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COMMISSION OF THE EUROPEAN COMMUNITIES

COM(84) 175 final

Brussels, 28 March 1984

Communication from the Commission to the Council
and to the European Parliament
on the application by the Member States of Directive 78/176/EEC on
waste from the titanium dioxide industry pursuant to Article 14
(1978-81)

COM(84) 175 final

BACKGROUND1.- Introduction

On 20 February 1978 the Council adopted Directive 78/176/EEC on waste from the titanium dioxide industry (1). The Directive is designed to prevent, progressively reduce and finally eliminate the pollution caused by the waste arising in the titanium dioxide industry.

The various articles of the Directive provide in particular that :

- waste is disposed of without endangering human health and without harming the environment (Article 2);
- Member States shall take appropriate measures to encourage the prevention, recycling and processing of waste, the extraction of raw materials, and any other process for the re-use of waste (Article 3);
- the discharge, dumping, storage, tipping and injection of waste are prohibited unless prior authorization is issued by the competent authority of the Member State in whose territory the waste is produced. Prior authorization must also be issued by the competent authority of the Member State
 - . in whose territory the waste is discharged, stored, tipped or injected;
 - . from whose territory it is discharged or dumped (Article 4);
- any disposal of waste shall be accompanied by the monitoring of the waste and of the environment concerned having regard to its physical, chemical, biological and ecological aspects (Article 7).

(1) O.J. L 54, 25.2.1978.

Pursuant to this last article, and on a proposal from the Commission, the Council adopted in December 1982 the proposal for a Directive on procedures for the surveillance and monitoring of the environments concerned (1).

- The competent authority in the Member State concerned shall take all appropriate steps to remedy one of the situations specified in Article 8 and, if necessary, shall require the suspension of discharge, dumping, storage, tipping or injection operations.
- Member States shall draw up programmes for the progressive reduction of pollution in respect of existing industrial establishments (2) (Article 9 (1)). The programmes shall also contain information on the state of the environment concerned, on measures for reducing pollution and on methods for treating waste directly arising from the manufacturing processes (Article 9 (2)).

Pursuant to this Article, the Commission sent to the Council on 18 April 1983 a proposal for a Directive on procedures for harmonizing the programmes for the reduction and ultimate elimination of pollution caused by waste from the titanium dioxide industry (3).

- New industrial establishments shall be subject to prior authorization by the Member States. Such authorizations must be preceded by environmental impact surveys. They may be granted only to firms which give an undertaking to use only such of the materials, processes and techniques available on the market as are least damaging to the environment (Article 11).
- Every three years, the Member States concerned, i.e. Belgium, France, Germany, Italy, the Netherlands and the United Kingdom shall prepare a report on the prevention and progressive reduction of pollution caused by waste from the titanium dioxide industry and forward it to the Commission, which communicates it to the other Member States (Article 14, first paragraph).

(1) O.J. L 378, 31.12.1982 (82/883/EEC).

(2) Establishments already set up at the date of notification of this Directive (Article 1(2) (d)).

(3) O.J. C 138, 26.5.1983, pp. 5-7.

Pursuant to this provision, the Commission arranged the information in comparable form and, having obtained the Member States' approval for the new version, sent them the report in June 1983;

- The Commission shall report every three years to the Council and to Parliament on the application of the Directive (Article 14, second paragraph).

This document fulfils the obligation in this provision.

2.- Purpose of the report

- 2.1.- The report summarizes achievements regarding the prevention and reduction of pollution and appraises the means of controlling pollution employed by the Member States.

This is an initial report and represents one stage only in the practical application of the Directive. The present TiO_2 production plants in the Community are "existing industrial establishments" within the meaning of the Directive. They will have to comply with whatever the Council decides regarding the Commission's proposal for a Directive on procedures for harmonizing the programmes for the reduction and eventual elimination of pollution (1).

To apply the decisions which are taken, waste-treatment facilities and even changes to current TiO_2 production methods will, in certain cases, have to be planned, financed and implemented.

- 2.2.- This report by the Commission is based on the information submitted by the Member States pursuant to the first paragraph of Article 14.

The Commission would emphasize that little information was supplied by the Member States concerning certain categories of waste and the provision made or planned for reducing the pollution.

(1) O.J. C 138, 26.5.1983, pp. 5 - 7.

b.- Results relating to the prevention and progressive reduction of pollution

The results concerning the application of Directive 78/176/EEC are summarized by Member States concerned, each category of waste - liquid, gaseous and solid - being discussed as a whole.

3.1.- Belgium

TiO₂ is produced at two establishments, both of which use the sulphate process : NL Chemicals, Ghent and NV BAYER, Antwerp. Production capacity is 40.000 tpy and 25.000 tpy respectively.

a) Liquid wastes

Strong acids, i.e. effluents with about 20 - 23 % sulphuric acid, are discharged into the North Sea without prior treatment.

These effluents contain various metals, the average annual content of which between 1978 and 1980 was as follows : Fe, 5 400 t; Mg, 1 500 t; Ti, 680 t; Cr, 52 t; and Mn, 80 t. However, the effluents are subject to a licensing procedure which lays down the discharge zones, disposal arrangements and related checks in order to reduce the environmental impact of such wastes.

The annual discharge in both 1979 and 1981 was about 620 000 t, as compared with about 495 000 t in 1980. At one of the establishments, about 20 % of the strong acids are reused in production, while the weak-acid effluent is discharged into either the Ghent-Terneuzen Canal or the Scheldt. At one of the plants, the effluent has been neutralized and decanted before discharge since 1978.

b) Solid wastes

Only one industrial establishment stores insoluble residus on land after suitable treatment.

Given the ore used and the process, little or no copperas should result.

c) Gaseous wastes

The results of the measures taken indicate that emissions are below the limits set by the Belgian authorities.

d) Conclusion

On the basis of the information supplied, the Commission finds that Belgium has implemented the Directive only in part, i.e. as regards solid wastes and weak-acid effluent.

The Commission is pleased to note that one establishment is recycling a certain percentage of its strong acids in order to reduce discharges, but very much regrets that this technology is not used at the other establishment.

Finally, the Commission would point out that the Court of Justice of the European Communities delivered a judgment (1) on 2 February 1982, the operative part of which is as follows :

"By not adopting within the prescribed period the provisions necessary to comply with Council Directive 78/176/EEC of 20 February 1978 on waste from the titanium dioxide industry (O.J. n° L 54, of 25 February 1978, p. 19), the Kingdom of Belgium has failed to fulfil its obligations under the EEC Treaty."

(1) O.J. n° C 75, 26.3.1982
(Case 68/81).

3.2.- Federal Republic of Germany

Annual production capacity is about 310 000 tonnes (1980). It is spread over four production units using the sulphate process (BAYER I at Krefeld-Uerdingen, Kronos Titan I at Leverkusen and Nordernham, and Sachtleben Chemie at Duisburg) and over two units using the chloride process (Bayer II at Krefeld-Uerdingen and Kronos Titan II at Leverkusen).

a) Liquid wastes

The quantity of acid effluent discharged at sea after prior authorization fell from 1 800 000 t in 1978 to 1 640 000 t in 1981. The actual liquid quantity is in fact somewhat lower, since these figures include the insoluble residues and the copperas from the Kronos Titan establishment at Nordernham.

b) Solid wastes

The action carried out between 1978 and 1981 consisted of the total recovery of the copperas from the Kronos Titan plant at Leverkusen and the partial reduction of the amount discharged into the aquatic environment from the same company's plant at Nordernham.

For the same period, the quantity of copperas discharged after authorization fell from 150 000 to 110 000 tpy, with an equivalent rise in the quantity recycled.

The German authorities believe that discharges of this waste can be completely eliminated during 1984.

The insoluble tailings from the Kronos-Titan plant at Nordernham, which are currently discharged into the aquatic environment, will have to be treated so that they can be stored on dry land.

(1) "Copperas" is the common name for heptahydrate ferrous sulphate ($\text{FeSO}_4 \cdot 7\text{H}_2\text{O}$) resulting from the reduction and crystallization of the solutions for attacking the ilmenite.

c) Gaseous wastes

The overall annual load of SO₂ was reduced by about 840 tonnes of sulphur equivalent.

d) Conclusion

As regards solid wastes (copperas and insoluble residues), the Federal Republic of Germany has taken appropriate measures, in accordance with Article 3 of the Directive, for encouraging the prevention, recycling and conversion of this type of waste.

However, the quantity of liquid waste discharged to sea remains considerable. One must be thankful, therefore, that in order to solve this problem as quickly as possible, the German authorities have tightened up the obligations in respect of discharges and, together with industry, are financing R&D projects for the re-use of weak-acid effluent.

As regards measures taken to reduce pollution resulting from the chloride process, the Commission cannot express an opinion, as it has no detailed information.

3.3.- France

In France, Titanium dioxide is produced at the following three establishments :

THANN et MULHOUSE's plants at Thann and Le Havre and the TIOXYDE establishment at Calais. All three use the sulphate process, and their respective production capacities are 24 000, 80 000 and 65 000 tpy.

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a) Liquid wastes

The total quantity of wastes discharged into the aquatic environment during 1979 and 1980 fell by about 25.2 %, the reduction in the separate categories being approximately :

- 22.2 % in respect of undissolved raw materials,
- 53.6 % in respect of ferrous sulphate (as FeSO_4), and
- 23.7 % in respect of strong acid (concentrated; as SO_4).

Reservoirs have been installed to store the liquid effluent when optimum conditions for diffusion or discharge at sea are not present.

b) Solid wastes

The wastes resulting from attacking the ore (insoluble residues) and from neutralizing (a) the acid effluent (at the THANN et MULHOUSE plant at Thann) and (b) the copperas are stored on dry land in suitable ponds so as to avoid any pollution of underground or surplus waters.

The use of slag (ore with a high TiO_2 concentration) as the raw material has made it possible to reduce discharges of copperas in particular. Finally, there has been an expansion in the recovery of this waste in the form of ferrous sulphate or chloro-sulphate.

c) Gaseous waste

The installation of specific gas-scrubbing equipment at the various production stages has made it possible to reduce pollution from such wastes significantly. Recent installations have been equipped with high stacks to ensure better diffusion of the gases produced.

d) Conclusion

The French authorities have taken suitable steps to implement Article 3 of the Directive, especially as regards solid wastes (utilization of enriched TiO_2 ore, storage of insoluble residues, increased recovery - and reduced discharge - of copperas).

As regards liquid wastes, there has been a decline in the quantity discharged into the aquatic environment, but despite everything the concentration of sulphate is still high, even though there has been some progress here too.

The Commission hopes, that as a result of the studies at present being carried out in the various fields, it will be possible to improve the production process and reduce pollution from liquid and gaseous discharges.

The Commission has noted that all the liquid wastes from one establishment are completely neutralized before being discharged into the aquatic environment and that all solid wastes are stored on appropriate prepared sites.

3.4.- Italy

At the date of notification of the Directive, titanium dioxide was produced by SPA MONTEDISON at Spinetta Marengo and SPA SIBIT at Scarlino (respective production capacities : 42 000 and 54 000 tpy). From August 1979 production at the Spinetta Marengo plant was suspended. It is not planned at the moment to bring this establishment back on stream.

a) Liquid wastes

The treatment of acid effluent with calcium carbonate and lime and the dumping at sea, below the euphotic zone, of the mud resulting from neutralization are being continued. As regards the surplus quantities which cannot be dumped, the specific techniques relating to the suitable treatment of the sludges with a view to storing them on dry land have been fully developed.

b) Solid wastes

The use of a richer TiO_2 basic ore since the spring of 1980 has meant that copperas is no longer obtained as a by-product. The existing copperas, which was stored in a suitable pond before the new ore was introduced, is gradually being recycled. The insoluble residues are also being stored on the ground.

c) Gaseous wastes

Gases and dusts which are likely to pollute are suitably scrubbed (i.e. gases from the ore-digestion towers, the calcination furnaces and the reactors for neutralizing the acid effluent). A sensing network has been set up over a wide area, so that the contents of nitrogen oxides, sulphur and suspended particulates in the escaping gases can be evaluated.

d) Conclusion

The Commission is glad to learn that the Italian authorities have taken measures applying the Directive, especially as regards solid wastes (copperas and insoluble residues).

The Commission has noted that, in order to reduce the noxiousness of and the pollution caused by liquid wastes, the Italian authorities have opted for neutralization rather than recycling.

The information so far available would seem to indicate that the wastes are disposed of without harming the environment.

3.5.- The Netherlands

There is only one establishment in the Netherlands and that uses the sulphate process : TDF TIOFINE BV, Rotterdam, with a production capacity of about 35 000 tpy.

a) Liquid wastes

In 1979 the competent authorities authorized TIOFINE to discharge its effluent into the Nieuwe Waterweg, with the provision that it should cease such discharges within two years of the authorization coming into effect. The underlying idea is that, to stop the discharges, the company must either treat the recipient medium containing the sulphuric acid released or convert to another manufacturing process.

TIOFINE has appealed against the authorization decision.

b) Solid wastes

The use of a richer TiO_2 ore (approximately 78 %) in a few years' time will make it possible to reduce the quantity of ferrous waste by about 25 %.

c) Gaseous wastes

Between 1978 and 1981 the establishment concentrated on air-pollution problems.

The methods of scrubbing the calcination gases have been improved. The total emission of sulphuric acid has been reduced to below 50 % of the maximum threshold value allowed (5 kg H_2SO_4/h). Studies are being carried out with a view to improving the scrubbing of the gases produced in the ore-digestion towers.

d) Conclusion

The Dutch authorities have taken measures to reduce the pollution caused in particular by the discharge of liquid effluents. However, it has not been possible to apply such measures, as TIOFINE has appealed to the Crown against the authorization decision.

Moreover, as little information regarding the various types of discharge and the state of the environments concerned has been submitted, the Commission cannot express an opinion on the implementation of the Council Directive.

3.6.- United Kingdom

At 20 February 1978 (the date when the Directive was adopted), there were four production units in the United Kingdom, namely :

- BTP TIOXYDE at Billingham and Grimsby with respective production capacities of 30 000 and 100 000 tpy (sulphate process in both cases);
- BTP TIOXYDE at Greatham, with a production capacity of 50 000 tpy (chloride process);
- LAPORTE Industries at Stallingborough, with a production capacity of 94 000 tpy (both processes).

These plants are situated near rivers flowing into the North Sea (the Tees and the Humber).

When the United Kingdom submitted its programmes for reducing pollution in July 1980 and January 1981, the situation with regard to the three kinds of waste was as follows :

a) Liquid wastes

- The Billingham plant, which operates the sulphate process, was capable of discharging a maximum of 14 000 m³ per day into the aquatic environment. These discharges contained about 200 tonnes of 100 % H₂SO₄, 21 tonnes of insoluble residues (dry matter) and 38 tonnes of dissolved ferrous sulphate. In 1980 this plant was closed and its production capacity transferred to the Greatham plant, which uses the chloride process.
- The Greatham establishment used to discharge about 5 000 m³ per day with a mean concentration of suspended matter of 0.2 g/l, about 95 % of which was titanium dioxide.
- The effluent from the Grimsby plant (sulphate process) was discharged continuously into the aquatic environment subject to an authorized maximum of 25 000 m³ per day. The average composition of the effluent was as follows : 25 g/l acid expressed as free H₂SO₄, 3 g/l suspended matter and 8.5 g/l iron.
- The effluent from the Stallingborough plant (both processes) was mixed with other industrial effluents before being discharged into the aquatic environment. The quantity of effluent from the titanium dioxide production unit was about 38 000 m³ per day. The total effluent discharged was composed as follows : 11 g/l acide expressed as free H₂SO₄, 2 g/l suspended matter and 4.175 g/l iron.

The sulphate unit at Stallingborough has been partially closed and its production capacity transferred to the chloride unit on the same site.

b) Solid wastes

A small quantity of inert and non-toxic wastes produced by the Greatham plant (chloride process) is stored on the ground.

No information has been supplied regarding the chloride unit at Stallingborough nor on what has happened to the insoluble residues and the copperas from the sulphate process. On the basis of the information in paragraph (a), the Commission is inclined to conclude that these wastes are discharged into the aquatic environment once they have been mixed.

c) Gaseous wastes

All discharges to the atmosphere from these industrial establishments are within the presumptive limits set by the UK authorities.

d) Remarks

The UK authorities have submitted no information regarding the quantity of the various wastes of the new production capacities (Articles 1(2)(e) and 11) following the partial closure of one unit at Stallingborough and the total closure of the Billingham plant with the attendant change-over in production from the sulphate to the chloride process.

e) Conclusion

The Commission has noted that the total closure of one sulphate process plant and the partial closure of another, with the transfer of their production capacity to other installations.

The Commission is pleased to report that this production has been shifted to plants which use the less polluting chloride process and that work has been started, notably at Greatham,

on improving filtration and decantation of the effluent and perfecting a catalytic process which will make it possible to stop discharging sodium hypochlorite (catalytic process for the decomposition of sodium hypochlorite into sodium chloride). The Commission regrets that insoluble residues and copperas have not been recycled to a greater extent, and hopes that the projected measures in the reduction programmes under study will make the progressive reduction of these discharges possible, especially where acidic liquid waste is concerned.

As regards the measures taken to reduce pollution from the chloride process, the Commission cannot express an opinion, for lack of information.

4.- Opinion of the Commission

4.1.- The Commission is happy to report that the majority of the Member States concerned have endeavoured to apply Council Directive 78/176/EEC.

- a) As regards the acidic liquid wastes arising in particular from the sulphate process, measures have been taken in certain Member States to reduce the impact of such discharges on the aquatic environment, although the total quantity of such wastes has not been reduced (construction of reservoirs for storing acid effluent, regulation of discharges to suit tidal conditions, increasing the length of discharge pipes, additional use of diffusers).

So that the pollution from the sulphate process can be progressively reduced, the Commission hopes that the studies being carried out in the Member States (e.g. on the reutilization of strong acids and the use of low-concentration sulphuric acid) will make it possible to find a satisfactory solution from both the technical and the economic viewpoints, and that industrial applications will rapidly materialize.

b) As regards solid wastes, there has been a reduction in the discharge of copperas and insoluble residues into the aquatic environment. In the case of copperas, such a reduction has generally been the result of using a richer TiO_2 ore.

c) Gaseous wastes are generally speaking lower, or comply with national limit values. The latter do not always seem to be identical.

4.2.- The Commission regrets that the reports on the prevention and progressive reduction of pollution drawn up by the Member States pursuant to the first paragraph of Article 14 of the Directive are not always exhaustive as regards the different types of waste, and that sometimes essential points have not been covered; if they had been, the Commission could have drawn more detailed conclusions.

The Commission would point out that little or no information on the chloride process was supplied in the reports.

Finally, it should be noted that various approaches have been adopted by the Member States in respect of the discharge of liquid wastes into the aquatic environment : recycling, neutralization and controlled discharge into the aquatic environment without prior treatment.

4.3.- In view of the experience acquired in this particular field, the Commission intends to draw up a questionnaire for the second report, the answers to which will enable the Commission to report more fully to the Council and to Parliament on the application of this Directive by the Member States.