

Limited Liability Company
PORTAL-GROUP

DRAFT

**JSC Chornobaivske. Poultry farm per 5 million commercial laying
hens in Belozersky district, Kherson region**

**ENVIRONMENTAL IMPACT ASSESSMENT
(EIA)**

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1. Introduction

Objective: To estimate the negative impact on the environment of agricultural production in growing and keeping of commercial poultry at Skhidne Village , Kherson region, Belozersky district.

The following normative materials were used for development of a project:

1. OND-86, Methods of calculation of concentrations in the ambient air of hazardous air pollutants contained in the emissions of enterprises;
2. DHST 17.2.3.02-78 , Nature Conservancy. Atmosphere. Regulations for establishing permissible emissions of pollutants from industrial enterprises;
3. DBN A.2.2-3-2004, Content, procedure of development, coordination and approval of project documentation for construction;
4. DBN A.2.2-1-2003 "Structure and Contents of the Environment Impact Assessment (EIA) materials during design and construction of enterprises, buildings and facilities;
5. Collection of methods for calculating emissions of pollutants from different productions, Hidrometvydav, 1986;
6. State sanitary rules for planning and building-up of settlements. Kyiv, Ministry of Health of Ukraine, № 173 from 19.06.1996,
7. Maximum permissible concentration and estimated safe levels of pollutants in ambient air in populated areas. Donetsk. 1998
8. Planning and development of urban and rural settlements. DBN 360-92 **, State Construction Committee of Ukraine, Kyiv, 2002
9. Poultry Enterprises. Department norms of production engineering. VNTP - AIC -04. 05. Ministry of Agrarian Policy of Ukraine, Kyiv, 2005
10. Veterinary-sanitary rules for poultry farms and their design requirements. Approved by Order of Chief state inspector for the Veterinary Medicine of Ukraine as of July 3, 2001 № 53.
11. Veterinary-sanitary rules for businesses (enterprises, shops) in poultry processing and egg production. Approved by Order of the Chief state inspector for the Veterinary Medicine of Ukraine as of September 7, 2001 № 70.
12. DBN B.2.4-3-95 "Master Plans farms."
13. "Collection of emission indicators (specific emissions) of pollutants into the air from different productions," Volume 3, Donetsk, 2004

2. General information about the object - Poultry farm per 5 million commercial laying hens

Object name: Poultry farm per 5 million commercial laying hens in Belozersky district, Kherson region.

Customer: PJSC "Chornobaivske."

Documentation Developer: Limited Liability Company " _____", of _____, Street. _____.

General Plan provided for the accommodation of such objects in the area

2.1. Rearing flocks areas:

- Poultry houses № № 1-10;
- Disinfection post № 11;
- Changing rooms № 12;
- Transformer substation № № 13,14;
- Diesel generators № № 15,16;
- Wet unit №17;
- Water tower № 18;
- Firewater tanks № 19;
- Veterinary laboratory № 20;
- Disinfection barrier № 21;
- Artesian wells № № 23-26.

2.2 Commercial poultry area:

- Poultry houses № № 1-20;
- Transformer substation № № 21-24;
- Diesel generators № № 27-30;
- Administrative building №33;
- Changing rooms № 44;
- Disinfection post № 35;
- Long-term egg storage facilities №36;
- Veterinary laboratory with crematorium №37;
- Disinfection barrier № 38;
- Maintenance station № 39;
- Fire department № 40;
- Firewater tanks № 43;
- Wet unit № 44;
- Packing store № 45;
- Wells № № 46-49;

3. Map - enterprise scheme, sanitary - protective zone

Scheme of air pollutant emissions sources distribution of PJSC Chornobaivske based on the Master plan. 1:500 scale drawings.

The allocated lands are located within agricultural area of Skhidne village, Belozersky district, Kherson region.

- From the south: Skhidne village;
- From the west: river Verovschyna;

- From the north, forest plantations and agricultural area;
- From the East: agricultural area;

The total area amounts to 70.01 hectares of land. Building area is equal to 117,532 m².

According to State sanitary rules for planning and building-up of settlements and DBN B.2.4-3-95, Farms Master Plans, the sanitary protection zone of this enterprise amounts to 1200 m. A residential area that is, Skhidne village is situated within the limits of standard sanitary protection zone. Thus this paper provides a thorough calculations of ground concentrations of pollutants, according to which the possible reduction of sanitary protection zone is possible in accordance with the procedure established by State sanitary rules for planning and building-up of settlements, approved by order of the MoH of Ukraine № 173 from 19.06.1996.

4. Brief physical and geographical, geological and climatic characteristics of the area

Poultry farm per 5 million commercial laying hens in Belozersky district, Kherson region is situated in Skhidne village in Belozersky district.

Short climatic characteristics are adopted in accordance with BNSH 2.01.01-82. The area belongs to the P-B category. The climate is continental with moderately cold winters and warm summers. Average annual air temperature, according to the Kherson Regional Centre for Hydrometeorology amounts to 9.8 °C. The average temperature of the coldest month amounts to - 3.0 °C, the average temperature of the warmest month amounts to +21.9 °C.

The relief of the area is smooth (terrain relief coefficient amounts to - 1.0). Groundwater horizon lies at depths of 14 - 25 m from the ground. Seasonal fluctuations in groundwater level is ± 1,0 m.

5. Sources of pollutant emissions into the air, which are located in the area of poultry farm that are taken into account during the calculation of dispersion of pollutants

While carrying out calculations of pollutant emissions into the atmosphere, to determine the cumulative impact of all farms one should consider:

The equipment located in the rearing flocks area:

- Gas air heating units GP 95 ELSTER;
- Gas boiler Wiessman Vitocrossal 200W;
- Gas boiler Wiessman Vitodens 200W;
- Diesel generator station VOLVO TAD 1242 GE;
- Other special equipment by SALMET (Italy).
- 10 poultry houses. Every poultry house of the area has 7 rows of cage batteries with 6 tiers of cages in each row. Droppings conveyor belt being 138 m in

length and 1.2 m in width is disposed below each tier of cages. Each poultry house has three bins for storage and supply of food, and one disposal conveyor pit.

At the same time no more than 5 tiers are involved in the process, due to the fact that in the 6-tier the rearing flocks before 6 weeks are being grown up, thereafter the rearing flocks are distributed among other 5-tiers.

Gas boilers are located in changing rooms, disinfection post and veterinary laboratory.

The equipment located in the commercial poultry area:

- Crematorium equipment;
- Diesel generator station VOLVO TAD 1242 GE;
- 20 poultry houses. Every poultry house of the area has 7 rows of cage batteries with 6 tiers of cages in each row. Droppings conveyor belt being 138 m in length and 1.2 m in width is disposed below each tier of cages. Each poultry house has three bins for storage and supply of food, and one disposal conveyor pit.

Heating and hot water in the area shall be provided by electricity.

5.1 Gross emissions

Detailed description of the emission sources is given in Appendix 2 Background data for calculation is found in Table 3.

Compositional Characteristics of emissions for each source are listed in Annex 2 Table 4.

Description of hazardous substances is given in Annex 2 Table 5.

Summation groups' description is given in Annex 2 Table 6.

Description of background concentrations is found in Annex 2 Table 7.

The feasibility of calculations of ground concentrations is found in Annex 3.

Characteristics of emission sources are provided in Annex 4.

Characteristics of pollutants are found in Annex 5.

6. Description of process as a source of environmental pollution in the farm area. General characteristics of the process.

Poultry farm consists of two areas, these are the rearing flocks area and commercial poultry area.

While calculating the dispersion of pollutant emissions into the atmosphere the mutual influence of the rearing flocks area and commercial poultry area shall be taken into account.

Keeping poultry in cages according to technology of SALMET firm is used in the operation of a farm .

All chickens during the year are moved from the rearing flocks area according to the flow process chart. Rearing flocks are consistently placed in cages for transporting and then in the same sequence are placed in the cages of poultry houses,

keeping the composition of rearing flocks grown up in one group. This will reduce the stressful effects due to their movement.

Each cage battery is equipped with battery watering systems, feeding system, egg collection system, droppings conveyor system with computer-aided management.

The main condition for keeping laying hens is to create optimal microclimate conditions in the poultry houses, namely, air temperature, light, air velocity, humidity, dust, microbial contamination. It is essential for normal functioning of all body systems to maintain productivity of birds at a high level, ensuring the laying up to 300 eggs per year.

The process of thermoregulation is important for the body of birds. Deviations in temperature significantly affect the health of the poultry. Increased temperature reduces the resistance, reduces appetite, and reduces the egg laying. Low temperatures entail cold-related diseases. The project contemplates an automatic optimum temperature. Temperature control shall be carried out in accordance with the thermometers. At normal temperatures chickens eat food normally, are uniformly distributed in a cage and lay eggs very good. The optimum temperature in poultry houses shall be maintained within 18-20 °C.

Given the intense gas exchange of chickens, which in the process of life generate heat, gases, bird droppings, also releasing gases and the zoo-hygienic requirements set restrictions on their content in the air. For instance, carbon dioxide should constitute no more than 25% of the poultry volume, ammonia - 15 mg/m³, hydrogen sulfide - 5 mg/m³. Humidity levels should be kept between 60-70%.

The project implies windowless poultry houses. They are lit by electric lamps. Light regimes are set according to duration, frequency and intensity of lighting in order to ensure all-year intensive egg laying. Duration of illumination (or light day) is an important factor in the light regime of laying hens. The project provides for an automatic adjustment of light by a computer program.

The birds shall be fed on complete feed. Feed stuff is produced on a separate existing feed mill plant. Feed rations are balanced and include all nutrients: protein, carbohydrates, vitamins and minerals.

During preventive break of no less than 4 weeks (30 days) (between the export of poultry and placing a new flock) the room with the equipment must be cleaned, rinsed and disinfected.

During the breeding of birds it is also need to carry out regularly works on cleaning and disinfecting cages, feeders, bird baths, equipment and machinery for making and distributing food. Disinfection is conducted under the current regulations of Veterinary Medicine.

The project implies the use of multirange disinfection apparatus TORNADO model 2897 (manufactured by Curtis Daina-Fogh, USA) in an amount of 2 pcs. per poultry house. Disinfection can be conducted in the presence of birds with certified in Ukraine drug "FOHNET" produced by Sanitec - Ocene company(France). Registration certificate of the State Department of Veterinary Medicine of Ukraine № 0251-01-031-04 as of 29.04.2004. As a carrier is used a spray additive ADN-01, produced by NPK KIN Kyiv.

Disinfectant FOHNET has bactericidal, fungicidal, virucide effects. To prepare the working solution per 1m³ is used 1.73 ml of FOHNET and 0.67 ml of aerosol carrier ADN-01.

Also to ensure the requirements of regulations concerning disinfection of equipment and transport facilities, adherence to purity, the farm also uses other drugs, certified by the State Department of Veterinary Medicine of the Ministry of Agrarian Policy of Ukraine (issued registration certificate), Namely:

- Septodor Forte (solution for disinfection), № 0454-01-078-04 as of 28.10.2004;
- Vet-Amin (the solution for disinfection), № 2589-01-841-07 as of 26/04/2007 ;
- Biosolv (washing solution), № 1942-01-695-06 as of 07/04/2006 ;
- Neohlor (solution for disinfection), № 2783-02-709-06 / 1 as of 11.07.2007 ;
- DezEkon (solution for disinfection), № 2016-01-707-06 as of 04/07/2006;
- Maksysan (solution for disinfection), № 2869-01-708-06 / 1 as of 5.10P .2007;
- Ambitsyd (solution for disinfection), № 1943-01-696-06 as of 04/07/2006 ;
- Septodor (solution for disinfection), № 1607-01-576-06 as of 26.01.2006,

And the certificate of registration issued by the Ministry of Health of Ukraine:

- Biohlor, № 000039 as of 15.02.2007;
- Neosteryl, № 000150 as of 26.06.2007 ;
- Demp (solution for disinfection);
- KASPOS (solution for disinfection).

6.1 Control of emissions of pollutants

Control of observance of maximum permissible emissions (MPE) of pollutants into the atmosphere is carried out by specialized organizations accredited to perform this type of activity. State control of observance of such standards is carried out by bodies of State control in the domain of environmental protection in accordance with the applicable legislation of Ukraine and in respect of the emissions specified in the project of MPE.

6.2 Air pollution emissions from enterprise under the adverse weather conditions and measures to reduce such adverse effects

Under the control of emissions of hazardous air pollutants (HAP) we understand the short-term reduction in periods of adverse weather conditions (AWC) entailing the formation of a high level of air pollution. Emissions control is carried out taking into account AWC predictions and on the basis of warnings about possible dangerous increase in concentrations of pollutants in the air in order to prevent it.

In the development of measures for the regulation of emissions the contribution of different emission sources to the ground concentrations of HAP shall be considered. Each case implies an alternate emission HAP reduction by reducing emissions from production manufacturing equipment.

To reduce emissions of pollutants under AWC the company has to:

- Strengthen the control of observance of technological requirements of production;

- Prohibit the work of equipment in intensified mode;
- Increase the control of observance of control-measuring instruments and automatic control systems;
- Increase the control over the impermeability of gas systems and components, materials pouring areas and other dust and gas sources.

It should also be borne in mind that according to the specifics of the enterprises under project, the reduction of pollutant emissions under adverse weather conditions by reducing or stopping power of the equipment is possible only for process equipment. Emissions of pollutants generated as a result of bird life activity can not be reduced.

7. Protection of water resources

Buildings of the poultry houses are equipped with centralized systems of cold drinking water supply. The sources of water supply are the projectable artesian wells. Artesian water intakes developed a separate project. Household and production drains from poultry house are sent by gravity to the general factory treatment plant, located in the rearing flocks area. For the removal of waste from daily floor cleaning and preventive treatment of the poultry houses and processing equipment the buildings are equipped with industrial sewage systems. Drainage systems consist of open stalls, floor drains and final piping connected to the sewerage system inside the area.

Industrial waste water from all 30 poultry houses after preventive cleaning is pre-lit in the general sump.

Drinking water is used for poultry watering and wet cleaning. Sources of water supply are separated (for each poultry houses) water-service pipes of the external plumbing inside the area.

Water supply of other buildings will be done from the outside household water plumbing. Preparation of hot water for household needs is local. At the poultry farm separate network system of household and industrial sewage are designed. Wastewater outfall from car washing is to be poured out in to the inverse water supply system with sump, after which water is used again. The system is equipped with petrol and oil well trap for periodic pumping of trapped oil products.

Basic indicators of water supply in poultry houses facilities:

Enterprise water needs are given in Tables № № 1-3.

Table 1. Water consumption in the rearing flocks area

Consumer	Water use		
	l / s	m3/hour	m3/day
Disinfection post	0,67	0,46	2,26
Changing rooms	1,97	4,57	9,25
Wet unit	0,16	0,16	0,096
Disinfection barrier	0,60	2,13	13,33
Veterinary laboratory	0,52	0,4	0,77
Poultry house №1	1,16	4,18	39,64

Consumer	Water use		
	l / s	m3/hour	m3/day
Poultry house №2	1,16	4,18	39,64
Poultry house №3	1,16	4,18	39,64
Poultry house №4	1,16	4,18	39,64
Poultry house №5	0,77	2,77	26,60
Poultry house №6	0,77	2,77	26,60
Poultry house №7	0,77	2,77	26,60
Poultry house №8	0,77	2,77	26,60
Poultry house №9	0,77	2,77	26,60
Poultry house №10	0,77	2,77	26,60
Total:	13,18	41,06	343,87

Table 2. Water consumption in the Commercial poultry area:

Consumer	Water use		
	l / s	m3/hour	m3/day
Administration building	0,29	0,39	0,39
Changing rooms	1,03	1,85	4,14
Disinfection post	2,50	0,90	8,10
Egg storage facilities	1,42	5,21	125
Veterinary laboratory	0,34	0,36	0,36
Wet unit	0,39	0,57	1,28
Wet unit	0,39	0,57	1,28
Disinfection barrier	0,15	0,18	0,18
Disinfection barrier	0,15	0,18	0,18
Maintenance station	0,15	0,16	0,16
Fire department	0,15	0,16	0,16
Poultry house №1	1,54	5,54	52,18
Poultry house №2	1,54	5,54	52,18
Poultry house №3	1,54	5,54	52,18
Poultry house №4	1,54	5,54	52,18
Poultry house №5	1,54	5,54	52,18
Poultry house №6	1,54	5,54	52,18
Poultry house №7	1,54	5,54	52,18
Poultry house №8	1,54	5,54	52,18
Poultry house №9	1,54	5,54	52,18
Poultry house №10	1,54	5,54	52,18
Poultry house №11	1,54	5,54	52,18
Poultry house №12	1,54	5,54	52,18
Poultry house №13	1,54	5,54	52,18
Poultry house №14	1,54	5,54	52,18
Poultry house №15	1,54	5,54	52,18
Poultry house №16	1,54	5,54	52,18
Poultry house №17	1,54	5,54	52,18
Poultry house №18	1,54	5,54	52,18
Poultry house №19	1,54	5,54	52,18
Poultry house №20	1,54	5,54	52,18
Total:	37,76	121,33	1184,83

Table 3. The total use of water

Consumer	Water use			
	l / s	m ³ /hour	m ³ /day	m ³ /year
Rearing flocks area	19,80	61,63	515,79	188263,35
Commercial poultry area	56,64	182,00	1777,25	648696,25
Total:	76,44	243,63	2293,04	836959,60

For disposal of household and industrial waste the company must use a ready-treatment facilities "BIOTAL-300" with capacity of 300 m³ of wastewater per day, produced by UKRBIOTAL, Ltd (Ukraine), certified in Ukraine and agreed to by the Ministry of Environment (letter number 8 / 2-4/17 as of 08.01.2002, a positive conclusion of the public health expertise № 5.10/586 as of 10.01.2002.), located in the rearing flocks area. After the sewage system the water is discharged into the Verovschyna river.

Key performance indicators of local treatment facilities BIOTAL are listed in Table 4. Local treatment facilities BIOTAL are designed in such a way that in the process of their work gradual adaptation of microorganisms of activated sludge to the wastewater pollutants is achieved. This operating system can withstand the discharge of waste water with high content of toxic pollutants for activated sludge (Synthetic Surfactants, chlorine, manganese, etc.). This allows their use for integrated biological treatment of wastewater from various farm facilities.

Table 4. Efficiency options of LTF BIOTAL

Index	Value before and after treatment	
	Input	Output
pH, units	9,0	7,1
XCK, мгО/л	492	49,1
Clayless salt-resistant drilling mud₂₀, (CSRDM) mgO₂/l	350	6,8
NH₄	19,1	0,24
Suspended solids	500	6,9

Local treatment facilities (LTFs) are fully automated and controlled by the controller of the company MITSUBISHI (Japan). Treatment plant is equipped with an activated sludge sensor, which at the end of each detention cycle automatically checks the level of an activated sludge in the system and by exceeding the specified level sends an automatic command to remove the excess activated sludge in to the sludge storage tank.

Sewage waters after the local treatment facilities are discharged into the existing field of underground filtration of the poultry farm.

General sump that is designed to illuminate the sewage waters after the preventive treatment of the poultry houses before their discharge to the LCFs, has the following geometric dimensions: 1,4× 4,2×3,1 m. Sump requires cleaning of sediments as regularly as once in every 6 months.

8. Waste products

In the process of functioning of sewage systems there are generated three types of waste products- excess dry activated sludge, mineral sediment (sand) and process water. The water use of household sewage amounts to 175 m³/day, the water use of industrial sewage amounts to 120 m³/day.

Calculating the volume of waste products generated during sewage sanitation of household and industrial sewage systems is carried in the following way:

Sewage sanitation of household and industrial sewage systems:

In the reception tank sand is trapped in the amount (M_p , t / h) which is calculated according to the formula:

$$M_p = 10^{-6} \times C \times W \times T,$$

where C is the concentration of sand in the drain, g/m³ (105.4 g/m³) with the effectiveness of sand collection in the reception tank equal to 100%.

W - average daily wastewater flow rate, $W = 300$ m³/day.

$T = 310$ days / year.

$$M_p = 10^{-6} \times 105,4 \times 300 \times 350 = 11.09 \text{ tons / year.}$$

In the process of functioning of sewage systems there is activated sludge generated, which is periodically discharged into the sludge tank, where the detension process takes place with the subsequent removal of partially dry substance to the disposal site.

Activated sludge accumulation in the system (P_r , mg / l) is calculated according to the formula:

$$P_r = 0.8 B + 0,3 L,$$

Where B - concentration of suspended substances on the entrance to the treatment facilities(TF) (500 mg / l);

L - CSRDM_{full} of wastewater entering the TF (350 mhO₂ / l).

$$P_r = 0,8 \times 500 + 0,3 \times 350 = 505 \text{ mg / liter.}$$

Accumulating sludge has high humidity (99.2 - 99.5%) so it is directed to the sludge tank where the water content decreases to 97%. Detention duration is not less than 3 hours.

Number of dry sediment ($M_{d.s.}$ tons / year) is calculated according to the formula:

$$M_{d.s.} = B \times E \times Q / 1000 \times 1000.$$

where E - efficiency of catching of suspended substances (95%);

Q - annual wastewater volume m³/year: $Q = W \times T$

$$Q = 300 \times 350 = 105,338 \text{ m}^3/\text{year, then}$$

$$M_{d.s.} = 500 \times 0,95 \times 105338 / 1000000 = 50,03 \text{ t / year.}$$

The volume of excess sludge on the entrance to the sludge tank taking into account the humidity 99.5% ($V_{s.e.}$, m³/year) is equal:

$$V_{s.e.} = M_{d.s} \times 100 / (100-99,5) \times \rho,$$

where ρ - density of activated sludge, t/m³, $\rho = 1$ t/m³.

$$V_{s.e.} = 50,03 \times 100 / 0,5 \times 1 = 10\,006 \text{ m}^3 \text{ \ year.}$$

After detention in the sludge tank the amount of partially dry sludge ($V_{s.d.}$, m³/year) will be:

$$V_{s.d.,.} = V_{s.e.} (100-99,5) / (100-97).$$

$$V_{s.d.,} = 10,006 \times 0,5 / 3 = 1667 \text{ m}^3/\text{year.}$$

$$M_{s.d.} = V_{s.d.,} \times \rho,$$

where $M_{s.d.}$ – mass of partially dry sludge subject to removal for recycling or disposal;

$$M_{s.d} = 1667 \times 1 = 1,667 \text{ tons / year.}$$

The volume of waste water separated from the sludge ($V_{w.}$, m³), which is sent to the receiving tank is:

$$V_w = 10006 - 1667 = 8339 \text{ m}^3/\text{year.}$$

Calculations based, it follows that the quantity of waste products from the processing of industrial waste in local treatment facilities and are subject to removal in designated places for disposal is equal to:

- Sand: 11.09 tons / year;
- Excess partially dry activated sludge: 1668 tons / year;
- Residual process water: 8339 m³/year.

Concerning the treatment of such waste products, according to the "Hygiene recommendations on the use of treated wastewater and sludge from facilities BIOTAL as of 05.11.2002, № 21/4198, issued by the O.M. Marzeyev Institute of Hygiene and Medical Ecology(attached), waste products generated as a result of sewage treatment by means of LTFs can be used in agriculture for soil fertilization and irrigation, they do not harm the environment and human health, that can be attributed to the waste hazard class IV.

In this case, sand and excess activated sludge formed as a result of the LTFs operation are transported for disposal at landfills pursuant to a contract with a specialized company and in accordance with the above calculated quantities.

Excess process water, along with other treated wastewater after the LTFs, is discharged into the Verovschyna river.

When washing vehicles and containers there are two types of waste products formed such as sludge from the sump (class IV hazard) and trapped oil products from the petrol and oil well trap (class II hazard).

The calculations of these types of waste products are subject to geometric dimensions, shape of such types of equipment and number of transport that is being served at the wash. the petrol and oil well trap has a round shape with a diameter of 1 m. the trapped oil products pumping occurs 1 in every 3 months, while the estimated value of the layer of oil that has been accumulated in the well trap during the month may amount to 0.05 m. Then the volume of trapped oil products equals to:

$$V_{op} = 3,14 \times 12 \times 0,05 / 4 = 0.039 \text{ m}^3 / 3 \text{ months} = 0.16 \text{ m}^3/\text{year.}$$

The internal geometric dimensions of sump of disinfection unit is 3.8 m × 0,8 m. In cross-section the place of accumulation of suspended particles in the sump has a geometric shape consisting of a right triangle and rectangle, the area of which is

easily calculated using the known project sizes, one of which estimated the thickness of the layer of suspended particless that accumulate in the tank (0, 5 m in the deepest place of the tank). Therefore, the amount of sediment that accumulates in the sump during the month is:

$$V_s = 2,8 \times 0,5 \times 0,8 / 2 + 1 \times 0,5 \times 0,8 = 0,96 \text{ m}^3/\text{month} = 11.52 \text{ m}^3/\text{year}.$$

Biological waste products (ie, killed, wounded or discarded poultry, vet laboratory waste products) are class I hazard wastes, only specially trained personnel in strict adherence to rules of sanitary hygiene and safety is permitted to carry out the treatment. The volume of such waste products is calculated in accordance with the recommendations of Appendix A departmental standards for technological design VNTP - AIC– 04.05, Poultry enterprises. Thus, the average percentage of discarded poultry of rearing flocks livestock amounts to 4,6%.

The total number of poultry found in the area, according to the technological data of the project draft is equal to 7,6 mln heads. The number of poultry including 4,6% of discarded poultry per year is:

$$7600000 \times 4,6 / 100 = 349,600 \text{ heads}.$$

Biological waste products are sent for disposal at a specialized company under the contract on condition of strict observance of sanitary-epidemiological and environmental standards.

General sump that is designed to illuminate the sewage waters after the preventive treatment of the poultry houses before their discharge to the LCFs, has the following geometric dimensions: 1,4* 4,2 *3,1 m. Sump requires cleaning of sediments as regularly as once in every 6 months, when the volume of sediment reaches 1 / 3 of the total. Thus, the volume of waste products generated in the sump of the poultry houses, is:

$$(1.4 \cdot 4.2 \cdot 3.1) / 3 \cdot 2 = 18.228 / 3 \cdot 2 = 12.15 \text{ m}^3/\text{year}.$$

Household waste: class IV hazard, exported for disposal to landfill under contract with a specialized enterprise. Calculating the number of domestic waste is carried out according to the number of employees at the facility (density 220 kg \ m³): 0.48 m³/year × 120 people. = 12.68 tons / year.

Waste Fluorescent Lamp: Class I hazard and are transferred for disposal at a specialized company.

Storage of waste fluorescent lamps shall be fitted in accordance with the norms of handling of hazardous wastes, namely, a separate room or container that is closed are allocated for their storage, which excludes the free access of unauthorized people. Together with the lamps is kept demercurization solution that is used in case of breaking lamps. By the order of the company an official is appointed responsible for the storage and handling of hazardous waste (exhaust fluorescent lamps), which shall be briefed with an appropriate instruction for dealing with such waste in the State Department of Environmental Protection in the Kherson region., keeps records of such waste products, is responsible for their storage conditions, a limit and timely deposit for demercurization.

According to the specifications of the project draft 26,290 fluorescent lamps with capacity from 15 to 65 watts are used in the facilities. Warranty period of lamp

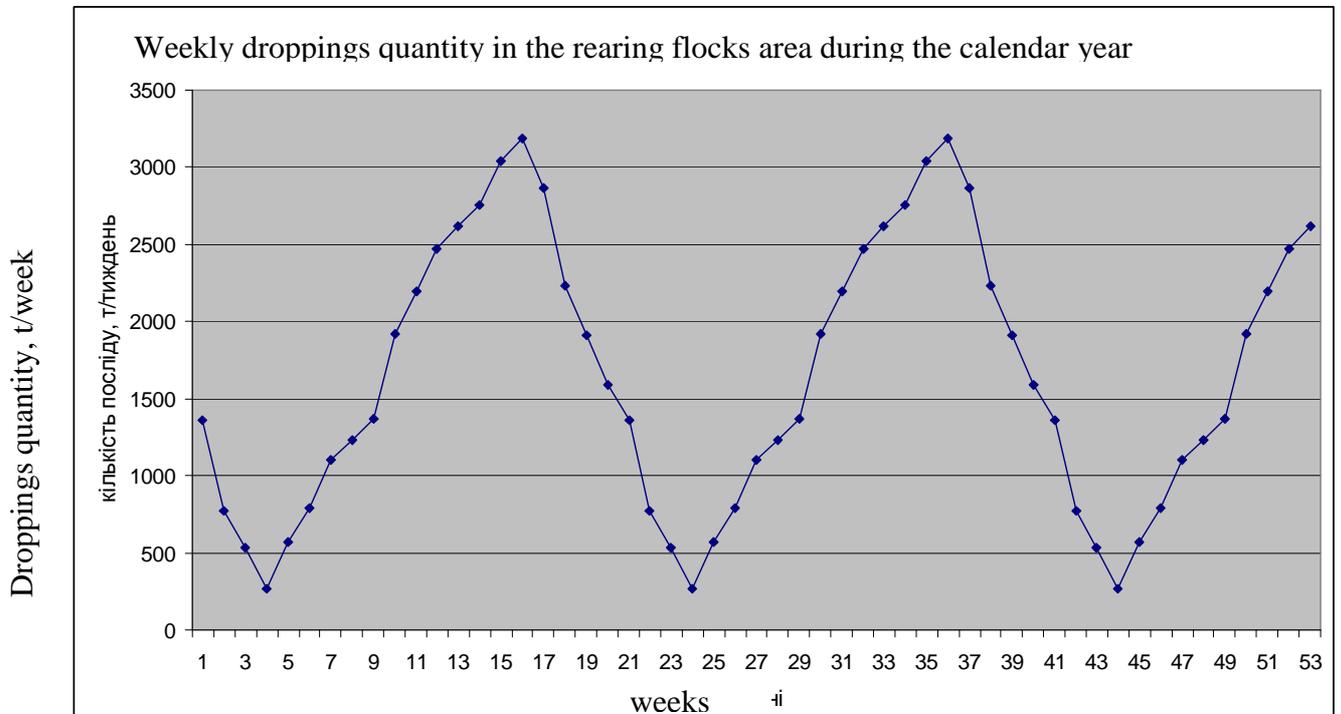
according to the specifications is 7000 hours. Given that the period of lighting in the enterprise during the year amounts to 4960 hours., each lamp needs to be replaced every two years, ie during the year the company will produce 13,145 waste fluorescent lamps.

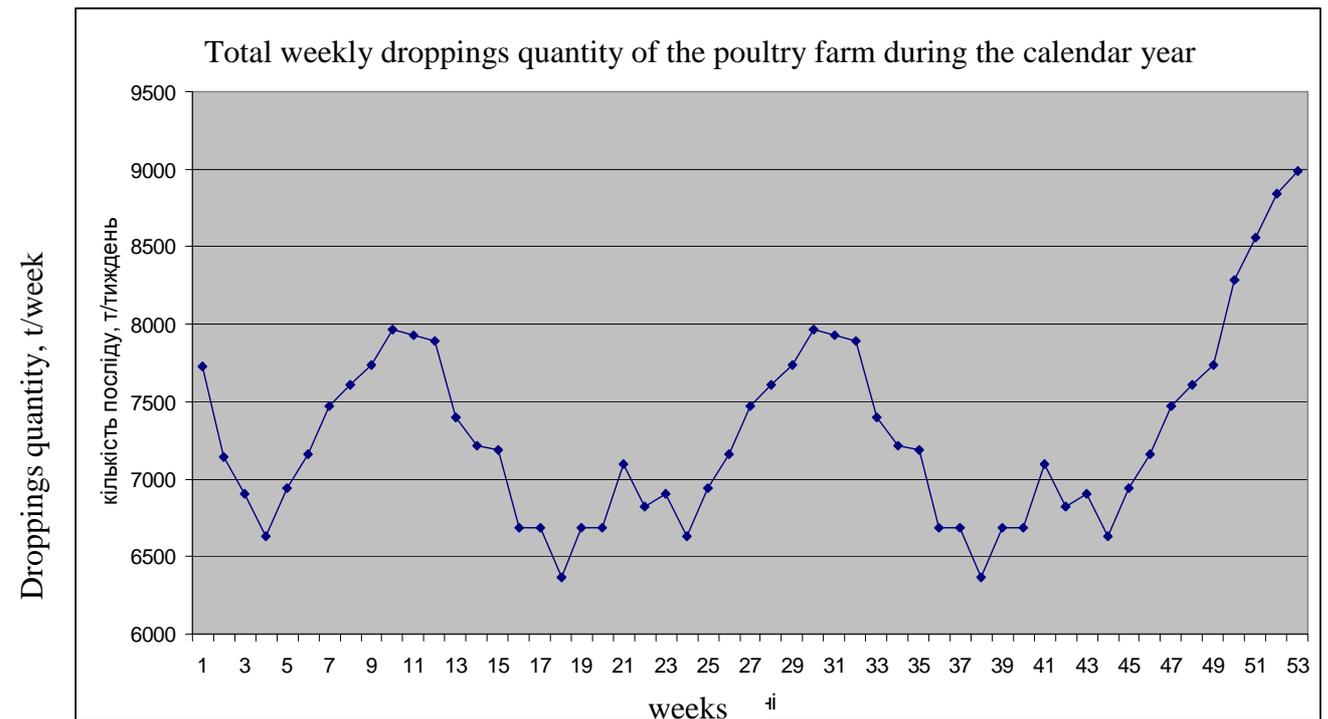
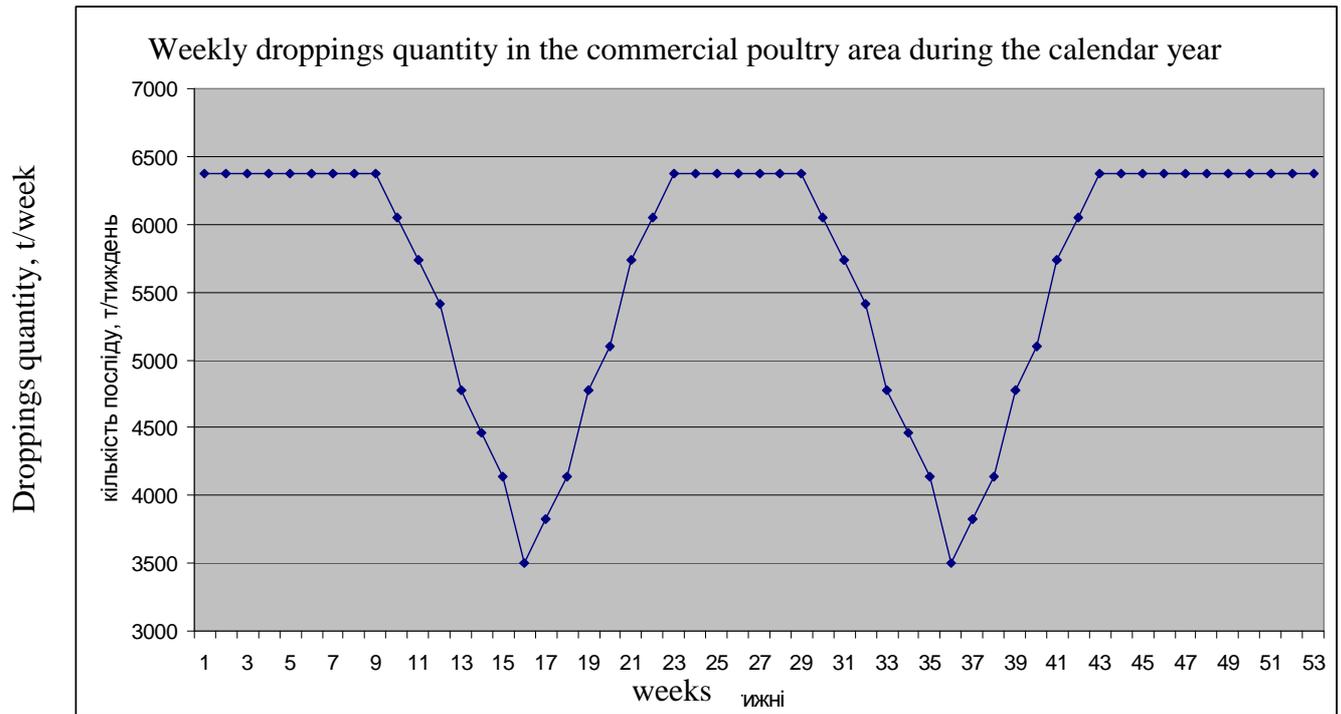
Calculations of the quantity of poultry droppings are presented in Table 5.

Table 5. Droppings output per weeks during a calendar year

Weeks	Rearing flocks, t/week	Commercial poultry, t/week	Total t/week
1	1361,36	6370	7731,36
2	768,04	6370	7138,04
3	536,9	6370	6906,9
4	262,08	6370	6632,08
5	571,48	6370	6941,48
6	791,7	6370	7161,7
7	1101,1	6370	7471,1
8	1233,96	6370	7603,96
9	1366,82	6370	7736,82
10	1916,46	6051,5	7967,96
11	2191,28	5733	7924,28
12	2475,2	5414,5	7889,7
13	2617,16	4777,5	7394,66
14	2759,12	4459	7218,12
15	3043,04	4140,5	7183,54
16	3185	3503,5	6688,5
17	2866,5	3822	6688,5
18	2229,5	4140,5	6370
19	1911	4777,5	6688,5
20	1592,5	5096	6688,5
21	1361,36	5733	7094,36
22	768,04	6051,5	6819,54
23	536,9	6370	6906,9
24	262,08	6370	6632,08
25	571,48	6370	6941,48
26	791,7	6370	7161,7
27	1101,1	6370	7471,1
28	1233,96	6370	7603,96
29	1366,82	6370	7736,82
30	1916,46	6051,5	7967,96
31	2191,28	5733	7924,28
32	2475,2	5414,5	7889,7
33	2617,16	4777,5	7394,66
34	2759,12	4459	7218,12
35	3043,04	4140,5	7183,54
36	3185	3503,5	6688,5
37	2866,5	3822	6688,5
38	2229,5	4140,5	6370
39	1911	4777,5	6688,5
40	1592,5	5096	6688,5

41	1361,36	5733	7094,36
42	768,04	6051,5	6819,54
43	536,9	6370	6906,9
44	262,08	6370	6632,08
45	571,48	6370	6941,48
46	791,7	6370	7161,7
47	1101,1	6370	7471,1
48	1233,96	6370	7603,96
49	1366,82	6370	7736,82
50	1916,46	6370	8286,46
51	2191,28	6370	8561,28
52	2475,2	6370	8845,2
53	2617,16	6370	8987,16
Total per year/t	86753,94	299390	386143,94





As it is seen from the calculations the poultry droppings quantity is 386,143.94 tons / year.

Poultry droppings, daily derived from laying hens and rearing flocks, is unloaded on tractor trailers and regularly taken out to the farms of the Kherson region, respectively entered into agreements with them. Before the removal of the droppings an obligatory laboratory control with sanitary and microbiological research on the presence of pathogenic microorganisms and helminth eggs is carried out. If they are found it is necessary to hold disinfection and dehelminthization of the droppings. In many farms of Kherson region have survived sectional dung-yards and open areas for droppings composting. Thus, chicken droppings is transported to the

repositories and platforms, where it is prepared for the use as an organic fertilizer with the permission of the sanitary and other control services. Decontamination is carried out by droppings composting in heaps (with filler - straw). The term of disinfection - 6 months, of which 2-3 months should fall on the warm season. Piles are formed on the water-resistant coating up to 2 m. Piles are covered with soil or ready 20-40 cm thick compost. Compost in which any pathogens and eggs of helminths will be detected may be used as fertilizer. The method of composting poultry droppings in agricultural areas is adopted as a temporary option. As a separate project is being developed a plant processing poultry droppings into biogas, which produce biogas and disinfected organic fertilizers by means of microbiological processing of poultry droppings by anaerobic digestion.

In addition, a separate project will include construction of biogas plant which will be processing chicken droppings into biogas, which is to produce electricity in the indicative amount of 50 million kWh per year, meanwhile recycling up to 80% of poultry droppings. EIA for biogas plants will be developed separately, taking into account the placement of the poultry farm.

It should be noted that such a complex construction of poultry farm, using waste products and producing 50 million. kWh per year significantly reduces greenhouse gas emissions and thus meets the modern international standards of ecology.

Rainwater, which is going to storm sewers from the territory of poultry farms will be almost up to 100% used in the biogas plant technology.

Table 6. Volumes of waste products

Name of waste products	Class hazard	Quantity	Measurement units	Utilization area
Poultry droppings	IV	386 143,94	t/year	agricultural enterprises for use as organic fertilizer
Household waste products	IV	12, 68	t/year	landfill
Waste fluorescent lamps	I	262 90	шт.	disposal at a specialized company
Excess dry activated sludge	IV	166 7	t/year	landfill
Sand	IV	11, 09	t/year	landfill
Excess process water	IV	833 9	m ³ /year	Existing drainage and filtration system of the poultry house
Oil products	II	0,1 6	m ³ /year	disposal at a specialized company
Sediments in the sump of the disinfection post	IV	11, 52	m ³ /year	landfill
Biological waste products	I	349	шт.	disposal at a

	(discarded poultry)		600	ads	specialized company
0	Sediments in the sump of the poultry houses	IV	12, 15	m ³ /year	landfill

9. Characteristic of enterprise influence on the soils, microclimate, flora and fauna, reserve objects

Erecting buildings of project enterprise soil upper fertile stratum will be taken off and removed for recultivation of existing lands of agricultural purpose in Bilozers'kyi district of Kherson region and which will be used for agricultural crops cultivation.

The amount of soil fertile stratum removed during erecting is calculated according to the areas of buildings, edifices, parking places, passages, pavements and projects sites planned for building with the total area in 68849 m². Then the amount of soil fertile stratum removed during erecting is:

$$117532 \times 0,1 = 11753 \text{ m}^3.$$

As far as soil fertile stratum will be further used appointedly it is possible to make conclusions that there will not be any loss of soil fertile stratum during erecting.

The development of unfavourable processes (erosion, landslips, abrasion) is absent.

Technological pollution of soils by dangerous substances is absent.

At the enterprise waste products of production and consumption are produced.

The enterprise ensures the absence of solid and liquid waste products influence on the geological environment, microclimate, water environment, flora and fauna, reserve objects.

Active and extensive influence of project activity on microclimatic conditions is absent, significant thermal pollution; evaporation on a vast scale is absent. The sources of electromagnetic, ionizing radiation, noise at the enterprise are absent.

Negative influence of agricultural activity and erecting process is within permissible limits.

Demolition of green plantations will not take place. The objects of nature reserve fund, territories perspective for reserve objects organization within enterprise influence are absent.

10. Characteristic of social environment and assessment of the influence on it

According to the state sanitary rules No173 dated 19.06.1996 enterprise with technological processes; detected sources of pollutant emission into the environment should be separated by means of sanitary- protecting area. According to the given classification SZZ of poultry farms with 5 million of hens with eggs laying capacity comprises 1200 m, which is entirely followed in the north, west and east. From the

north sanitary-protective area is reduced to 900 m, since at this distance there is Skhidne village. Such reduction is possible according to the rules of the State sanitary planning and house system of inhabited settlements, ratified by the Order Ministry of health care of Ukraine N0173 dated 19.06.1996, since the calculation of low-level concentrations is dispersed to the values of HDK at the distance in 600 m.

Negative influence of the enterprise, influence of junctures on the conditions of population vital activity is absent.

The calculation made of low-level concentrations of harmful substances caused by the enterprise influence has shown that the concentration of pollutants on the low-level stratum of atmosphere is within HDK.

New projected power of poultry farm give possibility to create new working places for Bilozers'kyi district citizens.

11. Evaluation of environmental pollution, determination of the hazardous level of enterprise

For determination of hazardous level of enterprise the coefficient of combined effect (CCE) is used which reveals the nature of joint action of simultaneously present in the atmosphere pollutants (summation, strengthening, weakening or independent action). Digital value of CCE is determined by experimental or calculation method and is displayed in shares of individual GDK of pollutants.

Concentrations at the borders of sanitary protective zones are within limits.

According to DSP-201-97:

$$CCE = \sqrt{n} = MPP$$

$$\sum PI = \frac{\tilde{N}}{MPC}$$

where:

- C – actual or projective concentration of the matter in mg/m³;
- MPP – indicator of maximum permissible atmosphere pollution;
- n – number of pollutants present at the atmosphere for which the nature of combined effect is not set officially
- MPC – value of maximum permissible concentration of this matter , mg/m³.

In our case n=9, as calculation of pollutant dispersion was carried out for 9 matters (nitrogen dioxide, carbon oxide, hydrocarbon, soot, anhydride sulfide, ammonia, hydrogen sulfide, methane, suspended solid matters).

$$CCE = \sqrt{9} = 3 = MPP$$

Evaluation of atmosphere pollution is carried out with account of multiplicity of pollution indicators exceeding their standard value and includes determination of the level of pollution (permissible, non-permissible) and its hazardous level: safe, low hazardous, medium hazardous, hazardous, very hazardous) according to the table:

Hazardous level	Multiplicity of MPC exceeding	Percentages of cases of MPC exceeding
Safe	<1	
Low hazardous	>1-2	>0-4
Medium hazardous	>2-4,4	>4-10
Hazardous	>4,4-8	>10
Very hazardous	>9	>25

Aggregative indicator of pollution $\sum PI$ by mixture of matters is calculated by the formula:

$$\sum PI = C_1/(MPC_1 \times K_1) + \dots + C_n/(MPC_n \times K_n), \text{ where}$$

C_1, C_n – value of matter concentration, contained in the mixture (mg/m^3);

MPC_1, MPC_n – value of maximum permissible concentrations of the corresponding pollutants, contained in the mixture (mg/m^3);

K_1, K_n – value of coefficients which take into account the hazardous class of the corresponding matters: (1 class of hazard – 0,8; 2 class – 0,9; 3 class – 1,0; 4 class – 1,1).

$$K_p = \sum PI / CCE,$$

$$K_p = 1,64/3 = 0,547.$$

Hazardous level of enterprise – safe.

12. Environmental Impact Assessment

12.1 Grounds for EIA.

Working project “Environmental impact assessment” is developed in accordance with existing norms, rules, regulations and government standards, including on labor protection and fire safety.

EIA – is an estimation of the nature and degree of danger of all potential hazards of impact on the environment of economic activity and assessment of environmental, social and economic consequences.

EIA is developed in order to prevent environmental degradation, rehabilitate damaged as a result of the previous economic activity natural systems, ensuring of ecological and economic equilibrium of economic development, creation of favorable living conditions, provide for measures that reduce the environmental hazards of industrial activity.

The project is made in accordance with DBN A 2.2.-3-2004 “Structure. Order of development, arrangement and approval of project documentation for construction” and DBN A 2.2.-1-2003 “Structure and content of materials of Environmental Impact Assessment (EIA) in the design and construction of plants, buildings and structures.”

This chapter is developed to build a poultry factory on 5 million laying hens at the address: Kherson region, Bilozerskyi district, Skhidne village.

The EIA is made in accordance with:

- Law of Ukraine “On protection of atmospheric air”;
- Law of Ukraine “On Environmental Protection”;
- Law of Ukraine “On ecological expertise”;

- Law of Ukraine “On Waste”;
- Water Code of Ukraine;
- Land Code of Ukraine;
- State sanitary regulations of protection of atmospheric air of population centers from pollution with chemical and biological agents. DSP 201-97 MH of Ukraine № 201 of 09.07.1997;
- technical terms and technological solutions adopted in the project;
- conclusions of the project of plot of land removal;
- general plan;

The goal of the EIA chapter is the environmental grounding of the expediency of the design activity and the ways of its implementation and compliance with environmental safety. The project is developed to build a new facility in order to produce foodstuffs, the arrangement of new working positions and meet the needs of the population.

2.12 The negative impact in the reconstruction of the facility on environment and geologic environment.

Developed project provides for the progressive and modern methods of construction, which decrease the negative impact by reducing the time of construction. Predicted impact is not durable, the area of influence is limited with boundaries of the allotted plot of land. Negative impacts on geological environment, namely, landslides, avalanches, erosion do not occur.

12.3 Characteristics of environment and assessment of effect on it

Impact on the air is determined on the basis of initial data, measures and calculations made in this chapter.

The calculation of concentrations of pollutants thrown out into the air, is made by the computer software.

Designed for use poultry equipment ensures no accidental emissions into the air. Equipment does not cause excess negative environmental impact during operation of the equipment in accordance with technological requirements.

There is no possibility of an emergency occurring.

The mentioned plot of land doesn't border with projects of nature-reserved fund (NRF). Exceed of the standards of maximum admissible emissions of pollutants does not occur accordingly a negative impact on projects of NRF, flora and fauna within admissible standards.

4.12 Measures to ensure proper environmental and ecological safety

To ensure a normative state of environment that meets the current environmental standards, it is necessary to follow the existing state control over the environment.

The measures of providing with normative state of the environment and the system of state control include:

- recurrent maintenance of equipment;
- control over the construction works;

- control of the sanitary-epidemiological supervision over following the sanitary norms;
- control by the state fire supervision over the execution of fire safety rules;
- control of the state environmental bodies for following the technology, standards of HDV, state of the air during unfavourable weather conditions.

13. Impacts on environment

In the process of construction designed facility affects the environment within admissible standards. When operating of poultry factory will impact on the air within the HDV standards.

13.1 The obligation of conducting the planned activities in accordance with environmental requirements

The customer provides trouble-free operation of the facility in accordance with the rules and regulations of worker safety, industrial sanitary and environmental protection, for which he bears responsibility in the manner determined by current legislation.

13.2 Conclusions

Normative state of the environment should be achieved through:

- use of equipment and machinery in accordance with technological regulations;
- conducting of recurrent service and technical adjustment of gas equipment;
- conducting of recurrent service and technical adjustment of technological lines;
- introduction of modern production technologies in all technological districts of the factory;
- by means of state control over following the requirements of current legislation on environmental protection, public health, worker safety and fire safety.

As a result of realization of planned measures excess environmental impact is not expected that will ensure environmentally safe operation of the facility.

Attachments:

Appendix 1. The task on calculation.

Appendix 2. Output data for calculation

Appendix 3. The feasibility of calculating ground concentrations of relevant substances

Appendix 4 Description of emission sources

Annex 5. Characteristics of pollutants

Annex 6. Summation Group 3 (Ammonia and Hydrogen Sulfide)

Annex 7. Summation Group 30 (Sulfur Anhydrides and Hydrogen Sulfide)

Appendix 8. Summation Group 31 (Hydrogen Sulfide and Sulfur Anhydrides)

Annex 9. Substance 301 (Nitrogen dioxide)

Annex 10. Substance 303 (Ammonia)

Annex 11. Substance 328 (Soot)

Annex 12. Substance 330 (Sulfur Anhydrides)

Annex 13. Substance 333 (Hydrogen Sulfide)

Annex 14. Substance 337 (Carbon Monoxide)

Annex 15. Substance 410 (Methane)

Annex 16. Substance 2754 (Saturates C12-S19)

Annex 17. Substance 2902 (Substances in the form of suspended solid particles)

Annex 18. Maps of ground concentrations

Annex 19. Source data & Certificates