

COMMISSION OF THE EUROPEAN COMMUNITIES

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SECOND ANNUAL REPORT FROM THE COMMISSION

ON THE IMPLEMENTATION OF THE COUNCIL DIRECTIVE ON AIR QUALITY LIMIT VALUES
AND GUIDE VALUES FOR SULPHUR DIOXIDE AND SUSPENDED PARTICULATES
(80/779/EEC)

JUNE 1986

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I. Introduction

Article 8 of Council Directive 80/779 of 15 July 1980 on air quality limit values and guide values for sulphur dioxide and suspended particulate requires that the Commission shall publish annually a summary report on the application of this Directive. The Commission submitted its first report in July 1985¹, which was published in 1986 (Report EUR 10393).

Information of general concern and already mentioned in the first annual report will not be repeated in this second annual report. All relevant information about the measurements during the period from 01.04.1984 to 31.03.1985 as well as other information required under the directive which the Commission received from Member States before the 1st of July 1986 has been incorporated in this report.

II. Legal implementation of the Directive

As regards the legal implementation of Directive 80/779 the situation, as of 1 August 1987, is as follows :

The Commission has initiated court proceedings against Ireland (case 319/86) because of absence of legislation². Furthermore, the Commission has decided to initiate court proceedings against Luxembourg and Greece.

As regards Germany, France, Italy and the United Kingdom the Commission has decided to issue Reasoned Opinions under Article 169 of the Treaty.

A Reasoned Opinion was also decided against Belgium. However, Belgium has recently sent information to the Commission which might lead to a termination of the proceedings.

¹ First Annual Report from the Commission to the Council on the implementation of the Council Directive on air quality limit values and guide values for sulphur dioxide and suspended particulates (COM(85) 368 final).

² By August, 1987 Ireland had communicated legislation to conform to the requirements of the Directive.

The Commission considered legal implementation in the Netherlands and in Denmark satisfactory, and decided to terminate proceedings. As regards Spain and Portugal, the Commission has already established contacts with the national authorities in order to examine the situation in these two countries.

III. Application of the Directive

III.1 Monitoring of the pollutants

III.1.1. National Bodies responsible for monitoring

No additions to the information given in Table 1 of the 1st annual report concerning national and/or regional bodies responsible for monitoring the quality of air of the first report have to be made.

III.1.2. Analytical methods, instrumentation and data presentation

Article 10(1) requires that Member States demonstrate to the Commission either a satisfactory correlation or a reasonably stable relationship, between national methods and the reference methods in the Directive.

In the framework of the implementation of Article 10(1) the Commission, in cooperation with the Member States, is working on the quantification of expectable differences ("satisfactory correlation and reasonably stable relationship) and, in the long term, on the harmonisation of the methods (see chapter V).

Since performance tests and parallel measurements should be carried out only by qualified laboratories the Commission has asked Member States to nominate competent national institutions. Table 1 lists institutions which have been nominated officially. On the basis of the Commission's recommendations to Member States the national equipment is being tested ^{2,3}.

With regard to the performance tests to be carried out according to the proposed test procedure, two instruments have been shown to meet the minimum requirements:

1. Monitor Labs, model 8850
2. Thermom Electron, model 43

Two other instruments have been tested according to the German test procedure⁴:

Woesthoff oHg, BO-Ultragas U3ES
Hartmann & Braun, F-Picoflux 4

² van de Wiel, Hollander, Verhagen:

Study to test and select one comparison apparatus for sulphur dioxide.

Final report (1984).

³ Verduyn, Derouane, Hallez, Lenelle, Rasse, Vanderstraeten:

Study on the applicability of Article 10(1) of the Directive 80/779/EEC

Final report (1984).

⁴ Federal Office of the Environment of the F.R. Germany: Test routine for the performance testing of measuring devices for continuous monitoring of emissions (1982).

Table 1: List of authorized laboratories nominated by Member States for the testing of measurement equipment in the framework of Directive 80/779/EEC.

Netherlands	RIVM Mr. H.K. van de Wiel A. van Leeuwenhoeklaan 9 P.O. Box 1 NL - 3720 BA Bilthoven MT-TNO Mr. J.C.T. Hollander Schoenmakerstraat 92 P.O. Box 214 NL - 2600 AE Delft
Ireland	National Institute for Physical Planning and Construction Research (AN FORAS FORBARTHA) St. Martin's House Waterloo Road Dublin 4
Denmark	Riso National Laboratory Air Pollution Lab National Agency of environmental protection DK - 4000 Roskilde

Belgium Institut d'Hygiene et d'Epidemiologie
14, rue Juliette Wytsman
B - 1050 Bruxelles

United Kingdom Warren Spring Laboratory
Department of Trade and Industry
Gunnels Wood Road
UK - Stevenage
Herts
SG1 2BX
UK

F.R. Germany Umweltbundesamt
Pilotstation
Frankfurter Str. 153
D-6050 Offenbach

Landesanstalt fuer Immissionsschutz
des Landes Nordrhein-Westfalen
D - Essen-Bredeneu

Landesanstalt fuer Umweltschutz
Baden-Wuerttemberg
D - Karlsruhe

The Commission has asked the RIVM to compare the tests and the results achieved, with the EC's requirements. On the basis of RIVM's expert evidence a decision will be taken as to whether or not these instruments meet the Commission's requirements or whether further testing is necessary. Other instruments will be tested in 1986.

In Denmark parallel measurements between the UV-Fluorescence method and the Danish impregnated filter method have been carried out in order to demonstrate the stable relationship requested by Article 10(1)⁵. Statistics were applied as proposed by Derouane et al.³. It could not be demonstrated in all cases that the Danish method meets the requirements. The measured concentrations were very low and often close to the detection limit of the monitor. In the light of these circumstances the Commission does not object to the use the method in Denmark as long as SO₂-concentrations do not exceed 75% of the limit values.

The Risø laboratory also checked the comparability between the Danish method for measuring gravimetrically suspended particulates and the German Kleinfiltergeraet. The Danish laboratory could not find any significant difference between the two samplers under field conditions. However, the cut-off diameter seems to be a little higher for the Kleinfiltergeraet.

Parallel measurements between specific SO₂-instruments and the method to measure Total Acidity designed to check the "reasonably stable relationship" in accordance with the Commission's proposal were started by France, Luxembourg, Ireland and the United Kingdom in October 1985. In Belgium the specific instruments are being run parallel to FPD-analyzers which are routinely used in the Belgian network. The measurements are also part of the Common Measurement Programme (see chapter 5). Results will be available in 1987 at the latest.

⁵ Kare Kemp: Report on the joint Measurement Program, undertaken by Denmark in cooperation with the Commission during 1984-85
Risø National Laboratory, December 1985

III.1.3. Network design

Article 6 of the Directive is concerned with the establishment of measuring stations (i.e. monitoring networks) for the purposes of implementing the Directive.

As mentioned in the first annual report, the Commission launched an international study in order to overcome the problems involved with network design and to improve the comparability between the national monitoring networks.

The study group has submitted its final report in December 1985 and came to the following conclusions⁶:

1. This study has shown that despite differences in the legal basis and distribution of responsibility for monitoring and controlling air pollution and in the components of pollution monitored, a common set of design criteria has been used to establish monitoring networks for SO₂ and suspended particulates and provide information relevant to the Directive.

Firstly, the networks have been found to be centred around highly industrialised areas, for example Rouen/Le Havre, Gent, Rijnmond or in densely populated cities, for example Milan and Berlin or in heavily polluted mining communities, like those in the Borough of Doncaster in the UK. When the monitoring networks were established account was taken of the spatial structure of industrial and domestic emissions as well as population density, at least in qualitative terms.

Secondly, the majority of current networks were established on the basis of historical monitoring results collected over periods of 20 or more years.

⁶ Beier, R., Gonzalez, P.-L., McInnes, G., Onderlinden, D.: EEC Directive 80/779/EEC: A study of network design for monitoring suspended particulates and sulphur dioxide in the Member States Warren Spring Laboratory Report CR 2778(AP)

Thirdly, efforts have been concentrated in those areas most at risk of approaching or exceeding the limit values. In the areas where exceedances of the limit values have occurred and which were visited during this study - Berlin, Doncaster, Gent, Milan and Rouen - network densities, as measured by interstation distance in the critical areas are about 4 km or better.

2. In order to arrange monitoring stations within the networks, different strategies were adopted. In Belgium, Denmark, France, Ireland, Italy, Luxembourg and the United Kingdom monitoring was concentrated in the more densely populated or industrialised areas where emissions were relatively high and there was the greatest risk of approaching or exceeding the limit values of the Directive. This was also the strategy adopted in the locally operated network in the Rijnmond area.

The national network of the Netherlands has been redesigned with emphasis on areas with large spatial gradients which effectively concentrates monitoring in the more industrialised areas.

Networks in F.R. Germany have been established to provide spatially representative data on pollution loads within the monitoring areas but do not concentrate on 'hot spots'. However due to the network density required as part of this strategy the areas relevant to the Directive are monitored and estimates of the percentage of the monitoring areas exceeding the limit values of the Directive can be made.

3. France, Ireland, Luxembourg and the United Kingdom use a non-specific method of analysis for SO₂. The other Member States use specific methods for the determination of SO₂. Belgium, France, Ireland, Luxembourg, the Netherlands and the United Kingdom use a black smoke method for suspended particulates and assess their results relative to the Annex I limit values. The other states - Denmark, F.R. Germany and Italy - use a gravimetric method for analysis of suspended particulates. This method is incompatible with the black smoke method and these states assess their suspended particulate results relative to the Annex IV limit values, which are equivalent to the national air quality standards adopted in each of these three states.

Only Ireland, Luxembourg and the United Kingdom monitor both suspended particulates and SO₂ at all their stations. The others have adopted a range of methods for assessing compliance with the limit values for SO₂ which are dependent on an associated trigger value for black smoke. Italy considers only the lower (more stringent) limit values which for the annual median and 98-percentile are equivalent to their national air quality standards. France considers the lower limit values where no black smoke measurements are taken at the station while Belgium takes the black smoke results from the nearest smoke-sulphur network station.

4. The variations in the minimum requirements for the calculation of averages for a particular period from shorter-term measurements and for calculating medians and percentiles from daily results produce variability in the stringency of the limit values which is dependent on the amount of data missing. At the critical point where the highest results are around the limit value concentrations, one method could produce an exceedance of the limit value while another method would not. Consistent methods for data handling and the calculation of the relevant statistics are required.

5. Different approaches were adopted for the reorganisation of the networks in France, the Netherlands and the United Kingdom.

In France principal component analysis is used to eliminate redundant stations. Then a kriging technique is used to locate areas where interpolation errors are highest and hence where additional stations are required to provide more accurate information on the spatial distribution of pollution.

In the Netherlands structure functions have been used to interpolate between monitoring stations and provide estimates of pollutant concentration for each 1 x 1 km square in the country to within +/- 15 per cent standard error. This method appears particularly suited to the boundary conditions in the Netherlands.

In the United Kingdom a more heuristic approach was adopted taking into account past monitoring results as well as emission structures, meteorological conditions and population density, at least in qualitative terms.

While the United Kingdom method cannot be described fully in quantitative terms, the more formalised methods used in France and the Netherlands do have limitations. Both methods take account of emission structure only in so far as it is reflected in the results from the existing networks. The methods do not allow for changes in emission structure and hence the networks are not so adaptable when changes in emissions occur.

6. Alert systems have been used in several member states as a means of helping reduce peak concentrations of SO₂ and thereby helping prevent exceedance of the Directive 98-percentile limit values. These systems require automatic monitoring of pollution concentration and of meteorological parameters, usually as part of the same system, in order to initiate rapid response.

The authors give the following recommendations:

1. Monitoring should be carried out in all areas where concentrations are likely to exceed 75 per cent of any of the limit values of the Directive. These areas being defined as 'at risk'.
2. When applying Article 6, 'representative of local conditions' should be interpreted on a scale of 1 x 1 km.
3. Allow the use of regular (grid-based) networks because of their spatial representitivity.
4. Define a maximum interstation distance based on population density or emission density (or both) to be applied in networks of stations located in areas 'at risk' of exceeding any of the limit values. On the basis of the network densities found in the areas considered in this report, the maximum interstation distance should be about 4 km in the 'at risk' areas.

5. For consistency across the Member States, suspended particulates measured gravimetrically or by the black smoke method should be monitored at, or within 1 kilometre of, all stations 'at risk' of exceeding any of the limit values for SO₂. In the absence of suspended particulate results from a monitoring station, the SO₂ results should be compared with the lower, more stringent, limit values.

6. Most Member States are able to operate stations in their monitoring networks with a high percentage data capture - in the order of 80 per cent (or 300 daily results) or better - without any interpolation to fill gaps in the results. All stations 'at risk' of exceeding any of the limit values should be operated to at least this capture level.

7. Percentiles should be determined on a consistent basis using the Formula suggested by the Commission in its proforma. If fewer than 300 results required by the 80 per cent capture recommendation are available from any stations, then the Commission's Formula should continue to be applied with the results available from that station.

8. Alert systems should be considered (if not already installed) in areas where there is a risk of exceedance of the limit values for SO₂.

Moreover, the study expressed its opinion that, with regard to SO₂, Annex IV is no longer applied in the form specified by any of the Member States. The networks' strategies adopted in the Member States concerned (F.R. Germany, Denmark) are much more in accordance with Annex I requirements and the values measured should consequently be compared with the Annex I limit values.

Remark: It was not possible in the present study to include information on networks in Italy (with the exception of Milano), Greece, Spain and Portugal.

III.2. Application of Article 3

III.2.1. Information received in accordance with Article 3

Article 3 of the Directive states, inter alia, that each Member State "where it considers that there is a likelihood that, despite the measures taken, the concentrations of sulphur dioxide and suspended particulates in the atmosphere might, after 1 April 1983, exceed in certain zones the limit values given in Annex I, it shall inform the Commission thereof before 1 October 1982." These zones were already listed in Table 5 of the first annual report and no information has to be added.

However, the number of these derogation zones in which the limit values have in fact been exceeded since the Directive came into force increased in the course of the second reference period. These new zones are Agglomeration Lyonnaise (F), Carling (F), Lens (F), Monteliard (F), Belfast (UK), Londonderry (UK) and Newry (UK). Moreover, in Berlin (FRG) not only the SO₂-limit values were exceeded but also the limit values for suspended particulates. In a number of zones in which the limit values were exceeded in the course of the first reference period, no exceedances occurred in the second one. These zones are Creil (F), Rouen (F), Barnsley (UK), Copeland (UK), Doncaster (UK), Mansfield (UK), Sunderland (UK), Wakefield (UK) and Warnsbeck (UK). Tables 2, 3 and 4 display the measured concentrations in the derogations zones, for as far as they were communicated to the Commission.

It should be mentioned that the fact that concentrations were below the limit values in some zones which exceeded them in the previous year, does not mean automatically that the air pollution problem has been remedied. Only in those cases where emissions have been substantially reduced would such an assumption be reasonable. However, for none of the zones which did not violate the limit values in the reference period 84/85, have detailed emission reduction plans been forwarded to the Commission. Therefore it must be assumed that exceedances may occur again in the future.

Moreover, in a number of zones, nominated by Member States, under Article 3, no breaches of the limit values have been reported since the Directive came into force. These zones are Agglomeration Grenoble (F), Dunkerque (F), Fos l'Etang-de-Berre (F), Lacq (F), Thann (F), Viviez (F), Zone de Chevire-Donges (F), Coutern (L), Allerdale (UK), Bassetlan (UK), Blyth Valley (UK), Bolsover (UK), Bradford (UK), Cannock Chase (UK), Castle Morpeth (UK), Chesterfield (UK), Crewe and Nantwich (UK), Cunningham (UK), Falkirk (UK), Glasgow (UK), Kirkless (UK), Newark (UK), Newcastle-under-Lyme (UK), Nottingham (UK), Staffordshire-Moorlands (UK), Strathclyde (UK). Italian sites are not included in this listing since the information forwarded by the Italian government is extremely incomplete.

Finally, the Member States concerned informed the Commission that of these zones those of Coutern (L) and Chesterfield (UK) can be withdrawn from the list of nominated zones because no future breaches of the limit values are to be expected.

Table 2 : Measurement stations located in Article 3, derogation zones at which Annex I SO₂-limit values of Directive 80/779/EEC have been exceeded in the reference periods 1.4.83-31.3.84 and/or 1.4.84-31.3.85 (underlined values are above allowed limits, NC - not communicated)

Member State	Zone	Year	Station	measured values in ug/m ³			Number of consecutive days on which the value 250 ug/m ³ or 350 ug/m ³ was exceeded	Comments	
				annual median	winter median	annual 98-percentile			
France	Aggl. Lyonnaise	84/85	Terreaux	84	102	221	5 (250) (1)		
			La Duchère	<u>49</u>	80	202	5 (250) (1)		
			Croix Rousse	49	70	173	4 (250) (1)		
			Croix Luizet	38	67	169	4 (250) (1)		
			Vaise	44	78	185	4 (250) (1)		
			Grand Clément	44	68	181	5 (250) (1)		
			Point du Jour	41	63	210	5 (250) (1)		
			Monchat	45	62	175	4 (250) (1)		
			Givors	42	51	187	5 (250) (1)		
							4 (350)		
					4 (250) (1)				
					3 (350)				
		Aggl. Parisienne	83/84	EDF 25	42	88	326 (1)	3 (250)	
			84/85	EDF 24	45	51	<u>326</u> (1)	nil	
		Creil	83/84	022	17	25	<u>451</u>	1 x 4 (250) (1) 1 x 12 (250) (1)	Results for 84/85 not communicated. However, it was stated that no exceedance of the limit occurred
	Lens	84/85	028	62	53	<u>1190</u>	nil		

Member State	Zone	Year	Station	measured values in ug/m ³			Number of consecutive days on which the value 250 ug/m ³ or 350 ug/m ³ was exceeded	Comments
				annual median	winter median	annual 98-percentile		
	Region de Marseille	83/84	Marie de	58	71	315 (1)	nil	
		84/85	Bouc-Bel Air	43	49	<u>321</u> (1)	1 x 2 (350) 1 x 3 (250) 3 x 2 (250)	
	Strasbourg	83/84	11	99 (1)	103	241	3 x 2 (250)	
		84/85	11	<u>82</u> (1)	79	<u>310</u> (1)	2 x 2 (250) 1 x 4 (250) (1) <u>1 x 7</u> (250) (1) <u>1 x 3</u> (350)	
		84/85	1	32	50	256 (1)	1 x (3) (250) (1)	
		84/85	2	46	47	244	<u>1 x 6</u> (250) (1)	
		84/85	3	38	49	<u>329</u> (1)	<u>1 x 7</u> (250) (1) <u>1 x 3</u> (350)	
		84/85	4	47	55	315 (1)	nil	
		84/85	5	47	67	<u>289</u> (1)	1 x 2 (250) <u>1 x 6</u> (250) (1)	
		84/85	6	61	79	<u>325</u> (1)	<u>1 x 4</u> (250) (1) <u>1 x 6</u> (250) (1) <u>1 x 2</u> (350)	
		84/85	7	44	62	<u>320</u> (1)	2 x 2 (250) 1 x 3 (350)	
		84/85	8	81	108	330 (1)	1 x (3) (250) (1)	
		84/85	9	61	82	<u>317</u> (1)	<u>1 x 2</u> (250) <u>1 x 6</u> (250) (1) <u>1 x 2</u> (350)	
		84/85	13	41	26	189	<u>1 x 4</u> (250) (1)	

Member State	Zone	Year	Station	measured values in ug/m ³			Number of consecutive days on which the value 250 ug/m ³ or 350 ug/m ³ was exceeded	Comments
				annual median	winter median	annual 98-percentile		
	Strasbourg	84/85	27	72	97	<u>389</u>	1 x 6 (250) (1) 1 x 4 (350) 1 x 8 (350)	
		84/85	33	57	62	<u>298</u> (1)	1 x 7 (250) (1) 1 x 3 (250) 1 x 3 (350)	
	Calais	84/85	31	29	37	<u>279</u> (1)	nil	results for 83/84 not communicated
	Carling	84/85	6	58	80	<u>257</u> (1)	1 x 4 (250) (1) 1 x 1 (350)	results for 83/84 not communicated.
	Zone Havraise	83/84	AF5	40	66	<u>418</u>	1 x 2 (350) 1 x 3 (350)	Results for 84/85 not communicated. However it was stated that no exceedance of the limit occurred
		83/84	AF37	20	18	<u>358</u>	2 x 2 (250) 1 x 4 (350)	
		84/85	AF37	41	65	<u>369</u>	3 x 2 (250) 2 x 3 (250) 1 x 3 (350) 1 x 2 (350)	
		84/85	AF33	22	30	<u>418</u>	2 x 2 (250) 1 x 5 (250) 1 x 3 (250) 1 x 4 (350) 1 x 2 (350)	
		84/85	AF30	29	42	<u>528</u>	2 x 4 (250) 1 x 3 (350) 1 x 2 (350)	

Member State	Zone	Year	Station	measured values in $\mu\text{g}/\text{m}^3$			Number of consecutive days on which the value $250 \mu\text{g}/\text{m}^3$ or $350 \mu\text{g}/\text{m}^3$ was exceeded	Comments
				annual median	winter median	annual 98-percentile		
	Zone Havraise	84/85	AF38	16	33	<u>488</u>	2 x 4 (250) 3 x 2 (250) 1 x 3 (250) 1 x 3 (350)	
	Montbéliard	84/85	CRL5	22	22	226	1 x 5 (250) (1) 1 x 3 (350)	results for 83/84 not communicated
		84/85	DUPH3	26	28	211	1 x 4 (350) 1 x 3 (350)	
F.R. Germany	Berlin (West)	83/84	3	41	N.C.	<u>277</u> (1)	N.C.	F.R. Germany applies Annex IV of the Directive. However, results of measurements carried out according to Annex IV have been communicated to the Commission only once (see reference 10). The results were obtained in the frame of the parallel measurement programme initiated by the Commission and carried out in cooperation with the German government. The programme covered
			5	64	N.C.	<u>307</u> (1)	N.C.	
			6	57	N.C.	<u>307</u> (1)	N.C.	
			7	40	N.C.	<u>259</u> (1)	N.C.	
			8	49	N.C.	<u>286</u> (1)	N.C.	
			9	52	N.C.	<u>287</u> (1)	N.C.	
			10	60	N.C.	<u>324</u> (1)	N.C.	
			11	73	N.C.	<u>428</u>	N.C.	
			14	57	N.C.	<u>317</u> (1)	N.C.	
			15	61	N.C.	<u>234</u>	N.C.	
			16	71	N.C.	<u>308</u>	N.C.	
			17	59	N.C.	<u>307</u> (1)	N.C.	
			18	59	N.C.	<u>267</u> (1)	N.C.	
			19	59	N.C.	<u>267</u> (1)	N.C.	
			20	57	N.C.	<u>254</u> (1)	N.C.	
			22	47	N.C.	<u>264</u> (1)	N.C.	
			23	55	N.C.	<u>277</u> (1)	N.C.	
			24	54	N.C.	<u>277</u> (1)	N.C.	

Member State	Zone	Year	Station	measured values in $\mu\text{g}/\text{m}^3$			Number of consecutive days on which the value $250 \mu\text{g}/\text{m}^3$ or $350 \mu\text{g}/\text{m}^3$ was exceeded	Comments	
				annual median	winter median	annual 98-percentile			
	Berlin (West)	84/85	3	39	78	247	nil	only a part of Berlin, known to be not the most polluted one. The SO_2 -concentrations were found to be very close or equal to Annex IV limit values, in particular for the 98 percentile. Due to the lack of information on Annex IV-coherent data, the Commission displays in this table data measured routinely in Berlin (West), which are in accordance with Annex I's requirements.	
			5	62	106	337 (1)	"		
			6	54	100	279	"		
			7	42	86	238	"		
			8	47	96	267 (1)	"		
			9	53	98	297 (1)	"		
			10	54	102	327	"		
			11	73	152	407	42		
			12	43	75	257 (1)	5		
			13	44	82	268 (1)	6		
			14	60	106	277 (1)	9		
			15	62	104	317 (1)	9		
			16	67	120	323 (1)	9		
			17	58	97	268 (1)	6		
			18	64	104	267 (1)	nil		
			19	61	101	323 (1)	7		
			20	54	104	277	nil		
			21	42	79	228	"		
			22	48	85	266 (1)	6		
			23	48	92	253 (1)	5		
			24	53	108	253 (1)	6		
			25	54	87	253 (1)	nil		
Italy	Milano	1.4.83	Sempione Marche	<u>118</u> <u>136</u>	<u>199</u> <u>225</u>	<u>440</u> <u>540</u>	55 (1) 69 (1)		The local authorities notified exceedances in

Member State	Zone	Year	Station	measured values in $\mu\text{g}/\text{m}^3$			Number of consecutive days on which the value $250 \mu\text{g}/\text{m}^3$ or $350 \mu\text{g}/\text{m}^3$ was exceeded	Comments	
				annual median	winter median	annual 98-percentile			
Milano	(2)	31.3.84	Lattenzio	92	162	420	33 (1)	SO ₂ -concentrations for the reference period 1.4.84-31.3.85 of the 98 percentile at the stations Borisio Masciago, Cormano, Sesto San Giovanni, Monza, Villasanta, Pioltello, Cassina de' Pacchi, Rho, Bollate, Pero, Legnano, Corsico	
			Juvaro	<u>123</u>	215	<u>520</u>	68 (1)		
			Zavattari	<u>126</u>	215	<u>440</u>	69 (1)		
			Niguarda	<u>89</u>	<u>152</u>	<u>370</u>	24 (1)		
			Brera	<u>149</u>	<u>237</u>	<u>690</u>	78 (1)		
			SSG Comune	<u>105</u>	<u>157</u>	<u>440</u>	43 (1)		
			Sesto Asilio	<u>110</u>	<u>186</u>	<u>440</u>	50 (1)		
			Monza	<u>97</u>	<u>152</u>	<u>400</u>	23 (1)		
			Villosanta C.	<u>86</u>	<u>141</u>	<u>300</u>	21 (1)		
			Magenta	<u>60</u>	<u>99</u>	<u>290</u>	2 (1)		
			Pioltello	92	160	<u>380</u>	22 (1)		
			Cormano	<u>105</u>	<u>173</u>	<u>450</u>	35 (1)		
			Cassina de' Pacchi	<u>76</u>	<u>126</u>	<u>290</u>	18 (1)		
			Villasanta CS	76	123	<u>310</u>	16 (1)		
			Villasanta Raffineria	76	126	<u>300</u>	12 (1)		
			Terrazano	86	141	<u>340</u>	14 (1)		
			Baranzati	<u>134</u>	<u>225</u>	<u>460</u>	72 (1)		
			Pero	<u>118</u>	<u>196</u>	<u>430</u>	51 (1)		
			Cesano Nord	<u>71</u>	<u>107</u>	<u>290</u>	9 (1)		
			84/85		Villae Raff	73	118		<u>250</u>
		Pioltello			97	165	<u>250</u>		25 (1)
		Cass. d'Pecchi			<u>99</u>	<u>162</u>	n.c.		21 (1)
		Gropello			<u>42</u>	<u>65</u>	n.c.		2 (1)
		Casirate			39	60	n.c.		3 (1)
		Aetieri	42	73	n.c.	5 (1)			

Deber State Zone	Year	Station	measured values in $\mu\text{g}/\text{m}^3$			Number of consecutive days on which the value $250 \mu\text{g}/\text{m}^3$ or $350 \mu\text{g}/\text{m}^3$ was exceeded	Comments
			annual median	winter median	annual 98-percentile		
Milano	84/85	Rivolta	31	68	n.c.	3 (1)	
		Bisentrato	34	55	n.c.	3 (1)	
		Corsico	86	147	250	18 (1)	
		Rho Centro	97	168	250	26 (1)	
		Rho Nord	92	134	250	16 (1)	
		Lucernate	66	107	250	13 (1)	
		Barenzate	144	246	250	40 (1)	
		Pero	126	209	250	45 (1)	
		Terrazzano	84	131	250	15 (1)	
		Legnano	84	141	250	20 (1)	
		Magenta	60	99	n.c.	4 (1)	
		Sempione	141	250	250	64 (1)	
		Marche	120	204	250	37 (1)	
		Lattanzio	105	186	250	25 (1)	
		Juvaro	139	238	250	54 (1)	
		Zavattari	97	141	250	9 (1)	
		Niguarda	94	162	250	26 (1)	
		Liguria	94	149	250	8 (1)	
		Brera	110	183	n.c.	n.c.	
		Gratosoglio	55	89	n.c.	5 (1)	
		Cesano E.	55	73	n.c.	2 (1)	
		Cesano N.	60	94	n.c.	4 (1)	
		Borisio	71	107	250	8 (1)	
		Corzano	92	154	250	24 (1)	
		SSG Comune	118	194	250	34 (1)	
		SSG Asilo	118	191	250	39 (1)	
		Monza	86	141	250	23 (1)	
		Villas-Comune	81	131	250	12 (1)	

Member State	Zone	Year	Station	measured values in $\mu\text{g}/\text{m}^3$			Number of consecutive days on which the value $250 \mu\text{g}/\text{m}^3$ or $350 \mu\text{g}/\text{m}^3$ was exceeded	Comments
				annual median	winter median	annual 98-percentile		
Luxembourg	Colmar-Berg	83/84	rue de Luxembourg	82	<u>131</u>	<u>642</u>	1 x 6 (350)	
		84/85		51	62	<u>444</u>	2 x 5 (350) 1 x 3 1 x 2	
United Kingdom	Barnsley	83/84	Goldthorpe 1	<u>81</u> (1)	85	240	nil	
	Belfast	84/85	17	64	89	<u>265</u> (1)	1 x 2 (250)	
			33	61	80	<u>258</u> (1)	2 x 2 (250)	
	Doncaster	83/84	27	97	115	<u>254</u> (1)	2 x 2 (250)	
Mansfield	83/84	Woodhouse 2	<u>82</u>	97	199	nil		

- 1) The concentration for Black Smoke measured in parallel with the SO_2 -concentration was greater or, if no results of measurements were reported, assumed to be greater than $40 \mu\text{g}/\text{m}^3$ or $60 \mu\text{g}/\text{m}^3$ or $150 \mu\text{g}/\text{m}^3$
- 2) Calendar year instead of EC-reference period for the 98-percentile

Table 3 : Measurement stations located in Article 3, derogation zones at which Annex I Black Smoke limit values of Directive 80/779/EEC have been exceeded in the reference periods 1.4.83-31.3.84 and/or 1.4.84-31.3.85 (underlined values are above allowed limits)

Member State	Zone	Year	Station	measured values in $\mu\text{g}/\text{m}^3$			Number of consecutive days on which the value $250 \mu\text{g}/\text{m}^3$ was exceeded	Comments
				annual median	winter median	annual 98-percentile		
France	Aggl. Lyonnaise	84/85	Terreaux	<u>88</u>	115	217	nil	
Greece	Athens	83/84	Patission	N.C.	N.C.	N.C.	2 x 4	
		84/85	Patission	<u>172</u>	N.C.	N.C.	N.C.	
			Ministry	<u>104</u>	N.C.	N.C.	N.C.	
Ireland	Dublin	83/84	Rathines	36	78	<u>326</u>	nil	
			Dame Street	47	80	<u>260</u>	nil	
			Cabra West	46	73	<u>262</u>	nil	
			Ballyfermot	60	<u>149</u>	<u>447</u>	1 x 4	
			Cornmarket	34	<u>68</u>	<u>296</u>	nil	
			84/85	Rathines	44	80	<u>400</u>	1 x 8
		Cabra West		41	84	<u>255</u>	nil	
		Ballyfermot		36	127	<u>429</u>	1 x 9	
		Cornmarket		47	75	<u>342</u>	1 x 4	
		Mountjoy Square		45	79	<u>311</u>	1 x 4	
		East Wall-Road		32	67	<u>293</u>	nil	
		United Kingdom ¹⁾	Barnsley	83/84	Goldthorpe 1	71	<u>95</u>	<u>329</u>
Grimethorpe 2	46				<u>87</u>	<u>324</u>	1 x 4	
Wombwell 2	42				82	<u>269</u>	1 x 2	
Belfast	84/85		12	31	<u>286</u>	1 x 5		
Copeland	83/84		Whitehaven 2	28	46	<u>291</u>	1 x 1	
								data for 84/85 not valid

Table 3 contd: Measurement stations located in Article 3, derogation zones at which Annex I Black Smoke limit values of Directive 80/779/EEC have been exceeded in the reference periods 1.4.83-31.3.84 and/or 1.4.84-31.3.85 (underlined values are above allowed limits)

Member State	Zone	Year	Station	measured values in $\mu\text{g}/\text{m}^3$			Number of consecutive days on which the value $250 \mu\text{g}/\text{m}^3$ was exceeded	Comments
				annual median	winter median	annual 98-percentile		
United Kingdom ⁽¹⁾ (cont'd)	Doncaster	83/84	Askern 6	42	55	<u>291</u>	1 x 3	
			Doncaster32 Moorends 1	<u>81</u> <u>76</u>	111 109	<u>359</u> <u>273</u>	<u>1 x 5</u> <u>1 x 3</u>	
	Londonderry	84/85	8	24	44	<u>254</u>	1 x 7	
	Mansfield	83/84	Woodhouse 2	46	87	<u>244</u>	1 x 2	
	Newry	84/85	3	N.C.	68	N.C.	<u>1 x 7</u> <u>1 x 3</u>	
			4	N.C.	N.C.	N.C.	<u>1 x 4</u> <u>1 x 3</u>	
	Sunderland	83/84	8	47	88	<u>321</u>	1 x 2	data for 84/85 not valid
	Wakefield	83/84	Castleford9	41	65	<u>286</u>	1 x 2	
	Wansbeck	83/84	Ashington4	56	104	<u>329</u>	1 x 2	

(1) It is possible that the three consecutive days criterion was breacked at a number of other stations. The data are currently reanalysed.

Table 4: Measurement stations located in Article 3 derogation zones at which the Annex IV limit values of Directive 80/779/EEC for suspended particulates have been exceeded in the reference periods 1.4.83 - 31.3.84 and/or 1.4.84 - 31.3.85 (underlined values are above the allowed limits)

Member State	Zone	Year	Station	Measured values in $\mu\text{g}/\text{m}^3$		Comments
				annual arith. mean	annual 95 percentile	
F.R. Germany	Berlin	84/85	Rathaus Wedding	121	<u>315</u>	
			Virchow Krankenhaus	130	<u>335</u>	
			Hansa-Schule	122	<u>338</u>	
Italy	Milano	83/84	Maiche	139	<u>302</u>	95-percentile value for the calendar year instead of the EC-reference period.

Table 5: Counter measures planned or underway in the Member States
in order to improve the air quality in derogation zones of Article 3

Member State	Zone	Brief description of counter measures
France	Aggl. de Creil	Measures under way: 1) study to identify the responsible sources ii) reduction of emissions from industrial sources
	Aggl. Grenobloise	Measures under way: Implementation of a pollution alert procedure (operational in 1986)
	Aggl. Marseillaise	Measures under way: Improvement of the alert procedure (installation of a gas desulphurisation unit in a power plant near Bouc-Bel Air)
	Aggl. Rouenaise	Measures under way: Studies on further emission reductions (improvement of the already existing alert procedure)
	Aggl. Strasbourg	Measures under way: Implementation of a pollution alert procedure (operational in 1986) Measures planned: Designation of Strasbourg as "Zone de Protection speciale"
	Carling	Measures under way: Reduction of emissions due to fuel change (use of gas instead of fuel oil)
	Dunkerque	Measures under way: Technical modifications of plants in order to reduce emissions from industrial sources
	Fos l'Etang-de-Berte	Measures under way: Modification of the already installed alert procedures
	Lacq	Measures under way: Reduction of emissions
	Lens	Measures under way: Technical modifications of plants in order to reduce emissions from industrial sources
	Montbéliard	Measures under way: Technical modifications of plants in order to reduce emissions from industrial sources
Thann	Measures under way: Technical modifications of plants in order to reduce emissions from industrial sources	

Table 5 contd.: Counter measures planned or underway in the Member States
in order to improve the air quality in derogation zones of Article 3

Member State	Zone	Brief description of counter measures
France (cont'd)	Vivier	Measures under way: Reduction of emissions
	Zone de Chevire	Measures under way: Modification of the already installed alert procedures
	Zone Havraise	Measures under way: Modification of the already installed alert procedures Reduction of industrial emissions
F.R. Germany	Berlin (West)	Measures under way: 1) Modification of the combustion systems of Reuter and Moabit power plants ii) Installation of FGD at several other power plants (Lichterfelde, Oberhavel, Reuter, Charlottenburg and Rudow)
		Measures planned: 1) Reduction of S-content in gasoil by 50% ii) Limiting of S-content in fuel oil to 1% S.
Greece		Measures planned: 1) Use of LPG for taxis ii) Regular maintenance and servicing of vehicles iii) Improvement of central heating installations and chimneys iv) Extended use of natural gas in industrial boilers v) Reduction of emissions from industrial sources like potteries, brick production etc.
Ireland		Measures under way: 1) Examination of the monitoring network ii) Greater use of natural gas
		Measures planned: 1) Updating of the legislative controls ii) Study to greater use of natural gas iii) Designation of Dublin as smokeless zone
Italy	Milano	Measures planned: 1) Reduction of the sulphur content in gasoil to 0.3% ii) Use of natural gas iii) Extended use of district heating

Table 5 contd.: Counter measures planned or underway in the Member States
in order to improve the air quality in derogation zones of Article 3

Member State	Zone	Brief description of counter measures
Luxembourg	Colmar-Berg	Measures under way: Substitution of diesel engines, used as power generators Measures planned: i) Substitution of old boilers ii) Installation of FGD iii) Use of low sulphur fuel
	Contern	Measures under way: Study whether natural gas could be used instead of heavy fuel oil
United Kingdom	Barnsley	Measures under way: Implementation of a smoke control programme Measures planned: Extension of the smoke control programme
	Belfast	Measures under way: Implementation of a smoke control programme Measures planned: Use of low sulphur fuel oil
	Copeland	Measures under way: Continuation of the smoke control programme Measures planned: Further extension of the smoke control programme
	Doncaster	Measures under way: Implementation of a smoke control programme Measures planned: Further extension of the smoke control programme
	Londonderry	Measures planned: Implementation of a smoke control programme
	Mansfield	Measures under way: Extension of the smoke control programme
	Newry	Measures under way: Implementation of a smoke control programme
	Sunderland	Measures under way: The government continues to encourage the Council to approve further smoke control programmes Measures planned: Extension of the smoke control programme
	Wakefield	Measures under way: Government officials are consulting the Council about the possibility of extending smoke control Measures planned: Extension of the smoke control programme
	Wansbeck	Measures under way: Implementation of a smoke control programme Measures planned: Extension of the smoke control programme

Together with the list of zones, Article 3 requires Member States to forward to the Commission their plans for the progressive improvement of the quality of the air in those zones. These plans, drawn up on the basis of relevant information on the nature, origin and evolution of the pollution, shall describe in particular the measures taken, or to be taken, and the procedures implemented, or to be implemented, by the Member State concerned. These measures and procedures must bring the concentrations of sulphur dioxide and suspended particulates in the atmosphere within these zones to values below or equal to the limit values given in Annex I as soon as possible and by 1 April 1993 at the latest.

All Member States but Italy have forwarded abatement plans to the Commission in addition to the information given last year and which has been published in the first annual report.

Table 5 displays the information received by the Commission on counter measures planned or under way in the Member States.

III.2.2. Gaps in the information

In spite of the information forwarded, as mentioned in the previous chapters, there are still many gaps in the information with respect to the Article 3 requirements. Table 6 gives a summary of these gaps (including Article 7 zones which will be dealt with in chapter III.3). As indicated in this Table, for many derogation zones the information which has been forwarded by Member States does not allow an evaluation and assessment of whether appropriate measures have been taken to decrease the pollution levels as soon as possible. Therefore, often a 'p' for 'incomplete set of information' is indicated in the Table.

Nevertheless, the picture available now provides a better overview than last year with respect to the efforts undertaken by Member States to meet the requirements of the Directive. An exception is Italy which submitted no information at all to the Commission for many zones.

III.2.3. Assessment of the available information

Table 6 shows that on the basis of the information received a preliminary assessment of the situation is possible for the following zones: Berlin (SO₂ only), Athens, Dublin and Colmar-Berg. For these zones there is a great likelihood that the limit values will be respected by 1993 at the latest if the measures underway or planned are completed. However, in the case of Berlin (West), the plan may fail because of the emissions from the GDR which are polluting the city substantially and which cannot be incorporated into an abatement plan.

For a number of derogation zones very brief indications of measures underway or planned were forwarded by Member States (see Table 5). These descriptions do not allow an assessment of the situation. However, the Member States concerned, France and the United Kingdom, are optimistic that the action taken or planned will remedy the local pollution problem before 1993.

III.3 Application of Article 7

III.3.1 Information received in accordance with Article 7

Article 7(1) obliges Member States to inform the Commission, not later than six months after the end (31 March) of the annual reference period, of instances in which the limit values laid down in Annex I have been exceeded and of the concentrations recorded.

Member States applying Annex IV are also obliged to inform the Commission but in accordance with article 10(3), they must do so at least twice a year.

Table 6: Summary of the information submitted to the Commission from Member States concerning the implementation of the Directive

† = complete set of information
 P = incomplete set of information
 - = no information
 n.r. = not relevant

SO₂ : Sulphur Dioxide
 BS : Black Smoke
 SPH : Suspended Particulate Matter
 measured gravimetrically

Member State	Zone	Article under which treated	Geographical location	Nature and evolution of pollution	Values measured in the ref. period	Article 10 (3) of the Directive	Origin of the pollution	Measures taken before the Directive came into force	Measures under way	Measures planned	expected or identified success of meas.	Comments
Belgium	Saint	7	†	P	†	n.r.	-	-	-	-	-	SO ₂
Germany	n.r.	n.r.	n.r.	n.r.	n.r.	P	n.r.	n.r.	n.r.	n.r.	n.r.	-
France	Appl. de Creil	3	†	P	P	n.r.	P	-	P	-	-	SO ₂
	Appl. de Valenciennes	3	†	P	†	n.r.	P	-	P	-	-	SO ₂
	Appl. de Lyon	3	†	P	†	n.r.	P	-	P	-	-	SO ₂
	Appl. de Marseille	3	†	P	†	n.r.	P	-	P	-	-	SO ₂
	Appl. de Paris	3	†	P	†	n.r.	P	-	P	-	-	SO ₂
	Appl. Rouennaise	3	†	P	†	n.r.	P	-	P	-	-	SO ₂
	Appl. de Strasbourg	3	†	P	†	n.r.	P	-	P	-	-	SO ₂
	Calais	7	†	P	†	n.r.	P	-	P	-	-	SO ₂
	Caullery	3	†	P	†	n.r.	P	-	P	-	-	SO ₂
	Chauny	7	†	P	†	n.r.	P	-	P	-	-	SO ₂
	Tourneuse	3	†	P	†	n.r.	P	-	P	-	-	SO ₂
	Fos (l'Etang de)	3	†	P	†	n.r.	P	-	P	-	-	SO ₂
	Lucy	3	†	P	†	n.r.	P	-	P	-	-	SO ₂
	Le Havre	3	†	P	†	n.r.	P	-	P	-	-	SO ₂
	Lens (Courcelles)	3	†	P	†	n.r.	P	-	P	-	-	SO ₂
	Montbéliard	3	†	P	†	n.r.	P	-	P	-	-	SO ₂
	Rocheville-Jours.	7	†	P	†	n.r.	P	-	P	-	-	SO ₂
	Saulxnes	7	†	P	†	n.r.	P	-	P	-	-	SO ₂
	Thion	3	†	P	†	n.r.	P	-	P	-	-	SO ₂
	Viviez	3	†	P	†	n.r.	P	-	P	-	-	SO ₂
	Z. de Chevilly-Douges	3	†	P	†	n.r.	P	-	P	-	-	SO ₂

Member State	Zone	Articles Under Article	Geographical Location	Nature and evolution of pollution	Values measured in the ref. period	Article 10 (2)	Origin of the pollution	Measures taken before the Directive came into force	Measures planned under way	Measures identified success of meas.	Comments
Luxembourg	Vicenza	3				-	-	-	-	-	
	Villarba	3				-	-	-	-	-	
Luxembourg	Calmar-Bury	3				n.f.					St. IS No further violations of the limit values expected
	Centura	3	P			n.f.	P		P	P	
United Kingdom	Alfordale	3				n.f.					
	Barnsley	3				n.f.					St. IS
	Barnsley	3				n.f.	P		P	P	St. IS
	Bassettan	3	P			n.f.	P		P	P	St. IS
	Belfast	3				n.f.	P		P	P	
	Belfast	3				n.f.	P		P	P	
	Blyth Valley	3				n.f.	P		P	P	
	Bolton	3				n.f.	P		P	P	
	Bradford	3				n.f.	P		P	P	
	Canwood Chase	3				n.f.	P		P	P	
	Castle Donington	3				n.f.	P		P	P	
	Chesterfield	3				n.f.	P		P	P	
	Chesterfield	3				n.f.	P		P	P	
	Chesterfield	3				n.f.	P		P	P	
	Cleveland	3				n.f.	P		P	P	IS
Crewe and Nantwich	3	P			n.f.	P		P	P		
Dunelm	3				n.f.	P		P	P		
Donnington	3				n.f.	P		P	P		
Donnington	3				n.f.	P		P	P		
Donnington	3				n.f.	P		P	P	St. IS	
Donnington	3				n.f.	P		P	P	St. IS	

Table 7 : Measurement stations not located in Article 3 derogation zones at which the Annex I SO₂-limit values of Directive 80/779/EEC have been exceeded in the reference periods 1.4.83 - 31.3.84 and/or 1.4.84 - 31.3.85 (underlined values are above the allowed limits, NC = not communicated)

Member State	Zone	Year	Station	measured values in ug/m ³			Number of consecutive days on which the value 250 ug/m ³ or 350 ug/m ³ was exceeded	Comments
				annual median	winter median	annual 98-percentile		
Belgium	Gent	83/84	714	28	37	<u>353</u>	nil	
			703	33	44	<u>354</u>	nil	
	Gent	84/85	721	N.C.	N.C.	N.C.	1 x 4(350)	
			032	N.C.	N.C.	N.C.	1 x 4(350)	
	Brussels	84/85	013	N.C.	N.C.	N.C.	1 x 4(350)	
014			N.C.	N.C.	N.C.	1 x 4(350)		
Antwerp	84/85	821	N.C.	N.C.	N.C.	1 x 4(350)		
France	Calais	84/85	31	29	37	<u>279</u> (1)	nil	
	Chauny	84/85	La Chaussee	74	174	<u>586</u>	1 x 6(350)	
							1 x 30(350)	
			Hopital	43	52	<u>440</u>	1 x 7(350)	
							1 x 5(350)	
	Roubaix	84/85	601	33	40	<u>297</u> (1)	nil	
Saulnes	84/85	66	50	50	<u>253</u> (1)	1 x 2(250)		
						1 x 2(250)		
F.R.Germany	Gelsenkirchen	84/85	Gelsenkirchen	66	81	<u>379</u>	1 x 5(350)	Results communicated by the German government in compliance with article 10(3)
	Dortmund	84/85	Dortmund	52	64	310	1 x 4(350)	
	Duisburg	84/85	Duisburg	53	68	<u>376</u>	1 x 6(350)	
	Witten	84/85	Witten	36	42	<u>279</u>	1 x 5(350)	

Table 7 contd.: Measurement stations not located in Article 3 derogation zones at which the Annex I SO₂-limit values of Directive 80/779/EEC have been exceeded in the reference periods 1.4.83 - 31.3.84 and/or 1.4.84 - 31.3.85 (underlined values are above the allowed limits, NC = not communicated)

Member State	Zone	Year	Station	measured values in $\mu\text{g}/\text{m}^3$			Number of consecutive days on which the value $250 \mu\text{g}/\text{m}^3$ or $350 \mu\text{g}/\text{m}^3$ was exceeded	Comments
				annual median	winter median	annual 98-percentile		
Italy	Bolzano	83/84	Via Amba Alagi	43	N.C.	<u>341</u> (1)	N.C.	Not communicated by the Italian government but identified by the Commission
			Piazza Walther	53	N.C.	<u>289</u> (1)	N.C.	
			Fieralam-pionaria	71	N.C.	<u>265</u> (1)	N.C.	

(1) The measured concentration for Black Smoke with the SO₂-concentration was greater or assumed to be greater than $40 \mu\text{g}/\text{m}^3$ or $60 \mu\text{g}/\text{m}^3$ or $150 \mu\text{g}/\text{m}^3$

Table 8 : Measurement stations not located in Article 3 derogation zones at which the Annex IV limit values of Directive 80/779/EEC for suspended particulates have been exceeded in the reference periods 1.4.83 - 31.3.84 and/or 1.4.84 - 31.3.85 (underlined values are above the allowed limits)

Member State	Zone	Year	Station	Measured values in $\mu\text{g}/\text{m}^3$		Comments
				annual arith. mean	annual 95 percentile	
Italy	ASNU-Campi Bisensio	<u>1.4.83 - 31.3.84</u>	01	97	<u>320</u>	
	Torino	<u>1.1.84 - 31.12.84</u>	C. Racconigi C. Vercelli	<u>162</u> <u>171</u>	287 <u>305</u>	not communicated by the Italian government, but identified by the Commission.
	Torino	<u>1.4.84 - 31.3.85</u>	CFP-station	<u>158</u>	<u>324</u>	
	Massa Carrara	<u>1.4.84 - 31.3.85</u>	1 5	<u>173</u> <u>142</u>	<u>325</u> <u>313</u>	

For Member States applying Annex I the due time for the second report was 30.9.1985.

None of the Member States informed the Commission in due time. Not until early 1986 did the Commission finally receive written communications from some Member States. This information has been incorporated into this report.

The information received supports the doubts of the Commission expressed in the first annual report as to whether the list of derogation zones really includes all zones in Europe which are likely to exceed the limit values. As displayed in Tables 7 and 8, several new zones had to be notified by Member States in the last year under Article 7 which had not yet been notified under Article 3.

It should be mentioned that the zones listed in Table 7 which exceeded the Annex I-SO₂-limit values in the F.R. Germany did not exceed the Annex IV-SO₂-limit values in the reference period.

The Annex I-SO₂-limit values have been also exceeded at a large number of other German sites (see Table 9). This fact was not notified by the German government because it is obliged by Article 10(3) to do so only for stations which are part of the parallel measurement programme.

Article 7 states that Member States shall notify the Commission, not later than one year after the end of the annual reference period, of the reasons for such exceedances and of the measures they have taken to avoid their recurrence.

The latest date for providing this information was 31.3.1986. In July 1986 the Commission received brief descriptions of measures taken by the French government with the aim to avoid a recurrence of breaches. No information from the other Member States concerned (Belgium, F.R. Germany, Italy) has been received by the Commission yet.

Article 7(3) requires that "Member States shall forward information to the Commission, at its request, on the concentrations of sulphur dioxide and suspended particulates in any zones they have designated pursuant to Article 4(1) and (2). However, up to now none of the Member States have used Article 4 so that no information could be requested.

III.3.2. Gaps in the information

As in the case of Article 3, there are many gaps in the information concerning the application of Article 7. Table 6 gives a summary of these gaps. Apart from the gaps already indicated the Commission has still doubts as to whether all polluted zones are monitored and if so, whether information is being submitted to the Commission in case of exceedances of the limit values. This is true in particular for Italy, where neither the monitoring nor the flux of information seems to be sufficient. However, since the regional authorities in Italy are neither obliged to report to the central government about exceedances and since they cannot be obliged by the Government to monitor the quality of the air in an appropriate way, the situation is quite difficult and needs some fundamental changes.

III.3.3. Assessment of the available information

The exceedance of any limit value in a non-derogation zone requires urgent and efficient action because Member States have to avoid any recurrence according to Article 7 (2). Due to the lack or incompleteness of information, as mentioned above, the Commission cannot assess whether or not the measures which are already under way or planned by Member States will be successful. However, in principle any recurrence has to be treated as a violation of the Directive.

On the other hand, there is little doubt that the exceedances in some zones, in particular in the F.R. Germany, and others located close to the German border, were caused by the smog episode which took place in January 1985 (see chapter III.4.2). This episode was at least partly caused by long-range transport of pollutants from Eastern European countries.

III.4 Assessment of the present ambient-air pollution levels

III.4.1 General trend

The information provided by the Member States and independent EC investigations does not indicate, with the exception of the smog episode of January 1985, a general change in air pollution levels for SO₂, Black Smoke and gravimetrically measured suspended particulates since the last report was completed.

It should be noted that Article 5 of the Directive requires that Member States shall endeavour to move towards the guide values of Annex II wherever the measured concentrations are higher than these values. In the light of the data available to the Commission it can be stated that zones exceeding these guide values exist in all Member States in large numbers.

III.4.2. Smog episode of January 1985

The cold spell in January 1985 caused a dramatic increase in the measured concentrations in some Member States.

F.R. Germany seems to be most affected, but Belgium, the Netherlands, Denmark and France also reported drastically elevated concentrations in the period from the 14th to 21st January 1985. Smog alert warnings were announced in several areas, e.g. in Berlin-West (FRG), parts of Nordrhein-Westfalen (FRG), Kassel (FRG), Giessen (FRG), Brussels (B), Limburg (NL) and the Rijmond area (NL). It should be mentioned that the local authorities in Belgium, F.R. Germany and the Netherlands cooperated closely during the episode.

Examples of SO₂-concentration ranges measured within this episode are given in Table 10. They indicate that the SO₂-concentration ranges achieved were higher by a factor of up to 3 than the allowed 98 percentile value of 350 ug/m³ (which does not necessarily mean that this limit value was exceeded at all of these sites). However, this episode led to a large number of exceedances of the "three consecutive days" requirement of Table A, in Annex I of the Directive.

Apart from the unfavourable meteorological conditions (extended, long-lasting inversion-layer in Middle Europe with relatively strong easterly winds), which, of course, formed the background for this episode, long-range transport played an important role in this episode at least for certain periods and in some of the regions affected. In its study of the episode, the Rijksinstituut voor de Volksgezondheid en Milieugygiene (NL) states that between 90% and 95% of the SO₂-concentrations measured in the Netherlands were imported from abroad.⁷ Main exporters were F.R. Germany (in the range of 25-50%), GDR (in the range of 20-30%) and Poland (in the range of 10-25%).

⁷ Rijksinstituut voor Volksgezondheid en Milieuhygiene:
Luftverontreinigingsepisode 16.-21. Januari 1985: Meet resultaten,
modelberekeningen en informatieverschaffing. Rapport nr. 228216042
Bilthoven 1985

Table 9:

Sites in the F.R.Germany which are not included in the measurement programme of Article 10 (3) and at which the Annex I SO₂-limit value (three consecutive days-rule) was exceeded in the reference period 1984/85 (24 hours SO₂-concentration in µg/m³)

Site	January 1985							
	14.1.	15.1.	16.1.	17.1.	18.1.	19.1.	20.1.	21.1.
Hellbronn	450	390	490	450				
Kassel-Nord		474	657	682	556	724	971	425
Kassel-Mitte	391	603	783	790	665	736	1083	409
Kassel-Bett	461	755	804	888	775	753	1186	670
Giessen		555	579	675	404	708	668	
Wiesbaden-Mitte	357	464	577	477				
Frankfurt-Süd	534	591	665	524				
Frankfurt-Ost	380	520	608	459				
Biebesheim	476	620	698	576				
Grebenu				1118	1049	1105	1275	
Oker-Eiche		397	429	672	646	410	369	824
Oker-Mühlenstr.		385	566	765	771	479	430	903
Harlingerode		368	649	823	834	561	454	899
Harzburg-Kur		536	433	781	594	543		
Krefeld		418	451	716	386	457	652	
Heerbeck			518	722	722	546	407	808
Styrum		470	515	776	528	526	603	

Site	January 1985							
	14.1.	15.1.	16.1.	17.1.	18.1.	19.1.	20.1.	21.1.
Kaldenhausen		399	374	584	430			
Buchholz				834	459	505	601	
Bottrop		394	529	772	549	475	553	
Herne			521	644	542	413	469	
Altendorf		351	494	722	547	506	567	
Leithe			518	661	520	558	444	
Bochum			556	684	506	587	487	
Niederaden			422	471	373	354		
Frohlinde			446	545	458	352		
Egge			445	519	476	768	796	

Table 10: Examples of SO₂-concentrations measured during the smog episode of January 1985 at a number of sites in different Member States (24 hours averages)

Member State	Zone	Measured SO ₂ concentration in µg/m ³							
		14.1.	15.1.	16.1.	17.1.	18.1.	19.1.	20.1.	21.1.
Belgium	Brussels	144	294	497	447	354	348	229	66
France	Strasbourg	435	557	469	446	452	389	254	173
	Carling	302	443	315	304	239	199	130	72
	Montbeliard	312	311	306	272	253	92	49	58
F.R. Germany	Kassel-Bett	461	755	804	888	775	753	1180	670
	Altendorf (NRW)	219	361	494	722	547	506	567	198
	Berlin-19	210	260	310	430	530	270	280	550
	Hamburg-	107	168	194	240	308	100	162	648
	Sternschanze								
	Braunschweig	178	208	225	291	342	188	355	722
	Krefeld	246	410	451	716	386	457	652	185
Netherlands	Arnhem	N.A.	N.A.	223	210	292	121	414	N.A.
	Schienvield	N.A.	N.A.	334	463	275	322	322	N.A.
Denmark	Odense	19	28	20	23	38	44	27	210

N.A. = not available

The comprehensive German examination of the episodes also indicates a substantial contribution of Eastern European emissions to the pollution burden in the F.R. Germany.⁸ Another important source of trans-boundary relevant emissions is the Rhein-Ruhr area. This seems to be true in particular for the last days of the episode (20.1 and 21.1) with regard to transport from Germany to the Netherlands.

During this cold spell several lessons with respect to the application of the Directive were learned:

- i. European cooperation is needed to manage such an episode because it does not stop at borders. The provisions of Article 11 of the Directive should therefore be implemented by Member States to a greater extent.
- ii. Smog alert procedures should be implemented by all Member States and, if possible, coordinated among them in order that the necessary emission reduction measures be taken in the most efficient way and as early as possible. The 'three consecutive days' requirement of Table A in Annex I can in many cases only be respected if such alert procedures are implemented.

⁸ Bericht des ad-hoc Arbeitskreises Smog-Synopse des Laenderausschusses fuer Immissionschutz der Bundesrepublik Deutschland: Die Smog-Periode im Januar 1985 - Synoptische Darstellung der Luftbelastung in der Bundesrepublik. Draft report of March 1986.

It should be mentioned that this episode passed without causing any reported drastic increase in morbidity or mortality.

IV. Annex IV problem

IV.1. General aspects

As outlined in the first report the Directive permits one of two systems of monitoring to be used to implement the Directive:

- (1) black smoke and sulphur dioxide fixed station networks (Annex I of the Directive)
- (ii) temporarily, until reviewed: suspended particles at fixed stations and sulphur dioxide from random sampling networks (Annex IV).

However, any Member State availing itself of the provisions of Article 10.2 and, therefore, the second of the above two alternatives, must carry out parallel measurements at a series of measuring stations, selected in accordance with Article 6, to verify the corresponding stringency of the two approaches. This requirement is set out in Article 10.3.

Two Member States, F.R. Germany and Denmark, are applying the Annex IV while Italy is applying the limit values of Annex I for SO₂ (with the exception of the winter values and the role concerning the three consecutive days) and the limit values set out in Annex IV for suspended particulates.

Parallel measurements are being carried out in these three Member States, partly in cooperation with the Commission (see Chapter V).

However, the obligation for regular reporting, as laid down in Article 10(2), has not been fulfilled by the Member States concerned. The Commission has received only one preliminary report from Italy, only one report from Denmark and four from F.R. Germany since the Directive came into force. The Commission has taken all the necessary steps to ensure that Member States comply with the requirements of this article.

IV.2. Results of parallel measurements

Results of parallel measurements have been reported by Denmark⁵, Italy⁹ and the F.R. Germany¹⁰. The main conclusions which can be drawn from the Danish results are:

- i. The relative stringency between the lower Annex I- and the Annex IV-SO₂ limit values is 0.97 ± 0.11 as a mean for the long-term values and 1.44 ± 0.29 for the short-term values, i.e. almost equal stringency for the long-term values and significantly more stringent Annex I short-term values. (However, it should be noted that these are comparisons between values measured at one and the same site and not, as requested by Annex IV in a 1 km x 1 km grid with random sampling).

⁵ Kemp, K.: Report on the joint Measurement Program, undertaken by Denmark in Cooperation with the Commission during 1984-85. Riso National Laboratory MST LUFT-A-100 (1985)

⁹ M.A. Bertolaccini: Programme for parallel measurements of Black Smoke and suspended particles. Draft progress report of Istituto Superiore di Sanita (1986)

¹⁰ Von Nieding, G., Lahmann, E., Eickeler, E., Laskus, L., Koenig, R.: Nationale Erprobung der in EG-Richtlinien vorgeschriebenen Verfahren zur Ermittlung der Immissionen. Forschungsbericht 10402308 des Instituts fuer Wasser-, Boden- und Lufthygiene des Bundesgesundheitsamtes (1985) im Auftrag des Umweltbundesamtes.

- ii. The heating of membrane filters used for monitoring suspended particulates according to Annex IV, leads to a loss of approximately 10% of the weight, compared to the long-term conditioning at controlled room temperature and humidity.
- iii. The Annex IV limit values for suspended particulates are almost twice as stringent as the Annex I limit values. This is broadly true for long-term and for short-term limit values.

The main conclusions to be drawn from the joint EC-German measurements (carried out in Berlin (West)) are:

- a. Simulated random measurements have proved that the number of the random samples taken has a great influence on the values of the parameters and that this should not be neglected.
- b. The 'long-term SO₂-value according to Annex IV was found to be more stringent than the corresponding ones of Annex I. The 'short-term SO₂-values' according to Annex I were more stringent than the corresponding ones of Annex IV.

The Annex IV limit values for suspended particulates were found to be more stringent than those for Black Smoke, laid down in Annex I.

- c. The limit values for black smoke were not exceeded. However, the trigger value for the 'short-term exposure' was exceeded at all three stations so that also the lower SO₂ 'short-term limit values' had to be observed. The latter was exceeded at the three measuring sites for suspended particulates. Presumably, the same applies to the other measuring sites, too. At one station, the SO₂ limit value of 350 ug/m³ was exceeded on more than three consecutive days. In the case of suspended particulates, the limit value was not exceeded on more than three consecutive days.

Preliminary results obtained in the Italian measurement programme are:

- i. in nearly all cases the measured SPM-concentrations are closer to the corresponding limit values than the measured Black Smoke concentrations.
- ii. in most cases the Black Smoke limits are respected, however, exceedances of the "three consecutive days"-rule may occur in the center of large North Italian cities.
- iii. exceedances of the SPM-limit values may occur at a few Italian sites.

IV.3. Assessment of the problem

The results of these three measurement campaigns once again show that there is no equal stringency between the limit values of Annexes I and IV of the Directive. Moreover, the results of the national German surveys indicate that the parallel application of these two sets of limit values leads to discriminatory provisions, because while the Annex I SO₂ limit values have been exceeded in several German zones, the Annex IV-SO₂-limit values have not been exceeded. Consequently, all the provisions of Article 7, e.g. the requirement to take measures to avoid the recurrence of such exceedances, need not to be applied by the German Government.

The Commission has therefore decided to put forward its report on the results of the parallel measurements, together with proposals for a revision of the Directive, at the earliest date possible, that is July 1987.

V. COMMON MEASUREMENT PROGRAMME (CMP)

V.1. Background

Article 10 (5) of the Directive obliges the Commission to carry out in cooperation with the Member States studies at selected locations on the sampling and analysis of sulphur dioxide and of black smoke and suspended particulates in order to promote the harmonization of methods.

The Commission started its studies in 1982 and coordinates procedures through a 'Common Measurement Programme'.

V.2. State-of-the-art of CMP

In the first annual report it was outlined that four activities are planned for 1985:

1. Revision of the SO₂ and Black Smoke reference methods.
2. Completion of the parallel measurements carried out in Italy, F.R. Germany and Denmark.
3. Conclusions of the procedures for determining the correlations and relationships between national measuring methods and the comparative measuring methods, as foreseen in Article 10 (1).
4. Completion of the first Quality Assurance Programme and preparation of further quality assurance measures.

These goals have been achieved only partly. With regard to point 1 the technical work on the revision is completed, however, the administrative procedure will last at least another 6 months.

With regard to point 2, Denmark and F.R. Germany decided to continue the measurements for one more year and two more years, respectively. Reports concerning the results of the first year measurements have been forwarded (5)(10). Italy is also continuing the programme but reported only in a preliminary and incomplete form.

The technical discussion on the procedures, mentioned in point 3, has been completed. However, the final reports, to be drafted by the Institut d'Hygiene et d'Epidemiologie (B) and the Rijksinstituut voor de Volksgezondheid en Milieuhygiene (NL) are still not available.

Work on point 4 is on schedule, and a preliminary final report, drafted by JRC-Ispra is available as well as a proposal for future work.¹¹

Finally, in October 1985 parallel measurements between the comparative SO₂-method and the 'Total Acidity' method started in three Member States (Ireland, Luxembourg, United Kingdom) and have recently been started in France. Belgium has been carrying out parallel measurements between the comparative SO₂-method and the national FPD-method since October 1985.

V.3. Results of the parallel measurements in Member States

Apart from the results concerning the Article 10 (3) problem (corresponding stringency of the Annexes I and IV), a couple of interesting results of common concern have been obtained from the parallel measurement:

¹¹ Commission of the European Communities, Joint Research Centre Ispra: Directive 779/80/EEC-First Quality Assurance Programme for sulphur dioxide, black smoke and suspended particulate material. Draft final report (May 1986)

- i. Kemp (5) used factor analyses in order to identify the main sources for Black Smoke and suspended particulates (SPM). He showed for two Danish sites that "soil" is an important source for SPM while 'long-range transport' sources contribute significantly to Black Smoke concentrations.
- ii. Lahmann et al. (10) identified substantial differences in the quality of pressured calibration gases as used in the Berlin network, giving evidence for the need for regular quality assurance checks and international calibration standards.
- iii. Lahmann et al. demonstrated that the calculation of the statistical parameters (median, 95 and 98 percentiles) according to Annex I of the EC Directive from 10-min and/or 30-min values showed practically identical results, whereas daily mean values led to an increase of the median and to a reduction of the 95 and 98 percentiles.
- iv. The German study also demonstrated the strong influence of the statistical treatment of the data and substantiated the Commission's opinion that all Member States should apply the same statistics in order to achieve comparable results.¹²

A further interesting result of the parallel measurement programme of the German Bundesgesundheitsamt is that the "Total Acidity" method used in several Member States, seems to overestimate the annual means but to underestimate the, more critical, 98 percentile.¹³

¹² See Commission documents XI/430/83 and XI/431/83 which have been distributed to all Member States.

¹³ Lahmann et al.: Schwefeldioxid- und Schwebstaub-Vergleichsmessungen gemäss der EG-Richtlinie 80/779 in Staub-Reinhaltung der Luft 46/2/72-81 (1986).

V.4. First Quality Assurance Programme

In the period 1984-1986, the Joint Research Centre, Ispra, acting as Central Laboratory, conducted a quality assurance programme in cooperation with Member States, which aimed at:

- i) checking the capability of the national laboratories to measure, as accurately as possible, the concentrations of SO_2 provided in gas cylinders;
- ii) comparing the instrumentation and procedures used by the national laboratories for evaluating black smoke stains;
- iii) testing the quality assurance procedure for suspended particulate matter.

In each of these sub-projects, several exercises have been performed in order to combine crosschecks between the Central Laboratory and selected national laboratories and among different national laboratories. All Member States taking part in the programme participated in one or more of the exercises.

With regard to point i), the following results have been obtained:

- (i) the air- SO_2 -mixtures, provided in pretreated aluminium and steel cylinders by two different European manufacturers, were found to be unstable. The 200 ppb batch lost approximately 7% (equal to 0.48% per month) of the SO_2 -content within the test period of 14 months; the 40 ppb batch lost approx. 50% (equal to 3.7% per month). The decay of the SO_2 concentrations fits quite well to an exponential regression line.
- (ii) All measured values have been corrected by taking this decay into account. The statistical evaluation of 186 crosschecks between national methods (in total, 28 analyses were made) and the Central Laboratory demonstrated in most cases the standard of the Laboratory work in Member States.

The observed differences range from -6.7% to +3.6% (outliers not included) for the lower concentration and -.8.2% to +10.5% for the higher concentration.

Instruments and methods stationed and used only in the laboratories performed better in the test than instruments located in networks.

- (iii) Larger differences were explained by biases in the calibration or instrument shortcomings. However, in the light of the limited number of crosschecks carried out between the Central Laboratory and the national laboratories concerned, these results should be interpreted with caution.

With regard to point ii), an excellent result has been obtained whenever the same instrumentation (reflectometer, filter paper and calibration curves) were used. Identified differences are in the range of ± 1 reflectance unit which corresponds to the precision of the reflectometry used. The comparison between different set-ups (other reflectometer / filter paper configurations) revealed systematic biases which underline the need to harmonize the Black Smoke methods used in Member States.

In the exercise which aimed at designing the test for a quality assurance procedure for suspended particulates, valuable information with respect to possible sources of systematic errors which may occur in such tests was obtained. Although particular attention was paid to storing and transporting the filter material as carefully as possible, losses of material occurred. These were mainly caused by the handling of one and the same filter in different laboratories. However, systematic biases, due to differences in the quality, calibration and possibly also maintenance of the balances, could be observed.

The experience gained in the course of this programme will be taken into account in the definition of the second quality assurance programme which is to start in October 1986.

VI. ADAPTATION OF THE REFERENCE METHODS

VI.1 General aspects

In the framework of the Common Measurement Programme it was decided to adapt the reference methods to technical progress, in order to overcome several shortcomings.

The Committee on the adaptation to technical progress, foreseen in Article 13 of the Directive, was set up in March 1985 to consider the reference methods for SO₂ and Black Smoke which were revised as a result of the Common Measurement Programme.

VI.2 SO₂ - reference method

The reference method for SO₂, a preliminary version of ISO Standard 6767, contained several shortcomings. The Commission will send a revised specification of an improved TCM reference method to Member States for voting.

VI.3 Black Smoke reference method

The method of measuring Black Smoke, as defined by the OECD in 1964, contains five different "proposals concerning international standard calibration measurements" based on studies in the early sixties.

The Commission will send a revised reference method based on a single calibration curve using Whatman N° 1 filter paper and an evaluation based on the EEL model 43 reflectometer to Member States for voting.

VI.4 Gravimetric suspended particulates reference method

The description of the gravimetric measurement of suspended particulates set out in Annex IV to the Directive cannot be considered as an unambiguous basis for a clearly defined reference measurement method.

The Commission is studying possible improvements of the method in close cooperation with the Member States.