



Proposed Acceptability for Continuing Registration

PACR2004-31

Re-evaluation of Carbon Dioxide

The purpose of this document is to inform registrants, pesticide regulatory officials and the Canadian public that the Pest Management Regulatory Agency (PMRA) has completed a re-evaluation of carbon dioxide. The PMRA has determined that carbon dioxide is acceptable for continued registration provided that the proposed mitigation measures are adopted. Additional data requirements are identified.

This Proposed Acceptability for Continuing Registration (PACR) document provides a rationale for the proposed regulatory decision for carbon dioxide. The PMRA will accept written comments on this proposal up to 45 days from the date of publication of this document. Please forward all comments to the Publications Coordinator at the address below.

(publié aussi en français)

6 August 2004

This document is published by the Alternative Strategies and Regulatory Affairs Division,
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ISBN: 0-662-37862-8 (0-662-37863-6)

Catalogue number: H113-18/2004-31E (H113-18/2004-31E-PDF)

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1.0 Background

The PMRA is re-evaluating all pesticides, both active ingredients and formulated end-use products (EPs), that were registered prior to 31 December 1994 to ensure that their continued acceptability is examined using current scientific approaches. Regulatory Directive [DIR2001-03](#), *PMRA Re-evaluation Program*, presents the details of the re-evaluation activities and program structure.

Carbon dioxide has been re-evaluated by the PMRA under Re-evaluation Program 1 as described in DIR2001-03. Under Program 1, the PMRA relies as much as possible on foreign reviews, typically United States Environmental Protection Agency (USEPA) Reregistration Eligibility Decision (RED) documents, to assess Canadian pest control products. For products to be re-evaluated under Program 1, there must exist a suitable foreign review that meets the following conditions:

- it covers the main science areas, such as human health and the environment, that are necessary for Canadian regulatory decisions;
- it addresses the active ingredient and the main formulation types registered in Canada; and
- it is relevant to registered Canadian uses.

Based on the outcome of foreign reviews, the PMRA will propose, under Program 1, a regulatory decision and appropriate mitigation measures for Canadian uses of an active ingredient.

The USEPA conducted a re-evaluation of carbon dioxide and concluded that, on the basis of health and environmental risk assessments, it was eligible for reregistration with implementation of mitigation measures. These conclusions were published in a 1991 RED document for carbon dioxide. In its re-evaluation of carbon dioxide, the PMRA based its conclusions on this 1991 RED document, taking into account the Canadian use pattern and Canadian issues (e.g., the federal Toxic Substances Management Policy [TSMP]). A review of the chemistry of Canadian products was also conducted.

2.0 Re-evaluation of carbon dioxide

Active substance:	Carbon dioxide
Common name:	Carbon dioxide
CAS number:	124-38-9
Empirical formula:	CO ₂

In Canada, carbon dioxide was first registered in 1988 as an insecticide for use as a fumigant in grain and flour storage areas, shipboard, in-transit ships and shipholds. There is currently one EP, Carbon Dioxide Standard Fumigant (PCP #20088), registered by Praxair Canada. It is classified as a commercial product with 99.8% guaranteed carbon dioxide.

Canadian registered use sites, application rates and application method are also registered in the United States.

Based on the comparison of American and Canadian use patterns, the USEPA assessment described in the RED document for carbon dioxide is considered to be an adequate basis for the proposed Canadian re-evaluation decision. The details of the assessments conducted by the USEPA are presented in the USEPA RED for carbon dioxide.

The federal TSMP and Regulatory Directive [DIR99-03](#) were taken into consideration during the review of carbon dioxide, and it was concluded that carbon dioxide is not a TSMP Track 1 substance. The technical product is not expected to contain impurities of toxicological concern as identified in Regulatory Directive [DIR98-04](#) or TSMP Track 1 substances as identified in Appendix II of DIR99-03.

3.0 Proposed re-evaluation decision

The USEPA published a RED document for carbon dioxide addressing the main science areas that are necessary for Canadian regulatory decisions, i.e., human health and the environment. This document addressed uses of carbon dioxide that are also registered in Canada. Based on the USEPA RED and Canadian use pattern, the PMRA has determined that carbon dioxide is acceptable for continued registration provided that the mitigation measures specified in Section 4.0 are adopted. Additional data requirements are identified in Section 5.0. Acceptable uses are outlined in Appendix I.

The PMRA will accept written comments on this proposal up to 45 days from the date of publication of this document to allow interested parties an opportunity to provide input into the proposed re-evaluation decision.

4.0 Proposed regulatory actions

For all carbon dioxide EPs, labels must be modified to include the following instructions to protect workers (required label statements are described in Appendix II):

- After fumigation, ventilate treated areas until the CO₂ level is below 5000 ppm.

- If CO₂ levels are between 5000 and 30 000 ppm (the OSHA short-term exposure limit), persons may re-enter the treated area without respiratory protection for 15 minutes or less. For periods longer than 15 minutes, use either a NIOSH/MSHA approved supplied-air respirator OR a NIOSH/MSHA approved self-contained breathing apparatus (SCBA) with a full face shield.
- No re-entry into treated areas is permitted without respiratory protection, if the CO₂ levels are above 30 000 ppm or if they are unknown.
- If CO₂ levels are below 5000 ppm, persons may re-enter the treated area without respiratory protection.
- The applicator must placard or post signs on all entrances to the fumigated area that conform to the specified requirements.
- Only to be used by individuals holding an appropriate pesticide applicator certificate or licence recognized by the provincial/territorial pesticide agency where the application occurs.
- An appropriate storage and disposal statement must be added to the label by the registrant.

Due to training requirements, carbon dioxide must be reclassified as a restricted product.

Label revisions should be submitted within 90 days of finalization of the re-evaluation decision.

5.0 Additional data requirements

The registrant of carbon dioxide is required to submit the following within 24 months of finalization of the re-evaluation decision:

- a submission to register a source of the technical grade active ingredient (TGAI);
- all data (as they relate to the Canadian use pattern) submitted to the USEPA in response to the data call-in prior to the reregistration in the United States and USEPA Data Evaluation Reports (DERs);
- all data (as they relate to the Canadian use pattern) that were required by the USEPA as a condition of reregistration of carbon dioxide; and

- a commitment and schedule to address Canadian requirements that are not addressed through submission of the data outlined above. These are outlined in the PMRA's data code (DACO) tables for use-site categories (USC) #3, 12 and 20. The registrant is required to address the following sections of DACO tables:
 - for the TGAI: DACOs 2 through 9, inclusive
 - for the EP: DACOs 5 through 9, inclusive

The above data and additional data may be required sooner if expansion of current uses of carbon dioxide is requested.

6.0 Supporting documentation

PMRA documents, such as DIR2001-03, and DACO tables can be found on our website at www.hc-sc.gc.ca/pmra-arla. PMRA documents are also available through the Pest Management Information Service. Phone: 1 800 267-6315 within Canada or 1 (613) 736-3799 outside Canada (long distance charges apply); Fax: (613) 736-3798; E-mail: pmra_infoserv@hc-sc.gc.ca.

The federal TSMP is available through Environment Canada's website at www.ec.gc.ca/toxics.

The USEPA RED document (*Carbon and Carbon Dioxide*) is available on the Office of Pesticide Programs' website at www.epa.gov/pesticides/reregistration under Chemical Status.

Appendix I Acceptable uses for carbon dioxide

SITE	PESTS	RATE
Use-site categories 03 (Empty Food Storage Areas), 12 (Stored Food and Feed) and 20 (Structural).		
Grain and flour storage areas (bins, silos, flour operations, and elevators), shipboard, in-transit ships or shiploads.	Granary weevil; rusty grain weevil; red flour beetle; confused flour beetle; American black flour beetle; and black flour beetle.	A concentration of 60–90%

Appendix II Use standard for the commercial class products containing carbon dioxide

(**Note:** The information in this appendix summarizes the uses and precautions for the commercial class products containing carbon dioxide, but does not identify all label requirements for such products. Registrants are referred to the PMRA's *Registration Handbook* for further guidance on label requirements for pest control products.)

COMMON NAME:	Carbon dioxide
CHEMICAL NAME:	Carbon dioxide
FORMULATION TYPE:	Pressurized product
USE-SITE CATEGORIES:	03—Empty Food Storage Areas 12—Stored Food and Feed 20—Structural

[The word "RESTRICTED" must appear on the Primary Panel of the label in capital letters.]

Only to be used by individuals holding an appropriate pesticide applicator certificate or licence recognized by the provincial/territorial pesticide agency where the application occurs.

PRECAUTIONARY STATEMENTS:

Exposure may result in suffocation or death. For handling activities in enclosed areas during fumigations, use either a NIOSH/MSHA approved supplied-air respirator, or a NIOSH/MSHA approved self-contained breathing apparatus (SCBA) with a full face shield. Work spaces under and adjacent to treatment area should be monitored for carbon dioxide.

AERATION

After fumigation, aerate treated areas until the level of CO₂ as measured by [*the registrant must identify one or more direct-reading detection devices suitable for use with the product, and provide or reference instructions on its use*], is **below 5000 ppm**.

Re-entry (below 5000 ppm): If CO₂ levels are below 5000 ppm persons may re-enter the treated area without respiratory protection.

Re-entry (5000–30 000 ppm CO₂): If CO₂ levels are between 5000 and 30 000 ppm, persons may re-enter the treated area without respiratory protection for 15 minutes or less. For periods longer than 15 minutes, use either a NIOSH approved supplied-air respirator or a NIOSH/MSHA approved self-contained breathing apparatus (SCBA) with a full face shield.

Re-entry (Over 30 000 ppm CO₂ or unknown): If CO₂ levels are over 30 000 ppm, or are unknown, a person must always wear the following:

- an approved self-contained breathing apparatus that has a full face shield and is operated in a pressure-demand or other positive mode, **OR**
- an approved supplied-air respirator that has a full face shield and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus.

A self-contained breathing apparatus should always be available for emergency use.

TRAINING REQUIREMENT

All persons working with this product should be knowledgeable of this chemical's hazards, and trained in the use of required respirator equipment and detector devices, emergency procedures and use of the product. When used for fumigation of enclosed spaces, (boxcars, silos, ship containers, and other transport vehicles), two persons familiar with the use of this product must be present during introduction of the fumigant, initiation of aeration, and after aeration when testing for reentry. Two persons do not need to be present if monitoring is conducted remotely (outside of area being fumigated).

PLACARDING INSTRUCTIONS:

The applicator must placard or post signs on all entrances to the fumigated area that conform to the following requirements:

- a) The sign shall be at least 35 cm by 25 cm in size and the letters shall be at least 7 cm in height unless a smaller-sized sign is necessary because the treated area is too small to accommodate a sign of this size. Letters shall be clearly legible.
- b) The signal word "DANGER" and the skull and crossbones symbol must be on the placard.
- c) The statement "Fumigation – DO NOT ENTER/ENTRÉE INTERDITE."
- d) The date of fumigation.
- e) The name of the fumigant (carbon dioxide).
- f) The name, address and telephone number of the applicator or pesticide handler.

These signs must be posted at eye level and must be visible from all visible points of entry to the treated area. They must remain posted during application and throughout the restricted-entry interval until the concentration of carbon dioxide is below 5000 ppm. Each separate treated area (i.e., boxcar, silo, ship container) must be posted or placarded with these signs.

The applicator or person responsible for monitoring levels of carbon dioxide may remove the placard when the concentration of carbon dioxide is at or below 5000 ppm.

STORAGE AND DISPOSAL:

STORAGE

Do not contaminate water, food, or feed by storage or disposal. Store in bulk CO₂ vessels that are permanent or semi-permanent installations or in approved CO₂ cylinders. Store cylinders in dry, cool, well-ventilated area under lock and key. Placard as a pesticide storage area. Store cylinders upright and secured to a rack or wall to prevent tipping. Cylinders should not be subjected to rough handling or mechanical shock such as dropping, bumping, dragging or sliding. Do not use rope slings, hooks, tongs or similar devices to unload cylinders. Transport cylinders using a hand crank or fork truck to which the cylinder can be firmly secured. Do not remove valve protection bonnet and safety cap until immediately before use. Replace safety cap and valve protection bonnet when cylinder is not in use.

SPILL AND LEAK PROCEDURE

Evacuate the immediate area where the leak has occurred. Use SCBA or combination air-supplied/SCBA respirator for entry into affected area to correct problem. Move leaking or damaged cylinders outdoors to an isolated location, observing strict safety precautions. When completely empty, return to manufacturer if instructed or dispose of leaking or damaged cylinders or containers in accordance with Provincial and Local waste disposal regulations.

Do not permit entry into spilled area by unprotected persons until concentration of carbon dioxide is determined to be less than 5000 ppm.

LEAKING BULK CO₂ VESSEL OR ITS ATTACHED PIPING

In the event of a leakage from a bulk CO₂ vessel or its attached piping, close the upstream valve to isolate the leaking section. Depressurize the affected section and remove or repair the leak. If shutting off the valves at the vessel fail to stop the leakages, contact the local CO₂ service personnel to pump out or unload the vessel before proceeding with repairs.

LEAKING OR DAMAGED CYLINDERS

Move leaking or damaged cylinder outdoors or to an isolated location, observing strict safety precautions. When completely empty, return to manufacturer if instructed or dispose of leaking or damaged cylinders or containers in accordance with Provincial and Local waste disposal regulations. Do not permit entry into spill area by unprotected persons until concentration of carbon dioxide is determined to be less than 5000 ppm.

PESTICIDE DISPOSAL

Bulk CO₂ vessels are generally moved empty and depressurized. The usual method to dispose of excess CO₂ is to dilute it with air by venting. Care must be exercised to prevent accumulations of high concentration of vented CO₂ gas in an enclosed or low lying area. This is usually accomplished by very slow venting of the CO₂ to avoid a local asphyxiation hazard.

CONTAINER DISPOSAL

Bulk CO₂ vessels should be removed and disposed of only by qualified CO₂ service personnel. Return empty CO₂ cylinders for re-use or disposal. When cylinder is empty, close valve, screw safety cap onto valve outlet and replace protection bonnet before returning to shipper. Only the registrant is authorized to refill cylinders. Do not use cylinders for any other purpose. Follow registrant's instruction for return of empty or partially empty cylinders.