Submitted by Mr. Manish Bhatia, Executive Vice President of Global Operations
Micron Technology

Additional Questions for the Record

The Honorable Rick W. Allen

1. The National Ambient Air Quality Standards (NAAQS) implemented by the Biden-Harris Administration's EPA, for example, have proven to be a significant burden on the U.S. manufacturing base. These stringent regulations have made it difficult to permit and develop many of the facilities needed to support our next-generation industrial base. Whether it be PM2.5 or ozone, EPA needs to provide flexibility when it comes to allowing areas to reach attainment, and this should include discounting international emissions or wildfire emissions. I applaud Administrator Zeldin for Monday's decision to provide states more flexibility under section 179A of the Clean Air Act to demonstrate that they would achieve compliance with NAAQS requirements but for emissions coming from outside of the United States. As you also point out in your testimony, EPA's "reconsideration of the Particulate Matter National Ambient Air Quality Standards (PM 2.5) is positive as this rule, as currently implemented, limits opportunities for American manufacturing."
    a. Can you elaborate on the limitations that the Biden-Harris NAAQS for PM2.5 imposed on Micron?

MICRON RESPONSE:

Last year, the EPA reduced the fine particulate matter (PM 2.5) national standard, a key component to air emission standard permitting, by one-third (from 12 to 9.5), which directly impacts our permitting efforts in New York and Idaho. While we recognize that the PM standard is a critical, health-based standard and we fully support clean air policies, we encourage the EPA to review the rule to provide operational flexibility, either by: 1) providing an exemption for critical industries such as semiconductors; 2) reverting to the previous standard of 12; or 3) allowing states flexibility on how background/baseline concentration is calculated at the state level (i.e. how the states' calculation impacts the total allowable PM). Doing so would help speed up implementation of CHIPS investments and protect the environment through other applicable regulations.

The Honorable Russ Fulcher

1. You note in your testimony the importance of access to reliable, affordable, carbon-free electricity. As you note, the making of memory chips requires not just a robust amount of power, but also "consistent" and reliable power for fabs. And yet, between mandates on utilities and the challenge of getting transmission lines through the NEPA process and getting permitted can take decades. In your testimony, the worry is the U.S. won't meet the increase in projected demand of 128 GW over the next five years. And yet, on transmission, tell us about the challenges companies like Micron face when it comes to trying to align obtaining the additional power you need to meet demand for memory chips with the delays and uncertainties you receive from land management agencies on permitting?

MICRON RESPONSE:

Enhancing transmission infrastructure is critical for revitalizing domestic manufacturing. The U.S. government must ensure timely permitting of power generation and transmission facilities to meet electricity demand. Without substantial policy changes, the U.S. risks losing competitive advantages due to increasing electricity costs.

Micron is aware of the regulatory delays affecting the transmission of current generating capacity to businesses and consumers. With limited transmission infrastructure in the northwest, Micron views the Boardman to Hemingway (B2H) transmission line as an opportunity to deliver necessary electricity from Oregon to Idaho. This line could supply Idaho with up to 500 MW of affordable, reliable power from the Pacific Northwest during the summer months.

The B2H project, initiated in late 2006, remains unconstructed as a result of previous delays with federal permitting approval. For nearly 20 years, this potential generating capacity has been delayed in Oregon, with permitting costs now exceeding $220 million, while energy demands in Idaho continue to increase.

Such delays impact the ability to enhance U.S. manufacturing, support resilient businesses and growing communities, and achieve AI leadership objectives. These delays result in higher electricity costs, affecting the competitiveness of the United States as a destination for companies.

2. Please explain how Micron is showing it can lower its electricity consumption throughout its design, test, and production processes? You noted implementation of AI-based tools to lower energy use in your design, test, and production processes.

MICRON RESPONSE:

Micron Technology has internally deployed AI extensively through its manufacturing processes to ensure that Micron and its future expanded U.S. workforce remains at the cutting edge. In particular, this includes deployment of AI in image analytics, acoustic listening, and thermal imaging. As a result of these AI innovations, Micron has improved worker safety and kept its operations competitive: between 2016 and 2020, worker productivity rose 18%, time to resolve quality issues fell by 50%, time to market for new chips fell 50%, and product scrap production fell 22%. All these innovations help reduce power consumption as measured in per-chip terms. Reduction of product scrap helps ensure that energy is not wasted on products not destined for market.

More broadly, beyond AI we deploy a variety of energy efficiency processes to reduce our power consumption. As an example, last year, we reduced our Boise facility energy consumption by 19.5 million kilowatt hours, equivalent to the average annual consumption of over 1,700 households. We were able do this through an all-of-the-above approach: we eliminate energy consumption where feasible through process improvements and tool optimization, we recover energy through heat recapture and other innovations, and we optimize the energy we use through energy sensors and smart controls.

3. Micron does a lot of work with Idaho National Labs. This committee has done a lot of work to help nuclear energy get permitted and approved more quickly to be another reliable source of power. Tell us about your work with INL and how Micron could see more reliable

sources of energy. Tell us about your work with INL, and things the federal government should continue to consider when it comes to Small Modular Reactors (SMRs) and other advanced nuclear programs?

MICRON RESPONSE:

For over 40 years, Micron's Memory Technical Center of Excellence (MTC) in Boise, Idaho, has anchored our R&D operations, and is the only full-flow memory and storage research site in the United States. Micron's hub and spoke model integrates expertise from R&D sites across the country, including Atlanta, Georgia for DRAM product design, Longmont, Colorado for test methodologies, Minneapolis, Minnesota for advanced controller development, California (Folsom & San Jose) for advanced architecture DRAM memory, and Richardson, Texas for bandwidth and energy efficiency improvements.

Additionally, Micron partners with the Department of Energy's National Labs, including Idaho National Lab (INL), the Pacific Northwest National Lab (PNNL), and Sandia National Lab. For example, our partnership with PNNL is addressing a major bottleneck in memory technology to increase problem-solving efficiency - near data computing to drastically reduce power consumption and increase performance. At Sandia, our partnership focuses on the development of high-bandwidth AI-optimized advanced memory technology and very large-scale memory systems to achieve a Peta-Scale Memory system to address rapidly changing AI and scientific applications.

Last month, I had the pleasure of meeting with senior INL leaders in Idaho Falls to discuss their extensive work on advanced nuclear technology, particularly SMRs. Their leadership in this field is extremely encouraging for the future of advanced nuclear technology development and ensuring U.S. leadership in remaining at the cutting-edge of nuclear power.

Accelerated permitting is essential to advance Small Modular Reactors (SMRs) and other advanced nuclear programs. The ADVANCE Act represents an initial step in reducing regulatory barriers to SMR deployment. However, with only one NRC-approved SMR design out of more than 80 designs using various fuel types, these approvals need to be expedited and made more cost-effective due to the lower expected power generating capacity compared to conventional reactors. Both China and Russia have operational SMRs, making it crucial for the U.S. to keep pace with SMR technology deployment, not just focusing on technological leadership. The manufacturing sector has shown strong interest, as has the power sector, indicating that federal government action is necessary.

This action includes supporting existing nuclear facilities in evaluating the feasibility of adding SMRs to utility-scale nuclear facilities in the United States. In January 2025, Constellation sought DOE permitting approval to construct an SMR at its Nine Mile Point nuclear station in upstate New York, near our expansion site. These permits should be reviewed promptly to demonstrate the proof-of-concept needed not only for expanded SMR siting in the United States but also for U.S. nuclear technology leaders to export their proven products to international markets.

The Honorable Nick Langworthy

1. The United States once produced nine percent of the world's memory chips. That was fifty years ago and today the U.S. only produces two percent. How can Micron, through projects like its facility under construction in Clay, New York, help get the United States up to twelve percent of the global share?

MICRON RESPONSE:

Over the next two decades, Micron's planned investments of over $140 billion in New York, Idaho, and Virginia will drive the U.S. to produce 12% of the global share of memory chips. However, building a fab in the United States takes twice as long as competing countries. Additionally, earlier estimates suggest that building advanced manufacturing fabs in the U.S. costs 35-45% more than building the same operations in Asia, and that gap has increased due to the inflation and lack of U.S. construction resources. Current U.S. incentives were established before inflationary pressures affected the entire country, and construction costs have surged by nearly 40% since 2020.

To reach the goal of substantially expanding the U.S. manufacturing share of the global supply of semiconductors, it is necessary to extend and increase the advanced manufacturing Investment Tax Credit (AMIC). Extending the AMIC by at least 4 years (it is currently set to expire next year) will ensure the construction of advanced manufacturing sites by providing the necessary timeline for planned projects to handle regulatory permitting and unanticipated governmental delays.

In addition to an AMIC extension, increasing the AMIC from 25% to 35% would give semiconductor manufacturers like Micron the stability needed to generate additional economic activity in the next four years, meet U.S. national security goals, and provide the confidence to make long-term investments in the U.S. by addressing the construction cost gap with Asia and level the playing field with other countries. The Building Advanced Semiconductors Investment Credit (BASIC) Act, led by Rep. Tenney (R-NY), would extend and increase the credit, and should be supported by members who wish to ensure America's technology leadership and manufacturing expansion. Further, Micron will need streamlined permitting regulations, continued investments in the semiconductor workforce for both operations and construction, and more access to affordable and abundant energy—as we testified.

2. We've seen bipartisan efforts in the past to streamline regulations, get rid of red tape, and clear the way for critical manufacturing projects. What still stands in the way as it relates to reforming the environmental review process? What has been left on the cutting room floor from past action that needs to be addressed this Congress?

MICRON RESPONSE:

From Micron's perspective, our company has completed an environmental review in a timely manner for its Boise expansion project and already has begun construction. In New York, Micron is currently undergoing both federal and state environmental reviews for its Clay, NY project.

Looking at the role of Congress, we are supportive of a process that ensures environmental protections but also streamlines review processes, especially for projects in states that already have robust environmental review processes in place where complying with state-level regulatory standards goes above and beyond the federal baseline. I would urge Congress to work swiftly to find

common sense reforms that will allow large-scale manufacturing projects to build in a timely fashion.

Looking forward, we are encouraged by recent action from EPA Administrator Zeldin to reconsider PM 2.5 as well as commitments to implementing wetland jurisdictional determinations in accordance with the U.S. Supreme Court's decision in Sacket v. EPA, 598 U.S. 651 (2023).

3. On April 9, 2025, I introduced the Infrastructure Project Acceleration Act (H.R. 2783), to help address these outstanding regulatory issues. My bill would allow projects in such states where the regulatory process is just as stringent as the federal process, to be exempt from NEPA review, among other regulatory reviews. This will shorten timelines, speed up projects, and help us get to where everyone here today believes we should be when it comes to American technological leadership. Is this bill something that would benefit projects like Micron's?

MICRON RESPONSE:

This bill goes to the core of the challenge we face expanding our operations in New York, addressing the same environmental concerns through overlapping and duplicative state- and federal-level regulations. Micron supports this bill as it would enable the build out of the semiconductor ecosystem in New York while maintaining environmental protections.

4. Focusing on the inflection point with meeting rising energy demand, how much energy and electricity do your facilities use? How has that changed over time?

MICRON RESPONSE:

A typical Micron fab uses around 400 megawatts of power, operating 24/7. This constant demand makes us a particularly good customer for utilities and helps maintain grid stability. But given that energy is a critical component of our operational costs, we work to ensure our energy consumption is as efficient as possible.

In Q4 2024, we saw a 15% reduction in our electricity intensity measured as electricity per gigabyte of production, from our CY2020 baseline. Last year, we reduced our Boise facility energy consumption by 19.5 million kilowatt hours, equivalent to the average annual consumption of over 1,700 households. We were able do this through an all-of-the-above approach: we eliminate energy consumption where feasible through process improvements and tool optimization, we recover energy through heat recapture and other innovations, and we optimize the energy we use through energy sensors and smart controls. Given how competitive our industry is, we must constantly stay ahead of the curve to make sure both our operations as well as the chips we manufacture are efficient as possible.

5. Looking specifically at the project being developed in Clay, New York, what role does natural gas play in powering this project?

MICRON RESPONSE:

As I discussed in my opening remarks, Micron supports an "all of the above" energy strategy that can keep prices affordable and reliable for our U.S. manufacturing expansion. This means expanding generating capacity across the board and permitting reform to update our transmission infrastructure and move it into the 21st century.

All of our U.S. sites have a blend of energy sources to fill our needs based on availability and what is most cost competitive. Each of our locations has a roughly 50/50 mix between natural gas and coal and carbon-free energy, so from our perspective expanding all energy sources makes sense to keep up with demand.

Looking at New York, state-wide the New York energy grid is around 15-20% hydro, 30-35% nuclear, 5-15% solar and wind, and 40-45% natural gas. For upstate New York, the generation mix is more concentrated in nuclear and hydropower (around 40% hydro and 43% nuclear), both significant competitive strengths for the region with abundant availability of both. However, natural gas plays a key role even in upstate New York, with approximately 7% of the region's power coming from natural gas in 2024.

The Honorable Doris Matsui

1. Mr. Bhatia, how can collaborations between the government and private sector be structured to accelerate the development and deployment of AI innovations while maintaining fair competition and safeguarding public interests?

MICRON RESPONSE:

As a semiconductor manufacturer, Micron has historically focused on deploying AI to optimize fab operations and ensure operational efficiency. Micron is recognized for its use of AI to remain competitive as the sole U.S. memory producer. Advanced manufacturing is crucial for success in the AI sector, yet the U.S. has not yet established a sustainable economic environment for this industry. To address this, it is essential for the U.S. government to enhance semiconductor incentives to foster a robust ecosystem and compete with other nations that have long invested in the semiconductor sector through supportive policies.

One significant measure is extending and increasing the Advanced Manufacturing Investment Credit (AMIC). Congresswoman Tenney proposed the BASIC Act, which aims to raise the AMIC value to 35% and extend its availability by four years. This, in combination with existing incentives, would help the U.S. stay competitive globally and ensure that we can expand U.S. semiconductor manufacturing. Enhancing the AMIC will accelerate investments in advanced manufacturing, generate jobs, stimulate economic growth, and establish a secure, leading-edge semiconductor ecosystem within the United States.

While advanced semiconductor manufacturing remains fundamental to AI progress, the growing complexity of large language models presents new challenges that necessitate memory-centric computing solutions. We recommend that Congress allocate additional funds for research and development partnerships with private industry to ensure microelectronics can keep pace with evolving AI technologies.

Semiconductors play a crucial role in enabling AI and should be a key focus of U.S. policy. As a semiconductor manufacturer, Micron continues to leverage AI to enhance fab operations and maintain competitiveness. Micron's AI applications include image analytics, acoustic listening, and thermal imaging, which improve manufacturing quality, efficiency, and accuracy while allowing engineers to focus on innovation. The company's AI initiatives also aim to enhance yield and quality through advanced AI systems. In expanding U.S. investments, Micron utilizes AI to optimize design and tool placement.

These AI advancements have contributed to improved worker safety and operational competitiveness at Micron: between 2016 and 2020, worker productivity increased by 18%, time to resolve quality issues decreased by 50%, time to market for new chips was reduced by 50%, and product scrap production fell by 22%. Such successes highlight the potential for greater collaboration between the government and the private sector to deploy AI in manufacturing, enhancing worker safety, reducing power and input consumption, and maximizing production. Micron's ability to utilize AI for manufacturing improvements supports its competitive edge and is expected to drive U.S. investment, potentially creating 80,000 jobs and furthering partnerships with the U.S. government.