

Alberta Health

Protective Action Criteria Review Summary

Public Health and Compliance

January 2017

About this document:

This summary document was prepared from a technical review conducted by Alberta Health. The full technical review “Protective Action Criteria: A Review of Their Derivation, Use, Advantages, and Limitations” is available online at <http://open.alberta.ca/publications/9781460131213>.

This document may be cited as follows:

Government of Alberta. (2017). *Protective Action Criteria: Review Summary*. Environmental Public Health Science Unit, Health Protection Branch, Public Health and Compliance Division, Alberta Health. Edmonton, Alberta.

Statement of Availability:

As part of the Government of Alberta’s commitment to open government, this publication is posted to and permanently retained in the Open Government Portal at <http://open.alberta.ca/publications/9781460131220>.

ISBN: 978-1-4601-3122-0 (PDF)

Copyright and Licence:

© Her Majesty the Queen in Right of Alberta, as represented by the Minister of Alberta Health, 2017

This document is made available under the Open Government Licence – Alberta (<http://open.alberta.ca/licence>).

Every effort has been made to provide proper acknowledgement of original sources. If cases are identified where this has not been done, please notify Alberta Health so appropriate corrective action can be taken.

For more information, please contact:

Health Protection Branch
Public Health and Compliance
Alberta Health
23rd Floor, ATB Place North
10025 Jasper Avenue NW
Edmonton, Alberta, T5J 1S6 Canada
Facsimile: 780-427-147
Telephone: 780-427-4518 in Edmonton
or to be connected toll-free inside Alberta, dial 310-0000

What are PACs?

Protective Action Criteria (PACs) are exposure guidelines used during chemical emergencies to help protect the public from health effects of short-term exposures to hazardous chemicals in the air.

Three categories of PACs represent concentrations at or above which the general population, including susceptible individuals such as infants, the elderly, and those with illnesses, may experience health effects based on a 60-minute exposure:

- PAC-1: mild, transient health effects
- PAC-2: irreversible or other serious health effects that could impair the ability to take protective action
- PAC-3: life-threatening health effects

When and how should PACs be used?

- During a chemical emergency, PACs can be used to inform decisions about what action to take (e.g., evacuation, shelter-in-place) to protect nearby populations from harmful exposures.
- PACs can be used in conjunction with exposure modelling to identify areas and populations that may be at risk of a harmful exposure.
- PACs can be used to predict the health impacts of potential accident scenarios in hazard or consequence analyses conducted for emergency planning purposes.

The basis of PACs

The PAC dataset¹ is a compilation of 3 types of emergency exposure guidelines; they have slightly different definitions, and are derived in different ways. A hierarchy is embedded in the PAC dataset that gives preference to guidelines based on the strongest evidence:

- 1. Acute Exposure Guideline Levels (AEGLs); developed by the US EPA.**
- 2. Emergency Response Planning Guidelines (ERPGs); developed by the American Industrial Hygiene Association.**
- 3. Temporary Emergency Exposure Limits (TEELs); developed by the US Department of Energy.**

Each PAC health effect level is based on the corresponding AEGL, ERPG, or TEEL value (e.g., PAC-3 values are based on AEGL-3, ERPG-3 or TEEL-3).

AEGLs and ERPGs are the preferred emergency guidelines, in that order, but are only available for a limited number of chemicals. For chemicals without AEGLs or ERPGs, TEELs are temporary guidelines used until AEGLs or ERPGs are developed. The PAC dataset consists of ~3400 chemicals, and it is clearly indicated whether a particular value is

¹ The PAC dataset (current as of May 2016) is available online at: <http://energy.gov/ehss/protective-action-criteria-pac-aegls-erpgs-teels-rev-29-chemicals-concern-may-2016>.

an AEGL, an ERPG, or a TEEL. Currently there are AEGLs (final, interim, and proposed) for ~270 chemicals, ERPGs for ~145 chemicals, and TEELs for over 3000 chemicals.

AEGL and ERPG development involves an analysis of all available human and animal toxicity studies and an extensive review process, requiring a significant amount of time and resources. In contrast, TEELs are derived from already existing guidelines such as workplace exposure levels. Consequently, TEELs can be developed relatively quickly; however, they are less reliable than AEGLs and ERPGs.

Who uses PACs?

The types of groups or individuals using AEGLs, ERPGs, TEELs, or the PAC dataset as a whole include government agencies, emergency planning committees, emergency responders, toxicologists, industrial hygienists, and risk assessors.

Application and selection of PAC values varies between agencies and industries. For example, several agencies, such as Environment Canada and Transport Canada, use only AEGLs and ERPGs.

The main advantages of using PACs

- PACs are intended to be protective for most of the general public including susceptible populations.
- The PAC dataset provides emergency inhalation exposure guidelines for ~3400 substances to assist in the management of chemical emergencies.
- Development of AEGL and ERPG values involves an analysis of all available toxicological data and a rigorous review process. AEGLs and ERPGs are peer-reviewed.
- TEEL values are derived using already existing guidelines and can be developed relatively quickly.

The main limitations of PACs

- AEGLs and ERPGs are available for a relatively small number of chemicals. The extensive review process involved in AEGL and ERPG derivation requires a significant amount of time and resources.
- TEEL values are not peer-reviewed and are considered less reliable than AEGLs and ERPGs.
- When using the consolidated PAC dataset, only one exposure duration is available (1 hour), which can lead to some confusion when actual exposure times are shorter or longer. This is particularly important for chemicals that do not have an AEGL to refer to (AEGLs include exposure durations of 10 minutes, 30 minutes, 4 hours, and 8 hours).

Additional information

The full PACs technical review “Protective Action Criteria – A Review of Their Derivation, Use, Advantages, and Limitations” is available online at:

<http://open.alberta.ca/publications/9781460131213>.