

An EA Revision Sheet has been prepared for this Environmental Assessment  
See the FONSI for this Food Contact Notification

## Environmental Assessment

### BASF SE

- 1. Date:** May 17<sup>th</sup>, 2017
- 2. Name of Notifier:** BASF SE  
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#### 4. Description of the Proposed Action

##### a. Requested Action

The action requested in this Notification is to establish a clearance for the food contact substance (FCS) of Hexanedioic acid, polymer with hexahydro-2H-azepin-2-one and 1,6-hexanediamine (Polyamid (PA) 6/66; CAS Reg. No 24993-04-2) in the manufacture of food contact articles as multi-layer films.

##### b. Need for Action

The FCS is intended for use in contact with all food types under conditions A through H as described in Tables 1 and 2 of 21 CFR FDA §176.170 (c). The FCS will be used as one layer in multi-layer films. The FCS films will have a maximum thickness up to 2 mil (0.002 inch). The Notifier does not intend to produce finished food packaging materials from the subject FCS. Rather, the Notifier plans to produce resin of the subject FCS, which will be sold to manufacturers engaged in the production of food-contact films.

##### c. Location of Use/Disposal

Food-contact films produced with the use of the polymers will be utilized in patterns corresponding to the national population density and will be widely distributed across the country. Therefore, it is anticipated that disposal will occur nationwide.

According to the U.S. Environmental Protection Agency's (EPA) 2016 update regarding municipal solid waste (MSW) in the United States, according to 2014 data 52.6% of MSW generally was land

disposed, 12.8% was combusted and 34.6% was recovered for recycling or composting<sup>1</sup>. The materials in which the FCS will be used are not expected to be collected for recycling or composting to a significant extent<sup>2</sup>. Excluding this means of disposal and assuming that all food contact articles made from the FCS are land-disposed or combusted, it is estimated that approximately 80% of the materials will be deposited in land disposal sites and about 20% will be incinerated<sup>3</sup>.

## 5. Identification of Substance that Is the Subject of the Proposed Action

The FCS is fully described elsewhere in this notification. The identity of the FCS is summarized below:

**a. Chemical Abstract Service name:**

Hexanedioic acid, polymer with hexahydro-2H-azepin-2-one and 1,6-hexanediamine

**b. Registry Number**

24993-04-2

**c. Trade or Common Name**

Polyamid 6/66 (PA 6/66), Nylon 6/66

**d. Other Chemical Names**

not applicable

**e. Empirical Formula**

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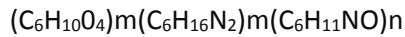
<sup>1</sup> U.S. Environmental Protection Agency.

Advancing Sustainable Materials Management: 2014 Fact Sheet, November 2016. EPA530-R-17-01 November 2016, Washington D.C. The percent noted above are based on municipal solid waste, excluding waste recovered for composting.

<sup>2</sup> EPA, 2017. *Advancing Sustainable Materials Management: 2014 Tables and Figures* ([https://www.epa.gov/sites/production/files/2016-11/documents/2014\\_smm\\_tablesfigures\\_508.pdf](https://www.epa.gov/sites/production/files/2016-11/documents/2014_smm_tablesfigures_508.pdf)) see p. 29 Table 22, which does not include a distinct category for flexible multi-layer packaging; additionally, various publications such as the following detail that while technically feasible, recycling flexible multi-layer packaging is not currently mainstream (Favaro, et. al., *PET and aluminum recycling from multilayer food packaging using supercritical ethanol*, *J. of Supercritical Fluids* 75 (2013) 138–143. See <http://ac.els-cdn.com/S0896844612003865/dx.doi.org/10.1016/j.supflu.2012.12.015>

<sup>3</sup> The distribution of disposal is adjusted as follows: %Combusted = 12.8% combusted / (12.8% combusted + 52.6% land disposed) = 19.6 %.

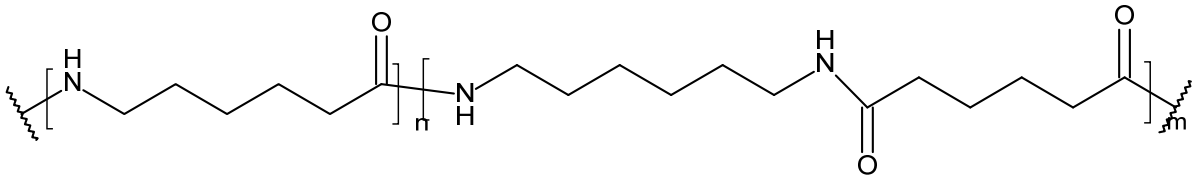
% land disposed = 52.6% land disposed / (12.8% combusted + 52.6% land disposed) = 80.4% land disposed.



**f. Molecular Weight**

see Confidential Attachment to the Environmental Assessment

**g. Structure**



**h. Physical Description**

solid white pellets

**6. Introduction of Substances into the Environment**

**a. Introduction of the substance into the environment as a result of manufacture:**

Under 21 C.F.R. 25.40(a), an environmental assessment ordinarily should focus on the relevant environmental issues relating to the use and disposal after use of the FCS, rather than the production, of FDA-regulated articles. Moreover, information available to the Notifier does not suggest that there are any extraordinary circumstances indicative of adverse environmental impact that may result from the manufacture of the FCS. Consequently, information on manufacturing site and compliance with relevant emissions requirements is not provided herein.

**b. Introduction of the substance into the environment as a result of use/disposal:**

No environmental release is expected upon the use of the subject FCS to fabricate packaging films. In these applications, the FCS will be entirely incorporated into the finished food package. Any waste materials generated in this process, e.g., plant scraps, are expected to be disposed of as part of the packaging manufacturer's overall nonhazardous solid waste in accordance with established procedures.

Disposal by the ultimate consumer of food-contact materials produced by the subject FCS will be by

conventional rubbish disposal and, hence, primarily by incineration or sanitary landfill. The subject FCS consists of carbon, oxygen, hydrogen, and nitrogen - elements that are commonly found in municipal solid waste. The products of complete combustion would be carbon dioxide, water and potentially nitrogen oxides or nitrous oxide. Since carbon dioxide and nitrous oxide are greenhouse gases (GHG), a GHG analysis has been provided in a confidential attachment to the EA to determine whether the GHGs emitted from incineration of the FCS at MSW combustion facilities will significantly impact the environment. However, since nitrous oxide emissions are expected to be negligible from MSW combustion facilities that employ proper air pollution controls (which is expected in the U.S.), only carbon dioxide is considered<sup>4</sup>. Background information and a summary follow.

MSW combustion facilities are regulated by the EPA under 40 CFR 98, which “establishes mandatory GHG reporting requirements for owners and operators of certain facilities that directly emit GHG”. Part 2 of this regulation (40 CFR 98.2), describes the facilities that must report GHG emissions and sets an annual 25,000 metric ton CO<sub>2</sub>-e emission threshold for required reporting. To evaluate the significance of the environmental impact of these GHG emissions, we refer to the Council on Environmental Quality (CEQ) regulations under 40 CFR 1508.27, which defines ‘significantly’ as it relates to assessing the intensity of an environmental impact in National Environmental Policy Act (NEPA) documents. 40 CFR 1508.27(b)(10) states, that when evaluating intensity of an impact, one should consider “whether the action threatens a violation of Federal, State, or local law or requirements imposed for the protection of the environment.” GHG emissions from MSW combustion facilities are regulated under 40 CFR 98.2. Based on projected market volume information provided in the confidential attachment to the EA, the expected carbon dioxide equivalent emissions are below 25,000 metric tons on an annual basis. As the estimated GHG emissions are well below the threshold for mandatory reporting, no significant environmental impacts are anticipated to result from combustion of the FCS in MSW combustion facilities.

Again, as the subject FCS consists of carbon, oxygen, hydrogen, and nitrogen - elements that are commonly found in municipal solid waste - the action requested in FCN 1787 is also not expected to significantly alter the emission from properly operating MSW combustors. Furthermore, based on the proposed use of the FCS and the expected market volume<sup>5</sup>, the FCS will make up a very small portion of the total municipal waste currently combusted (estimated to be 33 million tons or 12.8% of 258.5 million tons in 2014)<sup>6</sup>. In sum, incineration of the FCS will not cause municipal solid waste

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<sup>4</sup> K. Swoboda, D. Baxter and J. Martinec. *Nitrous oxide emissions from waste incineration. Review.* Chem. Pap. 60(1):78-90 (2006).

<sup>5</sup> The expected market volume is provided in a confidential attachment to the Environmental Assessment

<sup>6</sup> EPA, 2016, *Advancing Sustainable Materials Management: 2014 Fact Sheet*, EPA530-R-17-01 November 2016

combustors to threaten a violation of applicable emissions laws and regulations (40 C.F.R. 98.2, 40 C.F.R. part 60 under/or relevant state and local laws).

In the light of EPA's regulations governing municipal solid waste landfills, only extremely small amounts, if any, of the FCS are expected to enter the environment as a result of the landfill disposal of the food contact articles comprised of the FCS. EPA's regulations require new municipal solid-waste landfill units and lateral expansions of existing units to have composite liners and leachate collection systems to prevent leachate from entering ground and surface water. Landfills also required to have ground-water monitoring systems. (40 C.F.R. Part 258). Although owners and operators of existing municipal solid waste landfills that were constructed before October 9th, 1993 are not required to retrofit liners and leachate collection systems, they are required to monitor groundwater and to take corrective action as appropriate. The lack of concern regarding leachate is especially relevant in this case, because the subject FCS is a polymer that contains only minute levels of extractable material, even under conditions that greatly exaggerate environmental exposure.

## **7. Fate of Emitted Substances in the Environment**

### **a. Air**

No significant effect on the concentrations of and exposures to any substances in the atmosphere are anticipated due to the proposed use of FCS. The FCS is a high molecular weight polymer and does not readily volatilize. Thus, no significant quantities of any substances will be released upon the use and disposal of food contact articles manufactured with the FCS.

As indicated above in item 6 the FCS will make up a very small portion of the total municipal solid waste currently combusted, the FCS will not significantly alter the emission from properly operating municipal waste combustors, and incineration of the FCS will not cause municipal waste combustors to threaten a violation of applicable emissions laws and regulations.

Additionally, because the use of the FCS proposed in this FCN the same as the use of the similar FCS already authorized by FCN 502, the FCN is intended to compete with and replace PA6/66 polymers already used as proposed. Consequently, no new emissions are expected when this notification becomes effective.

**b. Water**

No significant effect on the concentrations of and exposures to the FCS or its constituents in fresh water, estuarine, or marine ecosystems are anticipated due to the proposed use of the FCS or the disposal of food contact articles made from the FCS. No significant quantities of the FCS will be added to these systems upon the proper incineration of the FCS, nor upon its disposal in landfills equipped with composite liners and leachate monitoring protocols.

As noted under Section 6 above, even if small amounts of the FCS or its constituents were to transfer from a disposed food contact article into landfill leachate, EPA's regulations governing landfills (40 C.F.R. Part 258) will minimize migration of the leachate into the natural environment. MSW landfills must comply with the federal regulations in 40 C.F.R. Part 258 or equivalent state regulations.

The federal standards include composite liner requirements, leachate collection and removal systems, ground water monitoring requirements and closure and post closure requirements. The environmental fate of substances in the aquatic environment does not need to be addressed, because no significant introduction of substances into the aquatic environment as a result of the proposed use of the FCS is identified.

**c. Land**

Considering the factors discussed above, no significant effect on the concentrations of, and exposure to, any substances in terrestrial ecosystems are anticipated as result of the proposed use of the FCS and its proper disposal. Only very small amounts of leaching of the FCS may be expected to occur under normal environmental conditions when finished food contact materials are disposed of. Furthermore, as noted above, if the FCS were to migrate from the discarded food contact articles, the leachate will be prohibited from entering adjacent ecosystems by proper environmental controls in place at landfill sites.

Thus, there is little expectation of any meaningful exposure of terrestrial organisms to these substances as a result of the proposed use of the FCS.

**8. Environmental effects of released substances**

No adverse environmental effects are expected as a result of the anticipated release of substances into the environment. No significant quantities of any substance are expected to be released to the environment as a result of the proposed use of the subject FCS. As discussed previously, the only substances that may be expected to be released to the environment upon the use and

disposal of food packaging materials fabricated with the FCS consist of extremely small quantities of combustion products and leachable, if any.

Accordingly, no adverse effect on organisms in the environment is expected as a result of the disposal of articles containing the FCS. In conclusion, no information needs to be provided on the environmental effects of substances released into the environment as a result of use and/or disposal of the FCS because, as discussed under item 6, only extremely small quantities of substances, if any, will be introduced into the environment as a result of use and/or disposal of the FCS. Therefore, the use and disposal of the food contact substance are not expected to threaten a violation of applicable laws and regulations, e.g., the environmental Protection agency's regulations in 40 C.F.R. parts 60 and 258.

#### **9. Use of resources and energy**

As is the case with other food packaging materials, the production, use and disposal of the FCS involves the use of natural resources such as petroleum products and coal. The use of the subject copolymer in the fabrication of food contact materials is not expected to result in a net increase in the use of energy and resources, however, because the substance is intended to be used in food contact articles in place of similar polymers already on the market in food contact applications. Polymers currently used in the applications in which the subject FCS is anticipated to be used include other PA6/66 copolymers, such as those authorized in FCNs 342, 502, 731 and 1354.

The partial replacement of these materials by the subject FCS is not expected to have any adverse impact on the use of energy and resources. Manufacture of the FCS and its conversion to finished food contact materials, will consume energy and resources in amounts comparable to the manufacture and use of the other FCS. Furthermore, the use of the subject FCS proposed in this Notification is as a replacement for the same polymers, which are not currently recovered for recycling.

Importantly, the applications for which this Notification will be effective involve film applications, as the maximum thickness proposed for the FCS is 50  $\mu\text{m}$  approx. equivalent to 0.002 inch (2 mil). Consequently, articles fabricated from the FCS will not replace food or beverage bottles - generally with a greater thickness than that proposed for the FCS - which constitute a significant portion of the plastic recycling stream. Instead, articles fabricated from the subject copolymer will be disposed of by means of sanitary landfill and incineration. Food contact materials produced using the subject FCS are expected to be disposed of according to the same patterns when they are used in place of the current materials.

#### **10. Mitigation measures**

As discussed above, no significant adverse environmental impacts are expected to result from the use and disposal of the FCS. This is primarily due to (1) the minute levels, if any, of leaching of components of the FCS from finished articles employing the FCS, (2) the insignificant impact on the environmental concentrations of combustion products of the FCS, and (3) the similarity of the subject FCS to the materials it is intended to replace. Thus, the use of the FCS as proposed is not expected to result in any significant environmental impact requiring mitigation.

#### **11. Alternatives to the proposed action**

No potential adverse environmental effects are identified herein that would necessitate alternative actions to those proposed in this Notification. The alternative of not approving the actions proposed herein would simply result in the continued use of the materials that the subject FCS would otherwise replace; such action would have no environmental impact. In view of the fact that the FCS constituents are not expected to enter the environment in more than minute quantities upon the use and disposal of finished food contact article, and the absence of any significant environmental impact which would result from its use, the establishment of an effective FCN to permit the use of the subject FCS as described herein is environmentally safe.

#### **12. List of preparers**

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#### **13. Certification**

The undersigned official certifies that the information presented is true accurate and complete to the best of her knowledge.

Date: May, 17<sup>th</sup> 2017



Dr. Ruth Zschiesche