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IMPROVING THE SAFETY OF PRODUCTION OF DAIRY PROTEIN PRODUCTS FROM SECONDARY DAIRY RAW MATERIALS
ПІДВИЩЕННЯ БЕЗПЕКИ ВИРОБНИЦТВА МОЛОЧНИХ БІЛКОВИХ ПРОДУКТІВ З
ВТОРИННОЇ МОЛОЧНОЇ СИРОВИНИ

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Abstract. *The article considers the main provisions for improving the safety of production of protein products from secondary milk raw materials; organization and implementation of measures for the protection of production personnel in the event of emergencies. The stages of development of a possible accident and the order of the emergency stop of the dairy enterprise are presented.*

Key words: *protein, secondary dairy raw materials.*

Introduction.

The safety of an enterprise is the state of effective use of its resources (capital, personal, information, technologies, technique, equipment, rights) and existing market opportunities, which prevents internal and external negative influences (threats) and ensures its long survival and resistant development.

At present, the following basic systems of quality and safety of food products are used in production practice:

- GMP (Good Production Practice) - Good manufacturing practice;
- GHP (Good Hygiene Practice) - good hygienic practice;
- HACCP (Hazard Analysis Critical Control Points) - analysis of risks and critical control points;
- Systems of quality management according to ISO standards: ISO 9000 series includes ISO 9000, ISO 9001 and ISO 9004 - quality management systems;
- ISO 14000 - environmental management; ISO 18000 - Occupational safety and health management; ISO 17000 - accreditation of laboratories;
- System of safety management in accordance with the requirements of the international standard ISO 22000 "Food safety management systems - requirements for any organization in the food chain".

Each system serves as an effective tool for ensuring the safety of manufactured food products.

GMP (Good Manufacturing Practice) is the foundation for any food business. It includes requirements for enterprise infrastructure, communication systems, life support systems, production processes, equipment operation, hygiene of personnel.

The HACCP system is an international principle that defines the requirements for effective food safety control. The HACCP system is based on 7 principles:

- conducting analysis of hazards: biological, chemical or physical;
- definition of critical points of control;



- definition of the limit values of the parameters (for example, the minimum temperature and cooking time);
- development of monitoring system of critical points control;
- implementation of corrective actions;
- development of the verification procedure in order to confirm the effectiveness of the HACCP system;
- keeping records.

A source: [1]

An emergency situation is a violation of the normal conditions for the functioning of the object and activities of people caused by an accident, catastrophe, natural disaster, etc., which have caused or may lead to human and material losses. Each year in Ukraine from emergency situations dies more than 70 thousand people. In recent years, there are up to 500 emergencies of technogenic origin, among which the last place is occupied by explosions and fires.

In Ukraine there are more than 1,500 large explosion-hazardous objects function, which contain about 13.6 million tons of solid and liquid explosion- and fire-hazardous substances. At the enterprises of dairy industry can also cause man-made accidents.

The territory of the dairy factories, in its functional use, is divided into pre-factory, production, storage-warehouse. In the pre-factory area there are administrative buildings, sanitary facilities, a checkpoint, a parking for vehicles. In the production area - industrial buildings, repair and mechanical workshops; in the storage-warehouse - boiler houses, pumping stations, ammonia warehouses, lubricants, fuel, building materials, containers. It should also be noted that around the artesian wells and reserve reservoirs for drinking water a zone of strict regime is allocated, and around the treatment facilities - a protective zone.

A source: [2]

Main text

Dairy factories are among the most powerful both in terms of volume of production and the number of working enterprises in the food industry. At the enterprises in the dairy branch, may occur crashes in systems of electro-, gas-, heat-, water supply. To date, at all dairy enterprises work of the prevention of human-made accidents is being conducted, which is based on monitoring and forecasts.

Enterprises of the food, meat and dairy industry, cold storage facilities, food base with refrigeration systems, in which ammonia is used as a coolant, belong to chemically dangerous objects.

About 20 chemical accidents are registered in the world every day. In sugar, canning, confectionery, meat and dairy and other industries, numerous cooking equipment of various designs are used (double-wall cookers boiler, evaporators, vacuum appliances, etc.), autoclaves (sterilizers); pressure vessels.

At each enterprise, a plan is developed to eliminate possible accidents. The training of workers and employees for work in emergency situations is organized, and a necessary reserve of forces and resources is provided for their elimination. It is necessary to keep in a constant readiness systems and means of warning, to have at the workplace the necessary number of personal protective equipment.



In case of emergency situations, an important task is to timely notify the personnel of the enterprise and the population of the residential community adjacent to this enterprise.

Accidents and catastrophes at a chemical-dangerous facility (CDF)- not a rare phenomenon of our day.

Causes of accidents on the CDF:

- failure of aggregates, mechanisms, nodes, pipelines, damage of capacities;
- violation of sealing of welds and connecting flanges;
- non-fulfillment of safety, organizational and human errors;
- acts of terrorism, acts of deception, sabotage;
- violation of the rules of safety and transportation of chemicals;
- external action of nature and man-made systems for equipment.

In the accidents on the CDF and transport, 25% of strongly acting poisonous substances (SAPS) highly toxic substances emissions are ammonia, 20% chlorine, 10% acids, 5% aromatic hydrocarbons (benzene, toluene, xylene), 2% mercury, 1-2% other SAPS. The main feature of chemical accidents (as opposed to other industrial disasters) is their ability to propagate in a large area, where large areas of dangerous environmental pollution may occur.

At each dairy enterprise in the event of an emergency, a plan for a rapid accident-free stopping of production is being prepared. It must ensure that the probability of occurrence of secondary damaging factors is minimized.

In this work, the order of the accident-free stop of the line for the production of protein product from secondary milk raw materials is developed. Emergency accident-free stop of dairy enterprises includes a number of successive, time-regulated technical and technological operations of emergency shutdown or stopping of aggregates and equipment, current technological lines, power sources, communications, protection of workers, raw materials, finished products. Process of production of protein product from secondary dairy raw materials: raw material stocking (position 1), pasteurization of raw materials (position 2-4), flocculation (position 5), drainage system for continuous serum using a tunnel (position 6), intermediate redundancy of the protein product (position 7), homogenization (position 8), intermediate redundancy (position 7), packaging (position 9), storage of the protein product (Figure. 1).

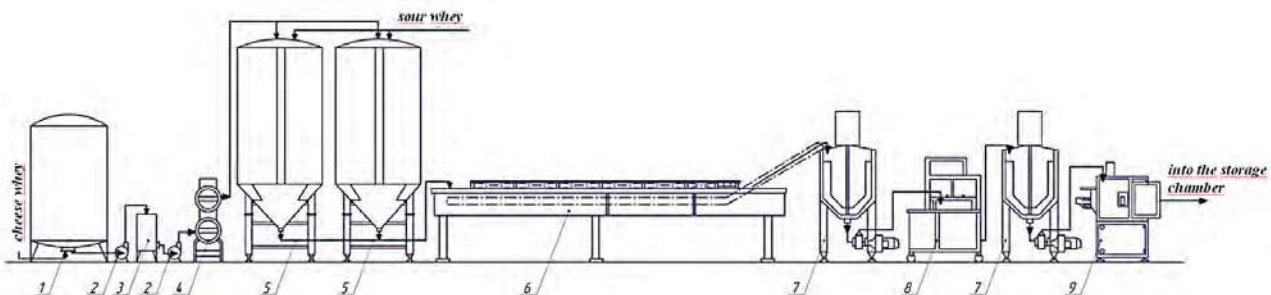


Figure 1 - Scheme for obtaining a protein product from secondary dairy raw materials

The developed stages of emergency development, conditions, sign of its occurrence, location and means of liquidation (Table 1).



Table 1
Stages of Emergency development, conditions, sign of its occurrence, location and means of eliminating

No	Scenario name and stage of accident	Background and signs of accident	Means of emergency protection	Technical means of emergency protection	The sequence of actions
1	Exceed of parameters above critical values	Increasing values	To warn others about the danger to use personal protection equipment to do the emergency stop of compressors, to switch on crash ventilation	Button of compressors emergency stop, pipe line fire, hand trunks RS-50, CMB-50	Use personal protection equipment. Disconnect compressor using the emergency shutdown
2	Depreciation or material fatigue of equipment	Corrosion, mechanical wear, damage of equipment	Evacuate people from the danger zone, isolate the zone, prevent entering of unauthorized individuals, work only in protection clothes	Filter respiration CD, insulating respirator IP-4	Inform about emergency via system of alerts communication. Assess the situation. Disable bad block
3	Mistakes of personnel servicing and repairing of equipment	Spill, leak, formation of gas clouds, depressurization of systems during repairs	Provide first aid to victims, direct victims from the zone of lesions for examination. In the case of intense gas leak, give it to evaporate, to apply water spray for its deposition. Isolate zone of emergency situation, notify manage	Protective suits, personal protection equipment	Block ways of getting ammonia in sewers, basements, tunnels. Neutralize gas using water hand barrels IBS-50, surround danger zone and evacuate people. Provide assistance to victims. Send people to medical examination

Production of dairy product from secondary dairy raw materials involves development of schedule of accident-free stopping of certain production zone or plant as a whole in order to prevent accidents on dairy enterprises system. Information on the maintenance of preventive operations, their agents and duration is shown in (Table 2).

Table 2
Content of the warning operation of accident-free stop the plant for the production of protein product from secondary dairy raw materials

Content of the operation	Executor	Start of operation, min	End of operation, min
Getting a signal	Responsible duty	1	2
Notification of plants manufactory	Manager, Service of alerts	2	5
Stop the raw feeding (cheese whey, sour cheese whey)	Heads of departments, operators of industrial buildings	3	6
Sequential shut down of batchers	Mechanical-engineer	4	7



Stop and disabling of equipment on all production lines (pasteurizer, flocculator, drainage system for continuous serum using a tunnel, homogenizer, packing machine)	Mechanical-engineer	4	20
Evacuation of the personnel	Responsible duty	5	11
Disconnection of the voltage from power panels, switching off sources of emergency lighting	Duty electrician, chief of the plant	10	17
Covering the raw dairy protein product)	Responsible staff	7	15
Blocking water and heating system	Duty mechanic	7	9
Turning off the power of plants on the main distributing board	Chief energy	14	20
Disabling the well, blocking water	Mechanical-engineer	7	10
Reporting to the chief engineer about shutdown of the protein product from secondary dairy raw materials production department, or milk processing enterprises in general	Chief engineer	18	22

Authoring

Summary and conclusions.

Provisions were considered to improve the safety of the production of protein products from secondary milk raw materials.

Technical measures were obtained to reduce the risk of fires. A set of preventive measures ensures the safety of all employees and thereby contributes to ensuring the necessary working conditions for the dairy plant.

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Анотація. В роботі розглядається основні положення щодо підвищення безпеки виробництва білкових продуктів із вторинної молочної сировини; організація та здійснення заходів щодо захисту виробничого персоналу на випадок надзвичайних ситуацій. Представлено етапи розвитку можливої аварії та порядок аварійної зупинки молочного підприємства.

Ключові слова: білок, вторинна молочна сировина.

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