



TGX:TSX-V

TRUE NORTH GEMS

Gemstone Processing

The extraction of mini-bulk samples from the ground is only the first step in the process of creating polished gemstones.

Most ruby deposits and mines in the world consist of rubies that are found in alluvial sources - this means that natural erosion and weathering has extracted the gems from their host rock and concentrated them into rivers and streams. The resulting rubies are generally rounded in shape due to weathering during transport, and are often of a high quality because the weathering preferentially erodes the softer non-gem material. Mining rubies from alluvial sources is a relatively simple process, as the difference in specific gravity (weight) between ruby and other minerals (sand) allows them to be separated by gravity in much the same way as gold is separated from gravel while panning.

The ruby occurrences found in Greenland are considered in-situ sources, meaning the ruby is still located within the original hard rock. Mining from bedrock sources is significantly more complicated than mining from alluvial sources because the rubies first need to be physically separated from the host rock in which they are contained. Fortunately, engineering has developed to a point that makes this step less of an issue today than it was a few decades ago when the Greenland rubies were first discovered.

After low-intensity blasting is used to mine large pieces of host-rock, the material is delivered to the rock crusher for size reduction. This crushing is done in the most delicate way possible, using crushers that allow the material to break along natural fractures rather than aggressively smashing the rock (and any rubies that may be contained within it). The ruby & waste material is then sent through a gravity wash plant which concentrates the material by removing the lightweight and magnetic minerals from the denser ruby.

Virtually all gemstone sorting and grading in the world is done by hand, a process economically feasible in countries with low wages (coincidentally also where most ruby mines are located); but less practical in developed nations.

The development of optic sorting technology in recent years has had a significant impact on the feasibility of gemstone deposits. Optic sorting machines operate by passing ruby bearing material over a series of specialized cameras - these can detect the red colour of ruby and small jets of air are activated to push the ruby-bearing material

into a secure sorting bucket. The end result is two piles of material; one made up entirely of 'red and pink material' – mostly ruby and minor amounts of waste rock, and the other containing only waste rock. Optic sorters have advanced sufficiently in recent years to separate shades of pink and red from each other - allowing a rough stone sort to be completed entirely by mechanized processes; this speeds up the processing and allows it to be completed in a more 'hands-off' environment.

Once concentrated the material is passed into a hydrofluoric acid-wash stage. This uses an acid to remove any left-over waste-rock and matrix from the outside of the gemstones without harming the gems themselves. This step allows the light to enter the stone unobstructed, and thus makes the overall stone grading easier and more accurate.

The rough stone grading involves taking all the ruby material collected from a sample and cataloguing it by colour (dark red to light pink), size (+2.0, +4.0, and +6.0 mm), and transparency (gem = transparent, near-gem = translucent, and non-gem = opaque). Each category is then weighed and parcelled. Normally, only the 'gem' grade material is suitable for cutting into faceted stones, while the 'near-gem' can be used to produce cabochons (smooth, domed shaped pieces).

The gem grades give a relatively good picture of the quality and gemstone content within an individual showing. This provides the company with valuable gram per tonne grade estimates which can be used during 3D-resource modelling to predict the grade of various parts of the deposit – a key part of the overall mining process.

Gemstone Cutting

Gemstone cutting is the process of increasing a gemstones value by turning a rough gemstone into something more beautiful than the original. The most common and valuable way to cut a stone is to facet it; this puts a series of flat faces on a gemstone allowing light to reflect through the gemstone and back to the eye in a pleasing manner. It is only possible to cut transparent material this way, as less translucent or opaque material will not be able to reflect the light properly, making the gemstone appear dull and without sparkle. Instead, these near or non-gem products can be cut into cabochons, beads, carvings, or it can be sold as rough material. This can be done in several different ways; however, it is important to understand that not all gemstones can be cut economically, thus the rough material may carry greater value.

Good gemstone cutters spend years perfecting their trade and they become very good at evaluating a rough gemstone to determine the best way to maximize its cut value. For exceptional stones (those that are large and of extremely high quality) world class cutters are used to guarantee a beautiful, high valued finished product. During any normal gemstone mining process, the majority of the material produced is classified as near or non-gem – i.e. non-translucent. The 'gem' portion from a mine is historically quite small but of high-value. Finding methods to maximise the price of the near and non-gem material is important.

True North utilizes well established and respected cutting houses overseas to cut a large volume of material. The use of mechanized cutting machines allows large volumes to be processed at relatively low cost – however, the smaller melee sized goods and the larger high-value stones still require expensive hand-cutting.

There are several enhancement procedures that are commonplace on the ruby market today. These procedures usually improve the colour or clarity of a gemstone. Heat treatment is the most common, and occurs to >95% of

rubies on the world market today. Heating the crystals in a controlled environment can improve the colour of the stones, which can make the gemstone more valuable. This is an industry-wide accepted practice, and because so many stones are heat treated, most stones are assumed to be treated unless it is specifically stated otherwise. There are other less common treatments which have varying effects on value, but these are only ever a problem when the treatment is not properly disclosed before sale.

Because gem treatments are so pervasive in the world market, it is rare to find rubies that have not been treated at all. Consequently, the value for high quality, *untreated* stones is much higher than for stones identical in appearance that have been treated. The True North rubies and pink sapphires from Greenland already have desirable colours in their native state and do *not* need any heat treatment to improve their colour or value.

Some common terms that may arise when discussing gemstone cutting are:

- *Carat* -- a unit of weight used to measure finished gemstones equal to 0.2 grams (i.e. 5 carats per gram).
- *Yield* -- a percentage indicating how much gem material is retained between the original rough gem weight and the finished stone after cutting. Acceptable yields are often between 5-30%.
- *Calibration* -- the process of cutting multiple stones to the exact same specifications (size, placement of facets, proportions, weight etc.). Calibration is extremely important when setting gemstones in jewellery as having the stones all the same size makes the process go smoothly. In order to achieve strict calibration, yields tend to be lower, usually around 5%.

When gemstones are cut and returned to True North, they are organized by colour, size, shape, and quality. They are then available for photography, valuations, and jewellery production. Each batch of gemstones is carefully logged into our customized tracking system which is audited frequently by Regulators. True North require an exploitation (mining) licence before any Greenlandic gemstones can be sold. All of the Greenland gemstone material extracted from the numerous bulk samples and drilling remains in secure storage.