

**The Phoenix Process;  
Taking Recycle PET from the curb back into  
Food Grade Consumer Bottles.**

Jean Bina  
Phoenix Technologies, LT

**Oral Presentation**

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### **Abstract:**

*The following abstract will illustrate how Phoenix Technologies' patented processes for producing food grade RPET significantly and positively impacts, "PLASTICS IMPACT ON THE ENVIRONMENT".*

*We propose to present to the attendees of the 2002 GPEC conference compelling information on how **the Phoenix Process** has and is impacting global progress in preserving the Environment and advancing Recycling.*

PET has long been recognized as an excellent candidate for reuse back into food grade applications, because its crystalline melting point characteristics allow devolatilization (decontamination) at relatively high temperatures, and also because PET's chemical structure and manufacturing process allow this particular plastic to be "reconstituted" with regard to its most important physical attribute. For use in direct food contact, it is necessary to demonstrate that RPET can be cleaned sufficiently to bring the level of any possible chemical contaminants that might have been picked up by the PET containers prior to the recycling steps down to extremely low levels in order to assure the FDA that the cleaned recycle material will be purified prior to reuse back into food grade applications.

Continued pressure on the industry and relentless publicity have taken the beverage industry to task for failing to "make good" on their decade old commitment to utilize recycle content in their containers. Although a number of FDA "LNO's" for RPET have been issued, only ONE of those, Phoenix Technologies, L.P. is a merchant supply source with the benefits of curbside bale economics.

Over seven years ago, PTI embarked on a multi-million dollar project to develop a unique, proprietary and low cost approach to decontaminating RPET to produce food-grade quality material and then to investigate the commercial feasibility of that process. Patents covering both technologies have been issued. Our submission for a Letter of No Objection to the USFDA was issued in August of '99, and we began commercial production of our FDA RPET at our Bowling Green, Ohio facility in December, 2000.

**The Phoenix Process - Food-Grade Recycled PET - LNO™**

**Technical Information:**

The "Phoenix Process" refers to a method of producing high-quality PET resin by recycling, refining and purifying PET containers from curbside recycling sources.

The two products produced by the Phoenix Process are:

LNO-F <sup>TM</sup>      A very small particulate, flake-like resin;  
High I.V., 0.90 dL/g  
35 pounds / cubic foot bulk density  
Ideal for sheet producers or other converters  
Who can perform their own melt filtration.

LNO-P <sup>TM</sup>      A pelletized, filtered, bottle resin;  
I.V. of 0.84 dL/g  
55 pounds / cubic foot bulk density  
A recycled, food-grade replacement for Virgin PET.

The Phoenix Process was jointly developed by Phoenix Technologies, L.P., of Bowling Green, Ohio, The Coca-Cola Company, of Atlanta, Georgia, Coca-Cola Amatil, of Sydney, Australia, and the Coca-Cola Enterprises self-manufacturing co-ops in North Carolina and Texas.

Phoenix Technologies, L.P. holds patents for two decontamination processes; a batch process and a continuous process, which are central to the LNO<sup>TM</sup> technology.

Based on early work done by Plastic Technologies, Inc., (Phoenix' parent company), and the data from the LNO pilot line, the FDA issued two Letters of No Objection to Phoenix Technologies, L.P. for the "Phoenix Process". This was the first such approval issued for use of all "curbside" PET as the feedstock for a food-grade process.

**The Installation**

This first production-scale installation of an LNO<sup>TM</sup> process took about 12 months to complete at a cost of over two million dollars. This was made possible, in part, by generous grants from the Ohio Department of Natural Resources, Lucas County Solid Waste district, and Wood County Solid Waste District.

This is the first commercial LNO<sup>TM</sup> operation in the Northern Hemisphere. Coca-Cola Amatil (CCA) started the World's first commercial operation with the Phoenix Process in Sydney, Australia, in 1998. That plant produces about 20MM pounds of RPET annually for use back into beverage bottles.

**The RVD**

The main RVD (Rotary Vacuum Dryer) has a working volume of 500 cubic feet. The vessel itself stands 22 feet tall and weighs approximately 40,000 pounds when empty. The vessel is maintained at very high temperatures, while under a hard vacuum. Its maximum speed of rotation is 2 RPM.

Due to the special, patented, particle size of the raw material, and the extreme temperature and vacuum, complete purification of the product takes place in a short period of time in the RVD.

The flake which leaves the RVD is suitable for use in Food Contact applications, and is the only product of its kind with such approval. This Product (LNO-F™) can be produced for considerably less than the cost of virgin PET resin.

This Line can produce on the order of 20 million pounds of LNO™ per year.

### **Pelletizing**

Phoenix Technologies has been in the pelletizing business since 1992. Proprietary technology allows Phoenix to melt filter and pelletize PET to produce the highest quality, lowest cost, best performing PET resin in the recycling industry.

By pelletizing the product from the RVD, Phoenix can produce a food-grade recycled resin which mimics virgin in handling characteristics, performance and appearance. The converter does not typically notice any changes when incorporating LNO™ into his normal virgin feedstock, even at high levels.

### **Unique Features**

The Phoenix Process has a number of attributes which make LNO™ resin the highest-quality, most economical means of recovering and purifying Post-Consumer PET plastic. Some of the unique features of the process are these:

- The Phoenix Process is not dependent on any particular sorting and/or washing method.
- Any clean, RPET source can be used.
- The Phoenix Process can use any recycled PET container waste stream, and is specifically designed to use "curbside" PET.
- The Phoenix Process finished product is LNO-F™ - an unfiltered, fine flake material.
- It requires no further processing to meet the FDA requirements for Food Contact.