

# The Sapphire Report

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Sapphires, probably alluvial "gems" of Burma and Ceylon, were among the first gemstones known to man. During the 10,000 years that man has collected these precious blue gemstones, he has associated them with an enormous amount of rich lore and legend.

The ancient Persians explained the blue of the sky by believing the earth rested upon a great sapphire. Early Hindus, noticing great similarity in hardness and weight between the corundum gemstones, believed that sapphires were really "unripened" rubies. Today, we know the red of rubies is created by a trace of chromium oxide incorporated into the crystal structure. The blues, the classic and most valuable color of sapphire, are caused by trace amounts of iron oxide or titanium oxide, or both.

Before 600 B. C., when diamonds were discovered, the corundum (sapphires & rubies) gems were the hardest material known to man. Hardness being the ability to resist scratching. Sapphires also rank extremely high in toughness, the ability to resist impact that might cause chipping or even shattering.

Unlike gold, which has an intrinsic value, gemstones owe their value to beauty and rarity of form. Although the earth has over 2,000 minerals, only a few dozen possess the attributes to qualify as gemstones, and only diamonds, rubies, sapphires and emeralds are termed truly precious gemstones.

The last decades of the nineteenth century were exciting times in the world of precious gemstones. Diamond fields in Brazil were still producing, as were the rich emerald mines of Columbia. A new sapphire deposit was discovered in Northern India, and the British were about to bring the traditional Ceylonese

and Burmese ruby and sapphire mines to record production. The greatest event, of course, was the discovery of the South African diamond fields.

These new discoveries and increased mine production meant a greater supply of sapphires than at any time in history. Still the growing demand for fine sapphires in jewelry, then in vogue in Europe, continued to outpace the supply.

## North American Sapphires

To most North Americans, the word sapphire has an intriguing foreign flavour conjuring images of crown jewels, sultans, and the steamy jungles of exotic places like Ceylon and Burma. But, do you know that the United States is a commercial source of what some gem experts consider the world's finest sapphire?

Sapphires were apparently first discovered in Montana in 1865. Stones were shipped to Tiffany & Co. in New York with some even being shipped to Amsterdam. The British still enjoyed at least partial control over every major sapphire source and market and were aggressively expanding their interests.

American cutters were decades behind the state of the art as practiced by leading European gem cutters, so it was no surprise that the British put up the early investment capital for the first North American sapphire mine in Montana. Between 1898 and 1924 the English Mine, as it was appropriately known, produced over 16 million carats of sapphires, with a finished value in excess of \$25 million.

## Heat Treatment

Early mention of the heat treatment of ruby and sapphire is found in various translations of ancient Indian texts. Rumours persist that the process of heat treatment of blue sapphire

in Thailand was accidentally discovered during sapphire-jewelry fabrication. Intense heat, applied to a gold ornament adjacent to light-blue sapphire, resulted in the stone's turning darker blue. Other rumours claim that a gem house burned down, and when looking through the debris it was found that some lower-quality greyish/bluish star Sri Lankan sapphires had become a beautiful blue color.



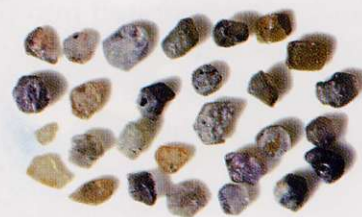
*A Thai heater, using a system virtually unchanged in centuries, treats sapphires in an outdoor furnace.*

Around 1980, some treaters connected oxygen to the furnace, increasing the operating heat treatment temperature that resulted in better recovery of the stones. The correct determination of the heat treatment parameters requires extensive knowledge of thermochemistry. Good engineering skills are needed to fabricate, operate, and maintain the special equipment needed to carry out the process. Successful heat treaters tend to be very secretive about their procedures.

Corundums may be heated at various temperatures, ranging from around 800 degrees to 1,800 degrees celsius for various processing times, ranging from few minutes to hours or days. Every heat process is characterized by three successive segments: heat-up, process-

ing, and cool-down. temperature and time are the two parameters, regardless of the furnace used. The behaviour of the various compounds within the corundum depends upon their structural, chemical, and physical relationships with the neighbouring atoms, which surround them in the structure of the crystal.

The characteristic physical properties of the heat-treated corundums are the same as their natural, non-heat-treated corundums. The identification of rubies or sapphires heated at low temperature for a prolonged time is more difficult than identifying similar corundums heated at high temperature. However, some high-temperature heated rubies or sapphires are virtually undetectable by qualified geological laboratories.



**Natural Stones**



**Heat Treated**



**Finished Sapphires**

*Heating permanently maximizes a stone's potential. Without it there would be few beautiful sapphires.*

### **Anglo Swiss Industries Inc.**

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