United States Environmental Protection Agency

For help accessing this document, email NEI_Help@epa.gov

Clean Air Act NESHAP Assessment

International Emissions Inventory Conference
Seattle, WA

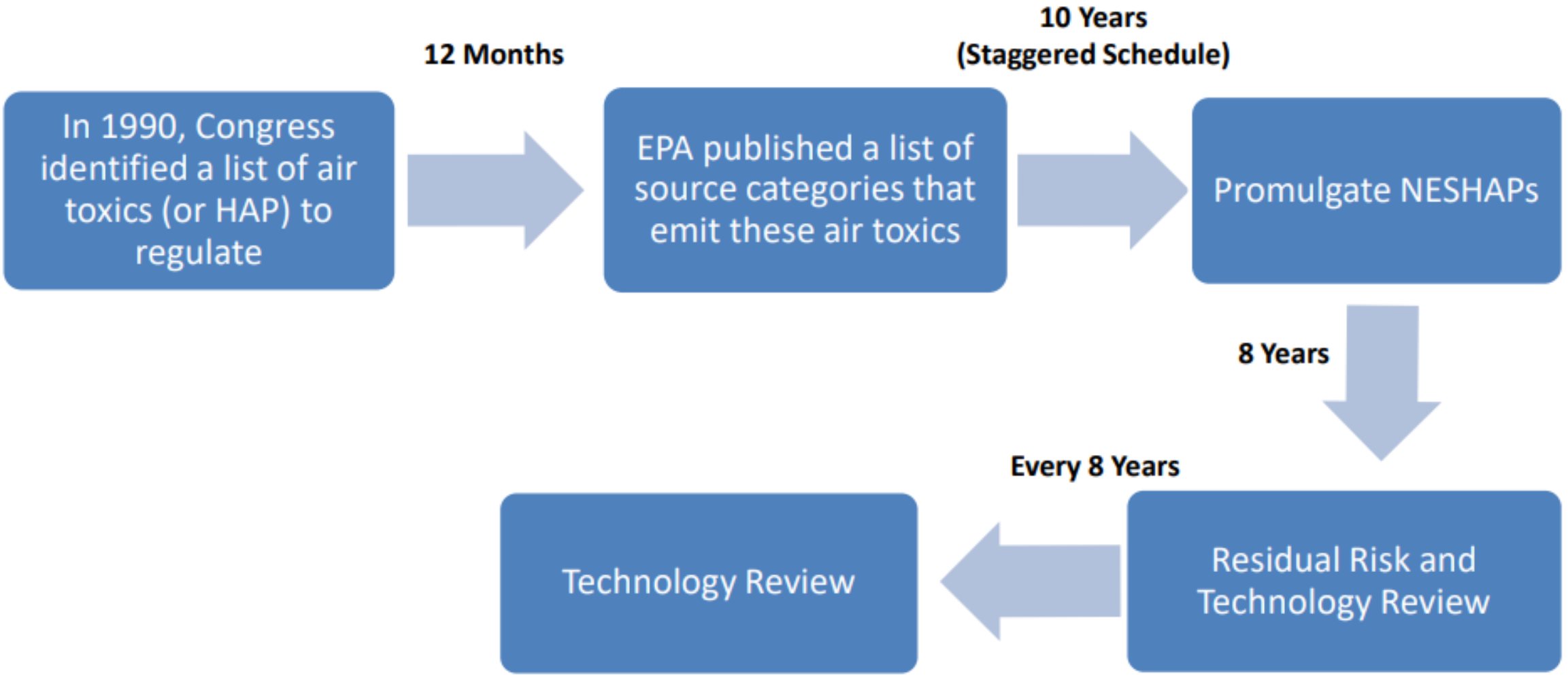
September 28, 2023

Presentation by Brian Shrager, U.S. EPA, and Stacie Enoch, Eastern Research Group

Overview

- Clean Air Act Section 112 Rulemaking
- Risk and Technology Review
- CAA NESHAP Assessment Analysis
  - Overview
  - Methodology
  - Summary of Results
- Conclusions
- References
- Acknowledgements

CAA Section 112 Rulemaking



Risk and Technology Review

- CAA section 112: Includes requirements for reviewing, and amending if required, all completed National Emission Standards for Hazardous air Pollutants (NESHAPs)
  - CAA section 112(f): Requires EPA to assess risk remaining (*i.e.*, residual risk) within eight years after promulgating maximum achievable control technology (MACT) standards.
    - Applies only to categories subject to MACT standards (does not apply to generally available control technology (GACT) standards).
    - Residual risk assessment is one-time requirement.
  - CAA section 112(d)(6): Requires EPA to review and revise all NESHAPs as necessary (taking into account developments in practices, processes, and controls), and applies to MACT and GACT.
    - Must be conducted every eight years.
  - Residual risk review and initial technology review conducted concurrently.
- RTRs amend existing standards or justify why changes are not required

CAA NESHAP Assessment - Overview

Analyze	Analyze trends in mass emissions and cancer toxicity weighted emissions prior to rule implementation, through RTRs, to 2020 NEI.
Identify	This work will help to identify rules that have effectively reduced emissions and rules that have been less effective.
Assess	In addition, results can be used to assess HAP emission reductions achieved through both the technology-based MACT standards and the required residual risk and technology reviews.

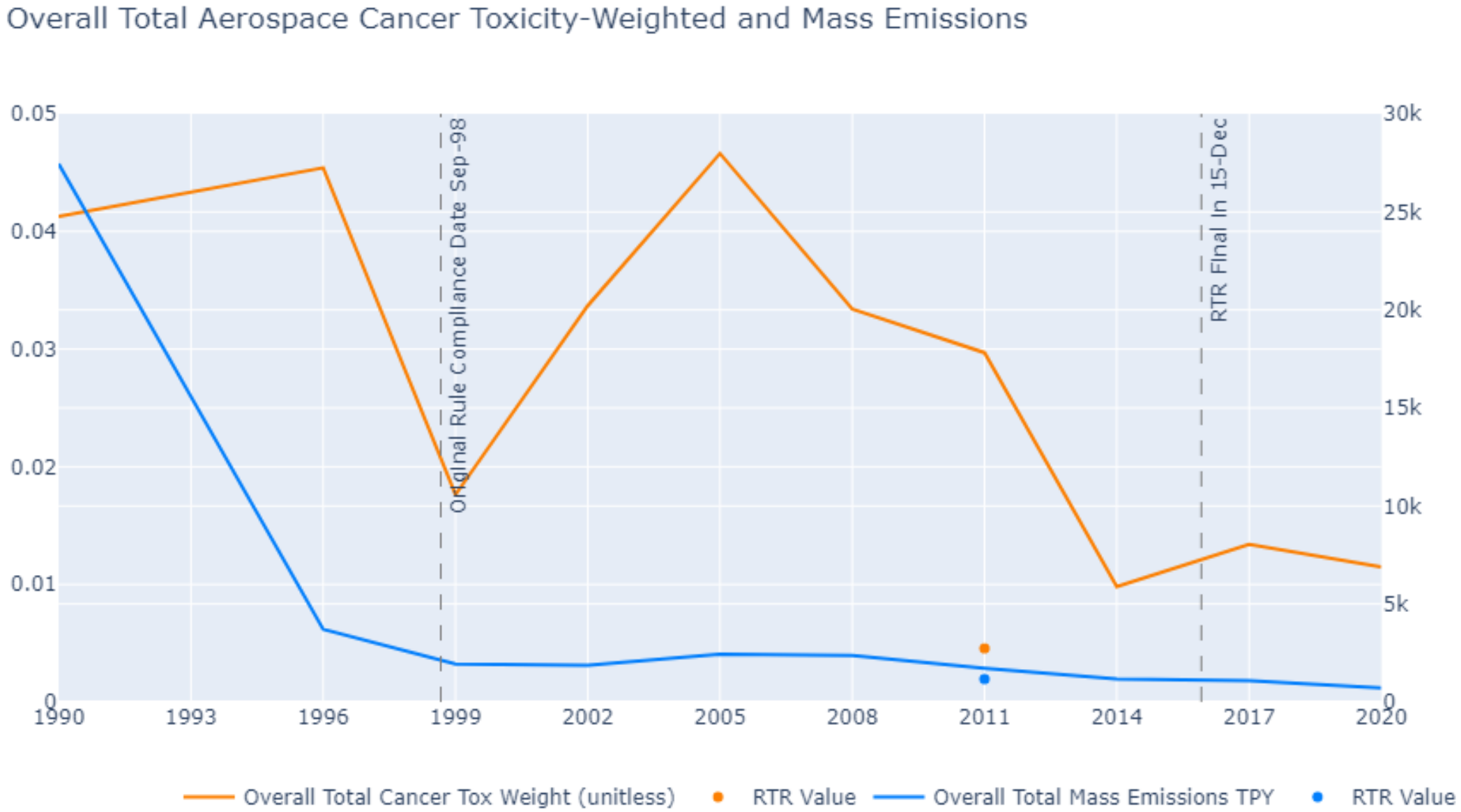
CAA NESHAP Assessment

Methodology

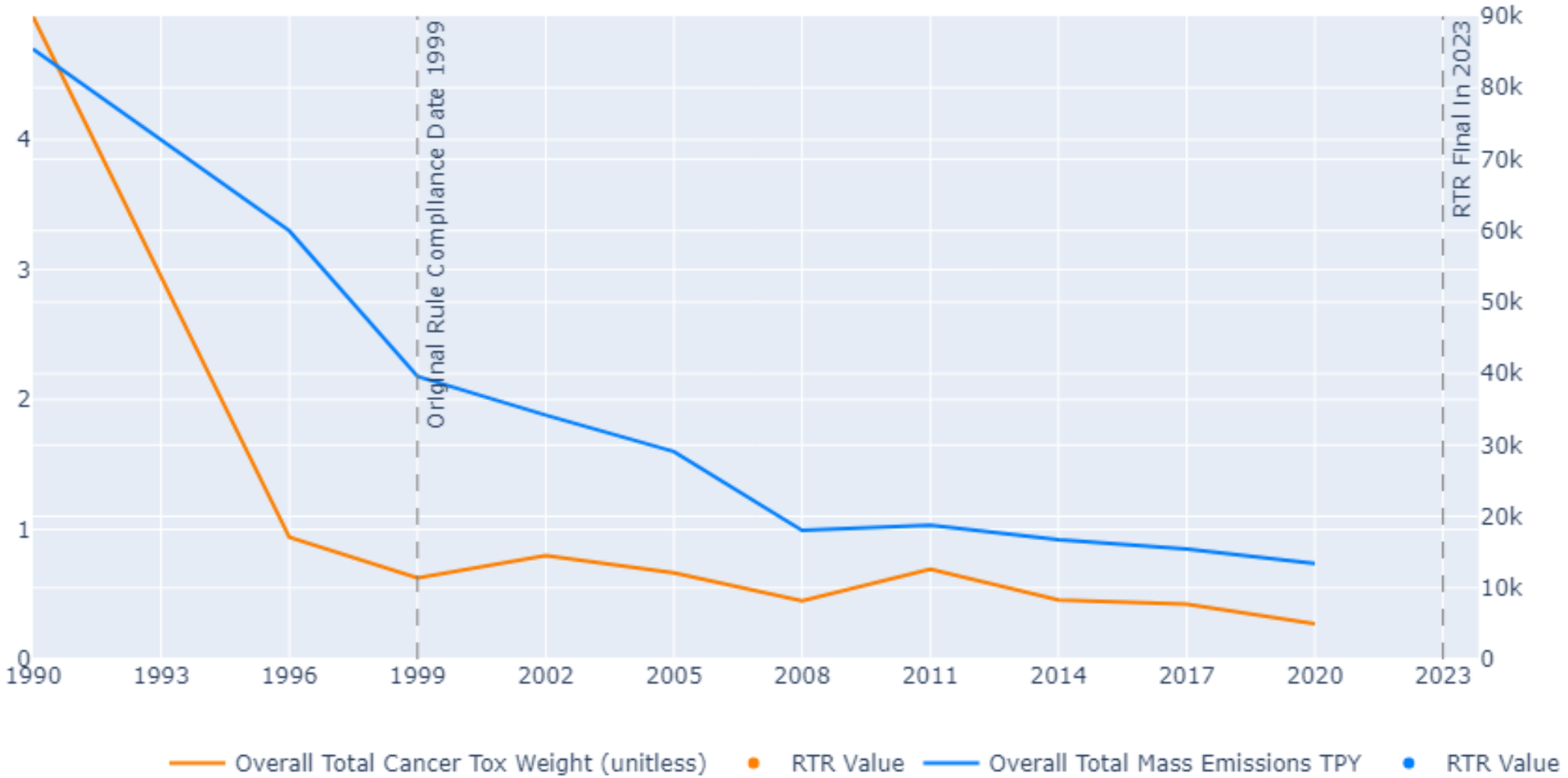
- Selected a list of source categories that have completed or proposed RTRs.
- Used rulemaking risk modeling files to compile facility lists.
- Mapped modeling file facility IDs to NEIs (1990, 1996, 1999, 2002, 2005, 2008, 2011, 2014, 2017, and 2020 base years).
  - Source categories that relied on “model plant” emissions or emissions data that are not readily available in NEI were excluded.
- Compiled inventory emissions and applied current chromium speciation profiles, WHO TEFs for dioxins/furans, and UREs to all base years to estimate cancer toxicity weighted emissions.

Comparison of Mass and Cancer Toxicity-Weighted Emissions: Results Summary

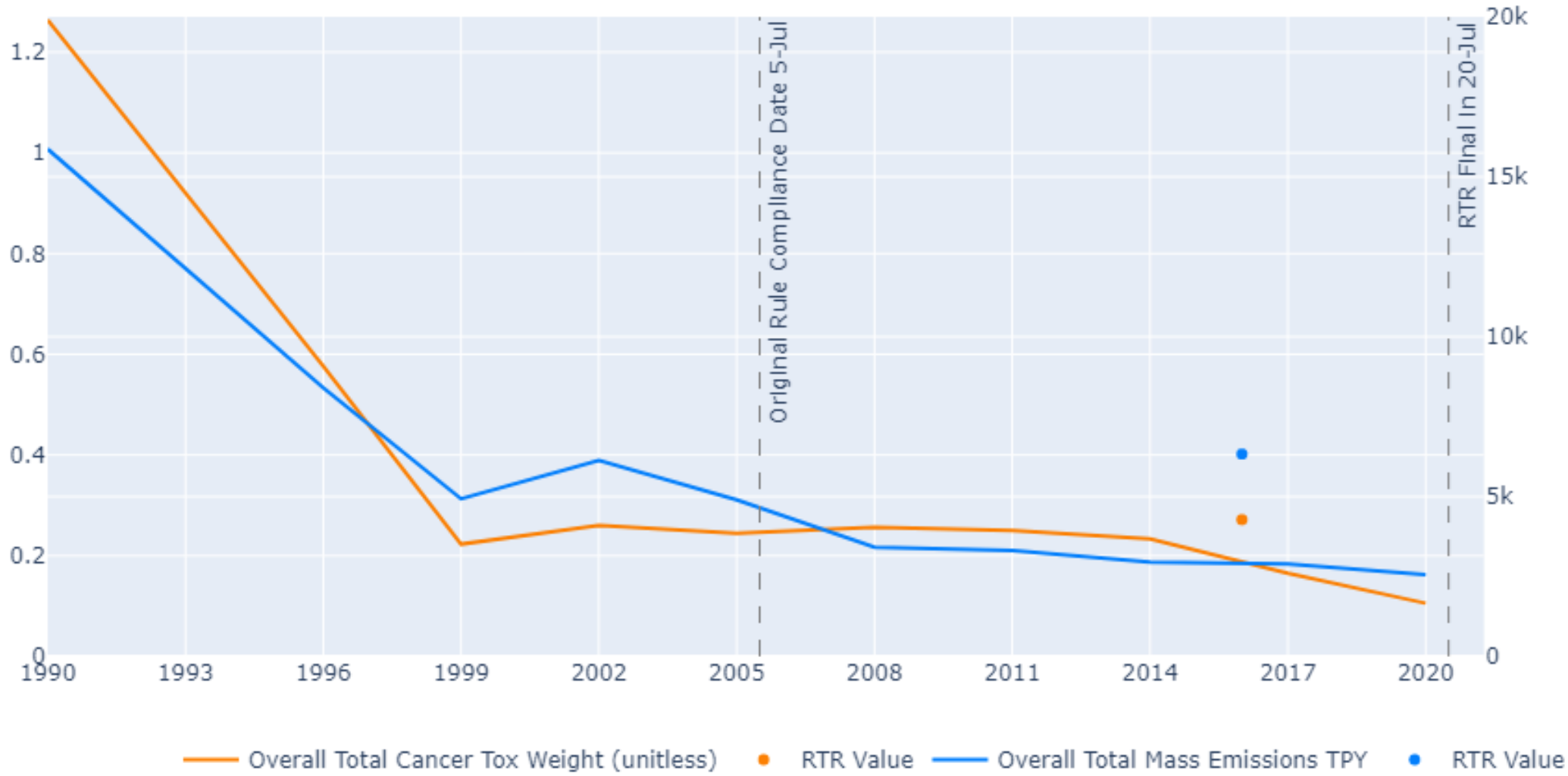
Category	Mass Emissions (tpy)		% Change in Mass Emissions	Original NESHAP Estimated HAP Reductions (Percentage)	Cancer Toxicity-Weighted Emissions		% Change in Tox-Weighted Emissions
	1999	2020			1999	2020	
Aerospace	1,944	724	-63%	-59%	1.76E-02	1.15E-02	-35%
HON	39,573	13,403	-66%	-88%	6.26E-01	2.75E-01	-56%
Ethylene Production	4,932	2,556	-48%	-60%	2.23E-01	1.06E-01	-53%
MATS	351,758	7,032	-98%	-74% Hg -88% HCl	1.62E+00	7.93E-01	-51%
Metal Can	351	40	-89%	-70%	1.38E-04	1.63E-04	18%
Metal Coil	2,625	957	-64%	-53%	2.77E-01	3.48E-03	-99%
MON	29,664	11,381	-62%	-69%	5.89E-01	2.00E-01	-66%
Plywood and Composite Wood	18,153	6,349	-65%	-58%	1.33E+00	2.02E-02	-98%
Petroleum Refineries	30,914	8,597	-72%	-59% for 1998 compliance; -87% for 2005 compliance	2.84E+00	5.39E-02	-98%
Portland Cement	4,270	1,960	-54%	-8.3 tpy for 2013 compliance	7.34E-02	1.17E-02	-84%
Primary Aluminum	5,283	2,045	-61%	-47% (total fluorides)	1.43E+00	1.19E-02	-99%
Pulp and Paper	123,100	26,628	-78%	-38%	5.54E-01	2.31E-02	-96%
Secondary Lead	278	64	-77%	-1411 tpy	1.40E-02	1.82E-03	-87%
Taconite	894	524	-41%	-43%	3.77E-02	2.39E-02	-37%



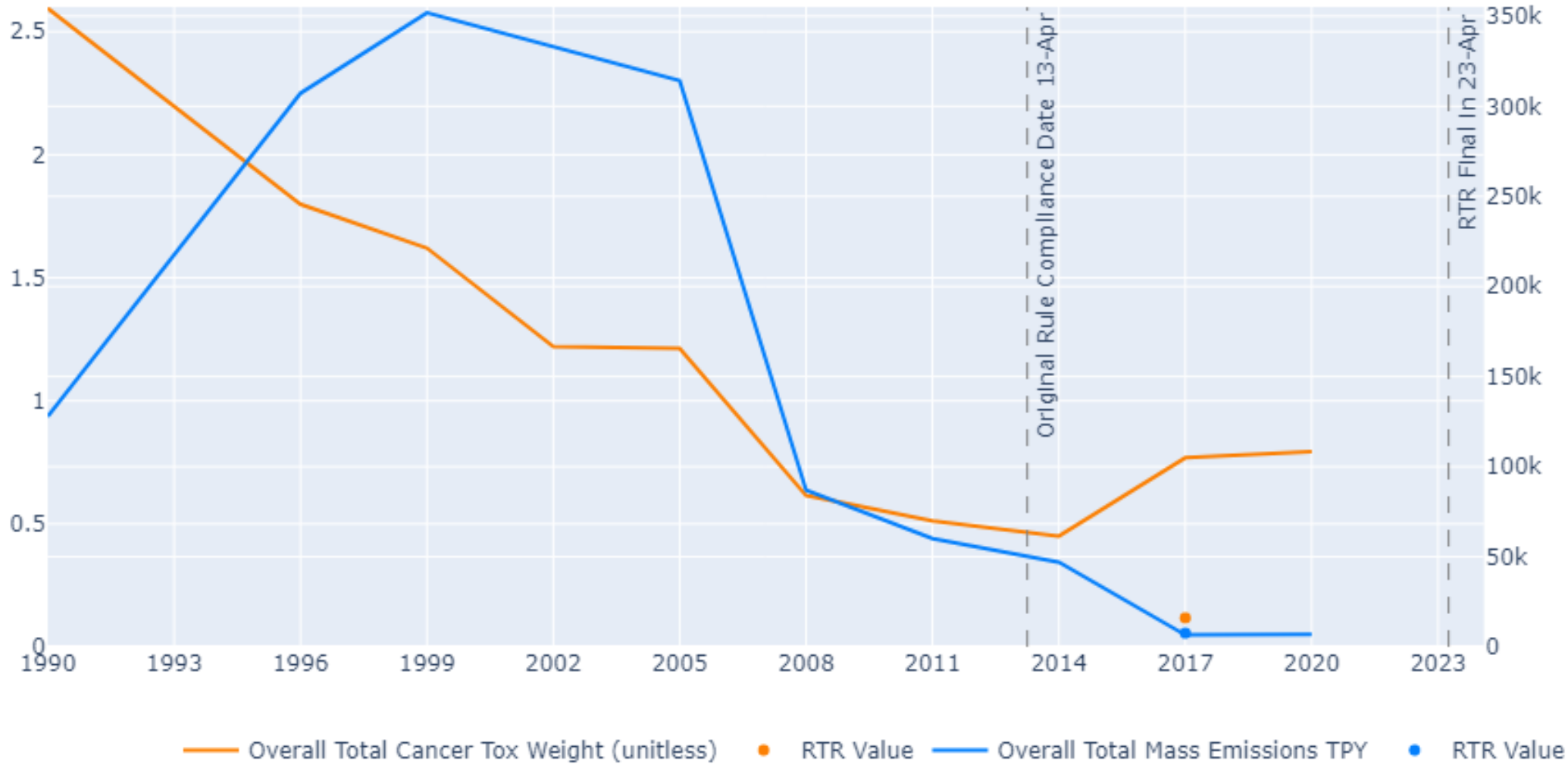
Overall Total HON Cancer Toxicity-Weighted and Mass Emissions

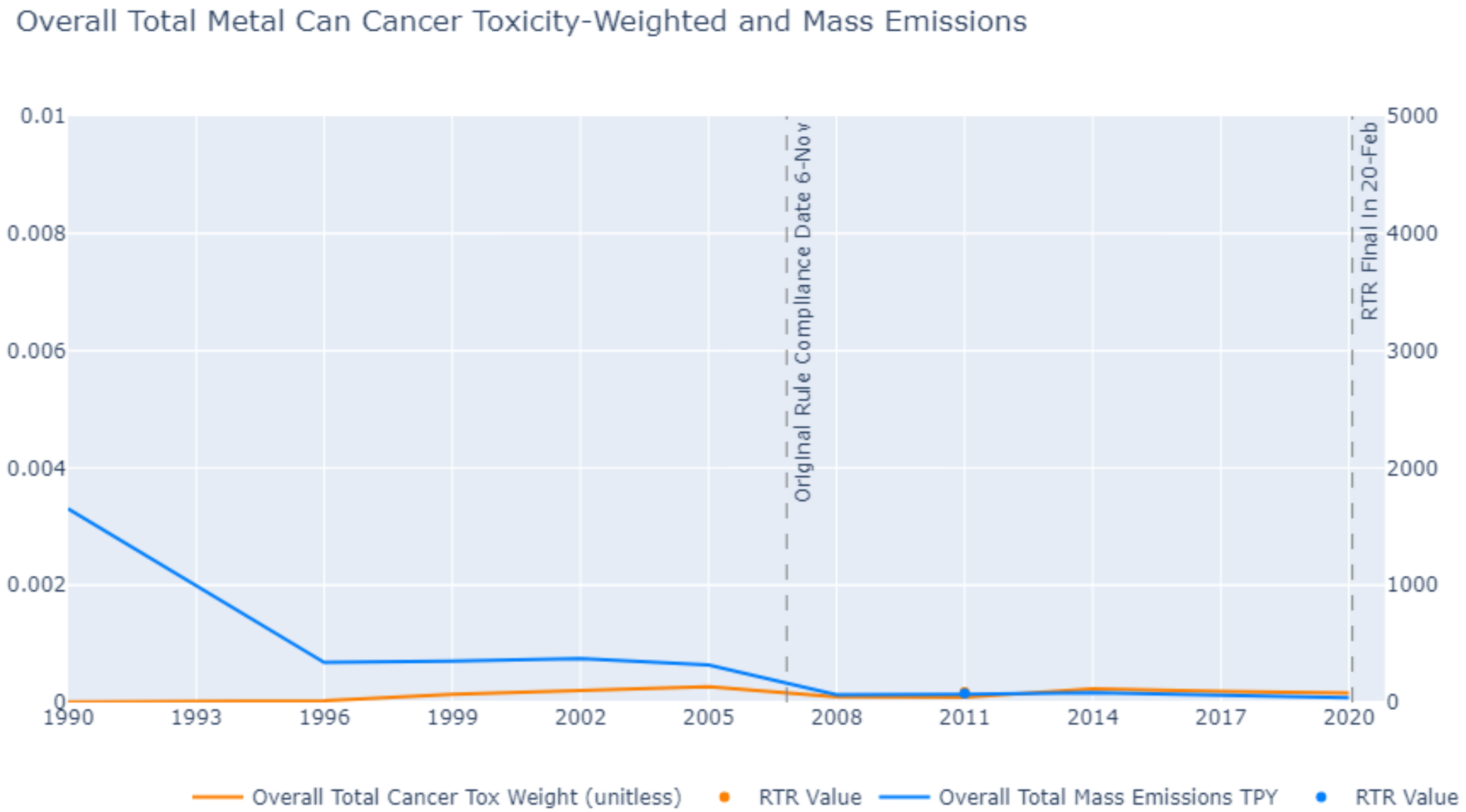


Overall Total Ethylene Production Cancer Toxicity-Weighted and Mass Emissions

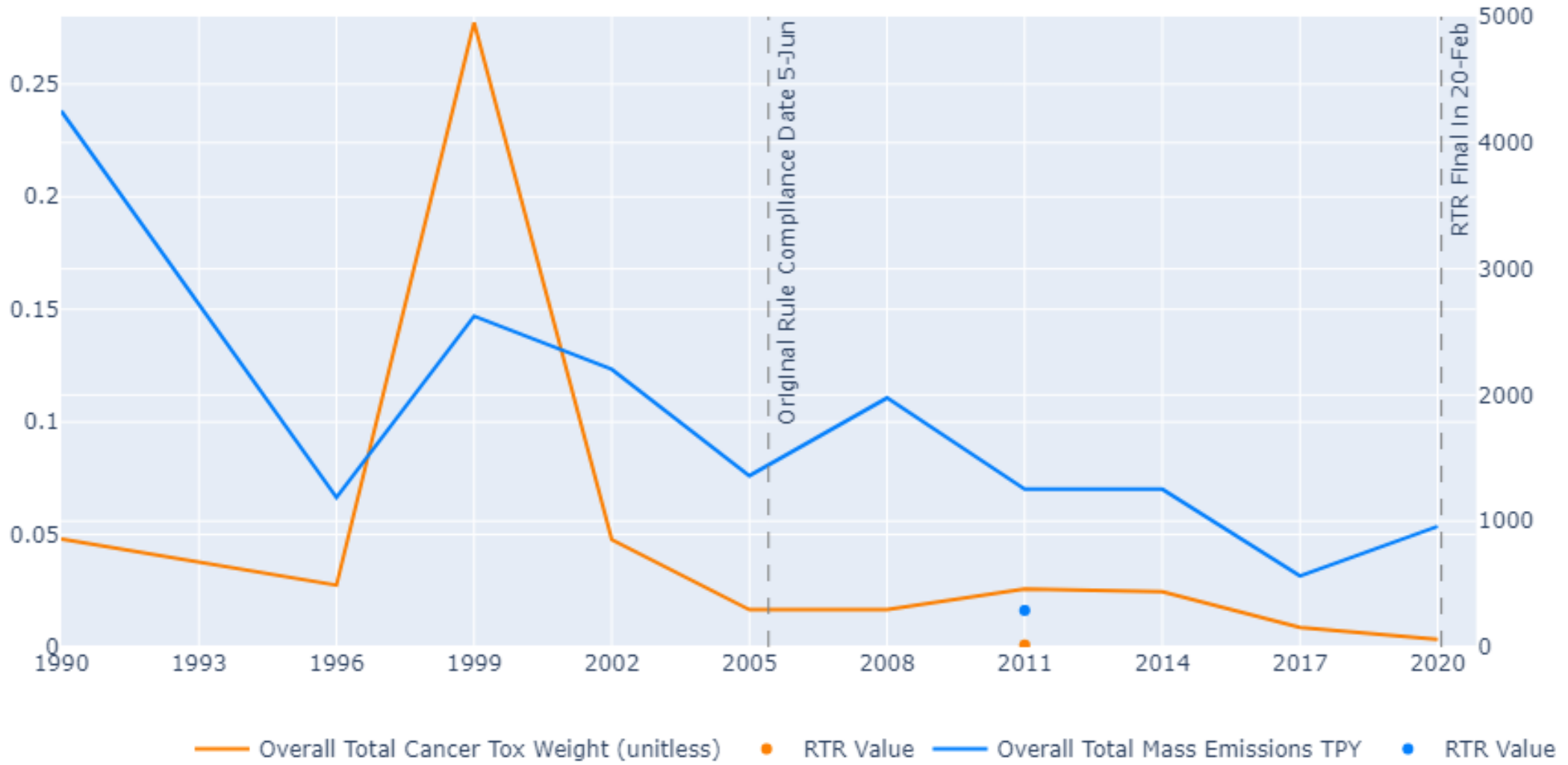


Overall Total MATS Cancer Toxicity-Weighted and Mass Emissions

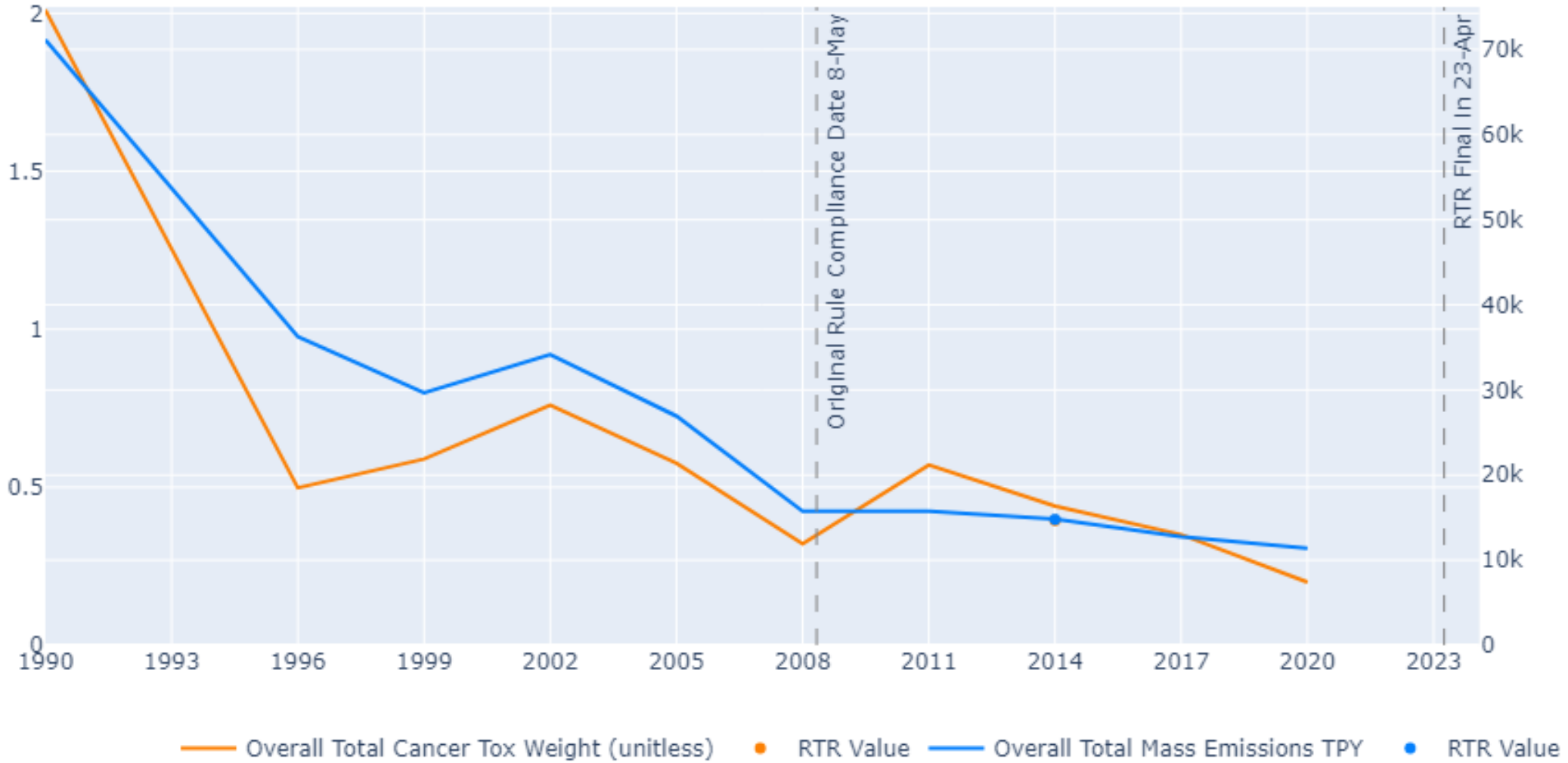


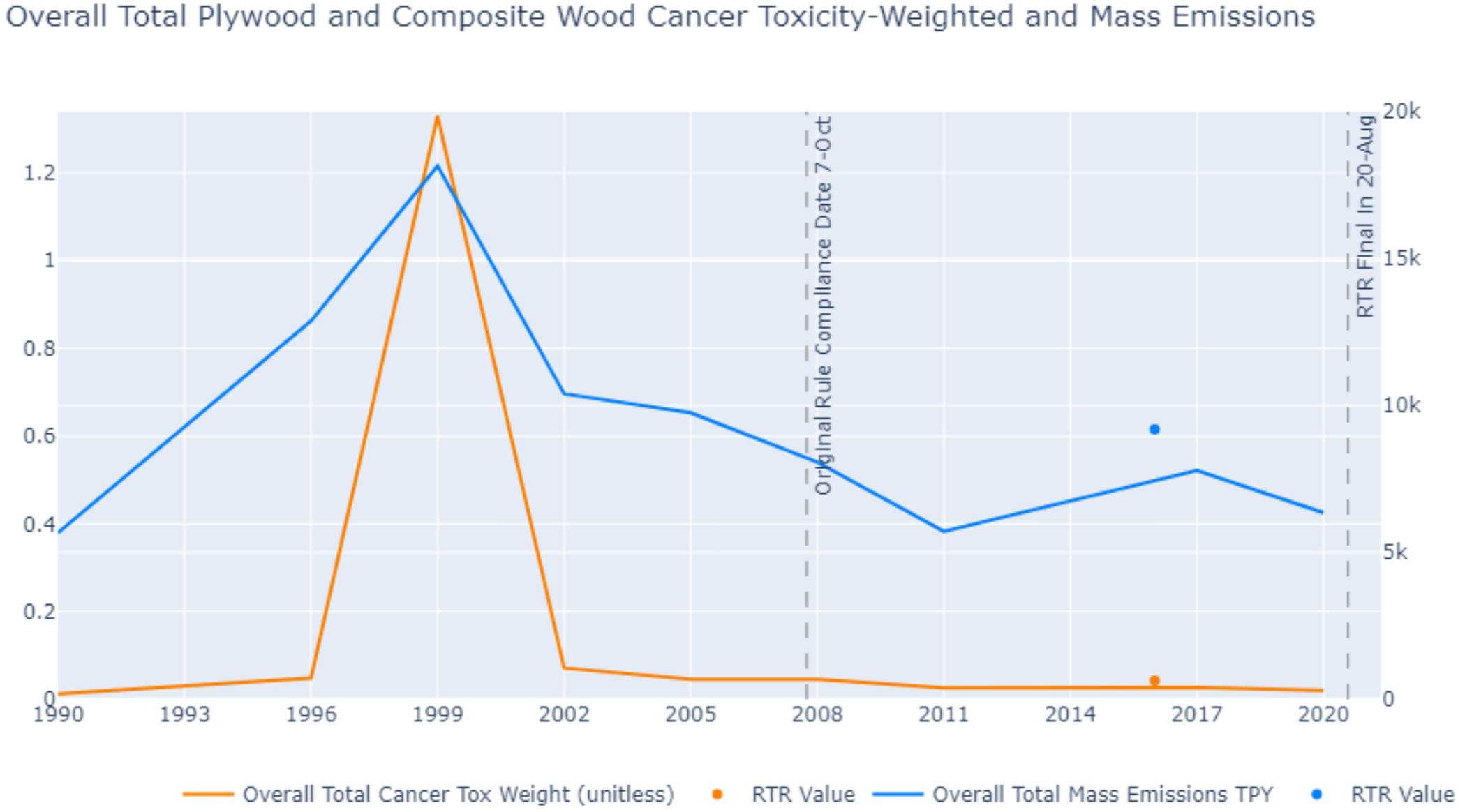


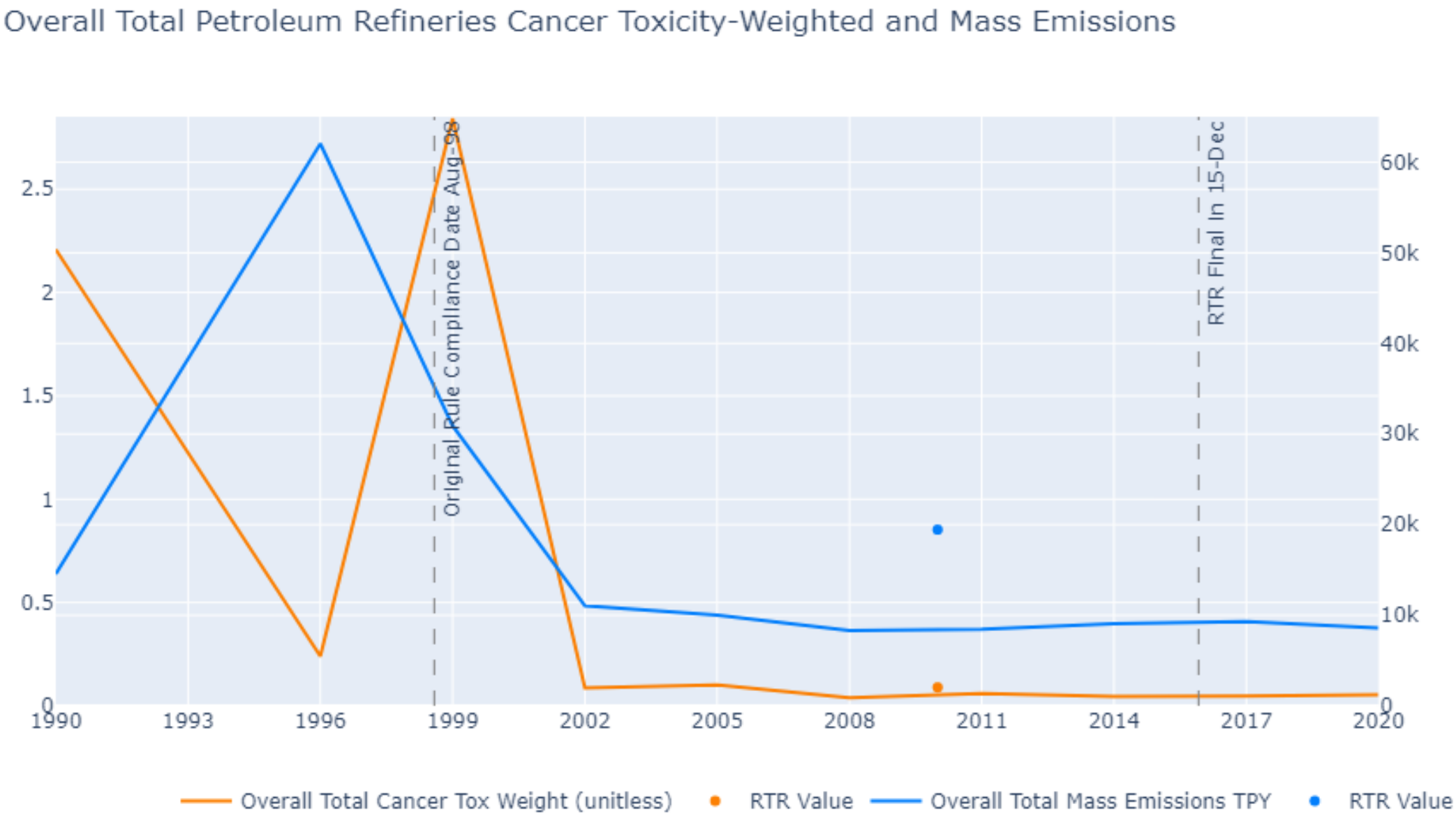
Overall Total Metal Coil Cancer Toxicity-Weighted and Mass Emissions

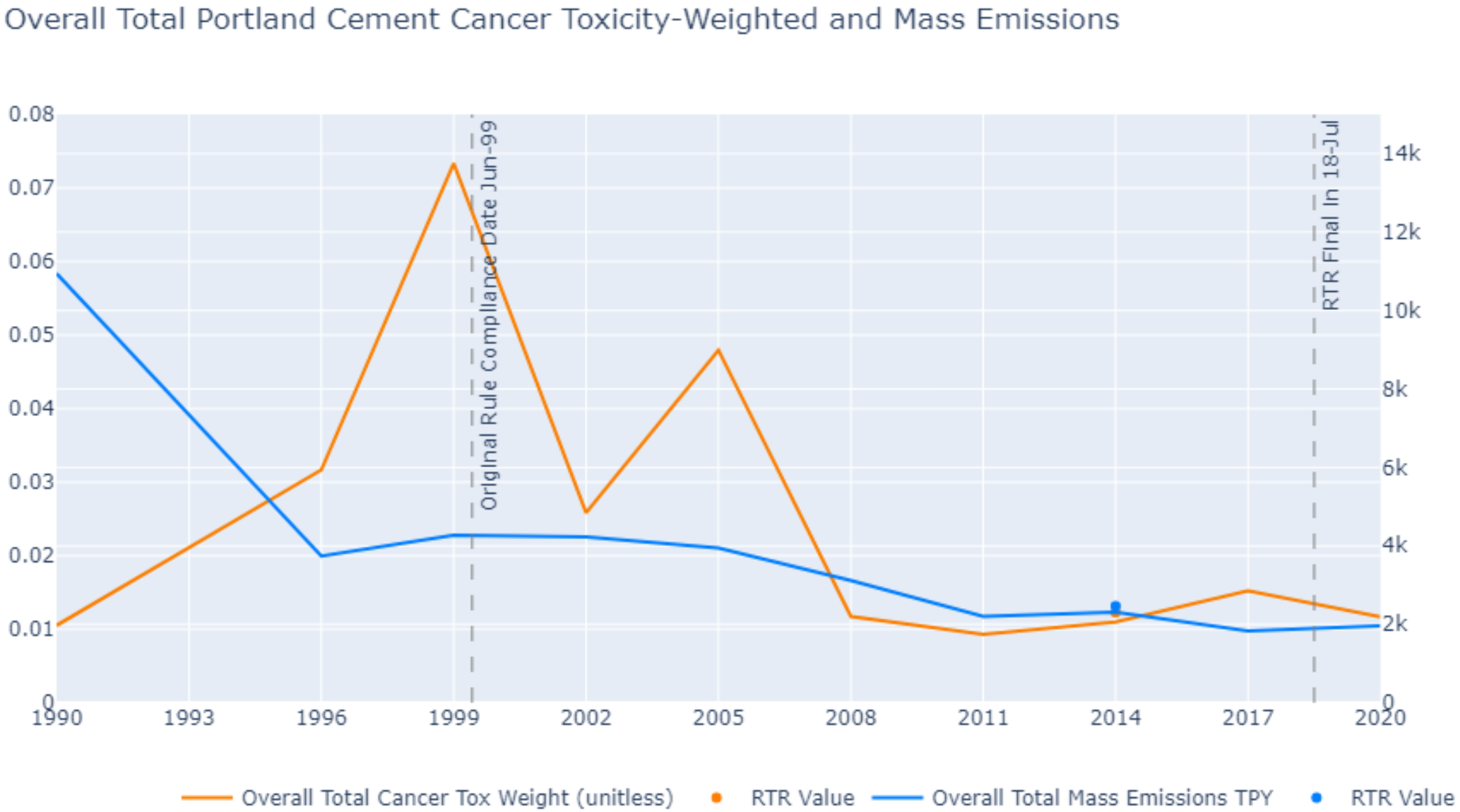


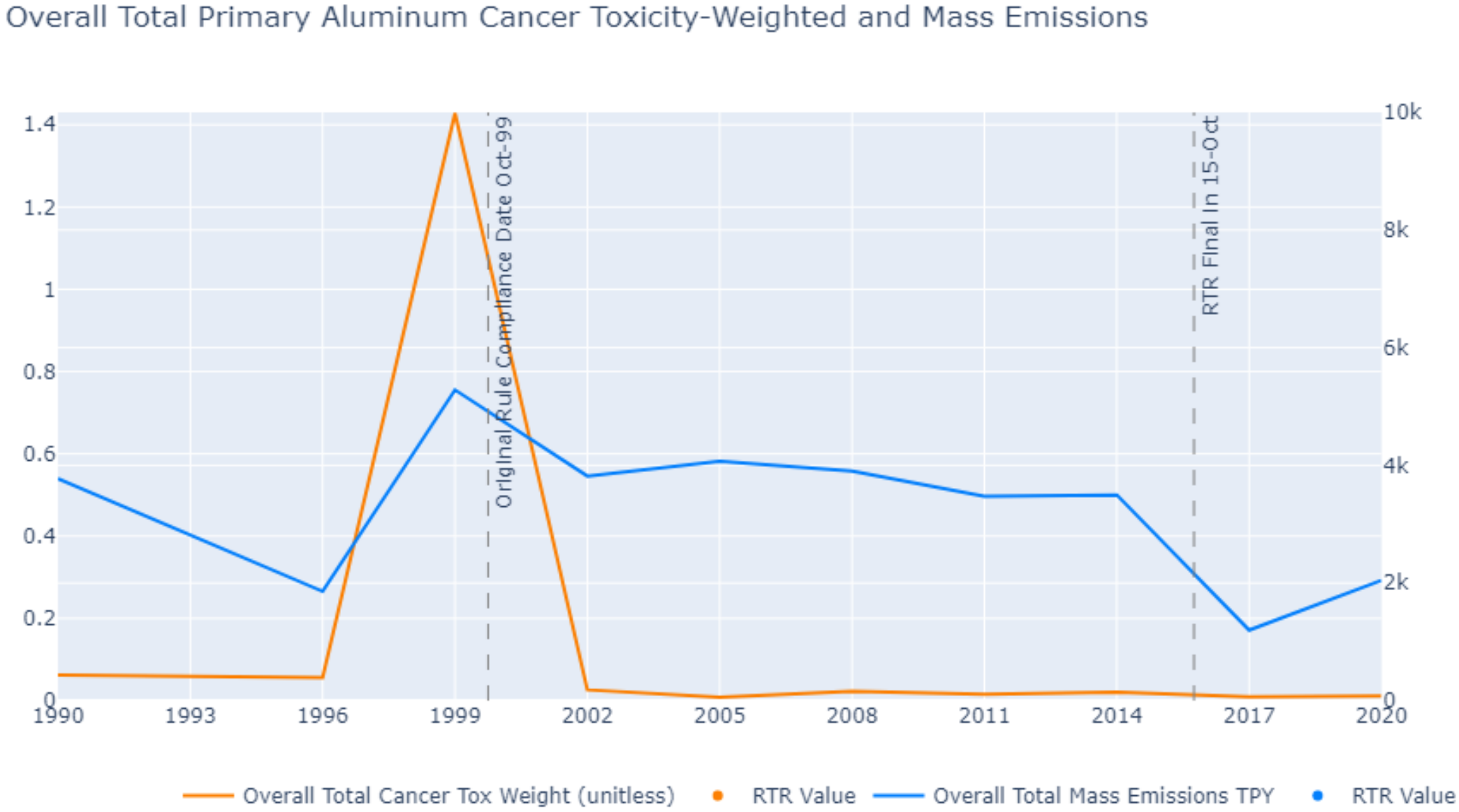
Overall Total MON Cancer Toxicity-Weighted and Mass Emissions

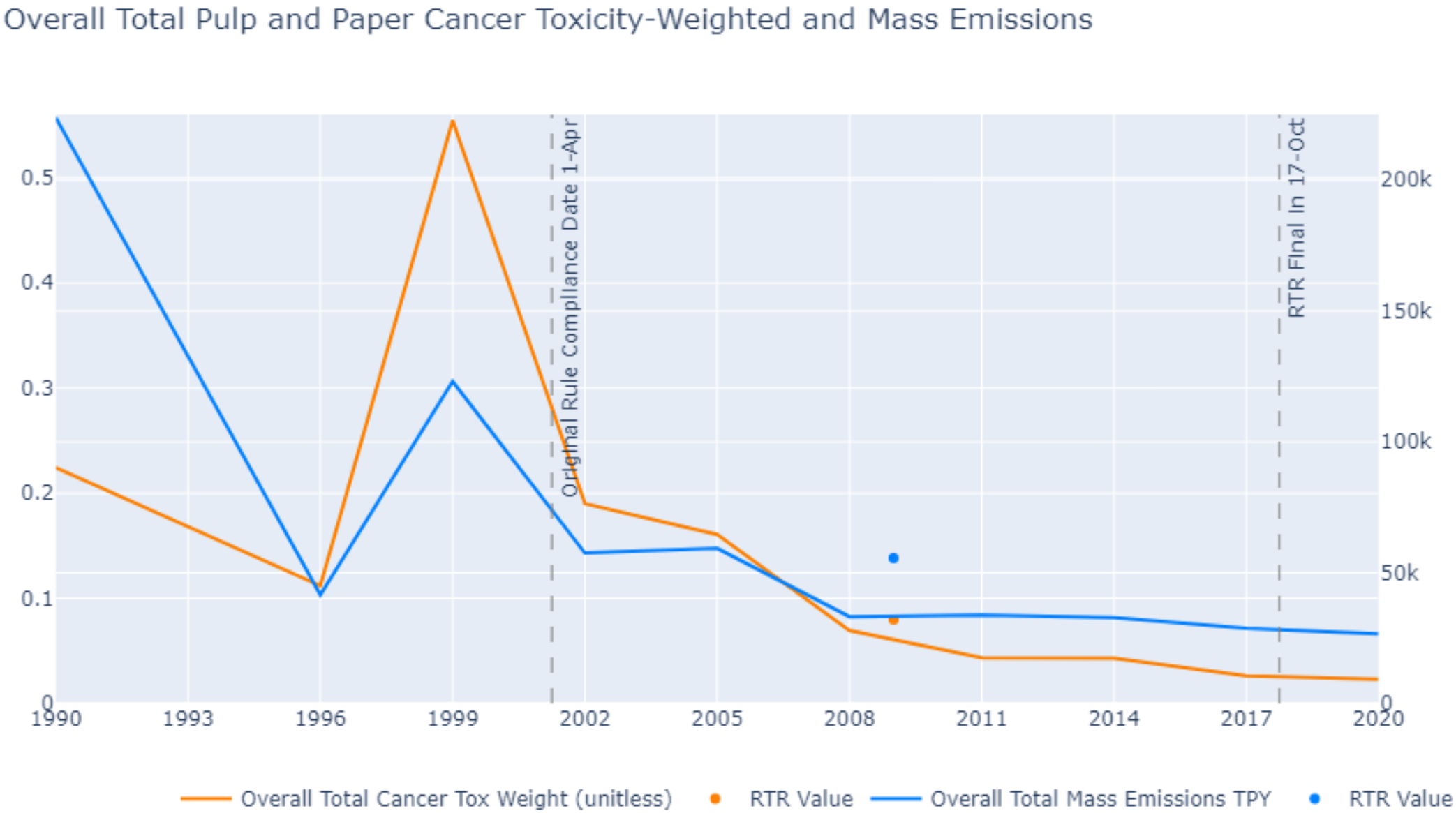


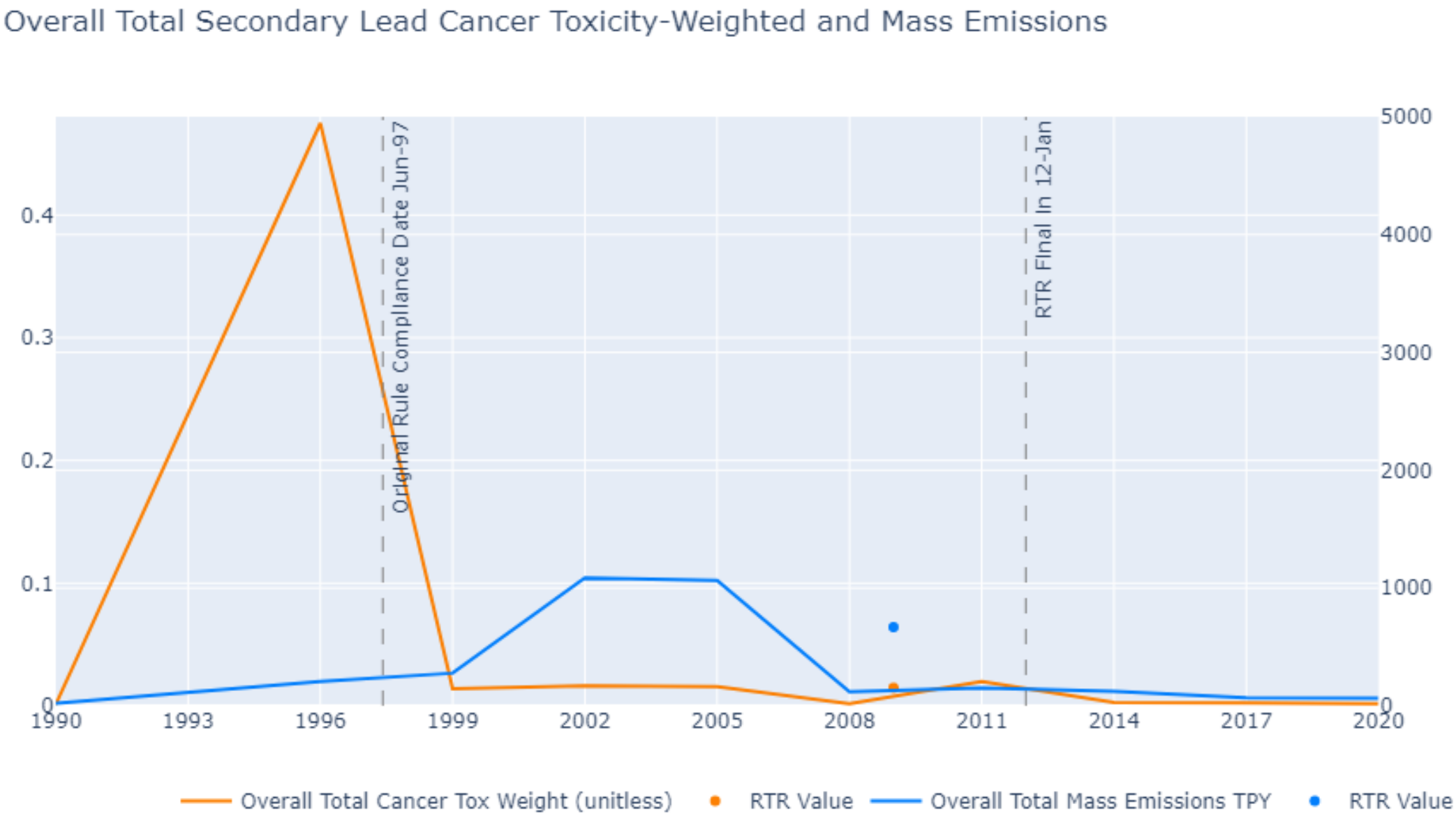


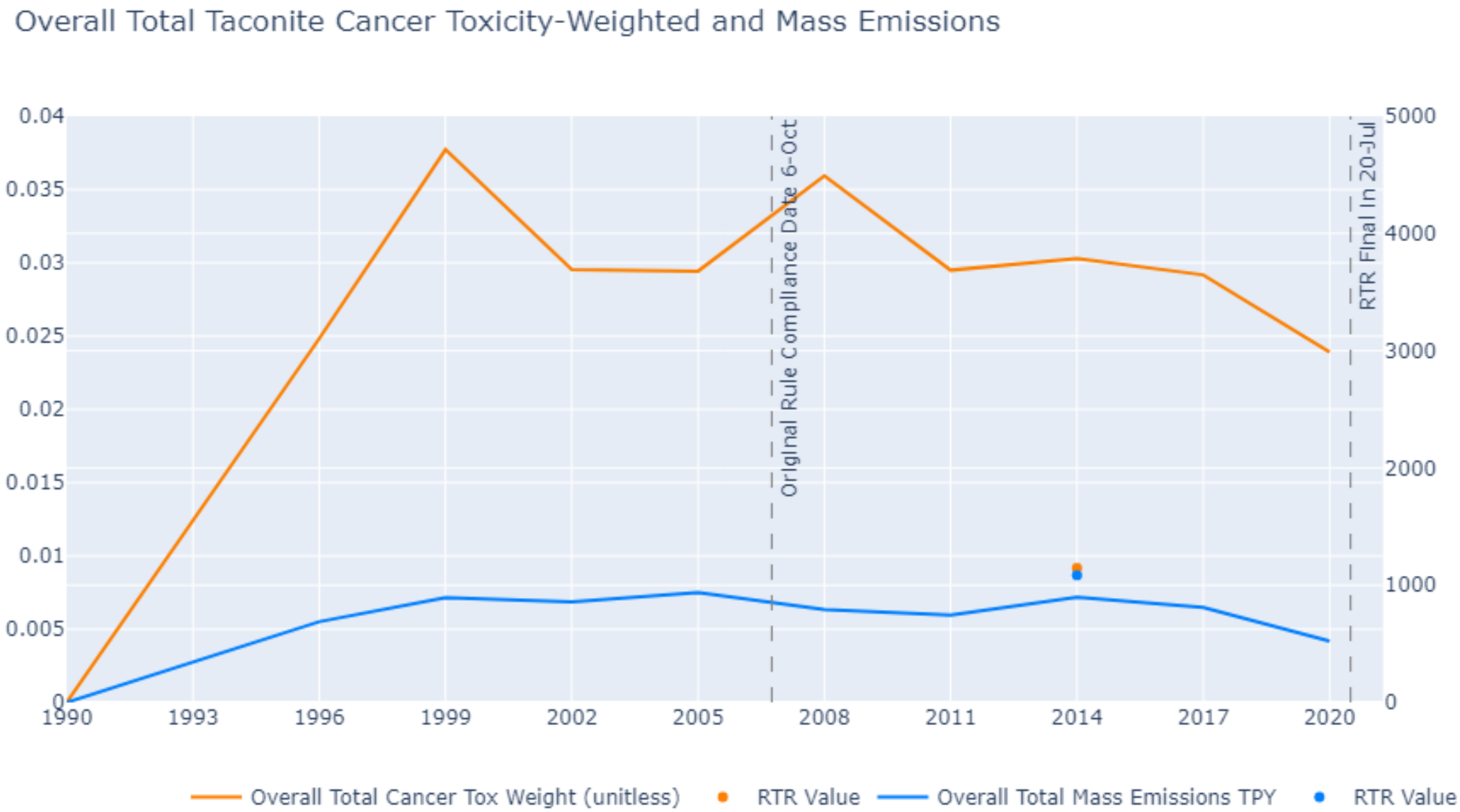












Conclusions

- All sectors we analyzed to date, with one exception, have shown reductions in mass emissions and cancer toxicity weighted emissions.
  - The exception showed a decrease in mass emissions while the cancer toxicity weighted emissions increased.
- HAP reporting and speciation are important for accurate results in risk modeling and in analyses like this assessment!

What's Next?

- We are considering ways to expand and improve this analysis:
  - Noncancer
  - Additional source categories
  - Refine pollutant and facility matching from historical NEIs to latest NEI
    - Are URE surrogates applied consistently for categories of non-speciated POM?
    - Search for additional facility matches where existing crosswalks did not find matches
- Changing reporting requirements such as AERR or listing of new HAPs will likely have an impact on future analyses

References

U.S. EPA (Environmental Protection Agency). (2010) Recommended Toxicity Equivalence Factors (TEFs) for Human Health Risk Assessments of 2,3,7,8-Tetrachlorodibenzo-p-dioxin and Dioxin-Like Compounds. Risk Assessment Forum, Washington, DC. EPA/600/R-10/005

Human Exposure Model, https://www.epa.gov/fera/download-human-exposure-model-hem

Acknowledgements

Thank you to the following ERG staff for providing data analysis support:

- Stacie Enoch
- Tyler Richman
- Steve Mendenhall
- Robin Weyl
- Jason Huckaby
- Regi Oommen