

Emission inventories for sources from inside Project area

a. ROŞIAMIN Activities

Table 4.2.13 Mass flow rates of particulate matter released into the atmosphere during ore extraction works¹

No.	Type of work/operation	Mass flow rates vs. particulate matter dimensions (kg/h)			
		d ≤ 30 µm	d ≤ 15 µm	d ≤ 10 µm	d ≤ 2.5 µm
1.	DRILLING	0.300	ND	0.069	ND
2.	BLASTING	32.4 kg/blast	ND	16.9 kg/blast	ND
3.	CRUSHING OF OVERSIZED BLOCKS	2.460	ND	1.279	ND
4.	STOCKPILING	0.292	0.050	0.037	0.031
5.	LOADING IN HAUL VEHICLES	0.294	ND	0.140	ND
6.	HAULAGE INSIDE OPEN PIT	1.257	0.785	0.566	0.149
7.	UNLOADING + PRIMARY CRUSHING	0.754	ND ³	0.359	ND
8.	WIND EROSION	13.584	ND	6.469	ND
	TOTAL ²	18.941	-	8.919	-

1 - hourly emission

2 excepting blast-related emissions

3 no emission factors

Table 4.2.14 Mass flow rates of pollutants released into the atmosphere by blasting¹

NO _x	CO	SO ₂
42	179	5.25

1 rock dust excluded; instant emissions (kg/blasting)

Table 4.2.15 Mass flow rates of pollutants released into the atmosphere by equipment and vehicles during ore extraction works¹

Source	Mass flow rates (g/hour)													
	NO _x	CH ₄	VOC	CO	N ₂ O	SO ₂	PM	Cd [10 ⁻³]	Cu [10 ⁻³]	Cr [10 ⁻³]	Ni [10 ⁻³]	Se [10 ⁻³]	Zn [10 ⁻³]	Pb 10 ⁻³]
Vehicles	1920.65	11.25	367.04	1538.32	5.4	449.8	193.41	0.45	76.47	2.25	3.15	0.45	44.98	0.00
Equipments	3288.31	11.46	477.08	1064.66	87.6	673.84	386.11	0.67	114.55	3.37	4.72	0.67	67.38	223.71
Total	5208.96	22.7	844.11	2602.98	93.00	1123.64	579.52	1.12	191.02	5.62	7.87	1.12	112.36	223.71

1 - hourly emissions

2 particulate matter contained in the exhaust gases (diameters are smaller than 2.5 µm)

Table 4.2.16 Mass flow rates of metals (contained in particulate matter) released into the atmosphere during ore extraction works¹

Type of particulate matter	Mass flow rates (kg/h)											
	As	Ba	Sb	Cu	Pb	Sn	Mn	Cr	Ni	Zn	Co	V
TSP ²	0.003	0.023	0.0005	0.0011	0.005	0.0001	0.038	0.0004	0.0003	0.006	0.0002	0.002
PM ₁₀ ³	0.002	0.011	0.0002	0.0005	0.0022	0.00005	0.018	0.0002	0.0001	0.003	0.001	0.001

1 - hourly emissions

2 particulate matter with Φ < 30 µm

3 particulate matter with Φ < 10 µm

Table 4.2.17 Mass flow rates of pollutants released into the atmosphere from the waste rock dumps¹

Source	Mass flow rates (kg/h)	
	TSP ²	PM ₁₀ ³
Valea Verde Waste rock dump	0.688	0.328
Hop Waste rock dump	0.626	0.298

1 fugitive emissions; hourly emissions

2 particulate matter with $\Phi < 30 \mu\text{m}$

3 particulate matter with $\Phi < 10 \mu\text{m}$

b. Localities and road traffic

Table 4.2.18 Emissions of atmospheric pollutants – stationary sources related to burning and animal farming

Locality	Mass flow (t/an)										
	PM10	CO	NO _x	N ₂ O	SO ₂	CH ₄ heating	TNMOC	CH ₄ animal	PAH	NH ₃	CH ₄ total
Tarina	9.180	69.240	0.840	0.000	0.120	9.000	15.900	4.241	0.219	2.206	13.241
Balmosesti	2.203	16.618	0.202	0.000	0.029	2.160	3.816	1.023	0.053	0.533	3.183
Corna	11.94	90.08	1.09	0.00	0.16	11.71	20.69	8.83	0.29	4.59	20.54
Bunta	1.33	10.01	0.12	0.00	0.02	1.30	2.30	0.98	0.03	0.51	2.28
Gura Cornei	1.377	10.386	0.126	0.000	0.018	1.350	2.385	1.010	0.033	0.529	2.360

Table 4.2.19 Emissions of atmospheric pollutants – mobile sources inside localities (surface sources)

Locality	Mass flow (t/an)														
	PM	CO	NO _x	N ₂ O	SO ₂	TNMOC	CH ₄	VOC _{tot}	Pb (10 ⁻³)	Cd (10 ⁻³)	Cu (10 ⁻³)	Cr (10 ⁻³)	Ni (10 ⁻³)	Se (10 ⁻³)	Zn (10 ⁻³)
Tarina	0.001	0.365	0.055	0.000	0.003	0.086	0.003	0.089	0.000	0.000	0.003	0.000	0.000	0.000	0.002
Balmosesti	0.001	0.234	0.038	0.000	0.002	0.055	0.002	0.057	0.000	0.000	0.002	0.000	0.000	0.000	5E-04
Corna	0.002	0.825	0.124	0.000	0.007	0.195	0.000	0.000	0.000	4.3E-05	0.007	0.0002	0.0005	4.52E-05	0.004523
Bunta	0.0003	0.0917	0.0138	0.0000	0.0008	0.0216	0.000	0.000	0.000	4.77E-06	0.000754	2.51E-05	5.03E-05	5.03E-06	0.0005
Gura Cornei	0.001	0.084	0.020	0.000	0.001	0.020	0.000	0.000	0.000	5.2E-06	9E-04	7E-05	1E-04	5E-06	5E-04

Table 4.2.20 Emissions of atmospheric pollutants – linear sources (road traffic outside localities)

Source	Mass flow (g/h)														
	NO _x	CH ₄	VOC	CO	N ₂ O	SO ₂	Part.	Cd	Cu	Cr	Ni	Se	Zn	Pb	
								[10 ⁻³]	[10 ⁻³]	[10 ⁻³]	[10 ⁻³]	[10 ⁻³]	[10 ⁻³]		
DJ 742	575.88	5.40	176.35	1030.54	1.62	52.73	31.35	0.16	27.05	0.80	1.11	0.16	15.91	0.69	

Emission inventories for sources from outside Project area

a. ROȘIAMIN Activities

Table 4.2.21 Mass flow rates of pollutants released into the atmosphere in the secondary crusher area ¹ (Aprabus)

Source	Mass flow rates (kg/h)	
	TSP ²	PM ₁₀ ³
Unloading + crushing of ore	3.675	1.75

1 fugitive emissions; hourly emissions

2 particulate matter with $\Phi < 30 \mu\text{m}$

3 particulate matter with $\Phi < 10 \mu\text{m}$

Table 4.2.22 Mass flow rates of pollutants released into the atmosphere in the processing plant area¹ – unducted sources

Source	Mass flow rates (kg/h)	
	TSP ²	PM ₁₀ ³
Unloading + crushing of ore	0.021	0.01

1 fugitive emissions; hourly emissions

2 particulate matter with $\Phi < 30 \mu\text{m}$

3 particulate matter with $\Phi < 10 \mu\text{m}$

Table 4.2.23 Mass flow rates of pollutants released into the atmosphere in the processing plant area¹ – thermal plant – ducted source

Pollutant	Mass flow rate (g/h)	Gas flow rate (Nm ³ /h)	Concentration in emissions (mg/ Nm ³)	Alert threshold (mg/Nm ³)	Intervention threshold (mg/Nm ³)
NOx	288.0	1440	200	315	450
CO	216.0	1440	150	119	170
SOx²	4147.2	1440	2880	1190	1700
Total particulate matter	100.8	1440	70	35	50
Organic particulate matter	0.048	1440	-	-	-
N₂O	1.584	1440	-	-	-
CH₄	0.749	1440	-	-	-
TOC³	3.6	1440	-	-	-
Formaldehyde	0.878	1440	-	-	-
Benzene	0.003	1440	-	-	-
PAH	0.017	1440	-	-	-
Benz(a)anthracene	0.00006	1440	-	-	-
As	0.019	1440	-	-	-
Cd	0.006	1440	-	-	-
Cr	0.016	1440	-	-	-
Ni	1.217	1440	-	-	-

1 ducted sources: the thermal power plant; hourly emissions

2 for a 2% sulphur content in fuel

3 total organic compounds

Alert threshold = 70% of the limit concentration as provided for by M.O. 462/1993 (with respect of M.O. 756/1997)

Intervention threshold = concentration limit of emissions as provided for by M.O. 462/1993 (with respect of M.O. 756/1997)

Table 4.2.24 Average mass flow rates of particulate matter released into the atmosphere from tailing ponds areas¹

Source	Mass flow rates (kg/h)	
	TSP ²	PM ₁₀ ³
Salistei Valley	1.20	0.57
Gura Rosiei	0.85	0.43

1 fugitive emissions; hourly emissions

2 particulate matter with $\Phi < 30 \mu\text{m}$

3 particulate matter with $\Phi < 10 \mu\text{m}$

At wind speed above 3m/s, it is possible for total particulate matter emissions from the dry surfaces of the two tailing facilities to reach 38 kg/h in the case of Salistei Valley, and 35 kg/h in the case of Gura Rosiei.

b. Localities and road traffic

Table 4.2.25 Emissions of atmospheric pollutants – stationary sources related to burning and animal farming

Locality	Mass flow (t/an)										
	PM10	CO	NOx	N2O	SO2	CH4 heating	TNMOC	CH4 animal	PAH	NH3	CH4 total
Virtop	10.526	79.395	0.963	0.000	0.138	10.320	18.232	4.847	0.251	2.518	15.167
Girda											
Barbulesti	5.753	43.390	0.526	0.000	0.075	5.640	9.964	2.670	0.137	1.389	8.310
Ignatesti	5.508	41.544	0.504	0.000	0.072	5.400	9.540	2.552	0.131	1.330	7.952
Iacobesti	2.938	22.157	0.269	0.000	0.038	2.880	5.088	1.343	0.070	0.700	4.223
Gura Rosiei	8.323	62.778	0.762	0.000	0.109	8.160	14.416	3.873	0.199	2.011	12.033
Coasta Hentii	7.589	57.238	0.694	0.000	0.099	7.440	13.144	3.539	0.181	1.839	10.979
Roşia Montana	24.152	182.237	2.254	0.002	0.316	23.678	41.832	2.419	0.576	1.480	26.097
ABRUD	399.195	3013.876	38.477	0.088	5.219	391.340	691.386	38.609	9.522	24.521	429.948
Gura Cornei	2.203	16.618	0.202	0.000	0.029	2.160	3.816	1.010	0.053	0.529	3.170
Bucium Sat	9.670	72.933	0.885	0.000	0.126	9.480	16.748	4.454	0.231	2.316	13.934
Dogaresti	2.203	16.618	0.202	0.000	0.029	2.160	3.816	1.084	0.053	0.562	3.244
Helesti	2.693	20.310	0.246	0.000	0.035	2.640	4.664	1.237	0.064	0.644	3.877
Floresti	2.938	22.157	0.269	0.000	0.038	2.880	5.088	1.417	0.070	0.733	4.297
Bisericani	10.159	76.626	0.930	0.000	0.133	9.960	17.596	4.760	0.242	2.473	14.720
Petreni	2.815	21.234	0.258	0.000	0.037	2.760	4.876	1.326	0.067	0.688	4.086

Table 4.2.26 Emissions of atmospheric pollutants – mobile sources inside localities (surface sources)

Locality	Mass flow (t/an)													
	PM	CO	NOx	N2O	SO2	TNMOC	CH4	VOCtot	Pb (10 ⁻³)	Cd (10 ⁻³)	Cu (10 ⁻³)	Cr (10 ⁻³)	Ni (10 ⁻³)	Se (10 ⁻³)
Virtop	0.001	0.365	0.055	0.000	0.003	0.086	0.003	0.089	0.000	0.000	0.003	0.000	0.000	0.000
Girda														
Barbulesti	0.002	0.430	0.072	0.001	0.005	0.102	0.003	0.105	0.000	0.000	0.004	0.000	0.000	0.000
Ignatesti	0.001	0.084	0.020	0.000	0.001	0.020	0.001	0.020	0.000	0.000	0.001	0.000	0.000	0.000
Iacobesti	0.001	0.215	0.036	0.000	0.002	0.051	0.002	0.052	0.000	0.000	0.002	0.000	0.000	0.000
Gura Rosiei	0.001	0.122	0.025	0.000	0.002	0.029	0.001	0.030	0.000	0.000	0.001	0.000	0.000	0.000
Coasta Hentii	0.002	0.337	0.061	0.001	0.004	0.080	0.002	0.082	0.000	0.000	0.003	0.000	0.000	0.000
Roşia Montana	0.002	0.318	0.058	0.001	0.004	0.075	0.002	0.077	0.000	0.000	0.003	0.000	0.000	0.000
ABRUD	0.002	0.065	0.076	0.001	0.007	0.014	0.000	0.015	0.000	0.000	0.059	0.002	0.002	0.000
Gura Cornei	0.150	25.140	5.451	0.047	0.389	5.926	0.183	6.109	0.009	0.001	0.252	0.018	0.025	0.001
Bucium Sat	0.001	0.084	0.020	0.000	0.001	0.020	0.001	0.020	0.000	0.000	0.001	0.000	0.000	0.000
Dogaresti	0.002	0.393	0.068	0.001	0.004	0.093	0.003	0.096	0.000	0.000	0.004	0.000	0.000	0.000
Helesti	0.001	0.084	0.020	0.000	0.001	0.020	0.001	0.020	0.000	0.000	0.001	0.000	0.000	0.000
Floresti	0.001	0.122	0.025	0.000	0.002	0.029	0.001	0.030	0.000	0.000	0.001	0.000	0.000	0.000
Bisericani	0.001	0.122	0.025	0.000	0.002	0.029	0.001	0.030	0.000	0.000	0.001	0.000	0.000	0.000
Petreni	0.002	0.411	0.070	0.001	0.005	0.097	0.003	0.100	0.000	0.000	0.004	0.000	0.000	0.000

Table 4.2.27 Emissions of atmospheric pollutants – linear sources (road traffic outside localities)

Source	Mass flow (g/h)													
	NO _x	CH ₄	VOC	CO	N ₂ O	SO ₂	Part.	Cd [10 ⁻³]	Cu [10 ⁻³]	Cr [10 ⁻³]	Ni [10 ⁻³]	Se [10 ⁻³]	Zn [10 ⁻³]	Pb 10 ⁻³]
DN 74 A	3923.90	41.59	1357.36	8127.04	11.03	353.29	208.16	1.09	185.40	5.45	7.63	1.09	109.06	6.28
DN 74	1480.22	11.28	368.06	2069.73	4.16	132.69	72.63	0.38	64.97	1.91	2.68	0.38	38.21	1.40