

# The Transport of Platina to Spain in the Late Eighteenth Century

## A FURTHER CHAPTER ON THE SPANISH CONTRIBUTION TO THE EARLY EXPLOITATION OF THE NEWLY DISCOVERED METAL

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*The founding of a platina refinery in Madrid in 1786 required the establishment of a system for collecting platina from the Chocó district of New Granada in South America and shipping it to Spain. After several unsuccessful attempts to amass platina over many years, the Viceroy of New Granada ordered a district attorney at the Santa Fé Audiencia to arrange an official visit to the Chocó district to establish a Royal monopoly in platina and to set up a local collection procedure. This time it was successful and the shipment to Spain of a considerable amount of platina took place between 1788 and 1805.*

Previous papers in this journal have dealt with the first interest of the Spanish Crown in platinum (platina) from the Chocó district of New Granada, in Spanish South America (1). This had resulted from requests for this new metal by European scholars and scientists following its discovery in the second half of the eighteenth century. The creation of a monopoly in platina had been proposed after the first investigations of the metal and the arrival in Spain, from the Viceroyalty of New Granada, of the first two consignments ordered.

The problem of purifying platina had been solved by F. Chabaneau and F. de Elhuyar in the *Real Seminario Patriótico* at Vergara, in the Basque Country, and following this a platina refinery, known as the 'House of Platina', was established in Madrid. In 1786 the Viceroy of

New Granada, Antonio Caballero y Góngora, who was also Archbishop of Santa Fé de Bogota, was ordered to arrange the collection of platina for shipment to Madrid. However, in spite of numerous attempts at collecting large amounts, for example by the appointment of two private mine owners as commissioners to the Viceroy and by making formal requests to local governors and mints, only two other consignments, designated 3 and 4, were collected.

### Official Visit to the Chocó District and Regulations Concerning Platina

After earlier failures to build up a stock of platina, on May 6th, 1786, Viceroy Caballero y Góngora ordered Vicente Yañez, the district attorney (*Fiscal*) at Santa Fé Audiencia, to draw up a procedure for accumulating the metal. At this time neither the Popayán Mint nor the commissioners had responded to the initial requests for the metal.

Yañez answered promptly on May 23rd, suggesting a series of measures (2), the most important being a tour of inspection (*Visita*) of Chocó by an official inspector with extensive powers (a Royal *Visitador*). He would investigate the problem at first hand and establish a monopoly (*estanco*) on behalf of the Spanish Royal Treasury. This would prohibit the mining and trading of platina, and orders would be issued governing its collection. The inspector considered it necessary to publish an edict for other areas of the viceroyalty where the metal was known to occur, ordering all platina to be placed at his disposal.

Two means of obtaining platina from the mines were considered. First, individual miners would



**Map of the countries of South America, showing New Granada as it appeared in the year 1777 in the publication 'Robertson's History of America'. The map was drawn by Thomas Kitchen, Senior, an English engraver, publisher and hydrographer to the King. The map is located in the Map Library of the British Library**

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be authorised to extract platina from the gold mines in which it occurred; the Royal Treasury would provide a labour force of slaves and their tools, and the platina that was extracted had to be delivered to Royal Agents at the price of one *patacón* (8 *reales*) per *libra*. Second, one or two mines with substantial platina content belonging to the Royal Treasury, where working had previously been prohibited, would be opened. Yañez calculated that the operating costs of these mines could be met by revenue generated from the sale of a particular type of brazilwood (*Caesalpinia braziliensis*) from which textile dyes were obtained, and which was also the subject of a Royal monopoly.

Another of Yañez's ideas was to collect the platina that had been abandoned or dumped in inaccessible places. This would be recovered by

people employed by the Royal Treasury or by private individuals who would then have to sell the metal to the Royal Agents at the price noted above.

Yañez proposed the assignment of army officials to oversee these tasks. He suggested that they should be rewarded with bonuses and given special opportunities for promotion, thus ensuring that his schemes worked well.

Shortly afterwards the Viceroy wrote to José de Galvez, Marquis of Sonora and Secretary of the Indies, bringing him up-to-date on the situation (3). Believing that it would be difficult to find someone to take responsibility for implementing Yañez's ideas, the Viceroy suggested that Yañez himself should be appointed. However, on July 14th, before he had received a reply the Viceroy again wrote to the Marquis

of Sonora, with further information (4). Among the matters covered was the decision of the Viceroy to increase the price paid for the platina from eight to twelve *reales per libra*; he believed "that it will indeed be necessary to give it the same price as silver."

He also reported on the amount of platina obtained to date: 6.5 *arrobas* shipped by commissioner Moreno, 6 *libras* sent by superintendent Del Sorribo, and another 10 *arrobas* shipped from Sínodo de Quito by order of a clergyman in Popayán. This was possibly the platina referred to in the "Summary of the Extract Record on Platina", numbered 34, corresponding to the year 1787, which reads:

"Juan Mariano de Grijalva, clergyman from Popayán hereby informs that through the Viceroy he remits a considerable portion of platina" (5).

Initially received by the Council of the Indies, the document was sent six months later to Antonio de Ulloa, who received it on January 18th, 1788. As a young Spanish naval officer, Ulloa had been a member of the 1736–1743

French expedition sent to Ecuador to measure the length of a degree of longitude. His account of the expedition contained the reference to platina that so aroused the interest of European scientists. Now, 72 years old, and commanding the Spanish navy, Ulloa prepared a report in just twelve days giving his thoughts on the workings of the platina mines (6, 7). Ulloa did not agree with the arrangements proposed by Yañez regarding the indiscriminate help to miners, but it appears that Ulloa's opinion was only requested at a late stage, possibly after the Council of the Indies had sent their authorisation to New Granada, in the second half of 1787, although this communication has not been found in the archives consulted. In any event, Yañez was appointed Royal *Visitador* of the Chocó district on December 14th 1787 (4).

Yañez's responsibilities were diverse and included the establishment of a monopoly in platina on behalf of the Royal Treasury, the prohibition of its sale or removal from the province, the regulation of the mines to prevent fraud, the control of the platina mining accounts – on

Table I  
Platina Consignments which Arrived in Spain

Shipment	Year of arrival	Amount	Weight, kg	Ship	Port of arrival
1	1767	1 @ 22 lb	21.62	–	Cadiz
2	1784	12,937 cs	59.51	–	Cadiz
3	1787	1 @ 17 lb	19.32	–	–
4	1787	6 @ 4 lb 8 oz	70.94	–	–
5	1787	69 lb 14 oz	32.14	F. El Pájaro	Cadiz
6	1787	16 @ 23 lb	194.58	F. La Posta de América	Cadiz
7	1789	122 @ 15 lb 9 oz	1310.16	–	–
8	1790	4543 cs	20.90	B. El Famoso Sevillano	–
9	1791	45 @ 6 lb	520.26	F. El Riojano	Cadiz
10	1791	962 cs	4.42	F. El Riojano	Cadiz
11	1791	100 lb 14 oz	46.40	P. N. S. Carmen	Cadiz
12	1795	146 lb 9 oz	67.30	V. San Carlos	Cadiz
13	1802	2267 cs 1/2 t	10.43	F. Sta. Sabina	Cadiz
14	1802	95 3/4 lb	44.04	F. Sta. Sabina	Cadiz
15	1802	493 lb 9 oz	227.04	F. Flor del Paraíso	Cadiz
16	1803	22 lb	10.12	F. Sta. Sabina	Vigo
17	1804	11 @ 17 lb 15 oz 7 oc	134.54	B. El Serrano	Cadiz
18	1805	114 lb 14 oz 5 oc	52.77		Corunna

@: arroba; lb: libra; oz: onza; cs: castellano; t: tomín; oc: ochava; F: frigate; B: brigantine; P: packet boat; V: vessel

behalf of the Royal Treasury, the inspection of the N6vita foundry and the establishment of a new smelting plant at Citar6. In his Confidential Instructions, the Viceroy explained in detail Y6ñez's obligations regarding platina (8).

The *Visita* took place during the Bourbon reformation in Spain, when Spain aimed to increase the dependence on Madrid of its American colonies and thus increase the economic power of the Spanish state. Y6ñez's *Visita* to the Choc6 began immediately. He made a public edict, dated in Quibdo on February 26th 1788, addressed only to the people of Citar6 which proclaimed that all platina belonged to the Royal Treasury. The extraction of platina from mines, placer deposits or inaccessible dumping sites was no longer prohibited, and indeed was to be encouraged, providing the metal was sold to the Royal Treasury at the price of two *patacones* (16 *reales*) per *libra*. Trading in platina and its shipment were banned, except as part of an official consignment. There were severe penalties for infringement of the laws (9).

One positive result of the *Visita*, and of the interest shown by the Viceroy before he resigned his position in 1789, was the despatch of shipment number 7 (10). The large amount of platina sent on this occasion, over 1300 kg and the largest to date, was the first time that abandoned platina had been recovered.

The procedures proposed by Y6ñez and Viceroy Caballero were successful for several years. Besides shipment 7, further consignments (shipments 8 through to 12) were made between 1789 and 1795. Yet the amount of platina collected was not large, except for shipment 9 which weighed over 500 kg. This was probably because Y6ñez's edict had not been issued in other parts of the Viceroyalty, giving an opportunity to continue fraudulent platina trading (11). Shipments 7 and 9, containing platina discarded over many years, made up 64.3 per cent of the total.

### **Fluctuations in the Shipment of Platina to Spain**

The signing of Peace in Basilea in July 1795, and the subsequent First Treaty of San Ildefonso in August 1796, renewed old family pacts

between France and Spain, but led to war with Britain. One consequence was the curtailment of shipping between Spain and the Indies, which explains the halt in platina shipments after 1795.

In October 1801, in order to restart the process, the Minister of the Royal Treasury, Miguel Cayetano Soler, ordered the Viceroy of Santa F6 to despatch all the platina that had accumulated during the war, to repeat the proclamation of all the edicts and to proceed with the collection of platina (12).

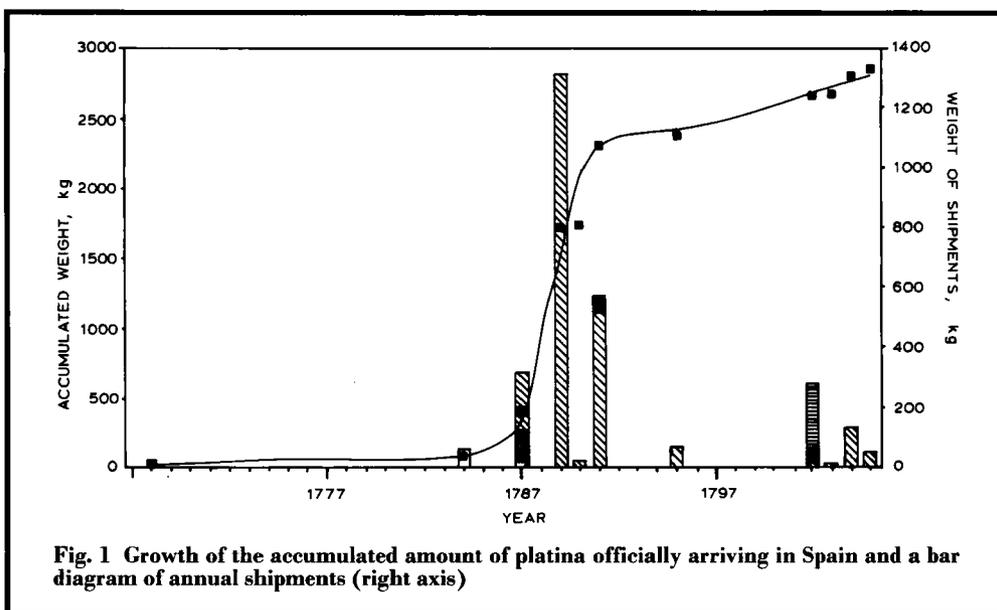
Simultaneously he ordered the Viceroys of Lima and Buenos Aires and the President of Chile to discover if platina existed in their regions. He also explained the measures to be taken for the collection of platina in New Granada (13).

The responses from Buenos Aires (14) and Chile (15) stated that there was no platina in their territories. A similar report prepared in Lima was apparently never sent (16).

In Santa F6 de Bogota, Viceroy Mendinueta dictated an edict similar to those published previously, but he informed Minister Soler of his doubts about the collection of large amounts of platina, because of the extremely low price being paid for it: only 2 *patacones* per *libra* (11). Shipments 13 and 14 were sent at the same time and shipment 15, sent soon afterwards, was of considerable size, possibly because of the six year gap in the transport of platina to Spain. In 1805, after three more shipments (16 to 18), shipments were again halted, because of the war between France and Britain which had been declared in May 1803, and because of Napoleon's invasion of Spain and the war of liberation. While Spain was at war a power vacuum developed in the colonies, favouring revolutionary ideas and causing political instability. This eventually halted platina exports and ended the Spanish monopoly of platina.

### **Platina Shipped to Spain**

Official platina shipments are summarised in Table I, with the total amount being determined as 2845.96 kg (an uncertainty arises because the gross weight of platina and its container boxes was given for shipment 5 – the weight of



platina in this shipment is estimated at 122 *arrobas*, 15 *libras* and 9 *onzas*).

There are indications that another shipment may have existed, for in February 1792, Viceroy Ezpeleta informed the Count of Lerena that he had ordered the Royal Agents of Santa Fé to send two boxes of platina on the war frigate "Santa Sabina" (17), but there is no other record of this.

A substantially different figure for the total amount of platina sent to Madrid has been reported by Chaston (18). He suggested that the quantity of crude platina which arrived in Madrid between 1786 and 1808 may have averaged 14,000 to 18,000 Troy oz per year – adding up to perhaps one-third of a million ounces (9560 to 12,320 kg) over the twenty-two year period. This amount is significantly larger than that reported here, although it must be acknowledged that smuggling could account for at least some of the difference between Chaston's figure and my account of legal commerce.

The amounts of platina remitted in the legal shipments are shown in Figure 1. These shipments are fairly well documented, with the exception of shipment 4. This was referred to in Cadiz, in a note dated November 24th 1787,

about the despatch of nine boxes of platinum and silver from the Popayán Mint (19). This consignment may have arrived with shipments 5 and 6, since Chabaneau signed a receipt for: "five sacks and four boxes of platina whose exact weight was unknown although it was calculated at twenty-six *arrobas* gross" (20).

In fact it can be deduced from a "Note of platina received and delivered by Francisco Chabaneau" (21) that shipment 4 was contained in four boxes and weighed six *arrobas*, four *libras* and eight *onzas*.

Furthermore, on two occasions small amounts of platina mixed with gold were sent to Madrid, not as official shipments but because they could not be separated in New Granada. The first occurred in 1797 (22) and the second was sent with shipment 13 in 1802 (23).

### Origin of Platina Shipments

The platina which arrived in Europe originated in the platinum regions of the Chocó district and Barbacoas. However, the port of embarkation varied for commercial, taxation or other reasons. Shipments were generally dispatched from the *cajas reales* (strong rooms) at Citará and Nóvita in the Chocó district

Table II		
Weight per Box of Platina		
Shipment	Number of boxes	Weight/box, kg
1	2	10.81
2	2	29.75
3	1	19.32
4	4	17.73
5	1	32.09
6	4	48.64
7	41	31.95
8	–	–
9	22	23.65
10	1	4.42
11	2	23.16
12	5	13.46
13	1	10.43
14	1	44.04
15	2	113.32
16	1	10.12
17	2	67.27
18	1	52.77

(shipments 7, 9 and 11), at Santa Fé de Bogota (shipments 1, 2, 3, 12 and 14), at Cartagena de Indias (shipments 15 and 16) or at Popayán (shipment 10). However, shipments 5 and 6 were an exception, being the only official ones to arrive from the viceroyalty of Peru, and were sent by private individuals, not from the *cajas reales*. Shipment 5, the smaller of the two, consisted of 69 *libras* and 14 *onzas* of platina and was sent by Pedro Ximénez de Morales, an Andalusian living in Lima. The authorities in South America had a very poor opinion of him (24) but Jorge Escobedo, who at that time was Sub-delegate Superintendent of the Royal Treasury in Lima, helped in the dispatch of this shipment.

Escobedo was also involved with Shipment 6, consisting of 423 *libras* of platina, which despite initial setbacks was eventually sent to Spain by Bernardo Roca, a resident of Guayaquil. This was done:

“on his own behalf, cost and risk at the disposal of the King, and for his sovereign to later remit the amount considered as just,

as per the price being paid for the metal there” (25).

This platina arrived on December 7th, 1787, and payment was made eight months later. In the “Note of expenses incurred in founding the Royal Platina Plant” payment is recorded of “twenty-seven thousand seventy-two *reales* which on August 9th, 1788 were released to the proxy representing Bernardo Roca, resident of Guayaquil in payment for 423 *libras* of platina” (26). This amounts to a price of 64 *reales* per *libra* before expenses, but if Bernardo Roca had sold the platina in Lima he could have received double the amount of money!

Only two official shipments were sent from the Kingdom of Peru, and although there were others they are more difficult to identify because of their clandestine nature. Known examples include the one thousand *onzas* of platina that the chaplain attempted to sell to the “El Achilles” Register in 1786, and the four boxes of platina sent by Roque Aguado but seized on the instructions of Minister Valdés when they were put on sale in 1787 (6).

### Packing and Shipment of Platina

As the platina was frequently in the form of high-density fine granules it required careful packing in order to minimise potential losses during shipment. A Royal Ordinance dated December 21st, 1781 instructed that platina should be packed in small amounts and in suitable boxes, in the same way that coin samples were shipped (27).

A document dated 1786 includes a description of the packing procedures: the platina was contained:

“in a sack of *crea* [a medium quality cloth], and subsequently in another of canvas, and then in a sheepskin sack which was wrapped in oil-cloth and then packed into a small wooden box, which was nailed shut and covered with iron sheets” (28).

The problem of packing platina for shipment had already been considered by Ulloa (6) who recommended that it should be contained in dried gourds, tightly packed in strong boxes, with straw or wool stuffing, then nailed shut,

covered with leather and finally stamped with the Royal Seal. This packaging was very similar to that used for transporting mercury from Spain to America (29), where it was used in the treatment of silver containing minerals.

Platina, however, was not always packed so well. For shipment 7 the platina was put "in sacks, then inside wooden boxes more costly than those most commonly used, so that they may be presented to H.M. in a fitting state, and then into other boxes which ... protect ... while at sea, or on the road ..." (10).

Shipment 11 consisted of "two boxes with platina covered in leather" (30), while "... this very day was received ... the sack of platina" was recorded for shipment 18 (31).

The number of boxes in each shipment of platina, and their average weights are given in Table II. These conform with the observations of the 19th century traveller C. Saffray, who reported that merchandise for transportation by mule in New Granada should be in bundles no bigger than 85 cm long and 45 cm high, and weighing no more than 50 to 60 kg (32). This is roughly consistent with the earlier instructions from Ulloa that a box should not contain more than 4 *arrobas* (6).

The packaging system employed was successful

and platina losses were relatively small, despite the long and difficult journeys by land and sea. Considering the rugged terrain in New Granada and the poor state of the few roads, it is likely that the rivers Magdalena and Cauca would have been used as transport routes (33) with mules being used for final access to the ports. The only case of recorded land transport is the platina sent by commissioner Moreno to Viceroy Caballero in 1787, which took over three months to travel from the Chocó district to Santa Fé de Bogota (4).

The only documented case of river transport relates to shipment 9. In a communication to Minister Valdés dated April 28th, 1790, the governor of Cartagena wrote:

"On the 18th day of the current month the galleon "Santa Elena" returned to this port, under the charge of Lieutenant Fernando Jorgenes, having concluded his mission of escorting the Convoy of Trade comprising a small schooner, a guayro and a canoe, which left for Chocó on December 20 of last year, and was carrying twenty-two boxes, with forty-five *arrobas* of platina for H.M. ..." (34).

Generally, the platina was stored at Cartagena de Indias before transportation to Spain; however, shipments 5 and 6 were sent from the port

A Spanish galleon from the 18th Century, typical of those used, among other ships, to carry platina from New Granada to the port of Cadiz in Spain. Platina was transported in the ship recorded in the register of gold, silver and fruits under the care of the ship's purser. In the event of attack, to avoid the danger of platina falling into the hands of enemies, in most cases the English, it was ordered that the boxes be thrown overboard as was the usual practice with the official correspondence

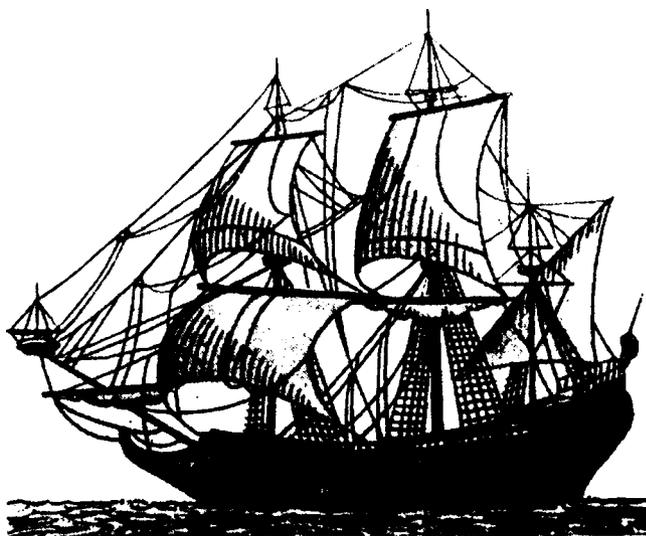


Table III Cost of Platina Shipments to Madrid					
Shipment	Year	Origin	Weight	Total value (r.v.)	Price per arroba (r.v.)
11	1791	Cadiz	100 lb 14 oz	73	18
12	1795	Cadiz	146 lb 9 oz	350	60
15	1802	Cadiz	493 lb 9 oz	1100	56
17	1804	Cadiz	11 @ 17 lb 15 oz	600	51
18	1805	Corunna	114 lb 14 oz 5 oc	230	50

r.v. reales de vellón

of “El Callao” in Peru, even though the platina had originated from the Chocó district.

The trip to Spain was made either in registered private merchant ships or warships of the Spanish Navy. The ships were instructed:

“that in any uncommon circumstances they should pitch them [the boxes of platina] into the water as is the usual practice with official correspondence” (27).

Journeys could take between about two months to three and a half months. On occasions mail boats, which had been introduced in 1764 to carry official documents and news as quickly as possible, were also used, even though they were generally prohibited from transporting precious metals or any type of merchandise (35).

When platina was transported by the Spanish Navy it was placed in the care of the ship’s purser. For consignment 16 it is recorded that:

“I, Antonio Alonzo, Purser for His Majesty’s frigate “Santa Sabina”, of which Miquel Gaston is the Commander and Captain of the Vessel of the Royal (Spanish) Navy, hereby state that I have received from the Royal Official Ministers of ... Cartagena de Indias twenty and two *libras* of platina metal to transport to the Port of Cadiz” (36).

Platina was delivered at the port of arrival, usually Cadiz, to the “President Judge of Set Prices and Arrival of Goods”, who informed the Secretary of the Treasury. The latter then arranged for its transportation to Madrid. Proper packaging was again insisted upon to minimise any losses which might occur. These precautions may have been put in place after substantial

losses from the first consignment:

“in May of this year two and a half *arrobos* were remitted in hand by the Marquis himself and due to poor travelling conditions only 47 *libras* reached Vergara” (21),

representing a loss of 24.8 per cent of the total.

The only available data relating to the cost of transporting platina to Madrid are given in Table III. Excluding the first consignment, the average cost was 54 *reales de vellon* per *arroba*.

Controversy surrounded the price to be paid for transporting platina. Documentation at the Corunna custom house only specified the carriage prices for silver and gold, which were 0.75 and 0.5 per cent of the total value, respectively (37), with no mention being made of platina. This was possibly because:

“the value of this metal cannot be determined even though we are aware that it is worth more than silver” (38).

The Secretariat of the Indies suggested the same price as for silver (39) but this was unacceptable to Minister Soler who stated that it should be treated as any other metal and its transport should be paid on the basis of its weight, not its value (40).

The various consignments of platina were ultimately delivered to the ‘House of Platina’ for purification, as evidenced by receipts issued by Chabaneau for shipments 1 (21); 4, 5 and 6 (20); 7 (41); 8 (42), 10 and 11 (43, 44) and for shipments 13, 14 and 15 (45) by his pupil and assistant Joaquín Cabezas, who later took charge of the Platina Laboratory.

Platina losses during land and sea transport

Table IV Platina Lost during Shipment			
Shipment	Weight of platina shipped, kg	Weight of platina received, kg	Loss, per cent
1	21.62	21.62	Nil
2	28.75	21.62	24.80
3	19.32	—	—
4	70.94	—	—
5	32.14	31.28	2.68
6	194.58	194.58	Nil
7	1310.16	—	—
8	20.90	20.56	1.64
9	520.26	519.34	0.18
10	4.42	4.37	1.13
11	46.40	45.08	2.85
12	67.30	—	—
13-15	281.51	282.32	0.29
16	10.12	—	—
17	134.54	—	—
18	52.77	—	—

were not significantly high, see Table IV and, with the exception of the aforementioned shipment 2, the difference in weight could be due exclusively to variations in the balance gauges used for weighing. This suggests that the packing system employed gave good results.

### Conclusions

A great many difficulties had to be overcome before even limited amounts of platina could be extracted from the earth in Spanish South America and transported safely over long distances by land and sea to Spain. The Spanish

government used it as a prestige item and for exchange with other European countries, and presented it to European scientists keen to investigate the remarkable properties of this “new” metal. In this way, platina formed part of Bourbon scientific policy. However, an appropriate mechanism for its export was never put into place, which generated direct trading in platinum between America and Europe, stimulated in New Granada by the low price officially paid for the metal, and in Europe, above all in England, by the growing industrial demand for platina (46).

The following units of weight were used in the original 18th century Spanish documents. The units of weight are given with the metric equivalents:  
 1 arroba = 25 libras; 1 libra = 460 g = 16 onzas = 100 castellanos;  
 1 onza = 28.75 g = 8 ochavas; 1 ochava = 6 tomines

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## Determining Oxygen in Polymers

A new method of determining the oxygen content in organosilicon polymers and organic materials is described by M. Aramata and T. Igarashi of Shin-Etsu Chemical Co. Ltd., and J. Okayama and M. Ikeda of HORIBA Ltd., in Japan (*Anal. Sci.*, 1998, 14, (3), 541-546). The silicon-silicon bonds in the polymers, which give them their unique electronic and optical properties, are easily oxidised to Si-O-Si resulting in loss of performance.

Oxygen content was investigated in an inert-gas fusion converter where samples of poly-organosiloxane/silicone and organosilicon polymers were pyrolysed in a furnace at 2600°C. Further reduction by a heated platinum/carbon catalyst gave carbon monoxide, which could be determined by an IR absorption technique.