



Workplace Safety &  
Insurance Board

Commission de la sécurité  
professionnelle et de l'assurance  
contre les accidents du travail

**REPORT ON  
OCCUPATIONAL DISEASE  
COST STUDY**

**Actuarial Services Division**

**August 2007**

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# Executive Summary

This document reports on the work undertaken by Actuarial Services in 2006 of the costs associated with occupational disease (OD) claims. Included in this report are also analyses of OD claim reporting lags, historical trends of claim frequencies and costs by Class, and commentary on the extent to which the valuation and premium rate setting processes capture OD claim costs. The details of the study are found in the main body of the report.

The report does not cover the projection of OD reporting and costs into the future or how this information may be applied into scenarios of future funding and premium rates. An OD cost projection model has been developed for this purpose to facilitate discussion among OD experts of future reporting and cost patterns, and how the results may be interpreted to drive future funding. A secondary report describes the modeling of current and future reporting and costs.

## Data

The Medical and Occupational Disease Policy Branch (MODPB) provided occupational disease claim data. The file was an extract from the ODISS (Occupational Disease Information and Surveillance System) system and System 57 with an extract date of June 2006. The file contained all occupational disease claims reported up to that date.

Only “approved” occupational disease claims were considered, as these claims had associated costs and specific dates of workplace injuries. The data were comprised of claims from 2005 and prior injury years and from Schedule 1 firms only. (The Schedule 2 OD claims data was not used because there was no readily available employment data to develop incidence rates, nor was there a valuation basis to develop full OD claim costs.) Due to the timing of the study, the impact of broadening the scope of occupational diseases to include the new firefighter legislation (introduced by the Ontario government in the spring of 2007) has not been included in the study. The expected frequencies and costs of these new claims are expected to impact Schedule 2 municipal firms more severely than Schedule 1 municipal firms, and may be included in the assumptions that are used in the OD projection model.

Although there continues to be discussion about the work-relatedness of OD claims, only approved claims, as had been adjudicated at the WSIB until May of 2006, were included in the study.

Despite these limitations, data on nearly 180,000 OD claims have been captured for this study.

## Claim Counts and Frequency

The data were analyzed both by registration year and injury year for the years 1990 and later. By both measures the total number of claims followed a cyclical pattern with gradual increases in the number of claims, followed by a slight decline or plateau. For example, claim counts rose to 1991, then declined steadily until 1996, leveled off in 1997 and 1998, rose again until 2003, and then declined for 2004 and 2005. The rise from 1999 to 2003 reflects the results of the latest OD outreach campaign.

**Table 1a**  
**OD Claims to Total Claims By Injury Year**

1990	1.13%
1991	1.45%
1992	1.55%
1993	1.57%
1994	1.46%
1995	1.45%
1996	1.37%
1997	1.42%
1998	1.49%
1999	1.54%
2000	1.77%
2001	2.15%
2002	2.48%
2003	2.54%
2004	2.33%
2005	2.55%

2005 (0.152%).

A more meaningful measure is the proportion (by number) of OD claims to total Schedule 1 claims. Table 1 shows that the total OD claim counts to total counts for all Schedule 1 claims (total means lost time injuries (LTIs) plus no lost time injuries (NLTIs)) is about 2½%, rising from about 1½% in the early 1990s. For the purpose of the study, a total claim count comparison was considered to be a more meaningful than an LTI-only comparison because most OD claims are for health care benefits only.

Since 1998, the proportion of OD claims to total claims has risen by more than 70% (from 1.49% (1998) to 2.55% (2005)). Since 1990, the proportion has more than doubled.

Another measure, shown in the table below, is the frequency of OD claims to the number of employed workers (the number of OD claims divided by the employment base). Frequency also shows a cyclical pattern. Frequency increased from 1990 through 1993 (0.142%), declined to 1996 (0.107%), rose again to new levels by 2003 (0.159%), declined slightly in 2004 and increased again in

**Table 1b**

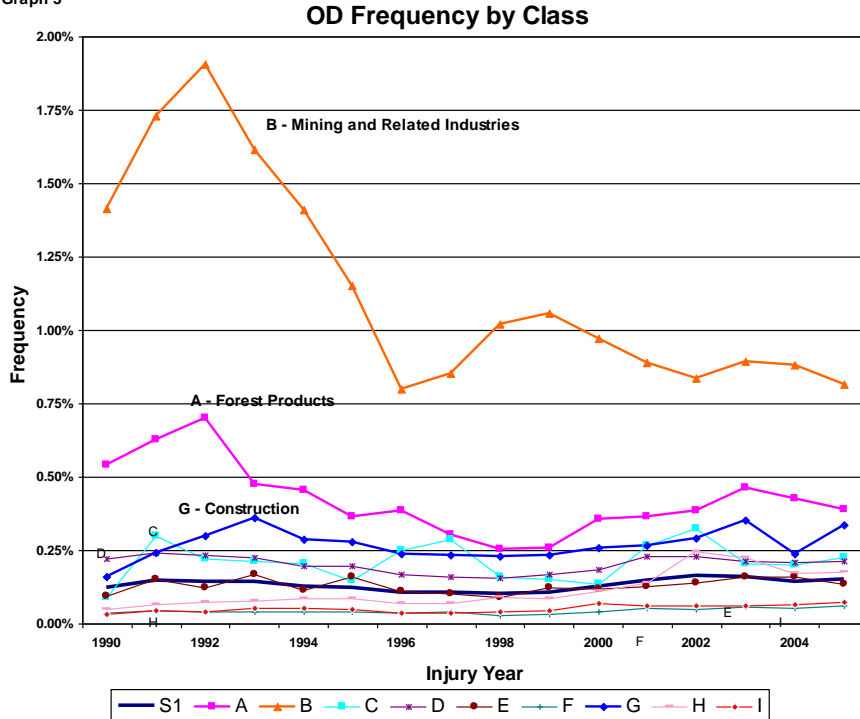
Injury Year	Employment	Matured OD	
		Claims	OD Frequency
1990	3,186,726	3,977	0.125%
1991	3,079,429	4,509	0.146%
1992	3,079,775	4,367	0.142%
1993	2,943,830	4,179	0.142%
1994	3,026,811	3,903	0.129%
1995	3,112,849	3,890	0.125%
1996	3,136,302	3,369	0.107%
1997	3,284,465	3,448	0.105%
1998	3,455,179	3,562	0.103%
1999	3,596,280	3,893	0.108%
2000	3,746,318	4,714	0.126%
2001	3,768,584	5,483	0.145%
2002	3,870,899	6,287	0.162%
2003	3,939,587	6,275	0.159%
2004	4,005,960	5,743	0.143%
2005	4,130,420	6,276	0.152%

For the purpose of the study, claim counts were “matured” for possible reporting lags based on historical reporting lag trends. Although claim counts may ultimately differ from expected, the maturing process helps to reduce the potential for understatement by injury year in future years.

A similar analysis was done at the employer Class level. The trends show similar up-and-down patterns. There were, however, significant variations in OD claim frequencies by Class. Although the data were thinner at the Class level, meaningful

trends were still evident. For example, Class B (Mining) had, by a wide margin, the highest frequency at almost 10 times more than the Schedule 1 average in the early 1990s. However, Mining’s frequency came down significantly to the mid-1990s, where it has remained about 5 times the Schedule 1 average. At the low end of frequency scale were Class F (Retail) and Class I (Other Services), which were both about one third of the Schedule 1 average.

Graph 3



Analyses by rate groups were not done because the data were too thin to provide any meaningful observations.

## Effect of

### Reporting Lags in Valuation and Premium Rates

A reporting lag analysis helps to determine whether OD claims have been adequately captured in the valuation of benefit liabilities and in the setting of premium rates. Reporting lag is defined as the time between the date of injury or disease and the date of registration of the claim with the WSIB. Due to lack of sufficient and reliable data, the time lags between the dates of exposures to hazardous materials and the onset of an OD injury or disease were not analysed.

From the analysis, more than 95% of all OD claims had a registration lag of one year or less, and 98% were registered within five years. However, due to their longer reporting lags, OD fatalities were analyzed as a separate group. Although few in number, a large number of fatal claims were cancer claims. About 73% of fatalities were registered within the first year, 80% within two years and 87% within five years. The longer reporting lags are likely the result of the longer times required to establish linkages to workplace exposures.

In the valuation of Schedule 1 benefit liabilities, claim counts are matured to 100% for reporting lags for each of the last five years. Based on the lag analysis and the valuation methodology to capture late reported claims (not only late reported OD claims), we conclude that the majority of all occupational disease claims have been sufficiently captured, leaving very few future OD claims unaccounted for in the valuation.

One area where the valuation of benefit liabilities could possibly be improved is in the estimation of fatality and survivor benefit costs where some additional margin might be appropriate.

The valuation is the starting point for estimating the cost of claims for premium rate setting purposes. However, in determining premium rates, a margin of 5% is added over the valuation costs, which is used to cover unanticipated increases in costs. This margin for premium rates covers any additional late-reported OD claims not already covered in the valuation.

### **OD Cost per Claim**

The OD costs in the study were fully loaded for past and future expected costs, where future costs are based on the valuation of benefit liabilities as of December 31, 2005. As explained below, for the purpose of this study, future claim administration costs were excluded from future OD claim costs.

Several cost analyses were performed at the Schedule 1, Class and claim-type levels. (Class-level results can be found in the main body of the report.) Costs per claim were derived two ways:

- dividing OD costs by the total counts of LTIs and NLTIs claims, and
- dividing OD costs by OD claims counts only.

In developing the 2007 premium rates, an average “cost per LTI” was \$21,300. The cost per LTI can be re-expressed without future claims administration costs (FCAC) as \$20,285. If the total Schedule 1 costs without FCAC are divided by the total number of claims expected in 2007 (by combining LTIs and NLTIs claim counts), the cost per claim would be \$6,319.

<b>Table 2</b>						
<b>2007 Schedule 1 Cost Per LTI and Cost Per Claim</b>						
<b>Description</b>	<b>HC</b>	<b>LMR</b>	<b>LOE</b>	<b>NEL</b>	<b>SURV</b>	<b>Total</b>
2007 Sch 1 cost per LTI	\$5,486	\$1,392	\$12,467	\$970	\$985	\$21,300
- with FCAE removed	\$5,224	\$1,326	\$11,873	\$924	\$938	\$20,285
2007 Sch 1 cost per <u>total</u> number of claims	\$1,628	\$413	\$3,699	\$288	\$292	\$6,319
Proportion of Total	25.8%	6.5%	58.5%	4.6%	4.6%	100.0%

Taking OD costs and spreading them over all Schedule 1 claims gives \$494 of OD claims cost per Schedule 1 claim. This helps to gauge the relative significance of OD costs to total claim costs, and shows that about 8% of total claim costs are for OD claims. More importantly, however, almost half of all survivor claim costs are OD claims.

<b>Table 3</b>						
<b>2007 OD Cost Per Total Claim</b>						
<b>Description</b>	<b>HC</b>	<b>LMR</b>	<b>LOE</b>	<b>NEL</b>	<b>SURV</b>	<b>Total</b>
2007 Sch 1 OD cost to Total claims costs	\$194	\$6	\$113	\$37	\$144	\$494
Proportion of OD claim costs to Total claim costs	12%	1%	3%	13%	49%	8%

The following table shows the average cost of a single OD claim per OD claim (including both OD LTI and NLTI counts) is \$27,004. Comparing this amount to the average cost of a Schedule 1 claim (LTI + NLTI) of \$6,319, means that, on average, an OD claim cost more than 4 times as much as a Schedule 1 claim. Comparing survivor benefit costs per claim, OD survivor claims (\$8,269) are 27 times more costly than average Schedule 1 survivor benefit claims (\$292).

<b>Table 4</b>						
<b>2007 OD Cost Per OD Claim</b>						
<b>Description</b>	<b>HC</b>	<b>LMR</b>	<b>LOE</b>	<b>NEL</b>	<b>SURV</b>	<b>Total</b>
Sch 1 OD cost per OD claim	\$10,303	\$339	\$6,246	\$1,847	\$8,269	\$27,004
Proportion of Total	38.2%	1.3%	23.1%	6.8%	30.6%	100.0%

OD claim costs by diagnosis were calculated and are shown in the following table. Cancer claims were the most costly, running at about \$300,000 to \$530,000 per OD claim due to the large costs associated with paying survivor benefits. On the other hand, although there were many more noise induced hearing loss (NIHL) claims (about 56,400 for all injury years in the study) and their costs were substantial in total, an average NIHL claim costs about \$25,000

(without any survivor benefit costs), and are much less costly than cancer claims. About 93% of NIHL costs are attributable to health care.

Table 5

2007 OD Cost Per OD Claim By Type of Claim							
Description	HC	LMR	LOE	NEL	SURV	Total	# claims
<b>Sch 1 OD cost per OD claim</b>	<b>\$10,305</b>	<b>\$339</b>	<b>\$6,246</b>	<b>\$1,847</b>	<b>\$8,272</b>	<b>\$27,009</b>	<b>179,442</b>
ASBESTOSIS	\$16,243	\$0	\$44,239	\$7,162	\$63,226	\$130,870	644
ASTHMA	\$7,412	\$2,319	\$20,161	\$2,326	\$2,003	\$34,220	3,033
BLADDER CANCER	\$42,514	\$0	\$110,244	\$20,540	\$138,931	\$312,229	55
CIRCULATORY SYSTEM DISEASES	\$56,008	\$3,298	\$79,735	\$8,470	\$69,962	\$217,474	3,168
DERMATITIS	\$757	\$1,155	\$9,420	\$641	\$0	\$11,973	43,415
GASTROINTESTINAL CANCER	\$42,784	\$0	\$112,802	\$42,252	\$314,537	\$512,375	132
HAND ARM VIBRATION SYNDROME	\$4,937	\$1,813	\$19,970	\$9,204	\$0	\$35,924	3,009
INFECTIOUS & PARASITIC DISEASES	\$3,392	\$91	\$6,143	\$1,038	\$1,911	\$12,575	5,503
KIDNEY CANCER	\$37,810	\$0	\$30,242	\$22,880	\$441,367	\$532,299	34
MESOTHELIOMA	\$45,709	\$236	\$44,846	\$33,370	\$408,682	\$532,844	879
NEOPLASM OF LUNG	\$30,346	\$153	\$66,825	\$37,086	\$363,415	\$497,826	1,811
NOISE INDUCED HEARING LOSS	\$23,407	\$9	\$206	\$1,526	\$0	\$25,147	56,396
OTHER DISEASES	\$25,843	\$743	\$50,501	\$12,007	\$15,827	\$104,921	1,685
OTHER NEOPLASMS	\$60,168	\$326	\$64,234	\$19,660	\$228,275	\$372,663	335
OTHER NERVOUS SYSTEM/SENSE ORGAN DISEASE	\$8,206	\$12	\$8,849	\$1,960	\$5,599	\$24,625	1,502
OTHER RESPIRATORY SYSTEM DISEASE	\$10,525	\$659	\$22,619	\$1,673	\$9,618	\$45,095	5,325
OTHER SKIN & TISSUE DISEASE	\$1,920	\$1,131	\$11,621	\$824	\$0	\$15,498	1,250
PLEURAL PLAQUES	\$4,646	\$0	\$3,645	\$1,136	\$0	\$9,426	873
SIGNS & SYMPTOMS	\$248	\$27	\$518	\$34	\$11	\$837	34,920
SILICOSIS	\$10,076	\$202	\$27,436	\$7,051	\$36,472	\$81,237	1,046
SURVEILLANCE CLAIMS	\$1,511	\$28	\$920	\$49	\$0	\$2,507	2,167
SYSTEMIC CONDITIONS	\$33,856	\$1,544	\$14,323	\$1,422	\$4,577	\$55,722	2,655
TOXIC EFFECT OF SUBSTANCES	\$785	\$175	\$1,338	\$825	\$484	\$3,608	9,528



# Purpose

The body of this report provides the following information and analyses of:

- incidence rates and costs associated with WSIB occupational disease (OD) claims;
- claim reporting lags of OD claims; and
- how OD claim costs are captured in the valuation and premium rate setting processes.

# Data

Occupational disease claim data were provided by the WSIB's Medical and Occupational Disease Policy Branch. The data file was an extract from the ODISS (Occupational Disease Information and Surveillance System) system with an extract date of June 2006. The file contained all occupational disease claims reported to the WSIB before that date that had been adjudicated as work-related OD claims. Data were available in three claim-type categories - Fatal, NIHL (Noise Induced Hearing Loss) claims and Non Fatal claims.

Excluded from the study were pending and declined claims, and also Schedule 2 OD claims. Also excluded were surveillance claims from the Program for Exposure Incident Reporting (PEIR) database that had not been reported as claims to the WSIB. Another 140 claims were excluded because no rate group data could be associated with them. Excluding these claims was not considered material to the analyses or results of the study.

Included in the study were both lost time injury (LTI) and non-lost time injury (NLTI) approved claims which had a date of injury of 2005 or prior. This consisted of a total of 179,442 claims with the following distribution across claim-type categories.

<b>OD Claims by Category</b>				
	<b>Fatal</b>	<b>Non Fatal</b>	<b>NIHL</b>	<b>Total</b>
<b>Category</b>	3,776	119,270	56,396	179,442

Cost data were extracted from the 2005 year-end RAPID (Revenue and Premium Insurance Data) data files, which were also used by Actuarial Services in the valuation of the 2005 benefits liability. RAPID data contained cash payments by injury year and benefit type which were needed to determine average claim awards (discussed later in the report under OD Cost per Claim section) and to develop expected claim costs by duration.

## Claim Counts and Frequency

The data were analyzed both by registration year and by injury year for years 1990 and later. Analyses by registration year provided a better indication of the level of claims activity whereas the data by injury year was considered more appropriate for premium rate setting purposes. Both are shown in the tables below, but more extensive analyses were performed using injury years.

Table 7

<b>Claims By Registration Year</b>				
<b>Year</b>	<b>Fatal</b>	<b>Non Fatal</b>	<b>NIHL</b>	<b>Total</b>
<b>pre 1990</b>	2,113	74,744	29,802	106,659
<b>1990</b>	111	2,002	2,122	4,235
<b>1991</b>	90	2,280	2,102	4,472
<b>1992</b>	73	2,240	1,991	4,304
<b>1993</b>	62	2,316	1,894	4,272
<b>1994</b>	99	2,402	1,542	4,043
<b>1995</b>	73	2,467	1,340	3,880
<b>1996</b>	72	2,151	1,183	3,406
<b>1997</b>	73	2,118	1,161	3,352
<b>1998</b>	98	2,143	1,166	3,407
<b>1999</b>	118	2,346	1,279	3,743
<b>2000</b>	144	2,771	1,562	4,477
<b>2001</b>	131	3,599	1,768	5,498
<b>2002</b>	137	4,156	1,824	6,117
<b>2003</b>	132	4,199	1,900	6,231
<b>2004</b>	148	3,491	2,050	5,689
<b>2005</b>	99	3,728	1,623	5,450
<b>2006</b>	3	117	87	207
<b>Total</b>	3,776	119,270	56,396	179,442

The number of occupational disease claims declined steadily from 1991 through 1996, leveled off between 1997 and 1998, rose again until 2003, and then declined for 2004 and 2005. If this cyclical pattern were to continue in the future it might be expected that the number of claims would decline in the next few years. However, it is too early to tell if 2004 and 2005 are indicating a plateau or if 2004 is simply a blip in the trend. Also, the 2005 data were still subject to some maturing as more reported cases would become “approved”.

The following table gives the total number of approved OD claims by year of injury (or disease).

<b>Year</b>	<b>Fatal</b>	<b>Non Fatal</b>	<b>NIHL</b>	<b>Total</b>
<b>pre 1990</b>	2,309	75,557	31,627	109,493
<b>1990</b>	83	1,921	1,895	3,899
<b>1991</b>	88	2,310	2,023	4,421
<b>1992</b>	78	2,269	1,934	4,281
<b>1993</b>	87	2,275	1,735	4,097
<b>1994</b>	89	2,360	1,377	3,826
<b>1995</b>	85	2,489	1,240	3,814
<b>1996</b>	86	2,092	1,109	3,287
<b>1997</b>	85	2,119	1,160	3,364
<b>1998</b>	110	2,212	1,136	3,458
<b>1999</b>	118	2,400	1,243	3,761
<b>2000</b>	98	2,889	1,546	4,533
<b>2001</b>	93	3,428	1,701	5,222
<b>2002</b>	110	4,127	1,666	5,903
<b>2003</b>	127	3,912	1,798	5,837
<b>2004</b>	87	3,376	1,782	5,245
<b>2005</b>	43	3,534	1,424	5,001
<b>Total</b>	<b>3,776</b>	<b>119,270</b>	<b>56,396</b>	<b>179,442</b>

The trend was very similar to the data by registration year - steadily declining from 1991 to 1996, leveling, then rising and declining again. However, the most recent years are immature due to reporting lags.

Maturing factors were developed using claims data from injury years 1990 and forward by tracking the actual delays in reporting through time to provide a historical trend. The raw factors were increased further to provide an element of conservatism. As an example of maturing, the number reported for 2005 will eventually be 25.5% higher; in 2004, 9.5% higher; etc. than shown in the above table.

The following table shows the expected or “matured” claim counts for all OD claims for injury years 1990 to 2005, based on maturing trends for claims from injury years 1990 and later.

Table 9

**Martured OD Claims By Injury Year**

<b>Year</b>	<b>Reported OD Claims</b>	<b>Maturing Factor</b>	<b>Matured OD Claims</b>
<b>pre 1990</b>	109,493	1.005	110,040
<b>1990</b>	3,899	1.020	3,977
<b>1991</b>	4,421	1.020	4,509
<b>1992</b>	4,281	1.020	4,367
<b>1993</b>	4,097	1.020	4,179
<b>1994</b>	3,826	1.020	3,903
<b>1995</b>	3,814	1.020	3,890
<b>1996</b>	3,287	1.025	3,369
<b>1997</b>	3,364	1.025	3,448
<b>1998</b>	3,458	1.030	3,562
<b>1999</b>	3,761	1.035	3,893
<b>2000</b>	4,533	1.040	4,714
<b>2001</b>	5,222	1.050	5,483
<b>2002</b>	5,903	1.065	6,287
<b>2003</b>	5,837	1.075	6,275
<b>2004</b>	5,245	1.095	5,743
<b>2005</b>	5,001	1.255	6,276
<b>Total</b>	<b>179,442</b>		<b>183,915</b>

Even with maturing, a decline is expected in the 2004 counts consistent with the analysis by registration year.

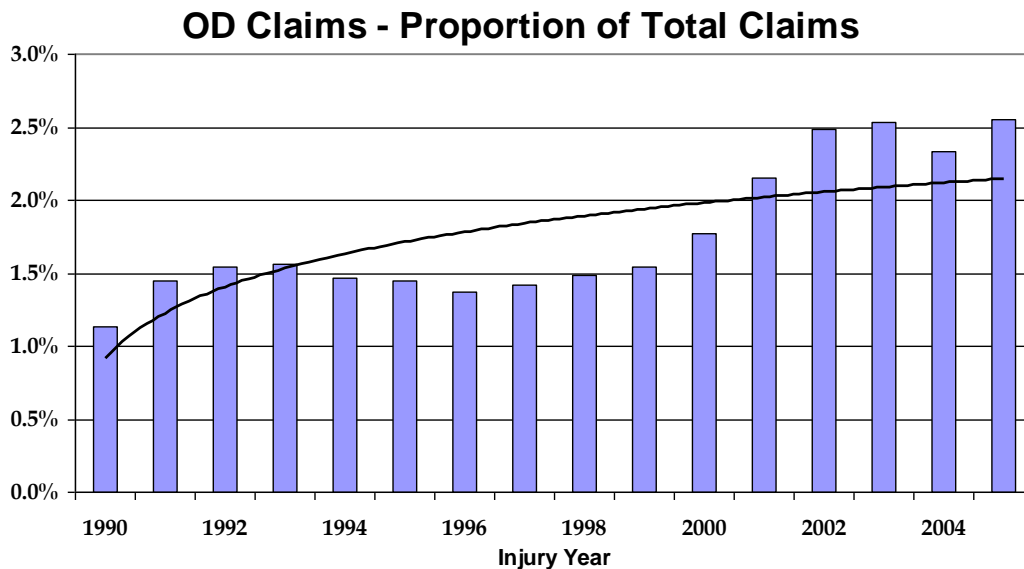
To put these values in context we compared them to bases of total claims and employment.

Table 10 compares the number of OD claims to the total number of claims, including NLTIs.

<b>Table 10</b>			
<b>OD Claims - Proportion to Total Claims</b>			
By Injury Year			
	Matured OD		
Year	Total Claims	Claims	% OD Claims
pre 1990	6,311,911	110,040	1.74%
1990	351,457	3,977	1.13%
1991	310,795	4,509	1.45%
1992	282,461	4,367	1.55%
1993	266,782	4,179	1.57%
1994	266,589	3,903	1.46%
1995	268,566	3,890	1.45%
1996	246,036	3,369	1.37%
1997	242,870	3,448	1.42%
1998	239,071	3,562	1.49%
1999	252,519	3,893	1.54%
2000	266,523	4,714	1.77%
2001	255,050	5,483	2.15%
2002	253,144	6,287	2.48%
2003	247,257	6,275	2.54%
2004	246,597	5,743	2.33%
2005	245,884	6,276	2.55%
<b>Total</b>	<b>4,241,601</b>	<b>73,875</b>	<b>1.74%</b>

OD claims, as a proportion of total claims, had varied very little from 1991 to 1999 (around 1.5%). Since then, however, they have risen by more than 70% where the trend sharply rose from 1999 through 2002, followed by a more gradual increase for 2002 and 2003, then a slight decline in 2004 with a moderate increase in 2005.

It should be noted that as the total number of claims (LTIs + NLTIs) has not changed much since 1993. This means the proportion of claims that are non-OD has fallen slightly over that time period. The black line in the graph below shows the trend.



Another way to measure the incidence of OD claims is to compare the number of OD claims to the employment base. This is the current method used to develop LTI rates for premium rate setting purposes.

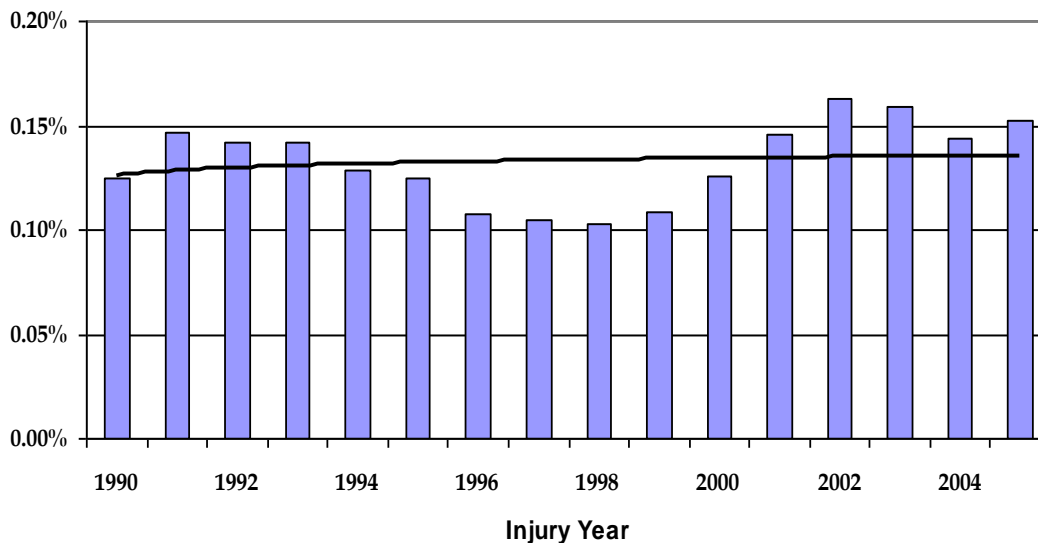
Injury Year	Employment	Matured OD Claims	OD Frequency
1990	3,186,727	3,977	0.125%
1991	3,079,432	4,509	0.146%
1992	3,079,775	4,367	0.142%
1993	2,943,830	4,179	0.142%
1994	3,026,811	3,903	0.129%
1995	3,112,850	3,890	0.125%
1996	3,136,301	3,369	0.107%
1997	3,284,465	3,448	0.105%
1998	3,455,179	3,562	0.103%
1999	3,596,280	3,893	0.108%
2000	3,746,318	4,714	0.126%
2001	3,768,584	5,483	0.145%
2002	3,870,899	6,287	0.162%
2003	3,939,587	6,275	0.159%
2004	4,005,960	5,743	0.143%
2005	4,130,420	6,276	0.152%
Total	55,363,418	73,875	0.133%

Similar to the prior tables is the decline from 1991 to 1996, leveling off in 1997 and 1998, rising until 2002, declining in 2003 and 2004, then rising again in 2005.

This comparison shows that the incidence of OD claims, expressed as proportion of the total employment base, has only risen very slightly since the early 1990's

Note: Employment numbers are taken from the WSIB premium rate manuals.

### OD Claims - Proportion to Total Employment



## Frequency By Class

The frequency of OD claims to total employment by class shows significant variations by class.

The titles of the nine classes are described in Table 12.

The table below and graph on the next page show the frequencies by class.

The rates for mining have improved considerably from about 10 times the Schedule 1 average since the early 1990s, but leveled off at about 5 times average in the mid-1990s, and have only improved marginally since then.

Forestry's rate has improved its rate from about 3 times average to 2 times average.

**Table 12**

<b>Class</b>	<b>Name</b>
A	Forest Products
B	Mining and Related Industries
C	Other Primary Industries
D	Manufacturing
E	Transportation & Storage
F	Retail and Wholesale Trades
G	Construction
H	Government & Related Services
I	Other Services

**Table 13**

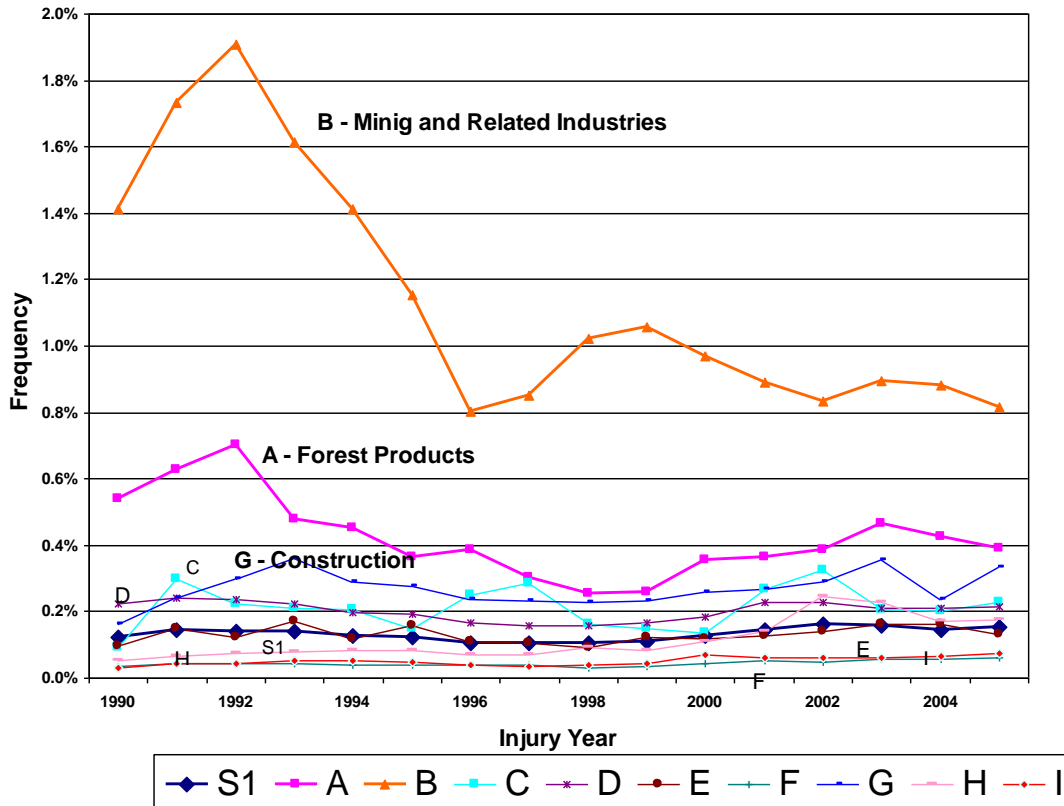
<b>OD Frequency to Total Employment By Class</b>										
<b>Year</b>	<b>Sch 1</b>	<b>A</b>	<b>B</b>	<b>C</b>	<b>D</b>	<b>E</b>	<b>F</b>	<b>G</b>	<b>H</b>	<b>I</b>
1990	0.125%	0.541%	1.413%	0.091%	0.223%	0.094%	0.035%	0.160%	0.051%	0.032%
1991	0.146%	0.626%	1.731%	0.298%	0.243%	0.150%	0.044%	0.241%	0.066%	0.045%
1992	0.142%	0.700%	1.907%	0.222%	0.235%	0.121%	0.042%	0.300%	0.075%	0.042%
1993	0.142%	0.477%	1.616%	0.213%	0.226%	0.169%	0.043%	0.359%	0.077%	0.052%
1994	0.129%	0.454%	1.411%	0.206%	0.198%	0.117%	0.041%	0.289%	0.085%	0.052%
1995	0.125%	0.366%	1.151%	0.150%	0.195%	0.158%	0.041%	0.278%	0.085%	0.048%
1996	0.107%	0.385%	0.801%	0.248%	0.167%	0.111%	0.038%	0.239%	0.068%	0.038%
1997	0.105%	0.304%	0.851%	0.285%	0.159%	0.104%	0.041%	0.233%	0.070%	0.037%
1998	0.103%	0.256%	1.022%	0.160%	0.157%	0.090%	0.031%	0.228%	0.092%	0.041%
1999	0.108%	0.260%	1.058%	0.150%	0.167%	0.124%	0.034%	0.233%	0.085%	0.044%
2000	0.126%	0.355%	0.969%	0.137%	0.184%	0.119%	0.043%	0.257%	0.110%	0.071%
2001	0.145%	0.366%	0.889%	0.268%	0.230%	0.125%	0.054%	0.266%	0.139%	0.061%
2002	0.162%	0.387%	0.834%	0.325%	0.230%	0.139%	0.049%	0.291%	0.246%	0.062%
2003	0.159%	0.465%	0.895%	0.205%	0.212%	0.162%	0.058%	0.354%	0.226%	0.061%
2004	0.143%	0.425%	0.882%	0.203%	0.211%	0.161%	0.055%	0.238%	0.172%	0.067%
2005	0.152%	0.390%	0.817%	0.226%	0.214%	0.134%	0.060%	0.334%	0.175%	0.075%

Construction's OD frequency rate has not improved. It has remained about 50% higher than the Schedule 1 average throughout the entire period, and in recent years has deteriorated slightly.

At the low end of the OD frequency range are Class F - Retail and Wholesale and Class I - Other Services.

Graph 3

### OD Frequency by Class





# Lag Analysis

The following tables compare the length of time between date of injury and registration date, hence providing a measure of the lag in reporting times. Three groupings of claims were considered - fatalities, non-fatalities and noise induced hearing loss (NIHL). Although NIHL claims were nearly all no-lost-time injuries, they were a very significant proportion (more than 31%) of the total number of OD claims, and so were analyzed separately.

## Fatal OD Claims

The column # Claims shows the number of fatal claims that were reported in the time frame. For example, 1,265 claims were reported within one month, and 1,077 claims between one month and six months. For fatalities there was a significant lag period with more than one quarter of the cases still not reported one year after the date of injury, and almost 13% still not reported within 5 years.

## Noise Induced Hearing Loss (NIHL) OD Claims

NIHL claims also show some lag but claim lag periods were significantly less than OD fatal claims, especially in the early years. For example, only 3.3% of NIHL claims were still not reported by five years following the date of injury.

**Table 14**

<b>Fatal</b>			
<b>Time</b>	<b># Claims</b>	<b>Cumulative</b>	<b>Cumulative %</b>
1 month	1,265	1,265	33.5%
6 months	1,077	2,342	62.0%
1 year	419	2,761	73.1%
2 year	278	3,039	80.5%
3 year	126	3,165	83.8%
4 year	64	3,229	85.5%
5 year	65	3,294	87.2%
6 year	63	3,357	88.9%
7 year	57	3,414	90.4%
8 year	29	3,443	91.2%
9 year	38	3,481	92.2%
10 year	36	3,517	93.1%
11 year	21	3,538	93.7%
12 year	19	3,557	94.2%
13 year	30	3,587	95.0%
14 year	13	3,600	95.3%
15 year	18	3,618	95.8%
15 year +	158	3,776	100.0%

**Table 15**

<b>Noise Induced Hearing Loss</b>			
<b>Time</b>	<b># Claims</b>	<b>Cumulative</b>	<b>Cumulative %</b>
1 month	38,380	38,380	68.1%
6 months	12,348	50,728	89.9%
1 year	1,532	52,260	92.7%
2 year	1,015	53,275	94.5%
3 year	470	53,745	95.3%
4 year	403	54,148	96.0%
5 year	366	54,514	96.7%
6 year	298	54,812	97.2%
7 year	275	55,087	97.7%
8 year	209	55,296	98.0%
9 year	201	55,497	98.4%
10 year	173	55,670	98.7%
11 year	145	55,815	99.0%
12 year	109	55,924	99.2%
13 year	107	56,031	99.4%
14 year	77	56,108	99.5%
15 year	55	56,163	99.6%
15 year +	233	56,396	100.0%

## Non-fatal OD Claims

The remaining, and by far the largest number of OD claims, contains all other types of OD claims – not fatal nor NIHL OD claims. The group is conveniently referred to as non-fatal OD claims.

The reporting pattern of non-fatal claims was quite quick, compared to fatal and OD claims. For example, more than 99% (less than 1% unreported) of non-fatal claims had reported within five years from date of injury.

## All OD Claims Combined

The next table shows that if all three groups are combined, nearly 96% of all OD claims were reported within 1 year, and 98.2% were registered within a five years.

The reporting lag analysis is used to determine how occupational disease claims are accounted for in the premium rate setting process, as is discussed in the next section.

Non Fatal			
Time	# Claims	Cumulative	Cumulative %
1 month	99,128	99,128	83.1%
6 months	15,534	114,662	96.1%
1 year	1,687	116,349	97.6%
2 year	1,108	117,457	98.5%
3 year	441	117,898	98.8%
4 year	312	118,210	99.1%
5 year	209	118,419	99.3%
6 year	139	118,558	99.4%
7 year	145	118,703	99.5%
8 year	84	118,787	99.6%
9 year	80	118,867	99.7%
10 year	64	118,931	99.7%
11 year	54	118,985	99.8%
12 year	45	119,030	99.8%
13 year	35	119,065	99.8%
14 year	26	119,091	99.8%
15 year	34	119,125	99.9%
15 year +	145	119,270	100.0%

All Claims			
Time	# Claims	Cumulative	Cumulative %
1 month	138,773	138,773	77.3%
6 months	28,959	167,732	93.5%
1 year	3,638	171,370	95.5%
2 year	2,401	173,771	96.8%
3 year	1,037	174,808	97.4%
4 year	779	175,587	97.9%
5 year	640	176,227	98.2%
6 year	500	176,727	98.5%
7 year	477	177,204	98.8%
8 year	322	177,526	98.9%
9 year	319	177,845	99.1%
10 year	273	178,118	99.3%
11 year	220	178,338	99.4%
12 year	173	178,511	99.5%
13 year	172	178,683	99.6%
14 year	116	178,799	99.6%
15 year	107	178,906	99.7%
15 year +	536	179,442	100.0%

# Premium Rate Setting Model

One of the objectives of this study was to determine if occupational disease costs are adequately captured in the premium rate setting process.

In the premium rate-setting model, an average cost per lost time injury is determined for the five benefit types: loss of earnings, health care, labour market re-entry, non-economic loss and survivor benefits (fatalities). For 2007, the premium rates were based on the portion of the 2005 benefits liability for the 2005 injury year. The total cost per LTI was compared to historical data from injury years prior to 2005 to ensure that the 2005 value was consistent with the emerging costs from previous years.

In the valuation of the benefit liabilities, the future award portion provides for claims that have been incurred but not yet been reported (IBNR) to the WSIB. This is accomplished by making an assumption regarding the “maturing” of LTI claim counts. The maturing process is used for each of the most recent five injury years. Having calculated the cost per LTI at 2005 year-end, the values by benefit type were projected forward to 2007 with appropriate inflation and cost assumptions, plus any anticipated changes in valuation methods and assumptions. In addition a 5% loading factor was added (as had been done in previous years) to provide for misestimation in the assumptions being projected to 2007.

Given the assumptions for maturing and misestimation, the current premium rate setting methodology adequately captures any lag in reporting claims up to the five-year point. From the lag analysis for all OD claims, 98.2% of these claims were reported within five years. A closer look at the three claim groupings showed that for the non-fatal group, about 99.3% fell into the five year window, 96.7% for NIHL, and 87.2% for the much fewer but more costly fatal claims.

Therefore, in determining premium rates, the additional 5% loading for misestimation is adequate to cover reporting lags of OD claims.

# OD Cost per Claim

As described in the previous section, for premium rate setting purposes, a cost per LTI was developed which took total costs and spread them over the number of LTIs. For this OD study, it was decided to take a different approach since there was a significant portion of non-lost time injury (NLTI) claims. The revision adopted was to spread OD costs over the total counts of both LTI and NLTI claims. For example, noise induced hearing loss (NIHL) claims were mostly for health care benefits with very few LTIs. To put Schedule 1 claims, always expressed as costs per LTI, on the same basis as OD claims costs, the Schedule claim costs were recalibrated to a claims costs per all claims (i.e. per total LTI plus NLTI claims).

All OD costs per claim were calculated using the average award methodology, which is currently used to value the health care portion (and other portions) of the benefit liabilities. With this technique, durational costs per claim were calculated and then projected into the future with assumed inflation or cost escalation factors to estimate costs in future years. These costs were then applied to claim counts to give future cash flows, which were then discounted back to the valuation date to determine the benefits liability for OD claims. Applying this durational series of costs for each claim gives a total cost per claim. The initial calculation used 2005 year-end data and projected forward two years similar to the premium rate setting process.

The first line of the following table shows the cost per LTI broken down into the benefit components as used in the 2007 premium rates. The second line shows the effect of removing the future cost of administering claims (FCAC), and the third line takes the admin-reduced cost per LTI and spreads them over the sum of LTIs and NLTIs.

\$6,319 is therefore the re-calibrated 2007 “cost per claim”, regardless of whether a claim was an LTI or NLTI claim.

<b>Table 2</b>						
<b>2007 Schedule 1 Cost Per LTI and Cost Per Claim</b>						
Description	HC	LMR	LOE	NEL	SURV	Total
2007 Sch 1 cost per LTI	\$5,486	\$1,392	\$12,467	\$970	\$985	\$21,300
- with FCAE removed	\$5,224	\$1,326	\$11,873	\$924	\$938	\$20,285
2007 Sch 1 cost per <u>total</u> number of claims	\$1,628	\$413	\$3,699	\$288	\$292	\$6,319

The average award methodology was applied to known past costs to determine OD claim costs at the class level by benefit type. As shown in the following table, OD costs (only) were also compared to total claims inventory costs (OD and non-OD claims) by class. This shows that the proportion of OD costs to total costs is approximately 8%.

Not unexpectedly, there were significant cost variations by class. For example, forestry, mining and construction sectors had the highest OD claims costs. In fact, about 31% (almost one-third) of all mining claim costs are OD related. In contrast, transportation & storage and other services were the lowest at 3% of total claim costs.

Description	HC	LMR	LOE	NEL	SURV	Total	All Costs To All Class Claims	OD Costs Only To All Class Claims	% OD Costs To Total
<b>Sch 1 OD cost per OD claim</b>	<b>\$10,303</b>	<b>\$339</b>	<b>\$6,246</b>	<b>\$1,847</b>	<b>\$8,269</b>	<b>\$27,004</b>	<b>\$6,319</b>	<b>\$494</b>	<b>8%</b>
Forest Products	\$17,524	\$233	\$4,828	\$1,644	\$4,653	\$28,882	\$10,798	\$1,051	10%
Mining	\$15,366	\$294	\$7,326	\$5,501	\$22,857	\$51,344	\$24,696	\$7,702	31%
Other Primary	\$5,435	\$535	\$3,471	\$556	\$1,368	\$11,364	\$6,196	\$245	4%
Manufacturing	\$10,614	\$391	\$5,666	\$1,969	\$7,381	\$26,022	\$5,720	\$544	10%
Transportation & Storage	\$10,727	\$133	\$4,499	\$1,167	\$7,792	\$24,318	\$9,436	\$255	3%
Retail and Wholesale	\$7,881	\$728	\$9,466	\$2,008	\$3,606	\$23,688	\$4,443	\$190	4%
Construction	\$15,772	\$283	\$12,200	\$3,787	\$20,739	\$52,781	\$14,421	\$1,085	8%
Government & Related Services	\$4,580	\$205	\$5,068	\$617	\$2,837	\$13,308	\$4,807	\$321	7%
Other Services	\$4,789	\$113	\$3,300	\$821	\$2,269	\$11,292	\$3,714	\$127	3%

Also of interest was answering the question: “what does an OD claim cost”. This was determined by dividing the OD costs over only the count of OD claims, which of course produces much larger costs per claim driven more high fatality costs. The following table illustrates the results by Class.

Here, Construction topped the list but was followed closely by Mining. Other Primary and Other Services had by far the lowest OD costs per OD claim. It is interesting to note that in this analysis Health Care costs comprised a very large portion of the total, followed by Survivor.

The last cost analysis was by type of claim, where OD claim costs for OD claims were grouped into 23 broad claim diagnosis categories. In some cases the number of claims was very small which tended to produce less credible results because of lack of data in given durations or benefit types.

Cancer claims are predominate with very high costs, ranging from \$300,000 to amounts in excess of \$500,000, due to large survivor benefit costs. Also of interest are the relatively high loss of earning costs, follow by health care costs, for almost all types of OD claims.

Description	HC	LMR	LOE	NEL	SURV	Total	# claims
<b>Sch 1 OD cost per OD claim</b>	<b>\$10,305</b>	<b>\$339</b>	<b>\$6,246</b>	<b>\$1,847</b>	<b>\$8,272</b>	<b>\$27,009</b>	<b>179,442</b>
ASBESTOSIS	\$16,243	\$0	\$44,239	\$7,162	\$63,226	\$130,870	644
ASTHMA	\$7,412	\$2,319	\$20,161	\$2,326	\$2,003	\$34,220	3,033
BLADDER CANCER	\$42,514	\$0	\$110,244	\$20,540	\$138,931	\$312,229	55
CIRCULATORY SYSTEM DISEASES	\$56,008	\$3,298	\$79,735	\$8,470	\$69,962	\$217,474	3,168
DERMATITIS	\$757	\$1,155	\$9,420	\$641	\$0	\$11,973	43,415
GASTROINTESTINAL CANCER	\$42,784	\$0	\$112,802	\$42,252	\$314,537	\$512,375	132
HAND ARM VIBRATION SYNDROME	\$4,937	\$1,813	\$19,970	\$9,204	\$0	\$35,924	3,009
INFECTIOUS & PARASITIC DISEASES	\$3,392	\$91	\$6,143	\$1,038	\$1,911	\$12,575	5,503
KIDNEY CANCER	\$37,810	\$0	\$30,242	\$22,880	\$441,367	\$532,299	34
MESOTHELIOMA	\$45,709	\$236	\$44,846	\$33,370	\$408,682	\$532,844	879
NEOPLASM OF LUNG	\$30,346	\$153	\$66,825	\$37,086	\$363,415	\$497,826	1,811
NOISE INDUCED HEARING LOSS	\$23,407	\$9	\$206	\$1,526	\$0	\$25,147	56,396
OTHER DISEASES	\$25,843	\$743	\$50,501	\$12,007	\$15,827	\$104,921	1,685
OTHER NEOPLASMS	\$60,168	\$326	\$64,234	\$19,660	\$228,275	\$372,663	335
OTHER NERVOUS SYSTEM/SENSE ORGAN DISEASE	\$8,206	\$12	\$8,849	\$1,960	\$5,599	\$24,625	1,502
OTHER RESPIRATORY SYSTEM DISEASE	\$10,525	\$659	\$22,619	\$1,673	\$9,618	\$45,095	5,325
OTHER SKIN & TISSUE DISEASE	\$1,920	\$1,131	\$11,621	\$824	\$0	\$15,498	1,250
PLEURAL PLAQUES	\$4,646	\$0	\$3,645	\$1,136	\$0	\$9,426	873
SIGNS & SYMPTOMS	\$248	\$27	\$518	\$34	\$11	\$837	34,920
SILICOSIS	\$10,076	\$202	\$27,436	\$7,051	\$36,472	\$81,237	1,046
SURVEILLANCE CLAIMS	\$1,511	\$28	\$920	\$49	\$0	\$2,507	2,167
SYSTEMIC CONDITIONS	\$33,856	\$1,544	\$14,323	\$1,422	\$4,577	\$55,722	2,655
TOXIC EFFECT OF SUBSTANCES	\$785	\$175	\$1,338	\$825	\$484	\$3,608	9,528

# Conclusion

The results of this study will be used as input to project future OD cost trends, and help facilitate the discussion of whether a change should be made to recognizing explicitly OD costs in setting premium rates.