

Programmatic Environmental Assessment for Marketing Orders for Republic Tobacco, LP “Top Silver 100 MM, Gambler Tubecut Silver King Size, Gambler Silver King Size, Gambler Tubecut Silver 100 MM, Gambler Silver 100 MM, TOP Silver King Size”

Prepared by Center for Tobacco Products

U.S. Food and Drug Administration

October 31, 2017

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This programmatic environmental assessment (PEA) is for marketing orders for multiple roll-your-own (RYO) tobacco filtered cigarette tubes manufactured by Republic Tobacco, LP. Information presented in the PEA is based on the submissions referenced in Appendix 1, unless noted or referenced otherwise. This PEA has been prepared in accordance with 21 CFR 25.40 as part of submissions under section 905(j) of the Federal Food, Drug, and Cosmetic Act (FD&C Act).

1. Name of Applicant

Republic Tobacco, LP

2. Address

2301 Ravine Way
Glenview, Illinois 60025

3. Manufacturer

(b) (4)
[Redacted]
[Redacted]
[Redacted]
[Redacted]
[Redacted]

4. Description of the Proposed Action

The proposed actions are for FDA to issue marketing orders under the provisions of sections 910 and 905(j) of the FD&C Act for the introduction of multiple new roll-your-own (RYO) tobacco filtered cigarette tubes into interstate commerce. These authorizations are based on the finding that these new products are substantially equivalent to the corresponding predicate products that were on the market as of February 15, 2007. The applicant stated that the predicate products will be discontinued after the new products are authorized.

4.1. Requested Action

Orders finding the listed tobacco products are substantially equivalent to the corresponding predicate products.

4.2. Need for Action

Republic Tobacco, LP submitted SE Reports SE0012487, SE0012488, SE0012489, SE0012490, SE0012491, and SE0012492 seeking marketing orders for the introduction of the new products (as described in Section 4.3) into interstate commerce for commercial distribution in the United States. The applicant claims that the new and corresponding predicate products are substantially equivalent, differing only in the amount of ink in the product, but that the new products do not raise different questions of public health. (sec. 910(a)(3)(A)(ii)). After considering the SE Reports, the Agency shall issue orders pursuant to section 910(a)(2) of the FD&C Act when finding the new products to be substantially equivalent to the corresponding predicate products.

4.3. Identification of the New Tobacco Products that are Subjects of the Proposed Action

4.3.1. *Type of Tobacco Products*

Roll-your-own (RYO), filtered cigarette tubes

4.3.2. *Product Names and Submission Tracking Numbers (STNs)*

STNs	New Products	Predicate Products
SE0012487	TOP Silver 100 MM	TOP Silver 100 MM
SE0012488	Gambler Tubecut Silver King Size	Gambler Tubecut Silver King Size
SE0012489	Gambler Silver King Size	Gambler Silver King Size
SE0012490	Gambler Tubecut Silver 100 MM	Gambler Tubecut Silver 100 MM
SE0012491	Gambler Silver 100 MM	Gambler Silver 100 MM
SE0012492	TOP Silver King Size	TOP Silver King Size

See Appendix 1 for additional STNs associated with the new products.

4.3.3. *Description of the Product Package*

The new products are RYO filtered cigarette tubes. A cardboard retail carton contains 200 tubes.

4.3.4. *Location of Manufacturing*

The manufacturer, (b) (4), is located at (b) (4) (Figure 1). The facility is located in a mixed use commercial area consisting of office buildings, warehouses, small businesses, and light manufacturing facilities.¹

¹ Land use reconnaissance via aerial photo, Google Earth. Accessed 8/16/2016.

(b) (4)



4.3.5. Location of Use

Republic Tobacco, LP intends to distribute and sell the new tobacco products to U.S. consumers in the United States.

4.3.6. Location of Disposal

The used and unused filtered cigarette tubes will be disposed of in municipal solid waste (MSW) landfills or as litter, in the same manner as any other marketed filtered cigarette tubes.

Following use, the packaging materials either would enter the recycling stream or be disposed of in MSW landfills or as litter. The geographic distribution of waste from disposal after use should correspond to the pattern of product use.

4.4. Modification(s) Identified as Compared to the Predicate Products

The applicant claims that the new products contain the same components, packaging materials, and ingredients and are made to the same specifications as the corresponding predicate products, with the exception of a reduction in the amount of ink used to produce the product.

5. Environmental Introduction Due to the Proposed Action

5.1. Introduction as a Result of Manufacturing the New Products

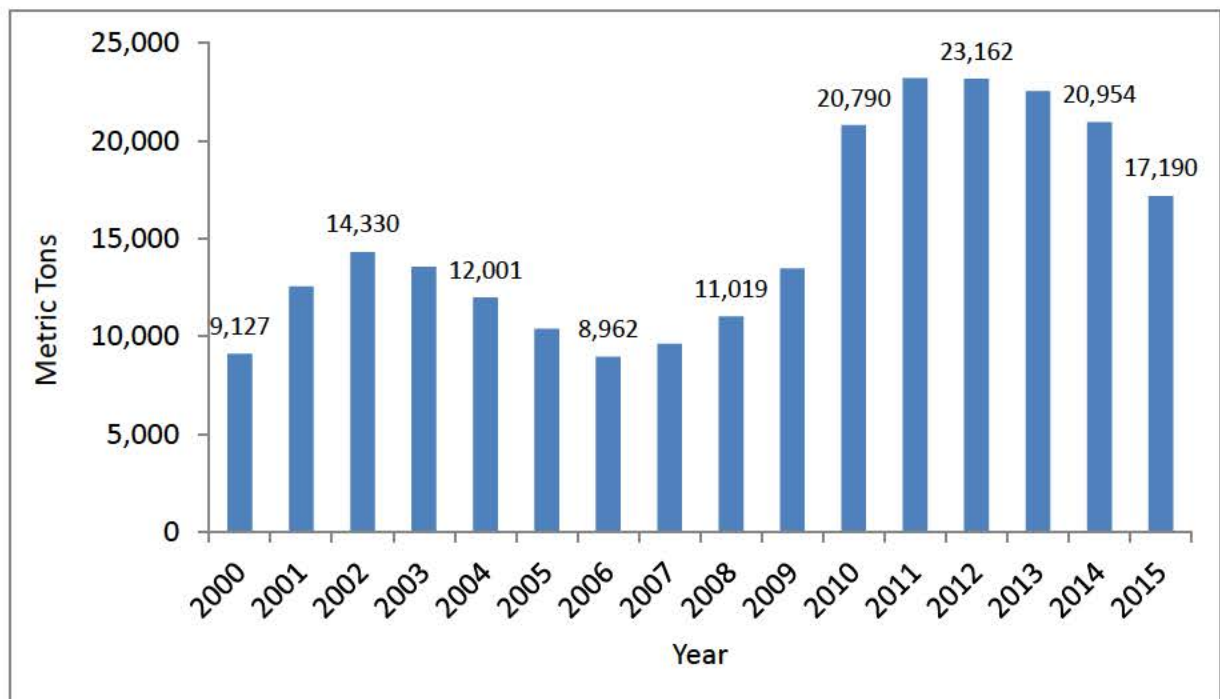
5.1.1. Tobacco Products Imported from Canada

Based on information collected by the U.S. International Trade Commission, the worldwide U.S. import of cigarettes decreased from 51,930 metric tons in 2014 to 50,026 metric tons in 2015. Likewise, all tobacco products imported from Canada (Table 1 and Figure 2)² decreased from 20,954 metric tons in 2014 to 17,190 metric tons in 2015.

Table 1. U.S. Tobacco Imports – All Tobacco Products from Canada and All Cigarettes from All Countries in 2014 and 2015

Year	Total Weight of Cigarettes Imported from All Countries to the U.S. (metric tons)	Total Weight of All Tobacco Products Imported from Canada to the U.S. (metric tons)
2014	51,930	20,954
2015	50,026	17,190

Figure 2. Total Tobacco Products Imported from Canada into the U.S., 2000 – 2015



² U.S. International Trade Commission. https://dataweb.usitc.gov/scripts/tariff_current.asp?Phase=List_items&lookfor=481310. Accessed on March 23, 2016.

5.1.2. Environmental Introduction from Manufacturing the New Products

The Agency anticipates the waste generated as a result of manufacturing the new products will be released to the environment, transferred to publicly owned treatment works, and disposed of in landfills in the same manner as any other products manufactured in the same facility and in a similar manner to other filtered cigarette tubes manufactured in Canada. The new products are anticipated to compete with other filtered cigarette tubes on the market. Therefore, the Agency does not foresee the introduction of the new products to notably affect the current manufacturing waste generated from the production of all filtered cigarette tubes in Canada.

According to information in the SE Reports, the only difference between the new products and the corresponding predicate products is a reduction in the amount of ink used to make the new products. The applicant claims the manufacturing facility will be in compliance with federal and provincial Canadian regulations for air emissions, solid waste, and liquid waste. Therefore, the Agency anticipates no new substances or new type of emissions to be released into the environment as a result of manufacturing the new products. In addition, (b) (4)

, the Agency anticipates no new construction of manufacturing facilities by the applicant as a result of manufacturing the new products and no need for new control practices for air emission, water discharge, or solid waste disposal.

The applicant provided the first- and fifth-year market volume projections for the new products (Confidential Appendix 1). Comparing the projected market volumes of the new products with the forecasted market volumes of the total imported tobacco products from Canada to the United States, the individual and cumulative projected market volumes of the new products are a small share of the total forecasted market volumes in both years (Appendix 2 and Confidential Appendix 2).

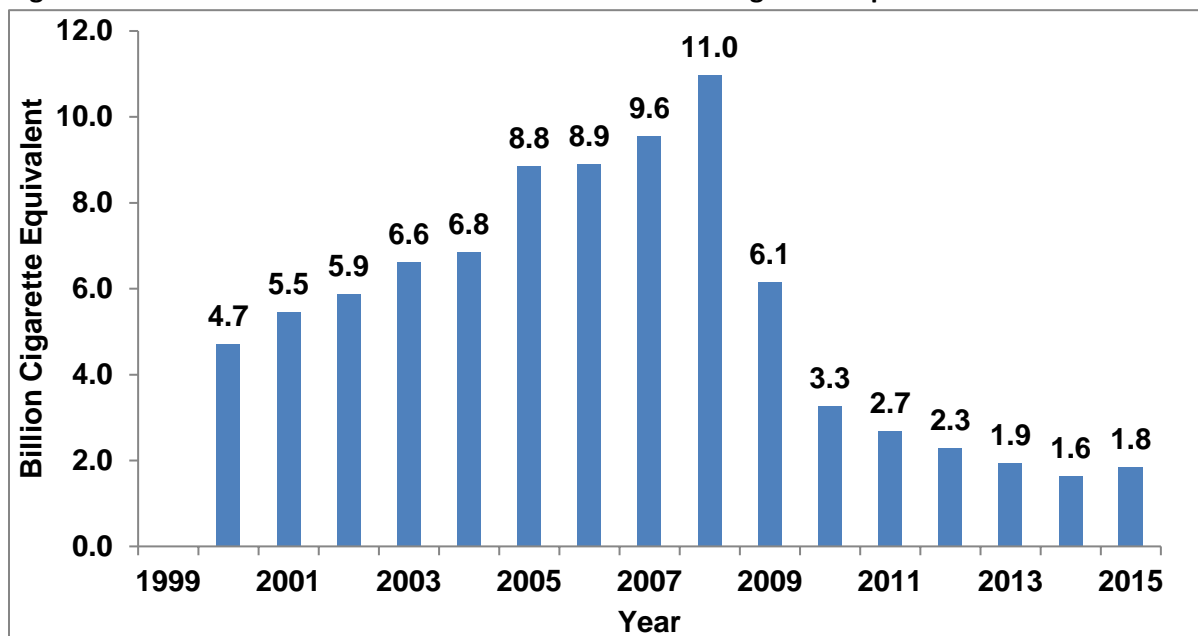
5.2. Environmental Introduction as a Result of Use of the New Products

5.2.1. Use of Filtered Cigarette Tubes

Data from the U.S. Alcohol and Tobacco Tax and Trade Bureau showed a gradual linear increase from 2000 to 2008 in the use of RYO tobacco in the United States from 4.7 billion cigarette-equivalents to 11 billion cigarette-equivalents (Figure 3).³ This was followed by a sharp decline in RYO tobacco use to 3.3 billion cigarette-equivalents in 2010 and to 1.6 billion cigarette-equivalents in 2015.

³ U.S. Department of Treasury Alcohol and Tobacco Tax and Trade Bureau. Tobacco Statistics. Available at: <http://www.ttb.gov/tobacco/tobacco-stats.shtml>. Accessed September 27, 2016.

Figure 3. Use of RYO in the U.S. from 2000 – 2015 in Billion Cigarette-Equivalents



Appendix 3 provides information on historical and projected future use in the United States of manufactured cigarettes.

When using cigarettes, the users inhale the mainstream smoke and release tobacco smoke to the environment, referred to as secondhand smoke. There is no safe level of exposure to secondhand smoke.^{4,5} Even low levels of secondhand smoke can harm children and adults in many ways, including the following:

- The U.S. Surgeon General estimates that living with a smoker increases a nonsmoker's chances of developing lung cancer by 20 to 30 percent.⁸
- Exposure to secondhand smoke increases school children's risk for ear infections, lower respiratory illnesses, more frequent and more severe asthma attacks, and slowed lung growth, and it can cause coughing, wheezing, phlegm, and breathlessness.⁶
- Secondhand smoke causes more than 40,000 deaths a year.⁷

⁴ U.S. Department of Health and Human Services (HHS). 2006. The Health Consequences of Involuntary Exposure to Tobacco Smoke: A Report of the Surgeon General. Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Coordinating Center for Health Promotion, Office on Smoking and Health. Atlanta, GA.

⁵ HHS. 2006. The Health Consequences of Involuntary Exposure to Tobacco Smoke: A Report of the Surgeon General—Secondhand Smoke: What It Means to You (Consumer Booklet). Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Coordinating Center for Health Promotion, Office on Smoking and Health. Atlanta, GA.

⁶ See previous two footnotes.

⁷ HHS. 2014. The Health Consequences of Smoking—50 Years of Progress. A Report of the Surgeon General. U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health. Atlanta, GA.

5.2.2. Environmental Introduction from Use of the New Products

As noted, according to the SE Reports, the new and corresponding predicate tobacco products differ only in the weight of tipping paper. During use, the new products, like other cigarettes, are usually burned to ash, carbon dioxide, water vapor, and products from incomplete combustion such as carbon monoxide. These combustion products are released in a similar manner from the new and predicate products, as well as from other filtered cigarettes. The released substances during use of the new products are negligible from the environmental viewpoint. Essentially, the Agency does not anticipate new substances to be released into the environment as a result of use of the new products, in comparison to the substances released by the predicate products or other combusted cigarettes currently on the market.

5.3. Environmental Introduction as a Result of Disposal Following Use

The waste that is generated following use of the new and corresponding predicate products consists of the disposed packaging materials and the discarded cigarette tube filters. Although the cardboard and paper material is biodegradable, the filters can persist in the environment for an extended time (see below).⁸

5.3.1. Disposal Following Use of Filtered Cigarette Tubes

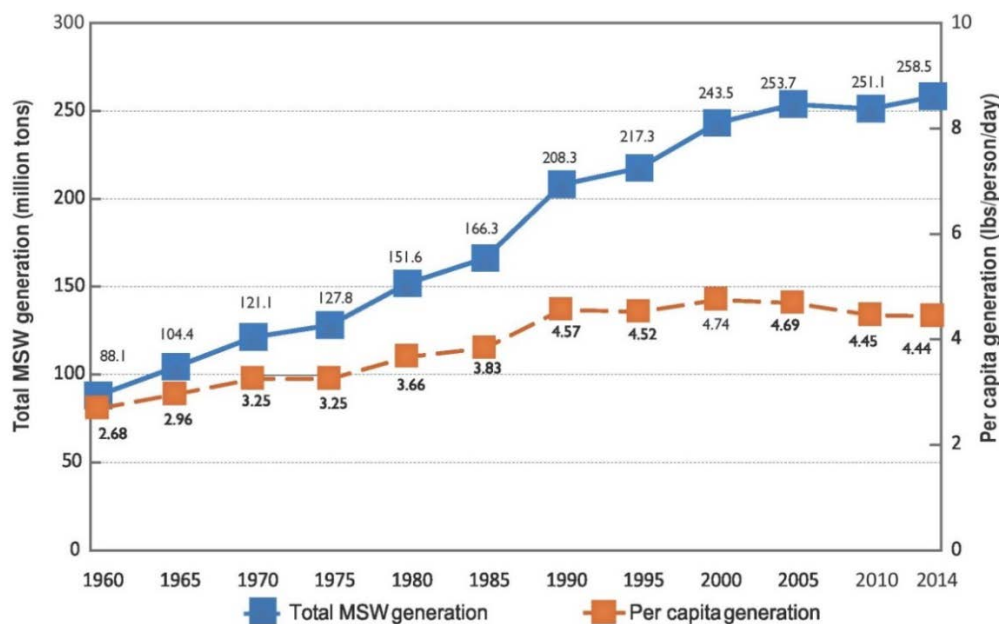
a) Disposal of packaging material

Disposal of the packaging materials following use would either enter the recycling stream or be disposed of in MSW landfills or as litter. In 2014, approximately 258.46 million tons of trash was generated in the United States, and approximately 89.4 million tons of this material was recycled and composted, equivalent to a 34.6% recycling rate (Figures 4 and 5). Paper and paperboard account for 68.61 million tons (26.5%) of the total MSW generated in 2014. Containers and packaging comprised the largest portion of total MSW generated at 76.67 million tons (29.7%), of which 39.13 million tons was made of paper and paperboard. Of the total paper and paperboard MSW, 44.4 million tons (64.7%) was recycled, 19.47 million tons (28.4%) was disposed of in landfills, and 4.74 million tons (6.9%) was combusted with energy recovery. On average, 4.4 pounds of waste was generated per person in the United States, of which 2.1 pounds was recycled, composted, or combusted for energy recovery.⁹

⁸ Novotny TE and Zhao F. Consumption and production waste: Another externality of tobacco use. *Tobacco Control* 1999; 8:75-80.

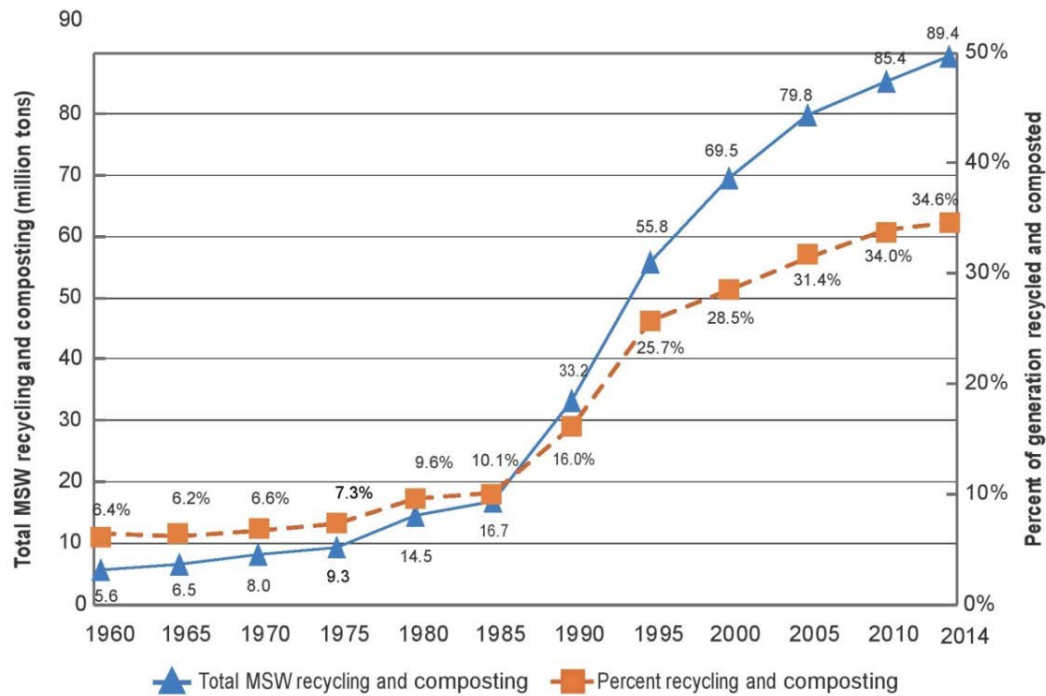
⁹ EPA. Advancing Sustainable Materials Management: Facts and Figures Report. Available at: <https://www.epa.gov/smm/advancing-sustainable-materials-management-facts-and-figures-report> (accessed December 7, 2016).

Figure 4. MSW Generation Rates in the U.S, 1960 – 2014



U.S. EPA's "Advancing Sustainable Materials Management: 2014 Fact Sheet"

Figure 5. MSW Recycling Rates in the U.S., 1960 - 2014



U.S. EPA's "Advancing Sustainable Materials Management: 2014 Fact Sheet"

b) Disposal of cigarette tube filters following use

A major existing environmental consequence of the use of filtered cigarette tubes is the waste disposal of the filters (cigarette butts). Evidence has shown that cigarette butts are the most prevalent items discarded into roads and streets in urban areas. Once dumped onto city streets, they move through the storm drains to streams, into the ocean, and back onto the beaches, while leaching toxicants into the environment along the way. Discarded filters are found to be the most collected item in beach clean-ups and litter surveys. An estimated 30 percent of the total waste (by count) on U.S. shorelines, waterways, and land is cigarette filter waste.¹⁰

Cigarette tube filters most commonly contain cellulose diacetate, which may persist under normal environmental conditions for 18 months to 10 years.^{11, 12} Researchers found that cigarette filters are a source for metal contamination, in which the filters gradually released multiple metals from the filter over a 34-day study period.¹³ In addition, scientists stated that cigarette filters are a source for nicotine entering the aquatic ecosystem over a 24-hour simulated rainfall event.¹²

5.3.2. Environmental Introduction from Disposal Following Use of the New Products

The Agency believes that the disposal of the new products will be similar to the disposal conditions of other filtered cigarette products that are currently being marketed. After using the new products, the users may dispose of or recycle the packaging paper material. Users may also discard the cigarette filters and ashes as MSW or as litter.

a) Disposal of packaging material

To estimate the amount of waste from disposal of paper packaging material, the Agency used the first- and fifth-year projected volumes of marketing the new and predicate products after issuance of the marketing orders for the new products (Confidential Appendix 4). The calculated cumulative waste of the paper packaging material is determined to be miniscule compared to the forecasted MSW to be generated in the United States. In addition, because paper components are more likely to be recycled, at least a portion of the waste is likely to be recycled.

b) Disposal of cigarette tube filters

¹⁰ Tobacco Control Legal Consortium. Policy Tools for Minimizing Public Health and Environmental Effects of Cigarette Waste. March 2014. Available at: <http://publichealthlawcenter.org/sites/default/files/resources/tclc-guide-cigarette-waste-2014.pdf>. March 27, 2015.

¹¹ U.S. Department of Health and Human Services. Reducing the health consequences of smoking: 25 years of progress. A report of the Surgeon General, 1989. Rockville, Maryland: Public Health Service, Centers for Disease Control, Office on Smoking and Health, 1989. (DHHS Publication No (CDC) 89-8411.).

¹² Ach A. Biodegradable plastics based on cellulose acetate. *Journal of Macromolecular Science: Pure and Applied Chemistry* 1993; A30:733–40.

¹³ Moerman, JW; Potts, GE. Analysis of metals leached from smoked cigarette litter. *Tobacco Control*. 2011; 20(Suppl. 1):I30-I35.

¹² Roder Green, AL; Putschew, A; Nehls, T. Littered cigarette butts as a source of nicotine in urban waters. *Journal of Hydrology*. 2014; 519:3466-3474.

To estimate the amount of waste from disposal of cigarette tube filters, the Agency used the first- and fifth-year projected volumes of marketing the new products (Confidential Appendix 4). Although the waste generated from cigarette filters remains as an environmental concern, the calculated cumulative waste of the filters due to the proposed actions is determined to be miniscule compared to the forecasted MSW to be generated in the United States.

Because the new products will compete with other filtered tobacco products on the market and based on the above-mentioned information regarding waste, construction of new landfills is not anticipated due to the proposed action.

6. Fate of Materials Released into the Environment Due to the Proposed Actions

The Agency does not anticipate that the proposed actions will lead to the release of new chemicals into the environment because the predicate products (filtered cigarette tubes with substantially equivalent attributes and characteristics as the new products) have been sold and would continue to be sold in the United States if the new products do not receive a marketing order. The new products are anticipated to be manufactured the same way as other products in the same facility and be used and disposed of the same way as other filtered cigarettes in the United States.

Therefore, the fate of any materials released to the environment is anticipated to be the same as other products manufactured in the facility. No new types of materials are anticipated to be released because the new products are substantially equivalent to the corresponding predicate products and will be made using the same materials and processes as the predicate products.

7. Environmental Effects of New Materials Released into the Environment Due to the Proposed Action

The applicant stated that the manufacturing operation will comply with all provincial and federal environmental laws in Canada. Therefore, cumulative introduction is not expected to exceed what is allowed to be introduced to the environment under relevant environmental laws.

Furthermore, as discussed above, the amount of materials anticipated to enter the environment due to manufacturing and use of the new products are small fractions when compared to that of the cigarettes imported in the United States. In addition, the amount of materials anticipated to enter the environment due to disposal following use of the new products occupies a small fraction of the total forecasted MSW in the United States. Consequently, no new environmental effects are anticipated due to the new products.

8. Use of Resources and Energy

In the SE Reports, the applicant stated that the paper and acetate tow ingredients are produced from renewable and sustainable resources in accordance with the Forestry Stewardship Council, Pan European Forest Certification, and the Canadian Sustainable Forest Management. These standards require raw materials to be obtained from sustainable and renewable resources that do not impact

critical habitats or endangered species. As to both resource and energy use, the new products will compete with other currently marketed tobacco products.

Furthermore, comparing the projected market volumes of the new products with the forecasted market volumes of the total imported tobacco products from Canada to the United States, the projected market volumes of the new products are small fractions of the total forecasted market volumes in both years. Accordingly, no additional use of resources and energy is anticipated.

9. Mitigation

During our review of the available data and information, we did not identify adverse environmental effects for the new products and the proposed use as filtered cigarette tubes. Therefore, no mitigation measures were developed.

10. Alternatives to the Proposed Action

Alternative A (No-action alternative): The no-action alternative is to not authorize the marketing of the new tobacco products in the United States. The environmental impact of this action would not change the existing condition of the manufacturing, use, and disposal following use of the tobacco products as many other RYO cigarette paper products will continue to be marketed.

Alternative B (Proposed action): There is no substantial environmental effect due to the proposed action of authorizing the new products and the associated manufacture, use, and disposal from use of the new tobacco products.

11. List of Preparers

The following individuals were primarily responsible for preparing and reviewing this environmental assessment:

Preparer:

Gregory G. Gagliano, MS, Center for Tobacco Products

Education: MS in Environmental Science

Experience: 34 years in environmental toxicology and risk assessment

Expertise: NEPA analysis, environmental risk assessment, environmental toxicology, environmental fate and effects

Reviewer:

Hoshing Chang, PhD, Center for Tobacco Products

Education: PhD in Biochemistry and MS in Environmental Science

Experience: 9 years in NEPA practice

Expertise: Waste water treatment, environmental impact analysis

12. List of Agencies and Persons Consulted

Not applicable.

13. Appendix List

Appendix 1: Submission Tracking Numbers for the SE Reports with Names of the New and Predicate Products, and Related Amendments that are Covered Under this Programmatic Environmental Assessment

Appendix 2: Forecast of Total Tobacco Imported from Canada to the United States

Appendix 3: Projected Use of Cigarettes in the United States

Confidential Appendix 1: The First- and Fifth-Year Market Volume Projections of the New Products

Confidential Appendix 2: Percentage of the Projected Total Tobacco Importation from Canada Occupied by the New Products in the First and Fifth Years of Marketing the New Products

Confidential Appendix 3: Percentage of the Projected Total Cigarette Market in the United States Occupied by the New Products in the First and Fifth Years of Marketing the New Products

Confidential Appendix 4: The First- and Fifth-Year Market Projections of Waste Associated with Use of the New Products

APPENDIX 1

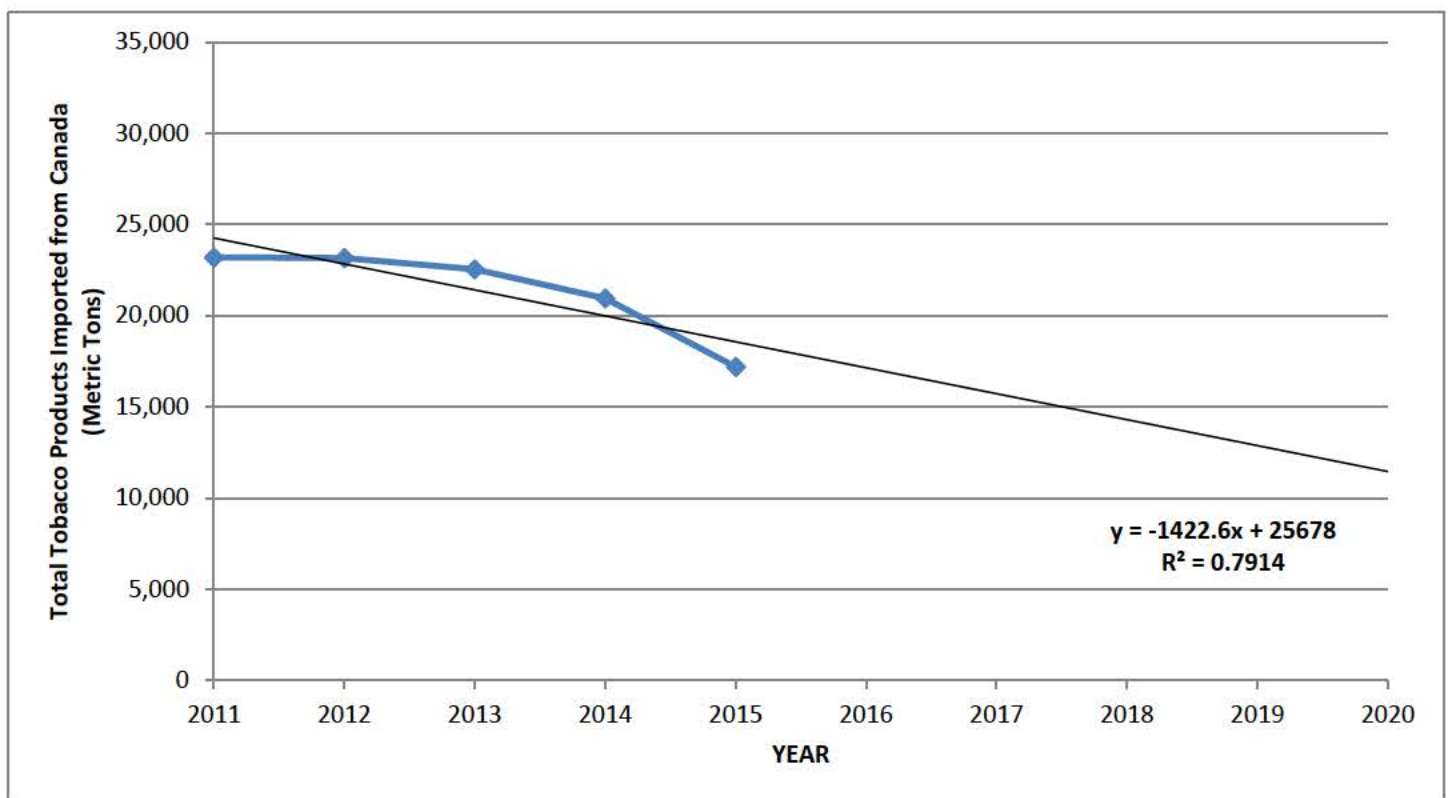
Submission Tracking Numbers for the SE Reports with Names of the New and Predicate Products, and Related Amendments that are Covered Under this Programmatic Environmental Assessment

STN	New Product	Predicate Product	Amendments
SE0012487	TOP Silver 100 MM	TOP Silver 100 MM	SE0012851
SE0012488	Gambler Tubecut Silver King Size	Gambler Tubecut Silver King Size	SE0012851
SE0012489	Gambler Silver King Size	Gambler Silver King Size	SE0012851
SE0012490	Gambler Tubecut Silver 100 MM	Gambler Tubecut Silver 100 MM	SE0012851
SE0012491	Gambler Silver 100 MM	Gambler Silver 100 MM	SE0012851
SE0012492	TOP Silver King Size	TOP Silver King Size	SE0012851

APPENDIX 2

Forecast of Total Tobacco Imported from Canada to the United States

To evaluate the environmental impact of the proposed action due to manufacturing the new products, historical data regarding total tobacco products imported from Canada to the United States from 2011 to 2015 were used to forecast the manufacturing of total tobacco products. This was achieved by using a best-fit linear trend line with the R^2 value of 0.79. Accordingly, the forecasted amounts of the total tobacco products to be imported from Canada to the United States are estimated to be 17,142 and 11,452 metric tons in the first and fifth years of marketing the new products, respectively.

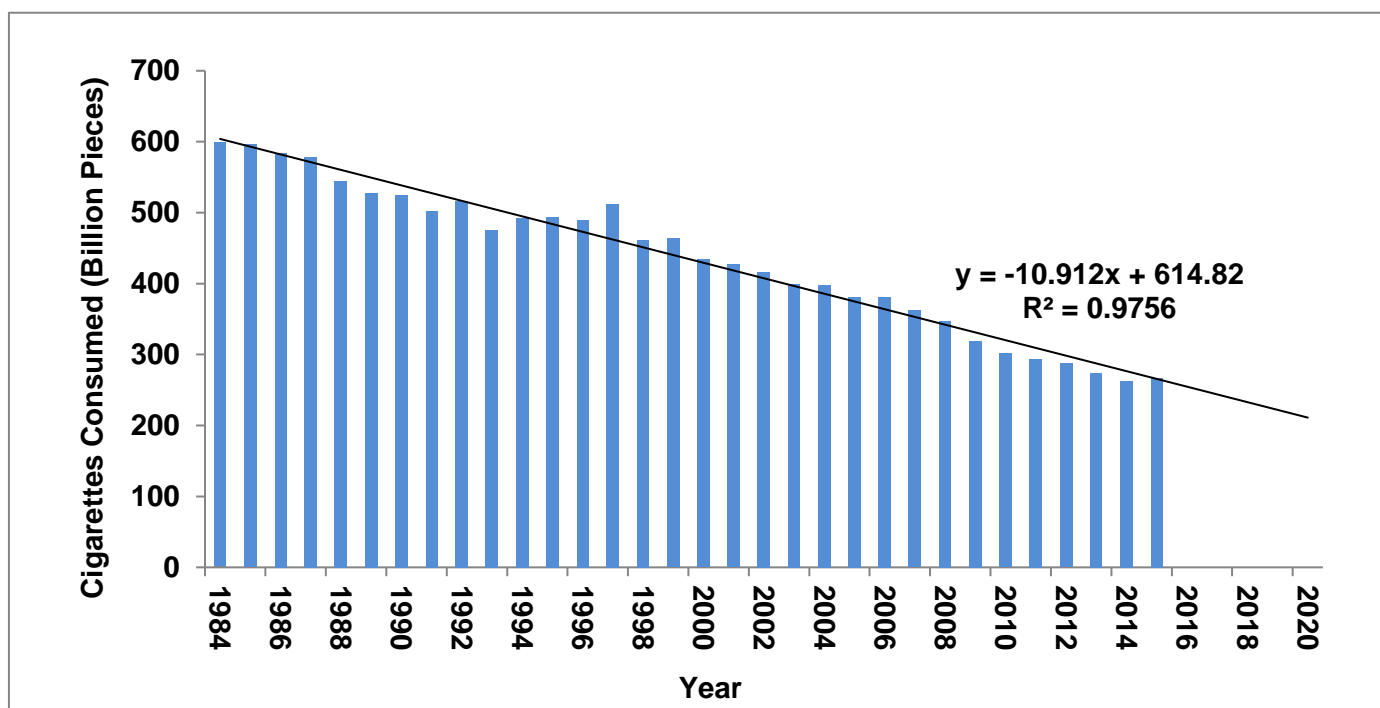


APPENDIX 3

Projected Use of Cigarettes in the United States

To evaluate the environmental impact of the proposed action due to use of the new products, historical data regarding use of total cigarettes from 1984 to 2015 was used to mathematically estimate the forecast of the total number of cigarettes used in the U.S. This was achieved by using one best-fit power trend line with the R^2 value of 0.98.

Accordingly, the forecasted total number of cigarettes that will be used in the United States is estimated to be 254.72 billion and 211.08 billion in the first and fifth years of marketing the new products, respectively.



CONFIDENTIAL APPENDIX 1

The First- and Fifth-Year Market Volume Projections of the New Products

STN	Product Name	1st-Year Projected Market Volume (tubes)	1st-Year Projected Market Volume (tons)	5th-Year Projected Market Volume (tubes)	5th-Year Projected Market Volume (tons)
SE0012487	TOP Silver 100 MM	(b) (4)			
SE0012488	Gambler Tubecut Silver King Size				
SE0012489	Gambler Silver King Size				
SE0012490	Gambler Tubecut Silver 100 MM				
SE0012491	Gambler Silver 100 MM				
SE0012492	TOP Silver King Size				
Total Projected Market Volume of New Products					

CONFIDENTIAL APPENDIX 2

Percentage of the Projected Total Tobacco Importation from Canada Occupied by the New Products in the First and Fifth Years of Marketing the New Products

Year	Weight of Total Tobacco Forecasted to be Imported from Canada (metric tons)	New Products	
		Weight (metric tons)	Percent of Total Tobacco Imported from Canada
First year of marketing new products	(b) (4)		
Fifth year of marketing new products			

The projected market volumes in weights for the new products are (b) (4) and (b) (4) metric tons in the first and fifth years of marketing the new products, respectively. Compared to the forecasted volume for the total amount of tobacco products imported from Canada, the first- and fifth-year market volume of the new products may each occupy (b) (4) of the total market of all tobacco products imported from Canada (see section 5.1.1).

CONFIDENTIAL APPENDIX 3

Percentage of the Projected Total Cigarette Market in the United States Occupied by the New Products in the First and Fifth Years of Marketing the New Products

Year	Projected Cigarette Use in the U.S. (millions of cigarettes)	New Products	
		Projected Use (millions of cigarettes)	Percent of Total Cigarette Use
First year of marketing the new products	(b) (4)		
Fifth year of marketing the new products			

The projected market volume for the new products is (b) (4) million and (b) (4) million cigarettes in the first and fifth years of marketing the new products, respectively. Compared to the number of cigarettes projected to be used in the United States, the new products would occupy (b) (4) of the total market of cigarettes in both years (see section 5.1.1).

CONFIDENTIAL APPENDIX 4

First- and Fifth-Year Projections of Waste Associated with Use of the New Products

To analyze the environmental effects from waste due to the proposed action, the Agency estimated the mass of the projected packaging and product materials waste (in tons) that would be generated from disposal after use of the new products in the first and fifth years of marketing. Projected waste generation is the sum of the cardboard box and used filter tip waste generation of the new products:

$$A = \sum_{i=1}^6 (B_i + C_i)$$

where:

$$B_i = \frac{D_i}{E} \times F \times H$$

$$C_i = D_i \times G \times H$$

A: Projected total waste generation from use of the new products (tons)

B_i: Projected retail cardboard box waste generation of each of the new products (tons)

C_i: Projected tip waste generation of each of the new products (tons)

D_i: Projected market volume of the new products (filtered tubes)

E: Number of filtered tubes per retail cardboard box

F: Mass of empty retail cardboard box (grams)

G: Mass of tip (grams)

H: 1.10231 x 10⁻⁶ U.S. tons/gram (unit conversion factor)

	STN	G	F	E	D	C	B	A
First Year	SE0012487	(b) (4)						
	SE0012488							
	SE0012489							
	SE0012490							
	SE0012491							
	SE0012492							
	Total First-Year Waste for New Products					(b) (4)		
Fifth Year	SE0012487	(b) (4)						
	SE0012488							
	SE0012489							
	SE0012490							
	SE0012491							
	SE0012492							
	Total Fifth-Year Waste for New Products					(b) (4)		

If all the waste (cardboard box and used filter tip) generated from use of the new products is disposed of in landfills, the projected cumulative waste disposed of in the first and fifth years of marketing the new products would be (b) (4) and (b) (4) tons, respectively. This is a negligible fraction (b) (4) of the 258.5 million tons of total waste reported in the United States in 2014.

A portion of the generated cardboard waste is likely to be recycled, with an overall recycling rate for paper and paperboard products of 64.7% in the United States.¹⁴ If 64.7% of the cardboard boxes is recycled and the rest (35.3%) is disposed of as waste, the estimated cardboard waste disposed of in landfills (Variable B above) would be decreased to $0.353 \times (b) (4)$ tons = (b) (4) tons in the first year and $0.353 \times (b) (4)$ tons = (b) (4) tons in the fifth year of marketing the new product. In this case, accounting for potential recycling, the total waste (cardboard box and used filter tip) disposed of would be decreased to (b) (4) and (b) (4) tons in the first and fifth years, respectively. This represents a decrease in the negligible fraction (b) (4) of the 258.5 million tons of solid waste disposed of in the United States in 2014.

The used cigarette filter tips can be disposed of in landfills, but they can also be discarded on streets and roadsides where they may move through storm drains into surface waters. When the used filter tips enter the environment, they can move into the ocean and ultimately back onto land, on beaches. Littered filter tips may leach potentially toxic materials into stormwater, which can reach surface water systems through runoff or contaminate soil and groundwater through infiltration.

¹⁴ EPA. Advancing Sustainable Materials Management: Facts and Figures Report. Available at: <https://www.epa.gov/smm/advancing-sustainable-materials-management-facts-and-figures-report> (accessed December 7, 2016).