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May 22, 2023

Krishna Vallabhaneni
Tax Legislative Counsel
U.S. Department of Treasury
15000 Pennsylvania Avenue, NW
Washington DC 20220

Re: **NPRM on Section 48D**
REG-120653-22

Dear Mr. Vallabhaneni:

The American Chemistry Council (ACC) respectfully submits the following comments on the Notice of Proposed Rulemaking (NPRM) issued under 26 U.S.C. § 48D, the Advanced Manufacturing Investment Credit.

By way of background, ACC represents a diverse set of companies engaged in the business of chemistry, an innovative, $565 billion enterprise. We work to solve some of the biggest challenges facing our nation and our world. Our mission is to deliver value to our members through advocacy, using best- in-class member engagement, political advocacy, communications and scientific research. We are committed to fostering progress in our economy, environment and society.

Every year, the chemistry industry invests tens of millions of dollars to ensure that the products making modern living possible are safe for our communities and the environment. In addition to research initiatives, ACC programs focus on anticipating and preventing accidents, as well as educating the public about how to use our products safely. Chemistry makes it possible to satisfy a growing world population. Our products protect our food supply, air and water, ensure safe living conditions and provide access to efficient and affordable energy sources and lifesaving medical treatments in communities around the globe. To enable these ongoing innovations, we advocate for public policies that support the creation of groundbreaking products to improve lives, protect our environment, and enhance the economic vitality of communities.

Chemistry Is Core to Semiconductor Manufacturing

As particularly relevant here, U.S. chemical manufacturers have been key to the semiconductor industry since its inception – and continue to be critical to the industry's success. According to the semiconductor industry, the production of semiconductor wafers requires the use of no less than 500 highly specialized chemicals. And in 2021, the business of chemistry in the United States supported 367,000 workers in the semiconductor and electronic component industry $50.3 billion in payroll, and $52.5 billion in value-added.[1]

Chemicals are essential in the manufacture of semiconductors, printed circuit boards, and other microelectronic devices. Among them are cleaners, developers, dopants, encapsulants, etchants, flame retardants, photoresists, specialty polymers, plating solutions, and strippers. In addition, chemical products can be used as key materials in various pipes, tubing, fittings, membranes, coatings, and moldings that are used in the semiconductor manufacturing process. This business serves major markets such as computers, telecommunications equipment, automotive, and medical devices. Long-term growth prospects are driven by the increasing proliferation of electronics in contemporary life. Key economic factors include increasingly global customers, high technological barriers to entry, device miniaturization, and shortening product life cycles.

A wide range of chemistries enable the manufacture of silicon wafers, doping to impart innovative characteristics (e.g., conductivity), polishing and cleaning of the wafers, and further preparation of the wafers. These chemistries include:

- Semiconductor substrates derived from crystalline silica;
- Atmospheric gases (e.g., nitrogen, argon, oxygen, helium, and hydrogen)(further discussed below);
- Specialty gases (e.g., nitrogen trifluoride (NF3), tungsten hexafluoride (WF6), germane (GeH4) and nitrous oxide (N2O));
- Photoresists and photoresist ancillaries;
- Chemical mechanical planarization (CMP) slurries and pads;
- Deposition, dielectric, and other electronic materials
- Fluoropolymers (further discussed below); and
  Hydrogen peroxide and flourogases.

As an example of integral gases, high purity nitrogen and general purpose nitrogen play essential roles in various steps of the semiconductor manufacturing. Without nitrogen, the wafer is subject to corrosion in the presence of oxygen and moisture, which results in defective wafers. High purity nitrogen is mainly used to purge any ingressed air and residual process chemicals, keeping the wafer and all production wetted surfaces and space free from contamination (e.g., oxygen, moisture, and undesired particles). High purity nitrogen is one of the few products that touch every semiconductor manufactured. In order for a continuous and reliable supply of nitrogen, the related equipment is often located on-site and integrated into the semiconductor manufacturing facility.

[1] 2022 Guide to the Business of Chemistry, p. 10, *available at* https://www.americanchemistry.com/chemistry-in-america/news-trends/press-release/2022/acc-publishes-2022-guide-to-the-business-of-chemistry

Fluoropolymers are also a key material for avoiding contaminants in semiconductor manufacturing because they exhibit a unique combination of properties, including resistance to chemical, thermal, and physical degradation that can withstand the semiconductor manufacturing process. Fluoropolymers are critical components of fab equipment (fittings, valves, wafer carriers), consumables (high purity air filters, lubricants), and chemical storage and transport equipment (tanks and pipes). They, and other products such as certain peroxides and fluorogases, can be used as etchants in the semiconductor manufacturing process. They are also used in powder coatings on duct work to protect against corrosion and heat.

In addition to their superior performance characteristics, fluoropolymers have well-established safety profiles and do not present a significant concern for human health or the environment. Because of their unique combination of physical and chemical properties, fluoropolymers meet criteria developed to identify polymers of low concern for potential risk to human health or the environment. These criteria were developed by chemical regulatory experts working collaboratively under the auspices of the Organization for Economic Cooperation and Development. Fluoropolymers are not water soluble and as a result are not found in sources of drinking water. Importantly, fluoropolymers are not PFOA or PFOS or other long-chain PFAS, nor can they transform to those substances in the environment.

Comments on the NPRM

ACC was dismayed by the NPRM to the extent it carves out, as those eligible to claim the tax credits, the manufacturing facilities producing chemicals described above that are integral and essential to support semiconductor manufacturing. Current CHIPS capital expenditure limits and requirements from the U.S. Department of Commerce are unlikely to attract sufficient production of the chemicals needed to meet semiconductor fab demand, especially if chemical and other materials companies are ineligible for the 48D investment tax credit.

Many chemicals used in semiconductor fabrication are used for other products, meaning domestic supply is unlikely to meet demand. In that regard, it is critical that the United States prioritize incentives to increase supply chain resiliency including leveraging the Section 48D that Congress provided. The NPRM incentivizes the manufacturing of semiconductors but does not support those upstream materials that are crucial to semiconductor manufacturing, which will in turn hinder the goals of the CHIPS Act.

Section 48D did not define semiconductor manufacturing equipment and we believe Congress fully intended the Department of Treasury and the IRS to take a broad view when issuing guidance on the application of the tax incentive. We do not believe that Treasury and the IRS should limit its application to only a small subset of companies but rather take a holistic approach to include as advanced manufacturing facilities those facilities whose primary purpose is producing materials integral and essential to manufacturing of semiconductors (i.e., semiconductor manufacturing equipment) in reduce our dependence on foreign sources.

Thank you in advance for your consideration. Please let us know if you have questions.

Sincerely,

Robert B. Flagg
Senior Director, Federal Affairs
American Chemistry Council