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Sintering Plants of Steel Industry - The Most Important Thermical PCDD/F Source in Industrialized Regions?

Lahl U.
Staatsrat beim Senator fuer Umweltschutz und Stadtentwicklung, Am Wall 177, D - 28 195 Bremen, Germany

A sintering plant is the core of an integrated iron metallurgical plant. Here, the iron ore is sintered to larger fragments for better processing in the subsequent blast-furnace plant. For this, the ore is mixed with coke and heated to a sintering temperature of about 1,000°C with a large air surplus. Beneath ore pretreatment, sintering plants serve for recycling of dusts, scrap and abrasion from other processes of the metallurgical plant to recover the iron for further use in the blast furnace. But this reasonable waste management method is accompanied by the problem of introducing traces of chlorine and organic compounds responsible for the generation of PCDD/F within these plants. Sintering plants mainly use simple dust filters (electrostatic precipitators) for pollution outlet control. Though clean gas does not contain extremely high concentrations of pollutants, high gas fluxes of up to 1 million m^3/h and more can cause considerable annual freights emitted by these types of plants.

In western Europe, to our knowledge 40 sintering plants are in operation, 14 of them in Germany. Table 1 shows age, size of the sintering band, and clean gas volume flux of all these plants.

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Table 1: Technical data of European sintering plants, 1991

Plant	Con-struc-ted in	Sinterband m^2	Estima-ted Clean Gas Volume Flux Mio m^3/h	Filter Type
Austria		**610**	**2.2**	
	1942	75	0.3	mech. dry
	1942	75	0.3	mech. dry
	1942	75	0.3	mech. dry
	1942	75	0.3	mech. dry
	1974	190	0.6	electro
	1973	120	0.4	electro
Belgium		**1,273**	**4.5**	
	1960	192	0.6	electro
	1976	152	0.5	electro
	1976	321	1.1	electro
	1964	210	0.7	electro
	1967	175	0.6	electro + mech.
	1972	313	1.0	dry
Finland		**246**	**1.0**	
	1964	75	0.3	mech. dry
	1964	75	0.3	mech. dry
	1976	75	0.3	mech. dry
	1961	21	0.1	mech. dry

France		**2,209**	**7.5**	
	1963	140	0.5	electro
	1966	160	0.5	electro
	1971	410	1.4	electro
	1973	400	1.3	electro
	1062	75	0.3	mech. wet
	1973	75	0.3	mech. wet + dry
	1963	196	0.7	electro
	1970	400	1.3	electro
	1063	166	0.6	cyclone
	1964	187	0.6	electro
Germany		**3,102**	**10.2**	
Thyssen	1964	150	0.5	electro
	1970	444	1.5	electro
	1979	250	0.8	electro
	1960	94	0.3	electro
Hoesch	1961	150	0.5	electro
	1974	174	0.6	electro
Mannesmann	1972	400	1.3	electro
Krupp	1971	400	1.3	electro
Salzgitter	1963	160	0.5	electro
Klöckner	1970	150	0.5	electro
Dillingen	1960	160	0.5	electro
	1981	258	0.9	electro
Eko	1975	156	0.5	electro
	1975	156	0.5	electro
Europe, total			**25.4**	

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Recent and actual emission analyses of German plants show a PCDD/F contamination of 3 - 10 ng I-TEQ/Nm³ in clean gas[1] [2]. Under the assumption that all European plants have clean gas contaminations in the same order of magnitude, these average values would result in a total emission of more than 1 kg I-TEQ PCDD/F from sintering plants. This exceeds the sum of all other known thermical sources. It seems, that sintering plants are a more important source of PCDD/F emissions than e.g. municipal solid waste incinerators[3].

This contribution will discuss this problem using actual PCDD/F emission measurements at a sintering plant in northern Germany.

Input-related strategies for reducing PCDD/F generation and release within sintering plants will be proposed.

Advanced filtering techniques for reducing clean gas contamination will have to be tested and installed.

With this knowledge, iron and steel plants have to be regarded as problematical as other thermical plants. Therefore, emission control authorities will have to take care for the best techniques to be installed at these plants. Iron and steel industry should have to keep the emission limit of 0.1 ng I-TEQ/m³ for clean gas, notwithstanding the economical problems this industrial branch has to face at the moment.

References

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3. Lahl U., Jager J.: Sinteranlagen - eine der bedeutendsten Dioxinquellen. Muellmagazin, in press