SEMICONDUCTOR INDUSTRY ASSOCIATION

Comments of the
Semiconductor Industry Association (SIA)
To the
Environmental Protection Agency (EPA)
On the
Pre-Prioritization and Consideration of Existing Chemical Substances for Future Prioritization under the Toxic Substances Control Act (TSCA)
EPA-HQ-OPPT-2023-0606
October 31, 2024

The Semiconductor Industry Association ("SIA") appreciates the opportunity to provide these comments regarding the U.S. Environmental Protection Agency's ("EPA's" and "the Agency's") efforts to collect information, data, and research on candidate chemical substances currently being considered for future prioritization actions under TSCA which would identify candidates for designation as "High-Priority Substances" for Risk Evaluation pursuant to Section 6(b) of the Toxic Substances Control Act ("TSCA").

SIA is the voice of the semiconductor industry, one of America's top export industries and a key driver of America's economic strength, national security, and global competitiveness. Semiconductors – the tiny chips that enable modern technologies – power incredible products and services that have transformed our lives and our economy. The semiconductor industry directly employs over a quarter of a million workers in the United States, and U.S. semiconductor company sales totaled $264 billion in 2023. SIA represents 99 percent of the U.S. semiconductor industry by revenue and nearly two-thirds of non-U.S. chip firms. Through this coalition, SIA seeks to strengthen leadership of semiconductor manufacturing, design, and research by working with Congress, the Administration, and key industry stakeholders around the world to encourage policies that fuel innovation, propel business, and drive international competition.

SIA members have practical knowledge of, and information about, how a number of the identified substances are used in the semiconductor industry. SIA agrees with EPA's approach to seek information on substances early in the regulatory process, prior to identifying candidates for prioritization and then designating High-Priority Substances for which Risk Evaluations would be undertaken. SIA urges EPA to continue building on prior experience and diligently seek information about, and be cognizant of, the real-life (on-going) uses of the identified substances in the market, including, but not limited to, those used in the semiconductor industry. Gathering information now will assist EPA in thoroughly understanding the actual conditions of such uses and the considerable importance that products which might contain these substances can have in the commercial, industrial, and consumer sectors in which they play a role. In addition, upon review of the information available on all the substances, EPA will be able to make a more informed judgement as to which substances truly warrant prioritization at this time, as opposed to those which can be better addressed at some later point in time.

In addition to using hazard, use, and exposure data to develop a basic chemical profile for the substances, EPA also should gather and analyze information concerning the level of effort and time required to develop suitable chemical formulations for specialized uses in highly technical and complex equipment, such as those used in the semiconductor industry, without the use of the identified substances. This information will enable EPA personnel to better understand the potential consequences that can follow from any decision to restrict use of a specific substance, or category of substances. Accordingly, EPA should more fully investigate whether there are technically feasible alternatives available for the listed substances in the uses identified.

To assist EPA with understanding how the candidate substances are used, SIA is providing the information available in Appendix A. This information is based on initial feedback received from SIA members and is subject to further evaluation by SIA members. It is not an exhaustive list of the various formulations, products, and circumstances in which the identified substances may be used or present during semiconductor manufacturing operations or other non-process applications. Some of the formulations used or present contain the identified substances only in trace amounts.

SIA hopes that EPA will take the needed time to investigate all ongoing and potential uses of the substances, the workplace controls, and personal protective equipment utilized when the substances/formulations are used. As EPA is likely already aware, the semiconductor industry deploys stringent and extensive engineering and administrative controls, in addition to adherence to applicable ACGIH TLVs or OSHA regulations, and the industry has been successfully managing the use of some of the identified substances for generations. Semiconductor manufacturing equipment is also designed with engineering controls to meet SEMI equipment design guidelines so that chemical emissions are limited to less than 1% of the TLV during normal operations and less than 25% of the TLV during maintenance operations.

+ + +

SIA appreciates EPA's interest in seeking public input regarding its pre-prioritization of chemical substances for potential risk evaluations and looks forward to engagement with EPA should any of the candidate substances relevant to the semiconductor industry be selected for further prioritization and evaluation.

Appendix A

Chemical Name	CASRN	Application in the Semiconductor Industry
Benzene	71-43-2	• Found as a trace component in multiple adhesives and photoresists. Benzene is likely a byproduct from synthesizing molecules in adhesives and resists and is not an active ingredient. • Present in photolithography coating chemicals used in the semiconductor manufacturing process • Lab uses
Bisphenol A	80-05-7	• Used in non-process related factory uses. Used as low concentration (<5%) component in adhesives used for repairs. Present in epoxies/hardeners. • Bisphenols are used as starting compounds to synthesize polymeric uses that may not be identified as Bisphenol A • Additional information available at: https://pubchem.ncbi.nlm.nih.gov/compound/bisphenol-A#section=Uses
DnOP	117-84-0	• Lab uses

Ethylbenzene	100-41-4	• Used in manufacturing in lower concentrations (<5%) in products including:
		  ○ Adhesives, in some packaging steps
		  ○ Coatings
		  ○ Aerosol mold cleaning agents
		  ○ Specialized process labelling steps used in production of military products
		  ○ Facilities maintenance products that are not used in manufacturing
		  ○ Present in niche lubricants and coats in small amounts
		• Lab uses

Naphthalene	91-20-3	• Used in die attach adhesives • Spin-on dielectrics • Lab uses • Present in paints/epoxies
Styrene	100-42-5	• Present in photolithography coating chemicals used in the semiconductor manufacturing process • Lab uses • Used in non-process primers/resins
Tribromomethane	75-25-2	• Lab uses
Triglycidyl isocyanurate	2451-62-9	• Used in epoxy at very low levels
p-Xylene	106-42-3	• Lab uses • Used in epoxies and construction-related products • Present in various applications, including enamel, paint, epoxy, adhesive, and acid test kits

Antimony and Antimony Compounds	Category	• Used as hardening agents in some wire and lead frame in the assembly steps and in finished product. • Used in lead free solder applications, in solders and solder-pastes • Used as a dopant to add charge bias to silicon. It is common in silicon-based semiconductor production. • Present in greases • Present within halogenated epoxies that may be used as flame retardants within integrated circuits. Some passive components within complex modules may contain Sb2O3. • Lab uses
Arsenic and Arsenic Compounds	Category	• Used as a dopant to add charge bias to silicon. It is ubiquitous on all silicon-based semiconductor production. • Used in thin film deposition • Lab uses
Cobalt and Cobalt Compounds	Category	• Used in dicing blades and many other specialized parts of manufacturing equipment • Used in final semiconductor products from specialized packaging metal structures • Used in ceramic headers • Used as an implant metal for many advanced semiconductors • Used in sputter thin films • Uses in electroplating • Used in non-process coatings, primers, and resins • Lab uses
Lead and Lead Compounds	Category	• Used in some specialized solders, solder balls and solder pastes for products used in harsh duty or for maximum reliability • Lab uses
Bisphenol S	80-09-1	• Found as a trace component in photoresists
Hydrogen Fluoride	7664-39-3	• Used in high volume in all silicon-based semiconductor manufacturing as a wet etch • Present in both wet and dry etch and/or cleaning applications used in the semiconductor manufacturing process • Footprint as a byproduct • Lab uses