

TO: Peer-to-Peer Dialogue Participants

FROM: Irina Mai

DATE: March 3, 2015

SUBJECT: DUST

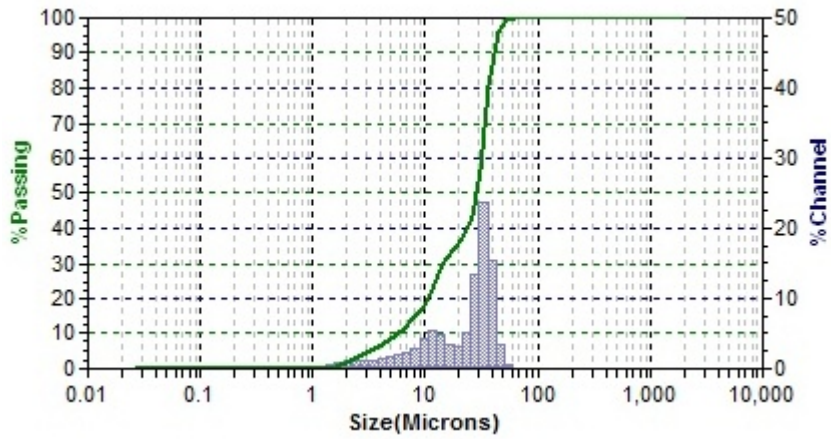
Methods, Examples and Study Results of Industrial Air Pollutants

On the basis of a laboratory test center FBUN and center for collective use of the Perm State Technical Research University (cooperation agreement № 2014/238 May 8, 2014) within the period of 2012 -2015 there have been conducted studies of dust disperse and component compositions.

Methodological and instrumental basis of the analysis:

- 1) To define dust disperse composition we use a method of optical dispersion. For this we employ a laser analyzer Microtrac S3500 (made in Japan, it detects particles with a size range of 20 nm to 2000 microns).
- 2) To determine dust composition we use a spectroscopic method, electronic microscopy. For this we use a scanning Electronic Microscope of High Definition (magnification is from 5 to 300 000 times; accelerating voltage ranges from 0.3 to 30 kV.). It has an X-ray fluorescence extension/device S3400N «HITACHI» (its detection limit is about 10.5 wt.%, The minimum study area/site/spot is 100 microns).
- 3) To determine chemical composition we use an X-ray diffractometer XRD-700 «Shimadzu». To process X-ray images/pictures we employed software «XRD 6000/7000 Ver. 5.21". This software has features of version «XRD 6000/7000 Ver. 5.21. "(since 2015)

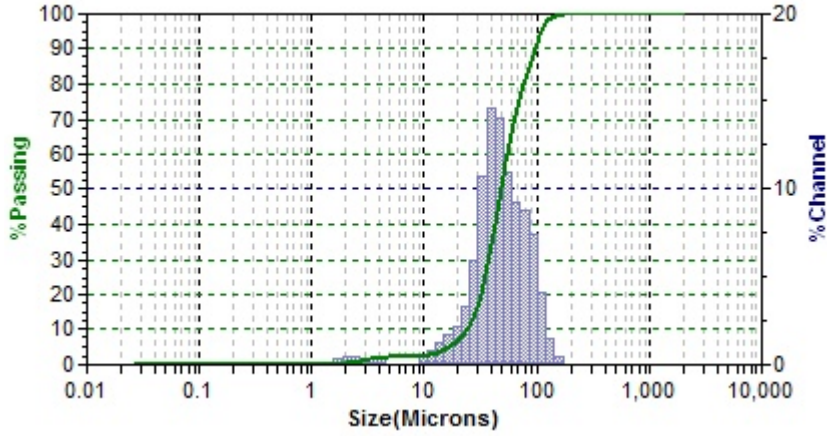
Examples of histograms and tables of dust disperse composition



1. Dust generated by ore grinding

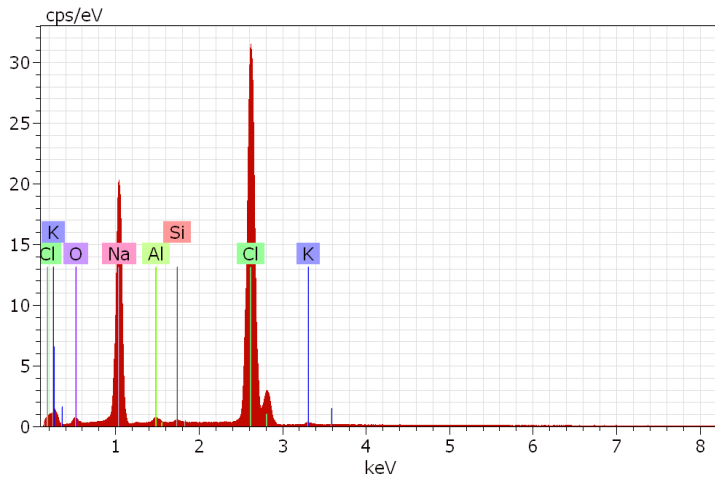
Particle size, microns		Volumetric fraction% of the total particles	
		According to the range	According to the size
The particle size > 10 mm	9 00.01-1000	-	81.21
	800.01-900.0	-	
	700.01-800.0	-	
	600.01-700.0	-	
	500.01-600.0	-	
	400.01-500.0	-	
	300.01-400.0	-	
	200.01-300.0	-	
	100.01-200.0	-	
	90.01-100.00	-	
	80.01-90.00	-	
	70.01-80.00	-	
	60.01-70.00	0.46	
	50.01-60.00	3.55	
	40.01-50.00	15.5	
30.01-40.00	36.96		
20.01-30.00	8.42		
10.01-20.00	16.32		
RM 10 (particle size up to 10 microns inclusive)	8.51-10.00	4.74	18.79
	7.01-8.50	2.37	
	5.51-7.00	2.09	
	4.01-5.50	3.25	
	2.51-4.00	3.01	
PM 2.5 (particle size ≤2.5 mm)	2.01-2.50	1.8	3.33
	1.01-2.00	1.53	
	0.01-1.00	-	

Dust generated by ore overturning



Particle size, microns		Volumetric fraction% of the total particles	
		According to the range	According to the size
The particle size > 10 mm	900.01-1000	-	67.67
	800.01-900.0	-	
	700.01-800.0	-	
	600.01-700.0	-	
	500.01-600.0		
	400.01-500.0		
	300.01-400.0		
	200.01-300.0	2.62	
	100.01-200.0	22.42	
	90.01-100.00	-	
	80.01-90.00	5.46	
	70.01-80.00	4.26	
	60.01-70.00	3.41	
	50.01-60.00	2.96	
	40.01-50.00	2.86	
30.01-40.00	6.31		
20.01-30.00	3.53		
10.01-20.00	13.84		
RM 10 (particle size up to 10 microns inclusive)	8.51-10.00	3.49	32.33
	7.01-8.50	2.33	
	5.51-7.00	2.25	
	4.01-5.50	4.28	
	2.51-4.00	5.37	
PM 2.5 (particle size ≤ 2.5 mm)	2.01-2.50	3.09	14.61
	1.01-2.00	7.32	
	0.01-1.00	4.2	

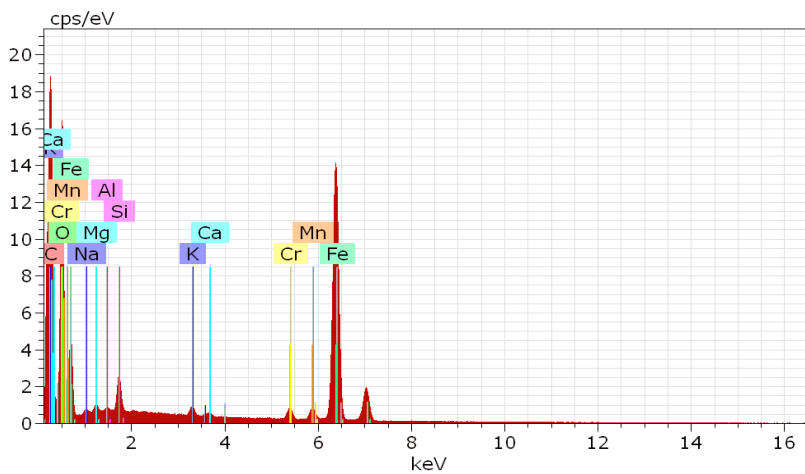
2. Analysis of dust components



Dust generated by ore overturning
(halite ores)

Components	Content/Concentration, %
Cl	54.86
Na	35.60
Al	0.75
K	0.34
Si	0.25
Total:	100

Dust from the steelmaking furnace

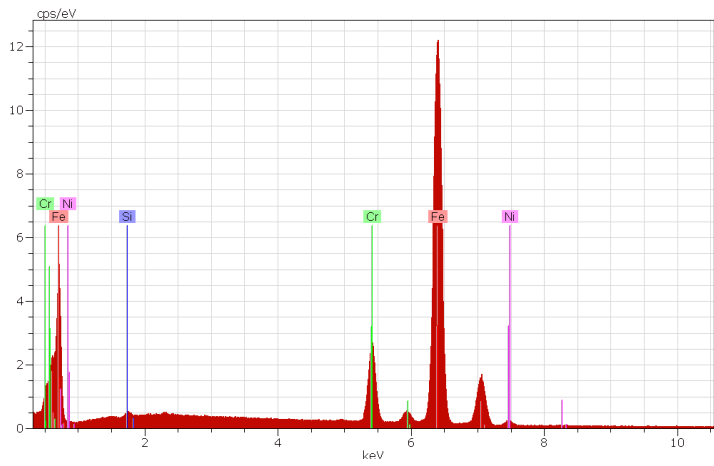


(Steel making from the iron ore)

p / p	Components	Content / Concentration, %
1	Fe	38.20
2	Mn	0.66
3	Cr	0.84

4	Ca	0.05
5	K	0.28
6	Si	0.98
7	Al	0.15
8	Mg	0.49
9	Na	0.68
10	O	34.53
Total:		100

Dust from the sinter plant



p / p	Components	Content/ Concentration, %
1	Si	0.46
2	Cr	10.00
3	Fe	77.36
4	Ni	1.16
5	Other	11.00
Total:		100