Appendix J

Nonrecurring Costs Calculations

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Nonrecurring Costs Calculations

Appendix J contains the methodology and costs staff used to assign nonrecurring costs for each category. Nonrecurring costs are those associated with research and development to reformulate complying products and are independent of, and in addition to, the costs of ingredients to produce a product.

For the cost scenarios, the initial statement of development goals to final delivery of the new product/product line to the marketplace shelves was divided into eight phases. The phases are: product development, including reformulation and development of a new delivery system if necessary; stability testing; efficacy testing; safety testing; labeling modification; registration with regulatory agencies, if necessary; manufacturing changes; and marketing.

For the consumer product categories, we estimated a low and a high cost scenario. The consumer products costs are shown in Tables J-1 and J-2

For the aerosol coatings, staff determined a single cost scenario for the reformulation changes due to the proposed amendments. This is appropriate given that the limits do not require major technology changes. The nonrecurring cost estimates used in this analysis are shown in Table J-3.

A description of each of the nonrecurring cost factors listed in the tables follows:

1. Nonrecurring Costs Considered

Product Development

Given a set of new product requirements, a laboratory prototype for product evaluation and testing must be developed. This includes formulating the contents and specifying the packaging and raw materials. New packaging and chemical formula components might need to be sourced.

Stability Testing

Stability testing ensures that the newly formulated chemical composition and/or package are compatible with each other and with product function for a reasonable period of time. Food and Drug Administration (FDA) and U.S. Environmental Protection Agency (U. S. EPA) regulated products require extra steps to ensure the stability of active ingredients and kill claims of products such as disinfectants.

Efficacy testing

Efficacy testing seeks to ensure that the product maintains the ability to perform label claims and to meet customer expectations. For U.S. EPA registered products (for

example, those which make bacterial kill claims) this would require extensive testing by a specialized laboratory to validate anti-microbial efficacy claims. The testing must be documented with and meet the approval of the U.S. EPA.

Safety Test

Safety testing costs include testing of the new product to ensure safety to manufacturing personnel during fabrication, logistics personnel during transit and to consumers during use and storage.

Labeling Modifications

Cost assigned for labeling modifications are those required when product qualities or use instructions change.

Registration Fees

Registration expenses are incurred for products requiring U.S. EPA registration or FDA regulation whenever changes are made to the label or formula.

Marketing

The costs for marketing consider focus group testing, conducting surveys, advertising and design and publication of print and internet materials.

Manufacturing

The costs for manufacturing consider the technology and infrastructure required to mass-produce a product. Manufacturing costs to comply with proposed standards can include 'pilot plant' testing and/or retooling of production lines or construction of completely new facilities.

A pilot plant test is a small scale version of full scale production which is large enough to approximate the physical characteristics and challenges which will be encountered in the full-scale version. A pilot test run consumes considerably less resources and raw materials than a full scale run to produce a batch of product which will not necessarily be ready or suitable for a commercial market.

Literature

Literature costs are those incurred when new sales and marketing and/or technical literature need to be developed and distributed in order to inform customers of the attributes of a new product.

2. Assigning Costs

Since 1999, a set of per product reformulation costs in 1991 dollars had been established for each phase of bringing a reformulated product into the market. The costs are adjusted to 2012 dollars using a well-established method of rationing chemical engineering plant cost indices as follows (Peters and Timmerhaus, 1980):

$$\text{Non - Recurring Costs (in 2012 dollars)} = \text{Non - Recurring Costs (in 1991 dollars)} \times \frac{\text{C.E. 2012 Index}}{\text{C.E. 1991 Index}}$$

where,

C.E. 2012 index = 2012 Chemical Engineering Plant Cost Index = 584.6 (Chemical Engineering, 2013).

C.E. 1991 index = 1991 Chemical Engineering Plant Cost Index = 361.3 (Chemical Engineering, 1997).

Table J-1 shows the cost assigned to each phase for the low and high cost scenario for an adhesive product. The aerosol Multi-purpose Solvent, aerosol Paint thinner, and aerosol coating categories in this rulemaking are considered "household products." The low and high cost scenarios for aerosol multipurpose solvent and paint thinner are shown in Table J-2 and the cost scenario for aerosol coatings is shown in Table J-3.

To develop the costs shown in the tables, personnel costs are assigned. Beyond personnel costs, additional cost elements were considered at each phase and added as appropriate. These cost elements are facility; equipment; tool; jig; fixture and miscellaneous materials handling equipment; purchased material; packaging; distribution; warehousing; technical data; research studies and tests; promotional literature; residual inventory and disposal; consumer tests; general and administrative expense; patent; registration fees; and computer support. The result of these considerations is a per-product cost for developing a reformulated product and bringing it to market.

The length of time in each phase was estimated based on an industry analysis of 80 new product innovations. Most of the phases occur in sequence; however, there is some time overlap in each phase.

Table J-1
Adhesive Consumer Product
Product Reformulation Costs (low and high cost approach)

Adhesive	Low Cost	High Cost
Product Development Material	$161.80	$970.83
Computer Support	$0.00	$0.00
Personnel/Formulation	$0.00	$17,313.09
Personnel/Delivery System	$0.00	$0.00
Prototype Equipment	$0.00	$0.00
Testing Material	$0.00	$485.41
Computer Support	$0.00	$0.00
Personnel/Stability Test	$0.00	$0.00
Personnel/Efficacy Test	$0.00	$0.00
Personnel/Safety Test	$0.00	$0.00
Labeling Modifications Material	$0.00	$323.61
Technical Data	$0.00	$970.83
Personnel	$0.00	$0.00
Registration/Fees	$0.00	$0.00
Personnel	$0.00	$0.00
Manufacturing Equipment	$0.00	$0.00
Technical Data	$0.00	$0.00
Computer Support	$0.00	$0.00
Other	$0.00	$0.00
Personnel	$0.00	$0.00
Marketing Studies	$0.00	$0.00
Literature	$0.00	$0.00
Inventory	$0.00	$0.00
Computer Support	$0.00	$0.00
Personnel	$0.00	$0.00
TOTAL	**$161.80**	**$20,063.77**

2013 C.E. Plant Cost Index =	584.6	(2012 Annual CPI)
1991 C.E. Plant Cost Index =	361.3	

Table J-2
Household Consumer Product – Aerosol Multi-Purpose Solvent & Paint Thinner
Product Reformulation Costs (low and high cost approach)

Household	Low Cost	High Cost
Product Development Material	$161.80	$809.02
Computer Support	$0.00	$0.00
Personnel/Formulation	$5,986.77	$20,549.18
Personnel/Delivery System	$0.00	$0.00
Prototype Equipment	$0.00	$0.00
Testing Material	$485.41	$485.41
Computer Support	$0.00	$0.00
Personnel/Stability Test	$1,294.44	$7,281.21
Personnel/Efficacy Test	$1,294.44	$5,986.77
Personnel/Safety Test	$3,236.09	$10,840.91
Labeling Modifications Material	$0.00	$0.00
Technical Data	$0.00	$0.00
Personnel	$0.00	$0.00
Registration/Fees	$0.00	$0.00
Personnel	$0.00	$0.00
Manufacturing Equipment	$0.00	$0.00
Technical Data	$0.00	$0.00
Computer Support	$0.00	$0.00
Other	$0.00	$0.00
Personnel	$0.00	$0.00
Marketing Studies	$323.61	$1,618.05
Literature	$0.00	$0.00
Inventory	$0.00	$0.00
Computer Support	$0.00	$0.00
Personnel	$0.00	$0.00
TOTAL	**$12,782.56**	**$47,570.55**

2013 C.E. Plant Cost Index =	584.6	(2012 Annual CPI)
1991 C.E. Plant Cost Index =	361.3	

Table J-3
Assigned Costs for Product Development
Aerosol Coating Product Reformulation Costs (low and high cost approach)

Household	Low Cost	Estimated Cost
Product Development Material	$161.80	$161.80
Computer Support	$161.80	$161.80
Personnel/Formulation	$5,986.77	$5,986.77
Personnel/Delivery System	$0.00	$0.00
Prototype Equipment	$0.00	$0.00
Testing Material	$485.41	$485.41
Computer Support	$0.00	$0.00
Personnel/Stability Test	$1,294.44	$1,294.44
Personnel/Efficacy Test	$1,294.44	$1,294.44
Personnel/Safety Test	$3,236.09	$3,236.09
Labeling Modifications Material	$161.80	$161.80
Technical Data	$323.61	$323.61
Personnel	$970.83	$970.83
Registration/Fees	$323.61	$0.00
Personnel	$647.22	$0.00
Manufacturing Equipment	$0.00	$0.00
Technical Data	$161.80	$161.80
Computer Support	$0.00	$0.00
Other	$0.00	$0.00
Personnel	$1,456.24	$1,456.24
Marketing Studies	$323.61	$323.61
Literature	$161.80	$161.80
Inventory	$0.00	$0.00
Computer Support	$0.00	$0.00
Personnel	$323.61	$323.61
TOTAL	**$17,474.90**	**$16,504.07**

2012 C.E. Plant Cost Index = 584.6
1991 C.E. Plant Cost Index = 361.3

Next, estimated personnel resources were allocated against each phase considering the most probable types of skills needed including general engineering; technician; drafting; packaging engineering; specification engineering; model making; chemical engineering; technical publication; production support; quality assurance; marketing; warehousing; word processing; and clerical. For the high cost elements for aerosol adhesives, aerosol multipurpose solvent and paint thinner, additional personnel were allocated to each phase.

As mentioned above, staff used a low cost and high cost scenario for aerosol adhesives and aerosol multi-purpose solvent and paint thinner categories. Staff used different assumptions for the low and high cost analyses, and considered the specific likelihood that each of the cost elements would occur for each product category individually.

Low Cost Scenario

In the low cost scenario it is assumed that only minor modification to the current formulation is necessary to come into compliance. Therefore, for the low cost analysis no major costs were added for changing delivery systems or other product attributes.

In addition, it is common that large companies having significant market share and broad product lines offer both low VOC complying products and higher VOC noncomplying products. In many cases, relatively low costs would be incurred where these companies could increase sales and distribution of complying products and discontinue noncomplying products.

If products do not change significantly, it is assumed that major retooling of manufacturing equipment would not be required, technical data changes would be minor, and the change in marketing costs would be small.

High Cost Scenario

Each category was analyzed individually to determine which of the elements, described earlier and shown in Tables J-1 and J-2, manufacturers would likely incur in their reformulation efforts. High costs for specific steps of the reformulation process were only included in the cost analysis where staff believed they were likely to occur. If staff believed a markedly different product would be needed to comply with the proposed limit, such as a new delivery system, then high personnel and capital resources, especially in product development and manufacturing changes, were assumed. In addition, a new delivery system would require investment for prototypes, new filling machines training, and technical data, so these high costs were also included in these scenarios. Additional costs were also added for packaging, distribution and warehousing. In areas where it was expected that little or no reformulation would occur, or that the cost of reformulation would be minimal, the value for low cost was used.

For especially challenging limits, it was assumed for the high cost approach that, because of a markedly different product, there would also be additional marketing costs,

including research studies and tests, promotional literature, and consumer tests. The cost analysis did not include the costs for an extensive advertising campaign. New products are regularly brought onto the market, and the advertising for a new product, whether reformulated or not, would replace the advertising for the existing product, and would be a normal cost. It was assumed that the new product would be marketed nationally.

The staff also recognized that development of a new product does not occur in isolation. Few companies have only one product line; for those that have more than one product line, the product lines can be very similar. Development and production tasks, from the initial concept through marketing, would be proceeding simultaneously on more than one product line, with a transfer of information and work-sharing between the products. For these companies, this "technology transfer" would substantially reduce the cost of developing and marketing a new product on a per product basis. For categories where the majority of products were held by a few companies it was assumed that this "technology transfer" would occur, and high costs adjusted accordingly.

For aerosol coatings staff used a single scenario approach based on the low cost scenario. As discussed earlier, staff believes this is appropriate because the reformulation that would be required by the proposed amendments would not involve new technologies. As shown in Table J-3, in the column "Est. Cost" all of the costs except those for registration were used. Only a handful, if any, of products would need to be registered.

Staff considered only nonrecurring costs that are likely to occur. Costs are adjusted from those determined in 1991 by using the Chemical Engineering Plant Cost Index. For aerosol coating products, only changes to the product's reformulation were necessary to comply with the new proposed limit, therefore, only the lower end of the nonrecurring cost was included. In addition, costs associated with registration were not included because, except for a few niche products, there is no requirement to register aerosol coating products. For aerosol coating products, the nonrecurring costs represent the costs associated with an entire product line. We believe that this approach gives a more realistic estimate of the costs.

References

1. Chemical Engineering. Chemical Engineering Plant Cost Index. April, 2013. (Chemical Engineering, 2013)

2. Chemical Engineering. Chemical Engineering Plant Cost Index. April, 1997. (Chemical Engineering, 1997)

3. Peters, M. S. and Timmerhaus, K. D. Plant Design and Economics for Chemical Engineers. 3rd Edition, McGraw-Hill Book Company, 1980, pp. 159-162. (Peters and Timmerhaus, 1980)