

G. Environmental Assessment

1. **Date** August 21, 2001
2. **Name of Applicant/Notifier** Polyplastics
3. **Address** All communications on this matter are to be sent in care of Counsel for Notifier, Jerome H. Heckman, Keller and Heckman LLP, 1001 G Street, N.W., Suite 500 West, Washington, D.C. 20001. Telephone: (202) 434-4140.
4. **Description of the Proposed Action**

The action requested in this Notification is the establishment of a clearance to permit the use of copolymers of 6-hydroxy-2-naphthoic acid and 4-hydroxybenzoic acid in the manufacture of films and sheets, and articles formed from them, used in single service applications and for all types of food-contact articles for repeated-use applications, in contact with all types of food under all conditions of use. The polymers that are the subject of this notification are marketed under the name

The subject liquid crystalline polymers offer several technical properties that make them useful in a variety of food and pharmaceutical applications. In particular, the moisture and oxygen barrier properties of the polymers make them useful in food and pharmaceutical

flexible packaging, and in certain rigid packaging applications (e.g., containers formed from thennoforming of sheets). The polymers also offer good contact clarity, and a high heat deflection temperature. The latter is of importance in applications involving steam autoclave treatment of the product.

The Notifier does not intend to produce finished food packaging materials from the subject liquid crystalline polymers. Rather, the polymers will be sold to manufacturers engaged in the production of food-contact materials. Food-contact materials 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, with about 76% of the materials being deposited in land disposal sites, and about 24% combusted.^{12/}

The types of environments present at and adjacent to these disposal locations are the same as for the disposal of any other food-contact material in current use. Consequently, there are no special circumstances regarding the environment surrounding either the use or disposal of food-contact materials prepared from liquid crystalline polymers.

^{12/} *Characterization of Municipal Solid Waste in the United States: 1997 Update*, EPA 530-R-98-007, U.S. Environmental Protection Agency (5305W), Washington DC, 20460, May 1998.

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

The additives that are the subject of this Notification are copolymers produced by the polymerization of 6-hydroxy-2-naphthoic acid and 4-hydroxybenzoic acid. As dealt with by the Notifier, the polymers are marketed under the trade name _____ and are referred to herein as such.

A confidential description of the polymer appears in Section B of this Notification.

6. Introduction of Substances into the Environment

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

No environmental release is expected upon the use of the subject polymers to fabricate packaging materials. In these applications, the polymers 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 copolymers will be by conventional rubbish disposal and, hence, primarily by sanitary landfill or incineration. The subject copolymers consist of carbon, oxygen, and hydrogen. No toxic combustion products are expected as a result of the proper incineration of the polymers.

Only extremely small amounts, if any, of liquid crystalline polymer constituents are expected to enter the environment as a result of the landfill disposal of food-contact articles, in light of the Environmental Protection Agency's (EPA) regulations governing municipal solid waste landfills. 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, and to have ground-water monitoring systems. 40 C.F.R. Part 258. Although owners and operators of existing active municipal solid waste landfills that were constructed before October 9, 1993 are not required to retrofit liners and leachate collections systems, they are required to monitor groundwater and to take corrective action as appropriate. The lack of any leaching is

especially true considering that the subject substances are high molecular weight polymers that contain only minute levels of extractable material even under conditions that greatly exaggerate environmental exposure conditions.^{13/}

7. Fate of Emitted Substances in the Environment

No significant effect on the concentrations of and exposures to any substances in the atmosphere are anticipated due to the proposed use of liquid crystalline polymers. The polymers are of high molecular weight and do not volatilize. Thus, no significant quantities of any substances will be released upon the use and disposal of food-contact articles manufactured with these polymers.

The products of complete combustion of the polymer would be carbon dioxide and water; the concentrations of these substances in the environment will not be significantly altered by the proper incineration of the polymers in the amounts utilized for food packaging applications.

^{13/} This expectation is confirmed by the results of extraction studies described in Section B of the Notification. As shown there, when 125 mil thick test plaques were extracted with either 10% ethanol or 50% ethanol at 121°C for 2 hours followed by 40°C for 30 days, there was no detectable migration at an analytical sensitivity of 50 parts per billion (ppb). Thus, the quantity of constituents in solid waste deposited in landfills will be extremely small.

No significant effects on the concentrations of and exposures to any substances in fresh water, estuarine, or marine ecosystems are anticipated due to the proposed use of the subject copolymers. No significant quantities of any substance will be added to these water systems upon the proper incineration of the polymers, nor upon its disposal in landfills due to the extremely low levels of aqueous migration of polymer components.

Considering the factors discussed above, no significant effects on the concentrations of and exposures to any substances in terrestrial ecosystems are anticipated as a result of the proposed use of the subject copolymers. In particular, because migration of components of the polymer was not detected, even at 121°C, in extraction studies, no leaching of these substances is expected to occur under normal environmental conditions when finished food-contact materials are disposed of. Furthermore, the very low production of liquid crystalline polymers for use in food-contact applications, as indicated in Appendix IX of this Notification precludes any substantial release to the environment of their components. Thus, there is no expectation of any meaningful exposure of terrestrial organisms to these substances as a result of the proposed use of the copolymers.

Considering the foregoing, we respectfully submit that there is no reasonable expectation of a significant impact on the concentration of any substance in the environment

due to the proposed use of liquid crystalline polymers in the manufacture of articles intended for use in contact with food.

8. Environmental Effects of Released Substances

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 use of the subject polymers consist of extremely small quantities of combustion products and insignificant extractables. As discussed in Section III of the Notification, none of the potential migrating components of the polymers present any toxicological concern at the minute levels at which they could be extracted upon use and disposal. Based on these considerations, no adverse effect on organisms in the environment is expected as a result of the disposal of articles containing the copolymers. In addition, the use and disposal of the copolymers 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. part 60 that pertain to municipal solid waste combustors and part 258 that pertain to landfills.

9. Use of Resources and Energy

As is the case with other food packaging materials, the production, use and disposal of liquid crystalline polymers involves the use of natural resources such as petroleum products, coal, and the like. However, the use of the subject copolymers in the fabrication of food-contact materials is not expected to result in a net increase in the use of energy and resources, since the copolymers are intended to be used in place of similar polymers now on the market for use in food packaging applications. Polymers currently used in the applications in which liquid crystalline polymer is anticipated to be used include high density polyethylene (HDPE), low density polyethylene (LDPE), linear low density polyethylene (LLDPE), polypropylene, possibly polyethylene terephthalate (PET; films only), and Ticona's polymers.

The replacement of these types of materials by liquid crystalline polymers is not expected to have any adverse impact on the use of energy and resources. Manufacture of the copolymers and conversion to finished food packaging materials will consume energy and resources in amounts comparable to the manufacture and use of HDPE, LDPE, LLDPE, polypropylene, PET (film), and Ticona's ctraB products. Moreover, the Notifier's liquid crystalline polymers will be used to manufacture films and sheets, and articles formed from them used in single service. Consequently, liquid crystalline polymers are not anticipated for use in the manufacture of single service

bottles; packaging for types of food other than those types contained in bottles are not recovered for recycling to a significant extent but are disposed of by means of sanitary landfill and incineration. Packaging materials produced _____ polymers are expected to be disposed of according to the same patterns when they are used in place of the current materials. With respect to repeated-use food-contact articles, FDA has concluded that the potential for introduction into the environment of components of repeated use food-contact articles from the use and disposal of these articles is very low;^{14/} it was on this basis that FDA established a categorical exclusion for components of repeated use food-contact articles under 21 C.F.R. § 25.32(j).^{15/} Thus, there will be no impact on current or future recycling programs.

10. Mitigation Measures

As shown above, no significant adverse environmental impacts are expected to result from the use and disposal of food-contact materials fabricated from the subject polymers. This is primarily due to the minute levels of leaching of potential migrants from the finished article; the insignificant impact on environmental concentrations of combustion products of the polymers; and the close similarity of the subject copolymers to the materials they are intended to replace. Thus, the use of the copolymers as proposed is not reasonably expected to result in any new environmental problem requiring mitigation measures of any kind.

^{14/} See May 1, 1996 *Federal Register* (61 Fed. Reg. 19476).

^{15/} See July 29, 1997 *Federal Register* (62 Fed. Reg. 40570).

11. Alternatives to the Proposed Action

No potential adverse environmental effects are identified herein which would necessitate alternative actions to that proposed in this Petition. The alternative of not approving the action proposed herein would simply result in the continued use of the materials which the subject copolymers would otherwise replace; such action would have no environmental impact. In view of the excellent qualities of the liquid crystalline polymers for use in food-contact applications, the fact that the polymer constituents are not expected to enter the environment in more than minute quantities upon the use and disposal of finished food-contact articles, and the absence of any significant environmental impact which would result from their use, the clearance of the use of liquid crystalline polymers as described herein by allowing this Notification to become effective is environmentally safe in every respect.

12. List of Preparers

Lester Borodinsky, Staff Scientist, Keller and Heckman LLP, 1001 G Street, N.W.,
Suite 500 West, Washington, D.C. 20001.

* * *

The undersigned official certifies that the information provided herein is true, accurate, and complete to the best of his knowledge.

Date: August 21, 2001



Jerome H. Heckman

Counsel for Polyplastics