

US EPA ARCHIVE DOCUMENT

Statement of Basis
Air Pollution Control
Draft Title V Permit to Operate
G&K Services, Inc. – Green Bay
Permit No. V-ON-5500900021-2014-01

The purpose of this document is to set forth the legal and factual basis for permit conditions, including references to applicable provisions of the Clean Air Act (CAA or Act) and implementing regulations. This document also gives the derivation of conditions as required by 40 C.F.R. § 71.11(b).

1. GENERAL INFORMATION

a. Applicant and Stationary Source Information

Owner	Source (SIC Code: 7218)
G&K Services, Inc. 5995 Opus Parkway Minnetonka, Minnesota 55343	G&K Services, Inc.—Green Bay 800 Isbell Street Green Bay, Wisconsin 54303
Responsible Official	Facility Contact
Steve Botts: (952) 912-5500	Douglas Krysiak: (920) 497-2509

b. Facility Description

G&K Services cleans and reconditions soiled industrial textiles such as towels, coveralls, uniforms, and other items for industrial customers. G&K Services operates five indoor-vented industrial washing machines, four stack-vented industrial washing machines, six natural gas-burning industrial dryers, a natural gas-fired steam tunnel, a 10.46 MMBTU/hr natural gas-fired boiler, and other processes, such as textile sorting activities and comfort heating.

G&K Services' customers include businesses in the printing and woodworking industries as well as automotive shops. These businesses send their soiled industrial towels to G&K Services to be washed. The soiled industrial towels from these customers typically contain volatile organic compounds (VOCs) and hazardous air pollutants (HAPs) that may be emitted from the facility as the towels are washed. Soiled industrial towels from other businesses and industry groups generally do not contain VOCs and HAPs.

G&K Services classifies the soiled industrial towels into three categories based on the towel's source. The first category, soiled print towels or "inkers," includes soiled industrial towels from printing, woodworking, wood finishing, and other facilities which return towels containing VOCs. The second category, soiled shop towels, includes towels from automotive shops and other similar operations which return

towels containing VOCs, oil, and/or grease. The third category includes towels and textiles from other sources that do not use materials containing VOCs or HAPs.

G&K counts and sorts soiled industrial towels, and launders them using a conventional industrial (aqueous) washing step and a drying step. The washing process consists of loading soiled textiles into an industrial washer and adding water, detergent, and other cleaning additives. The soiled textiles proceed through a washing stage, wash water draining stage, rinsing stage, and a final draining stage. Once washed, the textiles are then transferred to an industrial dryer for drying.

c. Area Classification

G&K Services Inc.—Green Bay is located within the exterior boundaries of the Oneida Tribe of Indians of Wisconsin's tribal reservation in Green Bay, Wisconsin. The EPA is responsible for issuing and enforcing any air quality permits for the source until the Tribe or State has EPA approval to do so.

The facility is located in Brown County, which is designated attainment with National Ambient Air Quality Standards for all criteria pollutants.

d. Title V Major Source Status

The facility has the potential to emit (PTE) more than 100 tons of VOC, particulate matter smaller than 10 microns (PM_{10}), and particulate matter smaller than 2.5 microns ($PM_{2.5}$) per year. Therefore, the facility is a major Title V source and must obtain a Title V permit.

e. Permit History

On February 13, 2013, G&K Services contacted EPA Region 5 to discuss the permitting status of its Green Bay facility. The facility is located within the Oneida Tribe of Indians of Wisconsin's reservation. As a result, EPA is the permitting authority for this facility.

Prior to the issuance of this permit, the facility operated according to the requirements of operating permits issued by the Wisconsin Department of Natural Resources (WDNR). Because WDNR did not have authority to issue Title V operating permits for the G&K Services – Green Bay facility, the operating permits issued by WDNR are not valid. However, these permits are listed below for reference:

- March 25, 2004: WDNR issued an initial Title V operating permit, permit number 405028690-P01, to G&K Services.
- December 21, 2007: WDNR issued permit modification 405028690-P02.

- March 16, 2009: WDNR issued a Title V permit renewal, permit number 405028690-P10, to G&K Services.
- February 25, 2010: WDNR issued permit modification 405028690-P11.
- July 11, 2011: WDNR issued permit modification 405028690-P12.
- May 17, 2013: WDNR issued permit modification 405028690-P13.

The current permit will be issued based on information provided in the following applications and follow-up information:

- June 14, 2013: G&K Services, Inc. application for an initial Part 71 permit.
- July 17, 2013: G&K Services, Inc., additional information explaining the calculation of emissions in its initial permit application.

2. PROCESS DESCRIPTION

a. Summary

G&K Services is an existing facility located at 800 Isbell Street in Green Bay, Wisconsin. The facility is physically located within the exterior boundaries of the Oneida Tribe of Indians of Wisconsin's reservation. Since the facility is located within the exterior boundary of an Indian reservation, EPA is the permitting authority responsible for issuing and enforcing air permits issued to G&K Services.

The facility operates the following emission units:

i. Process P01 – Industrial Washers Venting Indoors

Emission Unit	EU ID	Unit Description	Exhaust Stack
Jensen #3	P36	Industrial Washing Machine	Indoors
Braun #4	P37	Industrial Washing Machine	Indoors
Ellis Split Pocket #5	P38	Industrial Washing Machine	Indoors
Ellis Split Pocket #6	P39	Industrial Washing Machine	Indoors
Unimac #1	P40	Industrial Washing Machine	Indoors
Jensen L-Tron Washer/Extractor Model 450 OPT-H	P37	Proposed replacement for Braun #4	Indoors

ii. Process P02 – Industrial Washers Venting to Stack S34

Emission Unit	EU ID	Unit Description	Exhaust Stack
Jensen #1	P34	Industrial Washing Machine	S34
Jensen #2	P35	Industrial Washing Machine	S34
Unimac #2	P25	Industrial Washing Machine	S34
Unimac #3	P18	Industrial Washing Machine	S34

iii. Process P03 – Industrial Dryers Burning Natural Gas

Emission Unit	EU ID	Unit Description	Heat Input Rate (MMBTU/hr)	Exhaust Stack
Challenge #3	P08	Industrial Dryer	2.75	S08
Challenge #4	P09	Industrial Dryer	2.75	S09
American #1	P30	Industrial Dryer	3.5	S30
American #2	P31	Industrial Dryer	3.5	S31
Cissell #1	P05	Industrial Dryer	0.25	S06
Cissell #2	P06	Industrial Dryer	0.25	S07
Jensen DTX 800 Dryer #1	P30	Proposed replacement for American #1	2.5	S30
Jensen DTX 800 Dryer #2	P31	Proposed replacement for American #2	2.5	S31
WashTech DR-80 Dryer	P05	Proposed replacement for Cissell #1	0.25	S06

iv. Boiler B01 – 10.46 MMBTU Natural Gas-fired Boiler

Emission Unit	Unit Description	Burner Rating (MMBTU)	Exhaust Stack
Boiler B01	Natural gas-fired boiler	10.46	S01

v. Steam Tunnel

Emission Unit	Unit Description	Burner Rating (MMBTU/hr)
Leonard 24 foot Steam Tunnel	Steam Tunnel Dryer	0.8
Leonard Automatics Model VPT24 Steam Tunnel or a similar unit with a capacity rating up to 3.0 MMBTU/hr	Proposed steam tunnel replacing Leonard 24 foot steam tunnel	3.0

b. Insignificant Activities

The facility has the following insignificant activities as listed in 40 C.F.R. § 71.5(c)(11)(i):

- Mobile sources, such as forktrucks used for material transport
- HVAC units used for human comfort
- Office activities
- Janitorial services and consumer use of janitorial products.

The facility identified in its permit application the following emission units as insignificant activities based on insignificant emissions of regulated air pollutants and hazardous air pollutant pursuant to 40 C.F.R. § 71.5(c)(11)(ii):

- Continuous Roll Towel Machine
- Textile sorting and counting area
- Wastewater treatment/handling
- Boiler and HVAC maintenance
- Demineralization/Oxygen scavenging of Boiler Water
- Fire Control Equipment
- Maintenance of grounds, equipment, and buildings
- Purging of natural gas lines
- Sanitary sewer and plumbing venting.

c. Potential Emissions

Emission factors used to determine HAP and VOC PTE were determined through stack testing at the facility and other similar facilities owned by G&K Services, Inc. Emission factors listed for natural gas combustion units in AP-42, Fifth Edition, were used for determining the PTE of natural gas-fired emission units. Particulate matter (PM) emission factors were calculated using the available exhaust particulate matter loading, exhaust temperatures, and exhaust flow rates. It is assumed that the emissions of PM₁₀ and PM_{2.5} are equivalent to the PM emissions for the facility since separate PM₁₀ and PM_{2.5} emission factors are unavailable. This is a conservative estimate of potential PM₁₀ and PM_{2.5} emissions since all fractions of particulate matter are assumed to be emitted at the PM emission rate.

Calculations and the method used to calculate the emission potentials are included in spreadsheets as attachments to this statement of basis. The tables in this section represent the facility-wide potential to emit.

For the existing emission units at the facility, the PTE after federally-enforceable limits and controls are included in the table below. The figures are presented in tons per year.

Facility-wide Potential to Emit, Before Modification (tons per year)									
PM	PM ₁₀	PM _{2.5}	NO _x	SO ₂	CO	VOC	Lead	Single HAP	Total HAP
205.2	205.2	205.2	25.7	0.1	12.7	122.5	0	8.4	21.2

Construction permit SYN-ON-55000900021-2014-01 authorized the replacement of several units at the facility. The following table gives the facility-wide potential to emit after all federally-enforceable limits and controls and after all authorized emission unit replacements are completed. The figures are presented in tons per year.

Facility-wide Potential to Emit, After Modification (tons per year)									
PM	PM ₁₀	PM _{2.5}	NO _x	SO ₂	CO	VOC	Lead	Single HAP	Total HAP
195.4	195.4	195.4	25.8	0.1	12.8	122.5	0	8.4	21.2

d. Actual Emissions

G&K Services is an existing facility operating pursuant to the operating permit erroneously issued by WDNR. As a result of a condition in that permit, the facility submits an annual emission inventory to WDNR. Although the permits were issued by WDNR, EPA has included as a part of the record for this permitting action the emissions inventory from 2012. Actual VOC, highest single HAP, and total HAP emissions for calendar year 2012 are included in the table below.

VOC	HAP – Toluene	Total HAPs
57.1	4.12	9.2

Actual emissions for calendar year 2012 for all other pollutants are included in the table below. Figures are presented in tons.

PM	PM ₁₀	PM _{2.5}	NO _x	SO ₂	CO	Lead
2.99	2.99	2.99	1.79	0.01	0.88	0.02

3. APPLICABLE REQUIREMENTS

a. Title V Permitting

In accordance with 40 C.F.R. § 71.3(a)(1), all major stationary sources are required to obtain a Title V operating permit. “Major source” is defined at 40 C.F.R. § 71.2 as any stationary source belonging to a single major industrial grouping that directly emits or has the potential to emit 100 tons per year or more of any criteria pollutant. Since G&K Services’ Green Bay facility has the potential to emit more than 100 tons per year of VOC, PM₁₀, and PM_{2.5}, it is a major stationary source subject to Title V.

b. Construction Permits

This Title V permit incorporates the conditions from the following construction permit issued pursuant to the federal minor new source review program in Indian country, codified at 40 C.F.R. §§ 49.151-161:

- After-the-Fact Synthetic Minor Air Quality Construction Permit, permit number SYN-ON-5500900021-2014-01.

c. New Source Performance Standards (NSPS)

G&K Services operates a 10.46 MMBTU natural gas-fired industrial boiler installed in 1982. This boiler is not subject to 40 C.F.R. Part 60, Subpart D, Da, or Db because it burns natural gas as its only fuel and has a capacity smaller than 100 MMBTU/hr. This boiler is not subject to 40 C.F.R. Part 60, Subpart Dc because it was constructed prior to June 9, 1989 and has not been modified or reconstructed since initial installation.

There currently are no new source performance standards for industrial washing machines, dryers, or steam tunnels.

d. National Emission Standards for Hazardous Air Pollutants (NESHAP)

G&K Services has requested federally-enforceable HAP emission limits designed to limit the source to no more than 8.4 tons per year of any single HAP and no more than 21.2 tons per year of total HAPs. As a result, G&K Services will be considered an area source for HAP emissions. Since G&K Services is an area source for HAP emissions, the facility is not subject to any major source NESHAPs.

G&K Services is not subject to 40 C.F.R. Part 63, Subpart JJJJJ: National Emission Standards for Hazardous Air Pollutants for Industrial, Commercial, and Institutional Boilers Area Sources, because the boiler is a natural gas-fired boiler as defined at 40 C.F.R. § 63.11237. Pursuant to 40 C.F.R. § 63.11195(e), gas-fired boilers, as defined at 40 C.F.R. § 63.11237, are not subject to Subpart JJJJJ.

Emission Overview for G&K Services, Inc. -- Green Bay

PTE Before Modification (After Enforceable Limits)										
Process or Emission Unit	PM	PM10	PM2.5	NOx	SO2	CO	VOC*	Lead	Highest Single HAP*	Total HAP*
Boiler B01	0.341365	0.341365	0.341365	7.6358	0.02695	3.772984	122.5	2.24582E-05	8.4	21.2
Process P01	0	0	0	0	0	0		0		
Process P02	9.984731	9.984731	9.984731	0	0	0		0		
Process P03	171.2868	171.2868	171.2868	9.49	0.033494	4.689176		2.79118E-05		
Steam Tunnel	23.26643	23.26643	23.26643	0.584	0.002061	0.288565		1.71765E-06		
Miscellaneous	0.356638	0.356638	0.356638	7.97744	0.028156	3.941794		2.34631E-05		
TOTAL	205.2	205.2	205.2	25.7	0.1	12.7	122.5	0.0	8.4	21.2

* Sourcewide VOC, Single HAP, and Total HAP PTE limited by annual towel processing limit, a synthetic minor limit

PTE After Modification (After Enforceable Limits)										
Process or Emission Unit	PM	PM10	PM2.5	NOx	SO2	CO	VOC*	Lead	Highest Single HAP*	Total HAP*
Boiler B01	0.341365	0.341365	0.341365	7.6358	0.02695	3.772984	122.5	2.24582E-05	8.4	21.2
Process P01	0	0	0	0	0	0		0		
Process P02	9.984731	9.984731	9.984731	0	0	0		0		
Process P03	157.487	157.487	157.487	8.03	0.028341	3.967765		2.36176E-05		
Steam Tunnel	27.23322	27.23322	27.23322	2.19	0.007729	1.082118		6.44118E-06		
Miscellaneous	0.356638	0.356638	0.356638	7.97744	0.028156	3.941794		2.34631E-05		
TOTAL	195.4	195.4	195.4	25.8	0.1	12.8	122.5	0.0	8.4	21.2

* Sourcewide VOC, Single HAP, and Total HAP PTE limited by annual towel processing limit, a synthetic minor limit

GHG Overview for G&K Services, Inc. -- Green Bay				
	CO2	CH4	N2O	CO2e
Before Modification	18373.22	0.346273	0.034627	18392.2
After Modification	18475.7	0.348204	0.03482	18494.78

Pollutant Potential to Emit Calculations and Methodology - Boiler B01

Emission Unit	Heat Input Rate	Units
B01	10.46	MMBTU/hr
Natural Gas Heating Value	1020	MMBTU/MMSCF

Unit	Potential NG Throughput MMSCF/yr
Boiler B01	89.83294118

Pollutant PTE - Combustion								
	PM	PM10	PM2.5	NOx	SO2	CO	VOC	Lead
Pollutant Emission Factor lb/MMSCF	7.6	7.6	7.6	170	0.6	84	5.5	0.0005
Potential Emissions in tons/yr	0.3413652	0.341365176	0.3413652	7.6358	0.026949882	3.77298	0.247041	2.24582E-05

HAP PTE - Combustion						
Pollutant	Benzene	Dichlorobenzene	Formaldehyde	Hexane	Toluene	Total
Pollutant Emission Factor lb/MMSCF	2.10E-03	1.20E-03	7.50E-02	1.80E+00	3.40E-03	1.88E+00
Potential to Emit in tons/yr	9.43E-05	5.39E-05	3.37E-03	8.08E-02	1.53E-04	8.45E-02

Notes

MMBTU = 1,000,000 British Thermal Units, MMSCF = 1,000,000 standard cubic feet of natural gas

All PTE emissions assumed to be produced from combustion of natural gas.

Potential NG Throughput (MMSCF/yr) = Heat Input Capacity (MMBTU/hr) x 8760 hours/yr x 1 MMSCF / 1020 MMBTU

PTE (tons/yr) = Potential NG Throughput (MMSCF/yr) x Emission Factor (lb/MMSCF) / 2000 lbs/ton

Combustion emission factors are from AP-42, Volume 1, Fifth Edition, Chapter 1.4, Tables 1.4-1 and 1.4-2.

HAP emission factors are from AP-42, Chapter 1.4, Tables 1.4-3.

5 Highest HAPs are displayed for calculation purposes.

Pollutant Potential to Emit Calculations and Methodology - Process P01

Shop Towel Feed Rate (lbs/hr)	4688
Shop Towel Feed Rate (1000 lbs/yr)	41066.88

Shop Towel Wash Time	70%
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Pollutant	Shop Towel Emission Factor (lb/1000 lb)	Process P01 PTE (tons/yr)
VOC	12	172.480896
1,2-Dichloroethane	0.04	0.57493632
Cumene	0.01	0.14373408
Ethylbenzene	0.07	1.00613856
Methanol	0.05	0.7186704
Methyl Isobutyl Ketone	0.06	0.86240448
Methylene Chloride	0.01	0.14373408
Napthalene	0.01	0.14373408
n-Hexane	0.005	0.07186704
Tetrachloroethene	1.75	25.153464
Toluene	1.55	22.2787824
Trichloroethene	0.21	3.01841568
Xylene (isomers and mixture)	0.78	11.21125824
m-Xylene	0.355	5.10255984
o-Xylene	0.07	1.00613856
p-Xylene	0.355	5.10255984
Total HAP	4.545	65.32713936

Notes

Process P01 has a maximum feed rate of 4,688 pounds of soiled towels per hour.

Process P01 is not designed to wash soiled shop towels. Therefore, only shop towel PTE is considered in calculations.

Shop towel emission factors are based on source-specific testing and combines both washing and drying time.

Shop towels spend 70% of the time in the washing process.

Process P01 contains only washing machines. Therefore, drying emissions are excluded.

Shop Towel Feed Rate (1000 lb/yr) = feed rate (lbs/hr) * 8760 (hr/yr) / 1000

PTE = feed rate (1000 lb/yr) * emission factor (lb/1000 lb) * 0.7/2000 (lb/ton)

Feed rate assumes that all units within this process are operated at their maximum load capacity. In actual practice, this may not occur.

Pollutant Potential to Emit Calculations and Methodology - Process P02

	Print Towel	Shop Towel
Feed Rate (lbs/hr)	2240	2600
Feed Rate (1000 lbs/yr)	19622.4	22776

	Print	Shop
Cycle Time (%)	95%	70%

Emission Unit	Emission Rate (gr/dscf)	Stack Flow Rate (acfm)	Stack Temp (°F)	Calculated Emission Factor (lb/hr)	PM PTE (tons/yr)
Jensen #1	0.1	680	80	0.5699048	2.496182857
Jensen #2	0.1	680	80	0.5699048	2.496182857
Unimac #2	0.1	680	80	0.5699048	2.496182857
Unimac #3	0.1	680	80	0.5699048	2.496182857
Total					9.984731429

Pollutants measured during stack test	Print Towel Emission Factors (lb/1000 lb)	Shop Towel Emission Factors (lb/1000 lb)	Print Towel PTE (tons/yr)	Shop Towel PTE (tons/yr)	PTE Max of Print and Shop Towels (tons/yr)
VOC	127	12	1183.721	95.6592	1183.72128
1,2-Dichloroethane	0.01	0.04	0.093206	0.318864	0.318864
Cumene	0.48	0.01	4.473907	0.079716	4.4739072
Ethylbenzene	1.88	0.07	17.5228	0.558012	17.5228032
Methanol	0.56	0.05	5.219558	0.39858	5.2195584
Methyl Isobutyl Ketone	0.24	0.06	2.236954	0.478296	2.2369536
Methylene Chloride	0.05	0.01	0.466032	0.079716	0.466032
Napthalene	0.01	0.01	0.093206	0.079716	0.0932064
n-Hexane	0.07	0.005	0.652445	0.039858	0.6524448
Tetrachloroethene	0.14	1.75	1.30489	13.9503	13.9503
Toluene	8.78	1.55	81.83522	12.35598	81.8352192
Trichloroethene	0.25	0.21	2.33016	1.674036	2.33016
Xylene (isomers and mixture)	6.32	0.78	58.90644	6.217848	58.9064448
m-Xylene	2.53	0.355	23.58122	2.829918	23.5812192
o-Xylene	1.26	0.07	11.74401	0.558012	11.7440064
p-Xylene	2.53	0.355	23.58122	2.829918	23.5812192
Total HAP	18.79	4.545	175.1348	36.230922	175.1348256

Notes:

Proces P02 contains only washers. Therefore, only washing emissions are considered.

PM EF (lb/hr) = emission rate (gr/dscf) * 60 min/hr * (460 + 68) / (460 + Stack Temp °F) / 7000 gr/lb

PM PTE (tons/yr) = Emission Factor (lb/hr) * 8760 (hr/yr) / 2000 (lb/ton)

Based on best information available, PM10 and PM2.5 PTE are the same as PM PTE.

HAP & VOC PTE (tons/yr) = Emission factor (lb/1000 lb) * Feed Rate (lb/1000 lb) * cycle time (%) / 2000

Facility PTE is based on the maximum of either print towel PTE or shop towel PTE.

The units within this process group do not combust natural gas.

Feed rate assumes that all units within this process are operated at their maximum load capacity. In actual practice, this may not occur.

Pollutant Potential to Emit Calculations and Methodology - Process P03

	Print Towel	Shop Towel
Feed Rate (lbs/hr)	5500	5340
Feed Rate (1000 lbs/yr)	48180	46778.4

	Print	Shop
Cycle Time (%)	5%	30%

	Before Modification	After Modification
Total Heat Input Rate (MMBTU/hr)	13	11
Potential NG Throughput (MMSCF/yr)	111.6470588	94.47058824

Natural Gas Heating Factor (MMBTU/MMSCF)	1020
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Pollutant PTE - Combustion								
	PM	PM10	PM2.5	NOx	SO2	CO	VOC	Lead
Natural Gas Emission Factors (lb/MMSCF)	7.6	7.6	7.6	170	0.6	84	5.5	0.0005
Potential Emissions Before Modification (tons/yr)	0.424258824	0.424258824	0.424258824	9.49	0.033494118	4.689176471	0.307029412	2.79E-05
Potential Emissions After Modification (tons/yr)	0.358988235	0.358988235	0.358988235	8.03	0.028341176	3.967764706	0.259794118	2.36E-05

HAP PTE - Combustion						
Pollutant	Benzene	Dichlorobenzene	Formaldehyde	Hexane	Toluene	Total
Pollutant Emission Factor lb/MMSCF	2.10E-03	1.20E-03	7.50E-02	1.80E+00	3.40E-03	1.88E+00
Potential Emissions Before Modification (tons/yr)	1.17E-04	6.70E-05	4.19E-03	1.00E-01	1.90E-04	1.05E-01
Potential Emissions After Modification (tons/yr)	9.92E-05	5.67E-05	3.54E-03	8.50E-02	1.61E-04	8.89E-02

PM PTE - Other Than Combustion					
Emission Unit	Emission Rate (gr/dscf)	Stack Flow Rate (acfm)	Stack Temp (°F)	Emission Factor (lb/hr)	PM PTE (tons/yr)
Cissell #1	0.1	2160	136	1.640191755	7.184039885
Cissell #2	0.1	2160	136	1.640191755	7.184039885
Challenge #3	0.1	9000	110	7.145864662	31.29888722
Challenge #4	0.1	9000	110	7.145864662	31.29888722
American #1	0.1	13500	110	10.71879699	46.94833083
American #2	0.1	13500	110	10.71879699	46.94833083
Jensen L-Tron Dryer #1	0.1	12000	120	9.363546798	41.01233498
Jensen L-Tron Dryer #2	0.1	12000	120	9.363546798	41.01233498
WashTech DR-80 Dryer	0.1	1600	136	1.214956855	5.321511026
Total Before Modification					170.8625159
Total After Modification					157.1279953

	Combustion (tons/yr)	Other Than Combustion (tons/yr)	PM PTE
PM PTE - Combustion and Other Sources Before Modification	0.424258824	170.8625159	171.2867747
PM PTE - Combustion and Other Sources After Modification	0.358988235	157.1279953	157.4869835

Pollutants Measured During Stack Test	Print Towel Emission Factors (lb/1000 lb)	Shop Towel Emission Factors (lb/1000 lb)	Print Towel PTE (tons/yr)	Shop Towel PTE (tons/yr)	PTE Max of Print and Shop Towels (tons/yr)	PTE Before Modification (Towel and Combustion)	PTE After Modification (Towel and Combustion)
VOC	127	12	152.9715	84.20112	152.9715	153.2785	153.2313
1,2-Dichloroethane	0.01	0.04	0.012045	0.2806704	0.2806704	0.2807	0.2807
Cumene	0.48	0.01	0.57816	0.0701676	0.57816	0.5782	0.5782
Ethylbenzene	1.88	0.07	2.26446	0.4911732	2.26446	2.2645	2.2645
Methanol	0.56	0.05	0.67452	0.350838	0.67452	0.6745	0.6745
Methyl Isobutyl Ketone	0.24	0.06	0.28908	0.4210056	0.4210056	0.4210	0.4210
Methylene Chloride	0.05	0.01	0.060225	0.0701676	0.0701676	0.0702	0.0702
Napthalene	0.01	0.01	0.012045	0.0701676	0.0701676	0.0702	0.0702
n-Hexane	0.07	0.005	0.084315	0.0350838	0.084315	0.1848	0.1693
Tetrachloroethene	0.14	1.75	0.16863	12.27933	12.27933	12.2793	12.2793
Toluene	8.78	1.55	10.57551	10.875978	10.875978	10.8762	10.8761
Trichloroethene	0.25	0.21	0.301125	1.4735196	1.4735196	1.4735	1.4735
Xylene (isomers and mixture)	6.32	0.78	7.61244	5.4730728	7.61244	7.6124	7.6124
m-Xylene	2.53	0.355	3.047385	2.4909498	3.047385	3.0474	3.0474
o-Xylene	1.26	0.07	1.51767	0.4911732	1.51767	1.5177	1.5177
p-Xylene	2.53	0.355	3.047385	2.4909498	3.047385	3.0474	3.0474
Total HAP	18.79	4.545	22.632555	31.8911742	31.8911742	31.9918	31.9764

Notes:

PM EF (lb/hr) = emission rate (gr/dscf) * 60 min/hr * (460 + 68) / (460 + Stack Temp °F) / 7000 gr/lb
 PM PTE (tons/yr) = Emission Factor (lb/hr) * 8760 (hr/yr) / 2000 (lb/ton)
 HAP & VOC PTE (tons/yr) = Emission factor (lb/1000 lb) * Feed Rate (lb/1000 lb) * cycle time (%) / 2000
 Facility PTE is based on the maximum of either print towel PTE or shop towel PTE.

Feed rate assumes that all units within this process are operated at their maximum load capacity. In actual practice, this may not occur.
 Combustion emission factors are from AP-42, Volume 1, Fifth Edition, Chapter 1.4, Tables 1.4-1 and 1.4-2.

Pollutant Potential to Emit Calculations and Methodology - Steam Tunnels

Emission Unit	Heat Input (MMBTU/hr)
Leonard 24-foot Steam Tunnel	0.8
Leonard VPT24 Steam Tunnel	3

Emission Unit	Heat Input Rate	Units
Existing: 24-foot	0.8	MMBTU/hr
Replacement: VPT24	3	MMBTU/hr
Natural Gas Heating Value	1020	MMBTU/MMSCF

Unit	Potential NG Throughput MMSCF/yr
Existing: 24-foot	6.870588235
Replacement: VPT24	25.76470588

Pollutant PTE - Combustion								
	PM	PM10	PM2.5	NOx	SO2	CO	VOC	Lead
Pollutant Emission Factor lb/MMSCF	7.6	7.6	7.6	170	0.6	84	5.5	0.0005
PTE Before Modification in tons/yr	0.026108235	0.026108235	0.02610824	0.584	0.002061176	0.28856	0.018894	1.72E-06
PTE After Modification in tons/yr	0.097905882	0.097905882	0.09790588	2.19	0.007729412	1.08212	0.070853	6.44E-06

HAP PTE - Combustion						
Pollutant	Benzene	Dichlorobenzene	Formaldehyde	Hexane	Toluene	Total
Pollutant Emission Factor lb/MMSCF	2.10E-03	1.20E-03	7.50E-02	1.80E+00	3.40E-03	1.88E+00
PTE Before Modification in tons/yr	7.21E-06	4.12E-06	2.58E-04	6.18E-03	1.17E-05	6.46E-03
PTE After Modification in tons/yr	2.71E-05	1.55E-05	9.66E-04	2.32E-02	4.38E-05	2.42E-02

PM PTE - Other Than Combustion					
Emission Unit	Emission Rate (gr/dscf)	Stack Flow Rate (acfm)	Stack Temp (°F)	Emission Factor (lb/hr)	PM PTE (tons/yr)
Leonard 24-foot Steam Tunnel - Exh	0.1	6800	120	5.306009852	23.24032315
Leonard VPT24 Steam Tunnel - Exh 1	0.1	3790	120	2.957320197	12.95306246
Leonard VPT24 Steam Tunnel - Exh 2	0.1	3790	120	2.957320197	12.95306246
Leonard VPT24 Steam Tunnel - Combustion Unit	0.1	471.27	300	0.28063597	1.229185548
TOTAL for VPT24					27.13531047

Total PM PTE, 24-foot Steam
Tunnel) 23.26643139
Total PM PTE, VPT24 27.23321636

Notes

MMBTU = 1,000,000 British Thermal Units, MMSCF = 1,000,000 standard cubic feet of natural gas

All PTE emissions assumed to be produced from combustion of natural gas.

Potential NG Throughput (MMSCF/yr) = Heat Input Capacity (MMBTU/hr) x 8760 hours/yr x 1 MMSCF / 1020 MMBTU

PTE (tons/yr) = Potential NG Throughput (MMSCF/yr) x Emission Factor (lb/MMSCF) / 2000 lbs/ton

Combustion emission factors are from AP-42, Volume 1, Fifth Edition, Chapter 1.4, Tables 1.4-1 and 1.4-2.

HAP emission factors are from AP-42, Chapter 1.4, Tables 1.4-3.

5 Highest Combustion HAPs are displayed for calculation purposes.

PM EF (lb/hr) = emission rate (gr/dscf) * 60 min/hr * (460 + 68) / (460 + Stack Temp °F) / 7000 gr/lb

PM PTE (tons/yr) = Emission Factor (lb/hr) * 8760 (hr/yr) / 2000 (lb/ton)

HAP emissions are assumed to only come from natural gas combustion since most of the HAPs are removed from the washed towels during the laundering process.

Pollutant Potential to Emit Calculations and Methodology - Miscellaneous Natural Gas Emission units

Emission Unit	Heat Input (BTU/hr)
Gas Fired Unit Heater #1	150,000
Gas Fired Unit Heater #2	150000
Gas Fired Unit Heater #3	75000
Gas Fired Unit Heater #4	165000
Gas Fired Unit Heater #5	165000
Gas Fired Unit Heater #6	105000
Gas Fired Unit Heater #7	105000
Gas Fired Unit Heater #8	1255000
HVAC Units #1	250000
HVAC Units #2	250000
HVAC Units #3	205000
MUA Units Roof #1	3575000
MUA Units Roof #2	3575000
MUA Units Roof #3	865000
Convenience Water Heater #1	38000
TOTAL	10,928,000
Total (MMBTU/hr)	10.928

Emission Unit	Heat Input Rate	Units
Total	10.928	MMBTU/hr
Natural Gas Heating Value	1020	MMBTU/MMSCF

Unit	Potential NG Throughput MMSCF/yr
Total	93.85223529

Pollutant PTE - Combustion								
	PM	PM10	PM2.5	NOx	SO2	CO	VOC	Lead
Pollutant Emission Factor lb/MMSCF	7.6	7.6	7.6	170	0.6	84	5.5	0.0005
Potential Emissions in tons/yr	0.3566385	0.356638494	0.3566385	7.97744	0.028155671	3.94179	0.258094	2.35E-05

HAP PTE						
Pollutant	Benzene	Dichlorobenzene	Formaldehyde	Hexane	Toluene	Total
Pollutant Emission Factor lb/MMSCF	2.10E-03	1.20E-03	7.50E-02	1.80E+00	3.40E-03	1.88E+00
Potential to Emit in tons/yr	9.85E-05	5.63E-05	3.52E-03	8.45E-02	1.60E-04	8.83E-02

Notes

MMBTU = 1,000,000 British Thermal Units, MMSCF = 1,000,000 standard cubic feet of natural gas

All PTE emissions assumed to be produced from combustion of natural gas.

Potential NG Throughput (MMSCF/yr) = Heat Input Capacity (MMBTU/hr) x 8760 hours/yr x 1 MMSCF / 1020 MMBTU

PTE (tons/yr) = Potential NG Throughput (MMSCF/yr) x Emission Factor (lb/MMSCF) / 2000 lbs/ton

Combustion emission factors are from AP-42, Volume 1, Fifth Edition, Chapter 1.4, Tables 1.4-1 and 1.4-2.

HAP emission factors are from AP-42, Chapter 1.4, Tables 1.4-3.

5 Highest HAPs are displayed for calculation purposes.

Natural Gas Combustion Sources	Capacity (Before Modification) [MMBTU/hr]	Capacity (After Modification) [MMBTU/hr]
Boiler B01	10.46	10.46
Cissel #1	0.25	0
Cissel #2	0.25	0.25
Challenge #3	2.75	2.75
Challenge #4	2.75	2.75
American #1	3.5	0
American #2	3.5	0
Jensen L-Tron Dryer #1	0	2.5
Jensen L-Tron Dryer #2	0	2.5
WashTech DR-80 Dryer	0	0.25
Leondard 24-foot Steam Tunnel	0.8	0
3 MMBTU/hr Tunnel Replacement	0	3
Insignificant Activities	11.6	11.6
TOTAL	35.86	36.06

(Before Modification)	Greenhouse Gas PTE		
GHG Species	CO2	CH4	N2O
Emission Factor in kg/MMBTU	53.06	1.00E-03	1.00E-04
Potential Emission in tons/yr	18373.22461	3.46E-01	3.46E-02
Global Warming Potential	1	25	298
CO2e Per GHG Species in tons/yr	18373.22461	8.656815215	10.31892
Total Potential CO2e in tons/yr	18392.20035		

(After Modification)	Greenhouse Gas PTE		
GHG Species	CO2	CH4	N2O
Emission Factor in kg/MMBTU	53.06	1.00E-03	1.00E-04
Potential Emission in tons/yr	18475.69659	3.48E-01	3.48E-02
Global Warming Potential	1	25	298
CO2e Per GHG Species in tons/yr	18475.69659	8.705096393	10.37647
Total Potential CO2e in tons/yr	18494.77816		

Notes

1 MMBTU = 1,000,000 British Thermal Units

GHG PTE (tons/yr) = Heat Input Capacity (MMBTU/hr) x 8760 hr/yr x Emission Factor (kg/MMBTU) x 2.20462 lb/kg / 2000 lbs/ton

CO2e (tons/yr) = CO2 PTE (tons/yr) x CO2 GWP (1) + CH4 PTE (tons/yr) x CH4 GWP (21) + N2O PTE (tons/yr) x N2O GWP (310)

GHG Emission Factors and GWP from 40 CFR 98, Table A-1, C-1, and C-2 for natural gas combustion.

GHG Values based on November 29, 2013, GWP and Default Values