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# EXAMINATION OF STATISTICS AND REVIEW OF THE CURRENT MARKET SITUATION AND OUTLOOK

## Review of the current market situation and outlook

Report by the UNCTAD secretariat

This document has been prepared in accordance with the decision taken by the Intergovernmental Group of Experts on Tungsten at its third session. As provided in paragraph 25 of its report on the third session (TD/B/CN.1/27), the Group decided *inter alia* to remit to the fourth session of the Standing Committee on Commodities the determination of the date for the fourth session of the Group and to request the secretariat to pursue its review of the tungsten market.

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Contents



Annexes

# I. SUMMARY AND CONCLUSIONS

1. In 1994, the tungsten market evolved in a world economy that grew by 3.5 per cent, compared with -0.3 per cent in 1991, 1.4 per cent in 1992 and 1.5 per cent in 1993. This was, indeed, the highest growth rate achieved since 1988, when the strong performance of the world economy resulted in strong demand for tungsten in many tungsten-consuming industries.

2. However, the upturns in tungsten demand have yet to benefit mine production, which is still afflicted by the closures of tungsten mines in the 1980s and early 1990s. World mine production amounted to an estimated 28,197 metric tons in 1994, down 11.9 per cent. This was the fifth consecutive decrease since 1989 when it amounted to 60,630 metric tons. Mine closures have reduced world mine production to the level of the late 1960s.

3. World consumption of ores and concentrates in 1994 was estimated at 31,570 metric tons, down 0.5 per cent. Consumption of ores and concentrates did not significantly benefit from the upsurge of demand in market economy countries except in the United States. The increase in tungsten demand in this group of countries has led to an increased consumption of imported intermediate products and scrap. A significant part of the imported intermediate products seems to have emanated from stocks.

4. Most of the stock drawdowns have consisted of material which originated from unreported stocks, which were by far larger than reported stocks. The drawdown of such stocks could have amounted to between 10,000 and 15,000 metric tons in 1994. Reported commercial stocks also showed a substantial drawndown and fell to 3,145 metric tons from 3,885 metric tons in 1993 and 4,962 metric tons in 1992. The United States Defence Logistic Agency (DLA) reported no release of material from its tungsten stockpile in 1994.

5. Some sectors of the market have expressed concern about a supply crunch and the threat of substitution of tungsten by other material. This concern seems difficult to justify, given the current market situation, which still suffers from substantial closed-down mine capacities. Stronger tungsten prices would provide greater incentives for the reopening of mine operations. Thus, a greater supply will be forthcoming provided prices are remunerative; they were not so for most of the 1980s nor the beginning of the 1990s. At current low prices, the incentive to substitute tungsten by other material has been slow. Deliberate action to replace tungsten by other materials is still quite uneconomical.

6. Government action continues to play a significant role in international trade of tungsten material. China has stepped up export licence requirements, which has apparently constrained mainly the exports of ores and concentrates. Meanwhile, it continues its diversification efforts towards supplying more of its material in the form of upper-market products, including tungsten and tungsten carbide powder and a number of finished products. Chinese material in one form or another encounters anti-dumping duties in the United States of America and the European Union. The 151 per cent anti-dumping duty imposed by the United States on imports of ores and concentrates from China remains in force. Albeit at lower rates, the European Union anti-dumping duties on imports of Chinese material are more extensive, covering ores and concentrates as well

as tungsten oxide, and tungsten and tungsten carbide powders. They were introduced in 1991 and became definitive in March 1995.

7. The widening premium between ammonium paratungstate (APT) and concentrate prices does not seem to have led to a reopening of conversion plants in tungsten consuming countries. The anti-dumping duties imposed by both the European Union and the United States of America on imports of Chinese ores and concentrates have denied them an important source of supply. This development coupled with other structural changes in the tungsten market has forced some companies to relocate their production or sell off their plants abroad.

8. Like other non-ferrous metals, tungsten would benefit from the implementation of the Uruguay Round tariffs rates, particular in the case of tungsten products. The latter products are subject to various tariffs in most of major markets although there exist various exemptions such as those granted under the most-favoured-nation regime. The Uruguay Round Agreement would lead to lower tariff rates and in some cases bound tariff rates. For most non-ferrous metals, the latter rates have been lower than the anti-dumping duties which have been recently resorted to by the European Union and the United States of America. The implementation of the Uruguay Round Agreement will not only lower and harmonize the tariff rates on tungsten products but also reduce the use of anti-dumping duties.

9. The shift of consumers' preference in favour of imported APT and other intermediate products in most consuming countries has staved off any substantial recovery in the international trade of ores and concentrates despite the recent demand upturns. The market share of ores and concentrates in the international trade of tungsten material has now sunk to less than 15 per cent from more than 80 per cent over a decade ago. The anti-dumping duties mentioned above do not seem to serve any effective purpose. China would be unlikely to increase its exports of ores and concentrates to these countries even if they were to remove the anti-dumping duties.

10. Owing to the increased dominance of APT in the tungsten market, the APT price has become the benchmark for pricing other tungsten materials, including that of ores and concentrates. They led the way in price recovery following the recession in 1992-1993. In 1994, APT prices in Hong Kong rose by 191.5 per cent to reach between $US 85 and $US 87 per m.t.u. at year-end. In western Europe, APT prices went up 152.9 per cent to between $US 85 and $US 92 per m.t.u., while in the United States, they went up 110.2 per cent to between $US 99 and $US 105 per m.t.u. Since the beginning of 1995, APT prices have been mostly stable.

11. In comparison with APT, concentrate prices have made more limited progress largely because of low market offtake and decreased buyers' interest. Consequently the price spread between concentrates and APT has tended to widen. Based on Metal Bulletin quotations, concentrate prices rose by 64.9 per cent in 1994 to reach between $US 49 and $US 60 per m.t.u. Prices have continued to increase in 1995. At the time of writing, the material was being traded at between $US 58 and $US 70 per m.t.u. Regarding ferro-tungsten, price increases were more subdued, rising by 26.8 per cent, to reach between $US 4.40 and $US 4.60 per kg. However, the comparatively low ferro-tungsten prices have attracted

increased business in this material in 1995. At the time of writing, ferro-tungsten was traded $US 6.90 and $US 7.30 per kg.

12. In comparison with the period 1991-1993, the outlook of the tungsten market is largely positive. Considering the current performance and outlook of the world's major economies, demand for tungsten will remain steady at least in the short term. Under present supply conditions, the market will face a situation where consumption will outstrip mine production. Some additional supply will be forthcoming from a reopening of closed-down mines, from the C.I.S. countries, particularly the Russian Federation, and from traders' stocks. However, any substantial increase from these sources will require further price improvements. These will greatly depend on supply from China. Some Chinese suppliers have indicated recently that China aimed at achieving a stable tungsten market in the future. Based on this assumption, tungsten prices will tend towards stability or consolidation rather than further substantial strengthening.

## II. DEVELOPMENTS IN TUNGSTEN DEMAND

### A. Demand for tungsten

13. The recent strong upturn in the performance of world major economies has significantly improved demand for tungsten. However, the stronger demand has led to increased consumption of imported intermediate material and scrap rather than ores and concentrates. The larger part of the material has originated from stocks. In 1994, world consumption of ores and concentrates was down 0.5 per cent to an estimated 31,570 metric tons. A modest increase in developed market economy countries was more than offset by decreases in other countries (see annex II).

14. In 1994, consumption in developed market economy countries rose by 2.7 per cent to 5,650 metric tons. Among these countries, only Japan and United States of America remain substantial consuming countries of ores and concentrates. The other developed market economy countries are now mostly using imported intermediate material. These countries include Austria, France, Germany, Sweden and the United Kingdom, which in the past used to be substantial consuming countries of tungsten ores and concentrates. Even in Japan and the United States of America, a substantial part of the consumption now comprises the latter type of material.

15. In 1994, consumption of ores and concentrates in Japan and the United States of America amounted, respectively, to 950 metric tons and 4,700 metric tons, up 14.2 per cent and 17.5 per cent, respectively, compared with the previous year. In the other developed market economy countries, the situation has not changed much despite economic upturns. Most of their major APT plants remained closed. Among those reported to be still in operation were Hermann Starck Berlin of Germany, Seco Tools of Sweden and Wolfram-Bergbau of Austria. The recent widening gap between APT and concentrate prices does not seem to have exercised any direct incentive on the reopening of closed-down intermediate plants. The anti-dumping duties imposed by both the European Economic Union and the United States of America on Chinese tungsten concentrate imports have denied them an important source of supply. This development coupled with recent structural changes has forced some companies to relocate capacities or to sell off their plant abroad.

16. The tungsten industry in countries of Eastern Europe has suffered greatly in the wake of recent economic reform, which has led to sharp decreases in demand in such domestic sectors as coal mining, steel making, oil drilling and military ordnance. Their current level of ore and concentrate consumption is estimated at 5,000 metric tons, compared to over 15,000 metric tons a decade ago. To overcome their difficulties, such as finding new market outlets, capital and technology, some companies have been looking abroad for joint-venture partners. Recently, Sandvik took a 50 per cent stake in Moskovskiy Kombinat Tverdih Splavdov (MKTS), which is the largest cemented carbide company in the Russian Federation. More recently, Sandvik was also reported to be interested in setting up a joint venture with Nalchik, which is the largest tungsten oxide producer in the C.I.S. countries.[1]

17. In several of the rest of central and eastern European countries, industrial activities turned an important corner last year. Industrial activities, for example in the steel sector, showed some growth for the first time since these countries adopted economic reform. If the situation continues to improve, it should have before long a positive effect on tungsten demand, if not necessarily in increased consumption of ores and concentrates.

18. In 1994, consumption in developing countries was estimated at 20,760 metric tons, virtually unchanged from the previous year. China accounted for most of the consumption. Since the beginning of the 1980s, China has rapidly expanded its conversion capacity to cater for its increasing domestic needs as well for the export market. Domestic consumption consists mainly of mill products, particularly tungsten wire, which have grown at a reported annual rate of 15 per cent between 1982 and 1992. China has also made some progress in the production of a number of other tungsten-based products, including contact points, cutting tools and drills. On the other hand, in high-technology areas such as in the semiconductor industry, office automation equipment and so on, the use of tungsten is still small. In many of these areas of application, the quality standards are so high that the country is still greatly dependent on products imported from abroad. Consumption of tungsten in military applications accounts for only a negligible proportion in China.

19. In the late 1980s, China’s consumption of ores and concentrates was estimated at 25,000 metric tons per annum, of which 10,000 metric tons was accounted for by domestic demand. The rest was accounted for by exports in the form of intermediate products to overseas markets. Currently, Chinese consumption of ores and concentrates is estimated at 20,000 metric tons. Domestic tungsten consumption is expected to grow slowly in the future, at a rate estimated to be less than 1 per cent.[2]

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[1] See "APT slips in dull market conditions", Metal Bulletin, 15 December 1994, page 11.

[2] See Metal Powder Report, April 1994, page 16.

## B. Substitution

20. In comparison with many other metals, the scope of substitution of tungsten by other materials is limited. It is considered that over half of the consumption of tungsten in industry has a low elasticity of substitution. Owing to its unique technical properties, tungsten is indispensable in many industrial applications. Furthermore, the quantity needed is so small in many applications that price-driven incentives are negligible for the replacement of tungsten by other materials. Nonetheless, excessive price hikes or threats to supply security have in the past led to efforts to develop substitutes, as for instance in the late 1970s.

21. Recent increases in the price of tungsten have led to some fears that such hikes might lead to a greater substitution of tungsten by other material. However, at present this likelihood looks remote. Tungsten is still relatively cheap compared with prices in the late 1970s and early 1980s, when there were strong incentives to make savings on the use of tungsten. Moreover, the prices of many tungsten substitutes, such as molybdenum, have increased in line with most other minerals and metals recently. The substitution of tungsten by such materials becomes less interesting as a result. Since 1993, the price of molybdenum has risen on average faster than tungsten.[3]

22. Another material substitutable for tungsten is depleted uranium. In the 1970s, depleted uranium made substantial market gains at the expense of tungsten in a number of applications, including ammunition rounds and aircraft counterweights. The health hazards associated with depleted uranium and the increasing demand for environmental protection have virtually excluded its use more recently. An increase in tungsten prices in the future would probably not change this situation. Other substitutes include ceramics and cermets, which are substitutable for tungsten as a cutting material. They had made certain inroads into the tungsten market in the late 1970s and early 1980s. Of the two materials, cermets have been more successful as a substitute for tungsten because of the development of new cermet grades. Cermet tools constituted an estimated 25 per cent of the cutting tool market in Japan,[4] but the percentage was much less in Western Europe and in the United States of America. Although there is scope for expansion in the latter markets, they have not as yet followed the Japanese example. Regarding ceramic tools, their acceptance as a cutting material by the market has been even more limited. Its market share was a mere 4 per cent in Japan.

23. Savings in tungsten consumption can be made not only by substitutes but also by coatings, which have made substantial technical progress in recent years. By reducing wear, they prolong tool life, and sometimes greatly improve operational efficiency. Coatings on cutting tools reduce the coefficient of friction at all operating speeds but it is at higher speeds that the difference

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[3] The price of molybdenum recently rose to $US 10 per pound, compared to $US 1.90 per pound in January 1993 (Financial Times, 15 March 1995, page 23).

[4] See "Cutting edge technology at Sandvik", Metal Powder Report, December 1992.

between coated and uncoated tools is greatest.[5] Undoubtedly coating technology will continue to advance with more sophisticated coating materials coming onto the market. However, such progress is not driven purely by a deliberate effort for the sake of price-related substitution but rather because of material savings and operational efficiency.

24. In years to come, the market will probably witness a greater diversity of tool materials including cermets, ceramics and diamonds. Not only better coated materials will arrive on the market, but a greater proportion of tools will be coated. It is also likely that tungsten demand for military purposes will continue to diminish, not because of the substitution of tungsten by depleted uranium or other materials but quite simply because of the decrease in demand for ordnance. These developments are not price-related and there is no evidence that recent price increases have led to a greater trend to substitute tungsten by other materials. Given the current price level and the availability of the material, deliberate efforts to replace tungsten by other materials are quite uneconomical. Meanwhile, science and technology will continue to make progress with both beneficial and adverse effects on future tungsten demand.

## III. DEVELOPMENTS IN TUNGSTEN SUPPLY

### A. World mine production

25. The recent strength in demand has yet to result in increased mine production, which has recently fallen to its lowest levels. In 1994, world mine production was estimated at 28,197 metric tons (annex II), down 11.9 per cent compared to the previous year. Owing to large-scale mine closures, the level of world mine production dropped back to that of the late 1960s. The 1994 increase in demand was met largely from stock drawdowns, scrap recycling and exports from C.I.S. countries, including Kazakhstan, the Russian Federation and Ukraine. Part of the material from the latter countries was presumably of stockpile origin.

26. The weak prices in the 1980s had decimated mine capacities in developed market economy countries and the few substantial tungsten mines which had survived until then, were forced by the harsh price conditions in 1992-1993 to close down. In western Europe, the two largest mines, namely Mittersill in Austria and Panasqueira in Portugal, had little choice but to close down. Many factors contributed to their closure. They included sharp falls in tungsten prices in 1992 and 1993, increased availability of imported intermediate products, and the preference of consuming countries for the latter products. In the United States of America, the last tungsten mine to have closed down was the Pine Creek mine in California in mid-1992. At the beginning of 1980's, there were as many as 30 tungsten mines in operation in the United States.[6] Nor have the harsh market conditions spared the Japanese mine operations, which have dwindled rapidly in numbers and the last one was closed in 1993. Japan reported no mine production in 1994. With the recent shutdowns, developed market economy country

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[5] See Tom Gill,"Coatings at the cutting edge of engineering performance", Metal Bulletin Monthly, February 1995, page 56.

[6] Leung Ki, F.-C, "World demand and supply of tungsten", Berg- und Hüttenmännische Monatshefte, May 1994, page 187.

mine production amounted to merely 23 metric tons, down from 1107 metric tons in 1993.

27. Mine production in developing countries, including China, was estimated at 23,174 metric tons, down 10.5 per cent, largely owing to a reduction in Chinese production. Strengthened control in the application of export licence and higher costs arising from more stringent fiscal and tax measures sharply reduced the supply of tungsten material in China. In the 1980s, its mine production had expanded rapidly, faster than any other mineral and metal sector, reaching a record annual production estimated at over 40,000 metric tons. By the end of the 1980s, China accounted for some 68 per cent of the world total, compared to 30 per cent at the beginning of the decade when its mine production amounted to 15,000 metric tons. The increased production was accompanied by an increase of processing capacities for producing tungsten products, particularly intermediate products for export.

28. According to recent reports,[7] the People's Bank of China has eased credit available for domestic mines owing to persistent lobbying by the mining industry. Furthermore, the Government of China has reduced to 13 per cent a recently increased value-added tax of 17 per cent on ore and concentrate sales in a bid to rescue financially trapped domestic mines. These developments together with firmer tungsten prices could reverse or at least stop the recent decline in Chinese mine production. Given improving market conditions, a recent forecast foresees China's mine production would again reach 30,000-35,000 metric tons up to the year 2000.[8] This amount is equivalent to between 75 per cent and 85 per cent of the operational mine capacities in the late 1980s, and presuming that some of the recently closed-down mines would remain shut. Taking into account rising production costs and the depletion of ore reserves, the forecast may sound rather optimistic although not unrealistic. The average reserve grade is reported to have declined from 0.8 per cent to 0.5 per cent.

29. The same forecast anticipates that Chinese mine production to be mostly processed into tungsten intermediate and finished products domestically. Chinese production of ammonium paratungstate will amount to between 21,000 and 24,000 metric tons, cemented carbide from 6,760 to 7180 metric tons and tungsten products to around 2,000 metric tons. Such levels of production are quite within installed plant capacities,[9] part of which may however need renovation. Reduced domestic feedstock owing to cutbacks in mine production, have recently left a substantial part of these capacities idle.

30. In other developing countries, there are signs of a revival of mining activity albeit limited, particularly in Latin American countries, including Bolivia, Brazil and Peru. In 1994, production of ores and concentrates increased

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[7] See Metal Bulletin, 21 November 1994, page 7

[8] See "China outlines tungsten industry plans", Metal Bulletin, 21 November 1994, op. cit., page 7

[9] In 1993,China had a total estimated plant capacity of 40,000 metric tons for ammonium paratungstate and 13,345 metric tons for ferro-tungsten.

in all three countries mentioned, totalling 1,400 metric tons, about twice the level of the previous year. If current increases in tungsten prices remain firm, more mine capacities might reopen, for example in Mexico, which closed down its remaining tungsten mines in 1992. Such developments might similarly influence production in tungsten producing countries in Eastern and South-East Asian countries, including Thailand. Mine production in developing countries, excluding China, could increase by between 2,000 and 3,000 metric tons in the next few years.

31. Mine production has suffered from sharp cutbacks in the former USSR, of which the Russian Federation and Kazakhstan were the main producers. The Russian Federation accounted for 85 per cent of the production and Kazakhstan accounted for 55 per cent of the tungsten reserves of the former USSR. Kazakh tungsten deposits are largely unexploited, with current mine production estimated at only 300 metric tons per year. As regards the Russian Federation, its mine production is currently estimated at around 5,000 metric tons per annum, which shows a substantial fall in output since the mid-1980s. The end of state subsidies and the decline of domestic demand have led to large-scale mine closures. Among the closed-down Russian mines were Ternyauz, Dzinksy, Orlovsky and Primorsky-gok.[10] With a capacity of 4,000 to 5,000 metric tons per year, Ternyauz was believed to be the largest tungsten mine in the world.

## B. Supply from stocks

### 1. Unreported commercial stocks

32. Unreported commercial stocks have played an important role in supplying the material needed to meet the extra market requirements since the recent upsurge in demand. Movements of such stocks have been difficult to assess, however, as their actual size is never precisely known in the tungsten market. This difficulty may originate from one of the following sources. In some countries, stock figures are not collected and no national statistics are available in such cases. A number of other countries do not or are unable to report tungsten statistics because of commercial confidentiality or proprietary rights. This situation is particularly true of traders' stocks, which apparently accumulated vastly in 1992-1993. Another source of unreported stocks is material held in offshore warehouses such as in Amsterdam and Hong Kong, which is not customs cleared.

33. Movements of unreported commercial stocks have been overwhelmingly larger than reported stocks. In 1990, it was estimated that material held in such stocks in the market economy countries amounted to 20,000 metric tons. This amount would suggest that at the time, only a sixth of the available material in commercial stocks had been reported. The recent upturns in tungsten demand were reported to have significantly absorbed the material held in such stocks. The size of

[10] See "Dragon and Bear compete in tungsten supply", Metal Bulletin, 28 July 1994, page 19

Chinese stocks is equally not known. They were believed to have been at a record high in the recession years of 1991 and 1992 but recently exhausted.[11]

34. The economic transition in eastern-European and central-Asian countries, including Kazakhstan, the Russian Republic and Ukraine, has also influenced sales from stocks although there are no reported figures. The bulk of material held in strategic stockpiles in the former USSR has been divided between these three countries. Much of the material has now become commercial stocks available for sale. The most significant amount of the former USSR stocks is now held in the Russian Federation, spread in many mines across the country. The larger Russian mines have 1,000 to 2,000 metric tons each of such material while the smaller mines have smaller shares.[12]

### 2. Reported commercial stocks

35. Regarding reported commercial stocks, annex II shows that such stocks have been depleting since 1989. In 1994, commercial stocks of ores and concentrates amounted to 3,145 metric tons, down 19.0 per cent over the previous year. The decrease was mainly owing to the decline of producers' stocks, which were down by 26.3 per cent, to 2,083 metric tons. Although the recent demand upturns helped to absorb some of the stocks in producers' hands, the main reason for the decline was stock liquidation because of mine closures. In 1994, producers' stocks were entirely liquidated in Portugal while they fell by 3.9 per cent to 414 metric tons in Australia and by 2.9 per cent to 1,659 metric tons in Thailand.

36. In 1994, consumers' stocks amounted to 1,056 metric tons, virtually unchanged from the 1993 level, following successive falls since 1989. Consumers' stocks are currently at their lowest level since the beginning of the 1980s. They fell by 34.6 per cent to an estimated 300 metric tons in Japan but rose by 27.7 per cent to 756 metric tons in the United States. In the Republic of Korea, consumers' stocks of ores and concentrates were totally liquidated as the country became completely reliant on imported intermediate products. Unless there is a shift back to the consumption of ores and concentrates instead of imported intermediate products in the consuming countries, there is unlikely to be a significant replenishment of consumers' stocks.

37. Reported stocks of APT also show substantial drawdowns. In 1994, such stocks fell to 240 metric tons from 264 metric tons in Sweden and to 82 metric tons from 420 metric tons in the United States of America.

## C. Supply security and mine reopening

38. The sharp fall in mine production and reduction of material held in stock have revived concern about supply security in many consuming countries. Recently fears were expressed by some sections of the market that a huge gap in tungsten

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[11] According to Xinhua News Agency, as reported by Metal Bulletin, 28 November 1994, page 10.

[12] See Metal Bulletin, *op. cit*., 28 July 1994, page 19

supply was set to hit the market in the next few years.[13] In the past, such concern led to efforts by industry to achieve greater tungsten savings. These efforts included the substitution of tungsten by other materials and the outright assistance to promote domestic tungsten production. It also led to the build-up of substantial stockpiles in major consuming countries, including Japan, the United States of America, the former USSR and a number of EEC countries. However, with the end of East-West geopolitical confrontations, the need to stockpile tungsten for military purposes diminished significantly. As a material, tungsten has become militarily less strategic than formerly.

39. It might be interesting to examine whether the current market conditions warrant the recent concern about supply security. Thus concern seems to be mainly the result of potential shortfalls in mine production in relation to tungsten consumption and the recent price increases. One source has estimated that the supply-demand balance would leave a supply deficit of over 9,000 metric tons.[14] If demand remains strong, such deficits would accumulate, which would in turn drive tungsten prices sharply up, as happened in the late 1970s. This would have adverse effects on the competitiveness of the material, leading to a substantial loss of its market share to substitutes.

40. However, it should be noted that the present market conditions underlying the current supply deficits are very different from those in the latter part of the 1970s. In the latter period, the market had faced successive years of strong demand, leaving a tungsten industry with little idle mining capacities to spare, while tungsten prices rose to record heights. In contrast, the current market faces entirely different conditions. The market is only just emerging from a period of extreme low prices, which in 1992 to 1993 fell to their lowest level since the mid-1960s. The concern about supply security seems to have been voiced more loudly by sectors of the market which have become accustomed to plentiful supply, as was the case until recently. Sources of such supply have recently been drying up as shipments are cut down and the material in stock is used up. Even at current prevailing prices, tungsten is still a cheap material compared with prices of substitutes or past tungsten prices.

41. Furthermore, the supply deficits are occurring at a time when there are still considerable idle capacities in the mining sector. Most of the closed-down mines in the 1980s and the beginning of the 1990s have yet to reopen. There is substantial mothballed capacities in producing countries, including Australia, Canada and the United States of America. However, mine owners would remain reluctant to incur the costs for reopening their mines until they are convinced that demand strength would last. The Chinese mines, which have supplied most of the material in recent years, are also subject to this basic market principle as the Chinese economy becomes more market-driven.

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[13] Supply deficits have been commented on in a number of recent market reports, including "China's river of tungsten runs no more", American Metal Market, 31 August 1994, page 6; and "Tungsten deficit looms - Stratcor", Metal Bulletin, 24 November 1994, page 10.

[14]. See *Metal Bulletin*, 24 November 1994, page 10.

42. Nonetheless, as indicated earlier, a number of mining operations are reopening or are considering such a prospect. These include Panasqueira in Portugal, Regina Mine in Peru, and Bishop Mine in the United States of America. If reopened, the latter mine would become the first mining operation to reopen in North America. At present, there is no lack of mining capacities as to cause serious supply shortages in the tungsten market. However, future supply will very much depend on adequate price levels because the time has gone when cheap and subsidized tungsten was available in abundance. Some estimates reckon that a concentrate price of between $US 80 and $US 100 per m.t.u. could bring forth an additional supply of 10,000 to 15,000 metric tons of mine production. If the market is willing to pay the price, it need not worry about a supply shortage.

## IV. DEVELOPMENTS IN TUNGSTEN TRADE

### A. Developments in trade policies

43. Recent announcements made by Chinese suppliers indicate that China would pursue its diversification policy in the tungsten industry to achieve a better product mix in its exports. Chinese exports would continue to comprise a high proportion of intermediate products, which have largely superseded tungsten ores and concentrates. The proportion of tungsten products including tungsten and tungsten carbide powder and finished products would increase in future. According to the suppliers, China, in pursuing this policy, hopes to establish a fair, equitable, orderly market based on open competition.[15] Meanwhile, export licence requirements remain in place.

44. Another major policy development with impacts on supply is the recent legislative action taken by the United States of America, which changes the trade status of the Russian Federation from a non-MFN to an MFN country. This has had an immediate effect on the trade in tungsten between the two countries. The Russian Federation became the largest supplier of ores and concentrates to the United States of America in 1994. Until now, the trade between the two countries had been limited to small amounts of specialized products.

45. Meanwhile, anti-dumping duties on Chinese materials have been maintained in force in both the United States of America and the European Union despite improved market conditions. In the case of the European Union, the anti-dumping duties imposed on a preliminary basis in 1991, have become definitive since the end of March 1995.[16] The European Union anti-dumping duties on Chinese tungsten carbide and tungsten powder are more of the nature of pre-emptive rather than protective duties, since China exports only limited quantities of these products to European Union countries.

46. Like most other non-ferrous metals, the tungsten industry can reap substantial benefits from the implementation of the tariff regimes in the Uruguay Round Agreement which came into effect from January 1995. The imports of ores

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[15] See Metal Bulletin, *op. cit.*, 21 November 1994, page 7.

[16]. The anti-dumping duties include a duty of 37 per cent on concentrates, 35 per cent on tungsten oxides and tungstic acid, and 33 per cent on tungsten carbide powder and fused tungsten carbide.

and concentrates from developing countries enter duty-free in most major consuming countries under either preferential or most-favoured-nation (MFN) tariffs. The removal of such preferential and MFN tariffs would in theory means greater competition from developed country producers. In practice, however, such competition would remain limited, as most developed country mine operations have closed down and had relatively high-cost operations.

47. The benefits felt would be strongest in the case of tungsten products. The latter products are subject to various tariff rates in most of their major markets, although like ores and concentrates preferential rates such as under the GSP or MFN regime exist. For example, United States of America imports of tungsten products from China and the Russian Federation are granted MFN status. The implementation of the Uruguay Round regime would mean that imports from these countries would have to compete on an equal footing with imports from other sources which are mostly developed market-economy countries. However, such competition would more likely be limited to upper-market products such as tungsten and tungsten carbide powders. The Uruguay Round Agreement would benefit tungsten by leading to lower tariff rates and in some cases bound tariff rates. Bound rates set a limit on imposable duty, which will greatly reduce the use of anti-dumping duties.

## B. Trade in ores and concentrates

48. The shift of consumption in favour of imported APT and other intermediate products in major consuming countries has impeded any substantial recovery in international trade of tungsten ores and concentrates, despite recent demand upturns in the tungsten market. Intermediate tungsten products, including APT, have been available at competitive prices and have also the advantage of being more environment-friendly for the importing countries. The anti-dumping duties imposed on imports of Chinese ores and concentrates by the European Union and the United States of America have only contributed to accelerating the shift in favour of imported intermediate products.

49. As shown in annex I, total world imports of ores and concentrates in 1994 amounted to an estimated 4,692 metric tons, up 18.7 per cent. This increase contrasts with the successive sharp falls of 56.3 per cent in 1992 and 36.4 per cent in 1993. Despite the 1994 recovery, the current level of world imports is less than a sixth of what it was a decade previously, when the Republic of Korea was the only major developing country that exported tungsten in processed form. The market share of ores and concentrates in the trade of tungsten material, which was more than 80 per cent in the early 1980s, is now below 15 per cent. The only country still importing substantial quantities of ores and concentrates is the United States of America. In 1994, it imported 2,962 metric tons, up 71.9 per cent. Despite this sharp jump, ores and concentrates accounted for only a third of the tungsten material imported into that country.

50. With few conversion plants still in business, the shift to imported intermediate products has been more extensive in European Union countries. These countries, which had imported 290 metric tons in 1993, ceased to import any ores or concentrates in 1994, except for a small amount imported by the United

Kingdom. Similarly, imports sank heavily in Austria[17] and Japan. In 1994, imports of ores and concentrates dropped to 50 metric tons from 310 metric tons in Austria and to 150 metric tons from 275 metric tons in Japan.[18]

51. The sharp decline in the international trade of ores and concentrates also means that there were fewer buyers in the market; this lowered the offtake of the material, resulting in a more restricted market outlet for producers, particularly from small developing countries. This development has recently led to a widening spread between the prices of ores and concentrates and that of intermediate products.

52. In 1994, total exports of ores and concentrates were estimated at 4,587 metric tons, up 4.0 per cent (annex I). Exports originated mainly from two sources, namely the Russian Federation and Latin American producing countries, principally Bolivia and Peru. The chief market outlet for ores and concentrates was the United States of America. In 1994, the Russian Federation emerged as a net exporter of ores and concentrates for the first time. It exported 1,700 metric tons to the United States of America, thus becoming the latter country's largest supplier of tungsten ores and concentrates. According to reports,[19] some material was also exported to China for conversion into intermediate products for re-export. Whether the Russian Federation can sustain its recent level of exports is expected to depend on tungsten prices making it profitable to reopen its recently closed-down mines.

53. Latin American country exports rose to an estimated 1,340 metric tons, up 68.3 per cent compared with 1993. The material came principally from Bolivia and Peru, where mining production had shown substantial progress recently. In western Europe, with the closure of the Panasquiera mine in 1993, Portugal ceased exporting ores and concentrates in 1994. As noted earlier, Avancet took over this mine after it had been closed down in 1993 and the company is now considering reopening it.

54. A recent development has been the reported imports of ores and concentrates by China. This relatively unusual situation seems to have arisen because of the shortage of concentrates following closures of major domestic mines in China. Import statistics show that concentrates have indeed been shipped to China but the total amount is unknown.[20] It is illegal to import tungsten into China but apparently access is permitted for material to be used for toll-conversion in Chinese APT plants, as the material is re-exported as intermediate products. For the Chinese customs, China is technically exporting the service of its conversion

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[17] Austria was not a member of the European Economic Union before 1995.

[18] The 1994 imports was the lowest amount reported by Japan since Tungsten Statistics had been published by UNCTAD.

[19] See Mineral Industry Surveys entitled 'Tungsten in December 1994', published by the Bureau of Mines, the United States Department of the Interior, 28 February 1995

[20]. See Metal Bulletin, 17 November 1994, page 13.

plants and the ores and concentrates are not imports since they are matched by re-exports.

55. Statistics published by the Chinese customs show that in 1994 China exported 584 metric tons of ores and concentrates, compared to 360 metric tons in 1993.

### C. Trade in intermediate products

56. The recent rise in demand has led to a sharp increase in the trade of intermediate products, more significant than that of ores and concentrates. In 1994, world imports of intermediate products amounted to an estimated 28,000 metric tons, up 47.5 per cent compared to 1993. The largest increases occurred in France (13.5 per cent), Germany (9.5 per cent), Japan (25 per cent), Sweden (264.1 per cent) and the United States of America (31.6 per cent). These countries accounted together for four-fifths of the total imports. The Republic of Korea has recently also emerged as a substantial importing country of intermediate materials, mainly APT. Its imports rose successively from a mere 152 metric tons in 1992 to 1,591 metric tons in 1993 and 1,765 metric tons in 1994.

57. The principal source of intermediate product exports is China. In 1994, Chinese exports of various intermediate products were estimated at between 15,000 and 20,000 metric tons, compared to 11,158 metric tons in 1993. Assuming that mine production decreased recently as a result of mine closures, the increase in Chinese exports of intermediate products would have originated from the drawdown of stocks or the re-export of material after toll conversion for clients abroad. Chinese shipments comprise largely APT, tungsten oxide and hydroxide and ferro-tungsten. Until now, it exported only limited amounts of tungsten and tungsten carbide powders and other upper-market products. In 1994, China exported 9,127 metric tons of APT, compared to 6,504 metric tons in 1993.

58. A new source of intermediate products is the Russian Federation where supplies have so far been limited and irregular, although the amount is rising. Russian exports have consisted of diverse materials, including APT, tungsten oxide, ferro-tungsten, and tungsten and tungsten carbide powders. In 1994, these exports were estimated at 2,500 metric tons, compared to 400 metric tons in 1993. Efforts have recently been stepped up to gain a greater market share by addressing the concern of buyers, including uncertain quality standards and unpredictable delivery dates. The major Russian APT and oxide producer, Nalchik, is bringing its quality up to meet western specifications. The financing of the required investment has been made possible by large consumers like such as Sandvik, which have agreed to advance payments against future deliveries of material.

## V. PRICE DEVELOPMENTS IN THE TUNGSTEN MARKET

### A. Prices of intermediate products

59. With tungsten business conducted mostly in intermediate products, particularly APT, the prices at which these products become available are important in determining concentrate prices. In the past, it was the price of

concentrates that served as the benchmark price to determine the prices of other tungsten materials. The situation has now been reversed. As Chinese suppliers began to move their APT prices up in 1994, the prices of other tungsten materials began to move upwards as well, first at a steady pace then at a faster rate as demand further strengthened in the course of the year.

60. In the European market, the first signs of recovery in APT prices appeared as the market entered 1994. APT prices began to bottom out from the record low reached in the last quarter of 1993. However, the improvement was limited as market offtake remained subdued with isolated pockets of business concluded at $US 38 to $US 40 per m.t.u. This situation changed rapidly as "bargain" material was quickly snatched up. Based on Metal Bulletin quotations, the material was traded in Western Europe at between $US 41 and $US 44 per m.t.u. towards the end of the first quarter. With the rapid drawdown of inventories and increased demand in both domestic and export markets, buyers were more willing to pay more for the available material, which further strengthened prices in the second quarter. Price increases gathered significant momentum in the third quarter when some larger buyers who had been holding out decided to enter the market. Altogether, APT prices in the European market rose by 152.9 per cent in 1994 to end the year at between $US 85 and $US 92 per m.t.u., compared to between $US 32 and $US 38 per m.t.u. a year earlier.

61. In the United States of America, the market was still affected by the availability of some cheap material as the market entered 1994. This factor coupled with some slowdown in demand and a decline in spot business kept a lid on APT prices, which stayed at around $US 44 to $US 53 per m.t.u. in the first quarter. However, as it became more difficult to find cheap material, prices began to speed upwards and more than doubled in the next six months in Western Europe where the material was traded at between $US73 and $US79 per m.t.u. by the end of the second quarter, and between $US98 and $US105 per m.t.u. by the end of the third quarter. Meanwhile, the Hong Kong APT quotations became increasingly the benchmark, indicating the price at which Chinese material was available. Taking advantage of the slackening in demand in the fourth quarter, some buying interests tried to talk down tungsten prices, citing the increased availability of Russian material and the imminent reopening of some closed-down mines. However, APT prices remained quite steady in the fourth quarter. Altogether, APT prices in the United States of America rose by 110.2 per cent to end the year at between $US 99 and $US 105 per m.t.u., compared to between $US 42 and $US 55 per m.t.u. a year earlier.

62. APT prices have shown only limited movements since the market entered 1995. In western Europe, the best grades remained at around $US 90 per m.t.u., while the lower grades were on offer from $US 85 per m.t.u upwards. In the United States of America, the material fetched around $US 103 per m.t.u. for the better grades and $US 90 per m.t.u. for the lower grades. Although these prices showed a great improvement over the previous year, western APT producers were unwilling to reactivate their plants, as they would still be unable to break even.[21] Some

[21] See 'APT slips in dull market conditions', Metal Bulletin, op. cit., 15 December 1994, page 11.

market speculation had anticipated an increase of 20 per cent in the first quarter of 1995.[22] However, this proved to be unfounded.

63. Ferro-tungsten has benefitted less from the recent price improvement in the tungsten market. This may be attributed to a number of factors, including the decline of buying interest in this material which could be easily substituted by high grade concentrates, and the availability of Russian material Furthermore, there is a 20 per cent duty on the material in western Europe. As the market entered 1994, ferro-tungsten prices reached a record low of between $US 3.30 and $US 3.60 per kg. This range was the lowest since 1991. The price of ferro-tungsten improved only slowly, rising to between $US 3.60 and $US 3.75 per kg by the end of the first quarter and to between $US 4.20 and $US4.30 per kg by the end of the second quarter. In the second half of 1994, the lower grade material gained a further 30 US cents per kg and the upper grade 35 US cents per kg to end the year at $US 4.50 per kg and $US4.65 per kg respectively.

64. Since the beginning of 1995, the pace of price improvement has quickened in the ferro-tungsten market. At around the Chinese New Year, ferro-tungsten received a boost as some traders began to replenish their ferro-tungsten positions in the belief that prices would have to move up because of higher prices in both APT and concentrate markets. The material was mostly offered from $US 5.00 per kg upwards, with some forecasts anticipating that ferro-tungsten prices would reach $US 5.50 per kg within the next few months.[23] In fact, ferro-tungsten prices were to rise even faster than predicted. At the time of writing (mid-July 1995), the material was trading between $US 6.90 and $US 7.30 per kg, fob Rotterdam warehouses; while Hong Kong prices were between $US6.00 and $US6.30 per kg, fob main Chinese ports.

## B. Prices of ores and concentrates

65. The drastic rise in intermediate prices has strongly influenced concentrate prices although the latter increased less sharply. The higher increase in APT prices has widened the premium between concentrate and APT prices. Concentrate prices rose by 24.1 per cent to an annual average of $US 42.39 per m.t.u. in 1994, compared to $US 34.15 per m.t.u. in 1993.

66. The material was being traded at between $US 27 and $US 39 per m.t.u. as the market entered 1994. The abundance of supply, reported by coming mainly from stocks, was still depressing concentrate prices. In the first quarter, prices began to move up in response to firmer prices in the APT market, particularly at the higher end of the price range. However, the belief that concentrates were still available from stocks and the increased exports originating from the Russian Federation had a subdueing effect on price increases. In the next two quarters, concentrate prices continued to edge higher, nonetheless. The material was being traded at between $US 35.90 and $US 45.90 per m.t.u. by the end of the second quarter of 1994 and between $US 42.18 and $US 52.18 per m.t.u. by the end of the third quarter. In contrast to APT prices, concentrate prices did not

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[22] Refer to American Metal Market, 26 December 1994, page 1.

[23] See Metal Bulletin, *Op. cit.*, 9 February 1995, page 9.

soften in the last quarter but actually showed further increases, to end the year at between $US 48.86 and $US 60.00 per m.t.u.

67. Concentrate prices were still improving as the market began 1995. However, the market was adversely affected by some parcels being offered at bargain prices and a steady stream of material coming out of the Russian Federation and other C.I.S. countries. Russian material was said to be on offer below $US 50 per m.t.u. The lower prices were partly attributed to the lower quality of the material, thus contributing to widening the premium between the lower and upper grades traded in the market.[24] Concentrates prices jumped a further 18.5 per cent in the first quarter of 1995, to end with a price range at between $US 59 and $US 70 per m.t.u. Since then prices have remained steady at around the latter level. At the time of writing, tungsten concentrates were being traded at between $US 58 and $US 70 per m.t.u.

## VI. THE OUTLOOK IN THE TUNGSTEN MARKET

68. Like many minerals and metals, stronger performance of major world economies has greatly improved the outlook in the tungsten market, which suffered from one of the worst recessions in 1992-1993. In the latter period, mine production, which was already low, shrank further as a consequence of mine closures and the price collapse which had brought down tungsten prices to their lowest level since mid-1960s. With so many mines closed down, some as far back as the early 1980s, the higher demand generated by the recent strong upturns in world major economies has led to consumption outstripping mine production. This situation has resulted in significant stock drawdowns and price improvements in the market. Future prospects would depend considerably on the balance between demand and supply.

69. On the demand side, any slowdown of world major economies would make it unlikely that consuming industries, including automotive, metal manufacturing, construction and mining industries could sustain their recent performance. The levels of activity in such industries show signs of levelling off or even downturns in some cases. Although demand is likely to be dampened as a result, it may nevertheless still remain substantial, possibly holding at around current levels. Furthermore, the recent drawdowns of materials held in stock would suggest that some stock replenishment may soon be required, which could only further strengthen demand.

70. Regarding supply, mine production has decreased to its lowest level for many years, because of mine closures that have afflicted the tungsten industry since the early 1980s. The recent upsurge in demand has not resulted in any significant reopening of closed-down mines. This situation is largely expected to remain unchanged as long as current market prices are deemed unremunerative, which is still the case for most of the closed-down mines despite recent substantial price upturns. The shortfall of mine production in relation to tungsten consumption is likely to accumulate. If consumption remained at its 1994

[24] See "Tungsten drifts down into New Year", Metal Bulletin, 22 December 1994, page 11.

level and no mine were reopened, the market might face a shortage of between 10,000 and 15,000 metric tons in mine production.

71. Drawdowns from stocks have greatly helped to bridge the emerging gap between current consumption and mine production. How far material from stocks could maintain the market balance is difficult to ascertain because the amounts of such material remain unknown. What is known is that some stocks accumulated in the past have recently been exhausted. The larger part of the remaining stocks now lying in warehouses is reported to belong mostly to traders. Like additional supplies of mine production, most of these stocks are unlikely to be on offer in the market unless there are further price improvements.

72. Some additional supply may be provided by the C.I.S. countries, particularly the Russian Federation. Apart from the material held in their stocks, it is unlikely that these countries could supply significantly more tungsten from their mines than the amounts they were able to supply recently, without major investment in improving infrastructure and productivity. The funds needed are unlikely to be forthcoming either domestically given the prevailing economic conditions in these countries or externally if tungsten prices do not improve substantially.

73. Shipments from China (largest producing country) will continue to play a determinant role in the demand/supply balance. In the past, price upturns brought plentiful supplies of Chinese material, which resulted in subsequent sharp price falls. However, the time of unlimited availability of cheap supply from China would appear to be over. China, a developing country, needs to export; it would be unlikely to forego foreign exchange earnings by starving the market of tungsten. On the other hand, in an increasingly market-oriented China, production will be increasingly price-driven.

74. Therefore, based on the probable economic performance of the major world economies in 1995 and 1996, demand for tungsten can be expected to stay steady. Given present supply conditions, the market will face a situation where consumption will outstrip mine production unless market prices rise to choke off demand. Some additional supply could be forthcoming from the reopening of some recently closed-down mines, and the C.I.S. countries, particularly the Russian Federation, as well as material held in traders' stocks. However, any substantial increase from these sources of supply will require further price improvements. Such improvements will greatly depend on supply from China. On the assumption that China favours a stable tungsten market, as recently indicated by major Chinese suppliers, tungsten prices will tend towards stability or consolidation rather than further substantial strengthening.

Annex I

World consumption, production and trade of tungsten ores and concentrates by region
1985-1994

(Metric tons of tungsten content)

| | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 |
|---|---|---|---|---|---|---|---|---|---|---|
| A. World consumption | 52 968 | 50 956 | 51 382 | 55 220 | 58 049 | 50 738 | 41 877 | 36 490 | 31 721 | 31 570 |
| Developed market-economy countries | 16 812 | 13 336 | 13 943 | 15 600 | 14 931 | 12 174 | 10 260 | 7 320 | 5 501 | 5 650 |
| Developing countries | 18 453 | 19 256 | 19 695 | 25 096 | 28 468 | 26 064 | 24 157 | 23 310 | 20 960 | 20 760 |
| Countries of Eastern Europe | 17 703 | 18 364 | 17 744 | 14 524 | 14 650 | 12 500 | 7 460 | 5 860 | 5 260 | 5 160 |
| B. World production | 56 241 | 54 767 | 48 492 | 56 445 | 60 630 | 50 866 | 42 815 | 36 270 | 32 013 | 28 197 |
| Developed market-economy countries | 11 390 | 9 030 | 4 323 | 5 177 | 5 123 | 4 497 | 2 909 | 3 190 | 1 107 | 23 |
| Developing countries | 34 801 | 36 687 | 35 119 | 43 218 | 48 432 | 39 285 | 33 393 | 28 030 | 25 906 | 23 174 |
| Countries of Eastern Europe | 10 050 | 9 050 | 9 050 | 8 050 | 7 075 | 7 084 | 6 513 | 5 050 | 5 000 | 5 000 |
| C. World imports | 25 136 | 20 899 | 19 889 | 23 594 | 23 645 | 18 763 | 14 233 | 6 216 | 3 953 | 4 692 |
| Developed market-economy countries | 12 753 | 8 637 | 9 494 | 13 697 | 13 189 | 9 754 | 9 471 | 3 440 | 2 610 | 3 182 |
| Developing countries | 3 230 | 2 948 | 1 651 | 1 373 | 2 836 | 2 509 | 2 302 | 1 816 | 483 | 640 |
| Countries of Eastern Europe | 9 153 | 9 314 | 8 744 | 8 524 | 7 620 | 6 500 | 2 460 | 960 | 860 | 870 |
| D. World Exports | 26 592 | 23 392 | 21 925 | 23 360 | 25 521 | 16 660 | 11 563 | 6 310 | 4 409 | 4 587 |
| Developed market-economy countries | 7 893 | 4 833 | 3 137 | 3 758 | 2 981 | 2 707 | 2 696 | 1 309 | 1 731 | 75 |
| Developing countries | 18 699 | 18 559 | 18 788 | 19 602 | 22 540 | 13 953 | 8 867 | 5 001 | 2 678 | 2 812 |
| Countries of Eastern Europe | - | - | - | - | - | - | - | - | - | 1 700 |

Source: Tungsten Statistics, UNCTAD quarterly and annual bulletins, recent issues.

Annex II

Movements of tungsten stocks by type in selected countries, 1985-1994
(Metric tons of tungsten content)
End of year

| | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | A. Ores and concentrates | | | | | |
| **Producers' stocks** | | | | | | | | | | |
| Australia | 379 | 481 | 435 | 416 | 785 | 717 | 431 | 424 | 431 | 414 |
| Bolivia a/ | a/ | a/ | 105 | 130 | 210 | (200) | (100) | - | - | |
| Brazil | 17 | 875 | a/ | 70 | 84 | - | - | - | - | - |
| France | 85 | 205 | 65 | - | - | - | - | - | - | - |
| India | 54 | 50 | 50 | 57 | 10 | 11 | 13 | (10) | (10) | (10) |
| Japan | 27 | 26 | 21 | 41 | 72 | 75 | 101 | 207 | 30 | - |
| Mexico | 20 | 95 | 8 | 19 | 13 | 25 | 18 | 86 | 86 | - |
| Peru | 46 | 241 | a/ | 71 | 54 | - | - | - | - | - |
| Portugal | 305 | 1,042 | 941 | 970 | 1,057 | 1,180 | 634 | 709 | 551 | - |
| Republic of Korea | 200 | 44 | 45 | 45 | - | - | - | - | - | - |
| Rwanda | a/ | 60 | 10 | 10 | 10 | 22 | - | - | - | - |
| Spain | 84 | 50 | 62 | 47 | 45 | 20 | - | - | - | - |
| Sweden | - | - | - | - | 206 | - | - | - | - | - |
| Thailand | 1,029 | 1,025 | 1,100 | 1,295 | 1,487 | 1,553 | 1,617 | 1,684 | 1,709 | 1,659 |
| Turkey | 80 | 145 | 43 | 20 | - | - | - | - | - | |
| United States of America | 60 | 21 | 21 | 21 | 10 | 16 | 26 | (10) | (10) | |
| Sub-total | 2,386 | 4,360 | 2,801 | 3,187 | 3,883 | 3,829 | 3,040 | 3,230 | 2,827 | 2,083 |
| **Consumers' stocks** | | | | | | | | | | |
| Canada | a/ | a/ | 255 | 75 | 70 | 61 | 53 | - | - | - |
| France | 130 | 221 | - | - | - | - | - | - | - | - |
| Japan | 671 | 687 | 448 | 455 | 561 | 860 | 661 | 678 | 459 | 300 |
| Republic of Korea | - | - | - | - | - | - | 200 | 300 | - | - |
| Portugal | 10 | 1 | - | 1 | 1 | 1 | (1) | - | - | - |
| Sweden | 302 | 333 | 353 | 301 | 218 | 40 | 40 | 22 | - | - |
| United States of America | 1,077 | 502 | 329 | 499 | 1,261 | 1,077 | 1,778 | 702 | 592 | 756 |
| Sub-total | 2,190 | 1,744 | 1,385 | 1,331 | 2,111 | 2,039 | 2,733 | 1,702 | 1,051 | 1,056 |
| **Dealers' stocks** | | | | | | | | | | |
| Argentina | 9 | - | - | - | - | - | - | - | - | - |
| Japan | 1 | - | - | - | - | - | - | - | - | - |
| Peru | a/ | a/ | a/ | 7 | 7 | 27 | 27 | - | - | - |
| Thailand | 113 | 116 | 120 | 51 | 107 | 83 | 26 | 30 | 7 | 6 |
| Sub-total | 123 | 116 | 120 | 58 | 114 | 110 | 53 | 30 | 7 | 6 |
| **Total** (As shown above) | 4,699 | 6,220 | 4,306 | 4,576 | 6,108 | 5,978 | 5,826 | 4,962 | 3,885 | 3,145 |
| | | | | | B. Ammonium paratungstate | | | | | |
| Bolivia 513 | 389 | 27 | 159 | 179 | 237 | 276 | (250) | - | - | |
| Republic of Korea | 170 | 226 | 169 | 219 | 219 | 200 | 250 | (90) | 50 | - |
| Sweden | 76 | 318 | 126 | 306 | 467 | 340 | 332 | 420 | 264 | 240 |
| United States of America b/ | 1,056 | 477 | 292 | 911 | 915 | 896 | 578 | 333 | 420 | 82 |
| **Total** (As shown above) | 1,815 | 1,410 | 634 | 1,595 | 1,780 | 1,673 | 1,436 | 1,093 | 734 | 322 |

Source: Tungsten Statistics, UNCTAD, quarterly and annual bulletins, recent issues, and Bureau of Mines, the United States Department of the Interior.

- Denotes negligible or nil.

( ) Denotes provisional estimates.

a/ Not available.

b/ Consumers' and producers' stocks only.