



DEPARTMENT ORDER

**Texas Instruments Incorporated
Cumberland County
South Portland, Maine
A-698-71-Z-R/A (SM)**

**Departmental
Findings of Fact and Order
Air Emission License
Renewal/Amendment**

FINDINGS OF FACT

After review of the air emissions license renewal/amendment application, staff investigation reports and other documents in the applicant's file in the Bureau of Air Quality, pursuant to 38 Maine Revised Statutes (M.R.S.), § 344 and § 590, the Maine Department of Environmental Protection (Department) finds the following facts:

I. REGISTRATION

A. Introduction

Texas Instruments Incorporated (TI) has applied to renew and amend their Air Emission License permitting the operation of emission sources associated with the production of micro-circuits on thin silica wafers at its semiconductor manufacturing facility.

In addition to renewing the current license, TI has requested the following:

- 1) to increase fuel usage limits
- 2) to remove the annual limits previously established to restrict greenhouse gases,
- 3) to remove the limitation on the usage of fluorinated process gases, and
- 4) to make technical corrections and updates.

This license is both a renewal and amendment. It includes the above changes and incorporates previous amendments.

The equipment addressed in this license is located at 5 Foden Road, South Portland, Maine.

B. Emission Equipment

The following equipment is addressed in this air emission license:

Boilers and VOC Abatement Unit Burner

Equipment	Maximum Design Input Capacity (MMBtu/hr)	Maximum Firing Rate	Fuel Type	Date of Manufacture	Date of Installation	Stack #
Boiler 1	29.3	28,446 scf/hr	natural gas	1995	1996	1
		209 gal/hr	distillate fuel			
Boiler 2	29.3	28,446 scf/hr	natural gas	1995	1996	1
		209 gal/hr	distillate fuel			
Boiler 3	29.3	28,446 scf/hr	natural gas	1995	1996	1
		209 gal/hr	distillate fuel			
Boiler 4	29.3	28,446 scf/hr	natural gas	1995	1997	2
		209 gal/hr	distillate fuel			
Boiler 5	29.3	28,446 scf/hr	natural gas	2000	2000	2
		209 gal/hr	distillate fuel			
VOC Abatement Unit	1.5	1456 scf/hr	natural gas	2007	2007	3
		16 gal/hr	propane (back-up)			

Table note: Boiler 7 was removed from licensing through minor revision A-698-71-W-M (June 20, 2012).

Emergency Generators

Equipment	Maximum Design Input Capacity (MMBtu/hr)	Firing Rate (gal/hr)	Maximum Output Capacity (kW)	Fuel Type, % sulfur	Date of Manufacture	Date of Installation
Generator 1 (Bldg. 1 South)	5.5	40.2	470	distillate fuel, 0.0015%	Pre-1982	1982
Generator 2 (Bldg. 4 North)	14.6	106.7	1500	distillate fuel, 0.0015%	1996	1996
Generator 3 (Bldg. 4 South)	18.8	137.4	2000	distillate fuel, 0.0015%	1996	1996
*Generator 4 (Bldg. 1 North)	6.49	47.4	530	distillate fuel, 0.0015%	1999	2014
Generator 5 (Bldg. 4 West)	5.37	38.9	500	distillate fuel, 0.0015%	1999	2011

* Table Note: Generator 4 was originally installed and was replaced through minor licenses revision A-698-71-Y-M (Augusta 9, 2013).

Process Equipment

Equipment	Date of Manufacture	Date of Installation	Control Device	Stack #
SEF 4-1 (acid exhausts)	1996	1996	Wet Scrubber SC1	4-1
SEF 4-2 (acid exhausts)	1997	1997	Wet Scrubber SC2	4-2
SEF 4-3 (acid exhausts)	1996	1996	Wet Scrubber SC3	4-3
SEF 4-4 (acid exhausts)	1996	1996	Wet Scrubber SC4	4-4
SEF 4-5 (acid exhausts)	1997	1997	Wet Scrubber SC5	4-5
SEF 4-6 (alkali exhausts)	1996	1996	Wet Scrubber SC6	4-6
SEF 4-7 (alkali exhausts)	1997	1997	Wet Scrubber SC7	4-7
SEF 4-8 (acid or alkali exhausts)	1997	1997	Wet Scrubber SC8	4-8
SEF 4-9 (acid exhausts)	1996	1996	Wet Scrubber SC9	4-9
Process Exhaust – Volatile (PEV)	2007	2007	VOC Abatement Unit *	3

Table Note: * The VOC Abatement Unit originally installed to control the process exhaust was replaced in license A-698-71-R-A/M (September 19, 2007).

C. Definitions

Continuously. With respect to the operation of parameter and periodic monitors means providing equally spaced data points with at least one valid data point in each successive 15-minute period and a minimum of three valid 15- minute periods constitute a valid hour.

Distillate Fuel. For the purposes of this license, *distillate fuel* means the following:

- Fuel oil that complies with the specifications for fuel oil numbers 1 or 2, as defined by the American Society for Testing and Materials (ASTM) in ASTM D396;
- Diesel fuel oil numbers 1 or 2, as defined in ASTM D975;
- Kerosene, as defined in ASTM D3699;
- Biodiesel, as defined in ASTM D6751; or
- Biodiesel blends, as defined in ASTM D7467.

D. Application Classification

The application for TI does not include the installation of new or modified equipment, but it does include the removal of annual limits for greenhouse gases, increases fuel usage limit, the removal of usage limits of fluorinated process gases, and technical corrections and updates. Therefore, the license is considered to be a renewal and amendment and has been processed through *Major and Minor Source Air Emission License Regulations*, 06-096 Code of Maine Rules (C.M.R.) ch. 115.

The modification of a minor source license is considered a major or minor modification based on whether or not expected emission increases exceed the “Significant Emission” levels as defined in the Department’s *Definitions Regulation*, 06-096 C.M.R. ch. 100.

The emission increases are determined by subtracting the current licensed annual emissions preceding the modification from the maximum future licensed annual emissions, as follows:

<u>Pollutant</u>	<u>Current License (TPY)</u>	<u>Future License (TPY)</u>	<u>Net Change (TPY)</u>	<u>Significant Emission Levels</u>
PM	6.3	20.0	13.7	100
PM ₁₀	6.3	20.0	13.7	100
SO ₂	23.8	0.4	-23.4	100
NO _x	50.1	49.9	-0.2	100
CO	20.6	90.4	69.8	100
VOC	27.5	37.0	9.5	50

This modification is determined to be a minor modification and has been processed as such.

With the annual fuel limits on the boilers, operating hour restrictions on the emergency generators, and a VOC emission limit on process sources, the facility is licensed below the major source thresholds for criteria pollutants and is considered a synthetic minor. TI is also licensed below the major source thresholds for hazardous air pollutants (HAP) and is considered an area source of HAP.

II. BEST PRACTICAL TREATMENT (BPT)

A. Introduction

In order to receive a license, the applicant must control emissions from each unit to a level considered by the Department to represent Best Practical Treatment (BPT), as defined in *Definitions Regulation*, 06-096 C.M.R. ch. 100. Separate control requirement categories exist for new and existing equipment.

BPT for existing emissions equipment means that method which controls or reduces emissions to the lowest possible level considering:

- the existing state of technology;
- the effectiveness of available alternatives for reducing emissions from the source being considered; and
- the economic feasibility for the type of establishment involved.

B. Process Description

TI manufactures semiconductors composed of silicon wafers sized at 8 inches in diameter. Each semiconductor manufactured goes through the same general process steps, but the complexity and structural makeup between the products are slightly different. Oxide and metallic layers are built up on the blank wafers with changes or additions in chemicals or process parameters to build the various layers to the required specifications. The manufacturing processes include repeated batch operation steps such as pre-cleaning, doping, photo mask development, etching, backgrinding, and cleaning.

The wafers are first pre-cleaned with chemicals in cleaning tanks for a specific period of time. After each cleaning tank, the wafers are rinsed with deionized water. Following the pre-cleaning steps, the wafers are sent to diffusion furnaces where the initial layer of oxide is grown on the wafer. Depending on the stage of the oxide layer growth, layer number or product type, the operating parameters may vary significantly. The introduction of impurities (doping) may occur in the diffusion chambers if required.

After oxidation, the wafers are placed on photoresist coating equipment. The wafers are dried and photoresist (a light sensitive chemical) is applied. The wafers are baked and are exposed to a light beam shot through a mask containing the desired network configuration. After exposure, the wafer is developed using a photoresist fixer. The network configuration copied onto the wafer serves as a pattern for the next step in the process.

Before etching, some wafers are sent to the ion implanting area. Impurities are deposited into the layer(s) using a high-speed particle accelerator. Etching removes the oxide which was not fixed in the development stage. Either a gas or liquid chemical process is used for this removal. After etching, the remaining photoresist on top of the fixed portion of the wafer is stripped with sulfuric peroxide or carbon tetrafluoride and oxygen.

After the required layers are formed, the wafers are transferred to another room where the back side of the disk is ground down to specifications. In the assembly area, the wafers are cut into individual chips, aluminum contacts are soldered onto the proper junctions, and the chips are enclosed in a ceramic housing. Ultrasonic cleaning is used to remove cleaning fluids and machine oils from the chip frames. After completion of chip assembly, the semiconductor chips are inspected, boxed, and shipped.

Semiconductor fabrication makes use of various acids, alkalis, and VOC containing solvents in the different manufacturing tools utilized in each step. Tools are defined as chemical baths consisting of acids or alkalis or solvents. The VOC emitting tools are controlled with a VOC Abatement Unit. The acid and alkali tools are controlled with wet scrubbers. The tools are monitored by photohelics (pressure) or automatic power shut off systems, and the drain valves are opened to drain the acid, alkali, or VOC solvent to the appropriate waste system.

Additional equipment at the facility includes boilers and emergency generators.

C. Revisions to Limits Based on Greenhouse Gas Emissions

TI has proposed revisions to the facility-wide greenhouse gas emissions limitation of 100,000 tons/year of carbon dioxide equivalents (CO₂e), which was established in two amendments, A-698-71-W-M (6/20/12) and A-698-71-X-M (1/10/2013). At the time the amendments were issued, the facility-wide CO₂e limits were deemed necessary to keep the facility from being classified as a major source of greenhouse gases (GHG) requiring a Part 70 (Title V) license. On June 23, 2014, the United States Supreme Court struck down the requirement under the Clean Air Act (CAA) for facilities to obtain a Title V license based solely on potential emissions of greenhouse gases over the major source threshold of 100,000 tons/year CO₂e.

Due to the court ruling, TI has requested the removal of the licensed fuel limits for the purposes of restricting greenhouse gases and the removal of the CO₂e limits. The fuel limits required to keep the facility a minor source (under 100 tons/year of PM, PM₁₀, SO₂, NO_x and CO and 50 tons/year of VOC) shall remain.

The fuel limits will be increased to 2,803,000 gallons/year of distillate fuel and 1,146,359,000 scf/year of natural gas from the previous greenhouse gas-based limits of 674,000 gallons/year and 126,660,000 scf/year, respectively.

D. Boilers 1-5

TI operates five 29.3 MMBtu/hr Cleaver Brooks package firetube boilers (Boilers 1, 2, 3, 4, and 5). The units all fire natural gas as the primary fuel but have the capability to fire distillate fuel. The maximum firing rate for each boiler is 28,446 scf/hr when firing natural gas and 209 gal/hr when firing distillate fuel. Boilers 1, 2, 3, and 4 were manufactured in 1995, and Boiler 5 was manufactured in 2000. Boilers 1, 2, and 3 exhaust through Stack 1. Boilers 4 and 5 exhaust through Stack 2.

The boilers are all subject to the New Source Performance Standards (NSPS) 40 C.F.R. Part 60, Subpart Dc, *Standards of Performance for Small Industrial-Commercial-Institutional Steam Generating Units*, for units greater than 10 MMBtu/hr manufactured after June 9, 1989.

The boilers are not being modified, but the annual fuel limits are being revised since the limits are no longer necessary for TI to remain a minor GHG source. TI submitted a BPT analysis in support of this renewal and amendment. The BPT analysis did not result in any changes to short term emission rates, controls, or operating restrictions as previously licensed.

The emission rates and limits for the Boilers were originally established in A-698-71-A-T/N (6/3/1997). In license A-698-71-L-R (3/11/2003) the license emission factors were changed. Because the emission factors in the license A-698-71-A-T/N were based on vendor data and used for the BACT analysis and were used for the Ambient Air

Quality modeling for the facility, the emission factors were changed back in license A-698-71-U-R (12/30/2009). In addition, a correction was made to the distillate SO₂ lb/hr emission limit in A-698-71-U-R (12/31/2009).

1. BPT Findings

Natural Gas

- PM/PM₁₀ – 0.01 lb/MMBtu, 06-096 C.M.R. ch. 115, BACT
- *SO₂ – 0.0006 lb/MMBtu based on AP-42 Table 1.4-2 (7/98)
- NO_x – 0.07 lb/MMBtu, vender specifications, BPT
- CO – 4.40 lb/hr, vender specifications, BPT
- VOC – 0.59 lb/hr, vender specifications, BPT
- Visible – 06-096 C.M.R. ch. 115, BPT

Emissions

*updated as part of this license

The BPT emission limits for each boiler firing natural gas are the following:

<u>Unit</u>	<u>Pollutant</u>	<u>lb/MMBtu</u>
Boiler 1 - 5	PM	0.01
Boiler 1 - 5	NO _x	0.07

The BPT emission limits for each boiler firing natural gas are the following:

<u>Unit</u>	<u>PM (lb/hr)</u>	<u>PM₁₀ (lb/hr)</u>	<u>SO₂ (lb/hr)</u>	<u>NO_x (lb/hr)</u>	<u>CO (lb/hr)</u>	<u>VOC (lb/hr)</u>
Boiler 1	0.29	0.29	0.02	2.05	4.40	0.59
Boiler 2	0.29	0.29	0.02	2.05	4.40	0.59
Boiler 3	0.29	0.29	0.02	2.05	4.40	0.59
Boiler 4	0.29	0.29	0.02	2.05	4.40	0.59
Boiler 5	0.29	0.29	0.02	2.05	4.40	0.59

The BPT emission limits for each boiler firing distillate fuel were based on the following:

Distillate Fuel

- PM/PM₁₀ – 0.10 lb/MMBtu based on 06-096 C.M.R. ch. 115, BPT
- SO₂ – based on firing distillate fuel with a maximum sulfur content of 0.0015% by weight
- NO_x – 0.20 lb/MMBtu vender specifications, BPT
- CO – 2.05 lb/hr, vender specifications, BPT
- VOC – 0.88 lb/hr, vender specifications, BPT
- Visible Emissions – 06-096 C.M.R. ch. 115, BPT

The BPT emission limits for each boiler when firing distillate fuel are the following:

Unit	Pollutant	lb/MMBtu
Boiler 1- 5	PM	0.10
Boiler 1- 5	NO _x	0.20

The BPT emission limits for each boiler when firing distillate fuel are the following:

Unit	PM (lb/hr)	PM₁₀ (lb/hr)	SO₂ (lb/hr)	NO_x (lb/hr)	CO (lb/hr)	VOC (lb/hr)
Boiler 1	2.93	2.93	0.04	5.86	2.05	0.88
Boiler 2	2.93	2.93	0.04	5.86	2.05	0.88
Boiler 3	2.93	2.93	0.04	5.86	2.05	0.88
Boiler 4	2.93	2.93	0.04	5.86	2.05	0.88
Boiler 5	2.93	2.93	0.04	5.86	2.05	0.88

Boilers 1, 2, and 3 exhaust through a common stack, Stack 1. Boilers 4 and 5 exhaust through a common stack, Stack 2.

Visible emissions from Stack 1 and Stack 2 shall each not exceed 10% opacity on a six-minute block average basis.

To prevent becoming a major source of CO when firing natural gas, TI shall be limited to 1,146,359,000 scf/year of natural gas based on a 12-month rolling total. All other pollutants resulting from the combustion of either of these fuels are well below major source levels at these fuel firing rates.

If both fuels are combusted during the previous 12 months, TI shall be limited to a CO annual emission rate of 90.4 tpy based on a 12-month rolling total. A fuel heat capacity for distillate of 0.14 MMBtu/gal and a fuel heat capacity for natural gas of 0.00102 MMBtu/scf shall be used to calculate actual emissions.

Fuel Sulfur Content Requirements

Boilers 1 - 5 are licensed to fire distillate fuel. Per 38 M.R.S. § 603-A(2)(A)(3), as of July 1, 2018, no person shall import, distribute, or offer for sale any distillate fuel with a sulfur content greater than 0.0015% by weight (15 ppm). Therefore, beginning July 1, 2018, the distillate fuel purchased or otherwise obtained for use in Boilers 1 - 5 shall not exceed 0.0015% by weight (15 ppm).

2. Periodic Monitoring

Periodic monitoring for the boilers shall include recordkeeping to document fuel use both on a monthly and 12 month rolling total basis. Documentation shall include the type of fuel used and sulfur content of the fuel, if applicable.

TI shall calculate at least monthly the 12-month rolling total of the Annual Emissions. Documentation of these calculations and totals shall demonstrate compliance.

3. New Source Performance Standards (NSPS): 40 C.F.R. Part 60, Subpart Dc

Due to the sizes and years of manufacture, boilers 1-5 are subject to *Standards of Performance for Small Industrial-Commercial-Institutional Steam Generating Units*, 40 C.F.R. Part 60, Subpart Dc for units greater than 10 MMBtu/hr manufactured after June 9, 1989. [40 C.F.R. § 60.40c]

TI shall comply with all requirements of 40 C.F.R. Part 60, Subpart Dc applicable to Boilers 1-5 including, but not limited to, the following:

a. Notifications

Facility shall submit notification to EPA and the Department of the date of construction, anticipated start-up, and actual start-up. This notification shall include the design heat input capacity of the boiler and the type of fuel to be combusted. [40 C.F.R. § 60.48c(a)]

b. Standards

The distillate fuel fired in Boilers 1-5 shall not exceed 0.0015% sulfur by weight. [40 C.F.R. § 60.42c(d)]

c. Reporting and Recordkeeping

(1) TI shall maintain records of the amounts of each fuel combusted during each day or, if applicable, monthly records with fuel certifications. [40 C.F.R. § 60.48c(g)]

(2) TI shall submit semi-annual reports to EPA and to the Department.

[40 C.F.R. § 60.48c(d)] These reports shall include the following:

- i. Calendar dates covered in the reporting period; [40 C.F.R. § 60.48c(e)(1)]
- ii. Records of fuel supplier certifications; [40 C.F.R. § 60.48c(e)(11)] and
- iii. Any instances of excess emissions from Boiler 1-5. [40 C.F.R. § 60.48c(c)]

(3) The semi-annual reports are due within 30 days of the end of each six-month period. [40 C.F.R. § 60.48c(j)]

- (4) The following address for EPA shall be used for any reports or notifications required to be copied to them:

U.S. Environmental Protection Agency, Region I
Post Office Square, Suite 100 (OES04-2)
Boston, MA 02109-3912
Attn: Air Compliance Clerk

4. 40 C.F.R. Part 63, Subpart JJJJJ

Although Boilers 1-5 are dual fuel units, they are operated as gas fired boilers, therefore not subject to the *National Emission Standards for Hazardous Air Pollutants for Industrial, Commercial, and Institutional Boilers Area Sources* (40 C.F.R. Part 63; Subpart JJJJJ). Gas-fired boilers are exempt from 40 C.F.R. Part 63, Subpart JJJJJ.

Boilers 1-5 presently meet the definition of “gas-fired boilers”. A “gas-fired boiler” is defined as any boiler that burns gaseous fuels not combined with any solid fuels and burns liquid fuel only during periods of gas curtailment, gas supply interruption, startups, or for periodic testing, maintenance, or operator training on liquid fuel. Periodic testing, maintenance, or operator training on liquid fuel shall not exceed a combined total of 48 hours during any calendar year. [40 C.F.R. § 63.11237]

Any boiler designed to burn fuels besides gaseous fuels prior to June 4, 2010, will be considered an existing boiler under this rule. A boiler which currently fires gaseous fuels, but if it converts back to firing another fuel (such as distillate fuel) in the future it would become subject as an existing boiler at the time it is converted back to oil.

Fuel Switching

TI initially operated its boilers as existing oil-fired boilers. Their initial notification, and notification of compliance status indicating they had completed their tune up and energy assessment were submitted dated July 20, 2012 and July 17, 2014. Since then TI has been operating its boilers as “gas-fired” boilers. If TI no longer operates one or more of its boilers as gas-fired boilers, TI shall be subject to the following provisions:

- a. TI shall demonstrate compliance with Subpart JJJJJ to EPA and the Department for the affected boiler(s) within 180 days of the effective date of the fuel switch. [40 C.F.R. § 63.11210(i)]
- b. Notification of the changes shall be submitted to the EPA and the Department within 30 days of the change and shall provide the following:
 - (1) The name of the owner or operator of the affected source, the location of the source, the boiler(s) that have switched fuels, whether the boilers were physically changed or took a permit limit, and the date of the notice.

- (2) The date upon which the fuel switch, physical change, or permit limit occurred.
 [40 C.F.R. § 63.11225(g)]
- c. TI shall complete the tune-up on each boiler firing distillate fuel, by following the procedures described in §63.11223(b), no later than 180 days after the boiler(s) begins firing distillate fuel. [40 C.F.R. § 63.11210(i)]

E. Emergency Generators 1-5

TI has five distillate fuel fired emergency generators. The emergency generators are generator sets with each gen set consisting of an engine and an electrical generator.

Unit	MMBtu/hr	Power - kW	Location	Manu/Install
Emergency Generator 1	5.5	470	Building 1 South	Pre-1982/ 1982
Emergency Generator 2	14.6	1500	Building 4 North	1996
Emergency Generator 3	18.8	2000	Building 4 South	1996
Emergency Generator 4	6.49	530	Building 1 North	1999/2014
Emergency Generator 5	5.37	500	Building 4 West	1999/2011

1. BPT Findings

The BPT emission limits for the generators are based on the following:

- PM/PM₁₀ – 0.12 lb/MMBtu, 06-096 C.M.R. ch. 115, BPT
- SO₂ – combustion of distillate fuel with a maximum sulfur content not to exceed 15 ppm (0.0015% sulfur by weight)
- NO_x – 3.2 lb/MMBtu from AP-42, Table 3.4-1, dated 10/96
- CO – 0.85 lb/MMBtu from AP-42, Table 3.4-1, dated 10/96
- VOC – 0.09 lb/MMBtu from AP-42, Table 3.4-1, dated 10/96
- Visible Emissions – 06-096 C.M.R. ch. 115, BPT

The BPT emission limits for the generators are the following:

Unit	Pollutant	lb/MMBtu
Generators 1-5 (each)	PM	0.12

The BPT emission limits for the generators are the following:

Unit	PM (lb/hr)	PM ₁₀ (lb/hr)	SO ₂ (lb/hr)	NO _x (lb/hr)	CO (lb/hr)	VOC (lb/hr)
Emergency Generator 1 (5.5 MMBtu/hr)	0.66	0.66	0.01	17.60	4.68	0.50
Emergency Generator 2 (14.6 MMBtu/hr)	1.75	1.75	0.02	46.72	12.41	1.31
Emergency Generator 3 (18.8 MMBtu/hr)	2.26	2.26	0.03	60.16	15.98	1.69
Emergency Generator 4 (6.49 MMBtu/hr)	0.78	0.78	0.01	20.77	5.52	0.58
Emergency Generator 5 (5.37 MMBtu/hr)	0.64	0.64	0.01	17.18	4.56	0.48

Visible emissions from each emergency generator shall not exceed 20% opacity on a 6-minute block average basis.

In order to be consistent with federal regulations, Emergency Generators 1-5 shall each be limited to 100 hours per year of operation per calendar year, for licensing and fee calculation purposes, with no operating restrictions during emergency situations. This is a revision from the previous license which limited each unit to 500 hours per year including emergency situations.

2. 40 C.F.R. Part 63, Subpart ZZZZ

National Emission Standards for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines, 40 C.F.R. Part 63, Subpart ZZZZ is applicable to the emergency engines listed above. The engines are considered existing, emergency stationary reciprocating internal combustion engines at an area HAP source and are not subject to New Source Performance Standards regulations. EPA's August 9, 2010 memo (*Guidance Regarding Definition of Residential, Commercial, and Institutional Emergency Stationary RICE in the NESHAP for Stationary RICE*) specifically does not exempt these units from the federal requirements.

[40 C.F.R. § 63.6585]

A summary of the currently applicable federal 40 C.F.R. Part 63, Subpart ZZZZ requirements is listed below.

a. Emergency Engine Designation and Operating Criteria

Under 40 C.F.R. Part 63, Subpart ZZZZ, a stationary reciprocating internal combustion engine (RICE) is considered an **emergency** stationary RICE

(emergency engine) as long as the engine is operated in accordance with the following criteria. Operation of an engine outside of the criteria specified below may cause the engine to no longer be considered an emergency engine under 40 C.F.R. Part 63, Subpart ZZZZ, resulting in the engine being subject to requirements applicable to **non-emergency** engines.

(1) Emergency Situation Operation (On-Site)

There is no operating time limit on the use of an emergency engine to provide electrical power or mechanical work during an emergency situation. Examples of use of an emergency engine during emergency situations include the following:

- Use of an engine to produce power for critical networks or equipment (including power supplied to portions of a facility) because of failure or interruption of electric power from the local utility (or the normal power source, if the facility runs on its own power production);
- Use of an engine to mitigate an on-site disaster or equipment failure;
- Use of an engine to pump water in the case of fire, flood, natural disaster, or severe weather conditions; and
- Similar instances.

(2) Non-Emergency Situation Operation

An emergency engine may be operated up to a maximum of 100 hours per calendar year for maintenance checks, readiness testing, and other non-emergency situations as described below.

- (i) An emergency engine may be operated for a maximum of 100 hours per calendar year for maintenance checks and readiness testing, provided that the tests are recommended by federal, state, or local government; the manufacturer; the vendor; the regional transmission organization or equivalent balancing authority and transmission operator; or the insurance company associated with the engine. The owner or operator may petition the Administrator for approval of additional hours to be used for maintenance checks and readiness testing, but a petition is not required if the owner or operator maintains records indicating that federal, state, or local standards require maintenance and testing of emergency RICE more than 100 hours per calendar year.
- (ii) An emergency engine may be operated for up to 50 hours per calendar year for other non-emergency situations. **However, these operating hours are counted as part of the 100 hours per calendar year operating limit described in paragraph (2) and (2) (i) above.**

The 50 hours per calendar year operating limit for other non-emergency situations cannot be used for peak shaving, non-emergency demand

response, or to generate income for a facility by providing power to an electric grid or otherwise supply power as part of a financial arrangement with another entity.

Generators 1-5 shall be limited to the usage outlined in 40 C.F.R. § 63.6640(f) and therefore may be classified as an existing emergency stationary RICE as defined in 40 C.F.R. Part 63, Subpart ZZZZ. Failure to comply with all of the requirements listed in 40 C.F.R. § 63.6640(f) may cause these engines to not be considered emergency engines and therefore subject to all applicable requirements for non-emergency engines.

b. 40 C.F.R. Part 63, Subpart ZZZZ Requirements

(1) Operation and Maintenance Requirements for each emergency generator
(40 C.F.R. § 63.6603(a) and Table 2(d))

	Operating Limitations
Emergency stationary CI (Compression Ignition) Units: Generators 1-5	<ul style="list-style-type: none">- Change oil and filter every 500 hours of operation or annually, whichever comes first;- Inspect the air cleaner every 1000 hours of operation or annually, whichever comes first, and replace as necessary; and- Inspect all hoses and belts every 500 hours of operation or annually, whichever comes first, and replace as necessary.

The engines shall be operated and maintained according to the manufacturer's emission-related written instructions, or TI shall develop a maintenance plan which must provide to the extent practicable for the maintenance and operation of the engines in a manner consistent with good air pollution control practice for minimizing emissions.

[40 C.F.R. § 63.6625(e)]

(2) Optional Oil Analysis Program

TI has the option of utilizing an oil analysis program which complies with the requirements of § 63.6625(i) in order to extend the specified oil change requirement. If this option is used, TI must keep records of the parameters that are analyzed as part of the program, the results of the analysis, and the oil changes for each engine. The analysis program must be part of the maintenance plan for each engine.

[40 C.F.R. § 63.6625(i)]

(3) Non-Resettable Hour Meter Requirement

A non-resettable hour meter shall be installed and operated on each engine.

[40 C.F.R. § 63.6625(f)]

(4) Startup Idle and Startup Time Minimization Requirements

During periods of startup the facility must minimize the engine's time spent at idle and minimize the engine's startup time to a period needed for appropriate and safe loading of the engine, not to exceed 30 minutes.

[40 C.F.R. § 63.6625(h) and 40 C.F.R. Part 63, Subpart ZZZZ Table 2d]

(5) Annual Time Limit for Maintenance and Testing

As emergency engines, the engines shall each be limited to 100 hours/year for maintenance checks and readiness testing. Up to 50 hours/year of the 100 hours/year may be used in non-emergency situations (this does not include peak shaving, non-emergency demand response, or to generate income for a facility by providing power to an electric grid or otherwise supply power as part of a financial arrangement with another entity). [40 C.F.R. § 63.6640(f)]

(6) Recordkeeping

TI shall keep records that include maintenance conducted on the engines and the hours of operation of each engine recorded through the non-resettable hour meter. Documentation shall include the number of hours each unit operated for emergency purposes, the number of hours each unit operated for non-emergency purposes, and the reason each engine was in operation during each time. [40 C.F.R. § 63.6655(f)]

F. VOC Processes and VOC Abatement Unit

Various operations in the wafer fabrication process at TI emit VOCs. Due to product specifications and manufacturing needs, the amount of VOCs emitted from a specific vent can vary. The tools that use VOC solvents are controlled with a VOC Abatement Unit. These tool exhausts are referred to as Process Exhaust-Volatile (PEV).

The VOC Abatement Unit, licensed and installed in 2007, consists of a zeolite concentrator followed by an incinerator unit with a 1.5 MMBtu/hr natural gas burner and propane hookup. The unit exhausts to a 60 foot above ground level stack.

Previous licenses did not account for emissions from fuel fired in the VOC Abatement Unit. The following was added to correct this oversight. Emissions from the firing of natural gas in the VOC Abatement Unit are as follows:

The BPT emission limits for the VOC Abatement Unit when firing natural gas were based on the following:

Natural Gas

- PM/PM₁₀ – 7.6 lb/MMscf based on AP-42, Table 1.4-2, dated 7/98
- SO₂ – 0.6 lb/MMscf based on AP-42, Table 1.4-2, dated 7/98
- NO_x – 100 lb/MMscf based on AP-42, Table 1.4-1, dated 7/98
- CO – 84 lb/MMscf based on AP-42, Table 1.4-1, dated 7/98
- VOC – 5.5 lb/MMscf based on AP-42, Table 1.4-2, dated 7/98
- Visible Emissions – 06-096 C.M.R. ch. 115, BPT

The BPT emission limits when firing natural gas in the VOC Abatement Unit are as follows:

Unit	PM (lb/hr)	PM ₁₀ (lb/hr)	SO ₂ (lb/hr)	NO _x (lb/hr)	CO (lb/hr)	VOC (lb/hr)
VOC Abatement Unit	0.01	0.01	0.001	0.15	0.12	0.01

The BPT emission limits for the VOC Abatement Unit when firing propane were based on the following:

Propane

- PM/PM₁₀ – 0.7 lb/1000gal based on AP-42, Table 1.5-1, dated 7/08
- SO₂ – 0.054 lb/1000gal based on AP-42, dated 10/96
- NO_x – 13 lb/1000gal based on AP-42, Table 1.5-1, dated 7/08
- CO – 7.5 lb/1000gal based on AP-42, Table 1.5-1, dated 7/08
- VOC – 1 lb/1000gal based on AP-42, Table 1.5.1, dated 7/08
- Visible Emissions – 06-096 C.M.R. ch. 115, BPT

The BPT emission limits when firing propane in the VOC Abatement Unit are as follows:

Unit	PM (lb/hr)	PM ₁₀ (lb/hr)	SO ₂ (lb/hr)	NO _x (lb/hr)	CO (lb/hr)	VOC (lb/hr)
VOC Abatement Unit	0.01	0.01	0.001	0.21	0.12	0.02

VOC process emissions are collected from the VOC emitting tools (PEV) and conveyed to the VOC Abatement Unit via induced draft fan to ensure VOC emissions are captured and leaks remain in the system. The unit shall be maintained and operated to meet a minimum

removal efficiency of 90% or shall demonstrate that the outlet exhaust concentration is less than 20 ppm.

The removal efficiency shall be calculated as follows:

$$\frac{(VOC \text{ at inlet of abatement unit}) - (VOC \text{ at outlet of abatement unit}) \times 100}{(VOCs \text{ at inlet of abatement unit})}$$

TI may use either the 90% removal efficiency or 20 ppm output concentration to determine compliance. [A-698-71-O-M/A (1/19/05)]

The unit is designed to run within a temperature range of 1350°F-1500°F. When the monitored temperature goes below 1350°F, an alarm notification occurs. When the temperature goes below 1250°F, the unit shuts down. The records of unit shutdowns and alarms shall be incorporated into the emissions calculations since the VOCs vent to the atmosphere when the unit is not operating.

Due to emission reductions resulting from pollution prevention efforts and process improvements, the Department approved the following operational flexibility of the VOC Abatement Unit:

TI shall operate the VOC Abatement Unit at all times the wafer process is operating from April 1 – September 30; and may need to operate the unit during October 1-March 31, as necessary, to meet the facility-wide VOC and HAP limits. The requirement to operate the unit from April 1 – September 30 includes the official ozone season of May 1 – September 30. The unit shall have a 97% uptime during the compliance operating period (including malfunctions and maintenance).

BPT for TI solvent processes is the following:

- the use of a VOC Abatement Unit (with 90% efficiency; continuous monitoring of temperature, rotor rotation alarms, and air flow alarms; 97% uptime of the VOC Abatement Unit, operating minimally from April 1-Sept. 30),
- monitoring of the tool exhaust fans by the Facility Management System (FMS),
- a limit of 25 tons/year of VOC emissions on a 12-month rolling total basis,
- Visible emissions from the VOC Abatement Unit Stack, whether or not the VOC Abatement Unit is in operation, shall not exceed 10% opacity on a six (6) minute average basis.

Prior to October 30 of the same calendar year, TI shall maintain records and shall submit to the Department reports documenting non-compliance for any April 1-September 30 period during which the 97% uptime requirement is not met.

Calculations

In order to show compliance with the annual VOC limit, TI shall use its records of solvents issued from the stockroom, along with the VOC Abatement Unit control efficiency to calculate emissions. TI shall keep separate records for those solvents issued to controlled processes and those issued to uncontrolled processes.

Because most of the spent solvents are collected along with water at the manufacturing tool, TI is not able to measure the amount of spent solvent collected. Therefore, an alternate method was developed for calculating VOC emissions. For each month during the year, TI shall compute emissions for the previous 12 months. The emissions shall be estimated in accordance with the equations below:

Hourly rate

$HR =$ average VOC emission rate from the VOC Abatement Unit measured during VOC testing, (lbs VOC/hr)

When the VOC Abatement Unit is not operating, the emissions from the normally controlled area shall be considered uncontrolled in the VOC emission calculations. For this period, the uncontrolled hourly rate will be used.

Monthly Hours

$MH =$ No. of Hours per month of VOC Abatement Unit operation

Monthly Rate

$MR = HR \times MH$ lbs VOC emitted/Month

Process Solvents issued monthly from stockroom to manufacturing floor

$PS =$ lbs VOCs issued/month

Emission Rate

$ER = \frac{MR}{PS}$ (lb VOC emitted/lb VOC issued)

Process Annual emission Rate

$PAR = \sum_{n=1}^{n=12} (PS \times ER)_1 + \dots + (PS \times ER)_{12}$ for the 12 periods in a year (lbs/yr)

Uncontrolled Annual Rate

$UAR = \sum_{n=1}^{n=12} \text{Uncontrolled VOCs Emitted}$ for the 12 months in a year (lbs/yr)

Total Annual Rate

$TAR = PAR + UAR$, (lbs/yr)

$TAR = (PAR + UAR)/2000$ (tons/yr)

For VOCs from insignificant activities, TI shall maintain in its files an estimate of the VOCs emitted annually from such activities, to the extent that the VOC emissions are not included in the 12-month rolling average recordkeeping program. The estimate shall be

updated annually if process or raw material changes have occurred that would affect the previous estimate.

Testing and Monitoring

TI shall perform efficiency testing on the VOC Abatement Unit by December 1, 2018, and every other calendar year thereafter. The testing shall consist of measurements taken at the concentrator inlet and oxidizer outlet. The efficiency testing method may measure VOCs or total hydrocarbons.

TI shall keep records of events when the unit shuts down and events when the alarms are activated. The records shall include the dates and times the unit is not operating or controlling emissions (from when to when) and shall be used to determine compliance with the 97% uptime requirement, including malfunctions and maintenance.

TI shall maintain VOC emission records in accordance with the equations earlier in this section, on a monthly and 12- month rolling total basis.

Periodic and Parameter Monitoring

The facility shall monitor the following indicators on the VOC emissions capture and control as listed in the following table whenever the equipment is operating.

VOC Capture and Control				
Indicator	Units of Measure	Monitoring tool/method	Frequency of Monitoring	Frequency of Recordkeeping
Temperature	°F	Thermocouple	continuously	Hourly
Status of concentrator rotor	On/off	Rotor alarms	continuously	As Alarms occur
Rotor Rotation	Yes/No	Rotation Indicator	continuously	As Alarms occur

A combustion temperature monitor, a parameter monitor, shall be installed, operated and maintained and calibrated or replaced in accordance with manufacturer recommendations. Combustion temperature shall be continuously monitored at all times the VOC Abatement Unit is in operation.

The combustion temperature monitor must record accurate and reliable data. If this monitor is recording accurate and reliable data less than 98% of the VOC abatement unit operating time during April 1st to September 30, the Department may initiate enforcement action and may include in that enforcement action any period of time that the parameter monitor was not recording accurate and reliable data during that operating period unless the licensee can

demonstrate to the satisfaction of the Department that the failure of the system to record accurate and reliable data was due to the performance of established quality assurance and quality control procedures or unavoidable malfunctions. Data recorded during scheduled maintenance, continuous system breakdown and repair, calibration checks and zero span adjustments of the temperature monitors shall not be used for compliance demonstration.

G. Acid and Alkaline Scrubbers

TI has several acid and alkaline emission points which are controlled by alkaline and acidic wet scrubbers. The acid scrubber (4-1,4-2, 4-3, 4-4, 4-5) operate as a system fed by a common exhaust for acid emissions. The alkaline scrubbers (4-6, 4-7 and 4-8) operate as a system fed by a common exhaust for alkaline emissions where 4-8 is capable of alternatively connecting to the acid exhaust system. Acid scrubber 4-9 is a separate system and is fed by a separate exhaust. The acid or alkali usage depends on the specific wafer and circuit design. The usage can vary from batch to batch, resulting in fluctuations in types of chemicals emitted as well as fluctuations in concentrations. However, in general, the most commonly used acids are hydrochloric, hydrofluoric, and nitric. The most common alkali (base) is ammonia.

Control efficiency is dependent on the inlet concentration, which can vary. Therefore, compliance shall be demonstrated by operating the scrubbers within a specific design range. The scrubbers were tested in April 2006. The results showed an acid scrubber control efficiency in excess of 98% when the inlet concentration of hydrofluoric acid and nitric acid were in excess of 100 ppmv, in mid-90% range when the inlet concentrations ranged from 10-100 ppmv and 92% when the inlet concentrations were below 10 ppmv. The alkaline scrubbers demonstrated a control efficiency in excess of 99% for ammonia when the inlet concentrations were in excess of 60 ppmv.

As a requirement of the previous renewal, TI was required to conduct an optimization study, this study was conducted in 2010. Testing from the optimization study indicated that hydrofluoric acid inlet concentrations needed to be at least 1 ppm for scrubbing to occur. For inlet concentrations ranging from 1.7 ppm to 2.6 ppm, the scrubbing efficiency ranged from 52% to 78.9%. All ammonia scrubbing efficiencies were above 99.2% regardless of changes in recirculation, make up water flow and pH. During the study, hydrochloric acid measurements were below the detection limits at both the scrubber inlet and outlet. Based on the results of this study and parameters monitored at other similar facilities, TI proposed the monitoring of fans and re-circulation pumps as a method to indicate proper scrubber operation.

BPT for the acid and alkaline emission points shall be the use of wet scrubbers operated as follows:

- The pH of the alkali scrubber media shall be maintained at or below 7. TI may use either the effluent from the acid scrubbers and/or an addition of sulfuric acid to control the pH in the alkali scrubber. pH of the alkali scrubber shall be maintained on a 1-hour average basis.

- The pH of the acid scrubber media shall be maintained at or greater than 2.2. pH of the acid scrubber shall be maintained on a 1-hour average.
- Visible Emissions from each scrubber stack shall not exceed 15% opacity on a six-minute average basis.

Periodic Monitoring

Maintenance and operational records shall be maintained for the alkaline system, acid system and the scrubber 4-9 system. Descriptions and dates of all maintenance performed on a scrubber shall be recorded. Dates, times and reasons for all permit deviations (including pH deviations from target), emission upsets or reasons that the scrubber system is not operation shall be recorded.

The following shall be monitored and recorded to indicate scrubber operation:

Alkali and Acid Scrubbers				
Indicator	Units of Measure	Monitoring tool/method	Frequency of Monitoring	Frequency of Recordkeeping
pH meter	pH	Liquid pH	continuously	Once per shift
Scrubber recirculation flow	On/Off	Flow meters	continuously	As alarms occur

H. HAP (Hazardous Air Pollutant) Processes

Several VOCs emitted by TI contain HAP (substances listed in Section 112(b) of the Clean Air Act). In order to meet BPT and keep the facility under the major HAP source thresholds, TI shall be limited to emissions of 9.9 tons/year of any single HAP and less than 24.9 tons/year total of all HAP. Recordkeeping shall be done on a monthly basis documenting compliance with these 12-month rolling total limits.

Emissions from the acid and alkaline scrubbers include water vapor and a small amount of acid or base. These non-water vapor emissions are reported as part of TI's HAP. Emission rates may be based on previous stack test results and records of operating times.

Periodic Monitoring

TI shall maintain HAP emission records using a similar calculation method as used for VOC emissions, on a monthly and 12-month rolling total. HAP emissions calculations shall be based on stockroom records, SDS (safety data sheets) records for the various materials used in the facility, and whether the HAP emission points are controlled.

I. Parts Washer

TI only has only one parts washer and this washer does not use solvents subject to “*Solvent Cleaners*, 06-096 C.M.R. Ch. 130”.

J. Fugitive Emissions

Visible emissions from a fugitive emission source (including stockpiles and roadways) shall not exceed 20% opacity, except for no more than five minutes in any one hour period during which time visible emissions shall not exceed 30% opacity. Compliance shall be determined by an aggregate of the individual fifteen-second opacity observations which exceed 20% in any one hour.

K. General Process Emissions

Visible emissions from any general process source shall not exceed an opacity of 20% on a six (6) minute block average basis.

L. Annual Emissions

Total Annual Emissions

TI shall be restricted to the following annual emissions, based on a 12-month rolling total. The tons per year limits were calculated based on:

- 2,803,000 gallons per year of distillate fuel combusted facility-wide
- 1,146,359,000 scf/year of natural gas combusted facility-wide
- 8,760 hours of operation of the VOC Abatement Unit combusting propane
- 100 hours of operation of the generators
- VOC emissions from process sources limited to 25 TPY

Total Licensed Annual Emissions for the Facility
Tons/year

(used to calculate the annual license fee)

	PM	PM ₁₀	SO ₂	NO _x	CO	VOC
*Boilers	19.65	19.65	0.35	40.87	87.7	11.76
VOC Abatement Unit	0.05	0.05	0.01	0.93	0.54	0.07
Generator #1	0.03	0.03	0.01	0.88	0.23	0.02
Generator #2	0.09	0.09	0.01	2.34	0.62	0.07
Generator #3	0.11	0.11	0.01	3.01	0.80	0.08
Generator #4	0.04	0.04	0.01	1.04	0.27	0.03
Generator #5	0.03	0.03	0.01	0.86	0.23	0.02
VOC Process Emissions	--	--	--	--	--	25
Total TPY	20.0	20.0	0.4	49.9	90.4	37.0

* boiler emissions scenario resulting in highest annual emissions was used for annual totals

Pollutant	Tons/year
Single HAP	9.9
Total HAP	24.9

AMBIENT AIR QUALITY ANALYSIS

The TI facility was previously modeled through an ambient air quality impact analysis for air emission license A-698-71-D-A (9/9/1997) demonstrating that emissions from the facility, in conjunction with all other sources, do not violate Ambient Air Quality Standards (AAQS). An additional air quality impact analysis is not required for this renewal.

ORDER

Based on the above Findings and subject to conditions listed below, the Department concludes that the emissions from this source:

- will receive Best Practical Treatment,
- will not violate applicable emission standards, and
- will not violate applicable ambient air quality standards in conjunction with emissions from other sources.

The Department hereby grants Air Emission License A-698-71-Z-R/A subject to the following conditions.

Severability. The invalidity or unenforceability of any provision, or part thereof, of this License shall not affect the remainder of the provision or any other provisions. This License shall be construed and enforced in all respects as if such invalid or unenforceable provision or part thereof had been omitted.

STANDARD CONDITIONS

- (1) Employees and authorized representatives of the Department shall be allowed access to the licensee's premises during business hours, or any time during which any emissions units are in operation, and at such other times as the Department deems necessary for the purpose of performing tests, collecting samples, conducting inspections, or examining and copying records relating to emissions (38 M.R.S.A. §347-C).
- (2) The licensee shall acquire a new or amended air emission license prior to commencing construction of a modification, unless specifically provided for in Chapter 115. [06-096 C.M.R. ch. 115]
- (3) Approval to construct shall become invalid if the source has not commenced construction within eighteen (18) months after receipt of such approval or if construction is discontinued for a period of eighteen (18) months or more. The Department may extend this time period upon a satisfactory showing that an extension is justified, but may condition such extension

upon a review of either the control technology analysis or the ambient air quality standards analysis, or both. [06-096 C.M.R. ch. 115]

- (4) The licensee shall establish and maintain a continuing program of best management practices for suppression of fugitive particulate matter during any period of construction, reconstruction, or operation which may result in fugitive dust, and shall submit a description of the program to the Department upon request. [06-096 C.M.R. ch. 115]
- (5) The licensee shall pay the annual air emission license fee to the Department, calculated pursuant to Title 38 M.R.S.A. §353-A. [06-096 C.M.R. ch. 115]
- (6) The license does not convey any property rights of any sort, or any exclusive privilege. [06-096 C.M.R. ch. 115]
- (7) The licensee shall maintain and operate all emission units and air pollution systems required by the air emission license in a manner consistent with good air pollution control practice for minimizing emissions. [06-096 C.M.R. ch. 115]
- (8) The licensee shall maintain sufficient records to accurately document compliance with emission standards and license conditions and shall maintain such records for a minimum of six (6) years. The records shall be submitted to the Department upon written request. [06-096 C.M.R. ch. 115]
- (9) The licensee shall comply with all terms and conditions of the air emission license. The filing of an appeal by the licensee, the notification of planned changes or anticipated noncompliance by the licensee, or the filing of an application by the licensee for a renewal of a license or amendment shall not stay any condition of the license. [06-096 C.M.R. ch. 115]
- (10) The licensee may not use as a defense in an enforcement action that the disruption, cessation, or reduction of licensed operations would have been necessary in order to maintain compliance with the conditions of the air emission license. [06-096 C.M.R. ch. 115]
- (11) In accordance with the Department's air emission compliance test protocol and 40 C.F.R. Part 60 or other method approved or required by the Department, the licensee shall:
 - A. perform stack testing to demonstrate compliance with the applicable emission standards under circumstances representative of the facility's normal process and operating conditions:
 1. within sixty (60) calendar days of receipt of a notification to test from the Department or EPA, if visible emissions, equipment operating parameters, staff inspection, air monitoring or other cause indicate to the Department that equipment may be operating out of compliance with emission standards or license conditions; or
 2. pursuant to any other requirement of this license to perform stack testing.

- B. install or make provisions to install test ports that meet the criteria of 40 C.F.R. Part 60, Appendix A, and test platforms, if necessary, and other accommodations necessary to allow emission testing; and
- C. submit a written report to the Department within thirty (30) days from date of test completion.

[06-096 C.M.R. ch. 115]

- (12) If the results of a stack test performed under circumstances representative of the facility's normal process and operating conditions indicate emissions in excess of the applicable standards, then:

- A. within thirty (30) days following receipt of such test results, the licensee shall re-test the non-complying emission source under circumstances representative of the facility's normal process and operating conditions and in accordance with the Department's air emission compliance test protocol and 40 C.F.R. Part 60 or other method approved or required by the Department; and
- B. the days of violation shall be presumed to include the date of stack test and each and every day of operation thereafter until compliance is demonstrated under normal and representative process and operating conditions, except to the extent that the facility can prove to the satisfaction of the Department that there were intervening days during which no violation occurred or that the violation was not continuing in nature; and
- C. the licensee may, upon the approval of the Department following the successful demonstration of compliance at alternative load conditions, operate under such alternative load conditions on an interim basis prior to a demonstration of compliance under normal and representative process and operating conditions.

[06-096 C.M.R. ch. 115]

- (13) Notwithstanding any other provisions in the State Implementation Plan approved by the EPA or Section 114(a) of the CAA, any credible evidence may be used for the purpose of establishing whether a person has violated or is in violation of any statute, regulation, or Part 70 license requirement. [06-096 C.M.R. ch. 115]

- (14) The licensee shall maintain records of malfunctions, failures, downtime, and any other similar change in operation of air pollution control systems or the emissions unit itself that would affect emissions and that is not consistent with the terms and conditions of the air emission license. The licensee shall notify the Department within two (2) days or the next state working day, whichever is later, of such occasions where such changes result in an increase of emissions. The licensee shall report all excess emissions in the units of the applicable emission limitation. [06-096 C.M.R. ch. 115]

- (15) Upon written request from the Department, the licensee shall establish and maintain such records, make such reports, install, use and maintain such monitoring equipment, sample such emissions (in accordance with such methods, at such locations, at such intervals, and in such a manner as the Department shall prescribe), and provide other information as the Department may reasonably require to determine the licensee's compliance status.

[06-096 C.M.R. ch. 115]

SPECIFIC CONDITIONS

(16) Boiler #1, 2, 3, 4, and 5

A. Fuel

1. Total combined fuel use for Boilers 1, 2, 3, 4, and 5 shall not exceed 2,803,000 gal/yr of distillate fuel, based on a 12-month rolling total [06-096 C.M.R. ch. 115, BPT]
2. Total combined fuel use for Boiler 1, 2, 3, 4, and 5 shall not exceed 1,146,359,000 scf/year of natural gas based on a 12-month rolling total. [06-096 C.M.R. ch. 115, BPT]
3. If both distillate and natural gas are combusted during the previous 12 months, TI shall be limited to a CO annual emission rate of 90.5 tpy based on a 12-month rolling total. (Fuel heat capacity of distillate – 0.14 MMBtu/gal and of natural gas – 0.00102 MMBtu/scf). [06-096 C.M.R. ch. 115, BPT]
4. The facility shall not purchase or otherwise obtain distillate fuel with a maximum sulfur content that exceeds 0.0015% by weight (15 ppm). [06-096 C.M.R. ch. 115, BPT]
5. Compliance shall be demonstrated by fuel records from the supplier showing the quantity, type, and the percent sulfur of the fuel delivered (if applicable). Records of fuel use shall be kept on a monthly and 12-month rolling total basis. [06-096 C.M.R. ch. 115, BPT]

B. Emissions from each boiler shall not exceed the following when firing distillate fuel:

Emission Unit	Pollutant	lb/MMBtu	Origin and Authority
Boilers 1-4	PM	0.1	A-698-71-A-T/N (6/3/97), BPT
Boiler 5	PM	0.1	A-698-71-D-A (9/9/97), BPT
Boilers 1-4	NO _x	0.2	A-698-71-A-T/N (6/3/97), BPT
Boiler 5	NO _x	0.2	A-698-71-D-A (9/9/97), BPT

C. Emissions from each boiler shall not exceed the following when firing distillate fuel: [06-096 C.M.R. ch. 115, BPT]:

Emission Unit	PM (lb/hr)	PM₁₀ (lb/hr)	SO₂ (lb/hr)	NO_x (lb/hr)	CO (lb/hr)	VOC (lb/hr)
Boiler 1	2.93	2.93	0.04	5.86	2.05	0.88
Boiler 2	2.93	2.93	0.04	5.86	2.05	0.88
Boiler 3	2.93	2.93	0.04	5.86	2.05	0.88
Boiler 4	2.93	2.93	0.04	5.86	2.05	0.88
Boiler 5	2.93	2.93	0.04	5.86	2.05	0.88

D. Emissions from each boiler shall not exceed the following when firing natural gas:

<u>Emission Unit</u>	<u>Pollutant</u>	<u>lb/MMBtu</u>	<u>Origin and Authority</u>
Boilers 1-4	PM	0.01	A-698-71-A-T/N (6/3/97), BPT
Boiler 5	PM	0.01	A-698-71-D-A (9/9/97), BPT
Boilers 1-4	NO _x	0.07	A-698-71-A-T/N (6/3/97), BPT
Boiler 5	NO _x	0.07	A-698-71-D-A (9/9/97), BPT

E. Emissions from each boiler shall not exceed the following when firing natural gas [06-096 C.M.R. ch. 115, BPT]:

<u>Emission Unit</u>	<u>PM (lb/hr)</u>	<u>PM₁₀ (lb/hr)</u>	<u>SO₂ (lb/hr)</u>	<u>NO_x (lb/hr)</u>	<u>CO (lb/hr)</u>	<u>VOC (lb/hr)</u>
Boiler #1	0.29	0.29	0.02	2.05	4.40	0.59
Boiler #2	0.29	0.29	0.02	2.05	4.40	0.59
Boiler #3	0.29	0.29	0.02	2.05	4.40	0.59
Boiler #4	0.29	0.29	0.02	2.05	4.40	0.59
Boiler #5	0.29	0.29	0.02	2.05	4.40	0.59

F. Visible emissions from Stack 1 or Stack 2 shall each not exceed 10% opacity on a six-minute block average basis. [06-096 C.M.R. ch. 115, BPT]

G. New Source Performance Standards (NSPS): 40 C.F.R. Part 60, Subpart Dc
 TI shall comply with all requirements of 40 C.F.R. Part 60, Subpart Dc applicable to Boilers 1 - 5 including, but not limited to, the following:

1. TI shall record and maintain records of the amounts of each fuel combusted during each day or, if applicable, monthly records with fuel certifications.
 [40 C.F.R. § 60.48c(g)]
2. TI shall submit semi-annual reports to EPA and to the Department. These reports shall include the calendar dates covered in the reporting period and records of fuel supplier certifications. The semi-annual reports are due within 30 days of the end of each six-month period.
 [40 C.F.R. § 60.48c(j) and 06-096 C.M.R. ch. 115, BPT]
3. The following address for EPA shall be used for any reports or notifications required to be copied to them:

U.S. Environmental Protection Agency, Region I
 5 Post Office Square, Suite 100 (OES04-2)
 Boston, MA 02109-3912
 Attn: Air Compliance Clerk

H. If TI no longer operates one or more of its boilers as gas-fired boilers, TI shall be subject to the following provisions:

1. TI shall demonstrate compliance with Subpart JJJJJJ to EPA and the Department for the affected boiler(s) within 180 days of the effective date of the fuel switch. [40 C.F.R. § 63.11210(i)]
2. Notification of the changes shall be submitted to the EPA and the Department within 30 days of the change and shall provide the following:
 - a. The name of the owner or operator of the affected source, the location of the source, the boiler(s) that have switched fuels, whether the boilers were physically changed or took a permit limit, and the date of the notice.
 - b. The date upon which the fuel switch, physical change, or permit limit occurred. [40 C.F.R. § 63.11225(g)]
3. TI shall complete the tune-up on each boiler firing distillate fuel, by following the procedures described in §63.11223(b), no later than 180 days after the boiler(s) begins firing distillate fuel. [40 C.F.R. § 63.11210(i)]

(17) **Emergency Generators 1 - 5**

- A. Each of the emergency generators shall be limited to 100 hours of operation per calendar year, excluding operating hours during emergency situations. [06-096 C.M.R. ch. 115, BPT]
- B. The fuel sulfur content for Generators 1 - 5 shall be limited to 0.0015% sulfur by weight. Compliance shall be demonstrated by fuel records from the supplier documenting the type of fuel delivered and the sulfur content of the fuel. [06-096 C.M.R. ch. 115, BPT]
- C. Emissions shall not exceed the following:

Unit	Pollutant	lb/MMBtu	Origin and Authority
Emergency Generator 1	PM	0.12	06-096 C.M.R. ch. 103, § (2)(B)(1)(a)
Emergency Generator 2	PM	0.12	06-096 C.M.R. ch. 103, § (2)(B)(1)(a)
Emergency Generator 3	PM	0.12	06-096 C.M.R. ch. 103, § (2)(B)(1)(a)
Emergency Generator 4	PM	0.12	06-096 C.M.R. ch. 103, § (2)(B)(1)(a)
Emergency Generator 5	PM	0.12	06-096 C.M.R. ch. 103, § (2)(B)(1)(a)

D. Emissions shall not exceed the following [06-096 C.M.R. ch. 115, BPT]:

Unit	PM (lb/hr)	PM₁₀ (lb/hr)	SO₂ (lb/hr)	NO_x (lb/hr)	CO (lb/hr)	VOC (lb/hr)
Generator 1 (5.5MMBtu/hr)	0.66	0.66	0.01	17.60	4.68	0.50
Generator 2 (14.6 MMBtu/hr)	1.75	1.75	0.02	46.72	12.41	1.31
Generator 3 (18.8 MMBtu/hr)	2.26	2.26	0.03	60.16	15.98	1.69
Generator 4 (6.49 MMBtu/hr)	0.78	0.78	0.01	20.77	5.52	0.58
Generator 5 (5.37 MMBtu/hr)	0.64	0.64	0.01	17.18	4.56	0.48

E. Visible Emissions from each emergency generator shall not exceed 20% opacity on a six-minute block average basis. [06-096 C.M.R. ch. 115, BPT]

F. Generators 1-5 shall meet the applicable requirements of 40 C.F.R. Part 63, Subpart ZZZZ, including the following:
 [incorporated under 06-096 C.M.R. ch. 115, BPT]

1. Operation and Maintenance Requirements for each emergency generator
 (40 C.F.R. § 63.6603(a) and Table 2(d))

	Operating Limitations
Emergency stationary CI (compression ignition) RICE units: Generator 1-5	<ul style="list-style-type: none"> - Change oil and filter every 500 hours of operation or annually, whichever comes first; - Inspect the air cleaner every 1000 hours of operation or annually, whichever comes first, and replace as necessary; and - Inspect all hoses and belts every 500 hours of operation or annually, whichever comes first, and replace as necessary.

Records shall be maintained documenting compliance with the operational limitations.

[40 C.F.R. § 63.6603(a) and Table 2(d) and 06-096 C.M.R. ch. 115]

2. Oil Analysis Program Option

TI has the option of utilizing an oil analysis program which complies with the requirements of § 63.6625(i) in order to extend the specified oil change requirement. If this option is used, TI must keep records of the parameters that are analyzed as part of the program, the results of the analysis, and the oil changes for

each engine. The analysis program must be part of the maintenance plan for each engine. [40 C.F.R. § 63.6625(i)]

3. Non-Resettable Hour Meter

A non-resettable hour meter shall be installed and operated on each engine. [40 C.F.R. § 63.6625(f)]

4. Maintenance, Testing, and Non-Emergency Operating Situations

a. As emergency engines, the units shall each be limited to 100 hours/year for maintenance checks and readiness testing. Up to 50 hours/year of the 100 hours/year may be used in non-emergency situations (this does not include peak shaving, non-emergency demand response, or to generate income for a facility by providing power to an electric grid or otherwise to supply power as part of a financial arrangement with another entity). These limits are based on a calendar year. Compliance shall be demonstrated by records (electronic or written logs) of all engine operating hours. [40 C.F.R. § 63.6640(f) and 06-096 C.M.R. ch. 115]

b. TI shall keep records that include maintenance conducted on the engines and the hours of operation of each engine recorded through the non-resettable hour meter. Documentation shall include the number of hours each unit operated for emergency purposes, the number of hours each unit operated for non-emergency purposes, and the reason each engine was in operation during each time. [40 C.F.R. §§ 63.6655(e) and (f)]

5. Operation and Maintenance

The engines shall be operated and maintained according to the manufacturer's emission-related written instructions, or TI shall develop a maintenance plan which provides to the extent practicable for the maintenance and operation of each engine in a manner consistent with good air pollution control practice for minimizing emissions. [40 C.F.R. § 63.6625(e)]

6. Startup Idle and Startup Time Minimization

During periods of startup, the facility must minimize each engine's time spent at idle and minimize each engine's startup time to a period needed for appropriate and safe loading of the engine, not to exceed 30 minutes. [40 C.F.R. § 63.6625(h) & 40 C.F.R. Part 63, Subpart ZZZZ Table 2d]

(18) **VOC Processes and VOC Abatement Unit**

A. Facility-wide process VOC emissions shall be limited to 25 tons/year, based on a 12-month rolling total. [06-096 C.M.R. ch. 115, BPT]

B. Emissions from the VOC Abatement Unit shall not exceed the following when firing natural gas:

Unit	PM (lb/hr)	PM ₁₀ (lb/hr)	SO ₂ (lb/hr)	NO _x (lb/hr)	CO (lb/hr)	VOC (lb/hr)
VOC Abatement Unit	0.01	0.01	0.001	0.15	0.12	0.01

C. Emissions from the VOC Abatement Unit shall not exceed the following when firing propane:

Unit	PM (lb/hr)	PM ₁₀ (lb/hr)	SO ₂ (lb/hr)	NO _x (lb/hr)	CO (lb/hr)	VOC (lb/hr)
VOC Abatement Unit	0.01	0.01	0.001	0.21	0.12	0.02

D. TI shall maintain and operate the VOC Abatement Unit to control VOC emissions from the tool solvent vents. The abatement unit shall be maintained and operated to meet a minimum treatment efficiency of 90% removal or an output stack concentration of less than 20 ppm. The removal efficiency shall be calculated as follows:

$$\frac{(VOC \text{ at inlet of abatement unit}) - (VOC \text{ at outlet of abatement unit})}{(VOCs \text{ at inlet of abatement unit})} \times 100$$

[06-096 C.M.R. ch. 115, BPT]

E. Testing shall be performed by December 1, 2018, and every other calendar year thereafter on the inlet and outlet streams of the VOC Abatement Unit. Testing shall be conducted in accordance with the appropriate EPA method for VOCs or the appropriate EPA method for total hydrocarbons. [06-096 C.M.R. ch. 115, BPT]

F. Periodic and Parameter Monitoring

VOC Capture and Control				
Indicator	Units of Measure	Monitoring tool/method	Frequency of Monitoring	Frequency of Recordkeeping
Temperature	°F	Thermocouple	continuously	Hourly
Status of concentrator rotor	On/off	Rotor alarms	continuously	As Alarms occur
Rotor Rotation	Yes/No	Rotation Indicator	continuously	As Alarms occur

For the purposes of this condition, the monitors shall be operated continuously as defined in the Findings of Fact of this license. This data shall be used to demonstrate

compliance with the requirement that the combustion temperature monitor record 98% of the time the source is operating within the April 1- September 30 six-month period. [06-096 C.M.R. ch. 115, BPT]

1. The combustion temperature monitor is a parameter monitor and shall record accurate and reliable data. If this parameter monitor is recording accurate and reliable data less than 98% of the VOC Abatement Unit operating time during the April 1- September 30 six-month period, the Department may initiate enforcement action and may include in that enforcement action any periods of time that the parameter was not recording accurate and reliable data during that six month period unless the licensee can demonstrate to the satisfaction of the department that the failure of the system to record accurate and reliable data was due to the performance of established quality assurance and quality control procedures or unavoidable malfunctions.
 2. Compliance shall be determined at the end of this six-month period. Data recorded during schedule maintenance, continuous system breakdown and repair, calibration checks and zero and span adjustments of the temperature monitors shall not be used for compliance demonstration.
- G. TI shall keep records of events when the VOC Abatement Unit shuts down, including automatic shutoff when below the lower temperature limit of 1250°F, and activated alarm events when below 1350°F. The records shall include the time the unit is not operating. [06-096 C.M.R. ch. 115, BPT]
- H. TI shall operate the VOC Abatement Unit at all times the wafer process is in operation during April 1 – September 30 with a 97% uptime requirement on the VOC Abatement Unit. Compliance with this requirement shall be determined at the end of the six-month operational period. 1-hour averages of the data recorded as required by Specific Condition (18) G. shall be used to determine compliance with the requirement. For compliance purposes, the 3% downtime (97% uptime) calculation shall include any downtime of the abatement unit, regardless of cause (malfunctions, maintenance, etc.). [06-096 C.M.R. ch. 115, BPT]
- I. TI shall maintain records and shall submit, to the Department reports documenting non-compliance for any April 1-September 30 period during which the 97% uptime requirement is not met prior to October 30 of the same calendar year.
- J. TI shall keep maintenance records for the VOC Abatement Unit, recording the date, time, and reasons for all emissions upsets as well as all routine maintenance procedures. [06-096 C.M.R. ch. 115, BPT]
- K. Visible emissions from the VOC Abatement Unit Stack, whether or not the VOC Abatement Unit is in operation, shall not exceed 10% opacity on a six (6) minute average basis. [06-096 C.M.R. ch. 115, BPT]

- L. Total VOC emissions from the processes at TI shall be calculated on a 12-month rolling total, updated monthly using the following equations:

Hourly rate

$HR =$ average VOC emission rate from the VOC Abatement Unit measured during VOC testing, (lbs VOC/hr)

When the VOC Abatement Unit is not operating, the emissions from the normally controlled area shall be considered uncontrolled in the VOC emission calculations. For this period, the uncontrolled hourly rate will be used.

Monthly Hours

$MH =$ No. of Hours per month of VOC Abatement Unit operation

Monthly Rate

$MR = HR \times MH$ lbs VOC emitted/Month

Process Solvents issued monthly from stockroom to manufacturing floor

$PS =$ lbs VOCs issued/month

Emission Rate

$ER = \frac{MR}{PS}$ (lb VOC emitted/lb VOC issued)

Process Annual emission Rate

$PAR = \sum_{n=1}^{n=12} (PS \times ER)_1 + \dots + (PS \times ER)_{12}$ for the 12 periods in a year (lbs/yr)

Uncontrolled Annual Rate

$UAR = \sum_{n=1}^{n=12} \text{Uncontrolled VOCs Emitted}$ for the 12 months in a year (lbs/yr)

Total Annual Rate

$TAR = PAR + UAR$, (lbs/yr)

$TAR = (PAR + UAR)/2000$ (tons/yr)

- M. For VOCs from insignificant activities, TI shall maintain in its files an estimate of the VOCs emitted annually from such activities, to the extent that the VOC emissions are not included in the 12-month rolling average recordkeeping program. The estimate shall be updated annually if process or raw material changes have occurred that would affect the previous estimate. [06-096 C.M.R. ch. 115, BPT]

(19) **Acid and Alkaline Scrubbers**

- A. TI shall operate wet scrubbers to control emissions from the acid and alkaline emission streams. The wet scrubbers shall be operated at a minimum of 97% of the time the wafer process is operating; on a 12-month rolling average basis.
[06-096 C.M.R. ch. 115, BPT]

- B. The scrubber operations shall be monitored using pH. The pH shall be checked and recorded once per shift. Data recorded during calibrations, zero and span adjustments, and planned maintenance shall not be used for compliance demonstrations.
1. The pH of the acid vapor scrubbing media shall be maintained at or greater than 2.2. 1-hour averaging shall be used to determine compliance with this requirement.
 2. The pH of the alkaline vapor scrubbing media shall be maintained at or less than 7. 1-hour averaging shall be used to determine compliance with this requirement. [06-096 C.M.R. ch. 115, BPT]
- C. Maintenance and operational records shall be maintained for the alkaline system, acid system and the scrubber 4-9 system. Descriptions and dates of all maintenance performed on a scrubber shall be recorded. Dates, times and reasons for all permit deviations (including pH deviations from target), emission upsets or reasons that the scrubber system is not operation shall be recorded. [06-096 C.M.R. ch. 115, BPT]
- D. The following shall be monitored to indicate scrubber operation:

Alkali and Acid Scrubbers				
Indicator	Units of Measure	Monitoring tool/method	Frequency of Monitoring	Frequency of Recordkeeping
pH meter	pH	Liquid pH	*continuously	Once per shift
Scrubber recirculation flow	On/Off	Flow meters	*continuously	As alarms occur

* continuously as defined in the Findings of Fact of this license
 [06-096 C.M.R. ch. 115, BPT]

- E. Visible emissions from each of the acid scrubber stacks shall not exceed 15% on a six (6) minute average basis. [06-096 C.M.R. 115, BPT]

(20) **HAP Process**

- A. TI shall be limited to 9.9 tons/year of any single HAP and 24.9 tons/year of total facility HAP, based on a 12-month rolling total. [06-096 C.M.R. 115, BPT]
- B. TI shall maintain records on a monthly and 12 month rolling total basis for each HAP and total facility HAP. The HAP emission calculations may be directly correlated to the VOC emissions calculations in Condition (18)(M) of this license. HAP emissions calculations shall be based on stockroom records, SDS (safety data sheets) records for the various materials used in the facility, and whether the HAP emission points are controlled. The small amount of acid or base vapor exhausted from the acid and

alkaline scrubbers shall be included in the facility HAP (scrubber emission rates may be based on previous stack testing). [06-096 C.M.R. 115, BPT]

(21) **Fugitive Emissions**

Visible emissions from a fugitive emission source (including stockpiles and roadways) shall not exceed 20% opacity, except for no more than five minutes in any one-hour period during which time visible emissions shall not exceed 30% opacity. Compliance shall be determined by an aggregate of the individual fifteen-second opacity observations which exceed 20% in any one hour. [06-096 C.M.R. ch. 115, BPT/BACT]

(22) **General Process Sources**

Visible emissions from any general process source shall not exceed 20% opacity on a six-minute block average basis. [06-096 C.M.R. ch. 115, BPT/BACT]

(23) **Annual Emission Statement**

A. In accordance with *Emission Statements*, 06-096 C.M.R. ch. 137, TI shall annually report to the Department, in a format prescribed by the Department, the information necessary to accurately update the State's emission inventory. The emission statement shall be submitted as specified by the date in 06-096 C.M.R. ch. 137.

B. TI shall keep the following records in order to comply with 06-096 C.M.R. ch. 137:

1. The amount of distillate fuel fired in Boilers 1-5 and Generators 1-5 (each) on a monthly basis;
2. The amount of natural gas fired in Boilers 1-5 on a monthly basis;
3. The amount of natural gas or propane fired in the VOC Abatement Unit on a monthly basis;
4. The sulfur content of the distillate fuel fired in Boilers 1-5 and Generators 1-5;
5. Calculations of the VOC and/or HAP emissions from the facility on a calendar year total basis; and
6. Hours each emission unit was operating and/or active either reported on a monthly basis or calculated from operational data for the season.
[06-096 C.M.R. ch. 137]

C. In reporting year 2020 and every third year thereafter, Texas Instruments shall report to the Department emissions of hazardous air pollutants as required by 06-096 C.M.R. ch. 137, § (3)(C). Texas Instruments shall pay the annual air quality surcharge, calculated by the Department based on these reported emissions of hazardous air pollutants, by the date required in Title 38 M.R.S. § 353-A(3).
[38 M.R.S. § 353-A(1-A)]

Texas Instruments Incorporated
Cumberland County
South Portland, Maine
A-698-71-Z-R/A (SM)

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Departmental
Findings of Fact and Order
Air Emission License
Renewal/Amendment

- (24) TI shall notify the Department within 48 hours and submit a report to the Department on a quarterly basis if a malfunction or breakdown in any component causes a violation of any emission standard (38 M.R.S. § 605).

DONE AND DATED IN AUGUSTA, MAINE THIS 8th DAY OF January, 2020.

DEPARTMENT OF ENVIRONMENTAL PROTECTION

BY: 

GERALD D. REID, COMMISSIONER

The term of this license shall be ten (10) years from the signature date above.

[Note: If a renewal application, determined as complete by the Department, is submitted prior to expiration of this license, then pursuant to Title 5 M.R.S. § 10002, all terms and conditions of the license shall remain in effect until the Department takes final action on the license renewal application.]

PLEASE NOTE ATTACHED SHEET FOR GUIDANCE ON APPEAL PROCEDURES

Date of initial receipt of application: 9/30/2014

Date of application acceptance: 9/30/2014

Date filed with the Board of Environmental Protection:

This Order prepared by Lisa P. Higgins, Bureau of Air Quality.

