

## Chemical hazards

### (1) Examples

Chemical hazards that may affect NRTE/RTE products usually originate from five general sources: (1) Agriculture chemicals: pesticides, herbicides, animal drugs, fertilizers, (2) Plant chemicals: cleaners, paint, sanitizers, oils, lubricants, pesticides, (3) Naturally occurring toxicants: products from plant, animal, or microbial metabolisms such as mycotoxins, aflatoxins, lupin alkaloids, ergot, erucic acid, phomopsins, phytoestrogens, allergens, etc., (4) Food chemicals: preservatives, acids, food additives, sulfating agents, processing aids, etc., (5) Environmental contaminants: lead, cadmium, mercury, arsenic, tin, dioxins, or polychlorinated biphenyls (PCBs).

The potential health consequences of exposure to chemicals in food can be serious, are often inadequately understood, and deserve consideration. The long-term and cumulative effects of exposure associated with chemicals in food pose special difficulties in identifying and addressing these risks. The constant introductions of new chemicals that find their way into food also continue to present management challenges. It is apparent that at least some of the identified chemical hazards are of concern because they exert particular effects. For example, pesticides such as organochlorines, industrial chemicals such as dioxins and chemicals present naturally in food such as phytoestrogens may be of concern because they have the potential to cause endocrine effects and/or interfere with the immune system. Similarly some chemicals are of concern because of their potential to act as allergens. When food additives exceed approved amounts or when used in higher concentrations, these chemicals may create a food safety hazard. For example, nitrites and nitrates can be toxic in high concentrations. Some hazards such as lead contamination can affect a certain population- infants or young children-causing toxic effects. Lead, in addition to being a chemical hazard, may be a physical hazard.

### (2) Public health concerns

The most common well documented public health concerns associated with chemical hazards in NRTE/RTE products relate to the short-term effects of allergens (specific proteins) which involve the immune system. Allergens that are ingested by persons who are sensitive to them can cause a range of symptoms that may affect breathing, cause skin rashes, result in digestive disorders, and in more serious cases result in death due to anaphylactic shock. The symptoms usually begin with breathing difficulties and may progress to the point of death by suffocation. Long-term effects of chemicals are associated with exposure over a period of years (e.g., lead poisoning in infants or nitrites and nitrates, which have been determined to be carcinogenic). When product that contains excessive amounts of residual nitrites and nitrates is ingested, the health consequences may be deadly. Chemical residues have been linked

through research to various types of cancers. The public health concerns associated with the long-term effects of exposure to chemicals from ingestion of food is not well understood or well documented.

### 3) Control methods

The basic controls that the plant may apply for chemical hazards include using chemicals as approved, using them for the intended use, using them at the appropriate amount or concentration, and properly storing the chemicals. The establishment should use in-house control of all chemicals by maintaining the identity of the chemical or by properly labeling processed products to identify any known allergens that may be present in the food. Prevention may be achieved when the plant institutes a specification program for incoming materials, such as suppliers' letters of guaranty on packaging material or non-meat ingredients. In order to be applicable for use in meat and poultry plants, the label on chemicals must include directions and precautions for such use as required by Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) regulations. Accordingly, any such preparation offered for use in federally inspected meat and poultry plants must be labeled in compliance with those requirements. Documentation substantiating the safety of a chemical's use in food-processing will vary with the nature and intended use of that chemical. For example, for a pesticide, an establishment should have documentation showing that the compound is registered with Environmental Protection Agency (EPA) and the label information for the pesticide.

For a chemical sanitizer used on food contact surfaces, an establishment should have documentation showing that the compound complies with the relevant Food and Drug Administration(FDA) regulations in 21 CFR §178.1010. (Sanitizers meeting this requirement are usually identified as "Food Grade.") Meat and poultry establishments are responsible for ensuring that all proprietary substances and nonfood compounds are safe for their intended use and used appropriately. In some cases, other Federal Agencies require that chemicals meet their regulatory requirements. For example, EPA requires that pesticides be registered with EPA, labeled as such, and used only in accordance with approved instructions. An establishment should have documentation indicating that they meet these requirements.

Also, many chemicals, such as food contact surface sanitizers and lubricants used in food processing areas must meet FDA requirements. Again, the establishment must have documentation demonstrating this. Often, the statement "Food Grade" on the label of these and other chemicals indicates that they meet FDA requirements. Many chemical uses (anti-slip compounds, laundry soaps, etc.) are not approved for use by any Federal agency. An establishment will likely have labels, instructions, or letters of guarantee from the manufacturer to substantiate the safety of these chemicals in a food processing environment. In some cases, documentation will state that the chemical use was previously

approved by USDA or FSIS and that the formulation and use has not changed since that approval.

Nitrites/nitrates are interesting in that while they are needed for food safety (to prevent *C. botulinum* spores from germinating and forming the botulism toxin), in excess they can be lethal. So in the case of nitrites/nitrates, adding too little may actually be a food safety hazard because these food additives are in some products to impart a measure of food safety. Therefore, strict control over the storage and application of these chemicals is essential. A plant must have credible supporting data for the chemicals it uses in its facility.