Occupational Health Clinics for Ontario Workers Inc.

Centres de santé des travailleurs (ses) de l'Ontario Inc.

Occupational Exposure Limit (OEL) Adjustment Tool

Why & How

Occupational Health Clinics for Ontario Workers Inc.
Centres de santé des travailleurs (ses) de l'Ontario Inc.

Occupational Disease Prevention

Impact = Knowledge + Change + Action

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6th Annual October Symposia - 2020

Occupational Exposure Limit-Adjustment

- Background
- Ontario Context
- Québec Model
- History & Other Models
- OEL Adjust Tool & Demo

Background

- Limitations
- Irregular Work Shifts
- Occupational Disease Action Plan (ODAP)
  – Respiratory Hazards Working Group
- Accessible Practical Tools for Reducing Exposures

Ontario Context (cont'd)

Basis for proposal

- OELs are time-weighted limits based on a standard 8 hour work day and 40 hour work week.
  - Irregular work shifts, which can be longer than an 8 hour work day and/or a 40 hour work week, are now commonplace in a range of industries in Ontario.
- Prior to January 1, 2020 Ontario's approach for adjusting OELs for irregular work shifts reduced the TWA proportionately based on the increased exposure time.
  - Under this approach, all substances, regardless of toxicity, are treated the same.
- Based on stakeholder interest MLTSD proposed use of the Québec Model.
  - Québec's model takes into consideration an agent's effect on the body.
  - Considers toxicological information such as sensitization, irritation, organ toxicity, etc., in addition to exposure and recovery times.
- The model is referenced in the ACGIH TLV Book as an approach for addressing "irregular work schedules".
  - Besides Québec, model is used in a number of other Canadian jurisdictions (e.g. British Columbia, Alberta) and internationally.

Ontario Context (cont'd)

Change
Where found?

Schedule 1 :
Airborne Measurement and Calculation of Exposure

5. Subject to section 6 of this Schedule, the time-weighted average exposure to an airborne biological or chemical agent in a work day or work week shall be calculated as follows:

1. The cumulative daily or weekly exposure shall be calculated using the following formula:

$$C_1T_1 + C_2T_2 + \ldots + C_nT_n$$

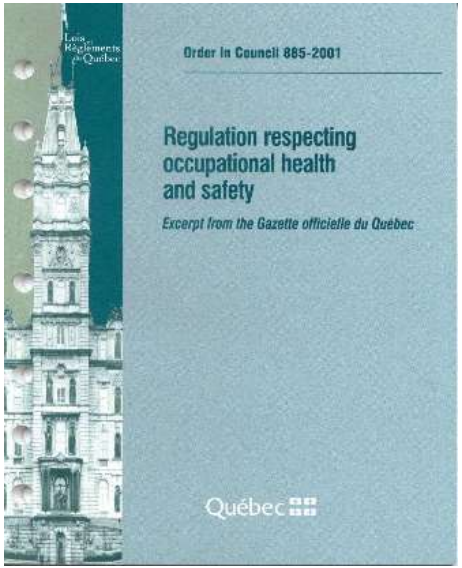
C_1 : concentration found in an air sample
T_1 : the total time in hours to which the worker is taken to be exposed to concentration C_1 in a work day or a work week.

2. The time-weighted average exposure shall be calculated by dividing the cumulative daily exposure by eight and the cumulative weekly exposure by 40 respectively.

NEW 6. A determination of time-weighted average exposure for extended work shifts may be calculated using the methodology set out in the *Guide for the Adjustment of Permissible Exposure Values for Unusual Work Schedules* (March 2015) published by Quebec's Institut de recherche Robert-Sauvé en santé et en sécurité du travail (IRSST), using the applicable TWA set out in the Ontario Table or the ACGIH® Table.

The « Québec » Model

History …



- **1994**, request for studies on unusual work schedules
- **1995**, adoption of the guiding principle and a faisability study (OSHA procedure)
- **1996**, application of this procedure to every substances of the RROHS
- **1999**, 1st version the Adjustment guide
- **1997-2001**, field application and evaluation
- **2001**, 1st version the Adjustment TOOL
- **2004, 2006, 2015 …**
  other versions of the Adjustment guide

Guiding toxicological principle

... to guarantee an **equivalent degree of protection** for workers with a conventional schedule of 8 hours per day, 5 days per week, and for workers with unusual schedules.

Method

OSHA logic

Adj Cat.	Category	Type of adjustment
1A	Substances regulated by a ceiling value	No adjustment
1B	Irritating or malodorous substances	
1C	Simple asphyxiants, substances presenting a safety risk or a very low health risk, whose half-life is less than 4 hours. Technological limitations	
2	Substances that produce effects following short-term exposure	Daily adjustment
3	Substances that produce effects following long-term exposure	Weekly adjustment
4	Substances that produce effects following a short- or long-term exposure	Daily or weekly adjustment (the more conservative of the two)

- attribution of primary health effects
- attribution of category of adjustment
  - No adjustment
  - Daily adjustment
  - Weekly adjustments
  - Daily or weekly (the most severe)

Haber's rule

$F_a = 8/H_d$, **daily** adjustment

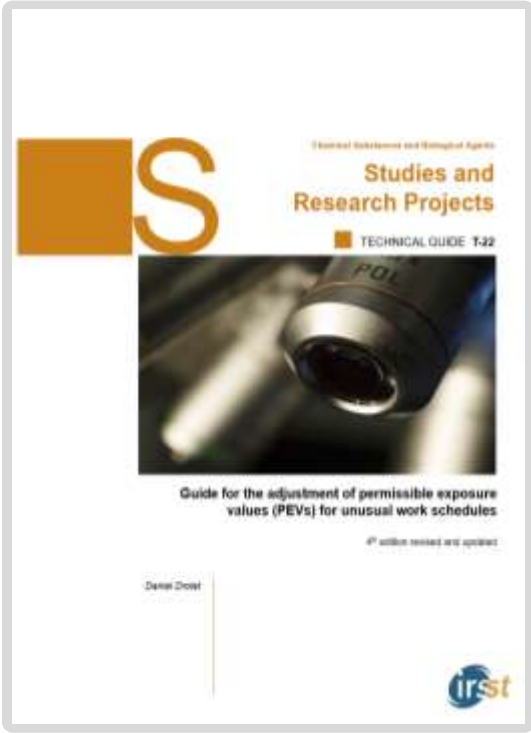
$F_a = 40/h_w$, **weekly** adjustment

Application conditions

- Adjusted OEL value cannot be higher than the TWA OEL value
- No adjustment for short-time exposure (STEL) or Ceiling (C) limits
- Planified working schedules
  (>= 80% of the real work shift)
- Definitions:

  Repetitive work cycle

  Mean weekly hours of exposure per repetitive work cycle



https://www.irsst.qc.ca/media/documents/PubIRSST/T-22.pdf

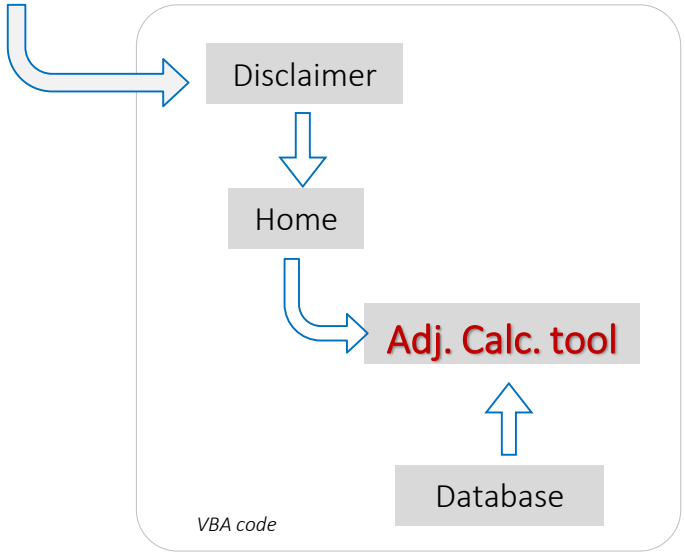
Ontario Adjustment Tool

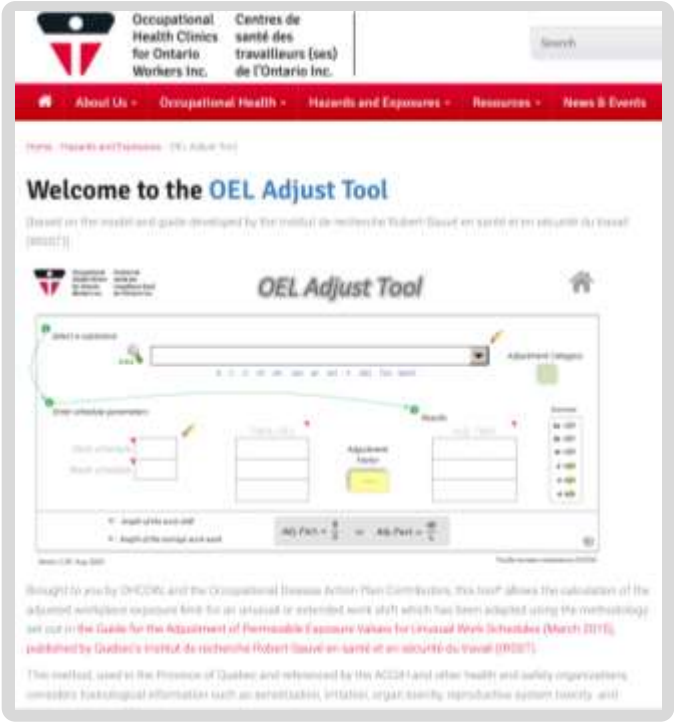
OEL Adjust

The tool …

A Microsoft Excel workbook containing many worksheets

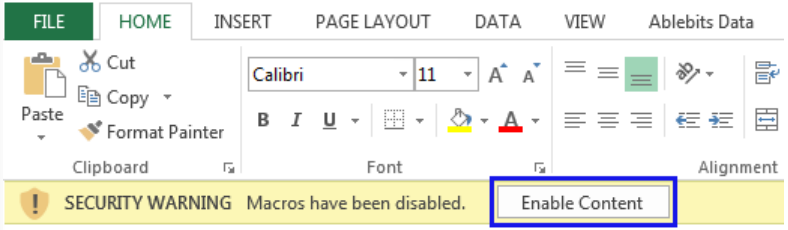
Structure/Interface





https://www.ohcow.on.ca/oel-adjust-tool.html

The tool works ONLY if …



or …

… if the macro security level of EXCEL is set to "enable all".

Procedure

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OEL Adjust Tool

1 Select a substance

1

C.A.S. 100-42-5

Styrene, monomer

B C D EF GH IJKL M NO P QRS TUV WXYZ

Adjustment Category

4

2 Enter schedule parameters

2

Daily schedule 12

Week schedule 42

3 Results

3

TWA-OEL	Adjustment Factor	Adj-TWA
35 ppm	0,667	23,3 ppm

Examples

1a 1b 1c 2 3 4

H : length of the work shift

h : length of the average work week

$$Adj.Fact. = \frac{8}{H} \quad \text{or} \quad Adj.Fact. = \frac{40}{h}$$

Version 1.00 : Aug. 2020

This file has been validated by OHCOW

Ontario OELs

Ontario

Ministry of Labour, Training and Skills Development

Current Occupational Exposure Limits for Ontario Workplaces Required under Regulation 833

https://www.labour.gov.on.ca/english/hs/pubs/oel_table.php

The OELs are in the tool !

List of the substances from the Ontario OELs

#	Substance Name	CAS	Ann CODE	TWA ppm	TWA mg/m³	TWA f/mL	STEL ppm	STEL mg/m³	STEL f/mL	Ceiling ppm	Ceiling mg/m³	Ceiling f/mL	TWA?
1	Acetaldehyde	75-07-0	1A							25			N
2	Acetamide	60-35-5	4	1									Y
3	Acetic acid	64-19-7	1B	10			15						Y
4	Acetic anhydride	108-24-7	1B	1			3						Y
5	Acetone	67-64-1	1C	250			500						Y
6	Acetone cyanohydrin, as CN	75-86-5	1A								5		N
7	Acetonitrile	75-05-8	2	20									Y
8	Acetophenone	98-86-2	1B	10									Y
9	Acetylene	74-86-2	1C										N
10	Acetylsalicylic Acid (Aspirin)	50-78-2	2		5								Y
11	Acrolein	107-02-8	1B							0.1			N
12	Acrylamide	79-06-1	3		0.03								Y
13	Acrylic acid	79-10-7	1B	2									Y
14	Acrylonitrile	107-13-1	3	2						10			Y
15	Adipic acid	124-04-9	3		5								Y

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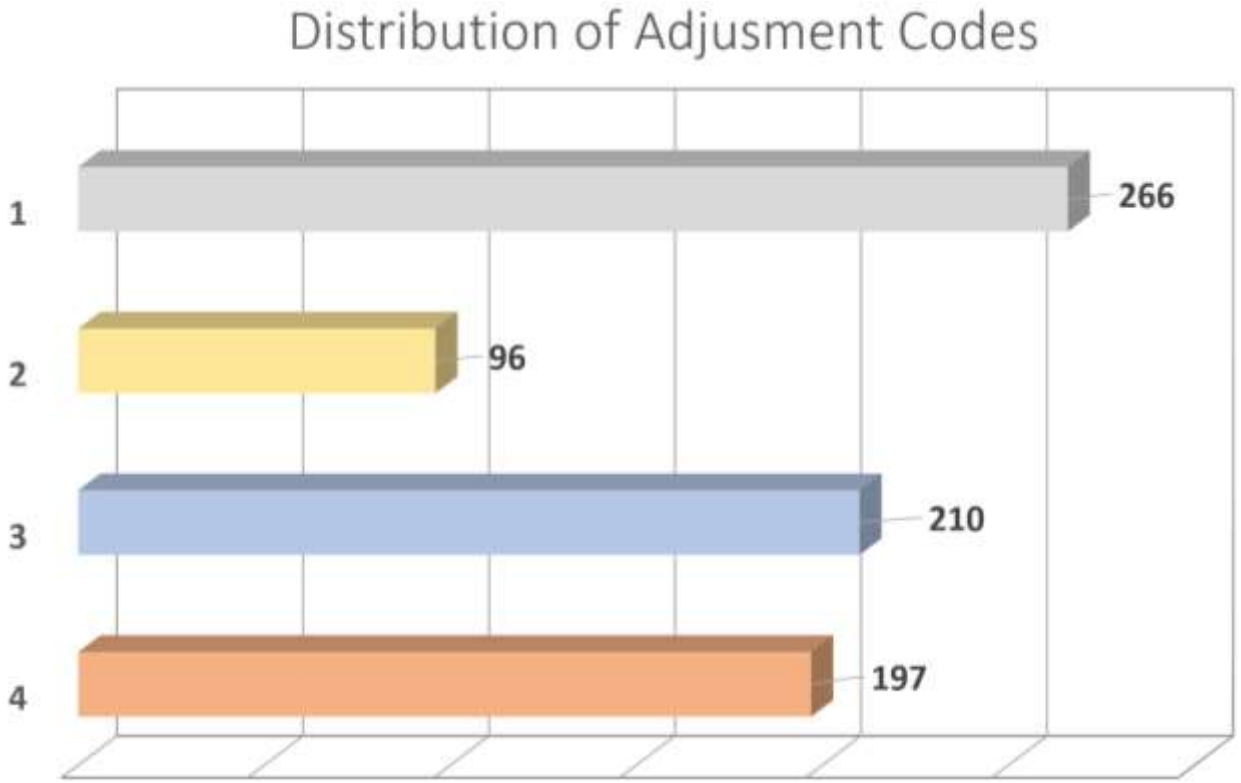
TWA values

Cat.	Type of adjustment
1	**No** adjustment
2	**Daily** adjustment
3	**Weekly** adjustment
4	**Daily or weekly** adjustment (the more conservative of the two)



Short

Live Demo

Example 1

Acetonitrile

OEL-TWA = 20 ppm

Effects considered for adjustment:

Acute effet : metabolic damage

Category 2

Daily adjustment

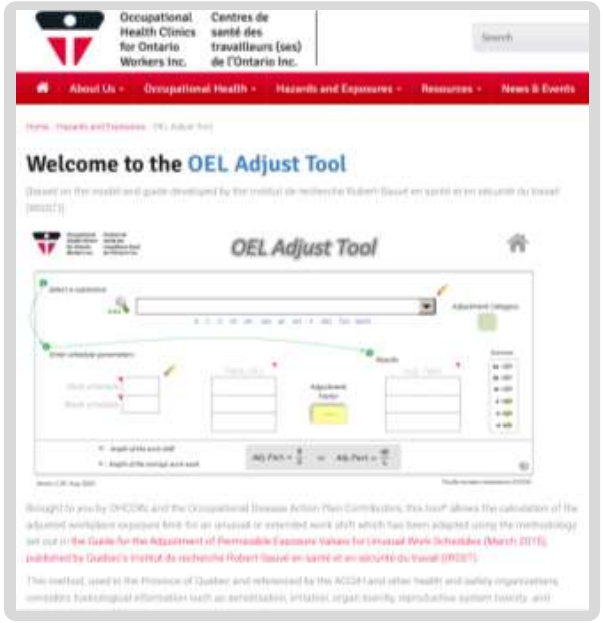
If the lenght of the workshift is 10 hours

Adj OEL = 20 * (8/H_d) = 16 ppm

Conclusion

- Please Share

https://www.ohcow.on.ca/oel-adjust-tool.html



- Comments / Any questions?

Thank You!