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### **B176 A Post-Incident Investigation of Ammonia Contamination of Food Products in a Cold Storage Facility**

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After attending this presentation, attendees will understand a protocol used to conduct a large-scale investigation regarding the sampling and analysis of numerous food products located in a cold storage facility, following an ammonia refrigerant leak. The protocol includes the development of statistically based sampling plans, sample collection procedures, and analytical methodologies.

This presentation will impact the forensic science community by providing examples and suggestions for dealing with similar incidents in the future. No published guidelines are available for this type of investigation. This presentation will illustrate the decisions and flexibility required to overcome the specific challenges associated with interfacing between numerous parties, including the business representatives, insurance companies, attorneys, and both state and federal governmental agencies.

This presentation will discuss an extended investigation following an ammonia refrigerant leak at a large-scale cold storage facility. Numerous types of food products were stored in the warehouse, including baked goods, meats, and seafood. Due to the variations in product compositions, packing techniques, exposure potentials, and requirements imposed by regulatory bodies, several different processes were utilized for sample collection and analysis.

The sampling plan for most of the products evaluated was based on a hypergeometric distribution, a statistically based sampling method commonly utilized by forensic scientists in other applications. The sampling plans were modified, as needed, to suit the needs and requests of the specific product owners. In total, more than 3,000 samples were collected for evaluation and analysis.

The primary instrumental analytical technique utilized for the investigation was Ion Chromatography (IC). Residual ammonia, when dissolved in the moisture contained in the product and/or extracted under acidic conditions, will be in the form of the ammonium cation. The IC technique is a sensitive method for detecting and identifying ionic species, including ammonium. For some products, organoleptic testing was employed at the request of regulating authorities. The organoleptic testing involved both taste and odor evaluations via a panel of analysts. All testing was based on published methodologies, adapted for use in this unusual application.

A summary of the analytical data and observations will be presented. Strategies for data interpretation will be discussed. Overall, the results of the investigation established the ammonia release had little to no impact on the food products stored at the facility. No health hazards were indicated, although ultimately, the decision regarding whether the products were suitable for public consumption was not made by the laboratory. The final decisions regarding the acceptability of the affected products varied greatly, depending on many factors. Over the course of this extensive investigation, numerous unexpected twists and challenges were encountered and overcome, and the narrative of the project should be both engaging and informative to other forensic investigators.

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#### **Ammonia, Food Products, Ion Chromatography**