

19th Century Mint Refining and Metallurgical Practices

Part I

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By way of background, I would like to discuss how I became interested in this topic and how it relates to the Carson City Mint. I also intend for this to be a multi-series of articles and hope that others may be able to contribute “discoveries” on this fascinating topic of historical metallurgical technologies as related to US coins.

Most US branch mints were set up with refinery and alloying facilities in order to meet the high standards of purity and consistency for precious metal coins. While the methods of refining through most of the mid-19th century were somewhat standard, as dictated by the Philadelphia mint, regional differences existed. Such things as the availabilities of raw materials like, acids for parting metals, availability of copper for alloying and fuels for melting furnaces, played a part in the quality of coins produced. Even the character of ores from various mining districts from which the precious metals were derived, could effect the overall refining process results. Thus precious metal purity used in branch mint coins could vary greatly from Philadelphia coins made with a similar process.

When I first began collecting type coins many years ago, I often noticed significant color differences between both silver and gold coins that were produced at branch mints and those of Philadelphia of the same period. Of course it was easy to assume that the coin metal refining and alloy processes at each branch mint could be different over this period of time, but I had no knowledge of how the

refining was done, say in the period of about 1830 to 1890. I did find information available for such processes of the Philadelphia Mint but a great deal of information was lacking for the branch mints. One of my first studies involved the processes of the Dahlonega Mint in the 1840's. I noticed that the color of many gold coins from this mint are significantly different than those of the Philadelphia Mint of the same time period. I discovered that it was the custom of the branch mints to send representative coins back to Philadelphia for assay analysis as a sort of quality control measure. This assay process in itself also raised significant questions for me about the methods used and accuracy obtained. But that is a topic for another time. What I found most interesting is that Mint reports exist that indicate that the Dahlonega mint was not alloying its gold coins with the requisite amount of copper, but instead the coins were high in silver content. This leads to speculation that the mint, maybe, was not alloying its coins at all, but was using the gold from dust and nuggets just melted as found. For me the mystery of the entire refining process was just beginning with more and more questions. I subsequently found a great deal of information about refining and alloying methods of other branch mints that was very fascinating.

Now let us fast forward a number of years past these other branch mint's years of operation to the Carson City Mint. Several years ago I decided to put together an XF to AU collection of "CC" quarters and halves. I thought it would be a fairly straight forward exercise until I actually tried it. Shock and Awe! Shock at the cost of early "CC" quarters and halves, but "awe" at the history and beauty of the pieces. I subsequently lowered some of my grade requirements but I did spend a great deal of time just looking. Several items I noticed on these early (1870 to 1873) coins were patches of different colors and, metal consistencies reminiscent of improper alloy consistency. I would later discover a possible reason for this.

But the other fascinating quality was this overall “grayish” look that did not seem to occur on Philadelphia pieces of the same period and condition. Also *some* “CC” coins exhibited a great deal of porosity not found in Philadelphia coins. The porosity issue indicated a possible alloy problem. I suspected that the metal in the alloy was not consistent with what Philadelphia had done but I had no hard proof. A significant breakthrough, for me, came when I discovered a copy of Weimar White’s *Coin Chemistry*. There it was on page 11! Page 11 has the assay results of an 1875-CC dime. This coin contained almost 1% lead. Lead plus the additional impurities began to explain the unusual color of many Carson City silver coins that I had looked at. The other issue it may explain is the extensive wear seen on some of these coins with almost proof-like fields. Lead in the alloy would cause a softening of the metal and thus promote greater wear. Of course, weak strikes can also play a factor here.



(Notice the extreme porosity on both sides of this 1876-CC dime.)

For me this was a start of an adventure to find out more on the metallurgy of the Carson City refinery operation. Subsequently I have seen assays of other “CC” coins and as one would suspect

of a batch process refining method, the results vary greatly. This raises a number of questions about how the lead got into the alloy and why it was not detected or could it have been a way of increasing coin weight at the expense of the silver? Also, chemical refining processes are greatly affected by temperature. There is no indication that the “CC” Mint had central temperature control, but the variations of hot in the summer and extreme cold of winter could affect the consistency of the refining and alloying processes. There are *many factors* that we can explore in understanding “CC” Mint refining and metallurgy practices.

A good place to continue this investigation is to piece together what we know of the refining processes of the day and those specifically of the Carson City Mint. This makes for a great lead in to Part II for my next article.

Happy “CC” hunting and by the way, I still need an 1870-CC half and quarter among a few other pieces!!