GOVERNMENT OF GEORGIA

ORDINANCE No 408

31 December 2013

Tbilisi

On Approval of Technical Regulations for Calculating Threshold Limit Values of Emission of Harmful Substances into the Ambient Air

On the basis of Articles 58(2) and 103(1) of the Product Safety and Free Movement Code of Georgia, and Articles 12 and 25 of the Law of Georgia on Normative Acts,

Article 1 -

The attached Technical Regulations for Calculating Threshold Limit Values of Emission of Harmful Substances into the Ambient Air shall hereby be approved.

Article 2 -

Order No 56 of 8 August 2013 of the Minister of the Environment and Natural Resources Protection of Georgia on the Approval of the Method for Calculating Threshold Limit Values of Emission of Harmful Substances into the Ambient Air shall hereby be repealed.

Article 3 -

The Ordinance shall enter into force as of 1 January 2014.

Prime Minister **Irakli Gharibashvili**

Technical Regulations for Calculating Threshold Limit Values of Emission of Harmful Substances into the Ambient Air

Article 1 - Scope of regulation of the Technical Regulations

The Technical Regulations regulate legal relations between the Ministry of Environment and Natural Resources Protection of Georgia, appropriate agencies of the Autonomous Republics of Ajara and Abkhazia and natural and legal persons (irrespective of the ownership and legal status).

Article 2 - Goals and objectives of the Technical Regulations

1. The purpose of the Technical Regulations is to develop a method for calculating threshold limit values of emission of harmful substances into the ambient air in order to prevent its adverse effects on human health and environment.
2. The objective of the Technical Regulations is to identify and regulate qualitative and - quantitative properties of harmful substances emitted from the stationary sources of pollution of ambient air.

Article 3 - Definitions of basic terms

The terms used in the Technical Regulations have the following meanings:
a) ambient air – air of the atmospheric shell, except for the air inside buildings;
b) harmful substance – any substance emitted into ambient air as a result of human activities, which adversely affects or may adversely affect human health and the natural environment;
c) ambient air pollution – change of the composition of ambient air due to the presence of harmful substances in it;
d) threshold limit values of concentration of harmful substances in the ambient air – a time-averaged ceiling level of harmful substances in the ambient air, the periodic or lifetime - exposure to which does not have an adverse effect on human health and generally on the environment;
e) average 24-hour threshold limit value of concentration of harmful substances in the ambient air – the concentration of harmful substances in the ambient air, which is calculated by averaging the concentration values of the samples taken within 24 hours;
f) single ceiling exposure concentration of harmful substances in the ambient air – maximum concentration of harmful substances in the ambient air, calculated according to the values of concentration in single samples taken at 20-30 minute intervals;
g) threshold limit value of emission of harmful substances into the ambient air – the established amount of emission of harmful substances into the ambient air from a stationary source of pollution, which is calculated on condition that the concentration of harmful substances emitted from this source together with other sources of pollution does not exceed the limit values of concentration of harmful substances in the surface layer of ambient air established for the territory effected by this source.

Article 4 - General requirements regarding the Technical Regulations for Calculating Threshold Limit Values of Emission of Harmful Substances into the Ambient Air

1. The criteria for determining threshold limit values of emissions ('TLVE') of harmful substances into the ambient air shall be the threshold limit values of concentration ('TLVC') of harmful substances into the ambient air.
2. The TLVE shall be determined by taking into consideration the production development potential, physical and geographic and climate conditions of the location, dispersion of harmful substances in the ambient air, background concentrations created by other enterprises, the relative locations of existing and planned residential buildings, child care centres, schools, higher education institutions, sport centres, parks, public curative and preventive treatment and recreational institutions, public catering facilities, airports, airfields and railway stations.
3. The TLVE shall be determined for all stationary sources of ambient air pollution (facilities), whose activities are subject to ecological examination. The TLVE shall be determined for a term of five years for each source of ambient air pollution and for each harmful substance.

4. The TLVE for the entire enterprise shall be calculated on the basis of the TLVE determined for each source of pollution and for each harmful substance emitted by the enterprise.
5. The TLVE shall be determined for the maximum available workload of technological equipment and for gas and dust trapping devices.
6. If an enterprise has two or more sources of pollution, the dispersion of harmful substances should be calculated electronically, and the software used for such calculation must comply with the requirements of these Technical Regulations. In the case of using a different software, it must be approved by the Ministry of Environment and Natural Resources Protection of Georgia.
7. The TLVE plan shall be prepared and signed by the operator, whose activities cause the emission of harmful substances into the ambient air from the stationary sources of pollution. The TLVE plan may be prepared by the operator independently or by a natural or legal person upon the commission of the operator, as provided for by the legislation of Georgia.
8. The TLVE plan must be approved by the Ministry of Environment and Natural Resources Protection of Georgia. In the case of enterprises located on the territories of the Autonomous Republics of Abkhazia and Ajara, the TLVE plan must be approved first by appropriate agencies of the Autonomous Republics of Abkhazia and Ajara, and then by the Ministry of Environment and Natural Resources Protection of Georgia. Without the above approved document, harmful substances may not be emitted into the ambient air from stationary sources of pollution.
9. The TLVE plan may be annulled on the basis of the application of an operator, or the substantiated argument of the body authorised to approve those documents.
10. The TLVE plan may be assigned or transferred to an authorised person in the case of assignment or transfer of a stationary source of pollution, regarding which an operator must notify in writing an appropriate body authorised to approve those documents.
11. If the capacity and/or profile of a stationary source of pollution is changed, the amount of consumed fuel is increased, the current type of consumed fuel is changed and/or additionally a new type of fuel is consumed, or new sources of release and emission of harmful substances, also gas and dust trapping devices are involved in the technological processes and/or the technical specifications of the existing devices are changed during reconstruction, the approved TLVE plan shall be considered annulled and a new plan shall be prepared and approved in accordance with the new conditions.
12. After the expiration of a five-year validity period of the TLVE plan, an operator shall prepare a new plan and ensure its approval for the next five years.
13. An operator shall be responsible for the correctness of the input data provided by an enterprise for calculating the TLVE.

Article 5 - Requirements for determining TLVE
1. The following requirements must be met for determining the TLVE:

$$\frac{C_m}{\text{ზღვ.}_m} \le 1, \text{ (5.1)}$$

where:
C_m – is the ceiling level of concentration of harmful substances calculated in the surface layer of ambient air (mg/m^3) for jointly all the sources of pollution;
TLVCm – is a corresponding single ceiling exposure concentration of harmful substances, mg/m^3;
2. In the case of presence of several harmful substances of combined impact simultaneously in the ambient air, the following requirements must be met:

$$\frac{C_{m.1}}{\text{ზღვ.}_{m1}} + \frac{C_{m.2}}{\text{ზღვ.}_{m2}} + \ldots + \frac{C_{m.n}}{\text{ზღვ.}_{m.n}} \le 1, \text{ (5.2)}$$

where:

Cm.1, *Cm.2*...*Cm.n* – are the calculated ceiling levels of concentration of harmful substances in the same zones of the surface layer of ambient air;
TLVCm1, TLVCm2 ... TLVCm.n – is a corresponding single ceiling exposure concentration of harmful substances, mg/m^3.
3. In the case of planning and implementing activities in resorts and protected areas, 1 must be replaced by 0.8 in the right part of 5.1 and 5.2 formulas.
4. For the harmful substances, single TLVC of which are not established yet, ten times the average 24-hour TLVC may be temporarily used instead.
5. If there is a background concentration (*Cf*) in the ambient air, C_m in the formula (5.1) above must be replaced by *Cm+ Cf*, and *Cm.1*, *Cm.2*...*Cm.n* in the formula (5.2) must be replaced by *Cm.1 +Cf.1*, *Cm.2 +Cf.2*...*Cm.n +Cf.n*.
6. When determining TLVE for operating enterprises and for those under reconstruction, *Cf* must be replaced by *C 'f* , which is the background concentration, and which does not contain the share of the enterprise in question.

$$C'f = Cf\left(1-0.4\frac{C_m}{C_f}\right), \text{ when } Cm \leq 2Cf \quad (5.3)$$

C 'f= 0.2Cf , when Cm >2Cf (5.4)

7. In the case of determining TLVE for the enterprises under construction:

C 'f= 0.2Cf (5.5)

8. The values of background concentration shall be established by the Legal Entity under Public Law (LEPL) - National Environmental Agency of the Ministry of Environment and Natural Resources Protection of Georgia, on the basis of the data of regular observation from the ambient air pollution monitoring stations. In the case of absence of these data, approximate values of background concentration shall be calculated according to the table given below.

Number of population, thousands of persons	**Value of background concentration, mg/m^3**			
	Nitrogen dioxide	**Sulphur dioxide**	**Carbonic oxide**	**Dust**
250-125	0.03	0.05	1.5	0.2
125-50	0.015	0.05	0.8	0.15
50-10	0.008	0.02	0.4	0.1
<10	0	0	0	0

Article 6 – Calculation of pollution caused by emission of harmful substances from individual point sources of pollution
1. Ceiling level of concentration of harmful substances in the surface layer of ambient air *Cm* (mg/m^3), which is achieved by emission of hot gas and air mixture from round branch pipes of an individual point source of pollution along the *Xm* (m) distance from this source under unfavourable meteorological conditions, is calculated with the formula:

$$Cm=\frac{AMFmn\eta}{H^2\sqrt[3]{V_1\Delta T}}, \quad (6.1)$$

where:

A – is the atmospheric temperature stratification coefficient (sec^2/3.0C1/2, mg/g), for Georgia – *A=200*;
M – the mass of harmful substances emitted into the atmosphere for a certain period of time (g/sec.). It is calculated on the basis of the threshold limit values determined for a given enterprise (processes);
F – is a dimensionless coefficient of the sedimentation rate of harmful substances in the ambient air. For gaseous harmful substances and low-dispersive aerosols (dust, ash) *F=1*; for high dispersion dust and lines - when average operational value of filtration coefficient is >90%, then *F=2*; when the value of this coefficient is within the range of 75% and 90%, then *F=2.5*; when the value of this coefficient is <75% or in the absence of filtration, then *F=3* .
H – the height of the source of emission from the surface of the ground (m).
ΔT – the difference between the temperature of the emitted gas and air mixture and the ambient air temperature (0C).
η – is a dimensionless coefficient of the impact of the relief on the dispersion of the gas and air mixture. For plain areas, where the drop height of the benchmark of the place does not exceed 50 m. per 1 km., η =1. In other cases η shall be determined on the basis of the cartographic materials, which depict the relief of the site 50 height radius of the pipe away from the enterprise, but not less than 2 km.
V1 – the consumption of gas and air mixture (m^3/sec.), which is calculated with the formula:

$$V1 = \frac{\pi D^2}{4}\omega_o , \quad (6.2)$$

where:
D – is the diameter of the branch pipe of the source of emission, (m);
wo – is an average speed of exit of gas and air mixture from the branch pipe of the source of emission, (m/sec);
m and *n* – are the dimensionless coefficients of the conditions of exit of air and gas mixture from the branch pipe of the source of emission, which are calculated with the formula:

if *f* <100, then: $m = \frac{1}{0.67 + 0.1\times\sqrt{f} + 0.34\times\sqrt[3]{f}}$ (6.3)

If *f* ≥100, then: $m = \frac{1.47}{\sqrt[3]{f}}$ (6.4)

If *fe<f<100,* then *m* coefficient is calculated with the formula (6.3), when *f=fe*.

if *f* <100 and

Vm≥2, then: *n=1* (6.5)

0.5 ≤Vm<2, then: n=0.532 Vm2-2.13 Vm+3.13 (6.6)

Vm<0.5, then: *n=4.4Vm* (6.7)

If *f*≥100, then *n* coefficient is calculated with the formulas (6.5-6.7) when *Vm=Vm*.
The parameters *f, Vm,* and *fe* are calculated with the formulas:

$$f = 1000\frac{\omega_o^2 D}{H_2 \Delta T} \quad (6.8)$$

$$V_m = 0.65 \times \sqrt[3]{\frac{V_1 \Delta T}{H}} \quad (6.9)$$

$$V_m^{'} = 1.3 \frac{\omega_o D}{H} \quad (6.10)$$

$$f_e = 800 (V_m^{'})^3 \quad (6.11)$$

2. In the case of emission of cold gas and air mixtures from the round branch pipes of individual point sources of pollution (when $f \geq 100$ or $\Delta T \approx 0$ and $V_m' \geq 0.5$) the value of *Cm* is calculated with the formula:

$$C_m = \frac{AMFn\eta}{H^{4/3}} \times \frac{D}{8V_1} \quad , \quad (6.12)$$

where:

n is calculated with the formula (6.5-6.7) for the value of $V_m = V_m'$, while if *f<100* and *Vm<0.5* or $f \geq 100$ and $V_m' < 0.5$ (in the case of minimum limit of dangerous wind speed), then:

$$C_m = \frac{AMFm'\eta}{H^{7/3}} \quad , \quad (6.13)$$

where:

$$m' = 2.86m, \text{ when } f<100, Vm<0.5 \quad (6.14)$$

$$m' = 0.9, \text{ when } f \geq 100, V_m' < 0.5 \quad (6.15)$$

3. The distance from the source of pollution, Xm (m), across which the concentration of harmful substances in the surface layer of ambient air C (mg/m^3) reaches maximum value Cm in unfavourable meteorological conditions, is calculated with the formula:

$$X_m = \frac{5-F}{4} dH \, , \quad (6.16)$$

where d - is a dimensionless coefficient, which is calculated with the formula:

if *f*<100 and

$$V_m \leq 0.5, \text{ then } d = 2.48(1 + 0.28\sqrt[3]{f_e}) \quad (6.17)$$

$$0.5 < V_m \leq 2, \text{ then } d = 4.95 V_m (1 + 0.28\sqrt[3]{f}) \quad (6.18)$$

$$Vm>2, \text{ then } d = 7\sqrt{V_m}(1 + 0.28\sqrt[3]{f}) \quad (6.19)$$

if *f*>100 and

$$V_m' \leq 0.5, \text{ then } d=5.7 \quad (6.20)$$

$0.5 < V'_m \le 2$, then $d = 11.4V'_m$ (6.21)

$V'_m > 2$, then $d = 16\sqrt{V'_m}$ (6.22)

4. Dangerous wind speed *Um* (m/sec.) at the level of wind direction indicator (10 metres above the ground), where the maximum concentration of harmful substances *Cm* is achieved, is calculated with the formula:

if *f*<100 and

$V_m \le 0.5$, then *um*=0.5 (6.23)

$0.5 < V_m \le 2$, then *um=Vm* (6.24)

Vm>2, then $u_m = V_m(1 + 0.12\sqrt{f})$ (6.25)

If $f \ge 100$ and

$V'_m \le 0.5$, then *um=0.5* (6.26)

$0.5 < V'_m \le 2$, then $u_m = u'_m$ (6.27)

$V'_m > 2$, then $u_m = 2.2V'_m$ (6.28)

5. In the case of unfavourable meteorological conditions and the wind speed *u* (m/sec.) (which is different from the dangerous wind speed *Um* (m/sec.), the maximum value of concentration of harmful substances in the surface layer of ambient air *Cm.u* (mg/m^3) is calculated with the formula:

Cm.u=rCm, (6.29)

Where r - is a dimensionless coefficient, which is calculated with the formula:

when $u/u_m \le 1$, then $r = 0.67u/u_m + 1.67(u/u_m)^2 - 1.34(u/u_m)^3$ (6.30)

when $u/u_m > 1$, then $r = \dfrac{3(u/u_m)}{2(u/u_m)^2 - u/u_m + 2}$ (6.31)

6. The distance from the source of emission *Xm.u* (m), across which the maximum concentration of harmful substances *Cm.u* (mg/m^3) is achieved in the surface layer of ambient air in the case of unfavourable meteorological conditions and wind speed *u* (m/sec.), is calculated with the formula:

Xm.u=pXm , (6.32)

Where *p* - is a dimensionless coefficient calculated with the formula:

when $u/u_m \le 0.25$, then *p*=3 (6.33)

when $0.25 < u/u_m \le 1$, then $p = 8.43(1 - u/u_m)^5 + 1$ (6.34)

when *u/um*>1, then *p*=0.32*(u/um)*+0.68 (6.35)

7. The concentration of harmful substances *C* (mg/m^3) in the surface layer of ambient air, which is achieved in the case of a dangerous wind speed *um* (m/sec.) across *x* (m) distance from the source of emission alongside the torch axle, is calculated with the formula:

$$C = S_1 C_m , \quad (6.36)$$

where *S1* - is a dimensionless coefficient, which is calculated with the formula:

when $x / x_m \le 1$, then $S_1 = 3(x / x_m)^4 - 8(x / x_m)^3 + 6(x / x_m)^2$ (6.37)

when $1 < x / x_m \le 8$, then $S_1 = \frac{1.13}{0.13(x / x_m)^2 + 1}$ (6.38)

when $F \le 1.5$ and *x/xm>8,* then $S_1 = \frac{x / x_m}{3.58(x / x_m)^2 + 35.2(x / x_m) + 120}$ (6.39)

when *F>1.5 and x/xm>8*, then $S_1 = \frac{1}{0.1(x / x_m)^2 + 2.47(x / x_m) - 17.8}$ (6.40)

For the sources of pollution of lower height, where $(2 \le H < 10)$ *x/xm<1*, the value of *S1* in the formula (6.36) must be changed with the value of *S1H*, which is calculated with the formula:

$$S_1^H = 0.125(10 - H) + 0.125(H - 2)S_1 \quad (6.41)$$

8. The concentration of harmful substances *Cy* (mg/m^3) in the surface layer of ambient air, which is achieved in the case of dangerous wind speed *u* (m/sec.) across *y* (m) distance from the source of emission in the perpendicular direction from the torch axle, is calculated with the formula:

Cy=S2C , (6.42)

where *S2* - is a dimensionless coefficient, which is calculated with the formula:

$$S_2 = \frac{1}{(1 + 5t_y + 12.8t_y^2 + 17t_y^3 + 45.1t_y^4)^2} , \quad (6.43)$$

where:

when $u \le 5$, then $t_y = \frac{uy^2}{x^2}$ (6.44)

when *u>5*, then $t_y = \frac{5y^2}{x^2}$ (6.45)

9. Maximum concentration of harmful substances *Cm.x* (mg/m^3), which is achieved in the case of wind speed *um.x* (m/sec.) from the source of emission alongside the torch axle, is calculated with the formula:

$$C_{m.x} = S_1' C_m , \quad (6.46)$$

where S_1' - is a dimensionless coefficient, which is calculated with the formula:

when $x/x_m \le 1$, then $S_1' = 3(x/x_m)^4 - 8(x/x_m)^3 + 6(x/x_m)^2$ (6.47)

when $1 < x/x_m \le 8$, then $S_1' = \frac{1.1}{0.1(x/x_m)^2 + 1}$ (6.48)

when $8 < x/x_m \le 24$, then $S_1' = \frac{2.55}{0.13(x/x_m)^2 + 9}$ (6.49)

when $24 < x/x_m \le 80$ and $F \le 1.5$, then $S_1' = \frac{x/x_m}{4.75(x/x_m)^2 - 140(x/x_m) + 1435}$ (6.50)

when $24 < x/x_m \le 80$ and *F>1.5*, then $S_1' = \frac{2.26}{0.1(x/x_m)^2 + 7.41(x/x_m) - 160}$ (6.51)

when *x/xm>80* and $F \le 1.5$, then $S_1' = \frac{x/x_m}{3.58(x/x_m)^2 - 35.2(x/x_m) + 120}$ (6.52)

when *x/xm>80* and *F>1.5*, then $S_1' = \frac{1}{0.1(x/x_m)^2 + 2.47(x/x_m) - 178}$ (6.53)

The wind speed *um.x* is calculated with the formula:

$$um.x = f1\,um , \quad (6.54)$$

where *f1* - is a dimensionless coefficient, which is calculated with the formula:

when $x/x_m \le 1$, then *f1=1* (6.55)

when $1 < x/x_m \le 8$, then $f_1 = \frac{0.75 + 0.25(x/x_m)}{(x/9x_m)^9 + 1}$ (6.56)

when $8 < x/x_m \le 80$, then *f1=0.25* (6.57)

when $x/x_m \ge 80$, then *f1=1* (6.58)

10. In the case of emission of harmful substances from a source of pollution with a rectangular branch pipe, the pollution of the ambient air is calculated with the above formulas, only for the values of the average speed of exit of gas and air mixture into the ambient air (ω_o, m/sec.),

effective diameter of the branch pipe ($D=D_{eff}$, m) and effective exit flow of gas and air mixture into the ambient air for a certain period of time ($V1=V1._{eff}$, m^3/sec.):

$$\omega_0 = \frac{V_1}{LB} \qquad (6.59)$$

$$D_{eff} = \frac{2LB}{L+B} \qquad (6.60)$$

$$V_{1.eff} = \frac{\pi D^2_{эф}}{4}\omega_0 , \qquad (6.61)$$

Where L – is the length of a branch pipe (m), and B – is the width of a branch pipe (m).

11. For each source of pollution the radius of the zone of exposure is calculated as the longest of the two distances *x1* and *x2* from the source of pollution, where *x1=10xm,* and *x2* is the distance from the source of pollution, started for which $C \le 0.05$ TLVC.

Article 7 – Calculation of pollution caused by emission of harmful substances from a line source of pollution

1. Maximum concentration of harmful substances *Cm* (mg/m3), which is achieved when the wind's direction is along the line source of pollution with *L* length (e.g. aerator flashlight) across *Xm* distance from that source, also the *Xm* distance, are calculated with the formula:

$$C_m = S_3 C'_m \qquad (7.1)$$

$$X_m = L/2 + S_4 X'_m , \qquad (7.2)$$

Where C'_m and X'_m - are deemed equal to the values of *Cm* and *Xm*, which correspond with individual point sources of pollution, in the case of the same emission capacity *M*, D_{eff} diameter of the round branch pipe and $V1._{eff}$ flow of emitted gas and air mixture. Also:

$$D_{eff} = \frac{2LV_1}{L^2\omega_0 + V_1} \qquad (7.3)$$

S3 and *S4* – are dimensionless coefficients, which are calculated with the formulas:

$$S_3 = \frac{1 + 0.45\dfrac{L}{X'_m}}{1 + 0.45\dfrac{L}{X'_m} + 0.1\left(\dfrac{L}{X'_m}\right)^2} \qquad (7.4)$$

$$S_4 = \frac{1}{1 + 0.6\dfrac{L}{X'_m}} \qquad (7.5)$$

The dangerous wind speed *um* is calculated with the formula:

$$u_m = u'_m \qquad (7.6)$$

2. The concentration of harmful substances *C* (mg/m^3) which is achieved across *Xm*distance from the line source of pollution, in the case of the wind speed *um* (m/sec.) alongside this source, is calculated with the formula:

$$C = (S'_5 - S''_5) X'_m C'_m / L, \quad (7.7)$$

When $u \neq u_m$, the value of *C* is calculated with the formula:

$$C = pr(S'_5 - S''_5) X'_m C'_m / L, \quad (7.8)$$

Where *r* and *p* are calculated with the formulas (6.30-6.35) for the value of u/u'_m, while S'_5 and S''_5 - accordingly for the values of $\frac{2X+L}{2pX'_m}$ and $\frac{2X-L}{2pX'_m}$.

C'_m and X'_m are calculated according to paragraphs 1 and 6 of this article.

3. Maximum concentration of harmful substances *Cm* (mg/m^3) when the wind speed is along the direction of the line source of pollution u'_m (m/sec.), is calculated with the formula:

$$C_m = \varepsilon_1 C'_m, \quad (7.9)$$

where ε_1 - is a dimensionless coefficient, which is calculated with the formulas:

When $a \leq 0.255$, then $\varepsilon_1 = 0.923a$ (7.10)

When $0.225 < a \leq 2.32$, then $\varepsilon_1 = 1.13a^2/(a+0.3)^2$ (7.11)

When *a>2.32*, then $\varepsilon_1 = a^2/(a^2+0.7)$, (7.12)

where:

$a = \frac{X'_m}{L\sqrt{u'_m}}$, when $u'_m \leq 5$ (7.13)

$a = 45\frac{X'_m}{L}$, when $u'_m > 5$ (7.14)

The distance from the line source of pollution *Xm* (m), across which the maximum concentration of harmful substances *Cm* (mg/m^3) is achieved, is calculated with the formula:

$$X_m = \varepsilon_2 X'_m, \quad (7.15)$$

where:

When $a \leq 0.25$, then $\varepsilon_2 = 3$ (7.16)

When $0.25 < a \leq 2.25$, then $\varepsilon_2 = \frac{1.5}{\sqrt{a}}$ (7.17)

When a>2.25, then $\varepsilon_2 = 1$ (7.18)

4. The concentration of harmful substances C (mg/m^3), which is achieved across X distance from the centre of the line source of pollution when the wind speed u (m/sec.) is perpendicular to the longitudinal axis of this source, is calculated with the formula:

$$C = S_1 S_6 r C'_m \quad (7.19)$$

The concentration of harmful substances Cy (mg/m^3), achieved across y (m) distance from the axle of the torch, is calculated with the formula:

$$C_y = \frac{rS_1}{2}\left[\left(1+\frac{2y}{L}\right)S'_6 + \left(1-\frac{2y}{L}\right)S''_6\right]C'_m, \quad (7.20)$$

where $S1$ - is a dimensionless coefficient, which is calculated with the formulas (6.37-6.41) for the value of x/px'_m :

S_6 , S'_6 , S''_6 – are dimensionless coefficients, which are calculated with the formula (7.21), depending on the values of L (m), $(2y+L)$ (m) and $(2y-L)$ (m), respectively:

$$S_6 = 0.57g\left[1-\frac{1}{\left(1+\frac{0.44}{g}+\frac{0.58}{g^2}+\frac{0.49}{g^4}\right)^4}\right], \quad (7.21)$$

where:

when $u \le 5$, then $g = \frac{x}{L}\sqrt{u}$ (7.22)

when $u > 5$, then $g = 0.45\frac{x}{L}$ (7.23)

If $g > 6.74$, the value of $S6$ is equal to 1.

5. In the case of any direction of the wind in relation to the line source of pollution (aerator flashlight), this source is conditionally considered as the group of N similar, equally remote point sources. For each of those point sources the maximum concentration of harmful substances Cm (mg/m^3), the corresponding Xm (m) distance and dangerous wind speed um (m/sec.) is calculated with the formula:

$$C_m = C'_m / N \quad (7.24)$$

$$X_m = X'_m \quad (7.25)$$

$$u_m = u'_m, \quad (7.26)$$

Where *N* – is the number of similar, equally remote point sources of pollution, which is calculated with the formula:

$$N = \frac{5L\sqrt{u}}{X}, \qquad (7.27)$$

where:

X - is the shortest distance from the aerator flashlight to the reference point of the site (m);
y - is the reference wind speed.
6. For similar, equally remote point sources of pollution, the concentration of harmful substances in the surface layer of ambient air is calculated with the same formulas, as for aerator flashlights, however for the calculation of the values of C'_m , X'_m and u'_m the average values of *D* and *V1* will be used instead of the values of D_{eff} and $V1._{\text{eff}}$, as it was characteristic of the individual point sources of pollution.

Article 8 – Calculation of pollution caused by emissions of harmful substances from groups of sources of pollution and area sources of pollution
1. For *N* sources of pollution, the concentration of harmful substances in the surface layer of ambient air *C* (mg/m^3) at any point of the site is determined as the sum of concentrations of harmful substances for the values of the given wind direction and the speed from each source of pollution:

$$C = C_1 + C_2 + \ldots + C_N, \quad (8.1)$$

Where $C_1 + C_2 + \ldots + C_N$ – is the concentration of harmful substances from the first, second and *N* sources of pollution, respectively.

2. The value of the maximum aggregate concentration of harmful substances, caused by *N* individual sources of pollution located on a given area near each other, which have similar height, branch pipe diameter, speed and temperature of exit of gas and air mixtures into the atmosphere, is calculated with the formula:

$$C_m = \frac{AMFmn\eta}{H^2} \times \sqrt[3]{\frac{N}{V\Delta T}}, \quad (8.2)$$

where *M* – is the aggregate mass of harmful substances emitted into the atmosphere from all sources of pollution for a certain period of time (g/sec.);
V – is the aggregate flow of gas and air mixture emitted into the atmosphere from all sources of pollution (m_3/sec.), which is calculated with the formula:

$$V = V_1 N \qquad (8.3)$$

The value of *Vm* parameter is calculated with the formula:

$$V_m = 0.65 \times \sqrt[3]{\frac{V\Delta T}{NH}} \qquad (8.4)$$

In all other cases, the calculation of concentration of harmful substances for the group of similar individual sources of pollution, located near each other, does not differ from the

calculation of concentration of harmful substances in the surface layer of ambient air for individual sources of pollution given above.
3. In order to reduce the volume of calculations, the group of a large number of similar sources of pollution is considered as an area source of pollution. For each of those individual point sources of pollution, the values of maximum concentration of harmful substances in the surface layer of ambient air *Cm* (mg/m^3), *Xm*(m) distance and dangerous wind speed *um* (m/sec.) are calculated with the formulas:

$$C_m = C_m'' / N \qquad (8.5)$$

$$X_m = X_m'' \qquad (8.6)$$

$$u_m = u_m'', \qquad (8.7)$$

Where C_m'' , X_m'' and u_m'' – are the values of *Cm* , *Xm* and *um* calculated for each individual point source of pollution (the combination of which constitutes the area source of pollution).
N – is the combination of similar equally remote individual point sources of pollution, which is calculated with the formula:

$$N = \frac{25 S_{\text{ց}} u}{L_{\text{ց}}^{\ 2}}, \qquad (8.8)$$

where:
S_{d} – is the area of the given source of pollution (m^2);
L_{d} – is the distance from the centre of the area source of pollution to the reference point (m);
u - is the reference wind speed.

Article 9 - Calculation of minimum height of the sources of emission
1. If M(g/sec.), W0(m/sec.), V1(m^3/sec.), D(m) and $\Delta T \approx 0$ are determined, the minimum height of a single source of emission (a pipe) H(m) is calculated with the formula:

$$\mathrm{H} = \left[\frac{\mathrm{AMFD\eta}}{8\mathrm{V1}(\text{ցջ} - \mathrm{C\text{ց}})} \right]^{\frac{3}{4}} \qquad (9.1)$$

2. If Vm′$\geq$2, calculated with (9.10) formula, corresponds to the value of H, calculated with (9.1) formula, the value of H shall be final.
3. If Vm′<2, it is necessary that n=n1 for the value of H=H1 according to (6.5, 6.6, 6.7) formulas, and to determine H=H2 with consecutive estimation with H1and n1; H=Hi+1 with Hi and ni, with the following formula:

$$\mathrm{H_{i+1}} = \mathrm{H_i} \left(\frac{\mathrm{n_i}}{\mathrm{n_{i-1}}} \right)^{\frac{3}{4}} \qquad (9.2)$$

where *ni* and *ni-1* are the dimensionless coefficients of *n*, which are calculated by *Hi* and *Hi-1* respectively.
The value of *H* must be specified to the point where two consequentially determined values of *Hi* and *Hi+1* are practically different from each other (accuracy 1m).

4. If $\Delta T > 0$, the value of *H* shall also be calculated by (9.1), if the determined value of *H* $H \le W_0\sqrt{\frac{10D}{\Delta T}}$, then this value shall be final.

5. If the calculated value $H > W_0\sqrt{\frac{10D}{\Delta T}}$, then the preliminary value of the minimum height of emission (pipe) is calculated with the formula:

$$H = \sqrt{\frac{AMF\eta}{(\text{ზღვ} - C_{\text{ვ}})\sqrt[3]{V_1\Delta T}}} \qquad (9.3)$$

The values of f, Vm, Vm', fe and the coefficients in the first approximation *m=m1* and *n=n1* shall be determined according to the value of *H=H1* calculated in this way. If $m_1 \cdot n_1 \neq 1$, the second approximation *H=H2* shall be calculated by *m1* and *n1* with the formula:

$$H_2 = H_1\sqrt{m_1 n_1} \qquad (9.4)$$

6. Generally the (i+1) estimation Hi+1 is calculated with the formula:

$$H_{i+1} = H_i\sqrt{\frac{m_i n_i}{m_{i-1} \cdot n_{i-1}}} \qquad (9.5)$$

Where *mi ni* corresponds with *Hi,* while *mi-1; ni-1* corresponds with *Hi-1.* If more than one harmful substances are emitted from the source, the final height of the pipe shall be equal to the maximum value calculated for each substance individually and/or for a group of substances having the joint impact.

The height of the pipe may be increased in order to observe TLVC in emissions of harmful substances in the surface layer of ambient air only if modern technical devices of reduction of emission are fully combined.

Article 10 - Limits for determining TLVE

The TLVC shall be determined in relation to the populated areas, child care centres, schools, higher education institutions, sport centres, parks, public curative and preventive treatment and recreational institutions, public catering facilities, airports, airfields and railway stations, which are nearest to the enterprise, but within not more than 500 metres radius from the enterprise.

Article 11 - Structure of a TLVE plan and the procedure for its drafting

1. The results of calculation of TLVE shall be documented as a plan of threshold limit values of emission of harmful substances into the ambient air, which must include: a title page, an executive summary, a table of contents, the definition of basic terms, the main calculation part, a reference list and annexes.

2. The title page is the first page of the TLVE plan, on the upper right and left corners of which the name of the organisation and the surnames of the heads of that organisation, that are coordinating and approving the plan, shall be written, the middle part of the page shall include the name of the plan and the lower part of the page shall include the organisation and the surname of the head of the organisation, that prepared the plan.

3. The executive summary shall include a brief overview of the work performed and key results.

4. The table of contents shall include the names of all paragraphs and sub-paragraphs, specifying the page numbers.

5. The definition of basic terms shall define all the terms used in the TLVE.

6. The main calculation part shall include:

a) basic data on the activities of the enterprise (Annex 1);

b) brief description of the nature and climate, and meteorological properties and coefficients of the area, where the enterprise is located, that determine the conditions of emission of harmful substances into the ambient air (Annex No 2);

c) brief description of the technological processes of the activities of the enterprise with regard to the ambient air pollution;
d) types and key properties of the harmful substances emitted into the ambient air (Annex No 3);
e) calculation of the amount of emissions of harmful substances into the ambient air;
f) the following parameters of emission of harmful substances into the ambient air: a) description of the sources of release of harmful substances (Annex No 4); b) description of the sources of emission of harmful substances (Annex No 5); c) description of gas and dust trapping devices (Annex No 6); d) emission of harmful substances into the ambient air, their filtration and utilisation (Annex No 7);
g) report on the dispersion of harmful substances into the ambient air, the obtained results and analysis (Annex No 8);
h) TLVE for a term of five years for each source of emission and each harmful substance (Annex No 9);
i) TLVE for a term of five years for the entire enterprise (Annex No 10);
j) a general plan of the enterprise indicating the sources of emission of harmful substances; a situational map and scheme of the layout of the enterprise.
7. The reference list shall include all the sources that will be used in the process of preparation of the TLVE plan.
8. An enterprise shall prepare a TLVE plan in two counterparts. One counterpart of the plan shall remain with the enterprise, and the other counterpart and its electronic version shall be forwarded to the Ministry of Environment and Natural Resources Protection of Georgia. For the enterprises located on the territories of the Autonomous Republics of Abkhazia and Ajara, the TLVE plan shall be prepared in three counterparts. One counterpart of the plan shall remain with the enterprise, the second counterpart shall be forwarded to the appropriate agencies of the Autonomous Republic of Abkhazia or Ajara and the third counterpart and its electronic version shall be forwarded to the Ministry of Environment and Natural Resources Protection of Georgia.

Article 12 - Liability for violating the Technical Regulations
The liability for violating the Technical Regulations shall be determined by the legislation of Georgia.

Annex No 1

Basic Data on the Activities of the Enterprise

Name of the facility	
Address of the facility:	
Current:	
Registered:	
Identification Code:	
GPS coordinates (UTM WGS 1984 coordinates system)	
The Head of the facility:	
Name, surname	
Telephone number	
E-mail	
Distance from the facility to the nearest populated area	
Type of economic activity	
Type of the produced products	
Installed capacity	
Type and amount of consumed raw materials	
Type and amount of consumed fuel (except for the fuel consumed by vehicles)	
Number of working days in a year	
Number of working hours per 24 hours	

Annex No 2

Meteorological Properties and Coefficients Determining the Conditions for Emission of Harmful Substances into the Ambient Air

Name of the meteorological properties and coefficients	Values
1	2
Atmospheric temperature stratification coefficient	
Coefficient of impact of the relief of the site	
Maximum average air temperature of the hottest month of the year, ^{0}C	
Average air temperature of the coldest month of the year, ^{0}C	
Average annual combination of winds, %	
- North	
- North-East	
- East	
- South-East	
- South	
- South-West	
- West	
- North-West	
Wind speed (according to multiple-year data), the frequency of the exceedance of which is 5%.	

Annex No 3

Types and Key Properties of the Harmful Substances Emitted into the Ambient Air

Harmful substances		**Threshold limit values, mg/m^3**		**Hazard category**
Name	**Code**	**Maximum single**	**Average 24-hour**	
1	**2**	**3**	**4**	**5**

Annex No 4

a) description of the sources of release of harmful substances

Name of the enterprise, workshop, unit	Source of emission of harmful substances			Source of release of harmful substances					Harmful substances		Amount of harmful substances emitted from the source of release, t/year
	Number*	Name	Amount	Number**	Name	Amount	Working time per 24-hours, hrs.	Working time per year, hrs.	Name	Code	
1	2	3	4	5	6	7	8	9	10	11	12

* the number of the source of emission shall be specified as follows: e-1, e-2, e-3, etc.

** all sources of organised emission of harmful substances shall have numbers from 1 to 500, while the numbers of all sources of unorganised emission of harmful substances shall start from 500.

Annex No 5

b) description of the sources of emission of harmful substances

Number of the source of emission of harmful substances	Properties of the source of emission of harmful substances		Properties of the dust and gas-air mixture at the exit of the source of emission of harmful substances			Code of harmful substances	Amount of emitted harmful substances		Coordinates of the source of emission of harmful substances in the coordinates system of the facility, m					
									Point source		Line source			
	Height	Diameter or cut-size	Speed, m/sec.	Volume, m^3/sec.	Temperature, t^0C		g/sec.	t/sec.	X	Y	for one end		for the other end	
											X_1	Y_1	X_2	Y_2
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15

Annex No 6

c) description of a gas and dust trapping device

Harmful substance			Gas and dust trapping device		Concentration of harmful substances, g/m^3		Quality of filtration of gas and dust trapping devices	
Number of the source of release	Number of the source of emission	Code	Name	Number, piece	before filtration	after filtration	installed	current
1	2	3	4	5	6	7	8	9

Annex No 7

d) emission of harmful substances into the ambient air, their filtration and utilisation, t/year

Harmful substance		Amount of harmful substances released from the source of release (col.4+col.5)	including			Trapped from the filtered amount		Total amount of the emitted harmful substances (col.3+col.7)	% of trapped harmful substances compared to the emitted harmful substances (col.7/col.3) x 100
			Emitted without filtration		Total amount flowed into the filtration device				
Code	Name		Total	from the source of organised emission		Total	including the utilised amount		
1	2	3	4	5	6	7	8	9	10

Annex No 8

Key results of calculation of dispersion of harmful substances

Name of harmful substance	Share of TLVC of harmful substances from the facility	
	to the border of the nearest populated area	to the border of 500 m. radius
1	2	3

Annex No 9

TLVE for the term of five years for each source of emission and each harmful substance

Source of release Name	Source of emission Number	TLVE for the years 20-- 20--	
		g/sec.	t/year
1	2	3	4
Name of the harmful substance			
Name of the harmful substance			

Annex No 10

TLVE for the term of five years for the entire enterprise

Name of harmful substances	***TLVE for the years 20-- 20--***	
	g/sec.	**t/year**
1	***2***	***3***