MEMORANDUM OF MEETING

Date: December 7, 1990

Place: CFSAN, FB-8

Subject: Benzene residues in soft drinks

Participants: Representing the National Soft Drink Association

Mike Redman
Howard R. Roberts

Representing FDA

Curtis E. Coker, Jr., DRG/HFF-314
Gregory Diachenko, DFCT/HFF-413
Jack Geltman, DRG/HFF-314
Charles Haynes, DRG/HFF-314
Ronald Joyce, DRG/HFF-314
Michael DiNovi, DFCT/HFF-415
Rosalie Angeles, DFCA/HFF-334
Arthur Lipman, DFCA/HFF-334
Catherine Bailey, OF/EOS/HFF-6

The visitors expressed their concern about the presence of benzene traces in their products and the potential for adverse publicity associated with this problem.

The State of Florida Laboratories found traces of benzene in Koala Springs flavored mineral water. There is speculation that the benzene traces originated from the sodium benzoate by way of photolytic degradation. Koala Springs conducted experiments on sodium benzoate solutions to arrive at this conclusion. Koala Springs also suggested that this problem is associated with older lots product.

Mr. Redman of NSDA also suggested that benzene formation occurs as an interaction among ingredients in the product for example, sodium Benzoate, ascorbic acid and FD&C yellow #5 under certain conditions might produce benzene. This is further confirmed by the presence of benzene in canned as well as bottled beverages.

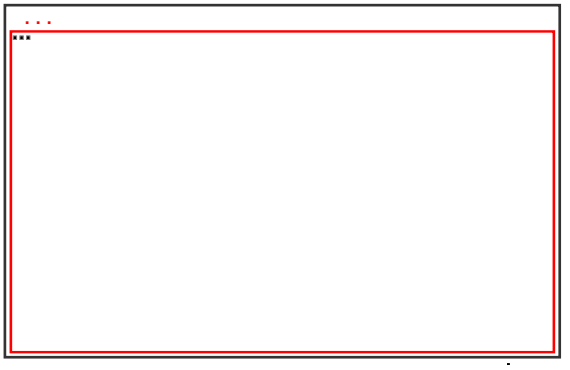
The Food and Drug Administration and the Health Protection Branch of Canada agreed that low ppb level of benzene found in these products do not constitute an imminent health hazard.

Greg Diachenko requested data from industry in order to investigate the possible mechanism of formation of benzene in these products.

Mr. Redman stated that industry will conduct its own scientific investigation in parallel with the Food and Drug Administration; it was agreed that several days lead time was necessary to gather enough data in order to better understand this problem and its ramifications. An attempt will be made to share this information with the FDA.

Jack Geltman

Jack Geltman



DEPARTMENT OF HEALTH & HUMAN SERVICES Public Health Service

Memorandum

Date January 18, 1991

From Supervisory Chemist, Indirect Food Additives Section, FFB, DFCT, HFF-413

Subject Summary of Information on Benzene Formation in Food Products

To Chief, Food Formulation Branch, Division of Food Chemistry and Technology, HFF-413

The following bullets summarize the information we have gathered from industry sources and our own laboratory experiments since the subject of benzene in soft drinks was brought to the Agency's attention by Koala Springs Corp. and Cadbury Beverages Corp.

* Benzene formation occurs at part per billion levels in some food formulations containing sodium benzoate and ascorbic acid. Levels increase with exposure to heat and/or UV light.

* Industry has indicated that other chemicals such as erythorbic acid, EDTA, oxygen and sweeteners like high fructose corn syrup influence benzene formation in the presence of benzoic acid.

1. Sweeteners are thought to inhibit the reaction, as the problem seems most noticeable in diet drinks.

2. EDTA appears to inhibit the reaction also, possibly by complexing metal ions that could act as catalysts.

3. Erythorbic acid may lead to benzene formation in much the same fashion as ascorbic acid.

4. Removal of oxygen by CO_2 or N_2 sparge may inhibit benzene formation.

* Solutions containing sodium benzoate and citric acid also form benzene although perhaps not as readily as those with ascorbic acid.

* Benzene does not form in mineral acid pH adjusted sodium benzoate solutions subjected to heat and UV light.

* Benzene has also been observed to form after exposure to light for 24 hrs in ascorbic acid solutions of benzoic acid anhydride, acetophenone, and benzaldehyde.

* There is some data to suggest that benzene may form from a contaminate in sodium benzoate. This possibility is being investigated.

* Other foods that naturally contain or have sodium benzoate or

ascorbic acid added are being examined for low levels of benzene.

* FDA can detect benzene at part per billion levels and quantitate at less than 5 ppb in aqueous solution and some aqueous foods using a purge and trap capillary column gas chromatographic method and flame ionization detection. Identification of benzene in foods by this method is about 90% certain. It is planned to improve this method by the use of a mass selective detector in the immediate future.

Henry C. Hollifield

Henry C. Hollifield, PhD