year. As an example, the projected incidence rate for brain cancer is 6.8 per 100,000 vested public safety officers with a 1-year expected survival rate of 63%. This means that 6.8 per 100,000 are projected to receive treatment in year 1, while only 4.3 (= 6.8 * 63%) are projected to survive and receive additional treatment in year 2.

One additional adjustment was applied only for PTSD. Based on the BMJ publication, only 75% of those with PTSD are expected to continue treatment year-over-year. This value is not reflected in the tables above, but is included in the calculation as an additional adjustment when projecting the number of individuals expected to receive treatment for PTSD in each year.

## Indemnity Severity

The minimum and maximum number of weeks of compensation are assumptions made by Oliver Wyman based on minimal data and information, as discussed previously in the text. The weekly benefit rate for volunteer firefighters is equal to the current minimum WC benefit in Virginia, effective July 1, 2019. The weekly benefit rate for actively employed firefighters is based on wage data from the Virginia Employment Commission.

## Medical Severity

The primary source for calculating the expected medical severity was the IBM Watson MarketScan Research Database (MarketScan) for calendar years 2015 through 2017. Members were flagged as having brain cancer, colon cancer, testicular cancer, or PTSD based on the presence of the specified ICD-10 codes on the claim. Claims for each member were grouped into treatment years based on the first month a specified ICD-10 was identified. As an example, someone identified with an ICD-10 for brain cancer for the

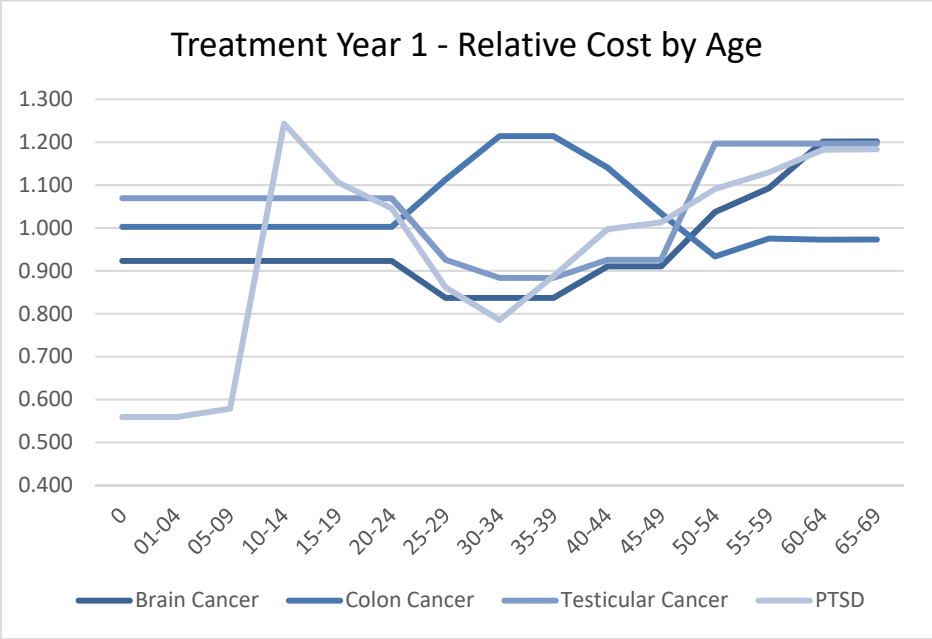
first time in November 2015 had the months of November 2015 through October 2016 representing their first treatment year, the months November 2016 through October 2017 representing their second treatment year, etc. Only those claims with an ICD-10 for PTSD were included for the PTSD calculations. However, all medical and drug claims for individuals with brain, colon, and testicular cancer were included in the cost calculation during the period for which they were determined to have cancer, regardless of the diagnosis code on the claim, as it is assumed that every claim could be tied to cancer treatment or is a result of cancer treatment.

After identifying the members with one or more of the specified ICD-10 codes on their claims, some limitations were applied to the data to more accurately reflect the expected cost of treatment for each disease.

1. Members where the first month of identification of a cancer or PTSD claim was also their first effective month of coverage in the MarketScan database were removed. It is unknown what month or year these members were first diagnosed as their history is unavailable.
2. Members with only one month of claims linked to a cancer or PTSD diagnosis were removed. These members may likely have had claims for rule-out/testing purposes and costs for these members are not indicative of the typical cost of treatment for the disease.
3. Members with less than $10,000 in total allowed costs for brain and colon cancer or less than $5,000 in total allowed costs for testicular cancer in the first year of treatment were removed. These members may likely have had claims in multiple months mainly for rule-out/testing purposes and costs for these members may not be indicative of the typical cost of treatment for the disease.
    - Note that these members were not removed when determining the low-end estimate of costs as treatment for members with costs in this range may still be covered under the presumptive benefit.

Claims associated with each individual's treatment year 1 costs were trended to 2017 to put them all on the same basis and the weighted average cost across all individuals with that disease was calculated while also normalizing for any differences in average duration (i.e., those with a first month of treatment identified after January 2017 were unable to have 12 total months of treatment costs included).

Age factors were calculated for each disease based on the treatment year 1 cost relativity of each age grouping compared to the overall average, and age groupings were combined as needed for credibility purposes. The chart below presents the treatment year 1 relative cost by age for each disease.




The final step in calculating the treatment year 1 expected costs was to apply a geographic adjustment factor to reflect Virginia costs, as nationwide data was used in the development for credibility purposes. The Virginia geographic adjustment factor for inpatient services was based on a comparison of the cost per DRG weight for inpatient services in Virginia and nationwide data. It was assumed that outpatient costs would reflect the same relativity as inpatient.

The Virginia geographic adjustment factor for professional services was based on a comparison of the cost per RVU for services provided in Virginia and those provided nationwide, using a common market basket of services. An additional adjustment was applied to the medical data to reflect the reimbursement “hair-cut” observed with the implementation of the Virginia WC Medical Fee Schedule as the 2018 fee schedule was based on 2014-2015 data with no unit cost adjustment initially applied. No further adjustments were applied to reflect workers’ compensation cost levels as the necessary data to determine those adjustments (i.e., provider contracts) was not provided for this analysis. In addition, no geographic adjustment was applied to the drug data as it is assumed Virginia costs are similar to those nationwide costs.

All costs were then trended to calendar year 2020 using the annual unit cost trend previously described. The resulting treatment year 1 expected costs that were utilized in the analysis are provided in the tables that follow. The values displayed represent weighted average treatment year 1 costs for each age band and gender combination.

## Treatment Year 1 Expect Costs by Age Band, Gender, and Cancer Type/PTSD

| | | Brain Cancer | | Colon Cancer | |
|---|---|---|---|---|---|
| Gender | Age Band | Low | High | Low | High |
| Female | < 40 | $158,723 | $180,060 | $136,917 | $156,036 |
| Female | 40 – 49 | $172,646 | $195,855 | $120,015 | $136,774 |
| Female | 50 – 59 | $199,754 | $226,608 | $106,531 | $121,406 |
| Female | 60+ | $200,582 | $227,547 | $95,537 | $108,878 |
| **Female** | **Total[1]** | **$188,940** | **$214,339** | **$110,573** | **$126,013** |
| Male | < 40 | $176,087 | $204,201 | $149,579 | $170,559 |
| Male | 40 – 49 | $191,533 | $222,114 | $131,427 | $149,860 |
| Male | 50 – 59 | $224,431 | $260,265 | $117,624 | $134,121 |
| Male | 60+ | $169,213 | $196,230 | $79,323 | $90,449 |
| **Male** | **Total[1]** | **$190,214** | **$220,585** | **$103,026** | **$117,476** |
| | **Total[1]** | **$190,159** | **$220,315** | **$103,405** | **$117,905** |

[1] Totals based on the projected distribution by age and gender

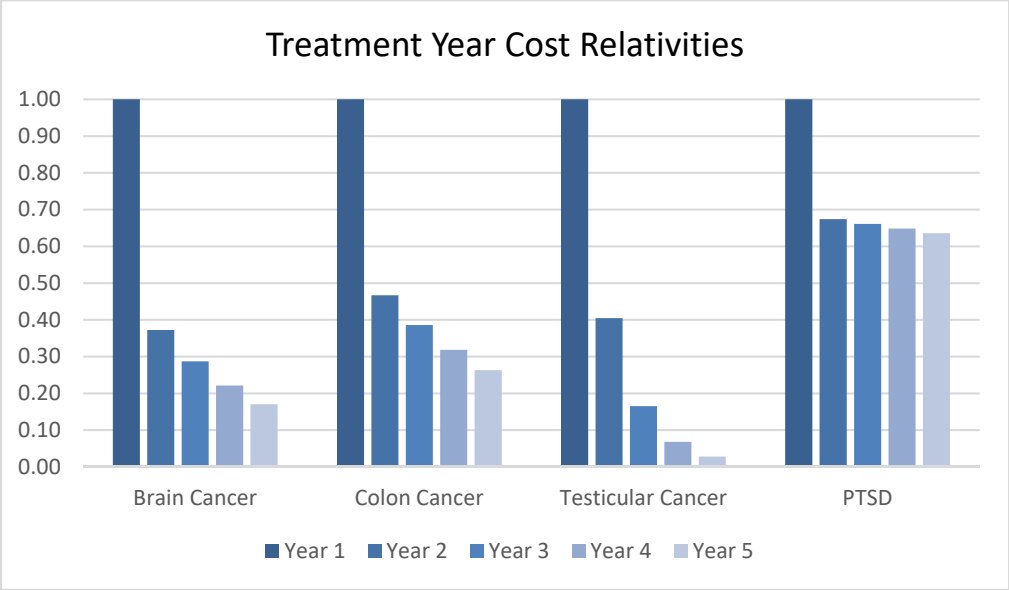
## Treatment Year 1 Expect Costs by Age Band, Gender, and Cancer Type/PTSD

| | | Testicular Cancer | | PTSD – Firefighters | | PTSD – Police Officers | |
|---|---|---|---|---|---|---|---|
| Gender | Age Band | Low | High | Low | High | Low | High |
| Female | < 40 | N/A | N/A | $5,196 | $6,064 | $5,196 | $6,064 |
| Female | 40 – 49 | N/A | N/A | $5,475 | $6,388 | $5,475 | $6,388 |
| Female | 50 – 59 | N/A | N/A | $5,985 | $6,983 | $5,985 | $6,983 |
| Female | 60+ | N/A | N/A | $5,924 | $6,913 | $5,924 | $6,913 |
| **Female** | **Total[1]** | **N/A** | **N/A** | **$5,364** | **$6,259** | **$5,364** | **$6,259** |
| Male | < 40 | $37,905 | $48,179 | $4,688 | $5,470 | $4,688 | $5,470 |
| Male | 40 – 49 | $39,690 | $50,449 | $5,314 | $6,200 | $5,314 | $6,200 |
| Male | 50 – 59 | $51,316 | $65,226 | $5,857 | $6,834 | $5,857 | $6,834 |
| Male | 60+ | $43,126 | $54,816 | $4,754 | $5,547 | $4,754 | $5,547 |
| **Male** | **Total[1]** | **$41,235** | **$52,413** | **$5,020** | **$5,858** | **$5,020** | **$5,858** |
| | **Total[1]** | **$41,235** | **$52,413** | **$5,072** | **$5,918** | **$5,095** | **$5,946** |

[1] Totals based on the projected distribution by age and gender

The MarketScan data was also used to project the expected costs for treatment years 2 and later. Months 13-24 since the first presence of the specified ICD-10 codes on a claim for a member represent treatment year 2 and months 25-36 since the first presence of the specified ICD-10 codes on a claim represent treatment year 3. The treatment year 2-to-year 1 average cost relativity and treatment year 3-to-year 2 average cost relativity were calculated for each gender and disease. As an example, if the average cost was $100,000 in treatment year 1 and $50,000 in treatment year 2, the year 2-to-year 1 cost

relativity would be 0.50 (i.e., $50,000 / $100,000). These relativity factors were applied to the treatment year 1 expected costs in order to calculate the expected costs for treatment years 2 and later. The treatment year 3-to-year 2 average cost relativity was assumed to apply for treatment years 4 and later as continuous enrollment experience for those treatment years was not available. Specific to testicular cancer, the treatment year 2-to-year 1 average cost relativity was used for all future years due to the much higher treatment success rate for testicular cancer, relative to other types of cancer. The weighted average relative expected cost factors by treatment year and disease are provided in the chart below.




Treatment costs for each future calendar year were increased by the annual unit cost trend assumption previously described. The treatment year costs were then combined with the incidence rates and survival rates previously described to calculate an average lifetime cost per case for each disease.

# 10

## Distribution and Use

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# 11

# Considerations and Limitations

**Data Verification** – For our analysis, Oliver Wyman relied on data and information provided by JLARC, collected through independent research, or provided by other organizations engaged by JLARC to assist with this project. Oliver Wyman relied on this information without independent audit. Oliver Wyman has assumed that the data and information relied on is accurate and complete. The results of our analysis are dependent on this assumption. If this data or information relied on is inaccurate or incomplete, the findings and conclusions presented in this report may need to be revised.

**Supplemental Data** – Data and information collected through independent research is an integral part of the analysis. Although Oliver Wyman believes these external sources to be valid sources of additional information, the use of external data may add to the uncertainty associated with conclusions presented in this report.

**Rounding and Accuracy** – Models and spreadsheets used for this analysis may retain more digits than those displayed within the report. In addition, the results of certain calculations may be presented within the report with more or less digits than would be considered significant. As a result, it should be recognized that (i) there may be rounding differences between the results of calculations presented in the report and replications of those calculations based on displayed underlying amounts, and (ii) the results of calculations may not have been adjusted to reflect the precision of the calculation.

**Unanticipated Changes** – Conclusions are based on an analysis of the data and information and on the estimated outcome of many contingent events. Future costs were developed from the data and information provided and collected for this assignment. Estimates in this report make no provision for extraordinary future emergence of new classes of losses or types of losses not sufficiently represented in data and information used for this analysis.

**Uncertainty Inherent in Projections** – While this analysis complies with applicable Actuarial Standards of Practice and Statements of Principles, users of this analysis should recognize that estimates, forecasts, and projections in this report are for future events, and are therefore subject to economic and statistical variations from expected values. This is especially true for the estimates, forecasts, and projections in this analysis because of the uncertainty of the underlying data and information relied upon for this analysis. Additionally, Oliver Wyman has not anticipated any extraordinary changes to the legal, social, or economic environment that might affect the frequency or severity of claims. For these reasons, no assurance can be given that the emergence of actual losses will correspond to the projections in this analysis.

**Other Issues** – Any issues not specifically addressed in this report should not be construed as acceptance by Oliver Wyman of the methodologies and judgments associated with those issues.

# 12

## § 65.2-402

**Presumption as to death or disability from respiratory disease, hypertension or heart disease, cancer.**

A. Respiratory diseases that cause (i) the death of volunteer or salaried firefighters or Department of Emergency Management hazardous materials officers or (ii) any health condition or impairment of such firefighters or Department of Emergency Management hazardous materials officers resulting in total or partial disability shall be presumed to be occupational diseases, suffered in the line of duty, that are covered by this title unless such presumption is overcome by a preponderance of competent evidence to the contrary.

B. Hypertension or heart disease causing the death of, or any health condition or impairment resulting in total or partial disability of (i) salaried or volunteer firefighters, (ii) members of the State Police Officers' Retirement System, (iii) members of county, city or town police departments, (iv) sheriffs and deputy sheriffs, (v) Department of Emergency Management hazardous materials officers, (vi) city sergeants or deputy city sergeants of the City of Richmond, (vii) Virginia Marine Police officers, (viii) conservation police officers who are full-time sworn members of the enforcement division of the Department of Game and Inland Fisheries, (ix) Capitol Police officers, (x) special agents of the Virginia Alcoholic Beverage Control Authority appointed under the provisions of Chapter 1 (§ 4.1-100 et seq.) of Title 4.1, (xi) for such period that the Metropolitan Washington Airports Authority voluntarily subjects itself to the provisions of this chapter as provided in § 65.2-305, officers of the police force established and maintained by the Metropolitan Washington Airports Authority, (xii) officers of the police force established and maintained by the Norfolk Airport Authority, (xiii) sworn officers of the police force established and maintained by the Virginia Port Authority, and (xiv) campus police officers appointed under Article 3 (§ 23.1-809 et seq.) of Chapter 8 of Title 23.1 and employed by any public institution of higher education shall be presumed to be occupational diseases, suffered in the line of duty, that are covered by this title unless such presumption is overcome by a preponderance of competent evidence to the contrary.

C. Leukemia or pancreatic, prostate, rectal, throat, ovarian or breast cancer causing the death of, or any health condition or impairment resulting in total or partial disability of, any volunteer or salaried firefighter, Department of Emergency Management hazardous materials officer, commercial vehicle enforcement officer or motor carrier safety trooper employed by the Department of State Police, or full-time sworn member of the enforcement division of the Department of Motor Vehicles having completed 12 years of continuous service who has a contact with a toxic substance encountered in the line of duty shall be presumed to be an occupational disease, suffered in the line of duty, that is

covered by this title, unless such presumption is overcome by a preponderance of competent evidence to the contrary. For the purposes of this section, a "toxic substance" is one which is a known or suspected carcinogen, as defined by the International Agency for Research on Cancer, and which causes, or is suspected to cause, leukemia or pancreatic, prostate, rectal, throat, ovarian or breast cancer.

D. The presumptions described in subsections A, B, and C shall only apply if persons entitled to invoke them have, if requested by the private employer, appointing authority or governing body employing them, undergone preemployment physical examinations that (i) were conducted prior to the making of any claims under this title that rely on such presumptions, (ii) were performed by physicians whose qualifications are as prescribed by the private employer, appointing authority or governing body employing such persons, (iii) included such appropriate laboratory and other diagnostic studies as the private employer, appointing authorities or governing bodies may have prescribed, and (iv) found such persons free of respiratory diseases, hypertension, cancer or heart disease at the time of such examinations.

E. Persons making claims under this title who rely on such presumptions shall, upon the request of private employers, appointing authorities or governing bodies employing such persons, submit to physical examinations (i) conducted by physicians selected by such employers, authorities, bodies or their representatives and (ii) consisting of such tests and studies as may reasonably be required by such physicians. However, a qualified physician, selected and compensated by the claimant, may, at the election of such claimant, be present at such examination.

F. Whenever a claim for death benefits is made under this title and the presumptions of this section are invoked, any person entitled to make such claim shall, upon the request of the appropriate private employer, appointing authority or governing body that had employed the deceased, submit the body of the deceased to a postmortem examination as may be directed by the Commission. A qualified physician, selected and compensated by the person entitled to make the claim, may, at the election of such claimant, be present at such postmortem examination.

G. Volunteer emergency medical services personnel, volunteer law-enforcement chaplains, auxiliary and reserve deputy sheriffs, and auxiliary and reserve police are not included within the coverage of this section.

H. For purposes of this section, "firefighter" includes special forest wardens designated pursuant to § 10.1-1135 and any persons who are employed by or contract with private employers primarily to perform firefighting services.

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# HB 1804

## VIRGINIA ACTS OF ASSEMBLY -- 2019 SESSION

### CHAPTER 415

*An Act to amend and reenact § 65.2-402 of the Code of Virginia, relating to workers' compensation; presumption of compensability for certain cancers.*

[H 1804]

Approved March 18, 2019

**Be it enacted by the General Assembly of Virginia:**

**1. That § 65.2-402 of the Code of Virginia is amended and reenacted as follows:**

**§ 65.2-402. Presumption as to death or disability from respiratory disease, hypertension or heart disease, cancer.**

A. Respiratory diseases that cause (i) the death of volunteer or salaried firefighters or Department of Emergency Management hazardous materials officers or (ii) any health condition or impairment of such firefighters or Department of Emergency Management hazardous materials officers resulting in total or partial disability shall be presumed to be occupational diseases, suffered in the line of duty, that are covered by this title unless such presumption is overcome by a preponderance of competent evidence to the contrary.

B. Hypertension or heart disease causing the death of, or any health condition or impairment resulting in total or partial disability of (i) salaried or volunteer firefighters, (ii) members of the State Police Officers' Retirement System, (iii) members of county, city or town police departments, (iv) sheriffs and deputy sheriffs, (v) Department of Emergency Management hazardous materials officers, (vi) city sergeants or deputy city sergeants of the City of Richmond, (vii) Virginia Marine Police officers, (viii) conservation police officers who are full-time sworn members of the enforcement division of the Department of Game and Inland Fisheries, (ix) Capitol Police officers, (x) special agents of the Virginia Alcoholic Beverage Control Authority appointed under the provisions of Chapter 1 (§ 4.1-100 et seq.) of Title 4.1, (xi) for such period that the Metropolitan Washington Airports Authority voluntarily subjects itself to the provisions of this chapter as provided in § 65.2-305, officers of the police force established and maintained by the Metropolitan Washington Airports Authority, (xii) officers of the police force established and maintained by the Norfolk Airport Authority, (xiii) sworn officers of the police force established and maintained by the Virginia Port Authority, and (xiv) campus police officers appointed under Article 3 (§ 23.1-809 et seq.) of Chapter 8 of Title 23.1 and employed by any public institution of higher education shall be presumed to be occupational diseases, suffered in the line of duty, that are covered by this title unless such presumption is overcome by a preponderance of competent evidence to the contrary.

C. Leukemia or pancreatic, prostate, rectal, throat, ovarian ~~or~~, breast, *colon, brain, or testicular* cancer causing the death of, or any health condition or impairment resulting in total or partial disability of, any volunteer or salaried firefighter, Department of Emergency Management hazardous materials officer, commercial vehicle enforcement officer or motor carrier safety trooper employed by the Department of State Police, or full-time sworn member of the enforcement division of the Department of Motor Vehicles having completed 12 years of continuous service who has a contact with a toxic substance encountered in the line of duty shall be presumed to be an occupational disease, suffered in the line of duty, that is covered by this title, unless such presumption is overcome by a preponderance of competent evidence to the contrary. For the purposes of this section, a "toxic substance" is one which is a known or suspected carcinogen, as defined by the International Agency for Research on Cancer, and which causes, or is suspected to cause, leukemia or pancreatic, prostate, rectal, throat, ovarian ~~or~~, breast, *colon, brain, or testicular* cancer.

D. The presumptions described in subsections A, B, and C shall only apply if persons entitled to invoke them have, if requested by the private employer, appointing authority or governing body employing them, undergone preemployment physical examinations that (i) were conducted prior to the making of any claims under this title that rely on such presumptions, (ii) were performed by physicians whose qualifications are as prescribed by the private employer, appointing authority or governing body employing such persons, (iii) included such appropriate laboratory and other diagnostic studies as the private employer, appointing authorities or governing bodies may have prescribed, and (iv) found such persons free of respiratory diseases, hypertension, cancer or heart disease at the time of such examinations.

E. Persons making claims under this title who rely on such presumptions shall, upon the request of private employers, appointing authorities or governing bodies employing such persons, submit to physical examinations (i) conducted by physicians selected by such employers, authorities, bodies or their representatives and (ii) consisting of such tests and studies as may reasonably be required by such physicians. However, a qualified physician, selected and compensated by the claimant, may, at the

election of such claimant, be present at such examination.

F. Whenever a claim for death benefits is made under this title and the presumptions of this section are invoked, any person entitled to make such claim shall, upon the request of the appropriate private employer, appointing authority or governing body that had employed the deceased, submit the body of the deceased to a postmortem examination as may be directed by the Commission. A qualified physician, selected and compensated by the person entitled to make the claim, may, at the election of such claimant, be present at such postmortem examination.

G. Volunteer emergency medical services personnel, volunteer law-enforcement chaplains, auxiliary and reserve deputy sheriffs, and auxiliary and reserve police are not included within the coverage of this section.

H. For purposes of this section, "firefighter" includes special forest wardens designated pursuant to § 10.1-1135 and any persons who are employed by or contract with private employers primarily to perform firefighting services.

**2. That the provisions of this act shall not become effective unless reenacted by the 2020 Session of the General Assembly.**

**3. That the 2020 Session of the General Assembly, in considering and enacting any legislation relating to workers' compensation and the presumption of compensability for certain cancers, shall consider any research, findings, and recommendations of the Joint Legislative Audit and Review Commission from the Commission's review of the Virginia Workers' Compensation program.**

# SB 1465

## 2019 SESSION

**INTRODUCED**

19103615D

**SENATE BILL NO. 1465**

Offered January 9, 2019

Prefiled January 8, 2019

*A BILL to amend and reenact § 65.2-402 of the Code of Virginia, relating to workers' compensation; presumption that post-traumatic stress disorder is an occupational disease.*

Patrons—McPike, Saslaw and Surovell; Delegates: Filler-Corn and Kory

Referred to Committee on Commerce and Labor

**Be it enacted by the General Assembly of Virginia:**

**1. That § 65.2-402 of the Code of Virginia is amended and reenacted as follows:**

**§ 65.2-402. Presumption as to death or disability from respiratory disease, hypertension or heart disease, cancer, or post-traumatic stress disorder.**

A. Respiratory diseases that cause (i) the death of volunteer or salaried firefighters or Department of Emergency Management hazardous materials officers or (ii) any health condition or impairment of such firefighters or Department of Emergency Management hazardous materials officers resulting in total or partial disability shall be presumed to be occupational diseases, suffered in the line of duty, that are covered by this title unless such presumption is overcome by a preponderance of competent evidence to the contrary.

B. Hypertension or heart disease causing the death of, or any health condition or impairment resulting in total or partial disability of (i) salaried or volunteer firefighters, (ii) members of the State Police Officers' Retirement System, (iii) members of county, city or town police departments, (iv) sheriffs and deputy sheriffs, (v) Department of Emergency Management hazardous materials officers, (vi) city sergeants or deputy city sergeants of the City of Richmond, (vii) Virginia Marine Police officers, (viii) conservation police officers who are full-time sworn members of the enforcement division of the Department of Game and Inland Fisheries, (ix) Capitol Police officers, (x) special agents of the Virginia Alcoholic Beverage Control Authority appointed under the provisions of Chapter 1 (§ 4.1-100 et seq.) of Title 4.1, (xi) for such period that the Metropolitan Washington Airports Authority voluntarily subjects itself to the provisions of this chapter as provided in § 65.2-305, officers of the police force established and maintained by the Metropolitan Washington Airports Authority, (xii) officers of the police force established and maintained by the Norfolk Airport Authority, (xiii) sworn officers of the police force established and maintained by the Virginia Port Authority, and (xiv) campus police officers appointed under Article 3 (§ 23.1-809 et seq.) of Chapter 8 of Title 23.1 and employed by any public institution of higher education shall be presumed to be occupational diseases, suffered in the line of duty, that are covered by this title unless such presumption is overcome by a preponderance of competent evidence to the contrary.

C. Leukemia or pancreatic, prostate, rectal, throat, ovarian or breast cancer causing the death of, or any health condition or impairment resulting in total or partial disability of, any volunteer or salaried firefighter, Department of Emergency Management hazardous materials officer, commercial vehicle enforcement officer or motor carrier safety trooper employed by the Department of State Police, or full-time sworn member of the enforcement division of the Department of Motor Vehicles having completed 12 years of continuous service who has a contact with a toxic substance encountered in the line of duty shall be presumed to be an occupational disease, suffered in the line of duty, that is covered by this title, unless such presumption is overcome by a preponderance of competent evidence to the contrary. For the purposes of this section, a "toxic substance" is one which is a known or suspected carcinogen, as defined by the International Agency for Research on Cancer, and which causes, or is suspected to cause, leukemia or pancreatic, prostate, rectal, throat, ovarian or breast cancer.

D. *If any (i) salaried or volunteer firefighter, (ii) member of the State Police Officers' Retirement System, (iii) member of a county, city, or town police department, (iv) sheriff or deputy sheriff, (v) Department of Emergency Management hazardous materials officer, (vi) city sergeant or deputy city sergeant of the City of Richmond, (vii) Virginia Marine Police officer, (viii) conservation police officer who is a full-time sworn member of the enforcement division of the Department of Game and Inland Fisheries, (ix) Capitol Police officer, (x) special agent of the Virginia Alcoholic Beverage Control Authority appointed under the provisions of Chapter 1 (§ 4.1-100 et seq.) of Title 4.1, (xi) for such period that the Metropolitan Washington Airports Authority voluntarily subjects itself to the provisions of this chapter as provided in § 65.2-305, officer of the police force established and maintained by the Metropolitan Washington Airports Authority, (xii) officer of the police force established and maintained by the Norfolk Airport Authority, (xiii) sworn officer of the police force established and maintained by*

INTRODUCED

SB1465

*the Virginia Port Authority, (xiv) campus police officer appointed under Article 3 (§ 23.1-809 et seq.) of Chapter 8 of Title 23.1 and employed by any public institution of higher education, (xv) animal protection police officer or similarly situated employee, or (xvi) 9-1-1 emergency call taker, dispatcher, or similarly situated employee receives a diagnosis of post-traumatic stress disorder (PTSD) from a qualified health care provider, suffers death or any impairment resulting in total or partial disability from work caused by the PTSD, and receives a statement from a qualified health care provider that the PTSD was caused by a single critical event or multiple exposures to critical events that occurred in the course of the employment, then the PTSD shall be presumed to be an occupational disease, suffered in the line of duty, that is covered by this title unless such presumption is overcome by a preponderance of competent evidence to the contrary. Factual findings that the critical event or events in question were expected as part of the claimant's job duties or that training had been provided to the claimant related to the type of critical event shall not prevent the presumption contained in this section from being applied. PTSD that is solely attributed to disciplinary action, work evaluation, job transfer, layoff, demotion, termination, or similar action taken in good faith by an employer shall not be covered by the presumption contained in this section. For the purpose of this subsection:*

*"Critical event" includes an event:*

*1. That results in serious injury or death to an individual;*

*2. Involving a minor who has been injured, killed, abused, exploited, or a victim of a crime;*

*3. Involving mass casualties;*

*4. That results in injury to or the death of a coworker;*

*5. Involving an immediate threat to the life of the claimant or another individual; or*

*6. Involving the abuse, cruelty, injury, exploitation, or death of an animal.*

*"Qualified health care provider" means a licensed physician, licensed clinical psychologist, licensed professional counselor, or licensed clinical social worker.*

*E.* The presumptions described in subsections A, B, ~~and~~ C*, and D* shall only apply if persons entitled to invoke them have, if requested by the private employer, appointing authority, or governing body employing them, undergone preemployment physical examinations that (i) were conducted prior to the making of any claims under this title that rely on such presumptions, (ii) were performed by physicians whose qualifications are as prescribed by the private employer, appointing authority or governing body employing such persons, (iii) included such appropriate laboratory and other diagnostic studies as the private employer, appointing authorities, or governing bodies may have prescribed, and (iv) found such persons free of respiratory diseases, hypertension, cancer ~~or~~*,* heart disease*, or post-traumatic stress disorder* at the time of such examinations.

~~E.~~ *F.* Persons making claims under this title who rely on such presumptions shall, upon the request of private employers, appointing authorities or governing bodies employing such persons, submit to physical examinations (i) conducted by physicians selected by such employers, authorities, bodies or their representatives and (ii) consisting of such tests and studies as may reasonably be required by such physicians. However, a qualified physician, selected and compensated by the claimant, may, at the election of such claimant, be present at such examination.

~~F.~~ *G.* Whenever a claim for death benefits is made under this title and the presumptions of this section are invoked, any person entitled to make such claim shall, upon the request of the appropriate private employer, appointing authority or governing body that had employed the deceased, submit the body of the deceased to a postmortem examination as may be directed by the Commission. A qualified physician, selected and compensated by the person entitled to make the claim, may, at the election of such claimant, be present at such postmortem examination.

~~G.~~ *H.* Volunteer emergency medical services personnel, volunteer law-enforcement chaplains, auxiliary and reserve deputy sheriffs, and auxiliary and reserve police are not included within the coverage of this section.

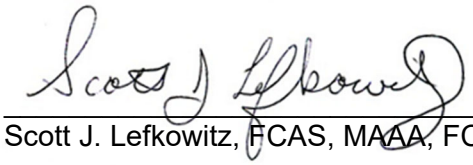
~~H.~~ *I.* For purposes of this section, "firefighter" includes special forest wardens designated pursuant to § 10.1-1135 and any persons who are employed by or contract with private employers primarily to perform firefighting services.

# 14

## Acknowledgement

I, Scott J. Lefkowitz, am a Partner for Oliver Wyman Actuarial Consulting Inc. I am a member of the American Academy of Actuaries, a Fellow of the Casualty Actuarial Society, and a Fellow of the Conference of Consulting Actuaries.

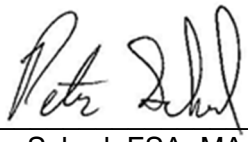
I meet the Qualification Standards of the American Academy of Actuaries to render the actuarial opinion contained herein.



Scott J. Lefkowitz, FCAS, MAAA, FCA

I, Peter Scharl, am a Senior Consultant for Oliver Wyman Actuarial Consulting Inc. I am a member of the American Academy of Actuaries and a Fellow of the Society of Actuaries.

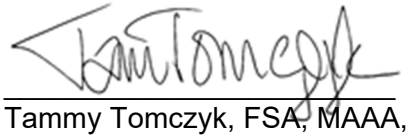
I meet the Qualification Standards of the American Academy of Actuaries to render the actuarial opinion contained herein.



Peter Scharl, FSA, MAAA

I, Tammy Tomczyk, am a Partner for Oliver Wyman Actuarial Consulting Inc. I am a member of the American Academy of Actuaries and a Fellow of the Society of Actuaries, and a Fellow of the Conference of Consulting Actuaries.

I meet the Qualification Standards of the American Academy of Actuaries to render the actuarial opinion contained herein.



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