

# Redfield Site

## Revised Action Levels for 1,1-DCE and TCE

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#### For More Information:

##### **Lisa Sigler**

Brown Retail/Redfield  
Community Relations  
Representative  
(303) 778-8355 phone  
(303) 778-8359 fax  
lisa@siglerinc.com

##### **Warren Smith**

Colorado Department of Public  
Health and Environment  
Community Involvement  
Manager  
303-692-3373 phone  
303-759-5355 fax  
warren.smith@state.co.us

**Information Line: 303-637-2503**

**Web Site: [www.redfieldsite.org](http://www.redfieldsite.org)**

## Background

Brown Group Retail, Inc. has been monitoring the indoor air in homes in the vicinity of the Redfield site since 1998 for the presence of eight chemical constituents identified by the Colorado Department of Public Health and the Environment (CDPHE). Of those eight, CDPHE identified 1,1-dichloroethene (1,1-DCE) and trichloroethylene (TCE) as the constituents of primary importance. 1,1-DCE is a breakdown product of certain solvents and TCE is a common ingredient in compounds used to degrease metal parts. Both compounds are present in varying concentrations in the groundwater under the Redfield site and in some surrounding areas. Because the compounds can migrate as a vapor from groundwater into air, 1,1-DCE, and to a lesser degree, TCE, have been detected in the indoor air in some homes in the vicinity of the site.

## Changes in the Action Levels

When Brown Retail began testing houses in the vicinity of the Redfield site, CDPHE's action level for 1,1-DCE was 0.49 micrograms per cubic meter of air ( $\mu\text{g}/\text{m}^3$ ). An action level is the measured concentration of a compound that a regulatory agency has determined warrants action or remediation. Homes exceeding CDPHE action levels for the Redfield site are offered a ventilation system like those used to vent radon from homes. These systems help prevent vapors from the compounds in the groundwater from entering the indoor air of a home.

Since 1998, CDPHE has raised the action level for 1,1-DCE twice, most recently in March 2012, to a level of  $7.3 \mu\text{g}/\text{m}^3$ . The previous change was made in 2004 from  $0.49 \mu\text{g}/\text{m}^3$  to  $5.0 \mu\text{g}/\text{m}^3$ . That change was made after CDPHE evaluated 1,1-DCE toxicity assessments conducted by the U.S. Environmental Protection Agency (EPA), the Agency for Toxic Substances and Disease Registry (ATSDR), and other health and regulatory agencies. EPA's 2002 guideline for 1,1-DCE is  $200 \mu\text{g}/\text{m}^3$ . None of the homes near the Redfield site have tested above EPA's 2002 guideline. The highest level of 1,1-DCE ever found in the indoor air of a home tested as part of the Redfield site work was  $131 \mu\text{g}/\text{m}^3$  in 2000. That home was promptly remediated to below the  $0.49 \mu\text{g}/\text{m}^3$  action level, which applied at the time.

Notwithstanding EPA's 2002 guideline for 1,1-DCE of  $200 \mu\text{g}/\text{m}^3$ , CDPHE initially opted for a much lower level of  $5.0 \mu\text{g}/\text{m}^3$ . In 2012, CDPHE raised the action level to  $7.3 \mu\text{g}/\text{m}^3$  based on uncertainties CDPHE found with the EPA studies. In 2012, CDPHE also increased the action level for TCE from 0.8 to  $2.1 \mu\text{g}/\text{m}^3$ .

<sup>1</sup>CDPHE's adoption of a new action level for TCE is discussed more thoroughly in the companion fact sheet entitled "Redfield Site Update On TCE, March 2012".

Following is a table that shows the results of 728 houses tested in the vicinity of the Redfield site based on the progression of CDPHE action levels for the compound 1,1-DCE.

Houses that Exceeded EPA Guidance for 1,1-DCE of 200 µg/m <sup>3</sup>	Houses that Exceeded CDPHE level of 0.49 µg/m <sup>3</sup> prior to 2005	Houses that Exceeded CDPHE 2004 action level of 5.0 µg/m <sup>3</sup>	Houses that Exceed CDPHE 2012 action level of 7.3 µg/m <sup>3</sup>
0	395	241	170

From 2005 to 2009, 148 homes, which previously had exceeded the CDPHE action levels applicable at the time, were retested. Of the 148 homes evaluated, 144 met the state’s 2004 and current action levels and therefore, do not require continued operation of the ventilation systems.

## Future Testing and Ventilation Protocol

Based on the new, higher action levels, it is anticipated that even more homes will no longer require ventilation from groundwater impacts. Additionally, because the groundwater quality in the area is also improving over time, even more homes will no longer require ventilation. Brown Retail will follow the testing protocol approved by CDPHE in 2005 to determine which houses may no longer require ventilation and/or monitoring based on the latest approved action levels.

For homes that meet the state’s new action levels after retesting, the property owners will receive a letter notifying them that they no longer need to operate their indoor air remediation system for compounds associated with the Redfield site. Indoor air testing of these homes will no longer necessary and will be discontinued.

Because the systems also eliminate naturally occurring radon, both CDPHE and the City and County of Denver Department of Environmental Health recommend that homeowners conduct radon tests in their homes to determine if they should continue operating the system to safeguard against radon. Homeowners may opt to continue operating and maintaining their ventilation systems at their own expense. Operating the system is economical, averaging slightly more than \$100 annually in electricity costs.

Homes located along a narrow bedrock channel in the vicinity of South Jasmine Street and East Mexico Avenue will remain vented and in the monitoring program until the offsite groundwater remediation system has been evaluated.

Brown Retail’s environmental contractor, EnviroGroup Ltd., will contact the owners of Phase III homes (those

that originally tested above the 2004 action level of 5.0 µg/m<sup>3</sup> for 1,1-DCE) to schedule an indoor air test to confirm that venting is not required to meet the new action level of 7.3 µg/m<sup>3</sup> for 1,1-DCE. Homeowners who opt to voluntarily shut off their system temporarily for this confirmation sampling will be asked to turn them off for only 2 weeks before testing. Once the air-sampling canister is removed, the system can be turned back on. A second sample will be collected in the winter or spring using the same procedure.

For houses where homeowners deny permission for the re-testing or do not respond to the request after repeated attempts, EnviroGroup Ltd. uses a comprehensive “lines-of-evidence” evaluation to determine the status of these homes. The evaluation takes into account chemical constituent concentrations in groundwater and nearby indoor-air data to determine if indoor-air levels in these homes would meet state criteria if the ventilation systems were turned off. CDPHE believes that the lines-of-evidence evaluation is an appropriate and acceptable approach for determining which homes meet the state’s new indoor-air levels for 1,1-DCE and TCE.

Evaluation of homes in Phase III is continuing. Until their homes are evaluated, Phase III homeowners, and those with homes in the Jasmine Channel, should continue to operate their ventilation systems. Brown Retail will also continue monitoring or system inspections for these homes.

Indoor air concentrations of 1,1-DCE and TCE will continue to decrease over time as the underlying groundwater continues to be treated and the groundwater quality improves.