COMMISSION REGULATION (EC) No 836/94

of 13 April 1994

amending Regulation (EEC) No 1696/87 laying down certain detailed rules for the implementation of Council Regulation (EEC) No 3528/86 on the protection of the Community's forests against atmospheric pollution

THE COMMISSION OF THE EUROPEAN COMMUNITIES,

Having regard to the Treaty establishing the European Community,

Having regard to Council Regulation (EEC) No 3528/86 of 17 November 1986 on the protection of forests against atmospheric pollution [1], as last amended by Regulation (EEC) No 2157/92 [2], and in particular Article 3 (2) thereof,

Whereas pursuant to Article 2 (1) of Regulation (EEC) No 3528/86, the aim of the Community scheme is to help the Member States to establish, on the basis of common methods, a periodic inventory of damage caused to forests, in particular by atmospheric pollution;

Whereas the deadline condition of the Community's forests continues to give cause of concern and steps should therefore be taken to extend the surveys on the network of observation plots in a coordinated and harmonious way;

Whereas a survey on the chemical content of needles and leaves on the existing network would provide basic additional information on the health of forest ecosystems; whereas limited mineral nutrition may be a direct cause of tree condition deterioration; whereas beside soil surveys the sampling and analysing of needles and leaves are an essential part to demonstrate possible deficiency symptoms in forest ecosystems; whereas a modification of Commission Regulation (EEC) No 1696/87 [3], as last amended by Regulation (EEC) No 926/93 [4], is necessary to take in account these tasks when defining the common rules for the implementation of Regulation (EEC) No 3528/86;

Whereas the measures provided in this Regulation are in accordance with the opinion of the Standing Forestry Committee,

HAS ADOPTED THIS REGULATION:

Article 1

Regulation (EEC) No 1696/87 is hereby amended as follows:

1. the following Article 1b is added:

'*Article 1b*

1. In addition to the annual inventory of damage caused to forests provided for in Article 2 of Regulation (EEC) No 3528/86, the chemical content of needles and leaves should be analysed and recorded over the same network of observation plots.

The survey of the chemical content of needles and leaves is optional.

2. Needle/leave samples shall be taken in accordance with an objective sampling method and analysed in accordance with established methods.

3. Member States participating in this survey, shall forward to the Commission by 30 June 1996 in a standardized form the data collected and analysed for each observation plot as specified in Annex VIc.

4. Technical details pertaining to the provisions of this Article are set out in Annex VII.';

2. the following fourth indent is inserted in Article 2 (1):

'— to carry out a survey on the chemical content of needles and leaves';

3. the following Article 3b is added:

'*Article 3b*

1. Member States participating in this survey shall draw up a report on the chemical content of needles and leaves in their respective areas and forward them to the Commission by 30 June 1996.

2. The contents of the report shall comply with the requirements set out in Annex VIII.';

4. Annexes III and VI to Regulation (EEC) No 926/93 replacing the respective Annexes to Regulation (EEC) No 1696/87 are hereby amended in accordance with the respective Annex hereto;

5. Annexes VIc, VII and VIII are hereby added to Regulation (EEC) No 1696/87 in accordance with the respective Annexes hereto.

Article 2

This Regulation shall enter into force on the third day following its publication in the *Official Journal of the European Communities.*

[1] OJ No L 326, 21. 11. 1986, p. 2.
[2] OJ No L 217, 31. 7. 1992, p. 1.
[3] OJ No L 161, 10. 6. 1987, p. 1.
[4] OJ No L 100, 26. 4. 1993, p. 1.

This Regulation shall be binding in its entirety and directly applicable in all Member States.

Done at Brussels, 13 April 1994.

For the Commission
René STEICHEN
Member of the Commission

ANNEX I

Annex III to Regulation (EEC) No 926/93 replacing the respective Annex to Regulation (EEC) No 1696/87 is hereby amended as follows:

1. the second sentence is replaced by the following:

   'For each of the measures to be carried out in accordance with Article 1 (tree vitality on an annual basis), Article 1a (soil sampling) and Article 1b (chemical content of needles and leaves) information on the following items shall be given:';

2. at point 4 the following indent (c) is inserted:

   '(c) the measures relate to the establishment and executions of a survey on the chemical content of needles and leaves of the Community at the observation plots of the Community network of 16 km × 16 km.

   1. Description of the existing situation.
   2. Plot number corresponding to the Community's network, which are to be included in the survey on the chemical content of needles and leaves (Form 3a).
   3. Detailed description of the sampling procedures used at plot level (number of single samples, etc.).
   4. Detailed description of parameters to be determined and the analysis method to be applied including a clear description of any calibration, correction, and/or recalculation needed to make the results compatible with the results analysed according to the established methods.
   5. Indication of the timetable for the execution of the projected measures (Form 3b).';

3. in Form 3a the following measure is inserted:

   'To establish and execute a survey on the chemical content of the needles and leaves in the observation plots of the Community's network'.

Annex VI to Regulation (EEC) No 926/93 replacing the respective Annex to Regulation (EEC) No 1696/87 is amended as follows:

in point I.1, the third paragraph is replaced by the following:

'Member States participating in the survey on the chemical content of needles and leaves shall submit this information by the 30 June 1996. These data shall be submitted in a digital form.

In this Annex the details on the submission of tree damage inventory data (Annex VIa), the soil condition data (Annex VIb) and the results of the survey on the chemical content of needles and leaves (Annex VIc) are presented.'

ANNEX II

The following Part c is added to Annex VI of Regulation (EEC) No 1696/87:

'ANNEX VIc

IV. Submission of data of the survey on the chemical content of needles and leaves

IV. 1. *General*

The data of the survey on the chemical content of needles and leaves are collected once.

The Member States participating in this survey should submit the data to the Commission before 30 June 1996. The data shall be submitted in two or three files; the plot file, the foliar data file with the mandatory parameters and if analysed, the foliar data file with the optional parameters.

In a later stage it will be decided, if a repetition would be necessary, and what frequency should be used.

IV. 2. *Information on plot level*

The information in the plot-file (see Annex VII: Form 5 a) should contain for each plot the following information in one row:

— country,
— plot number,
— date of sampling,
— actual latitude coordinate,
— actual longitude coordinate,
— altitude.

In an extra column remarks with regard to the plot can be added, namely whether the forest was fertilized, including nature and quantity of the fertilizer.

The abovementioned inventory data should be presented in a table with a separate number in the first column.

IV. 3. *Foliage sampling results*

The parameters to be submitted are split into a mandatory set and an optional set of parameters.

The mandatory set of parameters includes: N, S, P, Ca, Mg and K.

The optional set of parameters includes: Na, Zn, Mn, Fe, Cu, Pb, Al and B.

The analysis results on the above stated parameters shall be put into a table with a sequence number and a plot number in the first columns.

Each country is allowed to use its national methods. But it is necessary to compare the total concentrations obtained by national methods with those certified on the reference standard samples. Full details of the analysis method and/or recomputation are to be included in the report on the chemical content of the forest foliage. A copy of this part should be submitted together with the foliar analysis results (see Annex VIII).

IV. 4. *File names*

To avoid possible confusion between countries and years the files are to be named in such a way that country and year are known in the file name. DOS file names may consist of a name of eight characters and an extension of three characters. As characters, letters, numbers and some special signs are accepted. For the names only letters and numbers are used.

The file names should include the country code, consisting of two letters (FR = France, BL – Belgium, etc.) and the year of sampling (e.g. FR1994, FR1995). The file with the reduced plot information for the survey on the chemical content of needles and leaves will have the extension .PLF. The foliar data file the mandatory parameters will have the extension .FOM and the foliar data file with the optional parameters .FOO (e.g. FR1995.PLF, FR1995.FOM and FR1995. FOO).

IV. 5. *Submission of data*

Under separate cover and well packed for international transport the diskette(s) will be sent to the Commission. The diskette shall be accompanied with a note stating the names of the files, and the total number of plots and foliar samples in the file (last sequence number). Together with the diskettes a printed copy of the first page of the files shall be submitted. On this first page the columns and headers shall be clearly indicated.

Details of the methodology of the sampling, analysis and recomputation shall be forwarded to the Commission as a part to the report on the chemical content of the forest foliage, but a copy of this part should also be included with the data diskettes.'

ANNEX III

The following Annex is added to Regulation (EEC) No 1696/87:

'ANNEX VII

COMMON METHODS FOR THE ESTABLISHMENT OF A SURVEY ON THE CHEMICAL CONTENT OF NEEDLES AND LEAVES (ARTICLE 1b)

I. General remarks

The purpose of the scheme mentioned in Article 1b is to establish a survey on the chemical content of needles and leaves in the Member States.

The survey is to be carried out at Community level on the basis of the 16 km × 16 km grid network covering the entire area of each Member State or on a subsample of this gridnet. In addition, Member States may collect information from denser networks in order to obtain representative data at a national or regional level for the presentation of their report. For both levels (Community and national/regional) the common methods (described below) shall be adopted.

This Annex is based on the results of the Foliar Expert Panel of the UN-ECE/ICP on assessment and monitoring of air pollution effects on forests. Reference is made to manuals prepared by this expert group.

The survey is optional.

Member States participating in this survey shall submit the analysis results to the Commission before 30 June 1996. Foliage data, which were collected and analysed before 1994, but after 1 January 1990 could also be transmitted if the methods as described below have been applied.

II. Sampling and analysing methodology

II.1. *Selection of Sample plots*

The Member States are already using a 16 km × 16 km network of permanent plots for the inventory of the tree condition and the soil condition (see Annex I (II.1) to this Regulation). The same plots will be used.

II.2. *Plot information*

To ensure a good comparability between the tree condition data, the soil sampling data and the foliage sampling data, it is strongly recomended that the following plot information is collected of the sample plot and submitted to the Commission (see form 5a):

— descriptive code:

  — country,

  — plot number,

  — date of sampling,

  — actual latitude and longitude coordinates,

— site data:

  — altitude.

II.3. *Selection of the sample tree and number of trees to be sampled and analysed*

It is recommended to sample at least three trees of each main species. A composite sample of these at least three samples is analysed.

The trees needed for the sampling are selected in such a way that:

— the trees are spread over the total plot area, or around the plot if the stand is homogeneous over a larger area,

— the trees belong so to the predominant and dominant classes (forest with closed canopy) or to the trees with average height ± 20 % (forest with open canopy),

— the trees are in the vicinity of the locations where soil samples were taken for analysis ; however care must be taken that the main roots of the sample trees have not been damaged by soil sampling,

— the trees are different from those used for the crown assessment, in order to avoid the successive samplings introduce loss of foliage ; if stand and site conditions are homogeous on an area larger than the plot where the crown conditions have been assessed, it is advisable to choose the sample trees outside the plot,

— the trees are representative of the mean defoliation level of the plot (± 5 % of the mean foliage loss),

— the trees are representative of the sanitary status of the plot.

The sample trees must be numbered and in case of a repetition of the sampling the same trees shall be used.

Only trees of the main species of the Community are to be sampled (see list below).

The indicated numbers for the trees are the same numbers as used in the species list of the tree condition inventory.

Broadleaves

001 : *Acer campestre*
005 : *Acer pseudoplantanus*
006 : *Alnus cordata*
007 : *Alnus glutinosa*
010 : *Betula pendula*
011 : *Betula pubescens*
013 : *Carpinus betulus*
015 : *Castanea sativa (C. vesca)*
017 : *Eucalyptus* sp.
018 : *Fagus moesiaca*
020 : *Fagus sylvatica*
022 : *Fraxinus excelsior*
023 : *Fraxinus ornus*
028 : *Olea europaea*
029 : *Ostrya carpinifolia*
033 : *Populus hybrides*
034 : *Populus nigra*
035 : *Poplulus tremula*
036 : *Prunus avium*
041 : *Quercus cerris*
042 : *Quercus coccifera*
043 : *Quercus faginea*
044 : *Quercus frainetto*
046 : *Quercus ilex*
048 : *Quercus petraea*
049 : *Quercus pubescens*
050 : *Quercus pyrenaica*
051 : *Quercus robur (Q. pedunculata)*
052 : *Quercus rotundifolia*
053 : *Quercus rubra*
054 : *Quercus suber*
056 : *Robinia pseudoacacia*
068 : *Tilia cordata*

Conifers

100 : *Abies alba*
101 : *Abies borisii-regis*
102 : *Abies cephalonica*
112 : *Juniperus oxycedrus*
115 : *Juniperus thurifera*
116 : *Larix decidua*
118 : *Picea abies (P. excelsa)*

120 : *Picea sitchensis*
121 : *Pinus brutia*
124 : *Pinus contorta*
125 : *Pinus halepensis*
129 : *Pinus nigra*
130 : *Pinus pinaster*
131 : *Pinus pinea*
132 : *Pinus radiata (P. insignis)*
134 : *Pinus sylvestris*
135 : *Pinus uncinata*
136 : *Pseudotsuga menziesii*

II.4. *Date*

Deciduous species (including larch) : sampling must be done when the new leaves are fully developed, and before the very beginning of the autumnal yellowing and senescence.

Evergreen species : sampling must be done during the dormancy period.

Member States are requested to define for each region, and inside each region for plains and mountains, the most convenient period for the sampling and analysis of the various species, and to keep to this period.

II.5. *Selection and quantity of leaves and needles to be sampled*

The trees in the plot cannot be felled, which may influence the sampling method of leaves or needles. As the trees cannot be felled, any convenient way of sampling, taking into consideration kind of stands etc., is acceptable, provided that it does not lead to contamination of the sample, to heavy tree damage, or to risks for the sampling team.

It is important that sampled leaves or needles have developed in full light. Generally speaking the current year needles or leaves of evergreen species are most convenient for judging the nutrition level but, for a number of elements, comparing element concentration in older needles with that in current year needles may be interesting.

The sampled leaves or needles must be taken from the upper third of crown, but not from the very first whorls in the conifers ; in stands where the different whorls can be clearly identified, it is advisable to sample between the seventh and the 15th whorl.

For deciduous species, sampling is done on current year leaves or needles.

For evergreen species, sampling of both the current year needles or leaves and the second year needles or leaves (current + 1) is recommended.

For all species it is necessary to take care that leaves or needles which are sampled are mature ones, especially for species which have several flushes per year (e.g. *Pinus halepensis, Pseudotsuga menziesii, Eucalyptus* sp. *Quercus* sp.

For *Larix* sp. and *Cedrus* sp. samples are taken of the short twigs of the previous year.

In general sampling must be carried out in such a way that all the orientations are represented in the set of sample trees. If necessary it is allowed to sample different orientations on each tree of the sample set. In special sites with evident influence of one orientation (e.g. steep slopes or strong dominant wind) only one orientation is sampled, which always has to be the same. In such cases, it is necessary to document the orientation.

For the analysis of major elements and Fe, Mn Zn, Cu, the recommended quantity is 30 grams of fresh needles or leaves for each sampled age class.

Each country may decide to sample a larger quantity of leaf material, according to the need of its own analytical methods, or in order to conserve samples for the future.

II.6. *Pre-treatment before sending the samples to the laboratories for analysis*

For broadleaves, it may be advisable to detach the leaves from the twigs (and even, in certain species, the small leaves from the axis) but this is not necessary for the conifer needles. The shoots of the current year and those of the second year are separated and preserved in separate bags. The use of pierced high density polyethylene bags is recommended. If possible, samples are dried in a clean room and stored in a cool place in pierced polyethylene bags.

Great care must be taken to clearly mark each sample (forest, number of plot, species, age of needles, etc.) before sending it to the laboratory for analysis. These identifications must be given outside the bag (directly on the bag by indelible ink, or by clasping a label on the bag). It is recommended to repeat these identifications inside the bag on a paper label written with indelible ink. The label should be folded in order to avoid leaves or needle contamination by contact with ink.

II.7. *Treatment before analysis*

It is not necessary to cut the petioles of the leaves but in case of compound leaves it may be advisable to detach the small leaves from the axis if this has not been done in the forest. To avoid contamination, no powdered plastic gloves must be used.

It is not necessary to systematically wash the samples, but it may be advisable in regions with a high level of air pollution or near the sea. The samples shall be washed with water without any additions.

Oven drying must be done at no more than 80 °C for at least for 24 hours. The needles shall be removed from the twigs with the same precautions as for detaching the small leaves from their axis.

Dry samples shall be ground in order to obtain a fine powder, as homogeneous as possible. There will always remain some fibres, depending on the tree species ; this is not a major inconvenience if they are small and if the powder is mixed carefully before taking samples for analysis. For Mn, Fe, Cu, Cd, Al and Pb determination, it has to be assured that the grinder does not contaminate the samples. The grinder may be tested by grinding dried fibrous cellulose and analysing it for these elements before and after the grinding.

II.8. *Chemical analyses*

Only the total element concentration is determined.

In the "Manual on methodologies for leaf and needle sampling and analyses (1993)," prepared by the Foliar Expert Panel of the ICP-forests, the indicative methods for the analysis of the various foliar parameters are described. Each country is allowed to use its national methods, but it is necessary to compare the total element concentrations obtained by national methods with those certified on the reference standard samples.

The survey on the chemical content of needles and leaves is optional. If such a survey is carried out, a distinction is made between mandatory and optional parameters. Member States are free to analyse more, all, or part of the optional parameters. The analysis results shall be reported using Forms 5b and 5c.

Form 5a : Contents of reduced plot file to be used in combination with the survey on the chemical content of needles and leaves

1 - - 4	6 - 7	9 - - 12	14 - - - 18	20 - - - 25	27 - - - - - 33	35 - - - - - 41	43 - 44	46 - - - - - 56
Sequence	Country	Plot number	Sample number	Sampling date (D D M M Y Y)	Latitude coordinate (+ D D M M S S)	Longitude coordinate (± D D M M S S)	Altitude	Observations
1			.					
2			.					
3			.					
4			.					
5			.					
6			.					
7			.					
8			.					
9			.					
10			.					
11			.					
12			.					
13			.					
14			.					
15			.					
16			.					
17			.					
18			.					
19			.					
20			.					
21			.					
22			.					
23			.					
24								

Column

1 — 4 Sequence number of plots (1 to 9999)

6 — 7 Country code (France = 01, Belgium = 02, etc.)

9 — 12 Plot number (maximum 9999)

14 — 18 Sample number (tree species code - leaves type). Tree species (from 001 to 199) and leaves type for current leaves (= 0) and current + 1 (= 1)

20 — 25 Date of sampling in DD MM YY (e.g. 220690)

27 — 33 Latitude in + DD MM SS (e.g. + 505852)

35 — 41 Longitude in (+ or −) DD MM SS (e.g. + 035531)

43 — 44 Altitude (in 50 meter classes from 1 to 31)

In the last column a remark on the plot can be included :

46 — 56 Other observations (in words).

Form 5b : Contents of file with foliar analysis information (mandatory parameters)

Sequence number	Plot number	Sample number	Date of analysis (DD MM YY)	Tree numbers in composite sample			Mandatory parameters						Observation
							N (mg/g)	S (mg/g)	P (mg/g)	Ca (mg/g)	Mg (mg/g)	K (mg/g)	
1 - - - 5	7 - - 10	12 - - - 16	18 - - - - 23	25 - 27	29 - 31	33 - 35	37 - - - 41	43 - - - 47	49 - - 52	54 - - - 58	60 - - - 64	66 - - - 70	72 - 82
1		-					-	-	-	-	-	-	
2		-					-	-	-	-	-	-	
3		-					-	-	-	-	-	-	
4		-					-	-	-	-	-	-	
5		-					-	-	-	-	-	-	
6		-					-	-	-	-	-	-	
7		-					-	-	-	-	-	-	
8		-					-	-	-	-	-	-	
		-					-	-	-	-	-	-	
9 9 9 9 9	9 9 9 9	1 9 9 - 1	3 1 1 2 9 5	9 9 9	9 9 9	9 9 9	9 9 - 9 9	9 9 - 9 9	9 9 - 9 9	9 9 - 9 9	9 9 - 9 9	9 9 - 9 9	
							Maximum value (*)						

1 — 5	Sequence number	Sequence number of samples (1 to 99 999)
7 — 10	Plot number	(maximum 9999)
12 — 16	Sample number	Tree species. leaves type ; tree species (from 001 to 199) and leaves type for current (= 0) and current + 1 (= 1)
18 — 23	Date	Date of analysis (DD MM YY)
25 — 27	Tree number of first tree from which foliage has been taken	
29 — 31	Tree number of second tree from which foliage has been taken	
33 — 35	Tree number of third tree from which foliage has been taken	

Mandatory parameters		Units (**)
37 — 41	N	mg/g
43 — 47	S	mg/g
49 — 52	P	mg/g
54 — 58	Ca	mg/g
60 — 64	Mg	mg/g
66 — 70	K	mg/g
72 — 82	Observation	in words

For *Larix* sp. and *Cedrus* sp., samples are taken of the short twigs of the previous year

(*) Maximum values are used when the actually registered value is equal or higher than the maximum value. When the actual registered value is below the minimum value that could be entered, the minimum value shall be used. If no quantity could be measures (i.e. below detection limits) a special code — 1 (minus 1) will be used. When no analysis has been carried out for this parameter a zero or blank shall be used.

(**) By reference at 105 ° dried material.

Form 5c : Contents of file with foliar analysis information (optional parameters)

Sequence number	Plot number	Sample number	Date of analysis (DD MM YY)	Optimal parameters								Observation
				Na	Zn	Mn	Fe	Cu	Pb	Al	B	
				(µg/g)	(µg/g)	(µg/g)	(µg/g)	(µg/g)	(µg/g)	(µg/g)	(µg/g)	
1 - 5	7 - 10	12 - - - 16	18 - - - - 23	25 - 30	32 - 36	38 - 43	45 - 49	51 - 55	57 - 60	62 - 66	68 - 72	74 - 84
		-						-	-			
2		-						-	-			
3		-						-	-			
4		-						-	-			
5		-						-	-			
6		-						-	-			
7		-						-	-			
8		-						-	-			
		-						-	-			
9 9 9 9 9	9 9 9 9	1 9 9 - 1	3 1 1 3 1 1	9 9 9 9 9 9	9 9 9 9 9 9	9 9 9 9 9 9	9 9 9 9 9 9	9 9 - 9 9	9 9 - 9	9 9 9 9 9	9 9 9 9	
												maximum value (*)

1 — 5	Sequence number	Sequence number of samples (1 to 99 999)
7 — 10	Plot number	(maximum 9999)
12 — 16	Sample number	Tree species (from 1 to 199) and leaves type ; current (= 0) or current + 1 (= 1)
18 — 23	Date	Date of analysis (DD MM YY)

Optional parameters		Units (**)
25 — 30	Na	µg/g
32 — 36	Zn	µg/g
38 — 43	Mn	µg/g
45 — 49	Fe	µg/g
51 — 55	Cu	µg/g
57 — 60	Pb	µg/g
62 — 66	Al	µg/g
68 — 72	B	µg/g
74 — 84	Observation	in words

For *Larix* sp. and *Cedrus* sp., samples are taken of the short twigs of the previous year

(*) Maximum values are used when the actually registered value is equal or higher than the maximum value. When the actual registered value is below the minimum value that could be entered, the minimum value shall be used. If no quantity could be measures (i.e. below detection limits) a special code — 1 (minus 1) will be used. When no analysis has been carried out for this parameter a zero or blank shall be used.

(**) By reference at 105 ° dried material.

EXPLANATION OF FORMS 5a, 5b AND 5c

Code lists of the data for the survey on the chemical content of needles and leaves to be forwarded to the Commission

Form 5a : Information on plot level (to be comleted at the time of sampling in the field)

1. *Country*

01 : France
02 : België-Belgique
03 : Nederland
04 : Deutschland
05 : Italia
06 : United Kingdom
07 : Ireland
08 : Danmark
09 : Ellas
10 : Portugal
11 : España
12 : Luxembourg.

2. *Observation plot number*

The observation plot number corresponds to the number indicated for the intersection of the grid at this point on the list of latitude and logitude coordinates provided by the Commission (Forests and Forestry Division) and/or replacements. The observation plots numbers shall correspond to the plot numbers of the tree vitality inventory (Annex I) in the corresponding year.

3. *Sample number*

The sample number consists of the tree species code and the type of the leaves or needles in the sample. The tree species codes are listed in paragraph II.3. The code for the leaves type is 0 for the current leaves and 1 for the leaves of last year (= current + 1) e.g. 118.1 for the needles of last year for the *Picea abies.*

4. *Date of sampling*

The date of sampling is to be completed in the following order:

e.g.

Day	Month	Year
08	09	94

5. *Latitude/longitude coordinates*

Fill in the full six figure latitude and longitude coordinates of the observation plot. These coordinates will differ from the coordinates of the corresponding plot of the network provided by the Commission when the observation plot in question has been replaced as instructed in paragraph II.1 of Annex I.

e.g.

	+/−	Degrees		Minutes		Seconds	
— latitude	+	5	0	1	0	2	7
— longitude	−	0	1	1	5	3	2

the first box is used to indicate a + or − coordinate.

6. *Altitude*

1 : ≤ 50 m
2 : 51 — 100 m
3 : 101 — 150 m
4 : 151 — 200 m
5 : 201 — 250 m
6 : 251 — 300 m
7 : 301 — 350 m
8 : 351 — 400 m
9 : 401 — 450 m
10 : 451 — 500 m
11 : 501 — 550 m
12 : 551 — 600 m
13 : 601 — 650 m
14 : 651 — 700 m
15 : 701 — 750 m
16 : 751 — 800 m
17 : 801 — 850 m
18 : 851 — 900 m
19 : 901 — 950 m
20 : 951 — 1 000 m
21 : 1 001 — 1 050 m
22 : 1 051 — 1 100 m
23 : 1 101 — 1 150 m
24 : 1 151 — 1 200 m
25 : 1 201 — 1 250 m
26 : 1 251 — 1 300 m
27 : 1 301 — 1 350 m
28 : 1 351 — 1 400 m
29 : 1 401 — 1 450 m
30 : 1 451 — 1 500 m
31 : > 1 500 m

7. *Other oberservations*

Relevant information concerning the plot shall be stated here.

Form 5b : Foliar sampling results, mandatory parameters (to be completed after the analysis in the laboratory)

Observation plot number

See explanation item 2 in Form 5a.

Sample number

See explanation item 3 in Form 5a.

8. *Date of analysis*

The date of the start of the analysis shall be completed in the same way as the date of sampling (Form 5a, item 4).

9. *Tree numbers*

The same trees are sampled over the years. These trees are numbered.

10. *Foliar analysis*

The following parameters are mandatory :

N, S, P, Ca, Mg and K.

Methods for analysis are descripted in the Manual of the Foliar Expert Panel, approved in the Task Force meeting of May 1993.

For deciduous species, sampling is done on current year leaves or needles. For evergreen species, sampling of both the current year needles or leaves and the second year needles or leaves (current + 1) is recommended.

11. *Other observations*

Any additional observation which may be of interest shall be clearly noted on the form,

e.g. orientation, fertilization/liming ...

Form 5c : Foliar sampling results, optional parameters (to be completed after the analysis in the laboratory)

Observation plot number

See explanation item 2 in Form 5a

Sample number

See explanation item 3 in Form 5a

12. *Date of analysis*

The date of the start of the analysis shall be completed in the same way as the date of sampling (Form 5a, item 4).

13. *Foliar analysis*

The following parameters are optional :

Na, Zn, Mn, Fe, Cu, Pb, Al and B.

Methods for analysis are descripted in the Manual of the Foliar Expert Panel, approved in the Task Force meeting of May 1993.

14. *Other observations*

Any additional observation which may be of interest shall be clearly noted on the form,

e.g. orientation, fertilization/liming ...'

ANNEX IV

The following Annex is added to Regulation (EEC) No 1696/87:

'ANNEX VIII

REPORT ON THE CHEMICAL CONTENT OF NEEDLES AND LEAVES (ARTICLE 3b)

Each Member State participating in this survey, shall submit besides the data of the survey on the chemical content of needles and leaves (as detailed in Annex VII), a report on the chemical content of needles and leaves. This report shall be based in particular on data collected from foliar sampling of the plots of the 16 km × 16 km network. Furthermore the Member States shall present summarized results of national foliage surveys.

The national report shall contain information on the following subjects:

I. **General information on the execution of the survey on the chemical content of needles and leaves**

— National forested area

— Total area covered by network(s)

— Total number of observation plots

— Total number of plots sampled in the tree condition inventory (1993 or 1994)

— Total number of plots sampled in the forest foliage inventory

— Number of single samples per composite sample

— Sampling period

— Analysis and processing of data

— Fertilization, liming (type of fertilization, quantity, year)

— Problems encountered

II. **Methodology of sampling, analysis and processing**

In Annex VII, the methodology has been described, specifying the sampling, pre-treatment before sending the samples to the laboratories, treatment before analysis and chemical analysis of foliar samples.

A part should be devoted to describe the actually used analysis methods in detail.

II.1. *Sampling method in the field*

If the sampling is done in full accordance with the described method (as detailed in Annex VII), this shall be stated in the report. Any differences from the described method shall be explained in detail, including clear explanations of any regional differences. In special sites with evident influence of one orientation, it is necessary to document the orientation.

II.2. *Transport, storage and preparation*

The samples shall be transported and stored in such a way that no chemical changes can occur to the sample. The procedures of this transport, and storage (including waiting periods) shall be reported. Where applicable the problems and deviations of these procedures shall be reported in detail.

II.3. *Analysis methods*

A chapter will be devoted to the description of the methods actually used, problems encountered and the methods in which the analysis results have been corrected, calibrated, or converted.

Each country is allowed to use its national methods. In order to be sure of the accuracy of these methods, steps of quality assurance are to be foreseen. Statements on the quality control shall be included in the report.

II.4. *Processing of data*

An evaluation of the foliar analysis data is prepared. An explanation shall be given of the processing methods, the statistical analysis, and the total evaluations that have been used to arrive at the reported values. It is recommended that the evaluation shall include possible relations between the foliar results, the soil results and the recorded forest damage.

III. **Foliar analysis results**

Results shall be presented to the Commission in accordance with the instructions as stated in the "Submission of data of the foliar analysis in a digital format" (see Annex VIc).

IV. **Information regarding chemical content of needles and leaves**

A section of the national report shall be devoted to the analysis of any other important information for the explanation of the detected foliar content in particular with reference to atmospheric pollution. Results of any correlations made between different types and stages of forest damage (defoliation, discolouration, other signs of damage) and the measured foliar contents should be included in the report.'