

## Application Review

**Issue Date: December 03, 2024**

**Region:** Winston-Salem Regional Office  
**County:** Guilford  
**NC Facility ID:** 4101022  
**Inspector's Name:** Jim Hafner  
**Date of Last Inspection:** 04/10/2023  
**Compliance Code:** 3 / Compliance - inspection

<p style="text-align: center;"><b>Facility Data</b></p> <p><b>Applicant (Facility's Name):</b> Qorvo US, Inc.</p> <p><b>Facility Address:</b>          Qorvo US, Inc.          7628 Thorndike Road          Greensboro, NC 27409</p> <p><b>SIC:</b> 3674 / Semiconductors &amp; Related Devices  <b>NAICS:</b> 334413 / Semiconductor and Related Device Manufacturing</p> <p><b>Facility Classification: Before:</b> Title V    <b>After:</b> Title V  <b>Fee Classification: Before:</b> Title V    <b>After:</b> Title V</p>	<p style="text-align: center;"><b>Permit Applicability (this application only)</b></p> <p><b>SIP:</b> 15A NCAC 02D .0503, .0515, .0516, .0521, .0541, .1806, and 02Q .0308(a), .0309(b)  <b>NSPS:</b> Dc, IIII  <b>NESHAP:</b> GACT ZZZZ, GACT JJJJJ, GACT WWWW  <b>PSD:</b> NA  <b>PSD Avoidance:</b> 02Q .0317 (VOCs)  <b>NC Toxics:</b> 02Q .0711, 02D .1100  <b>112(r):</b>  <b>Other:</b> 02Q .0317 (MACT Avoidance)</p>
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Contact Data			Application Data
<p style="text-align: center;"><b>Facility Contact</b></p> <p>Stephanie Ellis          EHS Manager          (336) 678-5418          7628 Thorndike Road          Greensboro, NC 27409</p>	<p style="text-align: center;"><b>Authorized Contact</b></p> <p>Mike Fresina          VP Operations          (336) 678-8031          7628 Thorndike Road          Greensboro, NC 27409</p>	<p style="text-align: center;"><b>Technical Contact</b></p> <p>Stephanie Ellis          EHS Manager          (336) 678-5418          7628 Thorndike Road          Greensboro, NC 27409</p>	<p><b>Application Number:</b> 4101022.24A  <b>Date Received:</b> 04/26/2024  <b>Application Type:</b> Renewal  <b>Application Schedule:</b> TV-Renewal  <b>Existing Permit Data</b>  <b>Existing Permit Number:</b> 08409/T19  <b>Existing Permit Issue Date:</b> 11/25/2019  <b>Existing Permit Expiration Date:</b> 10/21/2024</p>

<b>Total Actual emissions in TONS/YEAR:</b>							
CY	SO2	NOX	VOC	CO	PM10	Total HAP	Largest HAP
2022	0.0100	6.48	58.42	3.11	0.3600	0.2903	0.1400 [Chlorine]
2021	0.0100	7.01	92.21	3.31	0.3800	0.8668	0.6420 [Chlorine]
2020	0.0100	6.66	57.65	3.14	0.3700	0.7852	0.5520 [Chlorine]
2019	0.0100	5.47	63.99	2.86	0.3300	1.18	0.9065 [Chlorine]
2018	0.0100	5.41	70.97	2.90	0.1000	1.21	0.8635 [Chlorine]

<p><b>Review Engineer:</b> Jacob Larson</p> <p><b>Review Engineer's Signature:</b>  <i>Jacob Larson</i></p> <p><b>Date:</b>          12/03/2024</p>	<p style="text-align: center;"><b>Comments / Recommendations:</b></p> <p><b>Issue:</b> 08409/T20  <b>Permit Issue Date:</b> December 03, 2024  <b>Permit Expiration Date:</b> November 30, 2029</p>
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## 1. Purpose of Application

Qorvo US, Inc (Qorvo) currently holds Title V Permit No. 08409T19 with an expiration date of October 31, 2024 for a semiconductor manufacturing facility in Greensboro, Guilford County, North Carolina. This permit application is for a permit renewal without modification. The renewal application was received on April 26, 2024 or at least six months prior to the expiration date. Therefore, the existing permit shall not expire until the renewal permit has been issued or denied. All terms and conditions of the existing permit shall remain in effect until the renewal permit has been issued or denied.

## 2. Facility Description

Qorvo currently operates out of the following sites, all located in Greensboro:

- 7907 Piedmont Triad Parkway: houses packaging lab operations and two natural gas-fired boilers. A third boiler for this site is in the permit but has not yet been installed.
- 7908 Piedmont Triad Parkway: This building houses semiconductor production of six-inch wafers. There are two semiconductor manufacturing lines, conducting photolithography, metallization, etch and deposition, and testing in clean room environments. The building also contains the wafer dicing center, three natural gas/No. 2 fuel oil-fired boilers, and four No. 2 fuel oil-fired emergency generators.
- 7914 Piedmont Triad Parkway: Primarily used for testing and R&D, this building houses five natural gas-fired boilers, six natural gas-fired humidifiers, and two No. 2 fuel oil-fired emergency generators. Qorvo has added a microshield plating line project at the site, which includes an electrolytic copper/nickel plating line, an electroless copper plating line, a rack stripping line, and three natural gas-fired rise water evaporators.
- 8220 Piedmont Triad Parkway: houses four natural gas-fired humidifiers, a natural gas-fired area heater, and a 500 kW No. 2 fuel oil-fired emergency generator. The facility has a 20,000-gallon capacity diesel fuel storage tank.
- 7628 Thorndike Road: This is the headquarters building. It has a small No. 2 fuel oil-fired generator.

## 3. History/Background/Application Chronology

### History/Background

November 25, 2019      Air Permit No. 08409T19 was issued on November 25, 2019 with an expiration date of October 31, 2024.

August 03, 2021      Permit applicability determination for PFC Abatement devices. Determination made on August 31, 2021 that permit is not required.

### Application Chronology

April 26, 2024      DEQ received permit application 4101022.24A for Title V renewal.

April 30, 2024      Sent acknowledgment letter indicating that the application for permit renewal was complete.

May 08, 2024	Sent PFAS Questionnaire to facility response received June 07, 2024.
May 24, 2024	Teams meeting with Stephanie Ellis the EHS Manager regarding PFAS questionnaire. Minor concerns were addressed.
June 11, 2024	Facility request PFAS Disclosure confidentiality. Technical additional information was requested by DAQ for the appropriate documentation for confidentiality request. Request for additional time received on July 11, 2024.
May 28, 2024	Draft permit and review forwarded for comments to Permitting Supervisor.
June 11, 2024	Requested technical additional information regarding permittee confidential request. Facility requested one month extension on July 11, 2024.
June 25, 2024	Comments received from Mark Cuilla, Permitting Chief.
July 12, 2024	Additional technical information request extension was given. Response received on August 12, 2024.
August 13, 2024	Requested approval of the facility confidentiality request from Mark Cuilla, Permitting Chief. Denial was received on September 24, 2024.
August 21, 2024	Draft permit and review forwarded to the Stationary Compliance Branch for comments. No comments were received August 30, 2024.
August 21, 2024	Draft permit and review forwarded to the Winston-Salem Regional Office for comments. Minor comments were received August 27, 2024.
September 25, 2024	Additional technical information was requested inquiring whether the applicant wanted to resubmit the confidentiality request or withdrawal the request. Applicant withdrew the request on October 04, 2024.
October 04, 2024	Draft permit forwarded to the applicant for comments. Minor comments were received October 15, 2024.
October 18, 2024	Draft permit and permit review forwarded to public notice.
November 17, 2024	Public comment period ends. No comments received.
December 02, 2024	EPA comment period ends. No comments received.
December 03, 2024	Permit issued.

#### 4. Permit Modifications/Changes and TVEE Discussion

The following table describes the modifications to the current permit as part of the renewal process.

Page No.	Section	Description of Changes
--	Cover page and throughout permit	<ul style="list-style-type: none"> <li>Updated all dates and permit revision numbers.</li> </ul>
3	Cover page	<ul style="list-style-type: none"> <li>Added “Notice Regarding The Right To Contest A Division Of Air Quality Permit Decision” page</li> </ul>
4	Summary of Changes to Permit	<ul style="list-style-type: none"> <li>Added summary of changes made to Permit No. 08409T20 according to the most recent requirements of the renewal Title V permit</li> </ul>
2	Table of Contents	<ul style="list-style-type: none"> <li>Added Section 3.0 as “Insignificant Activities List”</li> <li>Added Section 4.0 as “General Permit Conditions”</li> </ul>
3	List of Acronyms	<ul style="list-style-type: none"> <li>Added “List of Acronyms”</li> </ul>
11	2.1 D.3	<ul style="list-style-type: none"> <li>Updated MACT ZZZZ to current regulatory language</li> </ul>
13	2.1 D.3.o	<ul style="list-style-type: none"> <li>Updated Fuel requirement to 40 CFR 1090.305 per December 04, 2020 rule revision.</li> </ul>
15	2.1 E.3	<ul style="list-style-type: none"> <li>Updated NSPS IIII to current regulatory language</li> </ul>
16	2.1 E.3.e	<ul style="list-style-type: none"> <li>Updated Fuel requirement to 40 CFR 1090.305 per December 04, 2020 rule revision.</li> </ul>
17	2.1 E.4	<ul style="list-style-type: none"> <li>Updated MACT ZZZZ to current regulatory language</li> </ul>
19	2.1 F.1.a	<ul style="list-style-type: none"> <li>Corrected emission limit’s significant figures from 0.3658 to 0.37</li> </ul>
20	2.1 F.4	<ul style="list-style-type: none"> <li>Updated NSPS Dc to current regulatory language</li> </ul>
20	2.1 F.5	<ul style="list-style-type: none"> <li>Updated GACT JJJJJ to current regulatory language</li> </ul>
24	2.1 H.1.c-d	<ul style="list-style-type: none"> <li>Updated format</li> </ul>
26	2.2 A.1	<ul style="list-style-type: none"> <li>Updated NC Toxics condition and table to current shell version</li> </ul>
27	2.2 A.4	<ul style="list-style-type: none"> <li>Updated TPER condition and table to current shell format</li> </ul>
28	2.2 A.5	<ul style="list-style-type: none"> <li>Updated facility avoidance conditions for MACT 5B to current shell</li> </ul>
29	2.2 A.6	<ul style="list-style-type: none"> <li>Added PFAS Disclosure condition</li> </ul>
30	Section 3	<ul style="list-style-type: none"> <li>Added Insignificant Activities as Section 3 of the Title V Permit</li> <li>Corrected I-CTM description from “Single-cell cooling tower” to Two-cell cooling tower” per facility request.</li> <li>Updated subparagraphs to current shell</li> </ul>
31-38	Section 4	<ul style="list-style-type: none"> <li>Added General Conditions as Section 4 of the Title V Permit</li> <li>Updated General Conditions to version 8.0, 07/10/24 from version 7.0, 08/21/2023</li> </ul>

The following TVEE changes will be made as a result of this renewal:

- Corrected I-CTM description from “Single-cell cooling tower” to Two-cell cooling tower” per facility request.
- Addition of CDEB3 per Jim Hafner facility inspector
- Moved control devices CDEB4 and CDEB5 from ESMAN31 to ESMAN32 per Jim Hafner facility inspector
- Moved Emission source PL to insignificant list as I-PL
- Added I-ABATE-1 and I-ABATE-2 to insignificant list per applicant request.

## 5. Regulatory Review

Qorvo is subject to the following regulations. The facility's equipment and operations have not changed since the last renewal in 2019. The permit was updated to reflect the most current stipulations for all applicable regulations, where necessary.

- 15A NCAC 02D .0503, Particulates from Fuel Burning Indirect Heat Exchangers – The boilers (ID Nos. ESB31, ESB32, and ESB33) are subject to particulate emissions limitations of 0.37 lb/million Btu calculated by the equation below.

$$E = 1.090 \times Q^{-0.2594}$$

When: E=Allowable emission limit for PM in lb/million Btu  
Q= Maximum heat input in million Btu/hour

There are no monitoring, recordkeeping, or reporting requirements from firing natural gas or No. 2 fuel oil. Continued compliance is anticipated.

- 15A NCAC 02D .0515, Particulates from Miscellaneous Industrial Processes – This rule applies to emission sources that exhaust through a stack and are not subject to another particulate matter (PM) emission limit. Emissions of particulate matter from these sources (ID Nos. ESMAN31, ESMAN32, and ESWD2) and the Microshield Plating Lines (ID Nos. ES-PL1a through f, ES-PL2a through f, ES-SLa and ES-SLb) shall not exceed the emission rate as calculated by the following equations:

$$E = 4.10 \times P^{0.67} \quad (\text{for process rates less than or equal to 30 tons per hour}), \text{ or}$$
$$E = 55.0 \times P^{0.11} - 40 \quad (\text{for process rates greater than 30 tons per hour})$$

Where E = allowable emission rate in pounds per hour  
P = process weight in tons per hour

- Emission sources (ID Nos. ESMAN31 and ESMAN32) are controlled by three scrubbers (ID No. CD31, CD32, and CD33) are subject to daily monitoring and recordkeeping, and semiannual reporting.
- Wafer dicing Center No. 2 (ID No. ESWD2) uses laser equipment that cuts gallium arsenide wafers into individual die. This process produces a dust containing arsenic which is controlled by fabric and HEPA filters (ID No. CDWD2a, CDWD2c, CDWD2b, and CDWD2d) is subject to monthly monitoring recordkeeping and semiannual reporting.
- the Microshield Plating Lines (ID Nos. ES-PL1a through f, ES-PL2a through f, ES-SLa and ES-SLb) are controlled by mist eliminators (ID No. CD-ME1) and are required to record the process rate in tons/hr with no reporting requirement in order to determine compliance with the standard.

Continued compliance is anticipated.

- 15A NCAC 02D .0516, Sulfur Dioxide from Combustion Sources - This rule applies to combustion sources that are not subject to an SO<sub>2</sub> emission limit under NSPS or MACT. Emissions of sulfur dioxide from emission sources (ID Nos. ESG1, ESG31, ESG32, ESG33, G1, ESG34, ESB31, ESB32, and ESB33) shall not exceed 2.3 pounds per million Btu heat input. These sources only burn natural gas or No. 2 Fuel oil and due to the relatively low sulfur content of these fuels there are no MRR requirements. Continued compliance is anticipated.

- 15A NCAC 02D .0521, Control of Visible Emissions – This rule applies to sources of visible emissions (VE) that are not subject to another VE standard under 02D .0500. Sources manufactured after July 1, 1971 are considered “new” with respect to this rule and visible emissions shall not be more than 20 percent opacity when averaged over a six-minute period.
  - Emission sources (ID Nos. ESMAN31, ESMAN32, B10, ESG1, ESG31, ESG32, ESG33, G1, ESG34, ESB31, ESB32, and ESB33) are all new boilers/generators that use natural gas or No. 2 fuel oil. Therefore, are subject to 20% opacity and no MRR requirements.
  - Wafer Dicing Center (ID No. ESWD2) is subject to 20% opacity and no MRR requirements.
  - Microshield Plating Lines (ID Nos. ES-PL1a through f, ES-PL2a through f, ES-SLa and ES-SLb) is subject to 20% opacity with no MRR requirements.

Compliance for No. 2 fuel oil and natural gas is expected with proper operation and maintenance listed in NSPS IIII, Dc and GACTs 6J, 4Z detailed in Section 6. Wafer Dicing Center and Microshield Plating Lines are controlled by HAP, VOC, and PM control devices. Continued compliance is anticipated.
- 15A NCAC 02D .0541, Control of Emissions from Abrasive Blasting – This rule applies to sources that conduct abrasive blasting indoors and vented to atmosphere. Small parts bead blast system (ID No. B10) is controlled by cartridge filter (ID No. CDB10). This source is subject to monthly visual inspections and annual inspection of the cartridge filter. Summary report of the inspections and any maintenance shall be maintained in logbook and reported semiannually. Continued compliance is anticipated.
- 15 NCAC 02D .1806, Control and Prohibition of Odorous Emissions (State-enforceable only condition) - The Permittee shall not operate the facility without implementing management practices or installing and operating odor control equipment sufficient to prevent odorous emissions from the facility from causing or contributing to objectionable odors beyond the facility’s boundary. Continued compliance is anticipated.
- 15A NCAC 02Q .0308(a); 15A NCAC 02Q .0309(b), Disclosure of Information Relating to Emissions of Fluorinated Chemicals (State-enforceable only condition) - Permittee has ongoing duty to disclose the presence of material containing fluorinated chemicals that have the potential to emit fluorinated chemicals into the environment. Disclosers shall be submitted to the regional office supervisor within thirty days of facility becoming aware of such information.

As part of the renewal process, the applicant was requested to respond to a series of PFAS related questions developed by the Department. These questions were developed to begin the creation of a database of potential sources of PFAS. Questions and facility response can be found in section 13 Appendix.

## 6. NSPS, NESHAPS/MACT, PSD, 112(r), CAM

### NSPS

#### *Subpart Dc*

The facility’s three natural gas/No. 2 fuel oil-fired boilers (ESB31, ESB32, and ESB33) are subject to 40 CFR Part 60, Subpart Dc for “Small Industrial-Commercial-Institutional Steam Generating Units.” Under this rule, the sulfur content of the fuel oil combusted in the boilers shall not exceed 0.5 percent by

weight. To comply, the facility is required to record the amounts of each fuel combusted during each month. The records must be maintained for two years following the date of such record. The facility must also submit a semi-annual report of the fuel supplier certification. Continued compliance is anticipated.

### *Subpart III*

The facility's No. 2 fuel oil-fired emergency generator (ESG34) is subject to 40 CFR Part 60, Subpart III for "Stationary Compression Ignition Internal Combustion Engines." The generator is a 2006 Caterpillar model with a certified engine sticker that indicates it belongs to EPA Family 5CPXL78.1ERK. To comply, the facility must operate and maintain the engine according to manufacturer specifications. Diesel fuel used by the engine is limited to a maximum sulfur content of 15 ppm and a minimum cetane index of 40 or a maximum aromatic content of 35 volume percent. The engine must be fitted with a non-resettable hour meter. Operation for maintenance checks and readiness testing is limited to 100 hours per year. Operation in non-emergency situations is allowed up to 50 hours per year, but those 50 hours are counted towards the 100 hours per year provided for maintenance and testing. There is no time limit on the use of emergency stationary ICE in emergency situations. The facility is required to keep records of all notifications associated with the subpart and records of all maintenance conducted on the engine. The facility must also keep records of operation hours of the engine that are recorded through the non-resettable hour meter. Continued compliance is anticipated.

The insignificant 500 kW No. 2 fuel oil-fired emergency generator (IS-G2) at the 8220 Piedmont Triad Parkway building is also subject to 40 CFR Part 60, Subpart III. The generator is a 2016 Generac model with a certified engine sticker that indicates it belongs to EPA Family GCPXL15.2NZS-003. Continued compliance is anticipated.

### NESHAP/MACT

#### *GACTION ZZZZ*

The facility is subject to 40 CFR Part 63, Subpart ZZZZ for "Stationary Reciprocating Internal Combustion Engines" due to the five No. 2 fuel oil-fired emergency generators (ESG1, ESG31, ESG32, ESG33, and G1). Per this rule, engines at area sources are considered "existing" if construction commenced before June 12, 2006, and are considered "new" if construction commenced on or after this date. All five engines are considered existing, and emergency use only. The compliance date was May 3, 2013. For the five engines, the facility is required to do the following:

- Emergency stationary CI RICE must a) change oil and filter every 500 hours of operation or annually, whichever comes first; b) inspect air cleaner every 1,000 hours of operation or annually, whichever comes first; and c) inspect all hoses and belts every 500 hours of operation or annually, whichever comes first, and replace, as necessary. There are no other operating limitations, fuel requirements, or performance tests required.
- The facility with an engine subject to the oil change requirements has the option of utilizing an oil analysis program to extend the specified oil change requirement, as described under 40 CFR 63.6625(j).
- The stationary RICE must be operated and maintained according to the manufacturer's emission-related operation and maintenance instructions, or facilities must develop and follow their own maintenance plan which must provide to the extent practicable for the maintenance and operation of the engine in a manner consistent with good air pollution control practice for minimizing emissions.

- The engine’s time spent idle during startup must be minimized. The facility must also minimize the engine’s startup time to a period needed for appropriate and safe loading of the engine, not to exceed 30 minutes.
- Operation of the engine for any reason other than emergency operation, maintenance and testing, and operation in non-emergency situations for up to 50 hours per year is prohibited. There is no time limit on the use of emergency stationary RICE in emergency situations. Operation for maintenance checks and readiness testing is limited to 100 hours per year. Operation in non-emergency situations is allowed up to 50 hours per year, but those 50 hours are counted towards the 100 hours per year provided for maintenance and testing. The 50 hours per year for non-emergency situations cannot be used for peak shaving or to generate income for a facility.
- The engine must be equipped with a non-resettable hour meter. The facility must keep records which would support that the 100 hour per year operating limit is not exceeded, and the facility must document why the engine was operated and maintain records to support that the work practices were followed.

The facility must also keep records of each notification and report for this subpart. In addition, records regarding maintenance and any malfunction, including occurrence, duration, and corrective action, must be kept. The facility must submit a summary report of the monitoring and recordkeeping activities on a semiannual basis.

No. 2 fuel oil-fired emergency generator (ID. No. ESG34) is also subject to 40 CFR Part 63, Subpart ZZZZ for “Stationary Reciprocating Internal Combustion Engines”. The engine is considered “existing” if construction commenced before June 12, 2006, and are considered “new” if construction commenced on or after this date. ESG34 is considered a new source as it was constructed in May 2007 and is for emergency use only. The new engine has no other requirements under Subpart ZZZZ, except to comply with the requirements of NSPS 40 CFR Part 60, Subpart IIII. Continued compliance is anticipated.

Insignificant No. 2 fuel oil-fired emergency generators (ID. Nos. IS-G2 and I-FG3) are also subject to 40 CFR Part 63, Subpart ZZZZ. IS-G2 is considered a new source as it was constructed after June 12, 2006. Therefore, its only requirement is to comply with NSPS Subpart IIII detailed above. I-FG3 is considered an existing source for emergency use only. The compliance date for the compression ignition (CI) engines was May 3, 2013. The facility is required to meet the same requirements listed in Condition 2.1 D.3 of the permit. Continued compliance is anticipated.

*MACT BBBBB (Avoidance)*

The facility is subject to 02Q .0317 to avoid the applicability of 02D .1111 “Maximum Achievable Control Technology” for 40 CFR Part 63, Subpart BBBBB “NESHAP for Semiconductor Manufacturing” for Semiconductor Manufacturing Lines (ID Nos. ESMAN31 and ESMAN32) and Waste Solvent Storage Tanks (ID Nos. EST31, EST32, and EST33). To remain classified as a minor source for hazardous air pollutants (HAPs), the facility must emit less than 10 tons per year of each HAP and 25 tons per year of all HAPs combined. To comply, the facility must maintain monthly records of each material emitted containing HAPs so that the quantities of each individual and all combined HAP emissions per month can be determined. The facility must submit a summary report of the monthly individual and total HAP emissions for the previous 12 months on a semi-annual basis. The emissions must also be calculated for each of the 12-month periods over the previous 12 months.

During the application review of permit 08409T19, DAQ recognized that 02Q .0317 ensures minor status to avoid applicability of all major MACT—including Subparts ZZZZ and JJJJJ. Accordingly,



the stipulations in the permit pertaining to these MACT rules (for RICE, Specific Conditions 2.1 D.3, 2.1 E.4; for boilers, Specific Conditions 2.1 F.5) were revised to reference the requirements applicable to an area source. Continued compliance is anticipated.

#### *GACTION*

Generally Available Control Technology” in regard to 40 CFR Part 63, Subpart JJJJJ (6J) for “Industrial, Commercial, and Institutional Boilers at Area Sources.” The sources that would be subject to this federal regulation are the three natural gas/No. 2 fuel oil-fired boilers (ESB31, ESB32, and ESB33). The facility primarily uses natural gas and has opted for the exemption for liquid fuel backup for all their affected sources. To maintain this exemption, the facility is only allowed to fire liquid fuel during periods of gas curtailment, gas supply interruptions, startups, or for periodic testing on liquid fuel not to exceed a combined total of 48 hours during any calendar year. The facility must maintain records that document the time periods when liquid fuel is fired and the reasons for why the liquid fuel is fired. Continued compliance is expected.

#### *MACT WWWW*

The facility is subject to 40 CFR Part 63, Subpart WWWW (6W) “Area Source Standards for Plating and Polishing Operations” due to the nickel-plating tank (ES-PL1c), black nickel plating tank (ES-PL1d), and two copper sulfate and nickel sulfate plating tanks (ES-PL2a and ES-PL2b). These are considered new sources as construction occurred after March 14, 2008. Therefore, the compliance date is upon startup, which was January 17, 2017. The Initial Notification and the Notification of Compliance Status for this subpart were received on January 26, 2017. The facility complies with Subpart 6W by using mesh pad eliminators as provided in §63.11507(a)(2). The facility shall operate all capture and control devices according to the manufacturer’s specifications and operating instructions.

In addition, pursuant to 40 CFR 63.11507(g), the facility shall comply with the following management practices:

- Minimize bath agitation when removing any parts processed in the tank, as practicable except when necessary to meet part quality requirements.
- Maximize the draining of bath solution back into the tank, as practicable, by extending drip time when removing parts from the tank; using drain boards (also known as drip shields); or withdrawing parts slowly from the tank, as practicable.
- Optimize the design of barrels, racks, and parts to minimize dragout of bath solution (such as by using slotted barrels and tilted racks, or by designing parts with flow-through holes to allow the tank solution to drip back into the tank), as practicable.
- Use tank covers, if already owned and available at the facility, whenever practicable.
- Minimize or reduce heating of process tanks, as practicable (e.g., when doing so would not interrupt production or adversely affect part quality).
- Perform regular repair, maintenance, and preventive maintenance of racks, barrels, and other equipment associated with affected sources, as practicable.
- Minimize bath contamination, such as through the prevention or quick recovery of dropped parts, use of distilled/de-ionized water, water filtration, pre-cleaning of parts to be plated, and thorough rinsing of pre-treated parts to be plated, as practicable.
- Maintain quality control of chemicals, and chemical and other bath ingredient concentrations in the tanks, as practicable.
- Perform general good housekeeping, such as regular sweeping or vacuuming, if needed, and periodic washdowns, as practicable.
- Minimize spills and overflow of tanks, as practicable.
- Use squeegee rolls in continuous or reel-to-reel plating tanks, as practicable.

- Perform regular inspections to identify leaks and other opportunities for pollution prevention. The facility is required to prepare an annual certification of compliance. It is only required to be sent to the DAQ for years in which a deviation has occurred. The facility satisfies this requirement through submittal of the Annual Compliance Certificate report. Continued compliance is anticipated.

### PSD

Qorvo has accepted avoidance conditions of 2Q .0317 which states that for the facility to avoid the applicability of 2D .0530 “Prevention of Significant Deterioration,” the facility must emit less than 250 tons of VOC emissions per consecutive 12-month period. Calculations of the total amount of VOC emissions shall be recorded monthly in a logbook. VOC emissions shall be determined by multiplying the total amount of each type of VOC-containing material consumed during the month by the VOC content of the material. The facility must submit a semiannual summary report of the VOC emissions for the previous 17 months with 12-month rolling totals. The records were reviewed and found to be complete. The last reports were received on February 01, 2024 and on July 24, 2024, and found to be complete. In CY 2022, the facility emitted 58.42 tons of VOCs. The facility appears in compliance with 2Q .0317.

### 112(r)

The facility is not subject to Section 112(r) of the Clean Air Act requirements because it does not store any of the regulated substances in quantities above the 112(r) thresholds. No change with respect to 112(r) is anticipated under this permit renewal.

### CAM

The CAM rule (40 CFR 64; 15A NCAC 02D .0614) applies to each pollutant specific emissions unit (PSEU) at major TV facilities that meets all three following criteria:

- the unit is subject to any (non-exempt: e.g. pre November 15, 1990, Section 111 or Section 112 standard) emission limitation or standard for the applicable regulated pollutant.
- the unit uses any control device to achieve compliance with any such emission limitation or standard.
- The unit has potential pre-control device emissions of the applicable regulated air pollutant that are equal to or greater than 100 percent of the amount, in tons per year, required for a source to be classified as a major source (i.e., 100 tons per year for criteria pollutants or 10/25 tons per year for HAPs).

CAM was determined in a preceding permit review (December 29, 2014) to be non-applicable to the Qorvo facility. There has been no changes to the facility’s emission sources that would affect CAM. Therefore, the facility is not subject to CAM. This permit renewal does not change this facility’s CAM status.

## **7. Facility Wide Air Toxics**

The Qorvo facility is subject to the State-enforceable only emission limits for arsenic, chlorine, and sulfuric acid in accordance with 15A NCAC 02D .1100, “Control of Toxic Air Pollutants”. These emission limits were established as a facility-wide worst-case single stack modeling demonstration. To ensure compliance with these limits, Qorvo is required to comply with operating restrictions for wafer dicing center No. 2 (**ID No ESWD2**). The operating restrictions describe the control requirements for this source. In addition to the operating restrictions, Qorvo is required to conduct proper inspection and maintenance activities on the installed control devices. This permit renewal does not affect this status.

Pollutant	CAS No.	Facility Wide Emission Limits		
		(lb/yr)	(lb/day)	(lb/hr)
Arsenic	7440-38-2	1.21		
Chlorine	7782-50-5		34.28	10.41
Sulfuric Acid	7664-93-9		4.40	0.23

The permit lists several NC toxic air pollutants (TAPs) and their respective toxic permit emission rates (TPERs) as established in 15A NCAC 02Q .0711, "Emission Rates Requiring a Permit". Qorvo has demonstrated its facility-wide actual emissions do not exceed the TPERs. The permit requires Qorvo to operate and maintain the facility so that emissions of any listed TAPs from the facility, including fugitive emissions, will not exceed the TPERs; and to maintain records that demonstrate compliance with each TPER. Continued compliance is expected.

Pollutant (CAS)	CAS No.	Carcinogens (lbs/yr)	Chronic Toxicants (lbs/day)	Acute Systemic Toxicants (lbs/hr)	Acute Irritants (lbs/hr)
Acetaldehyde	75-07-0				6.8
Acrolein	107-02-8				0.02
Ammonia (as NH <sub>3</sub> )	7664-41-7				0.68
Benzene	71-43-2	8.1			
Benzo(a)pyrene	50-32-8	2.2			
Beryllium	7440-41-7	0.28			
Cadmium	7440-43-9	0.37			
Formaldehyde	50-00-0				0.04
Hydrogen chloride (hydrochloric acid)	7647-01-0				0.18
Hydrogen fluoride (hydrofluoric acid component of Fluorides)	7664-39-3		0.63		0.064
n-hexane	110-54-3		23		
Mercury vapor	7439-97-6		0.013		
Manganese and Compounds	7439-96-5		0.63		
Nickel metal	7440-02-0		0.13		
Nitric acid	7697-37-2				0.256
Chromium (VI) Soluble chromate compounds as chromic acid	7738-94-5		0.013		
Toluene	108-88-3		98		14.4
Xylene	1330-20-7		57		16.4

## 8. Facility Emissions Review

The facility-wide potential emissions do not change under this TV permit renewal. Actual emissions for criteria pollutants and HAPs for the years 2018 through 2022 are provided in the header of this permit review.

## **9. Compliance Status**

DAQ has reviewed the compliance status of Qorvo. During the most recent inspection, conducted on April 10, 2023 by Jim Hafner of WiRO, the facility appeared to be in compliance with all applicable requirements. Further, the facility has had no air quality violations within the last five years. The facility's Annual Compliance Certification was received on February 01, 2024 and indicated compliance with all applicable requirements in 2023.

## **10. Public Notice/EPA and Affected State(s) Review**

A notice of the DRAFT Title V Permit shall be made pursuant to 15A NCAC 02Q .0521. The notice will provide for a 30-day comment period, with an opportunity for a public hearing. Consistent with 15A NCAC 02Q .0525, the EPA will have a concurrent 45-day review period. Copies of the public notice shall be sent to persons on the Title V mailing list and EPA. Pursuant to 15A NCAC 02Q .0522, a copy of each permit application, each proposed permit and each final permit shall be provided to EPA. Also pursuant to 02Q .0522, a notice of the DRAFT Title V Permit shall be provided to each affected State at or before the time notice provided to the public under 02Q .0521 above. No affected states or local agencies are within 50 miles of this facility.

## **11. Other Regulatory Considerations**

- A P.E. seal is NOT required for this renewal application.
- A zoning consistency determination is NOT required for this renewal application.
- A permit fee is NOT required for this renewal application.
- EPA has promulgated a rule (88 FR 47029, July 21, 2023), with an effective date of August 21, 2023, removing the emergency affirmative defense provisions in operating permits programs, codified in both 40 CFR 70.6(g) and 71.6(g). EPA has concluded that these provisions are inconsistent with the EPA's current interpretation of the enforcement structure of the CAA, in light of prior court decisions<sup>1</sup>. Moreover, per EPA, the removal of these provisions is also consistent with other recent EPA actions involving affirmative defenses<sup>2</sup> and will harmonize the EPA's treatment of affirmative defenses across different CAA programs.

As a consequence of this EPA action to remove these provisions from 40 CFR 70.6(g), it will be necessary for states and local agencies that have adopted similar affirmative defense provisions in their Part 70 operating permit programs to revise their Part 70 programs (regulations) to remove these provisions. In addition, individual operating permits that contain Title V affirmative defenses based on 40 CFR 70.6(g) or similar state regulations will need to be revised.

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<sup>1</sup> NRDC v. EPA, 749 F.3d 1055 (D.C. Cir. 2014).

<sup>2</sup> In newly issued and revised New Source Performance Standards (NSPS), emission guidelines for existing sources, and NESHAP regulations, the EPA has either omitted new affirmative defense provisions or removed existing affirmative defense provisions. See, e.g., National Emission Standards for Hazardous Air Pollutants for the Portland Cement Manufacturing Industry and Standards of Performance for Portland Cement Plants; Final Rule, 80 FR 44771 (July 27, 2015); National Emission Standards for Hazardous Air Pollutants for Major Sources: Industrial, Commercial, and Institutional Boilers and Process Heaters; Final Rule, 80 FR 72789 (November 20, 2015); Standards of Performance for New Stationary Sources and Emission Guidelines for Existing Sources: Commercial and Industrial Solid Waste Incineration Units; Final Rule, 81 FR 40956 (June 23, 2016).

Regarding NCDAQ, it has not adopted these discretionary affirmative defense provisions in its Title V regulations (15A NCAC 02Q .0500). Instead, DAQ has chosen to include them directly in individual Title V permits as General Condition (GC) J.

Per EPA, DAQ is required to promptly remove such impermissible provisions, as stated above, from individual Title V permits, after August 21, 2023, through normal course of permit issuance.

## **12. Recommendations**

The permit renewal application for Qorvo US, Inc. located in Greensboro, Guilford County, North Carolina has been reviewed by DAQ to determine compliance with all procedures and requirements. DAQ has determined this facility is complying or will achieve compliance, as specified in the permit, with all requirements that are applicable to the affected sources. DAQ recommends the issuance of Air Permit No. 08409T20.

## 13. Appendix

### Questions concerning air emissions of PFAS Qorvo US, Inc Response – Title V Air Permit Renewal 08409T19

- a. Will your facility use any material or products in your operations that contain fluorinated chemicals? If so, please identify such materials or products and the fluorinated chemicals they contain.
  - a. *Yes – list attached as Appendix to end of questionnaire*
- b. Will your facility formulate/create products or byproducts (directly or indirectly) that contain fluorinated chemicals (across multiple media)? If so, please identify such products or byproducts and the fluorinated chemicals they contain.
  - a. *Fluorinated chemicals are utilized to etch or clean in-process materials and are not purposely incorporated into products manufactured at the Greensboro facility. There are no byproducts of our manufacturing operations.*
- c. Will your facility generate solid, liquid, or gaseous related emissions, discharges, or wastes/products containing fluorinated chemicals? If so, please identify such waste streams or materials and the fluorinated chemicals they contain.
  - a. *Air: Hydrogen fluoride is emitted as a breakdown emission from several processes on site. Unreacted process gases including SF6, C3F8, and CF4, as well as trace amounts of BF3 and Kr/Ne/F are emitted. Portions of C3F8 and SF6 process gases are abated as part of our greenhouse gas minimization program; breakdown gasses including C2F6, C5F8, and CHF3 are emitted post-abatement.*
  - b. *Wastewater: Fluorides from HF and NH4F etch processes and from chemical bottle rinsewaters are discharged to the City of Greensboro POTW.*
  - c. *Industrial Wastes: Corrosive contaminated solids, including wipes and PPE, can contain HF and NH4F residues. These materials are managed as industrial or regulated hazardous wastes through a contracted third-party TSDF.*
- d. Do your facility's processes or operations use equipment, material, or components that contain fluorinated chemicals (e.g., surface coating, clean room applications, solvents, lubricants, fittings, tubing, processing tools, packaging, facility infrastructure, air pollution control units)? Could these processes or operations directly or indirectly (e.g., through leaching, chemical process, heat treatment, pressurization, etc.) result in the release of fluorinated chemicals into the environment?
  - a. *PFA and PTFE materials are used throughout the facility as they are chemically compatible with the chemistries used in semiconductor manufacturing equipment. The materials themselves are disposed at end of life, typically to landfill. In addition, non-fluorinated construction materials (e.g. PVC, C-PVC, FRP) come into contact with fluorinated chemicals (HF, NH4F, SF6, C3F8, CF4, BF3, Kr/Ne/F) which could leach into those construction materials.*
  - b. *On site chillers contain several different types of fluorinated refrigerants, listed in the Appendix under refrigerant gas.*
- e. List the fluorinated chemicals identified (i.e., through testing or desktop review) above in your response under the appropriate methods/approaches? If one is not, are they on any other known US or International target lists?

- a. *All chemicals listed in the appendix were identified through desktop review. No testing has occurred to quantify or confirm emissions.*
  - b. *Small quantities of Class I and Class II ODS materials are on site in older equipment as refrigerant (R-12, R-22 and R-123). Remaining fluorinated refrigerants are HFCs.*
- OTM-45 (air emissions)
  - Methods 533 & 537.1 (drinking water)
  - SW-846: Method 8327 (water)
  - Draft Method 1633 (water, solids, tissue)
  - “Total PFAS” Draft Method 1621 for Adsorbable Organic Fluorine (wastewater)
  - Non targeted analytical methods
  - Qualitative approach through suspect screening
- f. Are there other facilities or operations in the U.S. or internationally engaged in the same or similar activities involving fluorinated chemicals addressed in your response to the above questions? If so, please provide facility identification information? In addition, are there any ISO (International Organization for Standardization) certification requirements?
- a. *Qorvo has semiconductor manufacturing facilities in Hillsboro, OR and Richardson, TX that are engaged in similar activities to the Greensboro, NC facility.*
  - b. *Qorvo is unaware of any ISO certification requirements relative to fluorinated compounds. Qorvo US manufacturing organizations are certified to ISO14001:2015.*
- g. Do you plan to store AFFF on site, use it in fire training at the site, use it for fighting fires at the facility, or include it in a fire fighting system at the site?
- a. *Qorvo does not have nor plans to store or use AFFF materials on site. There is a fluorinated dry chemical fire protection system for a server room that utilizes FM-200 as the extinguishing agent. See details in the Appendix.*
- h. Are other emerging contaminants (e.g., 1,4-dioxane, bromine, perchlorate, 1,2,3-Trichloropropane) used in some capacity within your facility or operations?
- a. *1,4-dioxane is present in some materials used on site.*
- i. Do you need technical assistance to answer the above questions?
- a. *Qorvo requested and received clarification on the scope and detail expected in providing data on this questionnaire from Jacob Larson with NC DEQ.*

In identifying any fluorinated chemicals or emerging contaminants in response to any of the above questions, please use CAS numbers (if available) and specify the relevant quantities of any such chemicals. If your answers to any of the above questions rely on assumptions or, if information necessary to respond to any of these questions is unavailable, please state. If any of the information requested is deemed a “trade secret” under N.C.G.S. § 66-152(3) and subject to confidential treatment under N.C.G.S. § 132-1.2(1) as required under the Public Record Act, please contact us to discuss proper designation of this information.

Appendix – Fluorinated Chemicals Present at Qorvo US, Inc – Greensboro Campus Facilities

Material Use	Material Description	Fluorinated Chemicals Contained	CAS Number
Manufacturing	Hydrofluoric Acid	Hydrofluoric Acid	7664-39-3
	Buffered Oxide Etch	Hydrofluoric Acid	7664-39-3
	Buffered Oxide Etch	Ammonium Fluoride	12125-01-8
	Buffered Oxide Etch with Surfactant	Hydrofluoric Acid	7664-39-3
	Buffered Oxide Etch with Surfactant	Ammonium Fluoride	12125-01-8
	Buffered Oxide Etch with Surfactant	Fluorinated Surfactant	Not available
	Titanium Etch	Hydrofluoric Acid	7664-39-3
	Photo Resists - Various	Fluorinated Surfactant	Not available
	Boron Trifluoride (BF3) Gas	BF3	7637-07-2
	Sulfur Hexafluoride (SF6) Gas	SF6	2551-62-4
	Octafluoropropane (C3F8) Gas	C3F8	76-19-7
	Tetrafluoromethane (CF4) Gas	CF4	75-73-0
	Fluorine/Krypton/Neon Gas Mixture	Fluorine	462-06-6
Refrigerant Gas	R-23	CHF3	75-46-7
	R-134a	C2H2F4	811-97-2
	R-404A	C2HF5/C2H3F3/C2H2F4	Mixture
	R-22	CHClF2	75-45-6
	R-407C	CH2F2/C2HF5/C2H2F4	Mixture
	R-508B	CHF3/C2F6	Mixture
	R-123	C2HF3Cl2	306-83-2
	R-410A	CH2F2/CHF2CF3	Mixture
	R-452	CH2F2/C2HF5/C3H2F4	Mixture
	R-12	CCl2F2	75-71-8
	R-236FA	C3H2F6	Mixture
R-14	CF4	75-73-0	
Heat Transfer Fluids	Galden HT High Boiling	1-Propene, 1,2,2,3,3,3-hexafluoro-, oxidized, polymd.	69991-67-9
	Galden HT Low Boiling	1-Propene, 1,1,2,3,3,3-hexafluoro-, oxidized, polymd.	69991-67-9
Maintenance	Dusters & 'Canned Air'	trans-1,3,3,3-Tetrafluoroprop-1-ene	29118-24-9
Fire Suppression	FM-200	Heptafluoropropane	431-89-0