

**Conference for Food Protection  
2012 Issue Form**

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<b>Delegate Action:</b>	Accepted _____	Rejected _____	

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**Title:**

Acrylamide Management in Retail Preparation of Processed Potato Products

**Issue you would like the Conference to consider:**

Since acrylamide's discovery in heated food products in 2002, Frozen Potato Products Institute (FPPI) members have invested significant resources in the exploration of acrylamide in processed potato products, as well as methods to reduce or mitigate the accumulation of acrylamide in finished products. This investigation has been and continues to be among the highest priorities for FPPI members.

As the majority of acrylamide is formed during preparation of processed potato products, most of the variability in the recorded levels of acrylamide is a result of differences in cooking method, time and temperature. Variability in cooking apparatuses (e.g., oven and fryer calibration, temperature cycling in ovens, variability in microwave oven wattage) can contribute to variability in the recorded levels of acrylamide in finished products. Similarly, variability in the incoming electrical power to the cooking equipment can contribute to inconsistencies in recorded levels of acrylamide. Slight differences in cooking conditions or product composition (even slight differences in the heat distribution during cooking or raw product from different parts of the process year) can also lead to major differences in acrylamide levels—as much as several multiples between different samples of the same product that have been prepared under the same conditions.

Customer and consumer expectations of color, texture and flavor (hereinafter referred to as "sensory" properties) of processed potato products, particularly French fries, are specific and distinct, and manufacturers implement precise processing techniques to produce products consistent with the taste, color and texture specifications of their customers and consumers. An effective and successful acrylamide mitigation technique must result in meaningful reductions in acrylamide levels; adhere to food safety requirements; contain only ingredients that are permitted for use; be able to implement at the factory level; be cost effective; and deliver a product that consistently meets the specific sensory requirements of customers and consumers.

Since 2002, to the extent that they can be applied safely and without undesired side effects, frozen potato processors presently employ several mitigation techniques, and have, as a result, achieved reductions in acrylamide levels in their products. In 2005 and 2006, members of the U.S. frozen potato product processing industry cooperated in the development of the Confédération des Industries Agro-Alimentaires de l'UE/Confederation

of the Food and Drink Industries of the EU (CIAA) Acrylamide "Toolbox," which continues to serve as a guiding instrument in U.S. efforts to identify effective techniques for the mitigation of acrylamide in foods. CIAA "Toolbox" recommendations for the reduction of acrylamide in processed potato products include measures performed at the agronomical, processing and final preparation stages of processing and as described below.

As mentioned previously the majority of acrylamide is formed during preparation of processed potato products, FPPI would recommend the Conference consider CIAA "Toolbox" recommendations for the retail-foodservice preparation of processed potato products, particularly French fries, to assist with the reduction of acrylamide in processed potato products. In addition, FPPI has created materials in the forms of training videos and a poster that could further aid in helping educate the retail-foodservice industry about measures that can be employed in the storage, preparation, and cooking to assist with acrylamide reduction.

## **Public Health Significance:**

### Background

Although some of this research has resulted in successful mitigation methods that have been implemented in the processing of potatoes, the research is incomplete and ongoing. Acrylamide is naturally occurring in many cooked, high-carbohydrate, plant-based foods. It is not a food additive, nor does it come from packaging. Though only recently discovered, it is not a new substance and has been present since humans began cooking foods. Acrylamide forms as food "browns" during high-heat cooking methods, such as frying, grilling, roasting, baking and toasting. Acrylamide has been shown to cause cancer in lab animals when exposed for their lifetimes at very high levels - 1,000 to 10,000 times the acrylamide found in foods; its effect on human health is being investigated, though there is not yet sufficient data to make an official determination. No health authority has recommended any changes in the diet because of acrylamide. Because it can be present in such a wide variety of foods, from coffee, bread, cereal, nuts, potato chips, and French fries to even some cooked fruits and vegetables, it is important to maintain a healthy, balanced diet. There is greater formation of acrylamide in food products that are heavily browned or crisped as a result of cooking. Consumers should fry, grill, bake, roast and toast foods to the lightest acceptable color to reduce the formation of acrylamide at home.

### Agronomical Control

Manufacturers have sought to reduce acrylamide levels first by controlling the levels of reducing sugars in raw potatoes. Reducing sugars are among the key reactants in the formation of acrylamide, so controlling sugar content is one of the primary means by which the industry has achieved a reduction in acrylamide levels in processed potato products. All process varieties of potatoes are selected for their low reducing sugar content with a goal of lowering sugars through raw material sourcing, and several additional varieties are under consideration for use. Each is currently being evaluated for its acrylamide formation tendencies. Assessing the quality of a new potato variety for processing and its acrylamide-forming tendencies, however, requires significant time and resources; it can take up to 10 years or longer to develop and evaluate new varieties. Generally, only mature potatoes are considered for processing, as they contain fewer reducing sugars than do young potatoes. Manufacturers also seek to reduce the formation of acrylamide in frozen potato products by storing and transporting raw potatoes at the "Toolbox" recommended temperature of  $>6^{\circ}\text{C}$  or  $>43^{\circ}\text{F}$  to suppress build-up of reducing sugars. Continually circulated, tempered air

throughout the storage facility helps ensure the potatoes remain dry and the gas mixtures appropriate. Consistent with Good Agricultural Practices (GAP), sprout suppressant is applied when evidence of sprouting is observed, as sprouting causes potatoes to convert starch to sugar.

### Processing

Acrylamide is formed during the Maillard reaction, which is the predominant chemical process determining color, flavor and texture in many cooked foods. Specifically, acrylamide is formed by the reaction of two main components, each occurring naturally in potatoes: free asparagine and reducing sugars. Asparagine is the main free amino acid found in potatoes, and can account for 20 percent to 60 percent of the total free amino acids found in potatoes. Flavor evaluations also show that asparagine has a significant impact on French fry flavor.

Manufacturers have explored many techniques for reducing acrylamide during the processing of potato products, including frying conditions, blanching, acidification and the use of other additives. Par-frying has been shown to have little or no effect on the level of acrylamide found in finished potato products. Blanching, however, can be effective in removing excess reducing sugars and thus lowering acrylamide formation in finished products.

The use of sodium acid pyrophosphate (SAPP) is standard industry practice for reducing after-cooking darkening. The application of SAPP has also demonstrated some ability to reduce acrylamide in finished products. Its efficacy as an acrylamide mitigating agent, however, is limited by the development of bitter "off" flavors that increase as the concentration of SAPP increases. Accordingly, use of SAPP above current industry standards is not a viable mitigation strategy.

Asparaginase, an enzyme that converts asparagine to aspartic acid, thereby reducing asparagine and thus potential for the formation of acrylamide in foods, has been tested with limited success on some products in a laboratory setting. Asparaginase has also been tested at factory scale on a limited basis; however, additional testing is required to determine its efficacy as an effective acrylamide mitigant.

### Preparation

As the majority of acrylamide is formed during final preparation of frozen potato products, the industry has taken steps to reduce acrylamide by lowering the recommended preparation temperature on on-pack cooking instructions, and eliminating certain methods of preparation from use. For foodservice, the cooking instructions on par-cooked frozen potato products have been changed to reflect a reduced recommended frying temperature from 360°F to 345°-350°F.

The primary methods of preparing retail frozen potato products are oven baking and stovetop skillet frying. On-pack baking instructions on retail products are being optimized to reduce acrylamide formation and maintain product quality. Still other preparation methods, such as toaster oven cooking, have been eliminated for some retail products, as these methods can produce acrylamide levels in finished products at significantly higher levels than do other cooking methods.

Intensity of browning during cooking is a significant variable determining the level of acrylamide present in a finished product. The frozen potato products industry, therefore, has attempted to encourage over time a change in customer and consumer perceptions and expectations of the color of prepared French fries from "golden brown" to a "golden

yellow" or "light golden" color. FPPI expects this action to help reduce acrylamide exposure over time.

To that end, cooking instructions for retail products prepared in the oven now include cautionary statements such as the following:

- Do not overcook.
- Cook to a golden yellow or light golden color.
- When cooking small amounts, reduce the cooking time.

### Conclusion

The food industry, the scientific community and many global government entities are all investigating the prevalence of acrylamide in the human diet, the possible effects of acrylamide on human health and ways to reduce the formation of acrylamide during the cooking process.

Potato growers are growing potato varieties that contain lower levels of sugars, which lead to lower levels of acrylamide during cooking. Growers are also adjusting potato storage temperatures to keep sugar levels low.

Food manufacturers, including potato processors, are incorporating best manufacturing practices to reduce acrylamide formation in food, including reformulating products; increasing moisture levels during processing (blanching); lowering cooking times and temperature levels during processing (par-frying); and providing specific instructions to consumers on packaging, like "cook to a light golden color."

FPPI member companies continue to research strategies and techniques to reduce the formation of acrylamide in its products. The frozen potato products industry is also undertaking efforts to educate consumers and restaurant operators about ways to reduce acrylamide in French fries during the cooking process.

Food producers continue to innovate and find new ways to improve the health and safety of their products. The frozen potato industry is committed to working with the scientific community and government agencies around the world to address the presence and reduction of acrylamide in food.

### **Recommended Solution: The Conference recommends...:**

The frozen potato products industry would support efforts to provide guidance to retail-foodservice operators and consumers on proper preparation (e.g., temperature and time) to aid in the reduction of acrylamide based on easily recognized product characteristics, such as color.

- that the Conference review all relevant documents contained in the CIAA "Toolbox" recommendations for the retail-foodservice preparation of processed potato products, particularly French fries, to determine if the materials can be added to the CFP web site to provide assistance to this sector with the reduction of acrylamide in processed potato products.

In addition, FPPI has created materials in the forms of training videos and a poster that could further assist in education efforts for the retail-foodservice industry about measures that can be employed further in the storage, preparation, and cooking to assist with acrylamide reduction. We recommend the Conference review these materials to determine if there is value in adding these resource tools as links or attachments on the CFP web site."

- that the Conference posts on the CFP web site the links to acrylamide resources that could aid in educating the retail-foodservice industry about measures that can be employed in the storage, preparation, and cooking to assist with acrylamide reduction in processed potato products. These links would include:

European Commission Directorate - General for Health and Consumers

[http://ec.europa.eu/food/food/chemicalsafety/contaminants/ciaa\\_acrylamide\\_toolbox09.pdf](http://ec.europa.eu/food/food/chemicalsafety/contaminants/ciaa_acrylamide_toolbox09.pdf)

U.S. Food and Drug Administration

<http://www.fda.gov/Food/FoodSafety/FoodContaminantsAdulteration/ChemicalContaminants/Acrylamide/UCM053569>

Codex CODE OF PRACTICE FOR THE REDUCTION OF ACRYLAMIDE IN FOODS, (CAC/RCP 67-2009).

[www.codexalimentarius.net/download/standards/11258/CXP\\_067e.pdf](http://www.codexalimentarius.net/download/standards/11258/CXP_067e.pdf)

Joint FAO/WHO Expert Committee on Food Additives (JECFA): Seventy-second meeting, Rome, 16-25 February 2010.

[http://www.who.int/foodsafety/chem/summary72\\_rev.pdf](http://www.who.int/foodsafety/chem/summary72_rev.pdf).

Frozen Potato Products Institute's "Know Your Fries" poster and educational videos about Fryer Management for Acrylamide Reduction available in both English and Spanish (see

[https://www.yousendit.com/dl?phi\\_action=app/orchestrateDownload&rurl=https%253A%252F%252Fwww.yousendit.com%252Ftransfer.php%253Faction%253Dbatch\\_download%2526batch\\_id%253DT2djclVBMm1Fd2ZtcXNUQw](https://www.yousendit.com/dl?phi_action=app/orchestrateDownload&rurl=https%253A%252F%252Fwww.yousendit.com%252Ftransfer.php%253Faction%253Dbatch_download%2526batch_id%253DT2djclVBMm1Fd2ZtcXNUQw)).

[https://www.yousendit.com/dl?phi\\_action=app/orchestrateDownload&rurl=https%253A%252F%252Fwww.yousendit.com%252Ftransfer.php%253Faction%253Dbatch\\_download%2526batch\\_id%253DT2djclVBMm1Fd2ZtcXNUQw](https://www.yousendit.com/dl?phi_action=app/orchestrateDownload&rurl=https%253A%252F%252Fwww.yousendit.com%252Ftransfer.php%253Faction%253Dbatch_download%2526batch_id%253DT2djclVBMm1Fd2ZtcXNUQw)).

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#### **Attachments:**

- "Know Your Fries Poster, English"

*It is the policy of the Conference for Food Protection to not accept Issues that would endorse a brand name or a commercial proprietary process.*