



National Aeronautics and  
Space Administration

**Principal Center for Regulatory Risk Analysis and Communication**

**REGULATORY ALERT**  
**Final Health Assessment for Trichloroethylene**

This information was prepared by NASA's Principal Center for Regulatory Risk Analysis and Communication (RRAC PC). An archive of regulatory alerts, summaries, and other information is posted on the RRAC PC website at <http://www.nasa.gov/offices/rrac/home/>. If you have further questions and/or need assistance, please contact Sharon Scroggins/MSFC (256-544-7932, [sharon.scroggins@nasa.gov](mailto:sharon.scroggins@nasa.gov)).

<b>Title:</b> <i>EPA Releases Final Health Assessment for TCE</i>	<b>Date [Citation]:</b> 28 September 2011 [IRIS Database]
<b>Rulemaking Type:</b> Scientific Assessment (non-regulatory)	<b>Regulatory Agency:</b> U.S. Environmental Protection Agency

**Summary:** On 28 September 2011, the U.S. Environmental Protection Agency (EPA) released the final health assessment for [trichloroethylene](#) (TCE) to the [Integrated Risk Information System](#) (IRIS) database. IRIS is an EPA program that evaluates emerging human health risk information regarding effects from exposure to environmental contaminants. This final assessment characterizes TCE as carcinogenic to humans. Cancer risks and non-cancer health hazards are listed as a concern in humans at lower levels than previously indicated. The final assessment posted on the IRIS website provides revised oral and inhalation toxicity values, which are used to assess human health risks and to evaluate appropriate response actions under several regulatory programs.

**Potential Impacts to NASA:** The final TCE toxicity values as reported in the assessment and now included in the IRIS database will be considered in the following:

- Developing appropriate regulatory standards limiting atmospheric emissions of TCE, which could affect how and where TCE can be used
- Revising EPA's maximum contaminant level (MCL) for TCE
- Evaluating exposure pathways of concern and estimating risks for sites where TCE has been identified as a contaminant
- Establishing site cleanup methods and risk management decisions
- Assessing and mitigating the risk from vapor intrusion as TCE vapors move from contaminated groundwater and soil into the indoor air of overlying buildings

Impact on Site Cleanup

NASA sites at which TCE is detected in environmental media (soil, soil gas, groundwater, surface water, and sediment) potentially are affected by this final health assessment, including the following:

- Superfund (Comprehensive Environmental Response, Compensation, and Liability Act [CERCLA]) sites
- Resource Conservation and Recovery Act (RCRA) sites
- State-led and voluntary cleanup sites

Future regional screening levels (RSLs) for TCE could be between 2 to 10 times lower than current RSLs, depending on the media and type of health risk (cancer or non-cancer), and indicates that cleanup levels for TCE in soil and groundwater could become more stringent. The number of sites requiring cleanup might increase and there is a potential for closed sites to be re-opened. The length of time to achieve site closure might increase and the estimated cost to complete a site closure also might increase.

Impact on Assessing and Mitigating the Vapor Intrusion Pathway

NASA sites that have groundwater and subsurface soil contaminated with TCE potentially are affected by this final health assessment. The final inhalation cancer and non-cancer toxicity values are 2 times and 5 times more toxic, respectively, than the California Environmental Protection Agency (CalEPA) toxicity values listed in the current RSL Table (EPA, June 2011).

Impact on Other Regulatory Standards or Criteria

The final assessment eventually could result in a lower MCL (Safe Drinking Water Act) and lower air standards under the Clean Air Act. Generally it takes several years to affect MCLs once the IRIS health assessment process is complete, and it is difficult to predict how or if the MCL will change. It is possible the MCL might be reduced from 5 to 1 or 2 micrograms per liter (µg/L). The potential impact on air standards is unclear.

## Background

TCE is a chlorinated solvent that has been used widely as a metal degreaser, as a precision cleaner and verification solvent, as a chemical intermediate and extractant, and as a component of some consumer products. TCE is designated as a hazardous air pollutant, is a common groundwater contaminant, and has been found at more than 1,500 hazardous waste sites across the United States. TCE enters the atmosphere from vapor degreasing and other cleaning operations or volatilization from contaminated soils, surface waters via direct discharges, and groundwater through leaching from disposal operations and hazardous waste sites. In addition, TCE can be released to indoor air from the use of TCE-containing consumer products, volatilization from water supplies, and vapor intrusion through walls and floors from contaminated soil and groundwater.

In 2001, EPA issued a draft reassessment of the health risks associated with TCE. This report concluded TCE posed a more significant human health risk than previous studies had indicated. After considerable comment and review from the public, affected parties, federal agencies, and the National Academies of Sciences, in 2009, EPA issued an external review draft of the IRIS toxicological review of TCE using data from the most recent toxicity studies. The 2009 draft document, which provided scientific support and rationale for revised cancer and non-cancer chronic toxicity values, identified TCE as "carcinogenic to humans" by all routes of exposure. Key points about the final toxicity values for TCE are discussed in the following text.

### Final Cancer Toxicity Values

According to the information presented in the final health assessment, the IRIS database has been updated to include revised oral and inhalation cancer toxicity values for TCE:

- The cancer toxicity values for TCE are based on the increased risks of kidney cancer, liver cancer, and non-Hodgkins lymphoma.
- Children potentially have increased sensitivity to the kidney cancer effects of TCE exposure (TCE is considered an "early-life exposure" carcinogen for kidney cancer).
- The final oral cancer and inhalation cancer toxicity values are 8 times higher (that is, 8 times more toxic) and 2 times higher, respectively, than the CalEPA toxicity values listed in the current RSL Table (EPA, June 2011). The RSLs have been used as the starting point when developing cleanup standards for Superfund sites. Inhalation is the most important exposure pathway for TCE.
- EPA might replace the CalEPA-based RSL values with these revised IRIS-based cancer slope factors in future revisions to the RSL Table.

### Final Non-cancer Toxicity Values

No non-cancer oral toxicity factor for TCE previously was available from EPA, although an inhalation non-cancer toxicity value was available. The IRIS database has been updated to include a final oral non-cancer toxicity value as well as the revised inhalation non-cancer toxicity value for TCE:

- The non-cancer toxicity values are based on the most sensitive adverse effects observed from exposure to TCE in laboratory animals.
- The critical adverse effects considered in developing the non-cancer toxicity values were heart malformations and immune system effects.

The final inhalation toxicity value is 5 times lower (that is, 5 times more toxic) than the value in the current RSL Table, obtained from the New York State Department of Health (EPA, June 2011).

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### Additional Information:

New IRIS Summary for Trichloroethylene (TCE): <http://www.epa.gov/iris/subst/0199.htm>

New TCE Toxicological Review: <http://www.epa.gov/iris/supdocs/0199/index.html>

Interagency Science Discussion Draft of the Trichloroethylene IRIS Assessment: [http://cfpub.epa.gov/ncea/iris\\_drafts/recordisplay.cfm?deid=237625](http://cfpub.epa.gov/ncea/iris_drafts/recordisplay.cfm?deid=237625)

National Toxicology Program profile on TCE: <http://ntp.niehs.nih.gov/ntp/roc/twelfth/profiles/Trichloroethylene.pdf>

Agency for Toxic Substances and Disease Registry (ATSDR) TCE Profile: <http://www.atsdr.cdc.gov/substances/toxsubstance.asp?toxid=30>

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