TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

Answers to Common Questions: TCEQ Toxicity Factors and Protection of Human Health

What are AMCVs and ESLs?

Air Monitoring Comparison Values (AMCVs) and Effects Screening Levels (ESLs) are screening levels for ambient air set to protect human health and welfare.

AMCVs:

- AMCV is a collective term for chemical-specific short- and long-term air concentrations used to evaluate air monitoring data.
- AMCVs are set to protect human health and welfare.
- Health-based AMCVs are safe levels at which exposure is unlikely to result in adverse health effects.
- The TCEQ long-term AMCVs are similar to the U.S. EPA's inhalation reference concentrations.
- AMCVs are used by the TCEQ to determine if there is a potential concern, which would trigger a more in-depth review and focus of agency resources, such as in areas on the Air Pollutant Watch List (APWL).

ESLs:

- ESLs are chemical-specific air concentrations set to protect human health and welfare and are used for air permitting.
- Health-based ESLs are set 70 percent lower than the safe level, or AMCV.
- This additional buffer allows the TCEQ to take into account exposure to chemicals from multiple sources in air permit reviews.
- ESLs are used to establish maximum emission rates that are written into enforceable air permits.

Are AMCVs and ESLs standards?

No!

AMCVs and ESLs are screening levels used to evaluate air monitoring data and air permits, respectively.

Are AMCVs and ESLs health protective?

Yes!

- The TCEQ has developed state-of-the-science guidelines for developing toxicity factors, which have undergone scientific peer review and two rounds of public comment. We also publish our work in the peer-reviewed scientific literature.
- ESLs and AMCVs are designed to prevent adverse health effects, including but not limited to cancer, respiratory diseases, and eye and respiratory irritation for all members of the population.
- These levels and values are set sufficiently below a level expected to cause adverse health effects so that, even when concentrations of a contaminant are somewhat above the ESL or AMCV, adverse health effects are not expected. Therefore, an exceedance does not necessarily mean that an adverse health effect is expected, but rather that an in-depth review is needed.
- The TCEQ guidelines follow standard scientific methods commonly used by other agencies, including the U.S. EPA, to develop up-to-date toxicity factors.
- The TCEQ guidelines were developed, in large part, in response to public demand for the most scientifically defensible screening values available.
- Differences may exist between TCEQ screening levels and comparable values from other agencies due mainly to selection of more current studies, different data sets, evaluation of different exposure durations and interpretation of dose-response data, science policy, and the analytical and statistical tools used. The methods used may differ as well.

Different values, regardless of whether they are higher or lower, are health protective and scientifically defensible.

- Development-support documents outline the scientific basis and steps taken to develop toxicity factors. The DSDs are published on the TCEQ's website at <www.tceq.state.tx.us/toxicology>.
- Values developed by the TCEQ are used by other states and countries—for example, Wisconsin, Canada (Ontario, British Columbia, and Calgary), etc.

Why have some of the AMCVs and ESLs changed?

Occasionally, when new scientific data, more recent methods, or both become available, AMCVs and ESLs can change. The new values are scientifically valid and are generally more health-based. Updated values, regardless of whether they are higher or lower than the previous values, are health protective and scientifically defensible.

Benzene

- The 2007 benzene DSD underwent public comment, and documents the most recent scientifically defensible benzene values available.
- The TCEQ unit risk estimate used to develop the benzene long-term screening level falls within the range the U.S. EPA has calculated, "within which any calculated unit risk estimate would have equal scientific validity" (EPA).
- The previous long-term screening level (1 ppb) for benzene was much less scientifically based. It was derived by dividing

an occupationally acceptable level (OSHA TWA PEL of 1 ppm) by 1,000 (i.e., not through a state-of-the science dose-response assessment).

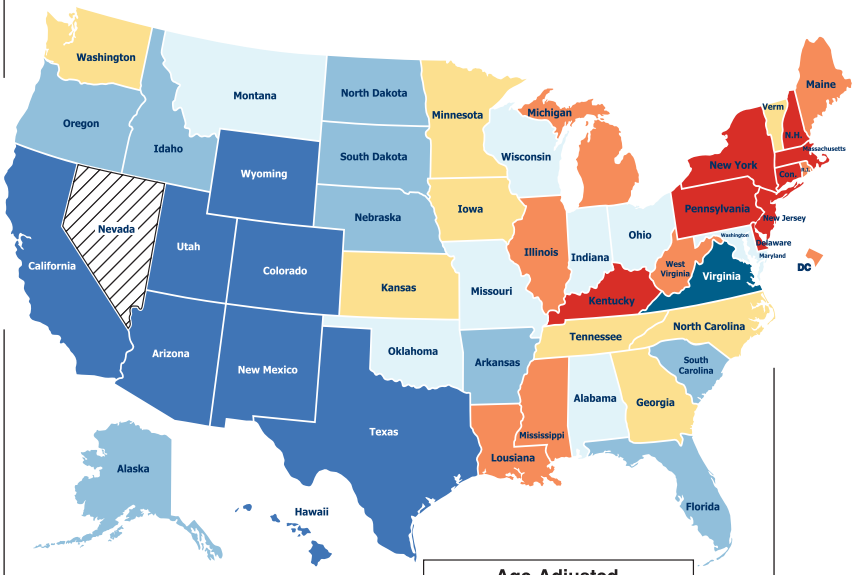
- The 2007 long-term screening level for benzene (1.4 ppb) is the product of using the TCEQ's state-of-the-science guidelines.

Do Texans have more cancer or asthma than the rest of the country?

No! Available data indicate that Texans have no more, or less, cancer and asthma than many other states, and the nation as a whole, even though Texas has more industry than any other state. (It is important to note, the environment is only one factor that may contribute to adverse health outcomes.)

- According to the Surveillance, Epidemiology, and End Results Program (SEER), statewide incidence cancer rates in Texas from 2007 through 2011 were among the lowest in the United States.

Incidence Rates[1] for the United States, 2007-2011
All Cancer Sites, All Races, Both Sexes, All Ages



Notes:
Data for the United States does not include data from Nevada.
State Cancer Registries may provide more current or more local data.
Data presented on the State Cancer Profiles Web Site may differ from statistics reported by the State Cancer Registries.
*[1] Incidence rates (cases per 100,000 population per year) are age-adjusted to the 2000 US standard population (19 age groups: ,1, 1-4, 5-9, ..., 80-84, 85+). Rates are for invasive cancer only (except for bladder which is invasive and in situ) or unless otherwise specified. Rates calculated using SEER*Stat. Population counts for denominators are based on Census populations as modified by NCI. The 1969-2012 US Population Data File is used for SEER and NPCR incidence rates.*
[2] Data not available for this combination of geography, statistic, age and race/ethnicity.

Surveillance, Epidemiology, and End Results Program (SEER)

Age-Adjusted Annual Incidence Rate (Cases per 100,000)

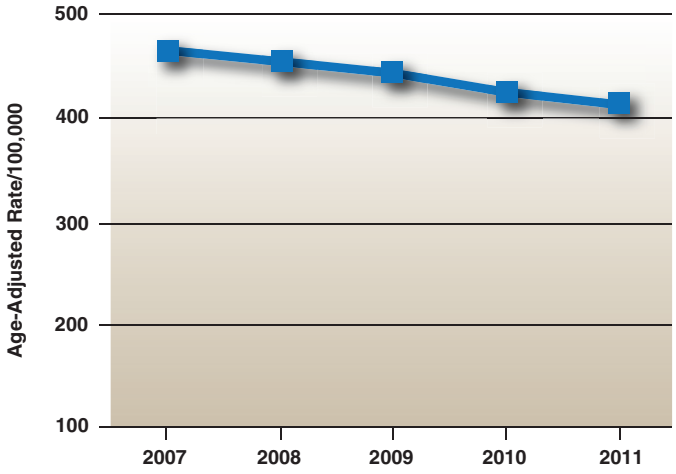
QUANTILE INTERVAL

- 491.2 to 512.5
- 475.6 to 491.2
- 463.3 to 475.6
- 455.9 to 463.3
- 439.9 to 455.9
- 392.3 to 439.9
- Data Not Available[2]

US (SEER + NPCR) Rate (95% C.I.) 459.8 (459.4 - 460.1)

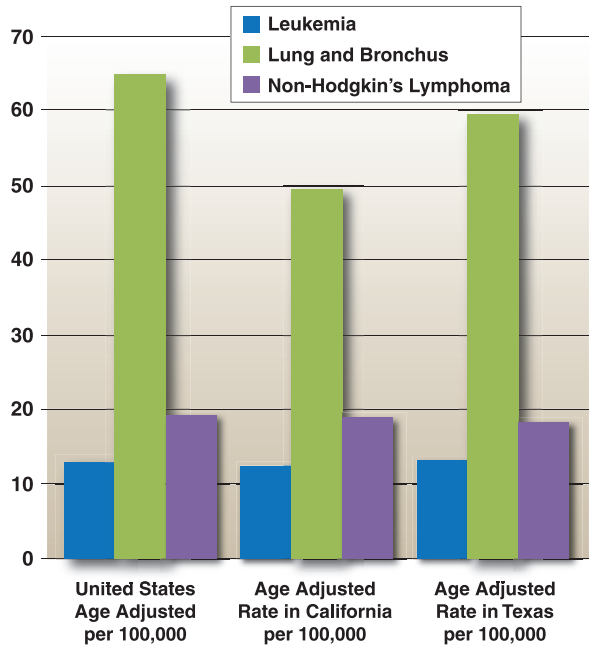
- According to the Texas Cancer Registry, statewide incidence cancer rates in Texas have demonstrated a slight decreasing trend from 2007 through 2011 (the most recent rates currently available).

Cancer Incidence in Texas, 2007-2011



- From 2007 through 2011, Texas' combined age-adjusted rates per 100,000 for leukemia, lung and bronchial cancers (not adjusted for smoking), and non-Hodgkin's lymphoma were similar to those of California and the overall United States.

2007-2011 Age Adjusted Cancer Rates per 100,000



- According to the Air Pollution and Respiratory Health Branch of the CDC, 2012 prevalence rates of lifetime asthma in Texas were among the lowest in the United States.

Notes:
Ranges are based on quintiles of the overall prevalence estimates from year 2011 data

Air Pollution and Respiratory Health Branch, National Center for Environmental Health Centers for Disease Control and Prevention

< 12.3% | 12.3% — < 13.4% | 13.4% — < 14.0% | 14.0% — < 15.0% | 15.0%+

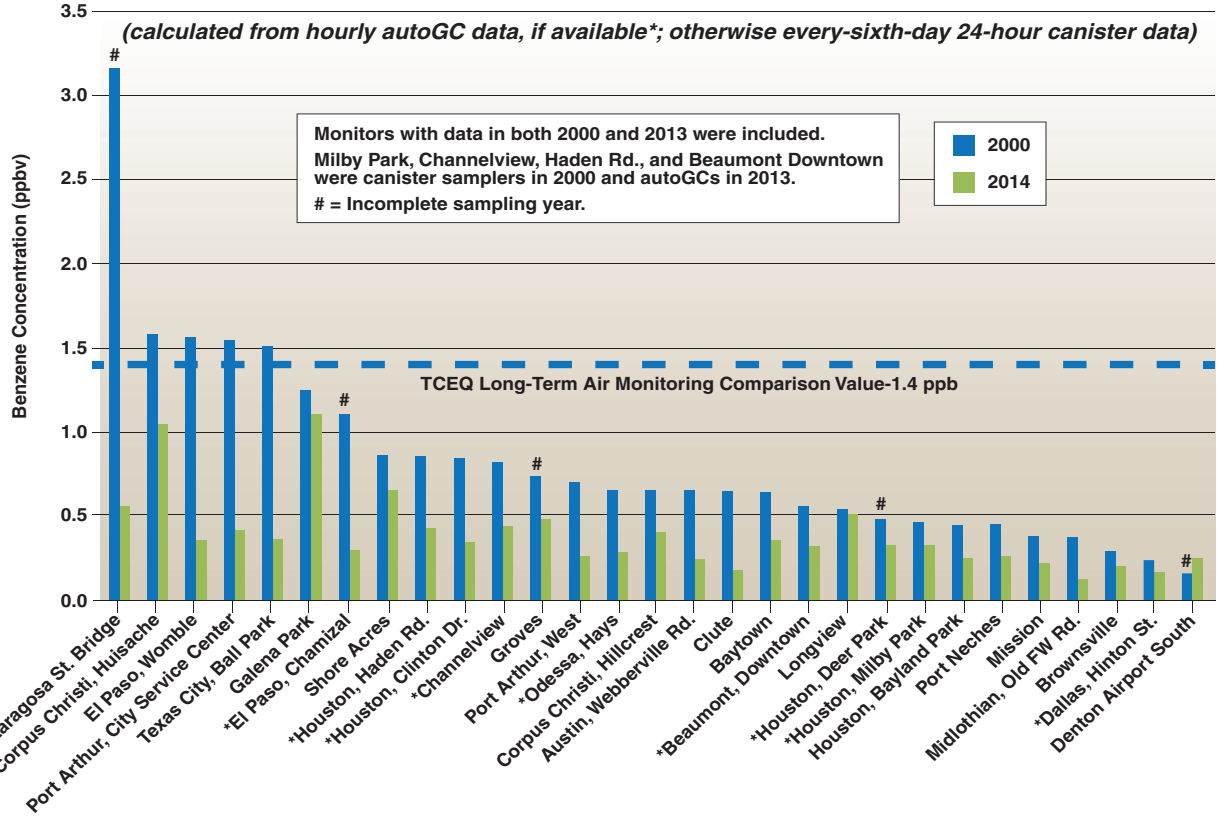
Has an increase in some AMCV or ESL values resulted in increased air concentrations?

No!

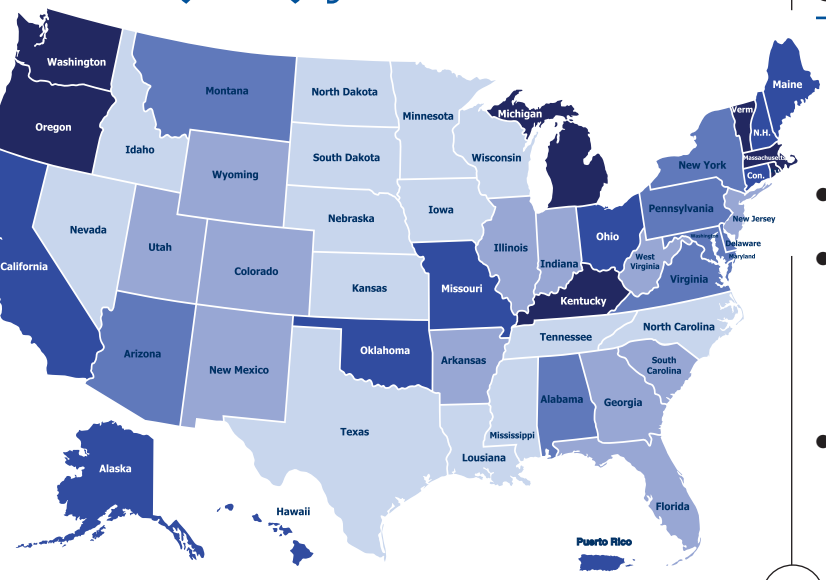
Benzene

- Benzene is released into the air by a variety of sources (for example, industry, automobiles, lawn mowers, etc.), and is one of the most widely monitored air toxics due to its ability to cause cancer (for example, in workers occupationally exposed daily to very high levels).
- Since 2010, all monitors in Texas have had annual average benzene concentrations below the state's long-term AMCV.
- From August 2013 through August 2014, all monitors in Texas had annual average benzene concentrations below the state's long-term AMCV.
- Over 90 percent of the monitors operating from 2000 through 2014 (29 total across the state) showed a decrease in annual average concentrations of benzene. In 2014, all monitors in Texas had annual average benzene concentrations below the state's long-term AMCV.

Annual Average Benzene Concentration at Texas Monitors Active in 2000 and 2014



Adult Self-Reported Lifetime Asthma Prevalence Rate (Percent) by State: BRFSS 2012



What is the process for changing AMCV and ESL values?

As new scientific data and more recent methods become available, AMCVs and ESLs may change to reflect the latest available science.

- As part of this process, the public has the opportunity to submit comments on DSDs.
- In addition, the TCEQ welcomes submission of data and proposed revisions from anyone. All data and proposals received by the agency are evaluated based on their scientific and technical merit. The agency may incorporate comments into DSDs that increase the scientific and technical merit of the chemical-specific AMCVs or ESLs.
- Toxicology e-mail alerts are a TCEQ service to keep the public informed of news and changes to our programs. To sign up to receive e-mail alerts related to the ESL List or the AMCV List, and other TCEQ Toxicology announcements, visit <www.tceq.texas.gov/toxicology/announcements>.

What are external experts saying about Texas guidelines?

Various other state and federal agencies have contacted the TCEQ to find out about our guideline levels, and have complimented our work as state of the science.

Wisconsin—*DNR Report to the Natural Resources Board: Silica Study* (August 2011)

- "In addition to its non-cancer benchmarks, TCEQ is the only air agency in the US that has established a cancer-based health benchmark for ambient air exposures to crystalline silica."
- "Among the states surveyed, Texas has the most comprehensive approach to controlling silica emissions."

Ontario—*Ministry of the Environment Science Discussion Document on the Development of an Air Standard for 1,3-Butadiene* (December 2008)

- "Of the risk assessments and unit risk estimations conducted by these jurisdictions examined, the dose-response analyses and quantitative risk analyses conducted by the TCEQ and NCSAB are preferred over those conducted by the Environment Canada/Health Canada and the US EPA for the selection of improved exposure estimation by the former jurisdictions. The TECQ provided detailed supporting documentation for its risk analyses and unit risk derivation. The TCEQ evaluation has been intensively peer-reviewed by an independent scientific organization and provided the most up-to-date evaluation of the cancer risks from 1,3-butadiene exposures. The unit risk estimate derived by the NCSAB is in close agreement with that developed by the TCEQ and therefore lends credibility to the inhalation cancer risk estimate reported by the TCEQ."

Peer-Reviewer Comments

U.S. EPA—Methods to Develop Inhalation Cancer Risk for Chromium and Nickel Compounds

- Of three independent reviewers, two suggested using the unit risk estimate derived by the TCEQ rather than the one derived by the Integrated Risk Information System (IRIS); the third author did not comment on alternative approaches.

2012 Update to TCEQ Guidelines for Developing Toxicity Factors

- "To the best of my knowledge, this guidance is complete and thorough, even exhaustive, in its coverage of relevant guidance on development of toxicity criteria available in the United States and Europe."
- "This reviewer was impressed that, for example, even reports that have not been adequately implemented by the originating Agency, such as EPA's …, have been cited, discussed accurately and implementation thoughtfully proposed. The point-by-point analysis and examples … are, in my judgment, more helpful and clearer than those offered by the originating agency. This reviewer further opines that risk assessors utilizing this guidance will finish with products that are more transparent and more internally consistent than they would be by attempting to apply much of the existing EPA guidances."
- "A Final Word: The authors really should speak with a book publisher about using this guidance as the basis for assembling a textbook to train risk assessors."

How qualified are TCEQ toxicologists to do their jobs?

Extremely!

- The TCEQ's toxicology staff consists of nine Ph.D.- and five master's-level scientists, including three certified by the American Board of Toxicology. Two are also OSHA HAZWOPER certified.
- The Toxicology staff collectively has over 150 years of scientific experience.
- The Toxicology Division has participated in several collaborative research projects:
  - Hillcrest Community Environmental Investigation, October 2012.
  - Midlothian, TX, Ambient Air Collection and Analytical Chemical Analysis, July 2010.
  - Houston Exposure to Air Toxics (HEATS), October 2009.
  - Houston Air Toxics Biomarkers of Exposure Study, December 2009.
  - Air Pollutant Concentrations Near Texas Roadways, August 2007.
- TCEQ toxicologists often participate in national workshops and serve on expert panels and are often invited to present at well-respected conferences and events.
- Several TCEQ toxicologists have received prestigious awards and honors throughout their careers.
- TCEQ toxicologists have written and cowritten research articles on a wide variety of toxicological subjects in a number of scientific journals.

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