The New Mexico Facetor

Volume 16, No., 2 November - December, 1996

In This Issue

The Prez Sez

By Moss Aubrey, PhD.

Being a fairly active stone cutter results in having a surplus of gemstones. Some folks might consider that an oxymoron, that you simply cannot have too many gemstones. Many cutters feel quite content with building their own vast collections. We have seen articles written in this newsletter on how to systematically build a cut gemstone collection. I agree that building a collection is fun. However, I found that many of the stones I cut had no logical place in my collection. I suspect that my entrepreneurial interests lured me into other areas besides collecting stones from my faceting efforts.

Each facetor must personally decide where the balance point lies between pleasure and business in regard to reasons for faceting. Several people this year sought my advise and asked about my methods on selling cut gemstones. This compelled me to outline my thoughts collectively in an article concerning this very topic. In reviewing previous articles in the Guild newsletter about the economics of amateur faceting, I also re-read Betty Annis' earlier thoughts on possible methods of marketing your productions. I discussed the many accessible options with several other cutters who sell their own stones. My conclusion resulted in this personal view on how to market gemstones. However, if you ask others how to market gemstones, and I encourage you to do so, you may possibly receive ideas and explanations quite different from mine.

If you want to recoup some of your costs in this admittedly expensive hobby we share, then occasional sales adequately do just that. I find the notion of cutting stones and selling them as a sole means of livelihood quite frightening. Inexpensive stones cut by young workers (some are mere children) from third world countries, who earn pennies per stone, flood the gemstone market. We contend with these overseas cutters and regard them as our competition. Clearly, we must offer something different to capture a niche in such a highly competitive market.

My experience shows that people buy from you for a number of reasons. Perhaps, you offer stones of common materials cut in unusually large sizes. Perhaps, you display exceptional cutting patterns along with traditional faceting patterns, all cut and polished especially well. Many people prefer to deal with local individual artisans rather than chain store jewelers. However, these customers may only be interested in buying fairly standard items from you.

When I sold several diamond engagement rings in the past, I did little direct craftsmanship on those items. I helped the clients obtain a superior item compared to the merchandise offered from several retail jewelry stores. The clients left happy, and I generated more working capital for future "special projects." Other clients search for very unusual items, such as obscure gem materials to comprise the centerpoint in a unique piece of jewelry. Others seek carved gemstones that reflect a high level of artistic merit and technical skill. Most jewelry stores do not carry such specialized items in their inventory. If you work at that level, finding an excited customer is very rewarding.

Some of the selling avenues open to you are informal and do not require much preparation other than cutting stones that you no longer want to keep. Others constitute a formal business, and you should consider how complex that can easily become. You may need to obtain a business license for the city or county where you sell your items. This license generally entails some cost, perhaps $25 to $50 a year. You also must register and collect state gross receipt taxes, sometimes known as sales tax.

Most states, including New Mexico, require that any tax collected must accompany an official report forwarded to the state department of tax and revenue. If you sell items without collecting taxes, then you run the risk of paying the state for the back taxes plus any interest and penalties incurred. Keeping records and reporting your transactions as a small business makes your federal tax report a more complex issue, but not unduly so. If your gem cutting effort operates as a legitimate business, then you may deduct all of your gem rough and equipment costs, travel expenses to gem shows, professional journal subscriptions, Guild membership fees, gemstone reference books, business cards, and other related costs from your taxes. These expenses often contribute a substantial offset to any profits which otherwise would have been directly taxed.

As you increasingly become more involved in the process of selling your products, you will probably generate increasingly greater costs for such activities. In addition to the costs mentioned for running any business, you may need to purchase display materials. When participating in shows open to the public, consider it prudent to invest in display cases. Small portable cases cost anywhere from $75 on up, and you may need several. Other needs include lights (halogen is recommended for intensity), extension cords, table cloths, and, possibly, several folding tables. Other types of individual display items seen in most jewelry stores include pads, pedestals, ring displays, loose stone trays, and the like. If you forego such formalities, be aware that your display arrangement may suffer, as presentation is paramount. Costs for display cases and all the accessories are also tax deductible.

As you expand your sales to a potentially greater market, you may need to learn more technical skills and purchase more equipment. It is difficult to be successful and only sell loose stones, but some faceters do just that. When you offer to mount your stones, you increase your chances to make more sales. To achieve that, you need to become familiar with the available jewelry part supply houses and acquire the skills in many aspects of jewelry making.

To begin in a simple way, limit yourself to prefabricated settings and a pair of setting pliers. Eventually, your tool inventory will comprise the required array of implements, torches, and equipment. Consider taking classes in the more advanced jewelry techniques. Some people will obtain inherent satisfaction from learning these new skills, which is its own reward. I feel very pleased after a successful adventure in soldering, which I still find daunting. If you object to these added requirements, reconsider how competitively you want to act in this market.

There are other points to consider as your market base expands. When a customer is not satisfied and wants to return an item, are you willing to write off your efforts for the sake of customer satisfaction? You will be unable to return any metal finding you have already used. That places you in the situation of holding it for a while until you can find a new buyer. A particularly frightening scenario is if a customer returns an item, and you suspect that the stones have been damaged or even switched before the return. Do you have the technical training to verify that such is the case? What will you do if you give the refund prior to making such an appalling discovery?

This negative side does exist in selling to the public. Public shows allow the entry of many types of people, and shoplifting also becomes an added risk. As your sales increase, so does the chance of receiving bad checks. Another liability is robbery. Reports describe gem merchants being

robbed as they were leaving a gem show, before they set up their displays and after closing, and while they engaged in sales. Such events are, thankfully, rare. The greater your exposure to the public, the greater your risk of potential problems becomes. This has not been a major problem for me, but the potential is there. If you are engaged in selling your items for business, your personal homeowner's insurance may not cover such losses. I suggest you check your policy and discuss this with your agent.

Given all of these complications and potential drawbacks, you still want to venture into selling your gemstones. What can you do with those stones?

1. **Gifts to family and friends.** Guaranteed to result in gratitude and praise for what a marvelous person you are. Limited only by your talent and personal fortune.
2. **Gifts to charity.** Also a good way to be appreciated, but this one may be tax deductible. Ask if the charity is qualified under the IRS guidelines as a charitable organization. While you cannot deduct your time in creating any items intended for donation, you may be able to deduct from your personal or business tax claim, the 'fair market value' of your product. This is the price that could have been agreed upon between a buyer and seller, both of whom are knowledgeable about the value of the item, and neither of whom is under duress either to buy or sell. Remember, the Facetters Guild is a qualified organization, so please consider donating all those surplus stones toward expanding the Guild collection.
3. **Occasional direct sales.** This is probably how many of us got started on the path of selling our creations. Friends, friends of theirs, family members, co-workers, and the like are all potential customers. I cannot tell you when you will have reached the point of conducting a formal business versus occasional sales. I suggest you confer with an accountant if you are unsure.
4. **Advertising for direct sales.** One way of expanding your exposure to customers is by directly advertising yourself. This can be accomplished through local newspapers and through national publications, depending on what market you target. Personal appointments with local jewelers is another way to market your items. This is time consuming, requires that you are comfortable initiating a sales contact, and that you will not be devastated by rejection. Be prepared to sell at low wholesale prices to be competitive, unless your items are particularly exceptional.
5. **Expose yourself**. Another way to have people aware of your faceting expertise is to conduct **faceting demonstrations.** Many of the Guild members demonstrate for museum events, the State Fair, and during commercial gem and mineral shows. While direct selling may be prohibited by demonstrators, a facetor can make customer contacts for future sales. Another way for name recognition is to enter **jewelry competitions**, such as the ones sponsored by the New Mexico Jewelers' Association and the American Gem Trade Association (AGTA). Even if you do not win, your creations will be viewed by many people.
6. **Mail order sales** open another venue, and you can limit yourself to strictly doing business by mail-order. If you do not have the ability to accept credit cards, some distant customers may decline from making purchases. Local ones will probably be comfortable writing checks to you. However, consider your course of action if the check is returned by the bank, and the customer already holds your goods. If you mail your items, purchase sufficient insurance and enclose a 'complete description of the items. Keep a copy for your records. The Internet has potential for marketing, but what little I know about that is you will need a current generation computer, some start up money, and at least some modest computer skills. The ability to accept credit card charges is essential to making this viable.
7. **Craft shows, flea markets, "mercados", and the like.** Such shows are abundant. I see advertisements for shows throughout the year, with a flurry of activity in November and December. Consider the type of product you are selling. While there is an advantage to being the only person at a show selling jewelry, the people attending may have come for all those other vendors and have little or no interest in your booth. It is particularly discouraging to spend the entire day at a show and not make enough money to cover your booth fee. On the other hand, many craft shows are inexpensive, with fees ranging from $25 to $75 for a day or two. The amount of advertising the show promoters initiated varies widely. You should ask questions about advertising, how many years has the show been held, what the typical attendance is, and what types of items the other vendors sell. Shoplifting and bad checks constitute potential problems when dealing with the public, but have not been a major problem for me. You might ask someone to assist you in setting up, helping you during the show (particularly for items openly displayed), and at closing.
8. **Mall kiosk, regular or seasonal.** We've all seen those little booths set up in the indoor aisles of the malls. The cost for renting floor space varies, but it can be quite expensive. You may be able to rent a display booth,

or you may need to build your own. Drawbacks include that you need to be there regularly, or else hire someone to work for you. Shoplifting is a liability. Some malls may not allow sales that directly compete with the retail jewelers established there. This idea does not seem very appealing.

9. **Open a store.** Not very practical, unless you are prepared for a full-time commitment. You will need to investigate and invest in display equipment, office rental, special lighting, advertising, and possibly hiring staff. You need a large inventory to serve customers who are usually interested only in traditional jewelry items. Insurance for jewelry stores is very expensive, but the risk of a catastrophic loss is even more frightening. This explains the reasons why retail jewelry stores have such high prices.

10. **Wholesale.** You can try to sell directly to jewelers. Some will consider single stones, while others will want large quantities of calibrated stones. They may not want to pay a premium for your superior cutting. You will be competing with overseas cutters, so offer something unique. Refer back to the article on the economics of amateur faceting. Then consider whether you can compete and still make money at this.

11. **Consignment.** This is an excellent option. Someone else has the assumed responsibility of opening a store, and all you need to do is leave your items there for sale. This has the potential to be an agreeable arrangement for all concerned. The store owner will charge you a percentage of the selling price and give the remainder to you after the item has sold. You should expect to give 25% to 45% to the store owner, so set the selling price accordingly. You can deal with local merchants or with store owners across the country.

There are some points to be aware of before you leave your items with someone. What is their reputation in the jewelry community? How long has the store been in operation? Do they carry sufficient insurance to cover your items? I recommend that you get a receipt clearly describing your items, stating that they are left for consignment sale, indicating the agreed upon selling price and the percentage consignment fee, and stating that the store owner is responsible for any items not returned to you in their original condition.

There is legislation in New Mexico intended to protect the many consignment artists. Unfortunately, this law does not seem to apply to jewelry items, especially ones that are not signed by the artist. Don't be deterred, as most retailers are ethical. They labored long and hard to develop their professional reputations, and they work continually to maintain them. Several members of the Guild have experience in selling items on consignment, and I suggest that you ask their advice on this avenue for selling your stones.

11). **Trade shows.** Gem and jewelry shows can be very successful, but they also involve a lot of work. Shows vary from local level retail shows to the national "wholesale only" shows. You can even set up your own show (talk to members of AGATE about their experiences). You can also register as a vendor at a commercial show. Show organizers initiate the advertising, and you pay $200 to $500 for the booth space. Booth fees are also tax deductible.

It can sometimes be challenging to recuperate that much money and still declare a profit. You need display fixtures, as well as other overhead costs. You may participate as an itinerant (roving) vendor and try to sell to the merchants there. Sometimes that works, but the vendors usually offer low wholesale prices (or less). Be aware that some shows prohibit such activity and may confiscate your inventory until you pay their vendor fee. These larger shows seem to be feasible only if you are fairly serious about selling and have at least a modest inventory for display. You may join forces with another person if neither of you has sufficient inventory for such a show. You also might approach someone you know who sells regularly at such shows and ask them to sell some of your items. This would be similar to the consignment method mentioned above.

So, is all this effort worth the payoff? That is a very personal decision, based upon subjective data. I happen to like it. At the same time, I can afford to limit how much time I spend pursuing this. I conduct about two shows a year in cooperation with my valued colleagues. I find the support of my colleagues essential. Working alone, especially when venturing into unknown territory, demands much from you. Having a group of peers with whom to share ideas and experiences can certainly be part of the fun. The stones I cut throughout the year are divided between my personal collection, gifts, and items for sale. If you enjoy talking with people about your efforts, and showing off your finished products, then the admiration for your talents may be reward enough.

Despite the stress I experience in setting up for any show, once underway, I find myself enjoying the whole process. People may stop by to chat, having little intent to purchase anything. It still is fun to talk with someone who appreciates the beauty of gemstones and who compliments your creations. Sometimes that is enough for me.

Minutes of the NMFG Meeting

November 14, 1996

by Nancy L. Attaway

President **Moss Aubrey** called the meeting to order at 7:15 P.M. Several guests introduced themselves and were welcomed to the Guild meeting.

Treasurer's Report:

Treasurer **Bill Andrzejewski** reported:

Heading	*Total*
Previous Balance	$971.70
Expenses	$276.70
Deposits	$338.50
Balance Forwarded	$1033.50

Old Business:

Christmas party chairperson **Eileen Rossen** distributed Christmas party invitations to the Guild members attending the meeting. She plans to send out the remaining invitations by mail to the members who were not present. Eileen described the four enticing entrees offered for the dinner party selections. She encouraged Guild members to bring guests to the party. Eileen also reminded members to bring gifts for the after dinner raffle. A four hour time slot for eating and socializing has been reserved for us. Thank you, Eileen.

Mark Guerin, jeweler and president of the New Mexico Jewelers Association, reported that the "All That Glitters" jewelry competition, sponsored by the NMJA and the New Mexico Museum of Natural History, netted $5,000.00 for the museum. The New Mexico Museum of Natural History, where our meetings are held, displayed all of the beautiful jewelry items entered into the competition. Mark mentioned that the NMJA was considering a possible faceting competition in conjunction with next year's jewelry competition. He asked for recommendations on faceting criteria for judging such a contest.

New Business:

President **Moss Aubrey** complimented the new editors of the Guild newsletter on the new format and the addition of current news articles relating to gems. He mentioned also that **Merrill O. Murphy**'s article that described rules for writing newsletter articles was very informative. Moss then referred to the latest issue of "Gems and Gemology", which featured an article on lab grown diamonds. He asked **Karen Fitzpatrick**, gemologist for Shelton' Jewelers, her appraisal of any problems associated with these diamonds. Karen stated that equipment for detecting lab grown diamonds from natural diamonds still showed room for improvement. She mentioned some production and financial problems that Chatham admitted to in regard to their lab grown diamond business shared with a Russian company.

Heidi Ruffner announced that the gem and jewelry show sponsored by the Albuquerque Gem Artisans Trade Expo. (AGATE) was scheduled for November 23 and 24. She extended an open invitation to all Guild members and their guests to attend the show.

Heidi also asked if the Guild would entertain the donation of a cash prize award for the Albuquerque Public School Science Fair in February 1997. The cash award would be given to that individual who excelled in a project relating to faceting, minerals, or jewelry making. This topic will be considered by the new board. Heidi volunteered to write a proposed award criteria and submit it for the board's approval.

Guild Vice-President (of programs) **Susan Wilson**, is also the custodian of the Guild Library. She brought several books from the library collection and encouraged Guild members to check out the many excellent and informative publications available. Susan gathered all of the information from the library collection and placed it in a computer data base file. Contact Susan for further library requests and information.

Guild Vice-President (of workshops) **Louie Natonek** recently attended the annual faceting symposium sponsored by the Texas Faceters Guild. He reported on the presentations given by Jim Rolands, Robert Strickland, and Glenn Vargas. Jim Roland discussed his methods of polishing with 100,000 grit diamond for competition faceting, where meets are painstakingly polished into alignment with the aid of a binocular microscope. Robert Strickland introduced his concept of retro-reflector facets, where light bounces between several points in a pavilion design before it returns through the table. Glenn Vargas presented his ideas on polishing with a new green chrome oxide lap, good for most gemstones except topaz and corundum.

Show And Tell:

The Show and Tell Case displayed some unusual gem materials. **Susan Wilson** faceted several pieces of the Oregon sunstone gem rough she purchased during her trip in August. These included a beautiful emerald cut peach colored sunstone that showed the famous copper schiller, and a lovely intense red sunstone round brilliant

cut. Susan used an ultra lap sheet to polish her sunstones. Susan also brought a faceted cushion cut square lavender amethyst and a round brilliant cut lemon citrine.

Will Moats faceted three round stones in the nine main variation cut. These included two golden beryls and an umbalite garnet, a pyrope/almandine end member. Will polished all three stones on a last lap with 50,000 grit diamond.

Elaine Weisman carved an opal freeform showing lots of red pinfire. Elaine explained how the form evolved as she removed the unwanted opal material. The opal showed a very nice polish.

Nancy Attaway brought five large faceted ametrines, all ready for Steve to carve. These included a variation on the barion square, two kite shape tablets, a larger kite shape with a deeper pavilion, and a half circle tablet slated for a crescent moon shape. The two tablets, the large kite, and the square all have flat culet areas for carving. The crescent moon tablet will emerge crescent shape when Steve uses a round diamond tool to grind into the half circle and polish the inside curve.

Refreshments were provided by **Sally Bolle, Heidi Ruffner,** and **Susan Wilson**. Thank you all for such delicious treats. **Eileen Rossen** and **Elaine Weisman** volunteered to bring the refreshments for the January meeting.

Future Programs

Susan Wilson announced that she scheduled Guild mineralogist **Paul Hlava** for a January 1997 presentation of his trip to the Republic of South Africa. Paul visited gold and diamond mines in South Africa, and photographed the diverse wildlife. Susan will reschedule Paul in 1997 for a talk on gemstone phenomenon. Paul uses an electron microprobe analysis machine at Sandia National Laboratories and will bring slides showing some very interesting inclusions. Susan mentioned a possible presentation on crystal growing by Ralph Dawson of Sandia National Laboratories for March or May of 1997. **Herb and Maria Traulsen** may also consent to provide the Guild with a slide show in 1997 on their autumn 1996 expedition to Australia and New Zealand.

Program/speaker:

Turquoise dealer **Gary Werner** presented a lively discourse on the many grades of turquoise. A turquoise miner for twenty-five years, Gary holds a patent for a particular method of turquoise stabilization. With Gary's permission, we included his articles regarding turquoise nomenclature and explanations of treatment in this newsletter. Other articles related to turquoise also appear in this issue.

The meeting adjourned at 9:50 pm, with the usual extended discussion in the parking lot.

In The News:

Thailand's Ruby Woes

From: Modern Jeweler October 1996

The Mong Hsu region in Burma replaced Thailand this year as the main supplier of ruby. Greatly reduced production from Thailand's Kanchantaburi mining district forced Chantaburi cutting factories in Thailand to work with the current abundant supply of sapphires from Australia. Reports state that only three mines out of the previous eighteen currently operate in the Kanchantaburi region. Thailand presently produces only a very small amount of ruby rough. Possible sources for sapphire exist in China and also in Nigeria. The Tunduru region in Tanzania produced some small, but very fine blue sapphires this year.

Mining Sapphires in Madagascar

From: Earth December 1996

Reports from Madagascar describe sapphire mining there as chaotic. Because miners disregard existing mining laws, complete anarchy rules over the mines.

Miners select land with limestone outcrops for potential mining sites. The miner digs a hole in the limestone and burns wood in the pit to crack the limestone. Iron bars pry the sapphires from limestone blocks.

Any organized mining venture there requires at least $2 million per site. The president of Madagascar was recently impeached, prompting questions in regard to the stability of the government. The mines of Madagascar produce small, but very fine blue sapphires.

Akoya Pearl Alert

From: Colored Stone November/ December 1996

Gemologist Antoinette Matlins warned the jewelry trade of low-quality cultured pearls currently misrepresented in the market as fine. She realized the scope of the problem during her research in writing "The Pearl Book". Her recent four-month investigation of retail jewelers on the East Coast uncovered a saturation in the market with inferior quality Akoya pearls. Her inquiry revealed the presence of expensive, large Chinese and

Japanese Akoya pearls having a very thin coating of nacre. In some cases, she observed nacre so thin that the pearls showed peeling.

A high quality pearl requires development inside an oyster from three to six years. In order to reduce costs, Japan harvests their pearls under one year. Without a long cultivation period, a pearl cannot develop the thick nacre and the intense luster necessary to last. After a very short cultivation period of less than six months, the Chinese tumble their pearls in drums with bamboo chips and beeswax. The resulting lustrous glow is only temporary. Another common method of pearl treatment is chemical bleaching. Akoya pearls are very labor intensive, reason enough for the high prices they command. The Japanese are leaving the low-end market to the Chinese who have an abundant supply of workers. Antoinette hopefully predicts quality to improve in future pearl harvests.

Glass Filling of Burmese Rubies

From Colored Stone November/ December 1996

Reports state that most of the rubies from Burma's Mong Hsu region are heat-treated to change the blue to red and also to remove any silk. However, recent information from gem labs revealed that the Mong Hsu rubies weighing one carat and over were glass filled. Ruby dealers lost money from returns of ruby sales this year due to the practice of glass filling in surface cavities and fractures. Gemologists believe that ruby traders performed the infilling deliberately. Ruby traders claim that the glass filling is a direct result from the common practice of adding borax during heat treatment. Borax is added to neutralize the atmosphere created by igniting fossil fuels during the burning process.

More Data on the 167 Pound Emerald

From Colored Stone November/ December 1996

The 167 pound emerald crystal cluster discovered in Madagascar measured 25 inches by 18 inches by 9 inches. Gemologists counted over 100 individual crystals, with some crystals measuring over 7 inches in length.

I.R.S. Warning to Foreign Vendors

From Colored Stone November/ December 1996

Any non U.S. citizen planning to sell merchandise at the next February Tucson Gem and Mineral Show will answer to agents of the Internal Revenue Service. The agents require all international vendors to pay their taxes on goods sold before leaving the United States.

Salting With Synthetic Amethyst

From Colored Stone November/ December 1996

The unethical practice of salting parcels of natural amethyst with synthetic amethyst is now driving down the price of natural amethyst. The widespread presence of synthetic amethyst shows signs of impacting the prices of high quality natural amethyst. Retailers discover so much synthetic material salted into parcels of natural amethyst, that the consequence reduces the price of the gem overall. This problem especially affects natural amethyst in sizes less that five carats. A major identifying feature of synthetic amethyst is the presence of small “bread crumb” inclusions.

Thailand's Jewelry Industry

From The Economist October 26, 1996

In 1995, Thailand's jewelry and gemstone exports ran second only to Italy's in the world market. However, many problems currently plague the gem industry in Thailand. Reduced gem rough production from the ruby mines caused the remaining supply to increase in price. Rising wages and business costs compelled manufacturers to search for cheaper labor and gem rough supplies in newly developing Asian and African countries. Increased competition for improved quality in faceting and jewelry design forced manufacturers to invest in expensive machinery and skilled labor. For Thailand to maintain a strong presence in the world market, manufacturers there must invest more money in modern technology for its workers to produce higher quality items.

Power Struggles in the Gem Fields of Myanmar and Cambodia

From The Economist October 26, 1996

Other political changes affected the gem trade in Cambodia and in Myanmar (formerly Burma). The Khmers Rouge ruled Cambodia's best gem producing deposits for years until a recent power struggle surfaced. In Myanmar, the ruling warlord and heroin boss fought the current government for control of the gem trade. The new mining and cutting industry in Tanzania and in Madagascar looks enticing because of the abundant supplies of gem rough, cheap labor, and casual politics.

Red Beryl, Again

From National Jeweler November 1, 1996

The World Wide Gem Marketing Company now offers for sale a lab-created red beryl, selling the stones as "red emeralds". The cut red beryl range in size from ten points to five carats. Prices vary from $90 per carat to $250 per carat. World Wide Gem Marketing Company uses a hydrothermal process to manufacture the gems. AGTA expects World Wide Marketing Company to clearly explain to customers and to conspicuously display their ads that the "red emerald" name is a trade name only for red beryl.

Auction of Argyle Pinks

From National Jeweler November 1, 1996

Bidders from Tokyo, Hong Kong, Perth, London, and Geneva purchased the entire 47.82 carat lot of pink Argyle cut diamonds, 47 stones total. The average price paid per carat was listed as $100,000.

More Colorado Diamonds

From National Jeweler November 1, 1996

In addition to the purchase of the 28.3 carat yellow diamond from the new mine in Colorado, William Goldberg, Inc. of New York and Hyde Park Jewelers of Denver also purchased a parcel of Colorado diamonds weighing 2,000 carats. The partnership wishes to market the diamonds as either "Colorado diamonds" or "U.S. diamonds". They hope that the diamonds will remain in the United States. The yield expected for the now famous 28.3 carat yellow diamond should weigh in at approximately ten carats when cut and polished.

Scheming With Russia's Diamonds

From The Economist November 9, 1996

Russia formed an "emergency commission" for tax collection to investigate the state-owned Almazy Rossii-Sakha. The commission demands a complete report on the business dealings between Almazy Rossii-Sakha and DeBeers. Almazy Rossii-Sakha currently operates a near monopoly of the diamond production in Russia. The commission wants an explanation of how Almazy Rossii-Sakha declared $570 million in debts and failed to pay dividends to investors when the company showed $1.4 billion in sales last year. The latest negotiations between Almazy Rossii-Sakha and DeBeers are now compromised because of this investigation.

Rough Diamond Prospects

From National Jeweler 10/16/96

The latest report from "Metals and Minerals Review" stated that rough diamond production totaled 107.3 million carats for 1995. Australia led the list with 40.8 million carats, followed by Zaire with 20 million carats, Botswana with 16.8 million carats, Russia with 12.5 million carats, and South Africa with 9.1 million carats. The report stated that DeBeers explored sites in Africa, Canada, Brazil, Europe, and the Far East for possible diamond deposits. DeBeers recently signed a letter of intent to scout for diamonds in China. The report also determined that most of the diamond rough from Zaire left the country in the pockets of smugglers. Political unrest still hinders diamond production in Angola, while smuggling remains a problem in Sierra Leone as well as in Angola. The first diamond mine in the Northwest Territories of Canada expects production to commence sometime in 1997.

The number 107.3 million carats equals 20.8 tons, a tremendous sum of gem rough. This yearly total dwarfs the amount of gem rough yielded for rubies, sapphires, emeralds, tanzanite, tourmaline, and other colored stones. Questions arise as to the continued increase in prices of diamonds, especially when so much diamond rough exists

New Mexico's Kilbourne Hole.

From Lapidary Journal December 1996

Robert Beard wrote a feature article on mineral collecting in Kilbourne Hole, located in southern New Mexico near El Paso, Texas, just above the Mexican border. He describes Kilbourne Hole as a maar or crater formed by a shallow volcanic eruption. Kilbourne Hole represents a special geologic site where the crustal plate met the oceanic plate and pushed the peridotite from the mantle to the surface. The olivine, pyroxene, and magnetite found there originated under great temperatures and pressure inside the mantle. Kilbourne Hole still yields gem quality olivine, known as peridot, for those lucky enough to find the gem-bearing nodules from the cliffs and in the sands. Seasoned collectors recommend visiting Kilbourne Hole during cool, dry weather. Bring lots of water and keep the gas tank filled.

Four years ago, Scott and Susan Wilson found a marble size piece of facet grade peridot in the basalt cliffs there. Unfortunately, our experience at Kilbourne Hole cost us a new planetary gear for the suburban. The two ham radio operators from El Paso, who we contacted with our ham radio, towed us to El Paso for repairs. (That's another entire saga.)

Lights Out for Russian Synthetic Diamonds

from National Jeweler 12/1/96

Tom Chatham announced earlier in the year that he planned to fulfill Christmas orders for his Russian synthetic white diamonds. Electrical power problems plagued his Russian manufacturers and stalled any release of production. As a result of this delay, Tom cancelled his scheduled synthetic diamond output. He is working toward moving the manufacturing facilities out of Russia to a place with a reliable power source.

Turquoise: Marketing the Gem of the Southwest

Ancient Americans incorporated the sky-blue gem known as turquoise in designs for jewelry, pottery, and other personal adornment. Turquoise still remains popular now as it was then. Guest speaker, Gary Werner addressed the Guild about the problems in today's turquoise market. He related the story of how the turquoise business in France evolved into a multi-million dollar enterprise in the 1970's.

In the early 1980's, some unscrupulous dealers infiltrated France's turquoise market with polymer-based ground turquoise and plastic imitation turquoise. These were labeled as genuine turquoise. Consumers and vendors complained to the government and demanded an inquiry. The French government closed all customs borders to turquoise until a turquoise standard was established. The inquiry results demanded that all turquoise products contain a 50% minimum of turquoise.

In response to the overseas market problems, Gary Werner worked with Bob North at Socorro's Bureau of Mines and developed testing methods for turquoise. Their methods included: 1)carbon/hydrogen level analysis to detect polymer compounds, and 2)X-ray diffraction analysis to mark the peaks of the fingerprints that identified the mineral contents. Test conclusions formed a set of determining factors found in the many processes used in treatments for turquoise.

Turquoise is a hydrous aluminum phosphate found in alumina-rich rocks of desert regions. Some stabilization processes combine turquoise with wax or epoxy to keep turquoise from crumbling when worked. Dyes also enhance the color. Some methods of turquoise treatments are temporary while others are permanent. Turquoise is sometimes tumble-polished in vats of crushed walnut shell with oil to enhance the color. The electro-fluorination method hardens turquoise by introducing silicates.

Gary Werner believes in total disclosure of all methods involving turquoise treatments. He stresses the importance of disclosure to his consumers. The turquoise market confuses consumers with unclear product treatments. As a result of this confusion, consumers tend to purchase turquoise trinkets and shun major pieces, whether built around natural or alterations of genuine turquoise. Gary thinks that product education promotes honesty and integrity. It also gives consumers the ability to choose quality merchandise with confidence

Turquoise: Imitation, Adulteration, or Natural

by Gary Werner

(reprinted from the proceedings of the Twelfth Annual New Mexico Mineral Symposium dated November 9th and 10th, 1991)

What turquoise is seems to be a matter of perception rather than fact. Turquoise, to a geologist, is a hydrous cupric aluminum phosphate, $CuAl_6(PO_4)_4(OH)_8\text{-}5H_2O$, with additional trace constituents of iron and silica. Turquoise, to a consumer, is a traditional semiprecious stone having a strong blue color. Turquoise is desired to be hard enough to polish and not crumble, dense enough to not absorb skin oils when worn, and plentiful enough to be available at affordable prices.

Unfortunately, turquoise will never meet all of these criteria. Many forms of imitation and adulteration have been used to capitalize on an insatiable demand for this misunderstood gem. So, to an opportunist, turquoise is an abundant commercial material of acceptable blue color and natural-appearing matrix. It needs be capable of retaining these qualities for the few months required for marketing. Price should be negligible and would increase only if an observable, but unverifiable, quantity of genuine turquoise is incorporated in the material. More valuable, in increasing order, are: 1) materials that will pass routine quantitative analysis, 2) genuine stone temporarily doctored with oils and sealer, 3) permanently doctored polymerizations and silications, and 4) most expensive and least available, the unadulterated natural stone.

The New Mexico State Legislature wished to protect the public from opportunists, but still wanted to allow producers of altered or imitation stone to enter their legitimate place in the market. In their attempt at this compromise. the New Mexico State Legislature passed the Indian Arts and Crafts Acts of 1973, revised 1978 (sections 30-33-3 through 30-33-8). Although the lawmakers' understanding of the technical aspects of the problems might have been limited or even erroneous, their intent, I believe, was apparent.

Subclass K reads: "unnatural turquoise" means any substance which is not natural turquoise, including:

(1) **"stabilized turquoise"** which means turquoise which has been chemically hardened but not adulterated so as to change the color of the natural mineral;

(2) **"treated turquoise"** which means turquoise which has been altered to produce a change in the coloration of the natural mineral;

(3) **"reconstituted turquoise"** which means dust and turquoise particles which are mixed with plastic resins and are compressed into a solid form so as to resemble natural turquoise;

(4) **"imitation turquoise"** which means any compound or mineral which is manufactured or treated so as to closely approximate turquoise in appearance.

All terms in this discussion that appear in quotes refer to these legal descriptions.

In 1985, Bob North, Mineralogist for the New Mexico Bureau of Mines and Mineral Resources, and I collaborated to establish laboratory procedures for fractionating turquoise specimens in accordance with the Indian Arts and Crafts Act. The logic we used in testing a specimen hinged on my theory that color and hardness depended on complete hydration, because turquoise is a hydrated phosphate. The insufficiently hydrated forms of turquoise known as chalk are more abundant and less expensive than high-grade natural. Processes to regain hardness and color were what we needed to target when testing genuine turquoise for adulteration.

In practice, a piece of chalk will return to its fully hydrated color when saturated, not only with water but also with oils, waxes, and most other polymers. Polymerization or color stabilizing (trade jargon coined, I believe, by the L.W. Hardy Company of Kingman, Arizona). is a laboratory procedure incorporating clear catalyzed resins that harden and permanently seal turquoise in the rough. I believe this process is recognized as **"(1) stabilized".** A specimen containing organic compounds would definitely be unnatural, but may lack the permanence and hardness of stabilization. For more insight, a carbon-hydrogen analysis was run on our fifteen samples, and the results are presented at the end of this article. Several processes are identifiable by their carbon content.

Fracture-sealed turquoise is, unfortunately, not addressed specifically by the Indian Arts and Crafts Act. It is sold, more often than not, as natural. In reality, it is a poor man's stabilization of cut or finished stones. Unlike fracture-sealed vitreous gems, porous turquoise assumes the treatment generally and will gain rehydrated color levels. These in-shop formulations are usually adhesives or lacquers that harden once the carrier solvents evaporate. The compounds tend to be ultraviolet sensitive and degrade with time. Our carbon analysis of fracture-sealed stones indicated carbon content much less than stabilized samples and about twice that of oiled samples.

In (2) **treated turquoise**, fully hydrated color levels can be exceeded, and slightly off-blue tints can be corrected with the use of dyes. These processes are usually used in conjunction with polymerization. They are quite difficult to detect because of the fixing qualities of the polymer. Visual examination for indications of dissimilar concentrations, such as dye lines, spots, and a good eye for unnatural shades, proved the most effective tests. Microscopic inspection of an oil infusion of a pulverized sample netted conclusive results in some instances.

In the case of a fairly new secret process, known as natural enhanced, dyes were not analyzed, because the normally corresponding organic additives were absent. The sample was erroneously classed as natural. In discussions with the owner of the formula, it was divulged that an electrical process on hard chalks was used.

I then tried oxalic acid to bleach dye stuffs on the assumption that copper phosphate or a similar mineral tint was either: (a) electrowinned into the crystalline lattice of the stone, or (b) valence bonded to sodium silicate. Silica occurs naturally in turquoise. Here, the turquoise was hardened by an electrical field, rather than with electrolytes. The results were positive with a bleached spot at the acid contact. Conclusive, similar tests on natural and stabilized specimens were negative.

Carbon content places the natural-enhanced process lower than the fracture-sealed process, but not notably higher than unaltered stones with wax or oil-based polishes. These polishes are used extensively and impart a slight color gain on only the most absorbent pieces of natural turquoise. In contrast, saturating the stone with oils and waxes

yields strong color gain, but imparts neither hardness nor color permanence.

(3) **Reconstituted turquoise** has evolved into two major types. The first is naturally occurring nuggets of chalk compressed and then bound by stabilizing polymers. The value of this material is based on availability of a genuine-turquoise base component. The second type is reconstructed powders.

Even with the use of dyes, stabilized turquoise powder becomes an unappealing gray. A pure, white mineral filler, aluminum hydroxide {Al(OH)3}, must be used in substantial proportions before a dyeable mix is attained. This compounded substance will be passed as turquoise by most assay labs. The content of filler can be as much as 100%, as in the case of the German imports sold as synthetic or genuine reconstructed.

In our procedure, X-ray diffraction was run first to quickly detect most imitations. If a sample contained aluminum hydroxide, it was classed as imitation, and no more tests were run.

(4) **Imitation** products frequently can be detected by visual examination, circumventing the need for further analysis. In the absence of readily available detection procedures, imitation has been lucrative and still spawns new formulations, as confirmed by Dr. Cornelis Klein of the University of New Mexico. Dr. Klein received a specimen of turquoise from Germany that had a beautiful lustrous, deep Persian color and gemmy homogenous grain. On analysis, it was a carbon-calcium nitrogen compound with minor amounts of phosphoric, titanium, and aluminum oxides.

Back in 1985, our intent was to implement the enforcement of a much needed law. Today, my hopes are that the State of New Mexico will fund continuing research in an effort to discourage fraudulent marketing. Informed and educated consumers help this effort by becoming more aware of what is being sold.

Gary Werner in Tucson.

TABLE 1. Definition of Names and Legal Terms for Turquoise

Description Slang/trade	*Description Common*	*x-ray test*	*carbon test*	*other test*	*Description legal*
natural	unadulterated	clean	0-0.15%	Negative to oxalic acid, visual exam for synthetics	natural
sealed natural	lacquered low grade & lacquered high grade	clean clean	0.45% 0.45%	Visual exam for surface puddling or coarse undissolved pigments	stabilized treated
fracture sealed	polymerized fractures	clean	Insufficient data for carbon; suspected 0.25-0.50%		stabilized
natural enhanced	mineral dying with or without silica or lacquer seal	clean	0-0.50%	Positive to oxalic acid on unsealed stone	treated
color stabilized	catalyzed polymerization of chalk and low grade turquoise	clean	2.5-20% High carbon values indicate complete penetration by complex organic compounds.		stabilized
silicated	hardened with glass. This process is seldom used without dye because almost no color gain is realized	clean	0-0.15%	No conclusive tests at this time	stabilized
color shot	dyed and polymerized; usually epoxy type	clean	2.5-20%	Visual exam for surface puddling, internal concentration lines and spots, and epoxy craze lines	treated
waxed or oiled	paraffin-boiled low grade hard turquoise	clean	0.27%	Extra deep colors may be seen along faults and fractures. This process is unstable, and oils will migrate into deeply discolored areas of concentration, leaving other areas almost colorless.	treated??? no hardening as in stabilizing; color gain is the only motive here.

TABLE 1. Definition of Names and Legal Terms for Turquoise

Description Slang/trade	*Description Common*	*x-ray test*	*carbon test*	*other test*	*Description legal*
oil base polishes	A commonly used process of polishing with oil-based or wax-based polishes. There is minimal color gain realized for medium grade or better.	clean	0.15-0.22%	Visuals are comparable to paraffined, but are less obvious	natural??? A judicial determination is needed here.
enhanced matrix	Black dyed is applied to the exterior to cover the chalky matrix and create the "Sea Foam" effect.	clean	Dyed black matrix typically comprises 0.05% of the carbon values in any specimen.	visual determination	treated??? A judicial determination is needed here.
compressed block	Compressed turquoise nuggets are bound by polymerization, with or without dye.	clean	2.5-20%	visual determination	reconstructed
"recon" reconstructed or "block"	Imitations are spun off "German block" formulations containing aluminum hydroxide{Al(OH)3} that have degraded to simply dyed plastics.	Contamination with Al(OH)3 or no crystalline forms perceptible under X-ray. The original German formula had no binders.	Carbon may run well in excess of 20%. Some samples combust upon ignition.		imitation
imitation	Anything that looks like turquoise, but is not.	non-turquoise X-ray	carbon irrelevant		imitation
treated	A catch-all phrase that no longer indicates any particular process; an irrelevant term, except for legal descriptions.				

Turquoise Purchasing Policy

By Gary Werner

Gary Werner uses the following headings and text to describe the types of turquoise available in the market.

Copyright, 1996 Gary Werner

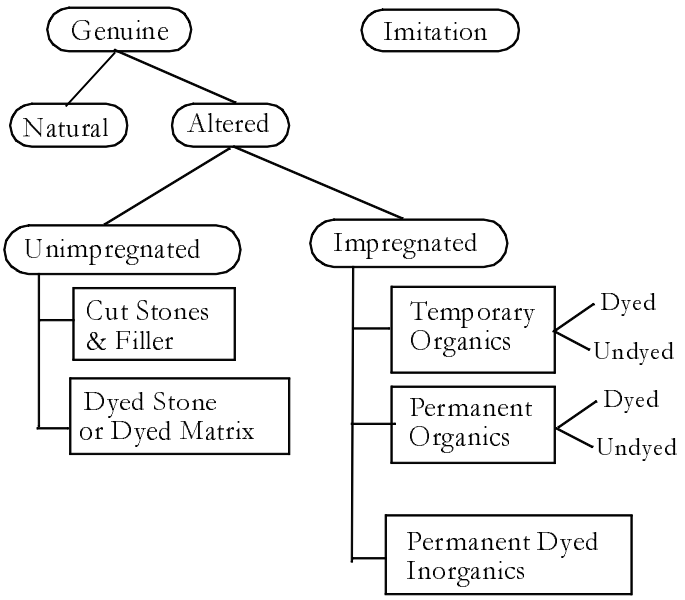
Dear Vendor:

Please be advised that our company has adopted the following purchase policy with regard to quality determination of turquoise and disclosure of same. Please keep this on file for future reference.

Your invoices should describe the turquoise being sold with one of the following terms: ***Natural, Imitation, Temporarily Altered,*** or ***Permanently Altered,*** preceded by ***Dyed*** or ***Filled***, if applicable.

The following examples, chart, and definitions are for your further understanding.

For example, the process commonly known as *Fracture Sealed*, if no dyes are used, would be described as ***Temporarily Altered Turquoise***. The process known as *Natural Enhanced* would be described as ***Dyed, Permanently Altered Turquoise***



- **Altered:** Any stone which has been processed in such a way that it improves, directly or indirectly, the appearance, durability, or availability of the stone.
- **Dyed:** The introduction of coloring materials into the stone to give a new color, intensify present color, or improve color uniformity. Lacquering and inking are commonly used to improve or create special effects, such as imitation matrix patterns. Hence, matrix dyed natural stone would be considered altered.
- **Filled:** The filling of surface breaking cavities or fractures with foreign substances to improve appearance. Usually an obtrusive imitation of matrix.
- **Genuine:** That which is what it appears to be. Real.
- **Imitation:** Any material used so as to imitate genuine stone.
- **Inorganic Impregnation:** The general introduction or infusion of any foreign inorganic substance. Hardens but does not rehydrate color levels. Generally used in conjunction with mineral dyes. Typically referred to as natural enhanced.
- **Natural:** Unaltered and exclusive of any backing material.
- **Organic Impregnation:** The general introduction or infusion of any foreign organic substance.
- **Permanently Improved Organic Impregnations:** An organic impregnation of stable nature which lends itself to heirloom quality. Catalyzed polymers applied under laboratory conditions produce hardening as well as rehydrated color levels. Typically referred to as color stabilized.
- **Temporarily Improved Organic Impregnations:** An unstable organic impregnation which should be shunned in ethical trade. Includes:(1) oils and oil- based polishes used in tumble finishes; (2) waxes, including wax-based polishes such as "Zam" and "Bruce Bar"; (3) procedures known as fracture sealing that use solvent-based uncatalyzed polymers, such as lacquers, shellacs, urethanes, and numerous adhesives.

The Historical Significance of Turquoise

By Nancy L. Attaway

Turquoise brought together many diverse cultures that shared a passion for the sky blue stone. Mined from many locales, turquoise affected trade and culture. Persian merchants first introduced turquoise to the trade in Western Europe from their travels through Turkey. A French interpretation developed a name for this "Turkish stone" that evolved into the word "turquoise". The Moors of Spain obtained the popular blue stone from the mines in North Africa. The Spanish called the stone "turquesa".

Turquoise held a special place in the many cultures of North, Central, and South America. The stone forged alliances and established relationships between the many and diverse groups. The mines in North America extended from the desert regions of California to Colorado, including Arizona and New Mexico. The turquoise mines in New Mexico attained a particular historical importance.

The most extensive prehistoric mining venture in America occurred in the hills near Cerrillos, New Mexico. Working with stone axes, mauls, picks, and chisels, turquoise miners dug many tunnels in the hills. Miners carried out tons of overburden in leather buckets to reach the turquoise. Wood hauled to the mine sites fueled the fires for heating the rocks. Buckets of water, also transported on the shoulders of the workers, quenched the heated rocks to break up the chunks.

Pre-Columbian Mesoamerican society fueled a great demand for turquoise. The stone evolved into a prestigious symbol equated with life itself. Words of wisdom compared precious turquoise to individual worth, representing it as important as water. Turquoise commanded a powerful place in religious ceremonies and social functions.

A highly structured and formal trade system for turquoise developed between the cultural regions of Southwestern America and the cultural centers of Central and South America. Turquoise provided the means for contact between the various societies in these cultural regions, who considered turquoise an extremely important trade item. The channels of communication opened by this trade encouraged intercultural exchanges between the many different societies. The religious meaning of turquoise spread among these societies, who adopted this belief into their own cultures.

Turquoise preserves well and lends itself to archaeological dating. Archaeologists recovered more than a million pieces of turquoise throughout Southwestern America and Mesoamerica for study. Chemical analysis allows investigators to discover whether one turquoise specimen relates to another. This applies to items found at locations separated by great distances, as well as for items that represent different time periods or cultural periods.

Two scientists proved that turquoise mined from one region was identical to the turquoise used in another region. Dr. Garman Harbottle and Dr. Phil C. Weigand studied the artifactual use of turquoise for over twenty years. Combining nuclear science with archaeological disciplines, they applied a fingerprinting technique to turquoise known as neutron-activation analysis. Used on pottery and other archaeological artifacts, this method is nondestructive.

To implement the neutron-activation analysis, a beam of neutrons hits a turquoise sample in a nuclear reactor to create the many isotopes of the trace elements found in turquoise. Each chemical element in the stone becomes radioactive and emits its characteristic gamma rays. Certain definite quantities of these elements identify turquoise from specific mines. Compositional patterns or profiles of these quantities indicate a common origin. Dr. Harbottle and Dr. Weigand published their extensive research and conclusions in the February 1992 Issue of Scientific American.

Much of the turquoise used originated from the mines near Cerrillos. Well documented trade routes existed to the south, and turquoise from Cerrillos traveled south to Mexico and South America. Archaeological sites in Central and South America yielded turquoise identified from the mines near Cerrillos.

Chaco Canyon contained many of the most substantial archaeological finds of turquoise ever produced. The trading hub at Chaco Canyon seemed to control the distribution of turquoise much like DeBeers controls the diamond distribution. Dr. David Snow of the Museum of New Mexico deduced how turquoise became concentrated at Chaco Canyon. Neutron-activation analysis revealed a direct link between the turquoise trade at Chaco Canyon and turquoise excavated from other sites in Southwestern America. Turquoise in artifacts from sites in Mexico matched the turquoise from Chaco Canyon, mined in Cerrillos.

What people regarded as turquoise treasures then remains treasured today. Modern artisans combine turquoise with gold, silver, coral, opal, and many different colored gemstones to create an updated appreciation for the ever popular sky blue gem. Holding a tur-

quoise nugget in the palm of the hand feels like clasping a piece of ancient American history. Whether worn for protection, enlightenment, or beauty, turquoise continues to be a cherished gemstone today.

Further reading recommended: "Turquoise in Pre-Columbian America" from the February 1992 Issue of Scientific American; "Roots of the Turquoise Trade" from the June 1996 Issue of Lapidary Journal; and the special feature spread on turquoise from the February 1995 Issue of New Mexico Magazine.

Gem Show Report

by Nancy L. Attaway

Several New Mexico Facetor Guild members participated in the recent two day Albuquerque Gem Artisans Trade Expo (AGATE) Show. AGATE is an organization of local artisans and integrates guest artisans for participation in their yearly show. Well over four hundred shoppers viewed the gem and jewelry work of Heidi Ruffner, Paul Hlava, Moss and Lauren Aubrey, Steve and Nancy Attaway, Tony and Edna Anthony, Bruce and Sally Bolle, Bill Andrzejewski, Will Moats, and Elaine Weisman. The UNM Continuing Education Center allowed more display room for the expanded group of artisans. Show attendees included Harvey and Ruby Lawler, Louie Natonek, Eileen Rossen and Troy, Scott and Susan Wilson, and Ed Cavanos. (Rumor has it that the Tucson Show began like this in someone's barn.)

Let's Talk Gemstones:

Kyanite

By Edna B. Anthony, Gemologist

My previous article initiated a series on polymorphic aluminum silicate gemstones, beginning with andalusite, following with kyanite (disthene) and ending with sillimanite (fibrolite). Andalusite, kyanite, and sillimanite all contain identical amounts of aluminum, silicon, and oxygen, combined with other trace elements. I find it intriguing to note the differences in how the chemical formulas for these three minerals are expressed by many well-known authorities on gemstones. That list includes: Joel Arem, Jaroslav Bauer, Max Bauer, Basil Booth, Vladimir Bouska, J.D. Dana, Malcolm Heuser, Cornelius S. Hurlbut, Jr., Cornelis Klein, J. Kourimsky, Michael O'Donoghue, Orlando Paddock, Walter Schumann, and Charles A. Sorrell. I once considered the possibility that those expressions might have been clues to indicate the form of the compound. However, I have not detected any clear pattern as yet. I located a very interesting discussion found on page 343 in the 19th edition of The Manuel of Mineralogy authored by Cornelius S. Hurlbut, Jr. and Cornelis Klein. In this reference, the chemical formulas for all three gems are expressed as A12SiO5.

Kyanite is usually of contact metamorphic origin, associated with its dimorph, andalusite, garnet, and corundum. Kyanite is also found in eclogites in kimberlite pipes. Flattened and elongated prisms of kyanite have been recovered from pegmatites, schists, and gneiss deposits all over the globe. The schists of St. Gothard in the Tyrol Mountains of Switzerland have been for many years the source for very fine kyanite crystals found in association with staurolite. The Machakos district in Kenya yields a very unusual colorless kyanite and some large green-banded blue kyanite crystals. Other kyanite sources include France, Italy, and India. Kyanite occurs in association with diamonds at Diamantina and also in the alluvial sands of Brazil. Some excellent dark blue facet grade kyanite has been found in a white quartz vein located near the summit of California's Yellow Mountain. Deep blue and green gem quality kyanite crystals, measuring up to two inches in length, occur in Yancy County, North Carolina. Other states with deposits of kyanite include Connecticut, Vermont, Massachusetts, Virginia, Georgia, and Montana.

Kyanite abounds with uncommon attributes. Twinning is very common, as is parallel intergrowth with staurolite. The most characteristic feature of kyanite is the remarkable difference in hardness of the crystal faces. Depending upon the crystallographic direction, the hardness of kyanite varies from 4 to 5 and from 6.5 to 7. The mineral name "disthene", from the Greek "di" for double and "sthenos" for strength, refers to this extreme variation in hardness. The prism faces of kyanite exhibit an unusual phenomenon also. Two of the narrow faces are striated vertically, and horizontal striations appear on the broad cleavage face. A plane of perfect parting oblique to the length of the crystal causes tiny horizontal cracks visible on the face. Kyanite is very brittle. A low cohesion makes it susceptible to splitting.

The combination of these characteristics create unique problems to faceters who work with kyanite. Most kyanite is translucent at best. Large lamellar cleavage masses of excellent color and with perfect cleavage surfaces frequently occur in matrix with other well developed crystals. Top quality kyanite gemstones make lovely, but

very fragile gemstones. Faceted kyanite and kyanite cut en cabachon are more suited for pendants. I have also seen large blue crystals of kyanite wire-wrapped for pendants.

Kyanite sometimes exhibits magnetic properties similar to tourmaline. In "A Guide in Color to Precious and Semi-Precious Stones" authored by Jaroslav Bauer and Vladimir Bouska, the text reports the case where blue crystals containing admixtures of iron and chromium follow the lines of force of the Earth's magnetic field like a compass needle when suspended on a hair.

Kyanite and andalusite is abundant in non-gem quality material. Kyanite has been used extensively in refractories and in the manufacture of highly refractory porcelains, ceramics, and spark plugs because of its resistance to high temperatures. Although kyanite is rarely free of inclusions, a few kyanite catseyes have been found.

The Greek word "kyanos" for blue provides the root for kyanite, however, individual color zoned crystals also occur in other colors such as pink. Dr. J. Kourimsky uses the name "disthene" to designate the blue variety of kyanite and "rhaeticite" to refer to the white and gray kyanite variety. At one time, French jewelers used the name "sappare" extensively when referring to kyanite, as a result of an error by a mineralogist from Geneva. The mineralogist, H.B. Saussure, Jr., misread a label attached to a specimen thought to be sapphire. Despite recognition of the mistake, the name "sappare" became widespread. That name is occasionally heard to this day when referring to kyanite

TABLE 2. Gemstone Properties

SPECIE	*KYANITE*
Composition:	Al2SiO5
Varieties:	transparent (by color)
	translucent to opaque
Colors:	blue, blue-green colorless, white, gray, yellow, and pink
Phenomena:	chatoyancy (extremely rare)
Streak:	white
Crystal System	triclinic
Habit:	flattened bladed crystals, rarely found terminated
Cleavage:	perfect
Fracture:	uneven, fibrous, and splintery
Fracture Lustre:	pearly
Lustre:	vitreous
Specific Gravity	3.5 to 3.67
Hardness	directional 4.5 to 7
Toughness:	poor
Refractive Index	1.71 to 1.734

TABLE 2. Gemstone Properties

SPECIE	*KYANITE*
Birefringence:	0.017
Optic Character	biaxial negative
Dispersion:	0.020
Pleochroism	strong for blue, colorless, and violet blue
Ultraviolet Fluorescence	variable; sw-inert; lw-weak red
Spectra	not diagnostic
Color Filter	no information
Solubility	no reaction to acids
Thermal Traits	infusible; avoid thermal shock
Treatments	none
Inclusions	fibers of ilmenite, rutile, and hematite flakes

Designer's Workshop

By Ernie Hawes

A few weeks ago, I had the privilege of meeting a man I consider a "facetor's facetor", Bill Deazley from Elma, New York. Bill is an associate member of the New Mexico Faceters Guild and was in Albuquerque visiting some old friends. I had the good fortune to be among a small group of Guild members gathered in Bill's and his lovely wife's motel room for an evening of conversation about faceting, as well as to see demonstrations of Bill's own gem design computer program and fantastic semi-automated faceting machine.

Bill is obviously a technical wizard. We were fascinated by the extraordinarily precise faceting machine designed and built by Bill that utilized not only the cutting angles and rotational index settings we are all well acquainted with, but also very accurate depth or distance settings for each "ring" of facets. (Bill used some language a little foreign to most of us; for example "ring" instead of row.) He easily conversed in mathematical terms that Steve Attaway, and Scott and Susan Wilson, and perhaps others understood, but left me sitting in silent wonder. (Obviously, a brilliant man!) An entire article could be devoted to describing Bill's faceting machine. It has several innovations that any of us would love to have. One I especially liked was an adjustable platen that automatically set each lap's surface to the same precise height in relation to the stone, regardless of the lap's thickness. Ingenious!

Bill very generously gave me a copy of his gem design program, and I have been playing with it as much as my school and family schedule allows. I must admit that I haven't figured it out entirely yet. It is truly interesting and obviously an important adjunct to Bill's faceting machine. He's created a number of interesting designs with it, one of which he gave us permission to publish. It is called "Endfire 2" and is, in my opinion, a truly attractive pattern. (Bill's program is designed to print on a 24 pin dot matrix printer, so I have copied the rather good image he printed out for me.)

The cutting instructions are given in the same format in which he printed them out. You will note the addition of the distance information. As I understand this, the distance data specifies the relative distance each facet center is away from the centerpoint of the girdle plane. His machine is designed so that the stone always rotates about this point. You don't have to use the distance data when cutting, but if you had a machine like Bill Deazley's, your work would be a fairly simple matter to accomplish. As I reviewed the cutting instructions, it became quickly apparent that the table facet instruction was missing. I'm not sure what the distance data would be, but I think most faceters can easily arrive at an appropriate setting to complete this design.

Our second design is one I did some time ago but never published. It is called "Simple Pinwheel" after it's obvious visual likeness to the familiar child's toy. This is an easy design to cut, as long as you can keep the traditional settings for the standard round brilliant out of your mind. While not exceptionally brilliant, it nevertheless cuts into an interesting stone

.

Finally, I want to compliment Nancy and Steve Attaway on the outstanding quality of their first issue as editors of our newsletter. I'm sure everyone enjoyed reading it and learned a lot from the very informative articles. Nancy has also proven herself to be a skillful designer of faceted gems. I think her designs are very good and clearly fulfilled Nancy's need for designs appropriate to getting the most out of the rough she had. Well done, to both Steve and Nancy. Our newsletter is in good hands.

Gem Show Report

by Nancy L. Attaway

The friendly folks in the Los Alamos Geological Society always extend an invitation to the New Mexico Faceters Guild to participate in their yearly Earth Treasures Show as demonstrators. On Saturday, Steve and Nancy Attaway shared a table with Barb Matz at the Show. Barb free-handed her cabachon making of opals and agates. She experimented on one agate with a four-point pillow design, similar to an apex table for a faceted stone. Steve demonstrated his carving techniques on chrysoprase and opal, while I faceted aquamarine and amethyst. Many people inquired about gemstones, and we fielded questions about our work and how the material evolves from a rough state to a cut gem.

Field Trips: An Oregon Sunstone Adventure

Scott and Susan Wilson, Ph.D[2]

10 November 1996

Most summers, we find ourselves out on the rockhound trail somewhere in the western states. This last September, we found ourselves in the vicinity of Oregon's southeast corner in search of the location for the beautiful feldspar, sunstone. We found the "gemstone magnetism" too powerful and were drawn in like buzzards to the BLM Sunstone Gem Collection Area. This very special place was set aside by the BLM in 1972. It remains open to any public collection of the fine sunstone gems.

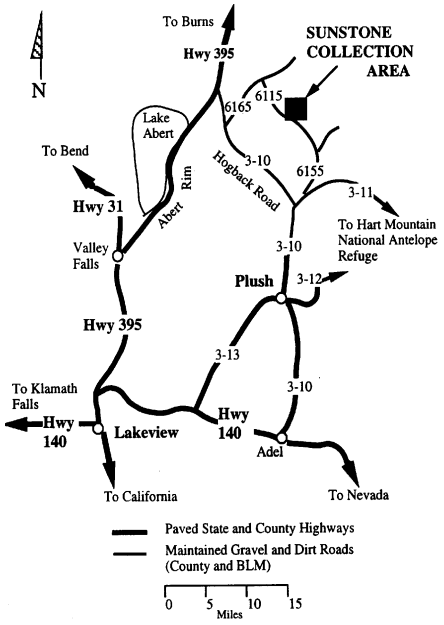


Figure 1. BLM Sunstone Gem Collection Area.

We arrived in the town of Plush, Oregon in the early afternoon and soon discovered that the grocery store (the only store) in Plush was an excellent source of information about the sunstone deposits. We stopped there to see what news we could dig out. The proprietors were very helpful and gave us a publication authored by the BLM, describing the roads, access, and rules in detail.

The sunstone site is reached by following a set of county and BLM roads, as shown in the map in Figure 1. We arrived there with no difficulty in the middle of the afternoon. The Sunstone Gem Collection Area comprises a square area about 2 miles on a side and lies in a large volcanic plain many miles across. The sunstone occurs over a much larger area than the Gem Collection Area. The four square miles of the Sunstone Gem Collection Area are all closed to any commercial mining claims to allow public access for hobby collecting.

On the way in, and just outside the south boundary of the public area, we passed an open-pit mining operation. A dusty sign on the side of the road proclaimed most appropriately, "Dust Devil Mining Company" (Figure 2). Offered for sale were rough and cut Oregon sunstone. We made a note to stop and see their goodies on our way out.

Figure 2. Entrance to Dust Devil Mine.

An information kiosk and wilderness restroom mark the approximate center of the public area. We drove a ways north through the sagebrush and fanned out on foot to search the surface for the feldspar crystals. The crystals were very abundant and could be collected without even leaving the truck! Of course, the better material required some effort to find. The surface material compared generally and nearly identically in appearance to the labradorite feldspar found in the Pueblo Park area of New Mexico. They only were larger in size. Fine, clear, straw yellow crystals suitable for cutting were found within a fraction of an hour. On occasion, a piece was found containing small zones of the beautiful red material, seen in the top quality sunstone from the Ponderosa Mine, situated about 90 miles north. We found a few chips containing some copper schiller and some with blue-green zones.

The different colors are due to varying amounts of copper in the feldspar crystal. How the copper gets inside the crystal is unknown. The blue and green color zones occurs when the copper concentration is around 100 parts per million (ppm). The red color zone occurs at about 200ppm. The metallic copper schiller is produced by copper concentrations of 300ppm and above. Some stones exhibit such a very strong pleochroism, that they appear red when viewed down one axis and blue when viewed down another axis.

We collected several pounds of material on the surface. It simply seemed to be everywhere. We located a few shallow holes and pits that indicated activity by other rockhounds.

After a few hours, we filled our buckets and decided to move on down the rockhound trail. On our way out, we stopped at the Dust Devil Mine. No one was about, or so it seemed. Even-

tually, three gentlemen appeared, clambering out of the open pit area that comprised the mine.

These men were serious miners, and certainly looked the part. Since they seemed friendly enough, we struck up a conversation with them. We asked about the rough and cut sunstones, particularly the beautiful red material featured in the gemstone magazines. A number of museum quality cut sunstones were produced for our inspection. The miners showed us brilliant red, peach, and cherry colored sunstones of all sizes. We held in our palms exquisite step-cut rectangles exhibiting multiple planes of intense copper schiller that lined up perfectly as if lithographed. One stone was the size of my thumb! Deep blue and green pieces and some very large brilliant yellow stones were also shown to us, along with a few masterfully carved pieces. What a treat!

Some Serious Miners!

Unfortunately, all of the sunstones the miners displayed were out of our price league. Then we asked about rough. Several large parcels, around 5 kilos each, were brought out. This material had been mined the day before we arrived. We purchased a small number of well formed crystals to take home and cut. Several were red, and a few contained the distinctive copper schiller.

We found ourselves engaged in a pleasant and wide-ranging conversation with the miners and soon lost track of time in the typical rockhound manner. The sun began to set, and we began to think about dinner. During our fun, we neglected to notice a black front moving in from the northwest. We soon noticed a strong wind, and the sun slipped behind angry dark clouds. These clouds could easily become snow clouds, but the miners assured us it would not get too ugly. They indicated that about anywhere out on the plain was as good for a camp as any other. The miners invited us back on the way out the next morning. We headed out into the public area to establish a camp. At this point, the wind began to gust around 20 miles per hour.

Dinner was deemed to be of greater importance than erecting the tent, so we began to prepare our dinner. We hid behind a tire on the truck, holding the pot about 6 inches offset from the camp stove burner in order to intercept the heat being blown in that direction by the wind. By the time we began to gobble our grub, the temperature dropped to near freezing. The wind now gusted to around 40 miles per hour.

The great expanse of sagebrush offered no vegetative or topological respite from the wind, which buffeted the truck as if it were a small boat in a gale. Dinner conversation (the finest table available of course, inside the truck) resolved the fact that Susan was not about to stay out there in the storm in our crippled tent. The tent sustained damage by heavy wind earlier at the Royal Peacock Opal Mine in Virgin Valley, Nevada. We decided to scramble out and head for Lakeview, Oregon, some 100 miles or more away, and see if we could hole up in a hotel.

On the way out, we stopped to let the mine folks know that we wouldn't be back because we were heading out. The miners were just on their way out to a hot-spring some 30 miles to the east for their weekly bath. They inquired as to what unfortunate event had changed our minds. Susan then provided her opinions on tent life in a storm. It must have sounded very sad, because we were immediately offered accommodations in the "Dust Devil Hilton". This consisted of a pair of immobile campers that the miners had brought in to serve as auxiliary accommodations and storage. We instantly accepted with immense gratitude! The miners left for their bath at the hot-spring. We were left to ourselves to stay with the camp guard dogs.

We moved our sleeping bags into a camper and landed gratefully on the foam bunks. We enjoyed the safer surroundings while the camper was jostled about by the wind. The snow flurried outside, and we remained warm inside. The next morning found our hosts hard at work repairing the front loader in preparation for the day's mining operations. The miners gave us a complete guided tour of their sunstone mine. (Figure 3).

The best crystals occur in a zone some 20 feet below the exposed surface of the basalt flows. A D-9 Caterpillar bulldozer, 109,000 pounds, uncovers and crushes the material, then moves it into piles. A front loader transfers the material to a highly efficient sorter, designed and built especially for this job by the miners themselves. A shaker and trommel breaks up and sorts the material. Water, hauled in from about 5 miles away, cleans and concentrates the material. The final sorting is done by visual inspection on a set of moving conveyors. A day's run processes around 20 cubic yards of ore. A typical day recovers around 10 kg. of gem rough.

Figure 3. Dust Devil Mine, looking north toward the public area. Note the vast expanse of the plain where the sunstone area lies.

We wandered around the vicinity of the mine most of the day, watching and learning. The mining area is a true mechanized oasis in the midst of the wilderness. The miners are able to expertly repair, construct, or rebuild nearly any piece of mechanical, hydraulic, or electrical equipment. It's a necessity, given the remote location. We watched the miners sort the material on the conveyors. Some pieces ranged between 30 to 50 carats.

The miners spent a great deal of time in earlier years digging as rockhounds in the public area. They discovered that by digging down 10 to 15 feet into the basalt, they located the red, copper schiller, green, and blue material in the public area. At one point, rockhounds developed pits as deep as 40 feet before the BLM declared them a public hazard and bulldozed them shut. The BLM area allows digging with hand tools only. I declare it seriously hard work to dig deep into the basalt with hand tools alone.

Our time eventually ran out, and we were forced to say good-bye to our new friends and great wilderness hosts. Before we left, they advanced us a small parcel of gem rough to bring to New Mexico and show to the Guild. This material is first-class and is a real pleasure to cut. See Scott or Susan if you would like to purchase a piece of this material. Checks go to the miners. The Dust Devil miners will be at the February Tucson Gem and Mineral Show. Stop by and check out the awesome cut sunstone gems that they will have. They'll have rough there, too. These are very interesting folks. They grabbed hold of a dream and made it happen!

Scott and Susan have a few of the BLM brochures from the sunstone area. Contact them if you want a copy, or contact the BLM directly at:

Bureau of Land Management
Lakeview Resource Area
PO Box 151
1000 S. 9th St.
Lakeview, Oregon 97630

The miners may be reached at:

Dust Devil Mining Company
PO Box 27
Beaver, Oregon 97108
Attention: Terry Clark

For Sale

Complete faceting set-up for sale. Ultratec facetor with assessories: grinding laps, polishing laps, facet design book, faceting rough, etc. Set-up is two years old. Paid $4,000.00. Asking $2,500.00 for everything. Call John McClure in Santa Fe at: 505-986-1949

TABLE 3. Tucson Gem and Mineral Show Calendar

Show	*26*	*27*	*28*	*29*	*30*	*31*	*01*	*02*	*03*	*04*	*05*	*06*	*07*	*08*	*09*	*10*	*11*	*12*	*13*	*14*	*15*	*16*
Gem and Lapidary Wholesalers	■	■	■	■	■	■	■	■	■	■	■	■	■									
Tucson Showplace	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■							
Atrium Productions		■	■	■	■	■	■	■	■	■	■	■	■	■								
American Indian Arts Exposition		■	■	■	■	■	■	■	■	■	■	■	■	■	■							
Pacifica AKS Trade Show		■	■	■	■	■	■	■	■	■	■	■	■	■	■							
US Gem Expos		■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	
AGTA Gemfair				■	■	■	■	■	■	■	■	■	■									
GLDA Gem and Jewelry Show				■	■	■	■	■	■	■	■											
AKS Gem and Jewelry Trade Show				■	■	■	■	■	■	■	■	■	■									
Shows of Integrity				■	■	■	■	■	■	■	■	■	■	■	■							
Galizia Gem Show				■	■	■	■	■	■	■	■	■	■	■	■	■	■					
Gem and Jewelry Exchange					■	■	■	■	■	■	■	■										
Congress Street Expo					■	■	■	■	■	■	■	■	■	■	■	■						
Rio Grande of Albuquerque Catalog in Motion							■	■	■	■												
La Quinta Group							■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Arizona Mineral and Fossil Show								■	■	■	■	■	■	■	■	■	■	■	■	■	■	
Gem America Show								■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Mineral and Fossil Co-op									■	■	■	■	■	■	■	■	■	■	■	■	■	
Tucson Gem and Mineral Society Show																			■	■	■	■

TABLE 4. Shows of Special Interest

Name	*Location*	*Date*
Quartzite, The Main Event	Quartzite, Arizona	Jan 11-26
Gila County Gem and Mineral Show	Globe, Arizona	Jan. 24-26
Albuquerque Gem and Mineral Club Show	UNM Continuing Education Center Albuquerque, New Mexico	March 1 & 2
Deming Gem and Mineral Show	Deming, New Mexico	March 6-9
The Southwest Gem and Mineral Society Show	San Antonio. Texas	March 14-16