Testimony of

Carolyn Duran, Ph.D.

Director of Supply Chain Ramp and Regulations, Intel Corporation

Before the

Environment and the Economy Subcommittee of the

House Energy and Commerce Committee

Hearing on

A Discussion Draft Entitled the “Chemicals in Commerce Act”

March 12, 2014

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Summary Points

- Intel Corporation is the world's largest semiconductor company. Intel continues to invest in U.S. high tech manufacturing, with over half of our roughly 100,000 employees residing in the United States. Intel invested over $8.9B in capitol in the U.S. in 2013 alone, and three-fourths of our microprocessor manufacturing is done here at facilities in Arizona, Oregon, New Mexico and Massachusetts.
- Intel supports chemical management approaches that align environmental protection, the safe use of chemicals, and U.S. technology innovation. An aspect of this is an approach that allows downstream user companies to develop a viable alternative that has clear benefits to public health and the environment before an existing chemical is banned for a particular use and provides for a reasonable transition timeline enabling business to continue while pursuing the conversion to a viable alternative.
- We also support an approach that allows EPA to address chemical substances in finished products or "articles" when warranted, targeting situations where there is exposure to the chemical substance in the article and where the risk of concern cannot be managed through a focus on the chemical substance.

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Mr. Chairman and Ranking Member Tonko, thank you for the opportunity to testify on behalf of Intel on the **Discussion Draft of the Chemicals in Commerce Act of 2014**. My name is Carolyn Duran, and I am the Director of Supply Chain Ramp and Regulations at Intel Corporation. In this capacity I am responsible for supply chain regulatory risk mitigation for chemicals and gases used in our manufacturing technologies globally. I appreciate your work to consider legislation to modernize the regulation of chemicals in commerce.

Founded in 1968, **Intel Corporation is the world's largest semiconductor company**, with net revenues of $52.7 Billion in 2013. Intel continues to invest in US manufacturing, with over half of our roughly 100,000 employees residing in the United States. Intel's latest technologies for microprocessor fabrication, assembly and test are developed and implemented in Oregon and Arizona. In 2013 alone, Intel invested over $8.9B in capital in the United States. As a global corporation, more than three-fourths of Intel's revenue comes from outside the U.S., yet roughly three-fourths of the company's microprocessor manufacturing is done here at facilities in Arizona, Oregon, New Mexico, and Massachusetts.

Since our inception, Intel has developed and implemented the revolutionary technologies necessary to achieve the transistor scaling known as Moore's Law, resulting in the smaller, faster, more efficient electronics that drive today's economy. Advancements in chemistry and materials science are a key to these successes. As an example, our recent changes in transistor structures, including high-k metal gate and the tri-gate transistor, represented significant advances and required the development of many novel materials to enable these technologies. This new transistor architecture provides an unprecedented combination of improved performance and energy efficiency. Our ability to experiment with novel materials in a timely fashion was critical to this success, and we continue to research new materials and processes to develop the radical innovations necessary to deliver the integrated circuits (IC's) that meet the needs of tomorrow.

Fundamentally, we believe that this **technological advancement should go hand in hand with environmental sustainability**. We've been the largest voluntary purchaser of green power in the U.S. since 2008 (according to the U.S. Environmental Protection Agency), and our commitment continues to grow. Over the last decade, we've worked with suppliers and customers in efforts to eliminate lead and halogenated flame-retardants from our products. We incorporate our environmental performance goals throughout our operations, and have made them public since 1994. Specifically in regard to chemical innovation, in 2012 we established a goal to implement an enhanced green chemistry screening and selection for 100% of our new chemical and gas purchases by 2020.

It's from this background of technology and environmental sustainability leadership that **Intel supports chemical management approaches that align environmental protection, safe use of chemicals, and U.S. technology innovation**. We are interested in chemical legislation from two perspectives. First, chemicals legislation impacts us indirectly through the companies that supply us with the materials used in our manufacturing processes. As I mentioned earlier, Intel manufactures three–fourths of our microprocessors here in the U.S. The ability of our chemical suppliers to get new chemicals approved in a timely way, to ensure the continuity of supply of existing chemicals and to have their intellectual property protected are all essential for Intel manufacturing competitiveness. In addition, as a downstream user or processor of chemicals, we are also directly impacted by certain aspects of chemicals management rules. This may involve uses of chemicals in our manufacturing processes or in our final products, which are considered "articles" in the context of TSCA. It's these areas where we have the most direct experience and where I'll focus today.

At this point I would also like to mention that in the area of chemicals management policy**, Intel works closely with industry partners including the Semiconductor Industry Association (SIA) and the Chemical Users Coalition**. While I'll share specific examples from our experience as a U.S. high tech manufacturer, many of the concepts are also applicable to a wide range of industries that are downstream users of chemicals.

The **semiconductor manufacturing process is highly controlled and performed to exacting standards**. In order to ensure quality and consistency in the production process, chemicals and materials used in semiconductor manufacturing are subject to significant and often redundant controls and safety measures. The highly controlled systems in a fab include enclosed

processes, automation, and chemical delivery systems. These systems result in high levels of protection of both the environment and fab workers because potential exposure to chemicals used in our processes is tightly controlled. Accordingly, we appreciate a risk-based approach to chemicals management policy which will allow the continued, safe use of innovative chemicals to produce leading edge technologies while protecting people and the environment.

We offer specific comments on the Draft Discussion in two areas:

1. Managing transitions to alternative chemicals

When the EPA determines that a particular chemical is likely to result in an unreasonable risk of harm to human health or the environment, we recognize that the EPA may decide to consider replacement of that chemical for particular uses. In this scenario we appreciate an approach that allows downstream user companies to a) develop a technically feasible alternative that can be demonstrated to be safer than the existing chemical and b) provides a reasonable transition timeline for implementation that enables us to continue our business while pursuing the conversion to feasible alternatives. The Discussion Draft includes these concepts in Sections 6(f)(4)(B) and 6(f)(4)(C), and these are critically important for highly technical, complex manufacturing processes such as integrated circuit manufacturing.

Each technology developed by Intel makes use of hundreds of different chemicals, utilized in advanced processing equipment resulting in a complex, highly integrated process flow that is comprised of several hundred individual process steps. Depending on the complexity of the new technology (i.e. trigate transistor development), the initial development of the technology can take anywhere from two to ten years. Once implemented in high volume manufacturing

for a given technology node, the chemical can be utilized ten or more years, and a significant percentage of chemicals used in one technology node are utilized again in a subsequent technology. A change in one step in the process can cause a significant impact to subsequent process steps, such that every change made to our process is done in a highly controlled fashion. As we seek to replace chemicals in already established manufacturing processes, it is often necessary to make additional changes to the subsequent process steps to ensure that the final product matches the technical performance.

As an example, in 2006, the semiconductor industry announced a plan to end non-critical uses of perfluorooctyl sulfonate (PFOS) chemicals in manufacturing and to work to identify substitutes for PFOS in critical uses even though the risk of exposure was small relative to the use of PFOS in other industries. At the time this work began, PFOS was used in over three hundred applications across all of Intel's manufacturing lines. EPA provided the transition time necessary for the industry to both develop safer alternatives and implement them into existing processes while maintaining product quality and technical requirements and this led to the desired result: over the past decade Intel has replaced PFOS in over 300 discrete applications across eleven different manufacturing technologies.

I would like to note the importance of identifying a viable alternative exists that has clear benefits to public health and the environment before an existing chemical is banned for a particular use. Such a policy assures that there will be a technological path forward that represents a positive improvement for the environment. In the interim, while a transition to alternatives is occurring, EPA can adopt appropriate restrictions for reducing exposure and otherwise mitigating the chemical's risk.

2. Articles

The treatment of "articles" under TSCA is important to Intel, as well as many other industries that market products in finished form that are classified as "articles." Our integrated circuits, along with the packages and peripherals that make up the final products sold in market, are comprised of many chemicals and materials used in extremely small volumes, including but not limited to metals, organic-metallic complexes, and organics. These materials are typically bound in a monolithic fashion and cannot be separated from the device. The chemicals incorporated into a semiconductor are not released to the environment during their normal use.

Accordingly, we believe the nature of the chemical in a finished products or "articles" should be taken into account in regulatory decision making. An article, such as semiconductor, where there is minimal risk of release of materials and of consumer exposure should be treated differently than those uses of chemical substances in products which have a high likelihood of exposure. For this reason, Intel supports that EPA should have the authority to regulate chemical substances in articles under both Sections 5 and 6, following the risk-based approach outlined in the Discussion Draft. In particular, Sections 5(a)(3) and 6(f)(2)(A)(ii), relating to significant new uses and to existing chemicals respectively, would focus the regulation of articles to situations where EPA:

a) defines specific types of articles that are, or likely will be, in United States commerce;

b) determines that an unreasonable risk of harm to human health or the environment may result from exposure to a chemical substance in the article; and

c) determines that placing requirements on the article is required because the risk of concern cannot be addressed adequately through requirements placed on the chemical substance or mixtures.

This language provides a valuable roadmap that will allow EPA to address chemical substances in specific articles when warranted and do so in a targeted manner. Such an approach allows EPA to provide protection for human health and the environment while also providing important predictability for high tech companies and the many other U.S. industries that manufacture products that are considered "articles" in the context of TSCA.

We look forward to working with this subcommittee and the Congress as a whole as it continues its review of U.S. chemicals legislation and consideration of the Discussion Draft of the Chemicals in Commerce Act of 2014.

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Thank you for the opportunity to submit this testimony on behalf of Intel Corporation. For more information, please contact Carolyn Duran at carolyn.duran@intel.com.