



VIA UPS DELIVERY

July 17, 2013

Michael Langman  
Air Permits Section (AR-18J)  
U.S. Environmental Protection Agency, Region 5  
77 West Jackson Boulevard  
Chicago, IL 60604

**RE: Application for a Part 49 Construction Permit and a Part 71 Operation Permit for G&K Services, Inc., Green Bay, Wisconsin – Supplemental Information**

Dear Mr. Langman:

The attached document provides information that you requested in your recent discussions with Brian Duffy, Environmental Engineer, G&K Services (G&K), relative to emission calculations contained in the permit applications for G&K's Green Bay facility. In preparing this information, we noted the need to correct certain estimates for "unrestricted" emission rates for Hazardous Air Pollutants (HAPs) contained on the application forms for both the Part 49 and Part 71 permit applications.

Emission Calculations (EMISS); Emission Unit ID: P03:

Unrestricted PTE HAP emissions for this process would be ~~31.8~~ 31.9 tons per year. This change is due to a rounding error in the original submittal.

Potential to Emit (PTE)

Unrestricted PTE VOC emissions for the facility would be ~~1,509.8~~ 1,509.2 tons per year. This change appears to be due to a typographical error in the original submittal.

If you have any questions regarding this correspondence, please contact Brian Duffy via phone at (952) 912-5713 or via email at [bduffy01@gksservices.com](mailto:bduffy01@gksservices.com).

Sincerely,  
G & K Services, Inc.

  
Steve Botts  
Director of Environmental Management  
(952) 912-5765

Cc: Genevieve Damico, Doug Krysiak, Andrew Utric, Lee Joniaux, Janine Wilson, Gene Bagot, Dennis Reynolds, Brian Duffy

## Washer and Dryer Emission Sources

The Washers and Dryers at the G & K Services facility consist of the following, grouped based on type of operation and whether the emissions are stack vented or exhausted to the plant air:

### Process P01 – Industrial Washers, Indoor-Vented

- Industrial Washing Machine (#3)
- Industrial Washing Machine (#4)
- Industrial Washing Machine (#5)
- Industrial Washing Machine (#6)
- Industrial Washing Machine (Unimac #1)

### Process P02 – Industrial Washers, Stack-Vented

- Industrial Washing Machine (Unimac #3)
- Industrial Washing Machine (Unimac #2)
- Industrial Washing Machine (#1)
- Industrial Washing Machine (#2)

### Process P03 – Industrial Dryers Burning Natural Gas

- Stack S06 – Industrial Dryer (Cissell #1), 0.275 MMBtu/hr
- Stack S07 – Industrial Dryer (Cissell #2), 0.275 MMBtu/hr
- Stack S08 – Industrial Dryer (#3), 2.75 MMBtu/hr
- Stack S09 – Industrial Dryer (#4), 2.75 MMBtu/hr
- Stack S30 – Industrial Dryer (American #1), 3.5 MMBtu/hr
- Stack S31 – Industrial Dryer (American #2), 3.5 MMBtu/hr

Units that are stack vented may be used to wash soiled Print Towels. Units that vent to plant air may not be used to launder Print Towels due to the potential for worker exposure to organic vapors. Process P01 may not be used to wash Print Towels due to the potential for worker exposures. Process P02 can be used for Print or Shop Towels. All dryers vent to the outdoors through stacks, and therefore can be used to dry either Print or Shop Towels.

## Theoretical Emission Rates

Theoretical emission rates have been calculated for washers and dryers and presented in Table 1.1. The calculated rates ignore process bottlenecks between washers and dryers and assume that a sufficient customer base is available. For certain air pollutants, washing or drying of Print Towels yields the highest emission rate while for others, it is Shop Towel processing

that yields the greater emission rate. The greater of the two emission rates has been reported for each air pollutant.

The facility has the capacity to wash 7,288 pounds of Shop Towels per hour if this were the only textile being processed, but can dry only 5,340 pounds of Shop Towels per hour. Alternatively, the facility could wash and dry 2,240 pounds of Print Towels per hour (Washers 1, 7, 8 and 9; Dryers 2 and 6) and wash 4,688 pounds of Shop Towels per hour (Washers 2, 3, 4, 5, and 6) but then could only dry 2,940 pounds of Shop Towels per hour (Dryers 1, 3, 4, and 5) due to process bottlenecks (see Attachment 1 – Capacity Table).

**Table 1.1 Theoretical Emission Rates, Tons Per Year**

	<b>Process P01 – Industrial Washers, Indoor- vented</b>	<b>Process P02 – Industrial Washers, Stack- vented</b>	<b>Process P03 – Industrial Dryers</b>	<b>Facility Total<sup>1</sup></b>
VOC	172.5	1,183.7	153.0	1,509.2
Federal HAPs	65.3	175.2	31.9	272.3
1,2- Dichloroethane	0.6	0.3	0.3	1.2
Cumene	0.1	4.5	0.6	5.2
Ethylbenzene	1.0	17.5	2.3	20.8
Methanol	0.7	5.2	0.7	6.6
Methyl Isobutyl Ketone	0.9	2.2	0.4	3.5
Methylene Chloride	0.1	0.5	0.1	0.7
m-Xylene	5.1	23.6	3.0	31.7
Naphthalene	0.1	0.1	0.1	0.3
n-Hexane	0.1	0.7	0.1	0.8
o-Xylene	1.0	11.7	1.5	14.3
p-Xylene	5.1	23.6	3.0	31.7
Tetrachloroethene	25.2	14.0	12.3	51.4
Toluene	22.3	81.8	10.9	115.0
Trichloroethene	3.0	2.3	1.5	6.9
Xylene (mixtures and isomers, included above with each isomer)	11.2	58.9	7.6	77.7

Note 1: The facility-wide emission rates have been restricted by permits to no more than 234 tons of VOC per year; and no more than 9.9 tons of any individual HAP per year; and no more than 24.9 tons of total HAPs per year. Rounding may cause the figures not to appear to be the sum of the individual process emission rates.

## Emission Factors

The following emission factors were used to calculate annual potential emission rates, as explained in the application submitted on June 14, 2013:

**Table 2.1: Emission Factors for Soiled Print and Shop Towels**

Pollutant	CAS No.	Emission Factors (lb/1,000 lb Soiled) (lb/1,000 lb Soiled Towels)	
		Print Towel Emission Factor	Shop Towel Emission Factor
VOCs	N/A	127	12.0
Federal HAPs	N/A	18.8	4.54
1,2-Dichloroethane	107-06-2	0.01	0.04
Cumene	98-82-8	0.48	0.01
Ethylbenzene	100-41-4	1.88	0.07
Methanol	67-56-1	0.56	0.05
Methyl Isobutyl Ketone	108-10-1	0.24	0.06
Methylene Chloride	75-09-2	0.05	0.01
m-Xylene	108-38-3	2.53	0.355
Naphthalene	91-20-3	0.01	0.01
n-Hexane	110-54-3	0.07	0.005
o-Xylene	95-47-6	1.26	0.07
p-Xylene	106-42-3	2.53	0.355
Tetrachloroethene	127-18-4	0.14	1.75
Toluene	108-88-3	8.78	1.55
Trichloroethene	79-01-6	0.25	0.21
Xylene (mixtures and isomers)	1330-20-7	6.32	0.78

These emission factors are derived from stack testing conducted at two other G & K sites. The original stack testing information for VOC emissions was presented “as carbon,” and has been converted to “as propane.”

These emission factors are for the entire wash and dry cycle. The emissions can be further partitioned to the washing and drying processes for each category as follows:

**Table 2.2: Emissions Breakdown for Wash and Dry Cycles**

	Wash Cycle	Dry Cycle
Print Towels	95%	5%
Shop Towels	70%	30%

Processing rates for Print and Shop Towels vary as shown below, due to machine volume capacity and batch cycle times.

**Process P01 – Industrial Washers, Indoor-vented (Shop Towels only)**

- Industrial Washing Machine (#3)
- Industrial Washing Machine (#4)
- Industrial Washing Machine (#5)
- Industrial Washing Machine (#6)
- Industrial Washing Machine (Unimac #1)

4,688 lb soiled towels/hour capacity  
12 lb VOC/1,000 lb soiled towels (SHOP)

70% Shop Towel emissions to Washing  
At 8,760 hours per year,  
Emissions =  
**172.5 TPY VOC**

**Process P02, Stack S34 – Industrial Washers, Stack-vented**

- Industrial Washing Machine (Unimac #3)
- Industrial Washing Machine (Unimac #2)
- Industrial Washing Machine (#1)
- Industrial Washing Machine (#2)

2,240 lb soiled towels/hour capacity (PRINT)  
2,600 lb soiled towels/hour capacity (SHOP)

127 lb VOC/1,000 lb soiled towels (PRINT)  
12 lb VOC/1,000 lb soiled towels (SHOP)

95% Print Towel emissions to Washing  
70% Shop Towel emissions to Washing  
At 8,760 hours per year

Max of: **1,183.7 TPY VOC (only PRINT Towels are processed)**

**95.7 TPY VOC (only SHOP Towels are processed)**

However, the facility emissions are limited to no more than 234 tons of VOC per year.

### **Process P03 – Industrial Dryers Burning Natural Gas**

Stack S06 – Industrial Dryer (Cissell #1), 0.275 MMBtu/hr  
Stack S07 – Industrial Dryer (Cissell #2), 0.275 MMBtu/hr  
Stack S08 – Industrial Dryer (#3), 2.75 MMBtu/hr  
Stack S09 – Industrial Dryer (#4), 2.75 MMBtu/hr  
Stack S30 – Industrial Dryer (American #1), 3.5 MMBtu/hr  
Stack S31 – Industrial Dryer (American #2), 2.5 MMBtu/hr

#### **P03 - Dryers, Outdoor (Print and Shop)**

5,500 lb towels/hour capacity (PRINT)  
5,340 lb towels/hour capacity (SHOP)

127 lb VOC/1,000 lb soiled towels (PRINT)  
12 lb VOC/1,000 lb soiled towels (SHOP)

5% Print Towel emissions to Drying  
30% Shop Towel emissions to Drying

At 8,760 hours per year:

Max of:  
**153.0 TPY VOC (if only PRINT Towels are processed)**

OR

**84.2 TPY VOC (if only SHOP Towels are processed)**

Hazardous Air Pollutant emission rates are calculated in the same manner, using the emission factors from Table 2-1, the partitioning of emissions between washers and dryers dependent on the type of textile (shop or print towel) as shown in Table 2-2, and the maximum processing

rates shown above. Where either print or shop towels can be processed, the calculated maximum emission rate is highlighted.

**Table 2.3 Annual Potential Emissions**

Pollutant	CAS No.	Emission Factors (lb/1,000 lb Soiled Weight)		Annual Potential Emissions (Tons Per Year)					Facility Total
				P01	P02		P03		
		Print Towel	Shop Towel	Shop Towels	Print Towels	Shop Towels	Print Towels	Shop Towels	
		Max. Process Rate (Lb/hr):		4,688	2,240	2,600	5,500	5,340	
VOCs	N/A	127	12	172.5	1,183.7	95.7	153.0	84.2	1,509.2
Federal HAPS	N/A	18.8	4.54	65.3	175.2	36.2	22.6	31.9	272.3
1,2-Dichloroethane	107-06-2	0.01	0.04	0.6	0.1	0.3	0.0	0.3	1.2
Cumene	98-82-8	0.48	9.91	0.1	4.5	0.1	0.6	0.1	5.2
Ethylbenzene	100-41-4	1.88	0.07	1.0	17.5	0.6	2.3	0.5	20.8
Methanol	67-56-1	0.56	0.05	0.7	5.2	0.4	0.7	0.4	6.6
Methyl Isobutyl Ketone	108-10-1	0.24	0.06	0.9	2.2	0.5	0.3	0.4	3.5
Methylene Chloride	75-09-2	0.05	0.01	0.1	0.5	0.1	0.1	0.1	0.7
m-Xylene	108-38-3	2.53	0.355	5.1	23.6	2.8	3.0	2.5	31.7
Naphthalene	91-20-3	0.01	0.01	0.1	0.1	0.1	0.0	0.1	0.3
n-Hexane	110-54-3	0.07	0.005	0.1	0.7	0.0	0.1	0.0	0.8
o-Xylene	95-47-6	1.26	0.07	1.0	11.7	0.6	1.5	0.5	14.3
p-Xylene	106-42-3	2.53	0.355	5.1	23.6	2.8	3.0	2.5	31.7
Tetrachloroethene	127-18-4	0.14	1.75	25.2	1.3	14.0	0.2	12.3	51.4
Toluene	108-88-3	8.78	1.55	22.3	81.8	12.4	10.6	10.9	115.0
Trichloroethene	79-01-6	0.25	0.21	3.0	2.3	1.7	0.3	1.5	6.8
Xylene (mixtures and isomers)	1330-20-7	6.32	0.78	11.2	58.9	6.2	7.6	5.5	77.7

Note, rounding may cause the figures not to appear to be the sum of the individual process emission rates.

G & K Services has chosen to limit HAP emission rates to no more than 9.9 tons per year of any individual HAP and no more than 24.9 tons per year of the combination of all HAPs.

**Example Calculation:**

**Process P02: Federal HAPs**

Either Print Towels or Shop Towels can be processed in P02. First the potential emission rate for Print Towels is calculated as follows:

$$2,240 \text{ lb soiled Print Towels/hour} \times 18.8 \text{ lb HAP/1,000 lb soiled Print Towels} \times 0.95 \text{ lb emitted at the Washer/1.00 lb total emissions} \times 8,760 \text{ hours/year} \times \text{Ton/2,000 lb} = 175.2 \text{ tons HAP/Year}$$

Next, the potential emission rate for Shop Towels is calculated as follows:

$$2,600 \text{ lb soiled Shop Towels/hour} \times 4.54 \text{ lb HAP/1,000 lb soiled Shop Towels} \times 0.70 \text{ lb emitted at the Washer/1.00 lb total emissions} \times 8,760 \text{ hours/year} \times \text{Ton/2000 lb} = 36.2 \text{ tons HAP/Year}$$

Because only one or the other can be processed at any given time, the potential HAP emission rate from P02 is determined to be 175.2 tons HAP/Year.

The maximum hourly emission rates are determined based on the emission factors in Table 2.4. The VOC emission factor for laundering of Print Towels was developed from a trade association study, with a safety factor of 50 percent. The VOC emission factor for laundering of Shop Towels was derived from emission testing with a smaller safety factor of 12.5 percent. For determining short term maximum hourly HAP emissions, the HAP emission factors in Table 2.1 have been increased in direct proportion to the VOC emission factors shown in Tables 2.1 and 2.4.

**Table 2.4: Hourly Maximum Emission Factors for Soiled Print and Shop Towels**

Pollutant	CAS No.	Emission Factors (lb/1,000 lb Soiled) (lb/1,000 lb Soiled Towels)	
		Print Towel Emission Factor	Shop Towel Emission Factor
VOCs	N/A	216	13.5
Federal HAPs	N/A	31.9	5.11
1,2-Dichloroethane	107-06-2	0.02	0.05
Cumene	98-82-8	0.82	0.01
Ethylbenzene	100-41-4	3.2	0.088
Methanol	67-56-1	0.95	0.06
Methyl Isobutyl Ketone	108-10-1	0.41	0.07
Methylene Chloride	75-09-2	0.09	0.01
m-Xylene	108-38-3	4.3	0.4
Naphthalene	91-20-3	0.02	0.01

n-Hexane	110-54-3	0.12	0.006
o-Xylene	95-47-6	2.1	0.08
p-Xylene	106-42-3	4.3	0.4
Tetrachloroethene	127-18-4	0.24	1.97
Toluene	108-88-3	14.9	1.74
Trichloroethene	79-01-6	0.43	0.24
Xylene (mixtures and isomers)	1330-20-7	10.7	0.88

The following table presents the maximum hourly emission rates, showing the factors that enter into the calculations (Maximum Process Rates and Emission Factors). Where either print or shop towels can be processed, the calculated maximum emission rate is highlighted.

**Table 2.5 Hourly Potential Emissions**

Pollutant	CAS No.	Emission Factors		Hourly Potential Emissions (lb/hour)					Facility Total
		Print Towel	Shop Towel	P01	P02		P03		
				Shop Towels	Print Towels	Shop Towels	Print Towels	Shop Towels	
		<b>Max. Process Rate (Lb/hr):</b>		<b>4,688</b>	<b>2,240</b>	<b>2,600</b>	<b>5,500</b>	<b>5,340</b>	
VOCs	N/A	126	13.5	44.3	459.6	24.6	59.4	21.6	563.3
Federal HAPS	N/A	31.9	5.11	16.8	67.9	9.3	8.8	8.2	93.4
1,2-Dichloroethane	107-06-2	0.02	0.05	0.2	0.0	0.1	0.0	0.1	0.3
Cumene	98-82-8	0.82	0.01	0.0	1.7	0.0	0.2	0.0	2.0
Ethylbenzene	100-41-4	3.2	0.088	0.3	6.8	0.2	0.9	0.1	8.0
Methanol	67-56-1	0.95	0.06	0.2	2.0	0.1	0.3	0.1	2.5
Methyl Isobutyl Ketone	108-10-1	0.41	0.07	0.2	0.9	0.1	0.1	0.1	1.2
Methylene Chloride	75-09-2	0.09	0.01	0.0	0.2	0.0	0.0	0.0	0.2
m-Xylene	108-38-3	4.3	0.4	1.3	9.2	0.7	1.2	0.6	11.6
Naphthalene	91-20-3	0.02	0.01	0.0	0.0	0.0	0.0	0.0	0.1
n-Hexane	110-54-3	0.12	0.006	0.0	0.3	0.0	0.0	0.0	0.3
o-Xylene	95-47-6	2.1	0.08	0.3	4.5	0.1	0.6	0.1	5.3
p-Xylene	106-42-3	4.3	0.4	1.3	9.2	0.7	1.2	0.6	11.6
Tetrachloroethene	127-18-4	0.24	1.97	6.5	0.5	3.6	0.1	3.2	13.2
Toluene	108-88-3	14.9	1.74	5.7	31.7	3.2	4.1	2.8	41.5
Trichloroethene	79-01-6	0.43	0.24	0.8	0.9	0.4	0.1	0.4	2.1

Xylene (mixtures and isomers)	1330-20-7	10.7	0.88	2.9	22.8	1.6	2.9	1.4	28.6
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Note, rounding may cause the figures not to appear to be the sum of the individual process emission rates.

**Attachment 1**

**G & K Services, Inc. - Green Bay  
Capacity Table**

		Print lb/load	Cycle Time (min)	Shop lb/load	Cycle Time (min)	Annual Print Capacity (lb/yr)	Annual Shop Capacity (lb/yr)	Print Loads lb/hr	Shop Loads lb/hr
P03	Industrial Dryer #1	1,300	45	1,200	40	15,184,000	15,768,000	1,733	1,800
P03	Industrial Dryer #2	1,300	45	1,200	45	15,184,000	14,016,000	1,733	1,600
P03	Industrial Dryer #3	100	40	100	35	1,314,000	1,501,714	150	170
P03	Industrial Dryer #4	100	40	100	35	1,314,000	1,501,714	150	170
P03	Industrial Dryer #5	650	45	600	45	7,592,000	7,008,000	867	800
P03	Industrial Dryer #6	650	45	600	45	7,592,000	7,008,000	867	800
<b>Total</b>						<b>48,180,000</b>	<b>46,803,429</b>	<b>5,500</b>	<b>5,340</b>
P02	Washer #1	100	75	100	60	700,800	876,000	80	100
P01	Washer #2		75	1,200	60	-	10,512,000	-	1,200
P01	Washer #3		75	600	60	-	5,256,000	-	600
P01	Washer #4		75	1,350	60	-	11,826,000	-	1,350
P01	Washer #5		75	1,350	60	-	11,826,000	-	1,350
P01	Washer #6		75	188	60	-	1,646,880	-	188
P02	Washer #7	100	75	100	60	700,800	876,000	80	100
P02	Washer #8	1,300	75	1,200	60	9,110,400	10,512,000	1,040	1,200
P02	Washer #9	1,300	75	1,200	60	9,110,400	10,512,000	1,040	1,200
<b>Total</b>						<b>19,622,400</b>	<b>63,842,880</b>	<b>2,240</b>	<b>7,288</b>