

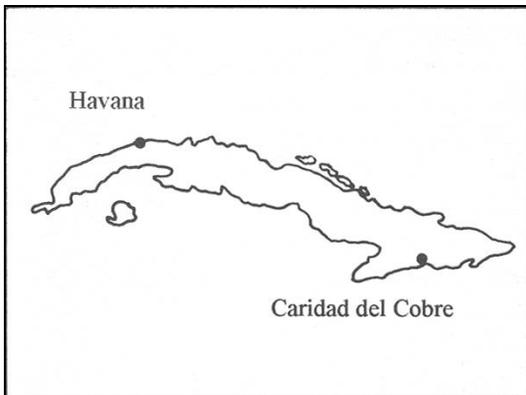
Copper on the *Nuestra Señora de Atocha*

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One of the larger cargoes put onboard the *Nuestra Señora de Atocha* in 1622 for the return voyage to Spain, was a 30,000 pound load of copper ingots. Though these ingots have not particularly captured the modern-day public's imagination, they have played a significant part in all aspects of the wrecked galleon's story.

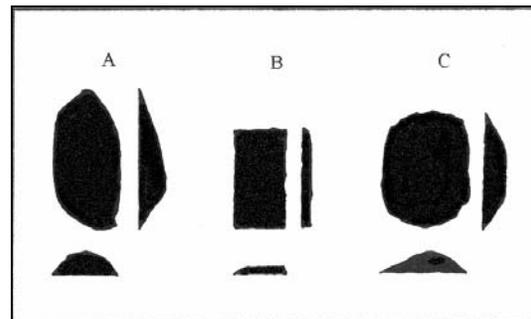
Five hundred and eighty-two copper ingots were loaded onboard at Havana, the *Atocha's* final stop in the Indies before sailing to Spain. The copper originated from the mine at Caridad del Cobre in the extreme southeast of Cuba. The mine was owned by the crown, and operated by a factor, Juan de Eguiluz. The miners who worked these deposits were slaves of African origin, and, because of this, Eguiluz was a man who also had a hand in the slave trade. After the ore was refined, the copper was cast into crude ingots, transported to Santiago de Cuba and then shipped in *fregatas* to Havana. Eguiluz turned it over to Crown officials at that port city, and it was then loaded onto the guard galleons of the fleet. Only three ships carried this royal cargo of copper in the 1622 *Tierra Firme flota*; the *Atocha*, *Santa Margarita* and *Rosario*.



The location of Caridad del Cobre, where the *Atocha* copper was mined, and Havana, where it was put onboard for shipment to Spain.

The primary reason for shipping copper to Spain was related to the earlier closing of the Havana cannon foundry. On its own, Cuban copper was found to be too brittle for artillery, and when processed resulted in too much waste.

When it was taken to Spain and combined with higher-quality Hungarian copper, a better bronze, and thus better, and more reliable guns could be manufactured. Another possible, though undocumented, purpose for shipping copper may have been that in the second decade of the 17th century that the Crown's New World treasure revenues began to decline. As the supply of silver began to decrease, an increasing number of coins were minted in Spain of a metal known as *vellón*; an alloy of silver debased with copper.



The three forms of copper ingots found on the wreck of *Nuestra Señora de Atocha*: A) "Boat" shaped, B) Rectangular, C) Oval. Cross-sections through the length and width are also illustrated.

A random sample of 50 of the *Atocha* ingots have an average weight of 54.2 lbs, close to the average 51.5 lbs derived for the 582 put onboard when they are divided into their declared weight. Extremes of 22lbs and 111lbs were found on the wreck. Though these ingots are crudely cast, seemingly from simple depressions in the ground, three basic forms have been discerned; rectangular, oval, and an elongated, "boat" shape. All the ingots have highly irregular, bumpy surfaces. None bear markings of any sort. The contemporary records of the *Atocha's* lading refer to these ingots simply as *planchas*, with no differentiation for form or size.

During the excavation of the lower hull area of the *Atocha*, it became apparent how the ingots were loaded on the galleon. Weighing as much as they did, it was logical they would be found in the lower hold. There they could be utilized as ballast, much as the silver bars and coins were.

The copper was found in a distinct cluster to the North of the silver. Because the wreck of the *Atocha* generally faced South, this means the copper was stored nearer to the stern, probably

immediately after the mainmast, while the silver was forward of it. The two cargoes complemented each other, providing a balanced load for steady sailing.

Table 1.
ELEMENTAL COMPOSITION ANALYSES OF *ATOCHA* COPPER INGOTS

INGOT #	%COPPER	%IRON	% ZINC	%GOLD	%LEAD	TIN*	ANTIMONY*
104-A	98.2	0.15	0.2	0.77	0.62	433	160
138-A	97.1	1.26	0.35	0.66	0.6	156	161
150-A	97.46	1.46	0.35	0.4	0.28	370	92
169-A	97.9	0.66	0.5	0.54	0.4	474	105
173-A	98.4	0.42	0.44	---	0.29	---	---

*parts per million