

Carbon Dioxide-Carp

U.S. EPA Registration Number: 6704-95

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Pesticide Label

- Carbon Dioxide-Carp
 - Registered in 2019
 - Section 3 (National)
- Approved as behavioral deterrent for invasive carps
- Broad spectrum pesticide
- Restricted use
 - State and federal natural resource agencies



Precautionary Statements:
Hazards to Humans and Domestic Animals

WARNING: May be fatal if inhaled. Do not breathe vapor.

Environmental Hazards
This chemical is toxic to aquatic vertebrates and invertebrates. Non-target organisms may be killed at rates recommended on this label. Directions for use must be strictly followed to minimize hazards to non-target organisms.

DIRECTIONS FOR USE
It is a violation of Federal Law to use this product in a manner inconsistent with its labeling. Read entire label and follow use directions carefully before applying.

Product Information:
This product is used as an Asian carp deterrent or as an under ice lethal control for aquatic nuisance species. Before applying carbon dioxide to water, ensure infusion equipment is in good working condition and there are no leaks. All persons working with this product must be trained in the product hazards, the use of respiratory devices when required, detection instruments, emergency procedures, and product application procedures. Obtain any permits required by Local, State, or Federal authorities before application.

Behavioral Deterrent:
Specific areas within waterways may be treated to induce avoidance behavior to limit the localized occupancy, movement, and spread of invasive carp.

Amount of product applied will depend on water volume to be treated. Target carbon dioxide concentration to induce avoidance behaviors ranges between 100–150 mg/L. To determine weight (W) of product (in kilograms; kg) to infuse, use:

$$W = (C \times V) \times f$$

where C is target concentration (in mg/L); where V is treatment area volume (expressed in liters); and, where f is unit conversion factor for mg to kg (0.000001).

Amount of product applied may vary slightly depending on gas transfer efficiency due to potential loss from biological uptake, effervescence, and other atmospheric losses. With target treatment concentrations ranging between 100–150 mg/L, temporary pH suppression to not less than 5.5 is expected.

For use only by U.S. Fish and Wildlife Service, U.S. Geological Survey, U.S. Army Corps of Engineers, State natural resource managers, or persons under their direct supervision

Carbon Dioxide-Carp

Active Ingredient:	
Carbon dioxide	100%
Total	100%

KEEP OUT OF REACH OF CHILDREN

WARNING

FIRST AID

IF INHALED	<ul style="list-style-type: none"> • Move person to fresh air • If the person is not breathing, call 911, then give artificial respiration, preferably mouth to mouth if possible • Call poison control center or doctor immediately for treatment advice
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Have the product container or label with you when calling a poison control center, doctor, or going for treatment. For non-emergency information concerning this product, call the National Pesticides Information Center (NPIC) at 1-800-858-7378 seven days a week, 6:30 am to 4:30 pm Pacific Time (NPIC Web site: www.npic.orst.edu)

Net Weight: 50 LBS

EPA Reg. No. 6704-95
EPA Est. No. 6704-WI-1

Manufactured by:
U.S. Fish and Wildlife Service
United States Department of Interior
18th and C Streets NW
Washington, DC 20240

Lethal Control:
All vertebrate and some invertebrate species under the ice in the treatment area are expected to die. Amount infused will depend on water volume to be treated. Maintain carbon dioxide concentration of 200 mg/L for a minimum of 96 hours for lethal control. To determine weight (W) of product (in kilograms; kg) to infuse, use:

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where C is target concentration (in mg/L); where V is treatment area volume (expressed in liters); and, where f is unit conversion factor for mg to kg (0.000001).

Ponds/lakes/impoundments can be restocked after pH returns to pretreatment level.

Storage and Disposal

PESTICIDE STORAGE

Store in cool, well-ventilated and secure area. Post as a pesticide storage area. The product may be stored in portable cylinders, portable bulk storage tanks, or permanent bulk storage tanks. Store cylinders upright, secured to a wall to prevent tipping. Do not subject cylinders to rough handling or mechanical shock such as dropping, bumping, dragging, or sliding. Do not use rope slings or hooks to unload cylinders. Transport cylinders using hand truck or fork truck to which the cylinder can be firmly secured.

Bulk storage tanks must be in a cool, well-ventilated and secure area. Post as a pesticide storage area. Do not allow vehicles or other large equipment to bump or collide with bulk storage tanks.

Do not store carbon dioxide containers in areas where there is a potential for electrical discharge. Electrical discharge into the container will cause carbon dioxide to decompose into carbon monoxide and oxygen.

PESTICIDE DISPOSAL

If carbon dioxide cannot be used, vent to open air in an area with restricted access away from people ensuring concentrations don't exceed 5000 ppm.

CONTAINER HANDLING

Return cylinders for reuse or disposal. When the cylinder is empty, close the valve and screw the safety cap onto the valve outlet before returning to shipper or allowing it to be refilled. Only the registrant is authorized to refill containers. Do not use cylinders or bulk storage containers for any other purpose.

Spill or Leak Procedures

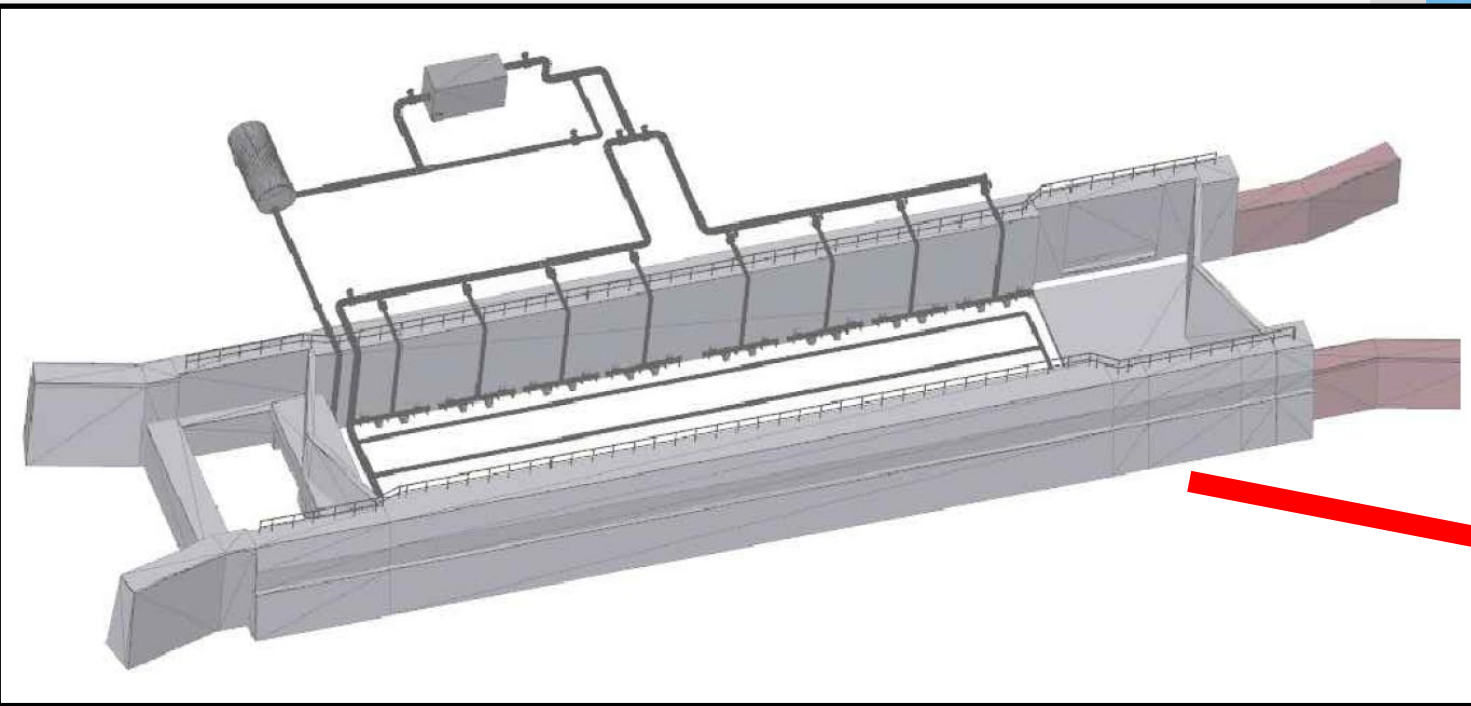
In case of leak, evacuate area immediately. Move leaking or damaged cylinders outdoors or to an isolated and ventilated location, observing strict safety precautions. Do not allow entry into spill area by unprotected persons until concentration of carbon dioxide is less than 5,000 ppm. When cylinder is completely empty, return to manufacturer.

Pesticide Application

- Conceptual application in outdoor pond
- Goal to clear fish from areas where treatment is applied
 - CO₂ injected into top right side
 - Analogous to lock chamber
- Telemetered bighead carp and grass carp
 - Multiple independent trials conducted
 - Randomized treatment location
- Fish generally avoided CO₂ plume
- Full report available
 - Cupp et al. (2021) *Journal of Great Lakes Research*



Large Scale Applications – Recirculating System



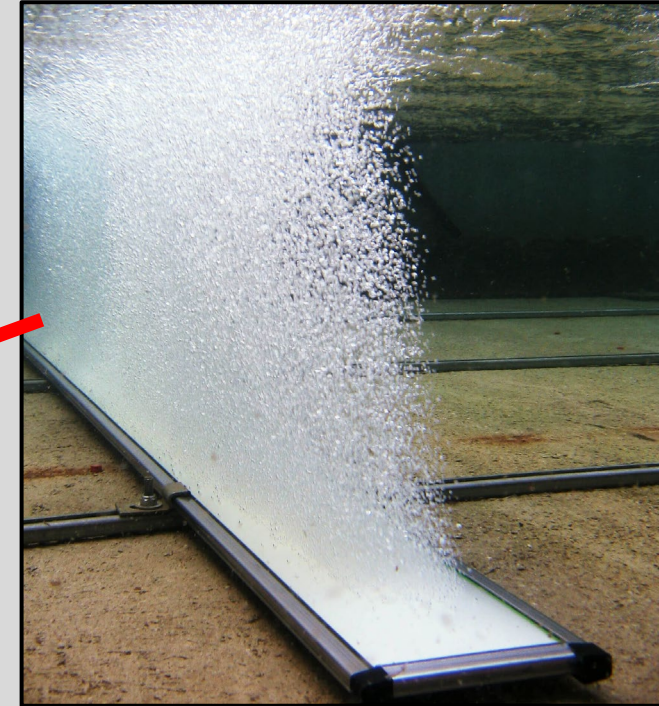
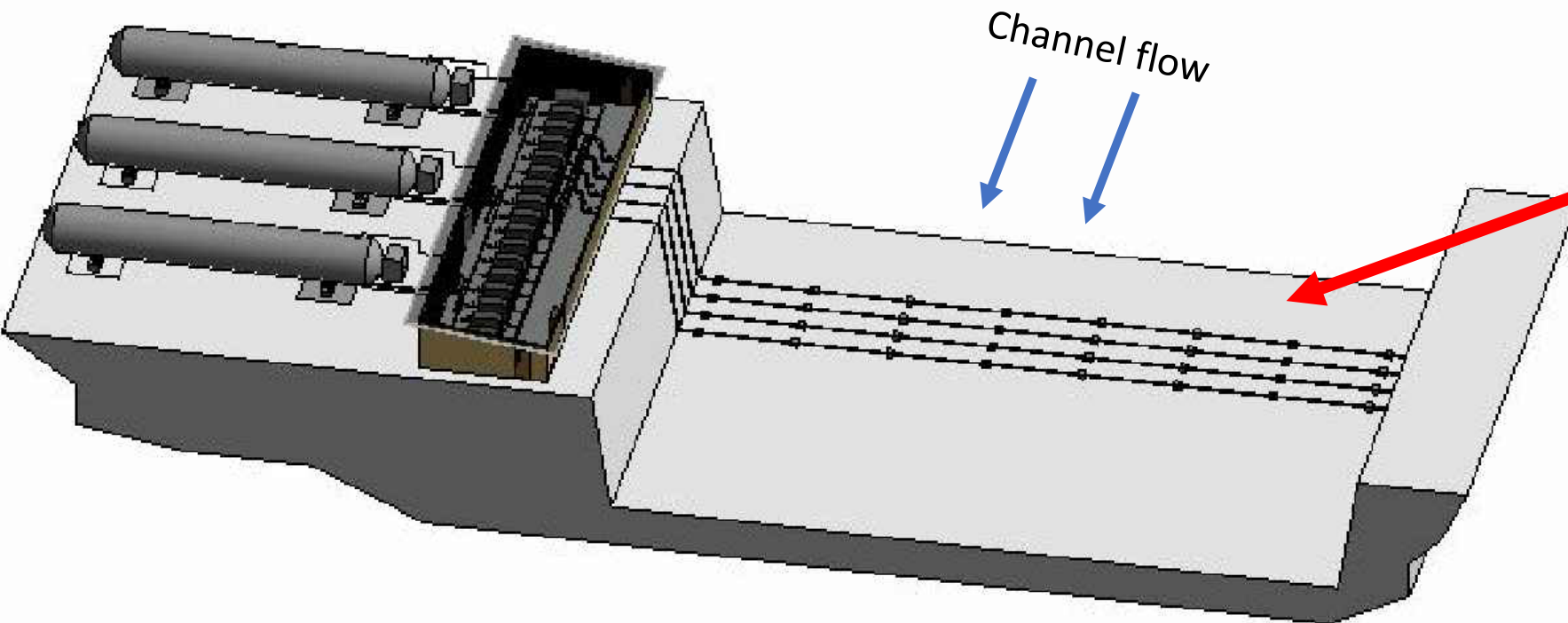
CAD drawings for pesticide delivery system at navigation lock
Zolper et al. (2022) *Journal of Environmental Engineering*



Carbon Dioxide-Carp Field Application



Large Scale Applications – Direct Gas System



CAD drawings for pesticide delivery system in flowing channel

How Can Resource Managers Obtain Label?

- USFWS finalizing ePermits web platform
- Standard Operating Procedures for Carbon Dioxide-Carp
- Reminder – state pesticide also required before a label will be provided and before application
 - Currently registered in AZ, IL, IN, IA, MI, MN, MS, OH, TN, WI
- Users purchase CO₂ from local supplier and affix Carbon Dioxide-Carp label to the bulk container before application
 - USGS is EPA establishment for Carbon Dioxide-Carp



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71709-922196A VESTOR
YOUNG BROWN, LLC, MANASSAS, VA 13104-0663 1-800-473-0498 www.YoungB.com

Other Considerations

- Inexpensive, widely available, relatively safe
- No harmful residues, FDA classified as Generally Regarded as Safe
- Repurposed from industrial byproduct, not produced for this use
- Broad spectrum pesticide and non-target organisms should be considered
 - Section 7, monitoring plans, other permits



Application at Emiquon Nature Preserve
Cupp et al. (2018) *Management of Biological Invasions*

Collaborators

- Collaborators
 - U.S. Geological Survey
 - U.S. Army Corps of Engineers
 - U.S. Army Engineer Research and Development Center
 - U.S. Fish and Wildlife Service
 - U.S. Environmental Protection Agency
 - U.S. Coast Guard
 - Invasive Carp Regional Coordinating Committee
 - Fox River Navigation System Authority
 - Wisconsin DNR
 - Illinois DNR
 - University of Illinois
 - University of Wisconsin Platteville
 - Bailey Edward Inc.
 - TOMCO2 Systems Inc.
- Funding provided by Agency appropriations and the Great Lakes Restoration Initiative (GLRI)



Questions?