II

(Acts whose publication is not obligatory)

COMMISSION

COMMISSION DECISION

of 4 December 1996

declaring a concentration to be incompatible with the common market and the functioning of the EEA Agreement

(Case No IV/M.774 — Saint-Gobain/Wacker-Chemie/NOM)

(Council Regulation (EEC) No 4064/89)

(Only the English text is authentic)

(Text with EEA relevance)

(97/610/EC)

THE COMMISSION OF THE EUROPEAN COMMUNITIES,

Having regard to the Treaty establishing the European Community,

Having regard to the Agreement on the European Economic Area, and in particular Article 57 thereof,

Having regard to Council Regulation (EEC) No 4064/89 of 21 December 1989 on the control of concentrations between undertakings [1], as amended by the Act of Accession of Austria, Finland and Sweden, and in particular Article 8 (3) thereof,

Having regard to the Commission Decision of 31 July 1996 to initiate proceedings in this case,

Having given the undertakings concerned the opportunity to make known their views on the objections raised by the Commission,

Having regard to the opinion of the Advisory Committee on Concentrations [2],

WHEREAS:

(1) On 1 July 1996 Société Européennes des Produits Réfractaires, Courbevoie ('SEPR'), Elektroschmelzwerk Kempten GmbH, Munich ('ESK'), and NV Noordelijke Ontwikkelingsmaatschappij, Groningen ('NOM'), jointly notified the creation of a joint venture under Dutch law for the manufacture, processing, marketing and sale of silicon carbide. SEPR will acquire 60 % and ESK and NOM will each acquire 20 % of the share capital of the newly created company.

(2) After examination of the notification, the Commission has concluded that the notified operation constitutes a concentration falling within the scope of Council Regulation (EEC) No 4064/89 ('the Merger Regulation').

(3) In order to ensure the full effectiveness of any decision taken later pursuant to Article 8 (3) or (4), on 22 July 1996 the Commission decided, pursuant to Articles 7 (2) and 18 (2) of the Merger Regulation, to continue the suspension of the concentration in question until a final decision is reached in this case.

(4) By decision dated 31 July 1996, the Commission found that the proposed concentration raised serious doubts as to its compatibility with the common market. The Commission accordingly initiated proceedings pursuant to Article 6 (1) (c) of the Merger Regulation. On 20 September 1996 the Commission, in accordance with Article 18 (1) of the Merger Regulation, submitted its objections to the parties to the proposed operation.

[1] OJ L 395, 30. 12. 1989; corrigendum: OJ L 257, 21. 9. 1990, p. 13.
[2] OJ C 274, 10. 9. 1997.

I. THE PARTIES

(5) SEPR is a French company active in the manufacture of fused-cast refractory products used mainly for glass furnaces. Its ultimate parent company is the French Compagnie de Saint-Gobain SA, Paris ('Saint-Gobain')([3]). SEPR handles the worldwide activities of Saint-Gobain's industrial ceramics division. Besides industrial ceramics, the Saint-Gobain group is mainly active in the manufacture and sale of flat glass, insulation, fibre reinforcement and building materials, abrasives, pipes and glass containers. The group's silicon carbide business is in the hands of its subsidiaries Norton AS, Norway ('Norton'), and Intermat SA, Belgium ('Intermat'). The Saint-Gobain group of companies had a total worldwide turnover of ECU 10 775 million in 1995, of which ECU [. . .]([4]) million was generated within the Community.

(6) ESK incorporates the material business unit of Wacker-Chemie GmbH, Munich ('Wacker Chemie')([5]). Wacker-Chemie is a German chemicals group jointly controlled by Hoechst AG and the Wacker family([6]). Apart from the materials business the company is active in the manufacture and sale of silicones, polymers, hyper-pure silicon-based semiconductors and poly-silicon. ESK's silicon carbide business consists of its Dutch subsidiary Elektroschmelzwerk Delfzijl BV, Delfzijl ('ESD'), and its processing plants in Grefrath and Kempten in Germany. Wacker-Chemie had a total worldwide turnover of ECU 2 091 million in 1995. Hoechst AG is one of the world's largest manufacturers of chemicals and pharmaceuticals and had a total worldwide turnover of ECU 28 181 million, of which ECU [. . .] million was generated within the Community.

(7) NOM is a private investment and development company for the northern provinces of the Netherlands. Its shares are held by the Netherlands Government (99,97 %). NOM offers entrepreneurs advisory and financing services and, in particular, invests in the share capital of companies that are regarded as important for the economy of the Northern Netherlands. The company had a turnover of ECU 10 million in 1995.

II. THE OPERATION

(8) On 27 June 1996 SEPR, ESK and NOM signed a contract to establish and to incorporate a Dutch joint venture in the form of a BV (public limited company). Shortly after its incorporation the new joint venture will establish and incorporate a German subsidiary in the form of a GmbH. Under the terms of the agreement, the new Dutch joint venture will acquire all the assets of ESK's Dutch subsidiary ESD and, through its newly created German subsidiary, will acquire all the assets of ESK's processing facilities in Grefrath as well as some assets of ESK's processing plant in Kempten which are dedicated to the silicon carbide business. The assets to be acquired from ESD are the production equipment of ESD's plant in Delfzijl, the stocks of raw materials and finished products, the accounts receivable, the silicon carbide order book of ESK as well as the intangible assets relating to the silicon carbide business. The assets to be acquired from ESK's Grefrath plant are the land and buildings, plant equipment, and all the other assets related to the silicon carbide business. Not included in the joint venture and therefore retained by ESK are the land and buildings of its Kempten plant, and all the assets specially related to the other non-silicon carbide activities conducted by ESK or Wacker-Chemie in the Kempten plant. The joint venture will control the silicon carbide production in Delfzijl and will coordinate the processing in Grefrath via its newly created German subsidiary.

(9) The notified operation does not include Wacker-Chemie's 50 % interest in the US company Exolon-ESK, Tonawanda/New York. Therefore, the 50 % interest that Exolon-ESK holds in the Norwegian company Orkla-Exolon AS KS is not included either. [. . .]. In Article 9.1 of the Joint Venture Agreement the parties have agreed that the coming into force of the proposed concentration is subject to the condition precedent that Wacker-Chemie is no longer the indirect shareholder of any of the abovementioned companies. In Article 9.2 of the Agreement the parties have agreed that the joint venture agreement will not come into force should Wacker-Chemie, six months from the day of its conclusion, still be a shareholder in these companies.

([3]) Saint-Gobain holds 20,5 % of the capital directly and 79,4 % indirectly via its subsidiary Vertec.

([4]) In the published version of the Decision, some information has been omitted, pursuant to the provisions of Article 17 (2) of Council Regulation (EEC) No 4064/89 concerning non-disclosure of business secrets (hereinafter indicated by [. . .]). However, for a better understanding of the text, exact figures have been replaced by ranges or some general information has been given in a footnote in those cases where it was possible to do so without violating the non-disclosure requirement for business secrets.

([5]) Wacker-Chemie owns 99,67 % of ESK's share capital.

([6]) See Case IV/M.284 — Hoechst/Wacker, OJ C 171, 22. 6. 1993, p. 4, paragraph 3.

(10) In addition to the abovementioned transfers of assets the parties have also agreed that the new Dutch joint venture will enter into a Licence and Technical Assistance Agreement with Norton for the purpose of transferring certain technology and technical assistance from Norton to the joint venture, for a consideration in the form of royalties at the rate of [...] of the joint venture's net sales. Furthermore, the parties have agreed that the joint venture will enter into a Toll Manufacturing Agreement with ESK relating to the manufacture by ESK of silicon carbide micro grits and powders for the joint venture for a transitory period of three years. After the expiry of the three-year period, the production line in ESK's Kempten plant will be closed, and some of its assets (machinery) will be transferred to the joint venture's plants in Grefrath or Delfzijl.

III. THE CONCENTRATION

Joint control

(11) The proposed joint venture will be jointly controlled by SEPR, ESK and NOM. The parent companies will hold differing proportions of the joint venture. However, no single shareholder will have the power to determine the strategic decisions of the joint venture. The Joint Venture Agreement provides for a shareholders' meeting, a Supervisory Board and a Management Board to be put in place in the joint venture. The Management Board of the proposed joint venture will be responsible for the day-to-day management and decide by simple majority. SEPR will have the right to propose the president of the Management Board who will be responsible for determining the number and functions of the other members of the Management Board. He will be appointed by a unanimous vote of the shareholders' meeting. If unanimity cannot be reached, SEPR will have the right to propose another candidate. Although SEPR will decide on matters concerning the day-to-day management, certain strategic decisions regarding the joint venture's business will require a unanimous vote by the Supervisory Board. The Supervisory Board will comprise five members, three of which will be appointed by SEPR and one each by ESK and NOM respectively. The strategic decisions taken unanimously by the members of the Supervisory Board will include, in particular, the prior approval of balance sheets and of profit and loss accounts, the approval of the three-year business plans, the approval of the annual budgets, and the approval of investments or capital expenditure by the joint venture companies above Fl [...] million which are not within the budget previously approved by the Supervisory Board.

Autonomous full-function entity on a lasting basis

(12) The proposed joint venture will operate as an independent producer and processor of silicon carbide on a lasting basis. It will have its own production and processing facilities and will own all the intangible assets that are related to ESK's current silicon carbide business carried on in Delfzijl and Grefrath, such as patents, know-how and trade marks. The proposed joint venture will produce and sell silicon carbide on its own account and is under no obligation to enter into supply contracts with its parent companies. Under the terms of the Toll Manufacturing Agreement, ESK will produce silicon carbide powders and micro grits exclusively for the proposed joint venture for a period of up to three years (see above). The fact that the proposed joint venture, for a transitional period, purchases processed products from ESK does not affect its full-function character, since the scope of this agreement is limited, and the joint venture could meet its needs for silicon carbide powders and micro grits from its own production. The joint venture will, from the beginning, operate its own processing facilities in Grefrath. The joint venture is, therefore, full-function.

(13) The parties have agreed to remain shareholders of the proposed joint venture for the first seven years and not to sell their respective shares within this period. Therefore, the joint venture will be established on a lasting basis.

Absence of coordination of competitive behaviour

(14) After the completion of the proposed concentration, the Saint-Gobain group of companies will be active on the same markets as the joint venture through its subsidiaries Norton and Intermat. ESK will retain no activities on these markets. After the Toll Manufacturing Agreement with the joint venture has expired, ESK's production line for silicon carbide micro grits and powders in the Kempten plant will be closed. According to the parties, products other than silicon carbide, which are currently manufactured and marketed by ESK, and which include boron carbide in grits and grain mixtures for grinding and lapping applications as well as for sintered parts, boride and nitrides in the form of powdered or sintered parts, and synthetic diamonds in micro grits, have entirely different applications from

silicon carbide and cannot be considered substitute products for silicon carbide. As far as boron carbide is used for the grinding and lapping of ceramic parts and hard metal, it cannot, according to the parties, be replaced by silicon carbide since it is much harder than these two materials and much more expensive. Moreover, boron carbide oxidizes to boron acid at temperatures above 500 °C. Accordingly, it is unsuitable for making grinding wheels. With respect to the use of synthetic diamonds, ESK undertakes the coating with a nickel/diamond layer of machine parts for the textile industry. Borides and nitrides are raw materials for sintered parts.

(15) As regards Wacker-Chemie's interest in the US company Exolon-ESK and the Norwegian company Orkla-Exolon, any coordination of competitive behaviour between the parent companies of the proposed joint venture can be excluded, since the Joint Venture Agreement only enters into force under the condition precedent that Wacker-Chemie divests itself of its interest in Exolon-ESK prior to the establishment of the joint venture.

Conclusion

(16) For the above reasons the joint venture resulting from the notified operation constitutes a concentration within the meaning of Article 3 (1) (b) of the Merger Regulation.

IV. COMMUNITY DIMENSION

(17) The combined aggregate worldwide turnover of Saint-Gobain, Wacker-Chemie, Hoechst AG, and NOM exceeds ECU 5 000 million. Two of the undertakings concerned, Saint-Gobain and Wacker-Chemie/Hoechst AG, have a Community-wide turnover in excess of ECU 250 million, but they do not achieve more than two-thirds of their aggregate Community-wide turnover within one and the same Member State. The notified operation therefore has a Community dimension according to Article 1 (2) of the Merger Regulation.

V. COMPATIBILITY WITH THE COMMON MARKET

(18) The proposed joint venture will be active in the production, processing, marketing and sale of silicon carbide (SiC).

A. RELEVANT PRODUCT MARKETS

A.1. Product market definition

Production process

(19) SiC is a synthetic mineral, which is produced from washed silica sand (SiO_2) and carbon (C) in the form of low-ash petroleum coke. In a specific carbon-to-silica sand granulation ratio the raw materials are melted in a resistance-type electric furnace. Crystallization of SiC occurs at very high temperatures, between 1 600 °C and 2 500 °C. The production of SiC is highly energy consuming [7] and sets free emissions of sulphur compounds and CO-gas.

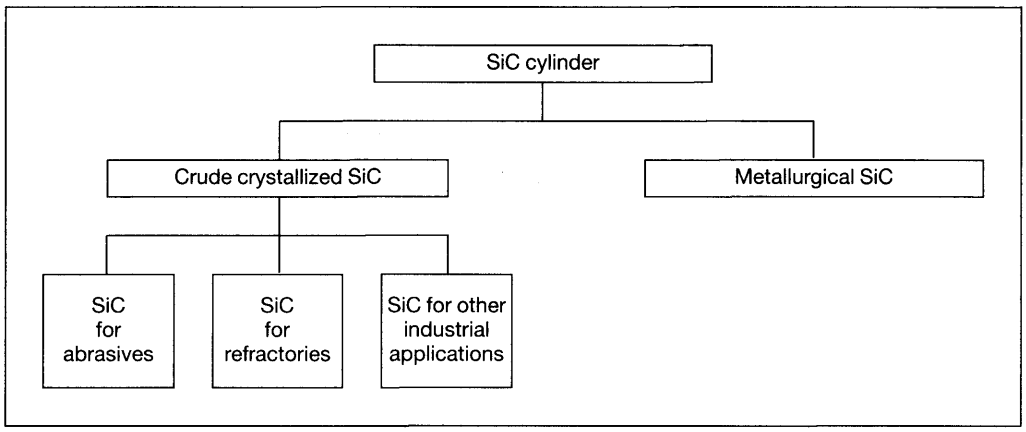
(20) A SiC furnace consists of two energizing electrodes which are connected by a graphite core. The graphite core is covered with the reaction mixture which, upon heating, converts into SiC by forming a polycrystalline, compact cylinder around the graphite core. Such a cylinder consists of several inner layers of crystallized SiC and an outside layer of less-crystallized material, known as metallurgical grade SiC. The most compact structure of crystallized SiC is found closest to the core of the cylinder. The more one moves away from the inner layer the more the SiC content decreases.

(21) Crystallized SiC is basically produced as so-called 'green' or 'black' SiC. The difference is due to differences in chemical trace elements (nitrogen, aluminium or boron) built into the crystal lattice. Green SiC is characterized by a very high chemical purity, whereas black SiC has a higher aluminium content. For this reason green SiC is more brittle than black SiC but less tough. Furthermore, green SiC shows a much higher electrical conductivity which makes it useful for the manufacture of heating elements, electrical resistors and light-emitting diodes. Green SiC can only be produced by using virgin raw materials, whereas black SiC can be produced from unreacted material that has remained from earlier furnacing as well.

[7] The electric power consumption depends on the size and the form of the furnaces and varies between 6,3 kWh/kg (ESK plant in Delfzijl), 7,1 kWh/kg (Arendal), and 7,7 kWh/kg (Zaporozshje). See K.-H. Mehrwald: *History and economic aspects of industrial SiC manufacture,* reprint from *Ceramic Forum International/Berichte der DKG,* Vol. 69 (1992), No 3, p. 57.

(22) The outer layer of less crystallized SiC is sold to the steel industry as metallurgical grade SiC, and is used as an additive in steel production. The well-crystallized inner layers of the cylinder, so-called crude SiC, are carefully separated according to the SiC content and further processed. Depending on the final use of the product, crude SiC is crushed to pieces, milled, micronized, de-ironized (iron removal), water-washed, and chemically treated. Finally, by sieving, air separation, and water-sedimentation, the SiC grits are classified to defined grain size distributions and either sold as abrasive or refractory grade SiC or further processed and sold as SiC powder. The production and separation process of SiC is shown in a simplified form in Figure 1.

Figure 1



(23) SiC producers like Saint-Gobain and ESK are active at all stages of the production process. They manufacture crude SiC in a furnacing plant and then process it. However, there are also companies active in the market that solely process SiC. These companies either operate as recyclers, buy crude or semiprocessed SiC from producers within the EEA or import the crude material from outside the EEA. They are referred to as processors.

Crude crystallized SiC is a different relevant product market from metallurgical SiC

(24) Metallurgical grade SiC and crude crystallized SiC, because of their different physical and chemical characteristics, are used in different applications. Substitutability of both products is limited due to differences in the SiC content. The SiC content indicates the level of impurities contained in the material. The amount and the kind of impurities (aluminium, iron, free silica and carbon) affect the colour of the SiC and the size, shape and modification of its crystals [8]. A high SiC content is necessary for abrasive applications since the SiC content, besides other parameters, determines the shape of the crystals and, therefore, has a direct impact on the abrasive capacity and the abrasive performance of the material. As regards refractory applications, material with a low SiC content does not provide the chemical purity required for the manufacture of heat-resistant products. For abrasive and refractory applications, therefore almost exclusively the crystallized types of SiC with a high SiC content are used, whereas metallurgical SiC used in the ferrous metals industry has a significantly lower SiC content. According to the article 'Silicon Carbide' by Roger Loughborough in the journal *Industrial Minerals*, November 1994 (Annex 12 to the Notification, page 47), metallurgical SiC generally has a SiC content of 85 to 94 %, refractory SiC of 92 to

[8] K.-H. Mehrwald: *History and economic aspects of industrial SiC manufacture*, reprint from *Ceramic Forum International/Berichte der DKG*, 69 (1992), No 3, p. 54. The proportion of different crystal types in the SiC material depends significantly on the aluminium content. See also *Ullman's Encyclopedia of Industrial Chemistry, 1993: Silicon Carbide*, p. 750, 752.

99 %, and abrasive SiC of 98 to 100 %. This has been confirmed by the Commission's investigation (9).

(25) The parties have taken the view that the SiC content has no significance with regard to the distinction of metallurgical SiC and crystallized SiC. However, according to the responses to the Commission's inquiries of 67 abrasive manufacturers, 26 manufacturers of refractory products as well as five customers that use crystallized SiC in other industrial applications, end-users consider the SiC content to be an important characteristic with regard to the manufacture of their final products. Furthermore, several suppliers stated that the SiC content, together with grading, chemical composition and density, is the main differential characteristic as to different categories and qualities of SiC. None of the suppliers asked by the Commission considered the SiC content to be unimportant as regards the distinction of metallurgical SiC and crystallized SiC.

(26) For use in foundry and blast furnace operations, metallurgical SiC can technically be replaced by crystallized SiC. However, from an economic point of view crystallized SiC cannot be considered a substitute, because of the difference in price. According to the findings of the Commission's investigation, the price of metallurgical grade SiC sold in the EEA was about ECU 445 per tonne in 1995, whereas the price of crude crystallized SiC was about ECU 471 per tonne. On the other hand, metallurgical SiC is not a substitute for crystallized SiC because it does not generally provide the crystal properties required for abrasives, and the chemical purity needed for refractory and other industrial applications.

(27) According to the parties 'the production technology for SiC is a classic case of joint production, i.e. metallurgical and crystallized grade SiC are derived simultaneously...' (Response to the Commission Statement of Objections ('Response'), page 20). The ratio between metallurgical SiC and crystallized SiC which results from the furnacing process depends on the construction and the size of the furnace and the quality of the raw materials. A furnace can be run in such a way that only metallurgical SiC is produced. However, it is technically impossible to increase the proportion of crystallized SiC above a certain level. In the conventional Acheson furnaces used by most producers, including Norton, the proportion of crystallized SiC can be increased to about 80 %, whereas in the large furnaces used by ESK in Delfzijl, the ratio of metallurgical SiC to crystallized SiC is about [...]. Any significant rise in the proportion of crystallized material above these levels would strongly increase the consumption of energy and costs for chemical treatment.

(28) In the EEA the production of metallurgical grade SiC is a by-product of the production of crystallized SiC, because the production of metallurgical SiC is less profitable at current prices. The parties in the Response, page 15, third paragraph, recognize that metallurgical SiC is only a by-product. This can also be inferred from the fact that one of the main synergies to be achieved from the operation is the possibility to increase the proportion of crystallized SiC produced in ESK's plant in Delfzijl (Response, page 16, paragraphs 4 and 5).

(29) The parties have argued that metallurgical SiC can in some cases be processed to refractory grade SiC by chemical treatment. They have, therefore, argued that 'supply-side substitutability justifies to conclude one single SiC market comprising both metallurgical and crystalline SiC' (Response, page 22). However, this is not the same as supply-side substitutability, since further processing is necessary. The process of upgrading metallurgical SiC to crude crystallized SiC involves additional cost, principally due to higher energy input. Indeed, it would seem irrational to sell matallurgical grade SiC at all, if it could simply be processed to a more profitable refractory grade. In a joint production process, which results in simultaneous production of metallurgical SiC and crystallized SiC, and where the incentive is to reduce the production of metallurgical SiC as much as possible, it is difficult to see why there should be any significant supply-side substitutability. Indeed, if that were the case, it would seem more rational to produce mainly crystallized SiC, and thereby avoid production of metallurgical SiC as a by-product. Joint production is a strong constraint on supply-side substitution, which is clearly evident from the fact that metallurgical SiC continues to be produced, despite the fact that it is the least profitable product.

(9) According to the Commission's survey, SiC refractory grains have on average a SiC content of 96 %, whereas SiC abrasive grains have on average a SiC content of 98,4 %.

(30) For the above reasons, indications are that supply-side substitutability between crude crystallized SiC and metallurgical grade SiC is highly limited and inadequate, and that crystallized SiC and metallurgical SiC are two different relevant product markets. Demand-side considerations confirm this conclusion. However, the market definition can be left open, since there are no competition problems on these two markets.

Processed crystallized SiC for abrasive and for refractory applications are separate relevant product markets

(31) Processed SiC for abrasive and refractory applications is almost exclusively produced from crude crystallized SiC. First, crude crystallized SiC is sorted according to the SiC content and afterwards crushed, milled, de-ironized, and sieved. SiC grains for refractory and abrasive applications are classified in different ways. SiC abrasive grains are classified according to the European FEPA standards, which are agreed by the European abrasives industry ([10]), whereas SiC refractory grains are classified according to individual customer requirements.

(32) There are two separate FEPA standards, the P-standard for coated abrasive grains and the F-standard for bonded abrasive grains. Bonded abrasives include wheels, segments, bricks and sticks, where the abrasive grains are held together by a bonding material, usually glass-based vitrified bonds, resin, shellac, or rubber. In coated abrasives, on the other hand, one layer of abrasive grains, without any adherence between the single grits, is firmly fixed on flexible backings, such as paper, cloth, fibre, papercloth, or cloth fibre. Both FEPA standards comprise several SiC grades which indicate the average grain size and the variability of sizes of particles within a given lot. P-grades have smaller tolerances than F-grades. Any deviation from the defined grain size distribution would put the abrasive material's performance at risk, since oversized grits will scratch the treated surface while undersized grains will not contribute to the material's abrasive capacity. For this reason all abrasives manufacturers, asked by the Commission, consider the FEPA standards to be important, both with respect to the manufacture of their final products and to the selection of their suppliers.

(33) For refractories, SiC grains for bricks and shapes for furnace linings should be in block form in order to achieve maximum density to provide for strength and thermal conductivity. In the case of kiln furniture the products must be as light as possible, but still have sufficient strength to support the products to be fired through the firing cycles. For that reason, grains of angular type with a lower bulk density are chosen.

(34) Generally speaking the processing of refractory grains is more simple than the processing of abrasive grains, since SiC grains for the manufacture of abrasive products, in addition to the crushing, sieving and de-ironizing, often undergo chemical treatment, are water-washed, and sometimes are wet classified (see Annex 13 to the Notification). The additional processing adds to the cost of production of abrasive SiC grains compared to refractory grains, and the price differential between abrasive grains and refractory grains to some extent reflects differences in processing costs. According to the findings of the Commission's investigation, the price of SiC refractory grains sold in the EEA was about ECU 835 per tonne in 1995, whereas SiC abrasive grains cost about ECU 1 255 per tonne.

(35) Refractory grains are processed to individual customer requirements, whereas abrasive grains are processed to the FEPA standard. Therefore, in view of a generally lower SiC content of refractory grains compared to abrasive grains, and the different grading of abrasive grains, abrasives manufacturers would never consider buying refractory grains, because it would not meet their requirements. On the other hand, although it would be theoretically possible for refractory manufacturers to use abrasive grains in some situations, it would never be considered in practice due to the individual requirements of refractory manufacturers and the significantly higher price of abrasive grains. Therefore, viewed from the demand-side SiC abrasive grains and SiC refractory grains are two separate relevant product markets.

(36) SiC grains for refractory and abrasive applications are crushed, sieved and de-ironized on the same equipment, which is simply adjusted according to

([10]) FEPA — Fédération Européenne des Fabricants de Produits Abrasifs: *Standard for coated abrasive grains of fused aluminium oxide and silicon carbide,* 1984, and: *Standard for bonded abrasive grains of fused aluminium oxide and silicon carbide,* 1984.

the type of grains which need to be produced. However, the additional processing of many types of abrasive grains means that there are limited possibilities for shifting from the production of refractory grains to abrasive grains, whereas the shifting from abrasive grains to refractory grains is possible. However, it should also be noted here that a major shift in production to refractory grains would mean that abrasive processing facilities such as chemical treatment and wet classification could be underused, which would limit the commercial incentive to shift from processing of abrasive grains to refractory grains.

(37) In conclusion processed SiC for abrasive and for refractory applications are two different relevant product markets. It should also be borne in mind in this respect that buyers of abrasive and refractory grains are two completely different customer groups, and that price differentiation between these two groups of customers is possible due to the product differences.

Processed SiC for other industrial purposes is a separate relevant product market distinct from processed SiC for abrasive and refractory applications

(38) Apart from the abovementioned applications, relatively small quantities of SiC are further processed, e.g. milled to SiC powders, and used in a number of other diverse industrial applications. These applications include in particular SiC powder for metal matrix composites and SiC for the manufacture of flooring materials, heating elements, lightning arresters, voltage-dependent electrical resistors, and sand-blasting.

Conclusion on SiC product markets

(39) Based on the above, the relevant product markets are:

— the market for SiC for metallurgical purposes,

— the market for crude crystallized SiC,

— the market for processed SiC for abrasive applications,

— the market for processed SiC for refractory applications,

— the market for processed SiC for other industrial applications.

(40) The approach to market definition taken by the Commission in the present case is consistent with the approach taken in previous cases. Thus, the above distinction between five different SiC markets is in accordance with the line adopted by the Commission in the Starck/Wienerberger case concerning a concentration in the market for corundum (electro-fused aluminum oxide), a raw material that is also used in the abrasives and refractory industries as well as for other industrial applications ([11]). In that decision, the Commission took the view that no single market for corundum exists, but, rather separate product markets according to their main applications and to the differences regarding customers and distribution channels, qualities required, price levels and range of possible substitute products. In this case as well, the customers and competitors questioned by the Commission almost unanimously agreed with the above distinction between five different SiC markets.

(41) Furthermore, in Case IV/M.619 — Gencor/Lonrho ([12]), platinum group metals (platinum, palladium, rhodium, iridium, osmium and ruthenium) were clearly produced in a joint production process. However, the Commission still concluded that each metal constituted a separate relevant product market, since the price setting, price levels, and applications of the metals were different.

(42) The parties have argued (Response, page 22, fourth paragraph) that SiC for abrasive, for refractory, and for other industrial applications are not distinct markets, but part of one overall SiC market. However, as discussed above, abrasive and refractory SiC grains are produced from crude crystallized SiC. The parties have, therefore, effectively argued that the raw-material is in the same relevant product markets as the processed grains. This argument would only be reasonable, if processing was trivial and the prices in the raw-material and finished-product markets were more or less the same, but this is not the case. In the Commission's investigation it was found that, on average, the price of crude crystallized SiC sold in the EEA was about ECU 471 per tonne in 1995, whereas the price of SiC refractory grains was about ECU 835, and the price of SiC abrasive grains was about ECU 1 255.

([11]) Case IV/M.702 — Starck/Wienerberger, OJ C 102, 4. 4. 1996, p. 18, paragraph 13. Confirmed in Case IV/M.811 — Creditanstalt-Bankverein/Treibacher, OJ C 8, 11. 1. 1997, p. 4.

([12]) OJ L 11, 14. 1. 1997, p. 30.

(43) The limited supply-side substitutability between the various grades of SiC is also evident in the different profit margins of the different grades. In their response to the Statement of Objections the parties acknowledge that [. . .] (Response, page 4). Furthermore, [. . .] (Response, page 15). Such differences in profit margins could not persist in a case with significant supply-side substitutability, since supply-side substitutability would lead to largely uniform profit rates for all grades. It is therefore evident that supply-side substitutability is low between the various grades of SiC.

(44) The parties, in the response to the Statement of Objections, argued that in the anti-dumping investigation in 1994 'the Commission reached the conclusion that supply-side arguments are strong enough that a definition of the market in terms of end-use applications is not justified in the case of SiC' (Response, page 19). According to the parties, the Commission would be acting inconsistently with the Council anti-dumping Regulation of April 1994, if it were to define the five abovementioned markets as the relevant product markets for the purpose of the current proceedings [13].

(45) In this respect, it should be noted that the purpose of an anti-dumping proceeding and a merger proceeding is not the same. An anti-dumping proceeding is intended to rectify distortions in international trade, so that measures can be taken against dumping which is causing material injury to producers in the Community, to the extent that the measures offset the injury caused to those producers.

(46) In an anti-dumping procedure, measures may only be taken in so far as it has been established that the product produced by the Community industry is a 'like product' to the imported product under consideration. This definition of the like product in an anti-dumping proceeding can therefore be of a different nature from the definition of the relevant product market(s) for the purposes of the Merger Regulation.

(47) In an investigation under the Merger Regulation, a detailed assessment of, among other things, the applications of a product in the Community, customer groups or substitute products is given more attention. This can, therefore, lead to a wider or narrower definition of the relevant product market than would be the case under the assessment of the anti-dumping legislation.

(48) In the present case, it was considered that the notified operation required also an examination of the downstream markets of crystallized SiC intended for abrasive, refractory, and other industrial applications, whereas the Council Regulation adopting the anti-dumping measures considered that, although different grades of SiC with different uses existed, the similar physical characteristics, the similar production process and the existence of a certain degree of substitutability between metallurgical grade SiC and crude crystallized SiC constituted sufficient grounds for deciding that SiC in general, sold by the Community producers, should be considered a like product to that imported from the countries concerned. However, supply-side substitutability was only considered in the anti-dumping proceeding to the extent that it was recognized that crude crystallized SiC could be used as a substitute for metallurgical SiC. It follows that metallurgical SiC was not a substitute for crystallized SiC intended for abrasive, refractory, and other industrial applications.

(49) For all the above reasons, it is justified for the Commission to decide that there exist the abovementioned five markets for the purposes of these merger proceedings. However, it is also clear that the abrasive and refractory SiC markets are differentiated product markets, and therefore each of those markets consists of a number of different product segments. Nevertheless, it would not be justified to argue that each of those segments should be considered to be separate relevant product markets, as there are demand and supply-side substitutabilities within both the abrasive and refractory market.

(50) The parties have argued that substitute products to SiC exist for abrasive, refractory and metallurgical purposes, and therefore these substitute products should be included in the relevant product markets. As discussed below, this is not borne out by the Commission's investigation.

[13] Council Regulation (EC) No 821/94 (OJ L 94, 13. 4. 1994, p. 21), imposed a definitive anti-dumping duty on imports of silicon carbide, originating in the People's Republic of China, Poland, the Russian Federation and Ukraine. This Regulation defines the product concerned ('product under consideration') as SiC of both crystalline and metallurgical grade. This conclusion is based on the basic physical characteristics of SiC, but it was explicitly recognized that SiC was produced in different qualities for different applications in a joint production process.

A.2. Silicon carbide for metallurgical purposes

(51) The parties have taken the view that SiC for metallurgical purposes can be replaced by 75 % ferro-silicon (FeSi) with normal or low aluminum content since both materials serve the same applications. According to the parties, the prices of both metallurgical SiC and FeSi are based on the silicon content of the respective material. End-users surveyed by the Commission have attributed particular advantages to SiC for metallurgical applications. However, the question as to whether metallurgical SiC and FeSi both belong to one and the same relevant product market can be left open, as the proposed concentration would in neither case create or strengthen a dominant position.

A.3. Crude crystallized silicon carbide

(52) Crude crystallized SiC is sold to processors, who process the raw material further to SiC grades for abrasive, refractory, and other industrial applications. No other raw materials can be considered alternatives to SiC at this production level, since only crude SiC can be processed to SiC for abrasive, refractory, and other industrial applications. However, the market definition can be left open, since no dominant position is created or strengthened.

A.4. Processed silicon carbide for abrasive applications

(53) The parties to the concentration have taken the view that SiC, despite differences in its physical properties and existing preferences by end-users in the abrasives industry for certain abrasive materials in certain applications, competes with other raw materials for abrasive applications. According to the parties, some of these materials can be regarded as forming a single product market together with SiC. The parties have, therefore, taken the view that there is not a separate product market for SiC for abrasive applications, but rather that SiC should be part of an overall market for raw materials for the abrasives industry including abrasive minerals like synthetic diamonds, cubic boron nitride (CBN), white and brown aluminium oxide, electro-fused alumina, zirconium aluminium oxide, and seeded gel aluminium oxide [14]. However, the parties have conceded that SiC cannot in all applications be replaced by these materials totally, but only to a certain extent. According to the parties, SiC can be replaced directly by synthetic diamonds in 40 % of its applications, and by white aluminium oxide in 10 % of its applications [15]. Therefore it was considered appropriate to add 40 % of the sales of synthetic diamonds, and 10 % of the sales of white aluminium oxide in the abrasives industry, to the market volume for SiC for abrasive applications [16]. The parties have stressed that the market in their definition has been very narrowly defined and that this must be kept in mind when evaluating the competitive impact of the proposed concentration.

(54) In order to verify the view of the parties, the Commission undertook an extensive survey of the major manufacturers of abrasives in the EEA. Of the total of 67 abrasives manufacturers that responded to the inquiry, 32 produced bonded abrasives, 16 produced coated abrasives and 19 produced either both types of abrasives or did not indicate what type of abrasives they produced. The abrasive manufacturers who replied to the Commission inquiry accounted for about one-third of the EEA market in 1995 (excluding captive use by the parties) [17]. Of the total of 67 abrasives manufacturers, who responded to the Commission questionnaire, 10 (14,9 %) purchased more than 500 tonnes SiC in 1995, 19 (28,4 %) more than 250 tonnes and 37 (55,2 %) more than 100 tonnes. The abrasives manufacturers purchased on average 238 tonnes SiC in 1995. The largest customer accounted for 2,7 % of total SiC for abrasive applications sold in the EEA.

Abrasive minerals — physical and chemical characteristics

(55) The size of the abrasive grains is of major importance for customers since coarse grits cut faster and cooler but burr can be minimized by using finer grits. In general, coarser grits are used for heavy duty work aimed at rapid stock removal from workpieces with rough finishes, whereas finer grits are used for finishing and polishing applications. The crystal shape and the grain size determine the abrasive capacity of the abrasive grains, whereas the chemical purity affects the manufacturing process of the final abrasive products. The higher the chemical purity, the

[14] Page 35 of the Notification.

[15] Page 37 of the Notification.

[16] Pages 37 and 55 of the Notification.

[17] This figure includes only purchases of SiC that was produced in or delivered into the EEA. Only a few of the EEA abrasive manufacturers belong to a group that also operates abrasive manufacturing plants in other parts of the world, i.e. 3M, Tyrolit.

better the abrasive grits react to the bonding material (resins, ceramics). This is of particular importance for the manufacture of bonded grinding wheels, which must resist high temperatures generated during the grinding process, as a significant rise in temperature can increase chemical reactivity.

(56) Apart from the grit size, the bonding material and the crystal shape, the kind of abrasive mineral and its characteristics are of decisive importance for the grinding capacity and the performance of the final abrasive product. Each type of abrasive mineral is characterized by different properties regarding hardness, toughness (ability to fracture), chemical inertness, thermal conductivity and the geometry of its cutting edges. For example, the harder an abrasive mineral, the better its ability to penetrate other materials (workpieces) and to remove stock. The tougher an abrasive mineral, the greater its ability to withstand long periods of high heat, pressure, impacts, and friction. Whereas abrasive minerals characterized by high brittleness fracture after dulling and thereby produce new exposed cutting edges to continue the grinding process.

Silicon carbide

(57) SiC is extremely hard, has a good durability and resists heating to around 1 500 °C. Due to its hardness combined with its brittleness, SiC is an excellent material for abrasive applications, in particular, according to the parties, for tool-room grinding, roll grinding (steel and paper), grinding and polishing of hypodermic needles and welds as well as for cutting of carbide. SiC is most widely used for grey iron, hard non-ferrous metals such as soft bronze, copper, aluminium, brass, and non-metallic materials such as glass, rubber, wood parts, natural stone, marble and cemented carbides([18]). Manufacturers of coated abrasives recommend SiC for paint, varnish, lacquer, plastic, and plaster([19]). Green SiC is harder but more brittle than black SiC([20]). Therefore it is primarily used for the precision grinding and polishing of hard non-ferrous metals where sharp needle-like cutting edges are necessary for material removal, e.g. for the removal of hardened scale on steel rolls in steel mills. Black SiC, on the other hand, is predominantly used for the grinding of non-metallic materials. The manufacturers of bonded abrasives are apparently more able to replace black SiC by green SiC, but for certain abrasive applications, because of its high purity and hardness, green SiC cannot be replaced by black SiC([21]).

(58) According to the responses to the Commission's survey, 95,7 % of the abrasive manufacturers consider the hardness of SiC to be at least 'rather important' with regard to the production of their final products, 75,4 % of them consider it to be 'very important'. Compared to other abrasive minerals only synthetic diamonds, cubic boron nitride (CBN) and boron carbide are harder than SiC. White or brown electro-fused aluminium oxide and zirconium aluminium oxide each have a significantly lower hardness than SiC (see Table 1).

(59) According to the Commission's inquiry, all abrasives manufacturers already use in addition to SiC other abrasive materials for the manufacture of their final products. Most also use white and brown aluminium oxide, some use zirconium aluminium oxide and seeded gel, and a small number of abrasives manufacturers use synthetic diamonds or CBN as well. However, most of them have stated that SiC cannot be replaced by other abrasive minerals. Moreover, because of its special product characteristics, SiC is indispensable in grinding and polishing applications. A large majority of manufacturers stated that they would use SiC in applications different from other abrasive minerals, and that the substitution of SiC by other abrasive minerals would only be possible to a very limited extent. In any case, as these abrasive minerals show different product characteristics and characteristics of performance, any replacement of SiC would require research and development effort, testing, and changes in production process. Abrasives manufacturers have stated that the costs associated with changing from a SiC-based product to another abrasive mineral would exceed an amount of 5 to 10 % of total costs. For these reasons, the overwhelming

([18]) See the *Specification Manual of Norton*, General information on conventional abrasives, Annex 12 to the notification, document D.27, p. 85. See also Norton Catalog 400, Annex 12 to the notification, p. 10. William W. Wellborn: The expanding role of synthetic minerals in industry, *Industrial Minerals*, April 1991, p. 53.

([19]) See response of 3M (UK).

([20]) See Bruce McMichael: Abrasive minerals. Taking the rough with the smooth. *Industrial Minerals*, February 1990, p. 26.

([21]) According to the Commission's survey a sizeable minority (30,2 %) of the abrasive manufacturers who, at present, use green SiC could manufacture their final products without green SiC and instead replace it by black SiC. However, 65,1 % stated that they could scarcely switch and 69,8 % stated that they would not replace green SiC by black SiC even if the price for green SiC were to increase by 5 to 10 %.

Table 1

Comparative characteristics of various abrasive minerals (1)

Abrasive minerals	Hardness		Toughness	Density
	Moh's scale	Knoop scale	Rank/batelle	gms/cc
Synthetic diamonds	10	6 000 — 6 500	7	3,50
Cubic boron nitride (CBN)	—	4 700	6	3,47
Boron carbide	—	2 760 — 3 580	6	2,5
Green SiC	9,75	2 600	5	3,2
Black SiC	9,5	2 480	4/2,62	3,2
White fused aluminium oxide	9	2 100	3	3,95
Brown fused aluminium oxide	9	2 050	2	3,95
Seeded gel	—	—	—	3,87 — 3,95
Zirconium aluminium oxide	7,5	1 450 — 1 700	1/3,26	4,3 — 4,6

(1) *Sources: The Industrial Minerals HandyBook II; Mitchell Market Report: Silicon Carbide,* 3rd edition 1992, volume 1, p. 105; E. H. Peter Wacht: *Feuerfest-Siliciumcarbid,* Wien 1977; information provided by the parties.

majority of abrasives manufacturers stated that they would not consider replacing SiC by other abrasive materials, assuming the price for SiC were to increase permanently by 5 to 10 % (see below).

(60) In their Response to the Statement of Objections the parties have said that '. . .the Commission ignores that in the abrasive market end-users do not care about the raw material they use but about the solution for the treatment of a specific material' (Response, page 70). This has not been confirmed by the Commission's inquiry among EEA abrasives manufacturers.

Aluminium oxide

(61) Electro-fused aluminium oxide is a synthetic mineral produced from bauxite in a furnacing process at high temperatures. Fused alumina are produced in two major qualities, white aluminium oxide, which is characterized by its chemical purity (Al_2O_3 content of at least 98 %), and brown aluminium oxide, which has a higher content of impurities (Al_2O_3 content of below 98 %). The hardness of SiC is significantly higher than the hardness of the different types of aluminium oxide, which makes SiC useful in different areas. In addition, the scratching pattern of SiC is different from aluminium oxide since the latter is much tougher. End-users, therefore, decide to use either SiC or aluminium oxide depending on the particular result, in surface roughness, desired. Fused alumina, because of their superior toughness, are most widely used for heavy-duty grinding applications of hard metals like carbon tool steel, alloy steel, stainless steel, high-speed steel, ductile iron, wrought iron, and hard bronzes (22). They are, therefore, predominantly used in grinding and snagging applications in the steel industry and in foundries. Typical products treated with aluminium oxide are steel castings, crank-shafts and all kinds of steel tools, as well as dies and gauges. Due to its inferior hardness, aluminium oxide cannot be used for the treatment of materials like glass, ceramics and cast iron.

(22) See the *Specification Manual of Norton,* General information on conventional abrasives, Annex 12 to the Notification, document D.27, p. 85.

(62) In contrast, SiC is most widely used for grinding and polishing applications of grey iron, hard non-ferrous metals such as soft bronze, copper, aluminum, brass, and non-metallic materials such as glass, rubber, wood parts, stone, marble and cemented carbides ([23]). The reason why SiC cannot effectively be used for the grinding of ferrous-metals, high carbon tool steels and alloy steels is its tendency to react chemically with these materials at temperatures usually generated during grinding applications ([24]). SiC reacts in particular with all kinds of oxides, such as copper oxide, nickel oxide, manganese oxide, chrome oxide, iron oxide, calcium oxide and magnesium oxide and would have an undesired effect on the workpiece. Aluminium oxide on the other hand is extremely inert even at high temperatures and there are only a few materials with which aluminium oxide reacts ([25]). This finding is supported by the *Norton Specification Manual* which recommends cut-off wheels made of aluminium oxide for most metals, whereas cut-off wheels made of SiC are recommended for non-metallic workpieces such as plastics, glass and ceramics ([26]). In addition, there are different FEPA standards concerning the chemical analysis of SiC ([27]) and fused alumina ([28]).

(63) Resinoid and vitrified-bound grinding wheels made of both SiC or fused alumina can be produced with the same equipment. Differences of minor importance concern the compacting by use of hydraulic presses and the baking temperature. However, any replacement of SiC by fused alumina would require an adaptation of the respective backings and formulation of the bonding materials. Since both are of major importance for the abrasive performance to be achieved, any change in the composition of the bonding materials would require investment in research and development and a testing phase in close cooperation with potential customers ([29]). Several abrasives manufacturers said that they doubt whether their customers would accept substitute minerals in all instances. In any case, the replacement would be associated with additional costs resulting from customer support, sales and marketing.

(64) However, indications are that it is mainly because of different physical and product characteristics that replacement of SiC by fused alumina is not considered to be likely, even if prices for SiC were to increase by 5 to 10 %. According to the responses to the Commission's survey, the large majority of the abrasives manufacturers, from a physical-technical point of view, could 'not at all' manufacture their final products without SiC and instead replace it by white aluminium oxide. Assuming the SiC price were to increase permanently by 5 to 10 %, an even larger number of customers would not replace SiC by white aluminium oxide. With respect to brown aluminium oxide the abrasives manufacturers consider the possibilities of replacing SiC to be even more limited.

(65) The parties have argued that the above results have not been evaluated in a methodologically consistent way, as they are simply derived from a headcount of the answers received without taking into account the economic weight of the companies which gave the particular answers. Thus the opinion of an abrasives manufacturer with a SiC consumption of some 5 tpa concerning the ability to switch to other materials is given the same weight as the opinion of a company with a SiC consumption of some 850 tpa.

(66) However, as the Commission has asked almost all major abrasives manufacturers in the EEA it seems probable that for the overwhelming majority of customers the possibilities of replacing SiC are even more limited than is suggested by the results of the Commission's inquiry. The parties indirectly conceded this when they stated that '... a smaller manufacturer specialized in SiC products can of course only use SiC for the manufacture of these tools' ([30]). Tyrolit, a large abrasives manufacturer, has indicated that it could 'partly' replace SiC by

([23]) See the *Specification Manual of Norton,* General information on conventional abrasives, Annex 12 to the Notification, document D.27, p. 85. See also *Norton Catalog 400,* Annex 12 to the notification, p. 10. William W. Wellborn: The expanding role of synthetic minerals in industry, *Industrial Minerals,* April 1991, p. 53.

([24]) E. H. Peter Wacht: *Feuerfest-Siliciumcarbid,* Wien 1977, p. 7. Reaction starts at about 800 °C. See also Saint-Gobain/Norton Industrial Ceramics Corporation (Annex 12 to the Notification): Study on SiC Abrasive Grain Opportunities, 1994, p. 3.

([25]) William W. Wellborn: The expanding role of synthetic minerals in industry, *Industrial Minerals,* April 1991, p. 53.

([26]) See the *Specification Manual of Norton,* Conventional abrasives, cutting-off, Annex 12 to the Notification, document D.27, p. 111.

([27]) See *Chemical Analysis of Silicon Carbide,* FEPA-Standard 45-1986, R 1993.

([28]) See *Chemical Analysis of Fused Aluminium Oxide,* FEPA-Standard 46-1986, R 1993.

([29]) According to Tyrolit, the adaptation and testing of a bonding-system to a new abrasive mineral could last up to one year. Another abrasives manufacturer has indicated that the replacement of SiC in all his major product lines would take up to two years at least.

([30]) Page 7 of the Parties' Response.

aluminium oxide. However, other large SiC customers have not suggested that they have great scope to replace SiC by other raw materials, since abrasive manufacturers that purchased the same or even greater tonnages of SiC grains than Tyrolit, indicated that they could not produce their final products without SiC and using instead other raw materials. Furthermore, as the majority of the abrasives manufacturers in the EEA are small and medium-sized companies, it can be concluded that the overall demand for SiC in response to a small and non-transitory price increase is likely to be even more inelastic than the responses to the Commission's survey have already indicated. These considerations suggest that a small but significant price increase would be profitable.

Table 2

Net-net prices of various abrasive minerals sold in Germany (1)

Abrasive mineral (product categories)	Average prices (in DM/t, DM/1 000 carat)		Change
	1. 2. 1995	1. 2. 1996	(%)
Synthetic diamonds, FEPA-D 852	1 525	—	—
Synthetic diamonds, FEPA-D 252	1 860	1 684	-9,46
CBN, graded	1 677	1 789	+6,68
Green SiC, minimum 98,5 % SiC, graded FEPA-F 60-120	2 676	2 746	+2,62
Black SiC, minimum 98 % SiC, graded FEPA-F 60-120	2 379	2 475	+4,04
White fused alumina, first quality, graded FEPA-F 60-120	1 580	1 637	+3,61
Brown fused alumina, graded FEPA-F 60-120	1 440	1 353	-6,04

(1) Average net-net prices ex-works supplier.
Source: Inquiry by the Commission among EEA suppliers (including the parties).

(67) For the above reasons, the Commission does not consider white and brown alumina to be direct and effective substitutes for SiC. This view is supported by the fact that fused alumina have not displaced SiC in abrasive applications although the latter is much more expensive. Indications are that the average price per tonne of aluminium oxide for abrasive applications is significantly lower than the average price per tonne for SiC abrasive grains. In Germany, for example, the average price for white fused aluminum oxide (FEPA-F 60-120) was about DM 1 637 per tonne on 1 February 1996, whereas the average price for black SiC abrasives grains (FEPA-F 60-120) was DM 2 475 per tonne (see Table 2). This resulted in a price difference of 51,2 %. The average price for green SiC grains (FEPA-F 60-120) was 67,8 % higher. The Commission, in preceding cases, has considered substantial and permanent differences in price between similar products to be indicative of different product markets (31). Furthermore, even the evolution of the average prices over the last five years was different. Since 1991, the price for white fused aluminium oxide has decreased by 14,3 % while the price for black SiC abrasive grains has decreased by only 3,7 %. In the same period, the price for brown fused aluminium oxide has even decreased by 14,8 %.

(68) For the above reasons, from the point of view of an abrasives manufacturer, white and brown aluminium oxide are not considered to be direct and effective substitutes for SiC.

(31) See Case IV/M.54 — Aerospatiale/Alenia/De Havilland, OJ L 334, 5. 12. 1991, p. 42; Case IV/M.214 — Du Pont/ICI, OJ L 7, 13. 1. 1993, p. 13; Case IV/M.190 — Nestlé/Perrier, OJ L 356, 5. 12. 1992, p. 1.

Synthetic diamonds

(69) Diamond wheels cannot be produced on the same equipment as grinding wheels made of conventional grains such as SiC or fused alumina. The technology applied for the production of diamond wheels is different as synthetic diamonds are bonded on a thin layer of resin, vitrified resin or metal that is finally connected to an abrasive body made of aluminium. All abrasives manufacturers asked by the Commission have stated that they could not manufacture diamond wheels with the same equipment and machinery they use for the manufacture of grinding wheels made of SiC or other conventional abrasive grains. Unless a customer is already a manufacturer of diamond wheels, the costs associated with switching demand from SiC to synthetic diamonds would include substantial investment in new equipment ([32]). According to estimates by various abrasive manufacturers, total investments in switching would amount to some DM 2,5 to 15 million ([33]). In addition, any change of the products would be an important strategic decision and would require a lasting commitment of the abrasives manufacturer to largely different groups of customers. Furthermore, there would be uncertainty whether customers of the final abrasive products would accept changes in the abrasives composition, since it would also require significant investment in new equipment on their part (see below). Both factors make it very unlikely that manufacturers of conventional abrasives would switch their orders for SiC to synthetic diamonds in response to a small, but significant change in their relative prices ([34]).

(70) According to abrasives manufacturers, synthetic diamonds can only be used for the production of metal-bound or galvanic wheels, but not for the production of flexible grinding wheels. Furthermore, any replacement of SiC by diamonds would not be possible for the manufacturers of coated abrasives since diamonds, because of their superior lifetime against the traditional backings used, would not be cost-effective in these applications. In addition, it is technically not possible to produce resin or vitrified bonded grinding wheels with diamonds.

(71) Because of the superior hardness of diamonds, grinding wheels made with diamonds can be used for much longer than wheels made with conventional grains like SiC. However, due to the high price of diamonds, they will be used only in conjunction with very hard metals, glass, ceramics, and stone in applications which, by virtue of their value, are able to carry the higher costs. In the stone-working and construction industries and in grinding applications in toolrooms of the metal-working industries, diamond tools have to a large extent replaced SiC. This substitution process has largely come to an end. In the remaining applications where SiC is still in use, any further substitution of SiC by synthetic diamonds is not expected because of their very high price. Such applications are discontinuous, short-run applications, in which SiC has a superior cost-performance ratio to diamonds.

(72) The effectiveness of modern toolroom machinery requires grinding wheels made of synthetic diamonds, even assuming the price for conventional abrasive grains, including SiC, were to fall permanently by 5 to 10 %. The costs associated with every interruption of the toolroom process are far greater than the abovementioned savings in price of conventional abrasive minerals ([35]). The switching costs between SiC and synthetic diamonds make it unlikely that conventional abrasive grains could regain ground they have already lost to more advanced products, even if their price were to fall ([36]). The replacement of conventional abrasive minerals in this area, in particular SiC, is caused by technological invention

([32]) For the importance of switching costs with regard to the product market definition see Case IV/M.603 — Crown Cork & Seal/Carnaud Metalbox (OJ L 75, 23. 3. 1996, p. 38, paragraph 19). See also Case IV/M.214 — Du Pont/ICI (OJ L 7, 13. 1. 1993, p. 13, paragraphs 43 and 44).

([33]) The broad range of investments necessary is attributable to the different numbers of SiC production lines that these companies have.

([34]) See Case IV/M.475 — Elf Atochem/Shell Chimie (OJ C 35, 11. 2. 1995, p. 4).

([35]) According to a comparison of total costs per piece associated with the grinding of ferrous-metal workpieces undertaken by GE Superabrasives, CBN is 30 % cheaper than aluminium oxide. See Annex 6 to the parties' letter of 11 July 1996.

([36]) This fact is also seen by the parties when they state in a different connection that the low level of investment in R&D in commodities such as corundum and SiC can be explained by the fact that it is unlikely that these commodities would regain the ground they have lost to more advanced products such as seeded gel aluminium oxide, CBN and synthetic diamonds if R&D spending were increased. See page 72 of the Notification.

and is not the result of price-driven competition between SiC and diamonds[37]. Rather it is expected that conventional grinding wheels have lost ground in this application and manufacturers are not considered capable of reversing this process[38].

(73) For the above reason, from the point of view of an abrasives manufacturer, synthetic diamonds are not considered to be direct and effective substitutes for conventional abrasive grains, in particular for SiC. According to the findings of the Commission's survey, the large majority of abrasives manufacturers, from a physical-technical point of view, could 'not at all' manufacture their final products without SiC and instead replace it by synthetic diamonds. However, assuming the SiC price were to increase permanently by 5 to 10 %, an even larger number of customers would not replace SiC by diamonds.

(74) Furthermore, since the Commission asked all the major abrasives manufacturers in the EEA, the possibilities of replacing SiC by synthetic diamonds are likely to be even more limited than indicated by the Commission's inquiry when account is taken of the large number of smaller manufacturers. Several large abrasives manufacturers with a broad range of abrasive products already have facilities for the production of diamond tools. But none of these manufacturers has indicated that they could produce abrasive products made of conventional grains and abrasive products made of diamonds with the same equipment or with the same production technology. Even the parties have not claimed that this could be possible. The overwhelming majority of abrasives manufacturers in the EEA, however, do not produce diamond tools and would, therefore, have to make considerable investment in new production lines if they wanted to replace SiC by synthetic diamonds (see above).

(75) For the above reasons the Commission does not consider synthetic diamonds to be direct and effective substitutes for SiC for abrasive applications. This differing price trend support this view. Since 1995, the price for synthetic diamonds (FEPA-D 252) has decreased by 9,5 %, whereas the price for SiC abrasive grains has increased (see Table 2).

Other abrasive minerals

(76) Other abrasive minerals considered by the parties to be interchangeable with SiC are cubic boron nitride (CBN), zirconium aluminium oxide, and seeded gel alumina.

(77) CBN is used in similar applications to synthetic diamonds. CBN is, for example, preferred for synthetic diamonds in applications where the heat generated by the abrasive process exceeds 800 °C, since synthetic diamonds will start to transform into graphite at this temperature. According to the Commission's survey, assuming the SiC price were to increase permanently by 5 to 10 %, the large majority of the abrasives manufacturers would 'not at all' manufacture their products without SiC and instead replace it by CBN. Furthermore, since 1991 the price for CBN has decreased by 13 %, whereas the price for black SiC abrasive grains has decreased by only 3,7 %.

(78) Zirconium aluminium oxide ('zirconia') is produced from very pure aluminium oxide and baddeleyite (zircon sand) and was invented by Norton in the early 1970s. Today, Saint-Gobain is the leading supplier of zirconia. Zirconia has a superior ability to fracture when heat from the surface of the workpiece reaches critical levels. Zirconia possesses the advantage of being self-sharpening and withstands long periods of pressure[39]. However, it is a very costly product

[37] This has been confirmed by the study of Saint-Gobain/Norton Industrial Ceramics Corporation on SiC Abrasive Grain Opportunities (Annex 12 to the Notification), page 3, where it is stated: '... the introduction of CNC grinding equipment has converted customers to diamond wheels due to their negligible wear rate. SiC wheels, while less expensive, require continuous machine adjustments and increased operator attention due to continuous wheel wear and dimensional changes.'

[38] In the study on SiC Abrasive Grain Opportunities (see previous footnote), page 3, it is stated: 'Unless a dramatic improvement in SiC product lifetime can be achieved through bond or abrasive development, it is unlikely that this particular market segment (toolroom grinding applications) can be reclaimed by SiC abrasives.'

[39] See Bruce McMichael: Abrasive minerals. Taking the rough with the smooth. *Industrial Minerals*, February 1990, pp. 19, 31.

and has predominantly replaced ordinary alumina for the coarse grinding of ferrous metals and armatures. In a recent decision the Commission considered that zirconia belonged to a separate relevant product market from white and brown fused aluminium oxide ([40]). Assuming the SiC price were to increase permanently by 5 to 10 %, according to the Commission's survey, the large majority of abrasives manufacturers would 'not at all' manufacture their products without SiC and instead replace it by zirconia.

(79) Seeded gel aluminium oxide ('seeded gel') is a high-purity, premium aluminium oxide manufactured by the seeded-gel process and was developed by Norton in 1987. Saint-Gobain and 3M hold the patents to this product and will be the only suppliers for the foreseeable future. Seeded gel is a hard, sharp, micro-crystalline abrasive primarily used for precision grinding of difficult-to-grind high carbon steels and alloy steels ([41]). This new abrasive grain possesses a combination of the toughness associated with brown fused alumina, while exceeding the sharpness of a white alumina grain and, therefore, is considered to compete primarily with white alumina ([42]). Assuming the SiC price were to increase permanently by 5 to 10 %, according to the Commission's survey, the large majority of abrasives manufacturers would 'not at all' manufacture their products without SiC and instead replace it with seeded gel.

(80) Boron carbide is an abrasive mineral with outstanding hardness and good mechanical properties. It is used in lapping, polishing and cutting applications, where economics favour its use over diamonds. It has not been mentioned by the parties as an abrasive to be included in the relevant product market. ESK is the world leader in the supply of boron carbide. Assuming the SiC price were to increase permanently by 5 to 10 %, according to the Commission's inquiry, nearly all the abrasives manufacturers would 'not at all' manufacture their final products without SiC and instead replace it by boron carbide.

([40]) Case No IV/M.811 — Creditanstalt-Bankverein/Treibacher (OJ C 8, 11. 1. 1997, p. 4, paragraph 18).

([41]) See the *Specification Manual of Norton,* General information on conventional abrasives, Annex 12 to the notification, document D.27, p. 85. Bruce McMichael: Abrasive minerals. Taking the rough with the smooth. *Industrial Minerals,* February 1990, p. 29.

([42]) See Bruce McMichael: Abrasive minerals. Taking the rough with the smooth. *Industrial Minerals,* February 1990, pp. 19, 29.

Conclusion

(81) The parties have argued that SiC is interchangeable with the abovementioned materials, with the exception of boron carbide, but particularly with synthetic diamonds and to a lesser extent with aluminium oxide. Therefore, according to the parties, it is entirely justifiable to include 40 % of synthetic diamond sales and 10 % of white aluminium sales in the market volume.

(82) It is unclear why only 40 % of synthetic diamonds sales and 10 % of white aluminium are to be included in the market volume. If synthetic diamonds and white aluminium were substitutes for SiC to a significant extent, it would seem more natural to define the relevant product market as including SiC, synthetic diamonds as well as aluminium oxide. However, for this to be correct, switching back and forth between these raw materials would be observed. Such switching does not take place as far as the Commission is aware.

(83) For the reasons stated above, the Commission is of the opinion that synthetic diamonds and alumina oxide are not part of the same relevant product market as SiC for abrasive applications. Matching characteristics in terms of functionality are not sufficient to establish substitutability in competition terms ([43]). In so far as SiC and other abrasive minerals are used in the same applications, the evidence is that there are significant price differences between these abrasive minerals, and in particular between SiC and aluminium oxide. Persistent price differences between various abrasive minerals for the same applications serve as a strong indication that, from a customer's point of view, these abrasive minerals have different performance characteristics and do not serve as direct and effective substitutes ([44]). Differences in physical characteristics and grinding performance, as well as considerable switching costs, indicate the existence of a distinct market for SiC grains for abrasive applications, where suppliers are able to act independently of the actions of companies selling other abrasive minerals, in particular aluminium oxide and synthetic diamonds.

(84) Indeed, the parties' argument for including synthetic diamonds and aluminium oxide in the same market as SiC could just as well be extended

([43]) Case IV/M.190 — Nestlé/Perrier (OJ L 356, 5. 12. 1992, p. 1, paragraph 9).

([44]) For the importance of price differences with respect to the product market definition see Case IV/M.603 — Crown Cork & Seal/Carnaud Metalbox (OJ L 75, 23. 3. 1996, p. 38, paragraph 15).

to CBN, zirconia, seeded gel aluminium oxide, and boron carbide (the latter has not been mentioned by the parties as forming part of the relevant product market). In any case the Commission is of the opinion that none of these raw materials forms part of the same relevant product as SiC by extension of the same reasoning as for synthetic diamonds and aluminium oxide.

A.5. Processed silicon carbide for refractory applications

(85) The refractory industry produces refractory bricks and shapes including monolithics and kiln furniture. The bricks, shapes and the monolithic refractory products are used as inner linings for blast furnaces and zinc furnaces; for waste incinerators; aluminium reduction cells; the production of crucibles and ladles; and as inner linings for oil and coal-fired power stations. Kiln furniture is mainly used in the ceramics and porcelain industry.

(86) Because of its properties (chemical inertness at relatively high temperatures, high abrasion resistance, very low thermal expansion, high thermal shock resistance and high thermal conductivity), SiC is an attractive material for the manufacture of various refractory products. In addition, SiC has a high thermal conductivity at elevated temperatures and is resistant to acids and alkalis. Ceramics represent a smaller segment of the overall refractory market. In this area SiC is used in the production of body armour, wear parts, nozzles for pressure blasting, and structural ceramics. Green SiC is typically used for ceramic applications, whereas because of traces of free silicon and carbon black SiC is less pure but is fabricated into many complex shapes common to both ceramics and refractories [45].

(87) The parties have indicated in the Notification that the average price for refractory SiC in the EEA in 1995 was about ECU 800 per tonne. However, wide price differences exist, particularly for specialized applications. SiC powder for the production of ceramic pieces is thus found at the high-quality end of the market for materials for the refractory industry. The ceramic pieces are sintered using SiC powder. Powders have an average size of below 2 microns. The price of these powders is about 10 times the price of ordinary refractory SiC reaching on average ECU 5 300 per tonne. The price depends on the grain size, the purity and the shape of the powders.

[45] William W. Wellborn: The expanding role of synthetic minerals in industry, *Industrial Minerals*, April 1991, p. 59.

(88) According to the parties SiC for refractory applications can, to a certain extent, be replaced by other raw materials:

— fused aluminium oxide competes with SiC in particular as the raw material for the interlinings of blast furnaces and the production of monolithics. According to the parties, 50 % of the stack in a blast furnace can be lined with either fused aluminium oxide or SiC-containing bricks. They estimate that about 27 % (ECU 8,5 million) of the total fused aluminum oxide sales to the refractory industry of about ECU 32,3 million in the EEA (1995) are directly substitutable for SiC. The average price of fused white aluminium oxide in 1995 was about ECU 580 per tonne in the EEA,

— carbon and graphite compete with SiC in the aluminium industry for the sidewall linings of the cells ([. . .] % of the cells are currently lined with SiC),

— cordierite is an oxide/clay substance which is used for linings of furnaces in the production of porcelain and other ceramic products and for the production of kiln furniture. It competes with SiC in all areas where the temperature exposure is less than 1 380 °C. In 1995 the average price in the EEA was ECU 560 per tonne,

— mullite is produced in two basic types, fused and sintered mullite. It competes with SiC in particular for the production of kiln furniture. The average price of mullite in the EEA was ECU 790 per tonne,

— magnesium oxide and other oxides are not included in the market definition by the parties because the overlap is small but, according to the parties, the influence of these products must be taken into account in the assessment of the operation.

(89) As evidence for the substitutability between SiC and the abovementioned materials, the parties quote a number of articles and product documentation from producers of refractory products:

(a) the parties argue that the listing of products in the product catalogues of the two producers of refractory material, [two large producers], demonstrates that there is substitution between SiC and other materials used as linings in blast furnaces. However, such catalogues cannot simply be taken as evidence of substitution. Indeed, as is recognized by the parties, the choice of material depends on the type of furnace. SiC is, for example, indispensable in water-cooled blast furnaces

due to its good thermal conductivity. Aluminium oxide is simply not an alternative. Therefore, just because companies like [two large producers] present SiC and aluminium oxide products together in their product catalogues, it cannot be concluded that these products are substitutes. This has been confirmed by the producers of refractory products, who say that they have no substitutes for SiC (see below);

(b) the parties argue that, according to an article in 'Eisen und Stahl', No 11, November 1995, Thyssen only uses aluminium oxide for the lining of blast furnaces. This is not correct according to Table 5 of the article, where it is indicated that SiC bricks were used in Thyssen's new blast furnace 2;

(c) the parties argue that scientific documentation by Ray, an industry expert, demonstrates that other material can be substituted for SiC in blast furnaces. The articles by Ray discuss, among other things, the choice of refractory products for linings of blast furnaces. The articles do not stress the substitutability between SiC and other materials, but rather the superior performance of SiC for its particular applications in blast furnaces;

(d) as far as kiln furniture is concerned, the parties argue that the product brochures of Annawerk demonstrate that SiC, cordierite, mullite and aluminium oxide can only be distinguished in very minor ways from the point of view of their applications. However, in these brochures it is clearly stated that SiC kiln furniture has different properties from cordierite, mullite and aluminium oxide kiln furniture. SiC products thus have the highest cold-crushing strength, hot-bending strength and thermal conductivity. These properties are important for the choice of material for a particular type of oven and for a particular type of application. Indeed, this is the reason for having different types of products, since SiC-based products are more expensive.

(90) In conclusion the parties estimate that 27 % of the white aluminium oxide used in the refractory industry and approximately 40 % of the consumption of mullite, cordierite and graphite should be included in the relevant product market.

(91) In order to verify the view of the parties, the Commission has undertaken a survey of the major manufacturers of refractory products and ceramics in the EEA. The total number of responses received was 26. The refractory manufacturers who replied to the Commission survey accounted for about 50 % of the EEA market in 1995 (excluding captive use by the parties). The largest customer accounted for 10,5 % of total SiC volume for refractory applications sold in the EEA.

(92) According to the responses to the Commission's survey, none of the manufacturers of refractory products can, simply from a physical-technical point of view, produce their final products without SiC and instead replace it by fused white or brown aluminium oxide, cordierite, mullite, carbon or graphite. Likewise, none of the main producers questioned considered that they would replace SiC in any of their final products by white aluminium oxide, cordierite, mullite, carbon or graphite, assuming the SiC price were to increase permanently by 5 to 10 %. Even Carborundum GmbH, an affiliate of the Saint-Gobain group, has stated that it could 'not at all' produce its final products without SiC and instead replace it by other raw materials.

(93) The parties consider that substitution cannot be refuted in such general terms, because it is not correct to base the definition of the product market on one single refractory SiC market as the substitutability occurs on three different levels: monolithics, bricks and shapes, and kiln furniture. These segments have to be considered separately in terms of substitutability. However, the refractory manufacturers contacted cover all these different final products. Furthermore, these manufacturers are the largest refractory producers who generally should have better substitution possibilities than smaller producers. Their view can therefore be taken to represent the market as a whole.

(94) Moreover, as with the abrasives markets, the various refractory materials have very different physical and technical characteristics. Indeed, as the parties have themselves argued, these raw materials are in many instances not used separately, but are blended in many variations to give end-products with a particular performance for a particular use. It would, therefore, seem that these products are complementary products and not substitutes. They are thus often used at the same time, but in different places and for different purposes, in a blast furnace or for ceramic applications. Indeed, the main producers of refractory products contacted by the Commission stated that most of their sales are to customers who demand specific product definitions or require characteristics typical of SiC. Moreover, they state that many years of research have been carried out to find the correct balance of SiC to achieve the required performance.

(95) Price data supports the view that SiC for refractory applications is in a different product market from fused aluminium oxide, cordierite, mullite, carbon or graphite. In the case of aluminium oxide this is illustrated by the price data supplied by the parties.

According to those data, the price of refractory SiC (with a SiC content of 98 %) passed from ECU 874 per metric tonne in 1993 to ECU 962 per metric tonne in 1995, i.e. a rise of approximately 10 %, whereas the prices of brown and white aluminium oxide decreased during the last three years. In these circumstances it would seem illogical to continue to use a more expensive product, i.e. SiC, in situations where a cheaper substitute product was available, e.g. aluminium oxide. Therefore, those price data would rather seem to indicate that refractory grade SiC constitutes a relevant product market distinct from white and brown aluminium oxide.

(96) In particular, it is not clear from the evidence presented by the parties that there is a simple demand-side substitutability between SiC and the other materials in the sense that, if the price of SiC goes up by a small percentage, then customers would simply shift to, for example, aluminium oxide. It would rather seem that any shift between materials would necessitate new product developments by the producers of refractories.

(97) It has to be concluded, after a survey of refractory producers and taking into account the opinion presented by the parties, that there are no substitution possibilities between SiC, fused aluminium oxide and other materials. SiC for refractory applications is a separate relevant product market.

A.6. Processed silicon carbide for other industrial applications

(98) As mentioned in Section A.1 above, relatively small quantities of processed SiC are also used in a number of other diverse industrial applications (see above). The parties have taken the view that SiC can be entirely substituted by other materials. As regards flooring materials, brown aluminium oxide serves exactly the same purpose. As far as lightning arresters and electrical resistors are concerned, Zincoxide is a full substitute for SiC([46]). It appears that the product-market definition can be left open, since no competition problem exists even on the narrowest possible market definition.

B. RELEVANT GEOGRAPHIC MARKETS

General remarks on the import data

(99) According to the Eurostat statistics, total imports of SiC into the EU (12) amounted to 141 254 tonnes (ECU 88 million) in 1995. Of that total, imports from Norway accounted for 41,4 % in volume terms and 59,5 % in value terms, SiC originating in China for 16,1 % and 6,7 %, and imports from Russia for 10,3 % and 6,7 %.

(100) Total imports of SiC into the EU (12), excluding imports from Norway, amounted to 82 832 tonnes (ECU 35,7 million) in 1995. According to the Eurostat statistics imports from non-EEA countries into the three new Member States, Sweden, Finland and Austria, amounted to 109 tonnes (ECU 71 000). Finally, according to the official Norwegian import statistics, imports of SiC from non-EU countries into Norway amounted to 3 716 tonnes (ECU 1,5 million). Adding all figures together, total imports of SiC into the EEA amounted to 86 657 tonnes (ECU 37,2 million) in 1995.

(101) The parties have claimed that the Eurostat statistics do not reflect certain SiC imports from non-EEA countries into the three new Member States (1 038 tonnes imported into Sweden and 415 tonnes imported into Austria and Finland). Furthermore, according to the parties, imports of 3 603 tonnes SiC into Denmark are wrongly shown in the Eurostat statistics as imports originating in Norway, when they should have been shown as originating in the Ukraine. By adding these volumes, according to the parties, total imports into the EEA should amount to [> 90 000] tonnes. This figure is [5-10] % higher than imports derived from the official statistics. However, according to the market-share tables provided by the parties, total imports of SiC amounted to [> 90 000] tonnes (ECU [> 40] million)([47]). These figures exceed the import figures derived from the Eurostat statistics by [. . .] or [. . .] respectively.

(102) The Commission is of the opinion that the Eurostat statistics establish a reliable source of information on total imports of SiC into the Community. The parties have not provided verifiable information about the country of origin and the quality of the allegedly imported materials or about the processors or end-users they were delivered to. The parties could not indicate whether this material was finally-processed SiC or semi-processed feed for further treatment by processors in the Community. Furthermore, the possibility cannot be excluded that this discrepancy could be explained by a wrong declaration of certain imports in the Danish import statistics. For these reasons, the Commission has decided not to take those amounts into account. Therefore, according to the Eurostat statistics and the Norwegian import statistics total imports of SiC into the EEA amounted to 86 657 tonnes (ECU 37,2 million) in 1995.

([46]) See Notification, p. 44.

([47]) These figures were arrived at by adding up the imports as shown in the market share tables for the respective applications. According to the parties' market-share table for the total SiC market, imports add up to [> 90 000] tonnes (ECU [> 40] million).

Table 3

Comparison of import figures calculated by the parties and the Commission

SiC imports	Parties' figures		Commission figures	
	in tonnes	in ECU 1 000	in tonnes	in ECU 1 000
Imports into the EU (12) excluding imports from Norway according to Eurostat statistics	82 832	35 665	82 832	35 665
Imports from non-EU countries into Norway according to Norwegian import statistics	3 716	1 497	3 716	1 497
Imports from non-EEA countries into Austria, Finland and Sweden (Eurostat)	109	71	109	71
Imports into the EU (15) excluding imports from Norway, allegedly not covered by the Eurostat statistics	5 056	NA	—	—
Imports into Norway allegedly not covered by the Norwegian import statistics	15	NA	—	—
Total	**91 728**	**NA**	**86 657**	**37 233**
Imports of metallurgical grade SiC	[>45 000]	[>15 000]	51 362	23 330
Imports of crude crystallized SiC	[<25 000]	[<10 000]	21 284	9 180
Imports of processed abrasive grains	[>10 000]	[>10 000]	9 100	8 188
Imports of processed refractory grains	[>10 000]	[>5 000]	4 911	3 015
Imports of grains for other industrial applications	—	—	556	425
Imports according to the market share tables (see Section C)	[>90 000]	[>40 000]	**87 213**	**44 138**

(103) Official import statistics that differentiate between metallurgical grade SiC and crude crystallized SiC, as well as between the different grades of processed SiC used for different applications, are not available. The Eurostat statistics only show the total volume and value of SiC imported into the Community. However, according to the market-share tables provided by the parties, total imports of crude SiC amounted to [< 25 000] tonnes (ECU [< 10] million) in 1995, imports of metallurgical grade SiC amounted to [> 45 000] tonnes (ECU [> 15] million), imports of processed abrasive grains amounted to [> 10 000] tonnes (ECU [> 10] million), imports of processed refractory grains amounted to [> 10 000] tonnes (ECU [> 5] million). These figures are, as the parties admit, estimates derived from their market experience and the monthly import statistics of the Member States. The parties have calculated the average prices of the respective imports and on that basis attributed the imports to certain applications.

(104) The Commission has doubts as to whether the figures furnished by the parties give a correct picture of the market structure and the importance of imports into the EEA. Firstly, according to the purchase figures provided by the suppliers and the customers, it seems likely that the parties have

underestimated the proportion of metallurgical grade SiC in total imports, and thus have overestimated the amount of imported processed crystallized SiC. Secondly, the parties have only incomplete information about the sources of supply and the sales structure of processors and traders in the EEA. In order to verify the estimates of the parties, the Commission has undertaken a survey of all major suppliers (producers, processors, traders) in the EEA. These suppliers and the parties together have imported 74 466 tonnes (ECU 35,6 million) of SiC in 1995. That total comprises 45 851 tonnes (ECU 20,8 million) metallurgical grade SiC, 19 000 tonnes (ECU 8,2 million) crude crystallized SiC, and 9 615 tonnes (ECU 6,6 million) processed crystallized grains [48].

(105) Furthermore, according to the Commission's customer survey, abrasives manufacturers purchased 881 tonnes (ECU 975 000) of processed grains from traders or agents closely linked to non-EEA producers. Similarly manufacturers of refractory products and ceramics purchased 112 tonnes (ECU 240 000). These purchases have been treated as direct-imports by end-users. As the Commission's survey, according to the parties' figures, has covered 29,1 % of the abrasive market volume and 53,2 % of the refractory market volume, the import figures were extrapolated accordingly. As a result the Commission estimates that imports of processed crystallized SiC by end-users amounted to some 3 240 tonnes (ECU 3,8 million). These figures rather overestimate the amount of direct imports by customers, since the Commission's survey has covered all the bigger customers. The smaller customers are likely to import relatively less.

(106) Adding both figures up, total imports by suppliers or end-users surveyed by the Commission amounted to 77 706 tonnes (ECU 39,4 million). In volume terms this accounts for 89,3 % of total imports derived from the official Eurostat statistics, and for about [< 85] % calculated on the basis of the parties' import figures.

(107) As the Commission's survey does not cover total imports into the EEA, the import figures derived from the supplier survey were extrapolated accordingly. As a result the Commission estimates that imports of metallurgical grade SiC amounted to some 51 362 tonnes (ECU 23,3 million), imports of crude crystallized SiC amounted to some 21 284 tonnes (ECU 9,2 million), and imports of processed crystallized grains amounted to some 14 567 tonnes (ECU 11,6 million) in 1995. Total imports of processed crystallized SiC comprised 9 100 tonnes (ECU 8,2 million) of abrasive grains, 4 911 tonnes (ECU 3 million) of refractory grains, and 556 tonnes (ECU 425 000) of grains for other industrial applications (see above, Table 3 and Sections B.3, B.4, C.5, and C.6 below).

[48] The Commission's investigation found that processed SiC for abrasive, refractory, and other industrial applications had, on average, a SiC content of 96,9 %. Only about 7,2 % of the volume and about 4,6 % of the value of processed SiC sold to industrial end-users in the EEA in 1995 had a SiC content of less than 94 %. Abrasive manufacturers may use SiC material with a SiC content of below 94 %, i.e., dust collector fines, as filler in their blends. For these reasons, the Commission considers only SiC with a minimum SiC content of 94 % to be crystallized SiC.

B.1. Silicon carbide for metallurgical purposes

(108) The market for metallurgical SiC is characterized by sizeable imports into the EEA from suppliers located in various geographical areas of the world, in particular China, Eastern Europe and South America. Transportation costs are of minor importance, as metallurgical SiC is shipped as bulk material in large quantities. According to the parties, prices have increased by 32 % since anti-dumping duties were introduced in 1994. However, the anti-dumping duties have apparently not hindered effective competition from suppliers outside the EEA, since imports originating in China, for example, still accounted for more than 15 % of the EEA market and total imports accounted for about 50 % in market value in 1995.

(109) For the above reasons, the geographical scope of the relevant product market for SiC for metallurgical purposes appears to be worldwide.

B.2. Crude crystallized silicon carbide

(110) According to the parties, imports of crude crystallized SiC into the EEA amounted to some [< 25 000] tonnes (ECU [< 10] million) in 1995. However, the Commission investigation has found that total imports amounted to some 21 300 tonnes (ECU 9,2 million). Apart from imports, there have been only minor sales of crude SiC on the market (non-captive) in 1995 by producers located in the EEA. The largest single importer of crude crystallized SiC into the EEA was Saint-Gobain. The company imported [...] tonnes originating in [...] for further processing by its subsidiary Intermat. ESK imported [...] tonnes of crude SiC originating in [...]. The parties together imported [...] tonnes of crude SiC into the EEA accounting for about [...] % of total imports. Most of the other imported material originated in Russia (Volzhsky), Venezuela (SiCVen), Romania (Casirom and Carbochim) as well as in Switzerland (Timcal). According to the

Commission investigation imported crude SiC accounted for about 89 % in volume terms and for about 85 % in value terms of total crude crystallized SiC traded in the EEA (excluding sales for captive use).

(111) Although the high import share of 85 % is a strong indication that the geographical scope of the relevant product market for crude crystallized SiC is wider than the EEA, the final determination of the geographic market can be left open, as the proposed concentration would not create or strengthen a dominant position for crude crystallized SiC even if the relevant geographic market was the EEA.

B.3. Processed silicon carbide for abrasive applications

(112) The parties have argued that the relevant market for SiC abrasive grains is worldwide. However, the majority of the abrasive manufacturers questioned by the Commission do not consider non-EEA suppliers to be alternative suppliers. Since the Commission questioned all large customers, who should have the best possibilities to buy outside the EEA, it can be assumed that the opportunities in the whole population of abrasives manufacturers for sourcing the material outside the EEA would be even less than in the Commission sample. The main reasons for the EEA being a separate relevant product market are:

Different industry standards and differences in product characteristics

(113) In Western Europe the FEPA standards have been established as a result of cooperation between industrial associations in the Member States of the European Union, Norway and Switzerland. These standards specify the designation and the size distribution of grains of fused aluminium oxide and SiC for bonded abrasive products (FEPA-F) and for coated abrasives (FEPA-P) ([49]). The FEPA standards have been incorporated into the various national standards throughout the European Union. At present, different grain size distribution standards apply to SiC grains for abrasive applications in Western Europe, the United States of America, Japan, China, Poland and Russia.

(114) In the United States of America, the American National Standards Institute (ANSI) has adopted its own standards which, in the case of macro grains for bonded abrasives, are identical with the FEPA-F standard. For coated abrasives, the FEPA-P standard is stricter than the ANSI standard. In Japan, the Japanese Industrial Standard (JIS) for grains for coated abrasives is identical to the FEPA-P standard. Although the JIS standard for macro grains for bonded abrasives is identical to the FEPA-F standard, the JIS standard for micro grains for bonded abrasives is different from the FEPA-F standard. China and Poland have already adopted the FEPA-P standard, but it has not been incorporated into the national standards yet. The certification according to the International Organization for Standardization (ISO) standard is still pending. Furthermore, as regards the classification of grains for bonded abrasives, there are still differences compared to the FEPA-F standard, in particular compared to the FEPA-F standard for micro grains.

(115) The European FEPA-F standard has been adopted by the ISO as the international standard for bonded abrasive grains ([50]). However, the incorporation of the standard into the various national standards throughout the world is still pending. In any case the standards are voluntary. Furthermore, even the ISO standard does not provide for the full range of grain sizes determined by the FEPA-P standard since the micro grits FEPA-P 1500 to FEPA-P 2500 standards have not yet been specified ([51]). At present, the graded material produced in the other geographical areas often does not serve as a direct substitute for SiC grains used in the EEA. For this reason, most of the SiC grains imported into the EEA have to undergo an additional grading process according to the FEPA standards, which entails additional costs. Furthermore, this classification process requires certain equipment such as sieves and sedimentation machinery and cannot, therefore, be done by the customers themselves.

([49]) See Fédération Européenne des Fabricants de Produits Abrasifs (FEPA): Bonded Abrasive Grain Size Standard (F), 42-1984, R 1993 and Coated Abrasive Grain Size Standard (P), 43-1984, R 1993. The F-standard defines 26 different macro grit sizes (F 4 to F 220) and 11 different micro grit sizes (F 230 to F 1200). The P-standard defines 15 different macro grit sizes (P 12 to P 220) and 13 different micro grits (P 240 to P 2500).

([50]) See ISO-standard 8486: Bonded abrasives — Determination and designation of grain size distribution.

([51]) See ISO-standard 6344: Coated abrasives — Grain size analysis.

(116) Nearly all of the abrasives manufacturers consulted by the Commission stated that the observance of the European FEPA standards is considered to be an important characteristic both with respect to the production of their final products and to the selection of their suppliers.

(117) Moreover, the existence of significant differences in product characteristics between suppliers within and suppliers outside the EEA has been established by the findings of the Commission's survey. Most of the abrasives manufacturers stated that suppliers from outside the EEA are not able to meet their requirements regarding chemical purity, SiC content and grain-size distribution according to the FEPA-P standard. Most of the suppliers in Eastern Europe and China produce SiC grades characterized by a low SiC content and a high degree of impurities and are not capable of providing the full range of SiC grades for abrasives applications.

(118) There are at present significant differences in product range between supplies from producers within the EEA and supplies from producers outside the EEA. The product range offered by importers does not entirely meet the requirements of customers. This has indirectly been confirmed by the parties, which have stated that producers outside the EEA are constantly improving the quality of their processing facilities and, consequently, of their products. The parties conclude that within the next few years those producers will continue to expand with the aim of providing the entire range of products and specifications ([52]). Furthermore, most producers outside the EEA do not yet have domestic standards for all the types of grades required by EEA customers. The supply of an entire range would therefore require both the creation of additional capacity as well as specialized production runs for EEA customers. As a result, non-EEA producers would not be able to adapt quickly to any changes in individual customer demand.

Unreliability of supplies from non-European suppliers

(119) According to the responses to the Commission's survey, the manufacturers of abrasive products consider the quality of the SiC abrasive grains, a uniform quality of supplies over time and the reliability of suppliers as regards delivery to be important with regard to the production of their final products ([53]). In particular, the fact that SiC grains are supplied uniformly over time is of major importance for European abrasives manufacturers. As the importance of both quality and reliability outweighs even the importance of price, suppliers outside the EEA, in particular in Eastern Europe and China have difficulties in meeting the requirements of EEA customers. Although non-European suppliers offer from time to time certain quantities of SiC abrasive grains classified according to FEPA standards, those offers are not considered by the EEA customers to be acceptable supply alternatives. At present, such offers are made only occasionally and, therefore, do not serve as a reliable source of supply over time. Despite the ongoing harmonization of standards, EEA customers at present do not expect non-EEA suppliers to be capable of meeting the FEPA standards. Importing SiC from non-EEA sources would rather impose additional risks and costs on the customers resulting from the need to test the chemical composition and the classification of the material.

Proximity to customers

(120) At the Hearing of the case, the parties stated that proximity to customers has to be considered as an important competitive advantage. Furthermore, the parties have stated that the grain size distribution resulting from the crushing and classification of crude SiC is not fixed but rather can be adapted to the present needs of the customers. Within certain limits, a processor is free to use already classified macro grits and crush them further to finer grades. A supplier who has processing capacities established within the EEA therefore has a significant advantage compared to non-EEA suppliers as he can adapt his production process to the product range demanded by the customers in the short-term. According to the Commission's survey, 95,5 % of the abrasives manufacturers considered 'short-term delivery on demand' to be an important factor with regard to the selection of their SiC suppliers. Only 2,9 % of them considered it to be 'rather unimportant'. Furthermore, about 78 % of the abrasives manufacturers considered the 'duration of cooperation' with their suppliers and the mutual knowledge to be important factors. Only 8,8 % considered it to be 'rather unimportant' regarding the selection of their suppliers. Those findings confirm the importance of the supplier's proximity to his customers and have to be considered as an additional factor limiting the geographical scope of the market.

([52]) Page 71 of the Notification.

([53]) For consideration of punctual delivery and absolute reliability as factors in the delineation of the geographical market, see Case IV/M.603 — Crown Cork & Seal/Carnaud Metalbox (OJ L 75, 23. 3. 1996, p. 38, paragraph 43).

Import duties

(121) The current import duties on SiC from outside the EEA are 4,5 % for developing countries except for China, and 6,5 % for China and industrialized countries.

Anti-dumping measures concerning the imports of SiC

(122) On 12 April 1994 the Council adopted a Regulation imposing definitive anti-dumping measures on imports into the European Community of SiC originating in the People's Republic of China, Poland, the Russian Federation and Ukraine([54]). The measures were imposed to remedy the injurious effects of dumped imports from those countries. The request for the imposition of measures was lodged by a large proportion of the European Community industry, including one of the parties but also other producers of SiC in the EU. The rate of the anti-dumping duty applicable to the net, free-at-Community-frontier price, before duty, is 52,6 % on imports from China, 23,3 % on imports from Russia and from Ukraine, and 8,3 % on imports from Poland. The Commission has accepted from the Russian Federation in conjunction with the State-trading company V/O Stanko-Import an undertaking of a quantitative nature. The anti-dumping measures have a normal duration of five years and will therefore expire in April 1999, unless the Community industry requests the measures to be reviewed and supplies sufficient evidence that dumping and injury will recur should the measures lapse. It is also possible to review the measures during the course of their application if sufficient *prima facie* evidence can be presented of changed circumstances. The measures for Ukraine are currently under review. The review concerns the dumping margin only. The review has not yet been concluded.

(123) According to the parties, the anti-dumping measures are the main reason why there are currently only minimal imports of high-quality processed SiC into the Community originating in the countries which are subject to the anti-dumping measures (Response, pp. 38, 40, Preamble to the Undertaking submitted). In particular the parties are of the opinion that the current anti-dumping duty of 52,6 % is the major obstacle for Chinese imports into the Community of processed SiC for abrasive and refractory applications. However, in their Notification the parties argued that 'recent import figures show that even the anti-dumping duties imposed do not hinder the continuous flow of cheap imports into the EEA'([55]).

([54]) See Council Regulation (EC) No 821/94 (OJ L 94, 13. 4. 1994, p. 21).

([55]) Notification, page 50, see also page 62.

(124) The large majority of abrasives manufacturers asked by the Commission stated that the imposition of anti-dumping duties on imports of SiC originating in the abovementioned countries has made it more difficult to divert orders from suppliers inside the EEA to suppliers in the above countries, and hence has increased prices. Furthermore, some suppliers and traders have indicated that they consider anti-dumping duties and import quotas to be an obstacle to the import of SiC for abrasives applications into the EEA([56]). However according to the customers, the imposition of anti-dumping duties on imports of SiC originating in the above countries has predominantly affected the markets for metallurgical grade SiC and for crude crystallized SiC. On the markets for processed SiC grains, the imposition of anti-dumping duties has had only a limited effect, as imports are relatively low, and the required qualities are not yet available in large quantities from suppliers in China and Eastern Europe. This was confirmed in the Commission survey on the Undertaking submitted by the parties (see Section G, and Annex III).

Import and price data

(125) *Absolute price differences:* The parties consider the relevant geographic market to be worldwide, as prices for SiC products in various applications do not show a large degree of variation and are homogeneous throughout the world. However, even the market data provided by the parties show that there are significant absolute differences in price for SiC grains for abrasive applications between the EEA and the other geographical areas of the world. In 1995, according to the parties, the average price of SiC for abrasive applications in the EEA was ECU [. . .] per tonne, whereas the equivalent price in Eastern Europe was ECU [. . .], in China ECU [. . .] and in the rest of Europe ECU [. . .]([57]). The parties argue that these differences in absolute prices are due to differences in SiC content and SiC-grade. However, according to the information furnished by the parties, the price levels for the same SiC-standards are also quite different. Prices in Japan were thus found to be more than 30 % higher than those for important customers in the EEA for the equivalent grades.

(126) *Differences in price evolution:* In addition, the price development was different in the respective areas. In the EEA, the average price calculated by the parties for SiC abrasive grains has increased since 1994 by about [5 to 10] %, whereas the average price in North- and South-America has decreased by 6,7 %, in Eastern Europe by 0,6 % and has remained the same in China.

([56]) See responses of Kuhmichel, Washington Mills, Timcal, Smyris abrasivi.

([57]) The average price in the EEA was found to be more than twice as high as in Eastern Europe and about 80 % higher than in China.

(127) Furthermore, the Commission has undertaken a comparison of prices for certain categories of SiC for abrasive applications in North-America and in the EEA. Prices for black SiC grains classified to the European FEPA standard F60-120 are significantly higher than black SiC grains classified according to the respective American standard. According to the results of the investigation, prices in the EEA in 1986 were 96 % higher than the prices for the corresponding grains in North-America (both prices were calculated in DM). This difference increased in the following years and reached its peak in 1991 (price difference of 184 %). Thereafter the price difference has decreased until 1994 (141 %), but reached a new peak in 1996 (191 %). This significant and persistent difference in price indicates that at least North-America and the EEA belong to distinct geographical markets. This difference in price has not led to a significant shift of demand from EEA suppliers to sources in North-America.

(128) *The competitive impact of imports into the EEA has been low.* According to the parties, imports of processed SiC for abrasive applications into the EEA amounted to ECU [> 10] million in 1995. This would account for [15 to 20] % of the market value estimated by the parties. However, based on the findings of its inquiries among European abrasive manufacturers and on the purchase figures of all major SiC supplies, the Commission estimates that imports of processed SiC for abrasive applications into the EEA amounted only to some ECU 8,2 million. This accounted for about 14,4 to 15,0 % of the market value (20 % of the volume) calculated by the Commission (see below). These estimates are not only based on the direct imports of processed abrasive grains by end-users, but also take into account the fact that imported material has often been sold by processors and traders under their own brand name without any indication as to the true origin of the material. As the Commission has asked processors and traders to disclose their sources of supply, it was possible to estimate their sales of processed SiC abrasive grains originating in countries outside the EEA. The only producers located outside the EEA that sold appreciable amounts of SiC abrasive grains directly to customers in the EEA were Moravitkarbo, Timcal, and Washington Mills. The rest of the imports are widely spread over several companies, in particular processors and traders.

(129) In their response to the Statement of Objections, the parties stated that after the exit of the Italian producer Samatec as a SiC supplier in 1994, Samatec's abrasives customers turned to Eastern European producers from the Czech Republic, Poland, Romania and the Ukraine (Response, pp. 35, 68). Eurostat import statistics for Italy show that in 1994 and 1995 Italian imports from Romania, the Czech Republic, Russia and the USA increased by as much as imports from other EEA countries. However, the findings of the Commission's survey do not confirm the parties statement of the parties. In 1994, the Italian abrasive manufacturers asked by the Commission imported 5,2 % of their total purchases of SiC abrasive grains from suppliers in Switzerland, Russia, the Czech Republic, Venezuela, and Mexico. In 1995, imports of SiC abrasive grains increased to 9,9 % of total purchases. Nevertheless, it has to be borne in mind that Samatec was a supplier of abrasive grains predominantly used in wire-saw applications in the stone-working industries. The parties have furnished information as to which suppliers have taken over Samatec's SiC sales to Italian customers (Response, Annex 11). According to this information, most of the customers have chosen an EEA supplier (Orkla-Exolon, Navarro, Norton, ESK).

(130) In any case, in evaluating whether imports are an indicator of a wider geographic market it is not enough simply to evaluate the size of the import share. The important question is the competitive impact of imports, and in particular whether imports are an indicator of a wider market integration in terms of price-setting and general competitive conditions. Indeed, the 14,4 to 15,0 % import share is not an indicator of a wider market in the present case. First, it has to be considered that imports are widely spread over several companies none of which has a market share of more than 2 to 3 % of the EEA market (in value terms). Furthermore, none of the importers supplied a full range of products. The limited impact of imports is borne by the differences in prices and price developments as discussed above. Imports and trade flows in general have not had enough impact to remove price differences between Japan, North America and the EEA.

Conclusion

(131) Significant differences in product characteristics, product quality, industry standards, price levels and price trends are often indications that the areas under consideration do not belong to one and the same geographical market. Furthermore, imports have not had an impact on the price-setting for SiC for abrasives in the EEA, and do not indicate a wider market integration. Rather, the large majority of the abrasives manufacturers asked by the Commission said that they would expect price increases, if the proposed operation

was to proceed. The relevant geographic market for processed SiC grains for abrasive applications is, therefore, considered to be the EEA.

B.4. Processed silicon carbide for refractory applications

(132) According to the parties, imports of processed SiC for refractory applications into the EEA amounted to ECU [> 5] million in 1995. This would account for [10 to 15]% of the market value estimated by the parties. However, based on the findings of its inquiries among European refractory customers, traders and competitors, the Commission estimates that imports of processed SiC for refractory applications in 1995 amounted to some ECU 3 million. This accounted for about 6,6 to 6,9% of the market value (about 9% of the volume) calculated by the Commission (see below).

(133) The parties consider that refractory producers encounter no substantial obstacles in sourcing refractory material from outside the EEA. Moreover, the parties have provided examples of EEA producers of refractory end-products which also sourced material from Brazil in 1996 or had already tested and approved material from China. However, questioned by the Commission, the same manufacturers have stated that sources from outside the EEA were unreliable.

(134) Moreover, it should be considered that this market seems to be even less open than the market for SiC for abrasive applications. SiC for refractories is produced to customer specifications rather than according to the FEPA standard, as is the case for abrasives. Processed SiC for refractories is therefore a less standardized product than processed SiC for abrasives. Proximity to the customers is, therefore, more important for refractory than for abrasive applications.

(135) As in the case of the market for abrasive applications, the market for processed SiC for refractories is the EEA, for basically the same reasons. Reference, therefore, is made to Section B.3.

B.5. Processed silicon carbide for other industrial applications

(136) The geographic market definition for this market can be left open, since no competition problem exists even on the narrowest possible market definition.

C. ASSESSMENT

C.1. Market volume of all SiC markets combined

(137) In 1995 total sales of SiC to industrial end-users in the EEA amounted to about ECU 156 million (210 000 tonnes). Metallurgical-grade SiC accounted for about 50% in volume terms and for 29% in value terms of total sales of SiC. Processed crystallized SiC accounted for about 51% in volume and 71% in value terms. Sales of processed SiC for abrasive applications accounted for about 37% of total sales of SiC, sales of processed SiC for refractory applications for about 29%, and sales of processed SiC for other industrial applications accounted for about 5% of total sales of SiC.

(138) Germany is by far the largest SiC market in the EEA. In 1995 Germany accounted for about [40 to 45]% of EEA consumption of SiC. Italy was the next largest market with a consumption of [10 to 15]% of EEA consumption, followed by the United Kingdom ([10 to 15]%), France ([10 to 15]%), and Spain ([5 to 10]%).

C.2. Sources of SiC consumed in the EEA

Production of SiC in the EEA

(139) Furnaces used for the production of crude SiC are technically simple and the technology is commonly known and easily accessible. Total investment for the construction of a greenfield furnacing plant with a capacity of [a medium-sized plant] is estimated by the parties to be some ECU [> 40] million in the EEA, not taking into account the cost of land([58]). Most of the investment is necessary to comply with environmental standards in the EEA. The parties, therefore, consider the barriers to market entry for the production of crude SiC to be relatively high in Western Europe due to environmental standards imposed on SiC production([59]). The situation is different in the former Eastern Bloc countries and third-world countries, including China.

(140) The SiC industry in the EEA has experienced a shake-out in the last 10 to 15 years. It has involved the shut-down of plants as well as takeovers. In 1987 Norton acquired Arendal Smelteverk AS in Norway, thereby adding a furnacing capacity of [> 40 000] tpa to its existing capacity in Lillesand of [> 20 000] tpa. In 1992

([58]) Page 71 of the Notification.
([59]) Page 71 of the Notification.

the Italian producer Samatec SA, a subsidiary of the ENI group, closed its two furnacing plants (30 000 tpa) and reduced its activities to become a processor of crude SiC, but in 1994 this activity ceased in an effort to focus on core business activities. In 1992 the French company Péchiney Électrométallurgie (capacity of 18 000 tpa) stopped all SiC production. In 1993 the company Alusuisse-Lonza withdrew from the market by closing its production facility of 20 000 tpa at Waldshut, Germany, and by selling its Swiss subsidiary Lonza G+T to Timcal AG.

(141) According to the findings of the Commission's investigation, it seems very unlikely that producers who have already ceased SiC activities would re-enter this market, since they have sold or scrapped their SiC production facilities. Furthermore, the Commission considers that entry of new competitors into the market for the production of crude SiC is not very likely within the foreseeable future, a view which is also shared by the parties [60]. The reasons for the shake-out of the EEA SiC industry cover a combination of factors including higher environmental demands, and low priced imports of metallurgical SiC from China and Eastern Europe.

(142) The closing of furnacing capacity means that SiC production in the EEA is smaller than total demand. However, despite the shake-out of the industry, about 85 % of crystallized SiC consumed in the EEA is still produced in the EEA. The furnace capacities of the main producers are shown in Annex I [61]. In Western Europe (EEA including Switzerland), total furnacing capacities amounted to [> 175 000] tpa in 1995. About [> 60] % of these capacities are operated by the parties. It is also apparent from Annex I that there are large SiC production capacities in Eastern Europe and China.

The main producers of SiC consumed in the EEA

(143) Saint-Gobain operates furnacing and processing plants in Norway (Norton). Furthermore, it has a processing plant for refractory grades in Belgium (Intermat). Saint-Gobain is the largest and most resourceful producer and processor of SiC in Western Europe and in the world. It operates [> 30] % of Western European production capacities. Saint-Gobain also has significant operations outside Europe. It is thus the largest producer of SiC in North America, and it has a furnacing plant in Venezuela (Industrial Norton de Venezuela) which mainly serves the North American market. It is also currently building a processing plant in China to serve the Pacific Rim countries, it has a stake in an Indian joint venture (Grindwell Norton Ltd), and it has plans to set up a furnacing plant in China. Saint-Gobain pursues a global strategy for its SiC business, and, according to its Strategic Plan, intends to become the global leader in SiC production.

(144) Saint-Gobain is a highly sophisticated producer of SiC, particularly of high quality and specialized products. Saint-Gobain has managed to keep its SiC operations profitable despite a decrease in SiC prices for metallurgical grade SiC, since the beginning of the 1990s. The company is vertically integrated into the downstream production of abrasive and refractory products. It is one of the most important European producers of abrasive and refractory end products.

(145) Wacker-Chemie (ESK) operates the world's largest furnacing plant at Delfzijl in the Netherlands. The company has processing facilities in Grefrath and Kempten in Germany. The ESK's processing facilities for SiC micro grits in Kempten are to be made available to the new joint venture by way of a Toll Manufacturing Agreement. Its interest in the US producer Exolon-ESK is to have been sold by the time the present joint venture commences production (see Section II above). ESK (excluding Orkla-Exolon) operates about [< 40] % of the furnacing capacities in Western Europe.

(146) Like Saint-Gobain, ESK is a highly sophisticated producer of SiC. However the company also produces a large proportion of metallurgical grade SiC due to the production technology used in the large furnaces in Delfzijl. This is one of the reasons why the overall profitability of ESK's SiC business has been under pressure from low-priced imports of metallurgical SiC from China and Eastern Europe, since the beginning of the 1990s. ESK is more vulnerable to such imports than Saint-Gobain, since the production technology at ESK's plant in Delfzijl inevitably generates [. . .] % metallurgical grade SiC against about 20 % normally achieved in the other European plants using the traditional Acheson furnaces.

(147) In comparison with other European producers, ESK has the advantage that it has already dealt with most of the environmental problems facing the company. In 1973 ESK developed SiC furnaces

[60] Page 70 of the Notification.

[61] Annex I to the Decision contains business secrets and, therefore, has not been attached to the published version.

in which the gases produced in the furnacing process are collected and reused for energy production. However, the investment in environmental protection has also given the company a relative cost disadvantage. It is today one of the highest-cost producers within the EEA.

(148) Orkla-Exolon of Norway is held 50 % by the Norwegian conglomerate Orkla and 50 % by Exolon-ESK of the United States. The company is a smaller producer accounting for less than 9 % of Western European capacity. In general terms, Orkla-Exolon produces SiC of a comparable quality to ESK and Saint-Gobain.

(149) Orkla-Exolon is a small company with about 100 employees. It has limited resources for product development, and regularly has to use external experts to solve technical problems, since such expertise is not available within the company. Orkla-Exolon is too small to produce the full range of SiC grades for abrasive and refractory applications. The company has to focus on specific product segments within the abrasive and refractory markets in order to make optimal use of its limited resources.

(150) Orkla-Exolon has until now not had to deal with environmental problems. However, in the future it will be required to invest in order to reduce the level of pollution from its production. Orkla-Exolon is in a sound financial situation and has been able to finance most of its investments from internal sources.

(151) Navarro of Spain is a family-owned company that generates electricity from water power. Although it is a producer of about the same size as Orkla-Exolon, its SiC activities are not considered to be core activities. The main activity of the company is to produce electricity in its hydroelectric power plant. Therefore, the actual level of SiC production depends on the amounts of water available in its reservoirs after it has fulfilled its obligations as an electricity producer.

(152) Timcal is a Swiss producer of SiC and belongs to the Canadian/Belgian company Imétal SA. Timcal took over the SiC furnacing capacities of Lonza G+T in Bodio/Switzerland in 1994. However, Timcal is not primarily a producer of SiC, but, rather of synthetic graphite, and only produces SiC as a by-product. The company has no processing facilities for the production of SiC abrasive grains according to the FEPA standards and has no facilities for subsequent chemical treatment. However, Timcal does produce group-graded SiC grains with a SiC content of not more than 95 % for use in abrasive and refractory applications that require coarse SiC, e.g. wire-saw applications in the stoneworking industries.

(153) Mineralien-Werke Kuppenheim (MWK) is a German processor of abrasive and refractory materials, including SiC, and operates processing facilities in Düsseldorf and in Kuppenheim. The company imports considerable amounts of crude (crystallized) SiC from producers in Eastern Europe and processes the material to abrasive and refractory grades. Besides that, MWK imports processed SiC from Russia and sells it directly to end-users. The company has no facilities for chemical treatment and wet-classification. Currently MWK can only process SiC abrasive grains according to the FEPA-F standard and has no processing facilities for micro grits.

(154) Treibacher Schleifmittel is a subsidiary of the Austrian Wienerberger group. The company holds all shares in the Slovenian firm Treibacher Schleifmittel d.o.o. (formerly Tovarna Dusika) in Ruse and in the Treibacher Schleifmittel Corporation in the USA. Treibacher produces exclusively electro-fused aluminium oxide. The company cannot be considered as a competitior in the SiC market as it has decided not to be active in the production and processing of SiC any longer. This strategic decision has led to the closure of the SiC production line in Ruse in 1995 and of its SiC production in Niagara Falls in the USA in 1994. Treibacher currently sells only small amounts of SiC in the EEA coming from stocks in Ruse.

(155) Washington Mills of the USA is a processor of abrasive and refractory materials. The company is active in Europe through its subsidiary Washington Mills Electro Minerals Ltd in the United Kingdom. Although a large producer of aluminim oxide, this company is only a small supplier of SiC, mainly to customers within the United Kingdom. Washington Mills does not produce crude SiC, but purchases semi-processed material (feed) mainly from the parties, in particular from Norton, and processes it according to the requirements of its customers. Furthermore, it is also active as a distributor of SiC for Norton in the United Kingdom.

Only marginal competition from imports

(156) China has emerged as the largest SiC producer country in the world in terms of volume. The parties estimate that the Chinese furnacing capacity is about 375 000 tpa. According to the parties there are more than 120 plants. Most are very small plants with a furnacing capacity of 1 000—10 000 tpa. The two largest plants only have a maximum capacity of 15 000 tpa of crude

SiC([62]). By far the greatest part of Chinese SiC production is metallurgical grade SiC. Most Chinese SiC producers are also active in the manufacture of abrasive and refractory products. A significant proportion of total SiC production is thus used internally.

(157) Eastern Europe companies have mainly delivered metallurgical SiC to the EEA market. There are two large producers and a number of smaller ones. The two largest producers, ZAC (joint firm INEC) in Zaporozhje in the Ukraine and AS Volzhsky Abrasives from Russia, account for 70 % of the furnacing capacity and for 60 % of the production in Eastern European countries([63]). Smaller SiC producers are Moravitkarbo of the Czech Republic and Korund SA in Kolo, Poland.

(158) Latin America: There are six smaller independent producers. Casil SA in Brazil (32 000 tpa)([64]), Electrometalurgia de Veracruz SA (Elmet) in Mexico (20 000 tpa), SiCVen in Venezuela (22 000 tpa), and Saint-Gobain in Venezuela ([15 000 to 25 000] tpa) are the largest. However, none of them has been very active in Europe. Imports from South America to the EEA have in the past been very small.

(159) North America: The two main producers in North America are Exolon-ESK and Saint-Gobain. Treibacher Schleifmittel has closed its SiC production facilities in Niagara Falls and is exclusively producing fused aluminium oxide. Washington Mills of the USA has only limited processing capacities for SiC and purchases the crude SiC it needs partly from Norton. Imports into the EEA from North America have been very low in the past.

(160) Japan: The two main producers are Pacific Rundum Co. and Yakushima Denko. Pacific Rundum specializes in the production of refractory SiC. At least one of them has reduced its crude production and is now importing crude crystallized SiC from China, which is further processed in Japan. They consider the EEA market to be very difficult and one would not even consider exporting to Europe. Besides those two producers, there are a few processors active in Japan, in particular Nanko Abrasives Co., Showa Denko, and Fujimi Inc. According to the parties, Fujimi and Nanko import macro grains from Chinese producers and convert them in their own processing facilities into micro grains([65]). Japanese producers have only exported very limited amounts of specialized products in the past, mainly to the USA. Total imports from Japan into the EU amounted to only 104 tonnes in 1995.

Conclusion

(161) It is clear that the parties will become by far the largest supplier of SiC in the EEA market following the proposed operation. Furthermore, the parties would control almost 75 % of the SiC furnacing capacities in Western Europe.

C.3. Silicon carbide for metallurgical purposes

(162) According to the parties, worldwide sales of metallurgical grade SiC amounted to ECU [> 135] million ([< 400 000] tonnes) in 1995. Metallurgical SiC accounted for [> 50] % in volume terms and for [< 30] % in value terms of total worldwide sales of SiC. Since 1993 sales have increased by 16 %. Sales of metallurgical SiC in the EEA accounted for about [< 30] % of worldwide SiC sales in 1995.

(163) According to the parties, their combined market share was about [< 20] % of worldwide sales of metallurgical grade SiC in 1995. The Chinese had 36,8 %, the Russians 8,3 %, Exolon-ESK [5 to 10] %, and a number of other producers less than 5 %.

(164) The presence of numerous competitors on the world market secures effective competition. On this market the Chinese companies represent permanent competition. The notified operation would not lead to the creation or strengthening of a dominant position on this market.

C.4. Crude crystallized silicon carbide

(165) According to the Commission's investigation, total sales of crude SiC in the EEA amounted to some ECU 11,2 million (23 842 tonnes) in 1995. Imports amounted to some ECU 9,2 million (21 284 tonnes) and sales of crude SiC (non-captive) by producers located in the EEA amounted to ECU 2 052 million (2 558 tonnes). The parties imported [...] tonnes (ECU [...] million) crude crystallized SiC in 1995, most of it for internal use in their processing plants. However, sales of crude crystallized SiC by the parties (non-captive) accounted only for about [...] % of the market value.

([62]) Notification, Annex 39.
([63]) Notification, Annex 39.
([64]) This and the following figures are estimates by the parties.
([65]) See letter of the parties of 14 October 1996, Annex 9.

(166) The parties are not only the largest single importers of crude SiC, but also by far the largest producers of crude crystallized SiC in Western Europe (see Table 4). However, most of their production is used internally for the processing of SiC grains for abrasive and refractory applications. Therefore, apart from imported materials there have been only minor sales of crude SiC by European suppliers on the market, and the parties market share on this market is only minor. Most of the limited amounts of crude crystallized SiC imported into the EEA originated in the USA (US army stocks), Mexico, Russia, Venezuela, China, Romania, and Switzerland.

(167) Crude crystallized SiC is only sold as an intermediate product for the processing of SiC grains for abrasive and refractory applications. Because of the high import share and the fact that the parties have only minor activities in the non-captive trade of crude SiC, the Commission considers that the proposed concentration on the market for crude crystallized SiC would not create or strengthen a dominant position on this market.

Table 4

Production and imports of crude crystallized SiC in the EEA in 1995
(including captive use)

Suppliers	Black SiC		Green SiC	
	(in tonnes)	(%)	(in tonnes)	(%)
Norton, Norway (Saint-Gobain)	[>40 000]	[<35]	[>10 000]	[>60]
ESK, Germany	[<30 000]	[>20]	[<5 000]	[<25]
Total parties	**[<70 000]**	**[50 — 60]**	**[<20 000]**	**[80 — 90]**
Navarro, Orkla-Exolon	<35 000	[25 — 30]	<2 500	[10 — 20]
Imports (including Timcal)	[>20 000]	[<20]	[0]	[0]
Total	**<125 511**	**100,1**	**<19 939**	**100,0**

Source: Result of the Commission's investigation; partly estimated.
Note 1: In should be noted that Saint-Gobain (Intermat) in 1995 was [. . .].
Note 2: Neither Navarro, Orkla-Exolon, Timcal have a share of more than 12,5 %.

C.5. Processed silicon carbide for abrasive applications

Market volume

(168) According to the parties, sales of processed SiC for abrasive applications in the EEA amounted to ECU [> 65] million ([> 55 000] tonnes) in 1995. Germany accounted for about [25 to 30] % of the market volume in the EEA, Italy for [20 to 25] %, France for [15 to 20] %, the United Kingdom for [10 to 15] % and Spain for [5 to 10] %.

(169) The Commission disagrees with the market volume estimated by the parties. Based on its survey of all producers and processors in the EEA, the major traders and importers, and 67 abrasives manufacturers, the Commission estimates that total sales of processed SiC for abrasive applications in the EEA amounted to some ECU 57 million (45 409 tonnes) in 1995 [66]. Although significantly lower than the market volume estimated by the parties, in value terms the

[66] First, the Commission added up the sales figures of the parties and the other major suppliers Orkla-Exolon, Navarro, MWK, Timcal, Washington Mills, H. C. Starck and Frank & Schulte. As a second step, the Commission eliminated double-counting resulting from inter-supplier purchases. Finally the Commission added the import figures estimated by it as explained under Section B, taking into account the fact that total imports include sales of Timcal in the EEA.

Commission's figure is significantly higher than estimates provided by other suppliers([67]).

Market position of the parties

(170) Market shares: Saint-Gobain in 1995 obtained a market share in the EEA of about [30 to 40]%; ESK had a market of about [20 to 30]% (in value terms)([68]). After the concentration the parties would achieve a combined market share of about [60 to 70]% of the market for SiC grains for abrasive applications. Thus the parties would have a market share which is more than eight times higher than the market share of their next largest competitor (see Annex II).

(171) The next largest competitors active within the EEA are the German processor MWK having a market share of below 8%, followed by the Norwegian producer Orkla-Exolon (< 7%), and the Spanish producer Navarro (< 5%). All other suppliers have market shares below 3%.

(172) Processing capacities: In 1995, the total EEA capacity for the processing of FEPA-F grains amounted to about [80 000 to 85 000] tpa at most and capacity for the processing of FEPA-P grains amounted to about [40 000 to 50 000] tpa at most([69]). About [80 to 90]% of total capacity was attributed to the processing of FEPA macro grains, whereas less than [10 to 20]% can be used for the processing of FEPA micro grains. However, as can be seen from Table 5, the parties are basically the only producers of FEPA-P grains and by far the largest producers of FEPA-F micro grains. Although it is technically possible to produce FEPA-P grains and FEPA-F with more or less the same type of equipment, the production of FEPA-P grains requires the observation of very strict specifications regarding sieve analysis, shape of the grains and other physical and chemical properties. A switch from FEPA-F to FEPA-P (or vice versa) would require adjustment of the sieves. For these reasons all suppliers asked by the Commission produce FEPA-F and FEPA-P grains in separate production lines. At present, practically, only the parties are able to produce both types of grains at the same time since they have by far the largest and most sophisticated processing facilities in the EEA.

(173) Research and development: In general, research and development are of minor significance in the production and processing of SiC for abrasive applications. The parties do not invest more than [< 1]% of their annual turnover in research and development. However, in the segments for micro grits, where crude SiC is refined into particularly pure and fine qualities for certain industrial applications, the proportion is higher. Nevertheless, considering the size of the competitors remaining after the operation, it seems clear that the parties will be the technological leader in the production of SiC grains for abrasive applications. Norton already considers itself to be the acknowledged technological leader([70]).

(174) Furthermore, research and development play an important role in the downstream production of abrasive end-products, where there is a steady flow of new products and product-varieties. A supplier of SiC abrasive grains can profit from the knowledge he acquires on the market for abrasive end-products, because it enables him to adapt his production of abrasive minerals more easily to the developments on the downstream market. Saint-Gobain is a leading player on the down stream market for abrasive end-products. Its vertical integration therefore gives Saint-Gobain an advantage *vis-à-vis* its non-integrated competitors in the market for SiC grains for abrasive applications. Saint-Gobain is the only vertically integrated producer of SiC abrasive grains in Western Europe.

Current competition

(175) As regards the market for SiC abrasive grains, Orkla-Exolon and Navarro are the only sizeable competitors that produce crude crystallized SiC themselves. However, those companies are not full range producers. Neither produces FEPA-P micro grains, and Navarro produces only a very limited amount of FEPA-P macro grains. As regards green SiC, Orkla-Exolon is the only other producer in Western Europe, but only to a limited extent. On the other hand, the parties are almost the only producers of FEPA-P grains in the EEA. Furthermore, they are not only the most important producers of green SiC within the EEA, but also outside the EEA.

([67]) Orkla-Exolon estimated the market volume for abrasive grains to be about 46 000 tonnes in 1995. According to Treibacher the market volume was about 45 000 tonnes (ECU 45 million). Navarro estimated the market value to be about ECU 44,6 million.

([68]) The Commission gives a range of the market shares since it could be argued that the market volume (market value), respectively total imports, were 7,2% (4,6%) higher as calculated on the basis of the customer and supplier inquiries (see footnote 47).

([69]) The two figures cannot be added up because certain parts of the equipment can be used in either way for the processing of FEPA-F and FEPA-P grains.

([70]) See Norton Catalog 400, introduction, p. 1.

Table 5

FEPA grain production in the EEA in 1995
(in %, including captive use)

Suppliers	FEPA-F grains		FEPA-P grains	
	macro	micro	macro	micro
Norton, Norway (Saint-Gobain)	[<50]	[<45]	[>50]	[>50]
Intermat, Belgium (Saint-Gobain)	[<5]	[<5]	[<5]	[<5]
ESK	[<15]	[>40]	[>45]	[<50]
Total parties	[60 — 70]	[80 — 90]	[>90]	[>90]
Orkla-Exolon, Navarro, MWK, Washington Mills (United Kingdom)	[30 — 40]	[10 — 20]	[<10]	[<10]
Total production in 1 000 tpa	35,6	7,6	5,7	2,3

Source: Results of the Commission's investigation.
NB: The figures for the competitors have been combined for reasons of confidentiality. However, none of them have a share in any of the categories of more than 20 %, and in all categories except for FEPA-F macro grains the competitors each have less than 10 %.

(176) Apart from the producers of crude SiC, the processors established in the EEA offer customers an alternative supply to the producers. However, their possibilities of providing effective competition to the producers are rather limited, since processors in the EEA that do not belong to the parties are unable to supply the finer grades of SiC (micro grains) needed in the industrial abrasive applications. Furthermore, the supplier-customer relationship between the processors and the parties will limit the processors' ability to compete effectively with the parties. There is a high likelihood that they will be price followers.

(177) The largest of the independent processors, MWK, started its business by recycling used grinding wheels and in recent years has developed into a sizeable supplier of processed SiC grains. However, MWK only processes macro grains according to the FEPA-F standard and currently operates no processing capacities for SiC micro grains and for abrasive grains according to the FEPA-P standard. MWK does not provide the full range of SiC grades. Therefore, MWK cannot be considered to be an effective competitor to the parties over the full range of processed SiC grains. Moreover, MWK considers itself not to be in direct competition with the parties as it is predominantly active in the coarser grades on the market. Furthermore, the company is family-owned and its financial resources to develop its business are rather limited compared to Saint-Gobain and ESK.

(178) Full-range suppliers have a significant advantage, since they can offer a complete range of SiC grades from a single source. To buy all grades from several suppliers would increase procurement costs for most customers. Furthermore, customers would risk receiving materials with different chemical compositions and thus would have to adapt their bonding materials accordingly. For all these reasons customers needing a broad range of SiC grades prefer to source from a full-range supplier. This may not be the case for customers specialized in specific abrasive end-products and who need only a small range of coarse macro grits, e.g. products for wire-saw applications in the stone-working industry. However, most of the abrasives manufacturers in the EEA produce abrasive products for use in various industrial applications and require a sufficiently wide range of SiC abrasive grades.

(179) ESK and Saint-Gobain are the only full-range suppliers in the EEA at present. The competition between the parties is the main source of competition in the current market for abrasive SiC.

No countervailing buyer power

(180) The customers for SiC for abrasive applications are predominantly small to medium-sized companies.

Most of the abrasives manufacturers operate only one production plant and purchase relatively small volumes of SiC. Many are small to medium-sized family-owned companies. The largest customer accounted for less than 3 % (value) of total SiC abrasive grains sold in the EEA in 1995. They therefore have no significant countervailing purchasing power.

Prospects for future demand

(181) The parties have taken the view that the development and introduction of new process technologies in the metal-working industries have led to a reduced use of SiC and therefore will have a constraining effect on the parties after the completion of the proposed concentration.

(182) However, recent market developments contradict the notion that there is a decline in demand. According to the parties, the market volume for SiC abrasive grains in the EEA has continuously increased from [. . .] tonnes in 1993 to [. . .] tonnes in 1995 ([+ 10 to 15] %), and average prices have increased by [5 to 10] % since 1994. According to the latest market report available, SiC grains in particular will continue to be used in quantities little different from those in use at present, since it is the preferred abrasive raw material for use on non-ferrous materials such as concrete, stone, glass and ceramics, and is particularly effective in short-run grinding operations [71].

(183) For these reasons, the introduction of new lathes and milling machines in tool-room applications is not considered to have any effects that would significantly constrain the conduct of the parties after the completion of the proposed concentration.

Barriers to entry

(184) Total investment for the construction of a green-field medium-sized SiC processing plant for macro grains (capacity of [. . .] tonnes) is estimated by the parties to be some ECU [> 10] million in the EEA not including the cost of land [72]. The establishment of a SiC processing plant for micro grains (capacity of [. . .] tonnes) is estimated to require an investment of ECU [> 5] million. Most of these investments concern specific equipment exclusively used for the processing of abrasive grains. An unsuccessful market entry is likely to leave the entrant with considerable sunk costs.

(185) The classification of grits according to the FEPA grain size distributions is demanding both with respect to the equipment required and the know-how and experience needed. Although both FEPA-F and FEPA-P grains are produced with identical machinery — except for the crushing which must produce more angular shapes for FEPA-P and block form for FEPA-F grains — indications are that processing in accordance with the very narrow and precise FEPA-P standard requires special know-how and long experience. Furthermore, although it may be possible to enter the macro grits- segment of the market, it appears quite difficult to process SiC micro grits with a constant grain size distribution over time.

(186) It is also necessary to have access to crude crystallized SiC with an appropriate chemical composition and a sufficient degree of chemical purity. The processing of certain SiC grades is supported by the exact knowledge of the raw materials' chemical composition and physical characteristics. For this reason, suppliers which both produce and process SiC grades apparently have a competitive advantage compared with companies active solely as processors. This finding is supported by the fact that only one processor not belonging to a SiC producer is active in Western Europe (see above). However, as already mentioned in Section C.2., the establishment of new furnacing capacities is associated with further investments, and in particular the necessity to meet environmental requirements.

(187) It should also be considered that any successful entry involving the setting-up of a furnacing plant would require the ability to supply all SiC markets and not only the abrasives market. Due to the nature of the furnacing process, whereby grades with different SiC content are automatically produced, it is necessary to be able to sell in all the SiC markets in order to secure a maximum level of revenue. It is impossible to focus only on the high-quality abrasive sector. This increases the need for know-how and investment on the part of a producer.

Potential competition

(188) *Exolon of the United States of America.* The parties have argued that the Exolon Company of the United States of America will become a more active competitor in the EEA after the links with

[71] Mitchell Market Report: *Silicon Carbide,* 3rd. edition, 1992, volume 1, p. 109.

[72] Page 71 of the Notification.

ESK have been cut. However, Exolon will not acquire any new assets in the EEA as a consequence of the operation. A significant increase in its presence in the EEA would, therefore, require new investment. The Commission has information which leads it to conclude that Exolon will rely on Orkla-Exolon for its expansion in the EEA. Furthermore, it is highly likely that such expansion will be slow and limited, particularly in view of the fact that Orkla-Exolon will be faced with a dominant firm, which is also the main competitor to Exolon in the United States of America. In this respect it should also be noted that Exolon at present depends on [. . .]. This dependence would remain for some time, even if the joint venture were to be implemented.

(189) Apart from Exolon, via Orkla-Exolon, an increase in potential competition to the parties could only come from outside the EEA.

(190) *Japanese* producers will not be potential competitors within the foreseeable future. In the past there have only been limited exports of specialized products from Japanese producers. Those exports went mainly to the United States of America and consisted of green abrasive SiC, which were for the most part distributed by the Norton Company (about 850 tonnes). Furthermore, according to a chart furnished by the parties showing the worldwide trade flows of SiC, there were no exports from Japan to the EEA in 1995. Indeed, according to the Eurostat statistics, total imports of SiC originating in Japan into the EU amounted to 104 tonnes in 1995, a level which has not been exceeded in the last five years.

(191) As far as the future is concerned the two main Japanese producers have indicated to the Commission that they have very little interest in the EEA market. Japanese producers in particular do not have an incentive to export to the EEA, since market prices in Japan are higher than in Europe. Japanese prices are thus about 30 % higher than prices in Germany, the main buyer of abrasive SiC in the EEA (see Section B.3.). It should in this respect also be borne in mind that the Commission in its survey asked customers in an open-ended way, which suppliers outside the EEA they would consider as being alternative sources of supply, and none of the customers mentioned Japanese suppliers as alternative sources of SiC. For all the above reasons it is not considered likely that Japanese suppliers will export significant amounts of SiC to the EEA in the foreseeable future.

(192) *Latin America.* Amongst the producers in Latin America, Casil in Brazil is the largest and most advanced. Casil started up production of SiC in 1980. In 1995 the company had a furnacing capacity of about 32 000 tpa and total production of about 30 000 tpa (Response, Annex 29). According to the parties, Casil produced 18 000 tonnes of crystallized SiC in 1995. The company has processing facilities for the production of about 6 000 tpa of abrasive grains and 10 000 tpa of refractory grains. As regards SiC for abrasive applications, Casil currently supplies only macro grains. However, the company has stated that it will start investing in processing facilities for coarse micro grits. Casil has exported only small amounts of processed SiC to the EEA in the past. Because of its limited processing capacities, Casil has not always been able to supply the product-mix required by customers and has problems with deliveries in the short term [73].

(193) The company is small and serves local markets in South America in addition to exporting to North America. Even if Casil were to increase its activity on the EEA market, the Commission considers that it would only have the capacity to achieve a market position similar to the current position of Orkla-Exolon. Therefore, the company does not have the capacity to be a potential competitor who could effectively constrain the future market behaviour of the parties after the merger.

(194) The Mexican producer Elmet is a small producer with a total furnacing capacity of 20 000 tpa. It does not export processed SiC to the EEA. Most of the limited amounts of crude crystallized SiC it exported to the EEA in 1995 were purchased and further processed by Saint-Gobain's subsidiary Intermat [. . .]. For these reasons, Elmet is not considered by the Commission to be an effective competitor of the parties for the foreseeable future.

(195) SiCVen in Venezuela has a furnacing capacity of about 22 000 tpa. It does not import processed SiC into the EEA. The limited amounts of crude crystallized SiC it exported to the EEA in 1995 were crushed and processed with Pechiney's old equipment in Southern France and distributed in Europe through its Swiss subsidiary Realindus. SiCVen is not an important competitor to the parties at present, and is only expected to have limited furnacing and processing capacities within the foreseeable future. Furthermore, it should be noted that Saint-Gobain is also present in Venezuela, where it operates a furnacing plant of a comparable size (20 000 tpa) to SiCVen's plant.

[73] See Response, Annex 30.

(196) *The former Eastern bloc.* The situation for the eastern European producers is very difficult. They are faced with large pollution problems, power shortages and are generally not considered to be very reliable suppliers. There is a large investment need, and until such investment can be undertaken, it is unlikely that they will be able to supply the qualities needed to be a real competitive factor in the EEA market. The two main producers are the joint stock firm Zaporozhsky Abrazivny Combinat ('ZAC') of the Ukraine and Volzhsky of Russia.

(197) ZAC was reorganized into a joint stock company in October 1995, in preparation for its privatization. The company is a producer of various kinds of abrasive materials and refractory products. To serve as an alternative supplier for EEA customers, ZAC has to process SiC abrasive grains according to the FEPA standard, which is different from the national standard in Ukraine. Since grain-size classification according to the FEPA standards requires certain know-how and experience (see paragraphs 185 and 186) it will take time before ZAC will be able to provide a full range of SiC grades. ZAC has started to supply SiC abrasive grains classified according to the FEPA standards([74]) through the trading companies INEC and VAZ Intermerkur. According to last year's price list of VAZ Intermerkur, ZAC supplies FEPA-F macro and micro grains, but does not offer SiC abrasive grains classified according to the FEPA-P standard([75]), even though, according to the parties, in 1996 ZAC supplied very limited amounts of FEPA-P macro grains to a single manufacturer of coated abrasives in Switzerland. However, as shown by the low market share, it has not been able to achieve wider market acceptance for its abrasive SiC.

(198) ZAC has since 1993 sought to restructure itself. It has stopped its production of green SiC due to environmental obligations, but has invested in new furnacing facilities for black crystallized SiC and metallurgical SiC. The restructuring process at ZAC has not yet been completed. According to the parties, ZAC's nominal furnacing capacities amounted to 100 000 tpa in 1995. However, the company is only able to utilize about 15 % of its furnacing capacities due to power shortage problems. Since electricity costs account for about one-third of total production costs, any SiC producer of a significant size requires a reliable source of electric power. As long as a SiC producer cannot operate its furnaces with the temperatures necessary to get crystallized material or has to observe certain power peaks, it will have to limit its total production. Given the current situation and its impact on the company's ability to be a reliable supplier, it is not possible to consider it an effective potential competitor in the foreseeable future.

(199) In Russia the state owned company V/O Stankoimport is a potential exporter. However, it is not a producer or processor of SiC, but trades in SiC material it has bought from Volzhsky (see below).

(200) Volzhsky is a large producer of fused minerals. As regards SiC, it has mainly exported metallurgical grade SiC and crude crystallized SiC into the EEA. This material has been purchased by the German company MWK for further processing. However, Volzhsky has also exported processed SiC to the EEA. Most of the material consisted of coarse macro grits for use in undemanding refractory and abrasive applications. Due to its close cooperation with MWK, the competitive potential of Volzhsky is to a large extent already represented by the market share of MWK. Furthermore, Volzhsky also depends on V/O Stankoimport for exports into the EEA. To become an alternative supplier for EEA customers, Volzhsky would have to change its current strategy and start to process SiC grades according to the FEPA standard, instead of relying on MWK. It would also have to develop a marketing capability in the EEA. Such a change in strategy is not easily carried out, since Volzhsky would have to invest in separate processing lines and would have to establish itself as a supplier of a range of abrasive grades in order to become an effective competitor in the EEA. This is highly unlikely to take place within the foreseeable future.

(201) The Czech SiC producer Moravitkarbo is a potential competitor and has managed to supply not only macro grains but also limited amounts of micro grains to end-users in the EEA. However, this company is an exceptional case among the producers in the former Eastern Bloc countries. In any case, Moravitkarbo is a very small producer with a furnacing capacity of only [...] tpa. Its processing capacities are even more limited. Until 1995 Moravitkarbo was only able to process [...] tpa of SiC micro grits. In summer 1996 the company doubled its micro processing capacities, but, they are still quite limited. For these reasons the impact of Moravitkarbo in the EEA market is only expected to be very small and not sufficient to serve as an effective constraint on the parties' future market behaviour after the merger.

([74]) See Response, Annex 25.
([75]) See letter of the parties of 14 October 1996, Annex 13.

(202) Korund of Poland produces black SiC and is an integrated abrasive tools manufacturer. The company is only able to supply abrasive macro grains classified according to the FEPA-F standard. Besides that it supplies refractory grains. According to the parties, Korund's furnacing capacities amounted to 20 000 tonnes in 1995, of which 15 000 tonnes were utilized. However, according to the finding of the Commission's inquiries, sales of processsed SiC by Korund were very limited in 1995. Since Korund is vertically integrated into the downstream markets for final products, it has rather exported metallurgical grade SiC.

(203) *China.* Theoretically there are large production capacities in China — at least for crude and metallurgical SiC. However, the Chinese producers are not in reality competitive threats to the parties (except for metallurgical grade SiC), since there are in practice no Chinese supplies of processed SiC into the EEA. According to the Commission's investigation, besides metallurgical grade SiC, only crude crystallized SiC was imported from China in 1995. However, even this material was of a low SiC content and could therefore only be used in less demanding applications in the abrasive and refractory industries. Moreover, it should be noted that a large proportion of the material was imported and further processed by Saint-Gobain.

(204) Furthermore, the Chinese producers have problems with power shortages. As mentioned above, power accounts for about one-third of total SiC production costs and any power shortage would seriously damage the production process. According to an article in the *Ceramic Bulletin,* June 1995, page 151, by Neil N. Ault and John T. Crowe from the Saint-Gobain/Norton Industrial Ceramics Corporation:

'China has many small producers located throughout the country with a combined capacity of about 200 000 metric tons. However, the rapid industrialization of China has caused electricity shortages and allocations. Power plant construction has not kept pace with industrial requirements. This has resulted in at least 25 % of the installed furnacing capacity being indefinitely idled. Prices for electricity also have shown market increases in China in the past two years. A significant percentage of China's production is exported. It is primarily used in metallurgical applications'.

(205) According to the parties, many Chinese SiC producers cooperate in exports of SiC. The most significant example is the Chinese Abrasive & Export Cooperation (CAEC). 59 factories and units around China are associated in CAEC. The producers belonging to CAEC are active in the entire range of abrasive raw materials. According to the parties CAEC includes, among others, the two most significant SiC producers, the Second Abrasive Wheel Factory (brand name: White Dove) and the Seventh Abrasive Wheel Factory (brand name: Mountain). These two companies export partly through CAEC and partly on their own account. However, indications are that exports to the EEA predominantly consist of final abrasive products rather than processed SiC.

(206) The parties have supplied the Commission with a brochure describing the activities of the Second Abrasive Wheel Factory (brand name: White Dove). The company employs about 700 people in SiC production and has a processing capacity of about 15 000 tpa of SiC abrasive grains. However, most of the SiC production is used internally as the factory is the leading Chinese producer of abrasive tools. According to the parties the company is using German equipment installed in 1986. However, in the companys' brochure it is indicated that this equipment is used for the production of coated abrasive products and not in the grain production itself. The parties have stated that the Second Abrasive Wheel Factory would be able to produce all SiC grades (macro and micro) for coated and bonded abrasives. However, from the comparison chart of grit sizes attached to the company's brochure, it can be seen that the factory cannot produce the full range of micro grits for coated abrasives (P-standard). In any case, the company focuses on the production of abrasive products and, therefore, any increase in exports of SiC abrasive grains would constrain its ability to produce and export those final products.

(207) The parties have also supplied a brochure describing the activities of the Seventh Abrasive Wheel Factory. The company produces aluminium oxide and SiC and is a major Chinese producer of abrasive tools. It employs 440 people in the production of SiC. Processed SiC ranges from FEPA 4 to FEPA 240, i.e. macro grits only. The parties estimate the processing capacity of the company to be about 20 000 tpa, of which 5 000 tonnes is for micro grits.

(208) The Second Abrasive Wheel Factory and the Seventh Abrasive Wheel Factory are the two main Chinese SiC producers. The parties have also furnished information about several other smaller factories, in particular about Henan Xingshi Abrasives (8 000 tpa), Danjiankou SiC Factory (5 000 tpa), and First Abrasive Wheel Factory (17 000 tpa). The parties estimate total Chinese processing capacity to amount to at least

150 000 tpa. Of that total, domestic Chinese consumption accounts for about 50 000 to 80 000 tonnes and exports for about 30 000 to 40 000 tonnes.

(209) In addition to this information, the parties have submitted [information] as evidence that the Chinese are capable of offering all micro and macro FEPA grades.

(210) Based on developments in recent years, the parties estimate that Chinese producers would be able to penetrate the EEA market for abrasive and refractory material after the expiry of anti-dumping measures on Chinese SiC. In particular, the parties have argued that the Chinese producers are already exporting considerable amounts of SiC to Japan, and this is evidence that Chinese producers are already capable of supplying processed SiC of a sufficient quality for EEA customers. Therefore, the Commission asked the 'Japanese Artificial Industry Association' and major producers about imports from China and whether Chinese SiC met Japanese quality requirements. 'The Japanese Artificial Industry Association' estimates that half of Chinese exports are being reprocessed in Japan. The producers have confirmed that in many cases SiC material is being processed in Japan. In this context it should also be noted that some of the imported material is being produced with technical assistance from Japanese companies in joint ventures or in close cooperation between Japanese and Chinese companies. From this evidence it cannot be concluded that Chinese producers are in general able to supply the full range of SiC abrasive grains demanded by EEA abrasive consumers, without further processing in the EEA.

(211) In this context it should be noted that the Second Abrasive Wheel Factory has obtained technical assistance from a leading Japanese supplier, which it now supplies with several thousand tonnes of processed SiC per year. Furthermore, the parties have supplied information about the Japanese processor Nanko that is going to start the production of black SiC micro grits for abrasive applications in China in 1997 with an expected annual capacity of about 1 200 tonnes, mainly for export to Japan and to Taiwan where Nanko has a production plant for abrasive products [76].

(212) According to the Commission survey, EEA customers do not consider Chinese SiC to be an alternative for use in abrasive, refractory and other industrial applications. This was also indicated in a visit report from the parties to a large [...] customer of ESK. According to this customer, Chinese material was not of a sufficiently good quality (Response, Annex 30). In addition, according to the customers questioned by the Commission the reliability of deliveries is not high enough for western European producers. In evaluating this information, it should be noted that the abrasive and refractory manufacturers contacted by the Commission have continuously tested alternative sources of supply of SiC.

(213) The largest SiC producers in China are currently not specialized in the processsing of SiC, but rather produce abrasive products for use in domestic industries and for export. Chinese producers may become potential competitors in the distant future. According to European SiC producers, it would take them as much as three years or more to build a plant, to acquire operational experience to run a processing plant and to gain market acceptance. The exact period of time will depend on the level from which a company starts. This estimate assumes that the know-how and financing required are in place. Where producers are in less favourable environments and the means to buy the necessary machinery or access to know-how depends on foreign partners, it must be expected to take longer for a company to enter the EEA markets for abrasive SiC.

(214) In conclusion, the parties' estimate of the Chinese producers being able to penetrate the EEA market within two to three years is very optimistic. In fact, it is highly likely that it will take more than three years for Chinese producers to enter the EEA market for abrasive and refractory material. Indeed, the Japanese example shows that the time needed for the Chinese to penetrate the EEA market may depend on technical assistance from Western producers, for example through joint ventures. Saint-Gobain has already set-up a SiC processing plant in China and is the most obvious EEA producer to pursue this strategy.

(215) *The parties' argument relating to anti-dumping measures.* The parties have argued that the anti-dumping measures are currently preventing companies from importing processed abrasive SiC from the former Eastern bloc countries and China. Indeed, some customers have indicated to the Commission that the anti-dumping measures are preventing them from buying from sources in those countries. However, as discussed above, producers in Russia, Ukraine and China are currently not able to supply a full range of abrasive SiC. Therefore, in the abrasives market the measures

[76] See letter of the parties of 24 October 1996, Annex 4a.

cannot be considered to prevent imports since the main reason for the low imports from China, Russia, Ukraine and Poland is in fact the suppliers' failure to meet the requirements of EEA customers as far as product quality, product range, and reliability in supply are concerned.

(216) *The forecast period.* The period within which potential competition should materialize for it to be taken into account as a factor preventing the creation or strengthening of a dominant position, can vary from case to case depending on the specific circumstances, but two to three years is normally considered as maximum. In Case IV/M.477 — Mercedes-Benz/Kässbohrer [77], potential competition played an important role in the decision to clear the case. The question was whether Mercedes-Benz would acquire a dominant position on the German markets for intercity buses and tourist coaches. In that case, strong competitors were already present on the market (MAN) or had already made arrangements to enter the markets (Volvo). Furthermore, companies with considerable resources like IVECO and Renault had product lines which could, with minor adoptions, be sold in Germany. Potential competition was, therefore, specific, easily identifiable and justifiable. In the present case the Commission considers a period of at most three years to be appropriate.

(217) *Conclusion on potential competition.* In the future, the main sources of potential competition would be from the former Eastern bloc countries and China. The producers in Ukraine are faced with power shortages and restructuring needs. The Chinese producers also have problems with power shortages and need technical assistance as demonstrated by their exports to Japan. These producers need to increase the quality of processed material, if they want to compete in the EEA market.

(218) Purchasers of SiC for abrasive applications, consulted by the Commission, stated that producers in the former Eastern bloc and China are not able to obtain the level of quality that is necessary for their needs. Furthermore, any attempt to enter the EEA market for processed SiC which is not based on a long-term commitment is likely to fail, since EEA customers consider the reliability of deliveries and product quality to be of greater importance than the product price. This is supported by several customers who stated they would not consider buying from non-European suppliers even if the products were cheaper.

(219) In view of the current problems of producers in the former Eastern bloc and in China, the Commission does not consider it likely that those producers will be able to materialize as potential competitors within the next three years. Indeed, the current difficulties in obtaining information as to the size and quality of the capacities of these companies is in itself an indication that these companies are not currently providing effective potential competition to the parties. It is likely that the producers in Russia, Ukraine and China will only be able to become potential competitors with the technical assistance and know-how of Western or Japanese companies. Saint-Gobain and Japanese companies already have joint ventures in processing in China, and Saint-Gobain has plans to set up a fusion plant in China.

Conclusion

(220) After the merger, the parties will be by far the largest supplier of SiC for abrasive applications in the EEA. The competitors are all smaller companies with limited resources who would not be able to challenge the parties. Furthermore, there are no potential competitors that would become effective in the EEA within a reasonable period of two to three years. In particular, it cannot be expected that potential competitors in eastern Europe and China will emerge to an extent which would constrain the market behaviour of the parties. It is highly likely that because of the failure to meet customer needs, the fact that most of the imported material consists of crude SiC that has to be processed in the EEA, and the lack of reliability of supply, producers from outside the EEA will not be able compete effectively in the EEA for a period of up to three years. Therefore, the proposed joint venture will lead to a dominant position in the market for processed SiC for abrasive applications. In particular, the parties will be in a position to impose a small but significant price increase, since the smaller competitors will not be in a position to challenge the parties, nor will potential competitors enter the market in the foreseeable future.

C.6. Processed silicon carbide for refractory applications

(221) According to the parties, sales of processed SiC for refractory applications in the EEA amounted to ECU [> 50] million ([> 55 000] tonnes) in 1995. Germany accounted for about [50 to 55] % of the market volume in the EEA, the United Kingdom for [15 to 20] %, France for [5 to 10] %, Spain for [< 5] % and Italy for [< 5] %.

[77] OJ L 211, 6. 9. 1995, p. 1.

(222) The Commission disagrees with the market volume estimated by the parties. Based on its inquiry of all producers and processors in the EEA, the major traders and importers, and 26 manufacturers of refractory products and ceramics, the Commission estimates that total sales of processed SiC for abrasive applications in the EEA amounted to some ECU 45,7 million (54 713 tonnes) in 1995 ([78]). Although significantly lower than the market volume estimated by the parties, in value terms the Commission's figure equals estimates provided by other suppliers ([79]).

Market position of the parties

(223) The market structure and the conclusions reached in that regard are similar to those found for the market for SiC for abrasive applications. The parties will have a combined market share of [60 to 70] % (in value terms) ([80]). As for abrasives, several smaller competitors are present on the market. However, Orkla-Exolon, Navarro, and MWK each have only about 10 % of the market. Other European producers have an even more marginal presence of less than 5 %. The market share of the parties is therefore six to seven times larger than their closest competitors (see Annex II).

(224) The parties' market position is stronger than is indicated by the combined market share, since the parties are by far the most important full-range suppliers, whereas the competitors are not full-range suppliers and mostly supply only basic products. Of the European competitors, Navarro and MWK mostly supply grades for less demanding refractory products. The position of suppliers located outside Europe is not significant. Imports are mainly of coarse grades, which are only to a limited extent alternatives to EEA suppliers. Imports are even lower than in the case of abrasives. Proximity to customers was said by the parties at the hearing of the case to be an important competitive advantage. This explains part of the difference in import levels between the markets for abrasive and refractory SiC, since refractory SiC is produced to individual customer specifications.

(225) *Processing capacities.* The crushing, sieving and deironizing equipment used for the processing of abrasive grains can also be used to produce refractory grains. However, as discussed under the product market definition, refractory grades are produced to customer specifications and not to defined industry standards like the FEPA standards. Refractory grains are therefore normally produced to order and not to stock, as is the case for abrasive material. However, the assessment of processing capacities in the abrasives market is also valid for the refractory market.

(226) *Research and development.* As for abrasive grains, research and development are not considered to be very important factors for the processing of refractory grains. However, for the same reasons as for abrasive grains, the vertical integration of Saint-Gobain also gives the parties an advantage compared to its non-integrated competitors. Saint-Gobain is the only vertically integrated producer of SiC for refractory purposes.

Current competition

(227) The Swiss company Timcal produces SiC refractory grains and is, therefore, a competitor on the EEA refractory market. However, the company has a very small market share, and only limited capacities. It is mainly a producer of graphite, and exports a large amount of its SiC production as crude material [. . .]. Otherwise the analysis and the conclusions are the same for refractory SiC as for abrasive SiC and reference is therefore made to the remarks above concerning abrasive grains.

No countervailing buying power

(228) The share of SiC in the total cost of a refractory product is on average 25 % according to the most important European users. This amount represents a significant share of the total costs per unit produced.

([78]) First, the Commission added up the sales figures of the parties and the other major suppliers, Orkla-Exolon, Navarro, MWK, Timcal, Washington Mills, H. C. Starck and Frank & Schulte. As a second step, the Commission eliminated double-counting resulting from inter-supplier purchases. Finally the Commission added the import figures estimated by it as explained under Section B, taking into account the fact that total imports include sales of Timcal in the EEA.

([79]) Orkla-Exolon estimated the market volume for refractory grains to be about 55 000 tonnes in 1995. According to Treibacher the market volume was about 45 000 tonnes (ECU 45 million). Navarro estimated the market value also to be about ECU 45 million.

([80]) The Commission gives a range of the market shares since it could be argued that the market volume (market value), respectively total imports, were 7,2 % (4,6 %) higher as calculated on the basis of the customer and supplier inquiries (see footnote 47).

(229) The customers for refractory material are larger than is the case for abrasives. The parties have claimed that buyers of refractory material have countervailing buying power. However, the buyer side for SiC for refractory materials is less concentrated than the supplier side and represents a large number of different applications. Furthermore, there is no specific basis on which the buyers would have countervailing buying power, except their size, which is limited in relation to the parties. It must, therefore, be concluded that buyers of refractory SiC grade have no buying power.

Prospects for future demand

(230) The parties have argued in the Notification (page 78) that demand is declining, or at best stable, due to its dependence on the steel and metallurgical markets in particular. However, this seems to be inconsistent with an article from *Industrial Minerals* provided by the parties in Annex 12 (Document 16). According to that article (page 51, paragraph 5), the share of SiC in total refractory products is expected to increase.

(231) Furthermore, according to the parties, sales have increased by 18,3 % and consumption (volume) has increased by 11,8 %, since 1993. Over the same period the average price for SiC grains for refractory applications in the EEA has increased by 9,9 %. However, according to the parties, the average price in 1995 is about 17 % higher than in 1994.

(232) SiC was first introduced on an experimental basis in blast furnaces in the 1970s and first became widely used as a refractory material in blast furnaces in the 1980s, according to the articles by Ray (Annex 12 to the notification, document 8). It appears that SiC has and will continue to replace other refractory materials, not due to price developments, but due to technological inventions. The actual demand may fluctuate with general economic conditions. However, overall, the demand prospects for SiC for refractory applications are not unfavourable.

Barriers to entry

(233) The barriers to entry are basically the same as for the abrasives market, since the processing equipment is the same as the equipment used for the processing of abrasives material. However, refractory material may be somewhat less complicated to produce.

(234) It should be noted that it is unlikely that equipment would be purchased only to produce refractory or abrasive grains. It would normally be purchased in order to produce for both markets. In this sense, barriers to entry in the abrasives market will have an impact on entry to the refractory market and vice versa. An increase in demand for refractory material would therefore not necessarily lead to new entry, even if there is a decline in overall grain demand for refractory, abrasive and other applications.

Potential competition

(235) According to the parties, proximity to the customer confers an important competitive advantage (see Section B.3.). Refractory products are produced to customer specifications, which will tend to make this aspect more important for refractories than for abrasives. For this reason potential competition will be even less in the refractory market than in the abrasives market. Otherwise, however, the assessment of potential competition is the same as for abrasives, and reference is made to Section C.5.

Conclusion

(236) Following the operation the parties will be the largest producer of processed SiC for refractory applications in the EEA. They will have a market share of [60 to 70] %. In some segments the parties will even be the only supplier. The remaining competitors within the EEA will be much smaller than the parties, and will not be able to constrain the competitive behaviour of the parties. Similarly, competitors located outside Europe do not represent an alternative source of supply for the refractory customers in the EEA. In particular, these producers have difficulties meeting the quality requirements of EEA customers, and they are not expected to be able to do so within the foreseeable future. Therefore, the parties would be in a position to impose a small but significant price increase, since the present smaller competitors would not be in a position to challenge the parties, nor would potential competitors enter the market in the foreseeable future.

(237) In conclusion the concentration will create a dominant position in the market for SiC for refractory applications, as a result of which effective competition would be significantly impeded in the market for processed SiC for refractory applications.

C.7. Silicon carbide for other industrial applications

(238) According to the parties, sales of processed SiC for other industrial applications in the EEA amounted to ECU [< 3] million (< 2 000 tonnes) in 1995. However, based on its inquiry of all producers and processors in the EEA, the major traders and importers, and five customers that use SiC in other industrial applications, the Commission estimates that total sales of processed SiC for other industrial applications in the EEA amounted to some ECU 7,4 million (7 632 tonnes) in 1995([81]).

(239) On this market the parties will have a combined market share in value terms of about [< 25]%. They will face effective competition from the other SiC suppliers in the EEA, in particular from MWK, Navarro, and Orkla-Exolon. It appears that the parties would not achieve a dominant position on this market.

D. 'FIXED COST DILEMMA'

(240) The parties argued in the Response that the proportion of total costs represented by their fixed costs amounted to between [...]% (including labour costs as fixed costs) compared to only [...]% variable costs (mainly energy and raw materials). According to the parties, this cost structure forces them to run their plants at full capacity, since they have an incentive to sell as much material as they can, as long as variable costs are covered. As a consequence they are forced to respond to low priced imports, since they cannot afford to lose market share. Therefore, their high market shares do not necessarily reflect market power.

(241) This argument cannot be accepted. First, it assumes that imports are the major source of competition on the market. As discussed above in Sections B and C, this is clearly not the case. The most important source of competition in the abrasive and refractory SiC markets is the competition between the parties to the notified merger. Imports only play a marginal role and it cannot, therefore, be accepted that imports would have a disciplining effect on prices for abrasive and refractory products, as argued by the parties. Therefore, the parties would not lose significant market shares to imports following the merger. The main source of competition on the market is the competition between the parties, which would disappear following the merger. Consequently, after the completion of the merger, there would be scope for price increases.

(242) Secondly, the main part of the fixed costs mentioned by the parties is only fixed for a very short period of time (one to three months). There is scope for adjustments of capacity and fixed costs of the plants of the parties. This is, for example, demonstrated by [...].

(243) Thirdly, the Commission assessment of market power is not only based on the size of the market shares of the parties, but also, for example, on the structure of current supply and demand and potential competition as discussed above in Section C.

E. ECONOMIC AND TECHNOLOGICAL PROGRESS

(244) The parties expect synergies resulting from the concentration in both the production and the processing of SiC([82]). As to production, synergies can be achieved in particular by:

— [...]([83]),

— [...],

— [...].

(245) The main synergies which can be obtained from this operation relate to the Delfzijl plant. As mentioned above, the Delfzijl plant is structurally disadvantaged compared to its competitors due to:

— [...],

— [...],

— [...].

(246) The Commission does not dispute that some synergies are achievable from a streamlining of the production in Delfzijl. However, there is no mechanism whereby the benefits of the synergies can be passed on to the consumers. The possibility

([81]) First, the Commission added up the sales figures of the parties and the other major suppliers, Orkla-Exolon, Navarro, MWK, Timcal, Washington Mills, H. C. Starck and Frank & Schulte. As a second step, the Commission eliminated double-counting resulting from inter-supplier purchases. Finally, the Commission added the import figures estimated by it as explained under Section B, taking into account the fact that total imports include sales of Timcal in the EEA.

([82]) Page 3 of the parties' letter of 22 July 1996.

([83]) Deleted business secret. The parties expect significant efficiencies and cost savings resulting from a restructuring and streamlining of the production process in the Delfzijl plant by integrating it into the European SiC operations of Saint-Gobain.

of a price increase of SiC, as a consequence of the operation, will outweigh the potential synergies. In assessing the potential efficiencies of the merger, therefore, it is important also to take into account the competitiveness of the down-stream EU producers of abrasive and refractory products. Since these producers have a much higher level of employment and value added than the SiC production itself, the overall effect of the operation would be likely to be more harmful than beneficial.

F. FAILING COMPANY DEFENCE

(247) The parties have supplied the Commission with information showing that ESK's SiC business [. . .]. However, the present merger does not present a failing company defence. A failing company defence could only be accepted if, even in the event of the merger being prohibited, the acquirer would inevitably achieve or reinforce a dominant position. As defined in Case IV/M.308 — Kali + Salz/MdK/Treuhand([84]) a merger is generally not regarded as leading to deterioration in the competitive structure, if it is clear that:

1. the acquired undertaking would in the near future be forced out of the market, if it is not taken over by another undertaking;

2. the acquiring undertaking would take over the market share of the acquired undertaking, if the latter were forced out of the market;

3. there is no less anti-competitive alternative purchaser.

However, in the present case, it is clear from an examination of the three criteria that a prohibition of the merger would be the less anti-competitive decision.

(248) *ESK's withdrawal from the market.* The Commission recognizes that ESK's SiC business [. . .].

(249) At the beginning of the 1990s Wacker-Chemie tried to implement an aggressive strategy in order to develop the SiC business into a globally active and viable business. However, the strategy failed [. . .].

(250) ESK has pursued several different options in order to find a buyer for the SiC business. In 1993 it sought to create a joint venture with [two competitors]. However, both [competitors] decided to close their SiC production before the joint venture plans could be implemented. In 1995 ESK tried to sell all its SiC activities to Saint-Gobain. The operation was notified to the Bundeskartellamt, but it was withdrawn [. . .].

(251) According to the parties the notified operation materalized as the best option following the notification to the Bundeskartellamt. According to the parties, it was in particular essential that Saint-Gobain has the industrial leadership of the joint venture, since the Delfzijl plant requires a strong industrial partner, which could achieve synergies and thus become viable.

(252) It cannot be accepted that ESK would be forced out of the market in the near future, if it is not taken over by another undertaking. [. . .].

(253) *Accrual of ESK's market share to Saint-Gobain.* Even if ESK were to close both its Delfzijl and Grefrath plants immediately, the market structure would still be less anti-competitive than that resulting from the merger. The consequence of a closure would be a major price increase, particularly in the abrasive and refractory SiC markets, since neither Saint-Gobain, nor Orkla-Exolon, Navarro or potential competitors would have the capacity to fill the demand gap left by ESK. There would be new investment in fusion and processing capacity and competition between Saint-Gobain, Orkla-Exolon, and Navarro. Furthermore, with such a major price increase the EEA market would become very attractive, which would make it highly likely that in time imports would take some of ESK's market shares.

(254) In this situation Saint-Gobain would be likely to take a large part of ESK's market share. However, it would not be able to capture all of ESK's market share. In conclusion the increase in Saint-Gobain's market share and market power would be less than if the merger is allowed to go ahead.

(255) *Alternative purchasers.* The parties have argued that Saint-Gobain is the only realistic buyer for the whole of ESK's SiC business.

([84]) OJ L 186, 21. 7. 1994, p. 38, paragraph 71.

(256) The source of the problem for ESK's SiC business is the Delfzijl fusion plant, which is structurally disadvantaged due to its high proportion of the lower-priced metallurgical SiC, which is less profitable due to the competitive pressures in this market. Furthermore, the Delfzijl plant. site is polluted and the clean-up costs are considerable. All in all, Delfzijl is not in itself a very attractive asset. Even Saint-Gobain may not be able to safeguard the continuation of the Delfzijl plant in the long term, since the plant will remain a high-cost producer.

(257) The Grefrath processing plant on the other hand is a highly valuable asset. It is one of the most advanced processing plants for SiC in the world. In particular it has very sophisticated facilities for the production of the finest abrasive and refractory grades.

(258) For Saint-Gobain it is attractive to buy both Delfzijl and Grefrath as a package. First, Saint-Gobain will be able to reduce the structural problems of the Delzijl plant by exploiting synergies with its other fusion plants. More importantly, Saint-Gobain will acquire attractive processing capacities and ESK's market shares. Saint-Gobain thereby will become dominant and able to increase prices also for its current production in its Norwegian plants.

(259) *In conclusion* it is not impossible that the Delfzijl plant will be closed. However, the Grefrath processing plant is a valuable asset. It is one of the most advanced SiC processing plants in the world, and could be sold either as a whole or in pieces to third parties. In either case, the processing capacities would remain in the market competing with Saint-Gobain. This has alredy happened in the past in connection with the closure of Lonza and Pechiney's SiC production. This solution would be less anti-competitive than the joint venture. For all the above reasons, therefore it cannot be accepted that the current operations should be approved due to a failing company defence.

G. UNDERTAKING PROPOSED BY THE PARTIES

(260) By letter of 25 October 1996 the parties have offered an undertaking in order to prevent the creation of a dominant position in the markets for abrasive and refractory SiC. In the preamble to the undertaking, the parties state that it is their firm belief that the only reason for the low volume of imports of high quality SiC from Russia, Ukraine, Poland, and in particular, China, is the anti-dumping duties imposed on imports from those countries.

(261) Accordingly, in order to eliminate the barrier to imports of high-quality SiC from China, Russia, Ukraine and Poland, the parties have offered irrevocably to withdraw their support and undertake to cause their future joint venture company to withdraw its support within the meaning of Article 5 (4) of Council Regulation (EC) No 384/96 of 22 December 1995 on protection against dumped imports from countries not members of the European Community([85]), for the complaint and the request for a review lodged by the European Chemical Industry Council (Cefic) on behalf of the Community producers of SiC.

(262) The Undertaking offered to the Commission by the parties cannot be taken into account in the Commission's assessment of this case under the Merger Regulation. The Undertaking does not in any way modify the original concentration plan notified to the Commission which the Commission finds to be incompatible with the common market. Furthermore, a decision to impose, adjust or remove anti-dumping measures lies with the Council. It is not therefore in the power of the parties or the Commission to decide on anti-dumping measures and there can be no guarantee that the measures would be removed, even if the parties were to withdraw their support for them and the Commission were to open a review. The interests of other SiC producers having a relevant share of the total Community SiC production for the purposes of Regulation (EC) No 348/96 would also have to be taken into account.

(263) In any case, the removal of the anti-dumping measures would not eliminate the competition problem in this case as SiC suppliers in the said countries in general are not yet capable of supplying the full range of SiC grades and have difficulties meeting the requirements of EEA customers. They are therefore not expected to become effective potential competitors within the foreseeable future, even if the anti-dumping measures were to be removed. It would take at least three years until they have invested in processing capacities for the production of the required SiC grades and have established themselves in the markets as full-range suppliers of SiC grades required by EEA customers.

(264) In conclusion, whereas an immediate lifting of the anti-dumping measures may increase competition for some qualities of abrasive and refractory SiC, it would not remove the competition concerns in these markets. Furthermore, despite the undertaking offered, it cannot be considered certain that the anti-dumping measures would

([85]) OJ L 56, 6. 3. 1996, p. 1.

actually be removed or modified even if the Commission were to initiate a review. For these reasons the undertaking submitted by the parties would not remove the dominant position of the parties in the markets for abrasive and refractory SiC.

H. CONCLUSION

(265) For the above reasons, the Commission has come to the view that the notified concentration is incompatible with the common market, since it would create a dominant position on the EEA markets for SiC grains for abrasive and refractory applications, as a result of which effective competition would be significantly impeded in the common market within the meaning of Article 2 (3) of the Merger Regulation,

HAS ADOPTED THIS DECISION:

Article 1

The concentration by way of the creation of a joint venture as notified by SEPR, ESK and NOM is hereby declared incompatible with the common market and the functioning of the EEA Agreement.

Article 2

This Decision is addressed to:

1. Société Européenne des Produits Réfractaires
   Les Miroirs — 18 Avenue d'Alsace
   F-92096 Paris — La Défense Cedex

2. Elektroschmelzwerk Kempten GmbH
   Hanns-Seidel-Platz 4
   D-81737 München

3. NV NOM
   PO Box 424
   NL-9700 AK Groningen

Done at Brussels, 4 December 1996.

For the Commission
Karel VAN MIERT
Member of the Commission

ANNEX I

(Annex I to the Decision contains business secrets and, therefore, has not been attached to the published version.)

ANNEX II

Product market for refractory SiC

(Market share range (in %))

Suppliers	In volume terms	In value terms
Saint-Gobain	[30 — 40]	[30 — 40]
ESK	[20 — 30]	[25 — 35]
Parties together	[50 — 60]	[60 — 70]
Orkla-Exolon	[< 15]	[< 10]
Navarro	[< 15]	[< 10]
MWK	[< 10]	[< 10]
Timcal	[< 5]	[< 5]
Washington Mills	[< 5]	[< 5]
H. C. Starck	[< 5]	[< 5]
Import share range	9,0 — 9,6	6,6 — 6,9

Assuming that the market volume (market value) respectively, total imports were by 7,2 % (4,6 %) higher as calculated on the basis of the customer and supplier inquiries (see footnote 47).

ANNEX III

Product market for abrasive SiC

(Market share range (in %))

Suppliers	In volume terms	In value terms
Saint-Gobain	[30 — 40]	[30 — 40]
ESK	[10 — 20]	[20 — 30]
Parties together	[50 — 60]	[60 — 70]
Orkla-Exolon	[< 10]	[< 10]
Navarro	[< 10]	[< 5]
MWK	[< 15]	[< 10]
Timcal	[< 5]	[< 5]
Washington Mills	[< 5]	[< 5]
H. C. Starck	[< 5]	[< 5]
Import share range	20,0 — 21,2	14,4 — 15,0

Assuming that the market volume (market value) respectively, total imports were by 7,2 % (4,6 %) higher as calculated on the basis of the customer and supplier inquiries (see footnote 47).