



***The
New Mexico***

Faceters Guild

September/October 2003



The Official Newsletter of the New Mexico Faceters Guild

NMFG

Show and Tell



The picture on the left shows a lovely aquamarine from Madagascar faceted by Dylan Houtman.

The picture on the right shows two oval Pakistani peridots faceted by Dylan Houtman, with one showing a checkboard crown.



The picture on the left shows a lovely spessartite garnet kite faceted by Dylan Houtman.

On the Cover: The cover photo shows nine Montana sapphires faceted by Nancy Attaway from the Rock Creek/Gem Mountain area and sapphire rough from the trip taken by Steve and Nancy Attaway and Scott Wilson.



The New Mexico Faceters Guild

Guild Officers 2002-2003

President: Scott Wilson

Vice President/Programs: Paul Hlava

Secretary/Treasurer: Ina Swantner

Guild Gemologist: Edna Anthony

Guild Mineralogist: Paul Hlava

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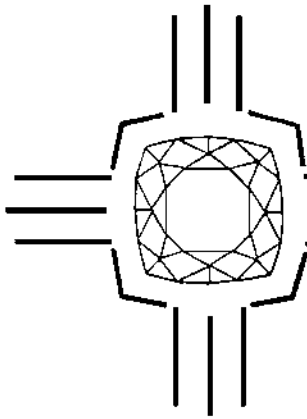
***Purpose of the Guild:** The purpose of the New Mexico Faceters Guild is to bring together persons who are interested in faceting or faceted stones. We promote the art and science of faceting and provide a means of education and improvement in faceting skills. Finally, we provide a means of communication between those persons involved in or interested in faceting as a hobby.*

***Guild Membership:** Dues are \$20.00 per calendar year (January through December) for newsletter issues sent by e-mail. Hard copies of newsletter issues sent by US mail are \$30. Please see the membership application / renewal form on the last page of the newsletter.*

***Meetings** are held the second Thursday of odd-numbered months at 7:00 p.m. at the New Mexico Museum of Natural History, 1801 Mountain Road N.W., Albuquerque, NM. Workshops are generally held in even-numbered months. Date, time, and place are given in newsletter. Also, any change in guild meeting times or dates will be listed in the newsletter.*

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The next meeting of the New Mexico Faceters Guild will be November 13, 2003.



The New Mexico Faceter

Volume 23, No. 5, September/October, 2003



NMFG President Scott Wilson

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New Mexico Faceters Guild Official Website

We invite everyone to visit our website at: www.attawaygems.com/NMFG for interesting and informative articles on gemstones and faceting techniques.

The Prez Sez:

by Scott R. Wilson, Ph.D

Gemstone Reflections

Again, we gather here in the autumn, watching the golden cottonwoods shimmer in the cool breeze along the Rio Grande. Fall is the time to reflect upon the year's events and contemplate the things learned.

The New Mexico Faceters Guild has been fortunate to enjoy several great faceting workshops, a block-buster party during the February Tucson Show, another fun-filled Christmas party, some great speakers and "show and tells" at our meetings, and more issues of our world-class newsletter. We absorbed many tidbits of knowledge during our meetings, workshops, and from people we met at gem and mineral shows. We have been privileged to hold our meetings at the New Mexico Museum of Natural History, a fine meeting place that we appreciate. Add to that a group of great members with whom to socialize, trade cutting tips, and share our passion for gemstones. We enjoy and learn from that case full of exquisite examples of faceted gems and hand-wrought jewelry, the end result of the art and science of gemcutting rendered by our members. We have taken the occasional gem hunting trip and have even shared in the purchase of parcels of nice gem rough. Total all of these, and this year has been a paradise for faceters and gem hounds.

It would not have happened without the hard work and dedication of my support team, the Officers of the Guild. I want to extend a great big "thank you!" to them for their efforts. **Steve and Nancy Attaway** have given us a simply stellar performance on the newsletter. **Ina Swantner** has kept us keenly aware of our financial position and handled our bills. **Paul Hlava** has consistently provided highly informative, educational, and entertaining programs. **Edna Anthony's** gem research educated us with her top-notch studies on how mineralogical structure, chemistry, and physical properties relate to the wonders we call gemstones. **Ernie Hawes** has been a tremendous resource to us in teaching and guiding our workshops, as well as a proliferate creator of faceting diagrams. I would also like to thank **Janie Johns** of Wild Rice Publishing for her high quality newsletter hard copies. Thank you all! Thank you, members, who supply the vibrant energy that is the heart and soul of our Guild. I plan to assist the new officers in carrying on the tradition. At the end of 2004, we should have even more upon which to reflect.



Minutes of the NMFG Meeting

September 11, 2003

by Nancy L. Attaway

President Scott Wilson called the meeting to order at 7:10 p.m. and welcomed all members and guests.

Old Business

Nancy Attaway reported that the August workshop was cancelled, since so many members were out of town, including two of the instructors. A workshop in January will be planned at the home of Scott Wilson.

New Business

President Scott Wilson announced that the selection of new Guild officers is the first item on tonight's meeting agenda. The Guild membership will vote on the elections for Guild officers during the November meeting. Scott entertained nominations from the floor.

The following candidates were selected from the membership to assume the following vacated Guild office positions for the years 2004 and 2005.

Dylan Houtman: Guild President.

Ernie Hawes: Guild Vice-President/Programs.

Ina Swantner: Guild Treasurer.

Scott Wilson: Guild Librarian.

Carsten Brandt: Editor of the Guild Newsletter, *The New Mexico Facetor.*

Paul Hlava: Guild Mineralogist.

Edna Anthony: Guild Gemologist.

Thank you all very much for your service to the New Mexico Faceters Guild.

This slate of officers will appear in the September/October, 2003 issue of *The New Mexico Facetor*. An official vote will be taken by the Guild membership during the November meeting. The new officers will assume their duties during the Christmas Party.

We would please ask the Guild membership to provide any ideas for programs and speakers they would like to have. Please feel free to submit your ideas.

Vice-President/Programs Paul Hlava announced that the tenth annual **AGATE** (Albuquerque Gem Artisans Trade Expo) Gem and Jewelry Show has been scheduled for **November 22 and 23** at the UNM Con-

ference Center (the Continuing Education Building) on 1634 University NE in Albuquerque. The show runs from 10:00am until 5:00pm on Saturday and from 11:00am until 5:00pm on Sunday. Several Guild officers and members, past and present, will be seen as dealers at the show. See you all there!

President Scott Wilson announced that the **Guild Christmas Party** will be held at the **home of Bill and Ina Swantner on December 14**, beginning at **5:00pm**. Members are cordially asked to RSVP to **Treasurer, Ina Swantner**. Invitations to the Christmas Party will be mailed. Please dress for this festive occasion and ask Ina what you can bring to the Christmas Dinner. Also, please bring a gift or two for the rowdy gift exchange that is traditionally held after dessert.

Ernie Hawes, a noted collector of faceting machines, volunteered to bring several different faceting machines to the afternoon session at Bill and Ina's home, which will begin at 1:00pm. He plans to discuss how each machine works and explain their similarities and differences. Members may bring their machines if they want to and work on their stones. The four instructors will be present to help with faceting problems.

Show and Tell

The Show and Tell Case tonight held many lovely faceted stones rendered by Guild members. **Moderator, Steve Attaway** used video and television equipment from the museum to better show the individual gemstones to the audience.

Dylan Houtman displayed 20 stones that he recently faceted. He showed a huge New Mexico obsidian round with a checkerboard crown; six small Mexican opals; two large oval Pakistani peridots, one cut with a checkerboard crown; a five-sided apatite; a dark orange-red Tanzanian garnet; a deep orange pear-shape spessartite garnet; a large, deep purple Zambian amethyst oval cut with a checkerboard crown; an emerald cut Madagascar aquamarine cut wide with a cushion flair; and two Zimbabwe aquamarines, one cut in a marquise and the other cut in a half moon design. He also faceted a fabulous Burmese ruby in an emerald cut with a checkerboard crown that weighed 1.6 carats!

Nancy Attaway displayed 10 stones that she recently faceted. She cut an 8mm round red andradite garnet with pink tones from Montana in a twelve-sided round Flasher Cut. The rough piece was found by a long-time friend from Montana who had been a gold miner. Steve will set the stone in a 14Kt. gold mounting for the miner's wife. Nancy also cut six deep blue, heat-treated Montana sapphires from the Rock Creek

area near Gem Mountain: a 6.5mm round and a 6mm round (Flasher Cuts), a 4.5x4.5mm square barion, a 7x5mm emerald cut, a 5.5x5mm shield, and a 7x6.5mm faceted tablet. She also cut three Nigerian deep pink tourmalines (liddicoatites): two 9.5mm Flasher Cut rounds and a 10.5x10.5x10.5mm cushion cut triangle in her new design, "Cushion Triangle for Liddicoatite". This design was published in the July/August, 2003 issue of the *New Mexico Facetor*.

Steve and Nancy showed the sapphire gem rough, untreated, that they mined from the claim, as well as some andradite red garnet gem rough they found between Nevada City and Virginia City, Montana.

Refreshments

Nancy Attaway brought refreshments to the September meeting. Gourmet coffee was served. Thank you very much. **Herb** and **Maria Traulsen** and **Nancy Attaway** volunteered to bring refreshments to the November meeting, plus the large coffee pot.

Future Programs

Vice-President/Programs Paul Hlava has arranged for noted speaker, **Jack Thompson** of Colorado Springs to address the Guild during the November meeting. This is a rare opportunity to hear this famous speaker. Jack Thompson plans to give a presentation on Colorado topaz. Many of the members from the Albuquerque Gem and Mineral Club plan to attend the November meeting to hear this excellent speaker. Jack Thompson is associated with the Denver Museum.

Guild member, **Elaine Weisman** will speak at the January, 2004 meeting on the "**History of Jewelry and Jewelry Design**". Elaine's presentation will cover the last one hundred-plus years and will be accompanied by many slides of interesting and beautiful jewelry that depict the various styles of certain time periods.

Guild Meetings in 2004

The dates for the Guild meetings at the museum in 2004 include: **January 8; March 11; May 13; July 8; September 9; and November 11**. E-mails to members will inform whether we will meet in the museum's regular large meeting room or meet in the museum annex across the street. Please keep your e-mail address current with Ernie Hawes and Carsten Brandt. Guild workshops in 2004 will also be announced by e-mail.



Program Speaker

by Scott Wilson and Nancy Attaway

A Visit to a Montana Sapphire Mine

Scott Wilson and **Steve Attaway** presented to Guild members an overview of a trip to a sapphire mine in Montana. In August, Steve and Nancy Attaway, with Scott Wilson, and the Attaway's malamute Dusty, visited a sapphire miner and mined sapphires on his 20-acre claim near Gem Mountain in southwest Montana. The sapphire area visited lies near Rock Creek and off Shalkaho Road, southwest of Philipsburg.

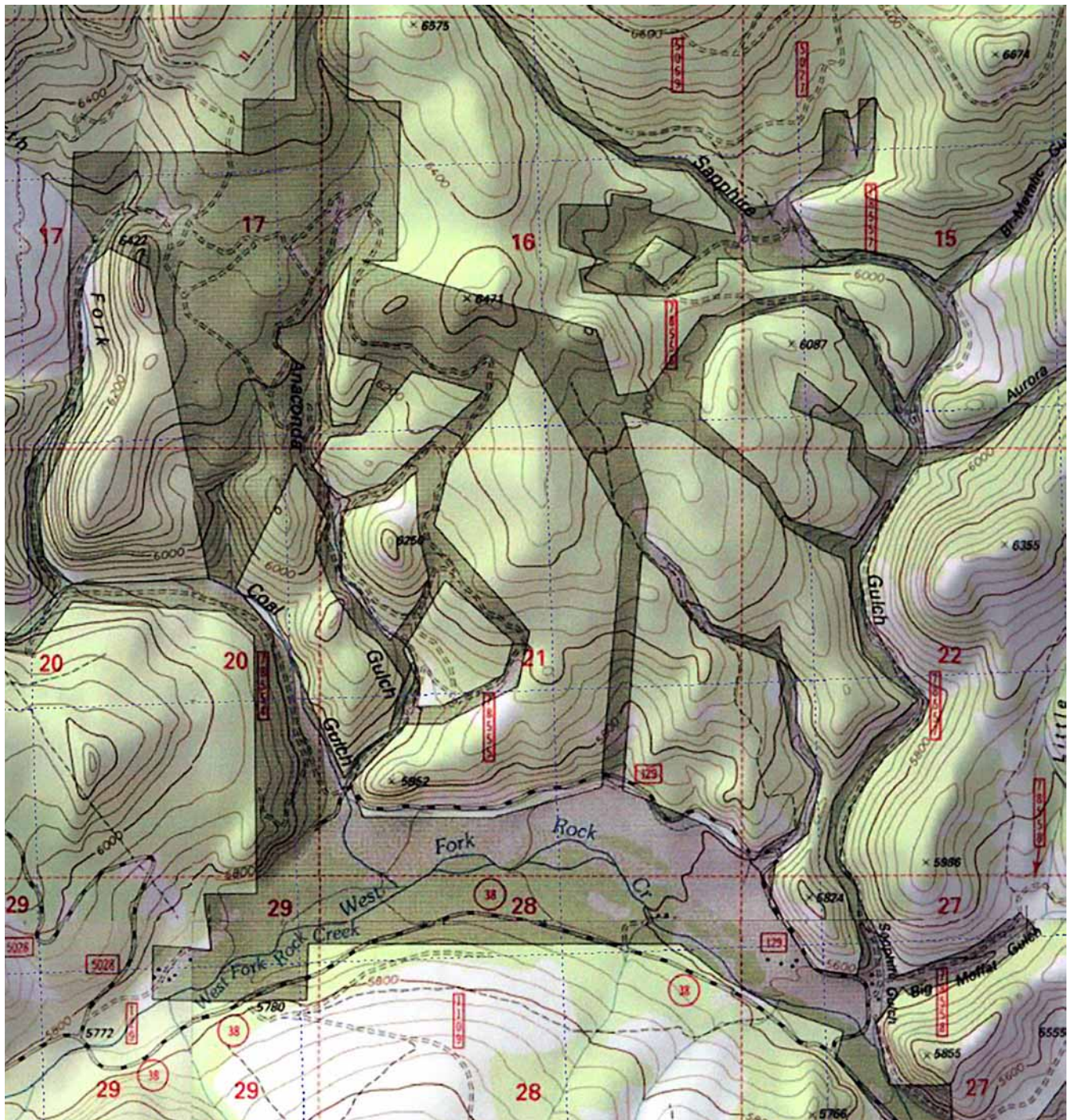
The Video "Gemstones of America"

Before the talk by Scott and Steve, **Ernie Hawes** showed the video entitled, "*Gemstones of America*", as a preview to the Montana sapphire mining trip. This film, created by the Museum of Natural History and the Smithsonian Institute, described gemstone mining in the United States. The video highlighted only a few American gem mines. Several mine owners were interviewed, and some of the miners were filmed at work, both hand digging and operating heavy equipment. The video visited sapphire mines in Montana, tourmaline mines in Maine and California, a red beryl mine in Utah, a sunstone mine in Oregon, and a turquoise mine in New Mexico. Some of the geology surrounding the mines was also explained. The video was somewhat dated, since it was filmed over ten years ago, and included persons no longer associated with the mines. However, it kept everyone's interest and provided a good insight into gem mining in the US.

Geology and History of Montana Sapphires

As we return to the trip taken by Steve, Nancy, and Scott, Nancy begins the story by including a bit of geology and some mining history that she researched.

Sapphires in Montana are believed to have emerged from the alluvial deposits left from ancient stream and river beds. However, it remains a mystery as to how the sapphires came to be there in the first place. Since granite is the dominant rock, current geologic opinion supposes that magma intruded formations to metamorphose and grow corundum crystals. The famous Boulder batholith (perhaps, a craton?) lies some distance to the east.



This topographic map shows the extensive historical workings at Gem Mountain. The shaded areas show the location of the original mining claims. The area depicted here covers over four square miles.

Miners panning for gold during the Montana gold rush discovered sapphires in Montana in 1865. The miners noticed that many colored pebbles clogged their sluice boxes and sank with the heavier gold concentrates. The multi-colored stones, appearing as both rounded river-worn pebbles and with distinct crystal faces, were positively identified as sapphires in 1889.

The sapphires were noted to have been well concentrated, as a single pan of paydirt gravel taken from bedrock was reported to have yielded as many as thirty stones. Twenty-five pounds of sapphire were reputed to have been recovered during a few days work in some areas. Commercial sapphire mining began in earnest between 1898 and 1901, when several men established a ground sluice operation. They were quickly recovering fifteen pounds of sapphire per day, along with some gold. Dredging operations soon followed. Around 1900, hydraulic mining at Rock Creek was producing 400,000 carats annually, and about 25,000 carats were gem quality. Those gem quality stones, especially the pinks, were faceted by locals in Helena. Rock Creek soon became known for its fancy colored sapphires. Of Montana's several commercial placer deposits, only the Rock Creek sapphire deposit was rich enough to be worked for the sapphires alone.

The Rock Creek sapphire deposit runs along the drainage of the West Fork of Rock Creek. The original lode source of the sapphires has never been found. Loose sapphires were deposited in the alluvial gravels of three gulches that flow south and empty into the West Fork. The three gulches are the Anaconda, the Maley, and the Sapphire. The entire historic production of Rock Creek was taken from the three gulches. Minimal overburden encouraged placer mining operations.

The alluvial findings in 1896 near Rock Creek initiated more sapphire mining activity. However, not many of the pale colored sapphire gemstones met with public approval. The gems from Montana appeared in a rainbow-wide color range but were either too small or too pastel in hue. The fine, rich blue sapphires from Ceylon established the benchmark of comparison for all sapphires at that time. Instead of being all set in jewelry, Montana sapphires were mostly shipped to Europe to be placed in watch bearings and used for abrasives.

Workers from China had been imported into the US to assist in building the Transcontinental Railroad. After the railroad's completion, some Chinese workers were sent to southwest Montana to hand dig for sapphire. Structures still stand that were once part of two such camps that housed the Chinese workers back then.

It was not until the 1970's that Montana sapphire became a recognized and a desired gemstone. (This particular situation did not include the fine, cornflower blue sapphires from Yogo Gulch that require no treatment at all. Discovered in 1894 in dikes from igneous rock, Yogo sapphires were first faceted by experts from France and Germany. Although the ownership of the Yogo mine changed over the years, Yogo sapphires have kept their value and are still in demand today.) Credit has been given to Dr. John Emmett of Crystal Chemistry (formerly Crystal Research) now located in Brush Prairie, Washington and his foremost student, Brian Kvasnik (deceased) of Gem Resources, Inc. in Minneapolis, Minnesota, as the first persons who successfully heat-treat Montana sapphire. By imitating the heat-treaters in Bangkok, Thailand, these two men created a new gem market for Montana sapphires.

Not all Montana sapphires are suitable for heat-treating, due to the variations in chemical composition. Heat-treating deepens the blues and brightens the yellows and oranges. Montana sapphires can be diffusion-treated, but they are not well suited to it because of their high iron content. GIA recently revealed that Montana alluvial sapphire contains concentrations of iron, manganese, and titanium. GIA said that some of the sapphires contain trapped holes that produce a yellow concentration. When this yellow coloration permeates most or all of the sapphire, a stone will show an orange color center. We call these "egg yolk" sapphires.

Nancy Attaway has enjoyed faceting Montana sapphires and thinks the gems are truly lovely. She wears two rings that hold blue Montana sapphires that she cut, one a square barion and the other a twelve-sided round. An invitation to visit a family-owned sapphire mining claim was extended to Nancy Attaway last spring. The claim owner had read her article on Montana sapphires on the NMFG website and asked her to visit his mining area. After several e-mails and a few phone calls, an August date was settled upon for a grand tour. This article about Montana sapphires evolved from this trip.

The Trip, as Narrated by Scott Wilson

The overland trip from New Mexico became a push through Colorado mountain territory and western Wyoming. We entered Montana via the majestic route through Beartooth Pass. We stopped briefly at the "Contintail Show" in Buena Vista, Colorado and searched the dealer tables for interesting mineral specimens. Actually, the trip north was a story in itself, as we traveled through some very scenic and marvelous terrain. We camped every night, cooked our suppers,

and made our breakfasts. Anyone interested in our route up and back may contact me for more info.

One aspect of the trip deserving of note was that smoke from forest fires polluted the skies nearly the entire way was across central Montana. Smoke was even thick and heavy enough in places to obliterate entire vistas of mountain and valley scenery. This smoke resulted from numerous wildfires that devastated expanses of Montana and Idaho during the summer. It was difficult to imagine the immense scale of those forest fires, even though we were near to some. We spotted a few new ones as we traveled to the mine.



The friendly staff at the Gem Mountain fee area help visitors sift and wash their Montana sapphires. Cutting services are also offered.

Upon arrival at Gem Mountain, we met Chris Coney, an energetic and dedicated miner who recently purchased the mine holdings of American Gem Corporation. Chris had gained control over the claims to the large placer deposits, including the gravel/sorting/concentrating plant and the well-known “screen your own sapphires” operation at Gem Mountain. Chris invited us to camp at the nicely-developed overnight area campground near the headquarters of the mine operation at Gem Mountain. The occasional moose visited our campsite in the mornings and evenings.

Chris explained to us that the sapphire-bearing area encompasses quite a large portion of land. About 1/3 of it was consolidated by American Gem Corporation and now comprises part of his operation. Another 1/3 is under the control of a timber products concern, and the remainder is owned by a number of smaller claim hold-



This adult female moose visited our camp site at Rock Creek/Gem Mountain.

ers. Chris’ first order of business in the area has been the reclamation and environmental remediation of many of the areas previously worked by American Gem Corporation and even some of the earlier groups. Chris’ background includes expertise in this area, and he is putting it to good use. Chris is currently focusing his effort on the tourist/rockhound operation of Gem Mountain and intends to expand it. He includes quite a bit of marketing development in his plans to make the bucket screening operation a national family-fun destination, and it appears that he is well on his way.

Chris gave us a personal tour of the Anaconda Gulch placer and showed us the gravel concentrator. He had literally just finished reconfiguring the concentrator to improve its efficiency and increase the retention of large sapphire crystals (in the 100 carat range) in the concentrate. This gravel concentrate is supplied to the bucket screening operation and to his own automated sapphire jigs. The very first concentrate from this new configuration was ready to be taken to the headquarters, but we ran out of time to see what the results were.

Chris is an intensely busy gentleman, and we were fortunate to have some of his time before he had to be excused to repair equipment and push forward with reclamation and mine development work. You will certainly be seeing more of Chris and hearing about his Montana sapphire operation in the future. I expect to

also read about his mining endeavors in the various gem and mineral publications.

The following day, we met Ray and Deb Hess, the instigators of our trip. Ray was the one who had invited us to visit his sapphire mining claim. Ray's father obtained sapphire mining claims in the Rock Creek area back in the early 1960's, and Ray has spent many years working there. He had even worked in the large sapphire mining operation throughout high school. Ray is now a full-time teacher in the Phillipsburg school district and serves as the high school football coach, among other things. When not organizing the next wave of pigskin marauders, Ray spends time in the mining area, primarily surveying expanses of territory (some previously worked, some not) to determine where he might make a wildcat strike for gem sapphire.

Ray treated us to a wonderful personal tour of the entire Rock Creek/Gem Mountain area. We saw areas where the "old-timers" unearthed literally millions of carats of gem sapphire over a span of a few days, as they worked their way up the various mountain drainages. The miners accomplished this by using hydraulic mining techniques, similar to that done in the placer gold mining camps of California well over a hundred years ago. This method moved a great deal of material and recovered much of the sapphire, but it had its limitations. Long and expensive flumes were constructed to bring water from nearby ranges back then. Any damage to a flume would mean that there were small sapphire bearing areas left untouched in some of the heavy producing areas worked by the old-timers. Ray had developed a keen sense of where these areas were and had started to survey them for likely mining prospects.

Hydraulic mining cannot be done today, due to the restrictions on water quality in Rock Creek itself. Rock Creek has been designated as a "blue-ribbon" trout stream. Instead, gems must be recovered with gravel concentrating operations, either automated or by hand.

Ray, his survey work by hand, shoveled dirt into a hand-operated shaker screen that takes the concentrate, which is really just sorted gravel, back to his house. There, he screens the gravel by hand with water held in an aluminum tub to better concentrate the sapphire.

As we traversed the deposit, Ray discussed what is known about the geology. The geology there is subtle and quite complex. Numerous intrusives (dikes, mostly) cut across the deposit along a southwest-northeast trend. Heavy erosion has occurred on a geologic scale that destroyed many of the dikes. The erosion also washed down a great deal of alluvial material from

points north from the higher elevations. In certain areas, sedimentary deposits are evident, seen alongside metamorphic zones. The sapphire appears to be most strongly correlated to the sedimentary zones, however, those zones may often contain a high concentration of volcanic ash and mudflows that confuse the situation. The intrusive rock chemistry seems to change greatly, as one goes across the deposit. The sapphires are not found in the intrusives but in the areas between them. These areas are often filled with the ash/mudflows and alluvial sedimentary and metamorphic materials.

Some research was done in past years to conduct a "first-hand look" geologic survey of the area, but an in-depth study has never been done. Ray pointed out that such a survey costs a lot of money. As long as the miners can find enough sapphire for it to be profitable, there is little interest in funding such a study, even though the origin of the gems might be established and new reserves potentially identified.

Ray took us to an area where the old-timers had worked, an area with a clay zone on top of an ash/mudflow zone. The flume supplying their hydraulic nozzles had failed. The miners either did not deem the area important enough to fix the flume and continue work, or other circumstances prevented them from returning to it. This area was now under control of the timber operation, with whom Ray has a business arrangement. He surveys the sapphire potential for them.

We screened a pickup-bed full of five-gallon buckets of gravel from this area, keeping track of which horizon the raw dirt was taken. This is hot, dusty work and will make a big, brawny miner of you in a hurry. Ray out-dug Steve and I by about 2-to-1. Nancy found several cuttable stones on the surface near this area, potentially indicating that we were on a good prospect.



An example of one of the fine sapphires in Ray Hess' collection, a blue hexagonal crystal with a well formed trigon.



Steve Attaway and Scott Wilson are eating dust while sifting sapphire concentrate. Buckets of dirt are sieved between two mesh screens. The material that does not pass through the 1/2-inch upper mesh is removed. The finer material that passes through the lower 1/8-inch mesh is also removed. The remaining “concentrate” is placed in five gallon buckets to be washed later.

After Ray guided us to the rest of the mountain, we conjectured on the geological aspects of the deposit. We were then treated to a visit of the large floating concentrator that belongs to the Skalkaho Grazing Association. This is a group of lawyers and investors who own the large meadows below the mountain, adjacent to Rock Creek. The concentrator is not a dredge, although it appears to be one, a first glance. It really is simply a very large gravel sorting/sapphire concentrator machine floating on large pontoons. This machine was only operated for a short time, and it apparently produced much sapphire from the limited area where it operated. The owners’ interest appears to have withered, as the property and equipment lie idle for now.



Nancy Attaway is standing next to the floating sapphire plant. The scale of this machine shows the size of the effort required to commercially recover Montana sapphires.



Ray Hess is shown here, with his father, washing sapphires. The washing process removes the hard dried clay. By shaking the screen just right, the heavy sapphires will sink to the bottom and move to the center of the screen.



An example of a Montana sapphire with a well defined color center.



Ray Hess prepares to flip the shaken concentrate over and view the color center.



Nancy and Steve Attaway are shown here sorting sapphires with a tweezer.

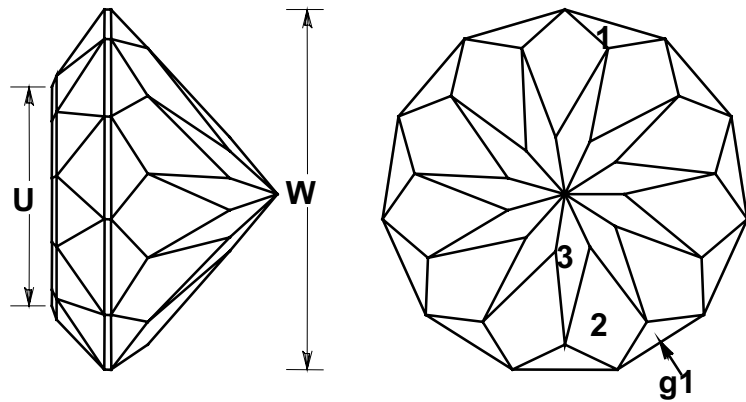
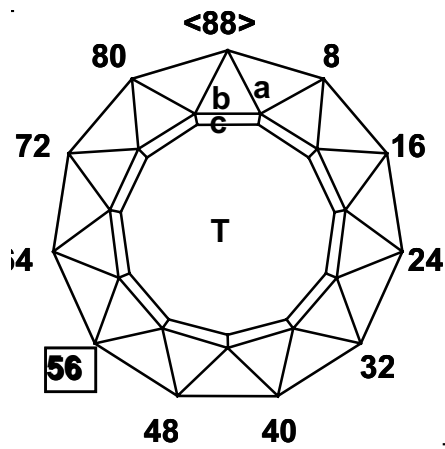


The color center lies to the right of the quarter. The heavy sapphires settle to the center of the box when shaken just right. Ray Hess and his family reminisced about buckets with 5-inch color centers.



Steve Attaway, Ray Hess, Debbie Hess, Ray's father, and Nancy Attaway are shown here after a day's work sorting sapphire. After sorting the concentrate of over 20 five-gallon buckets, we were able to fill the small pill bottle in the photo.

We brought the truck full of buckets back to Ray's residence, where his wife Deb and their three-year-old son helped us screen the gravel for sapphire. Ray's method for screening the finer dirt concentrate made the sapphires fall mostly in the center of the pile. The first screen showed a large pale yellow sapphire, and Ray nearly jumped out of his shoes when he saw it. Within a few minutes, Ray's Father soon appeared,



88 SWIRL By Ernie Hawes

Angles for R.I. = 1.760

67 + 11 girdles = 78 facets

11-fold radial symmetry

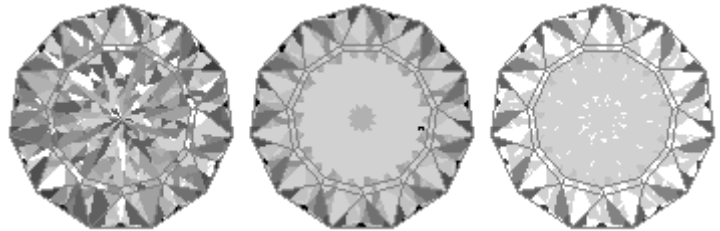
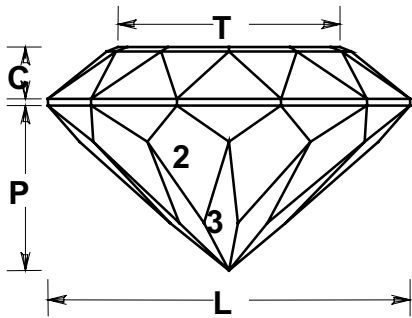
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$L/W = 1.010$ $T/W = 0.619$ $U/W = 0.613$

$P/W = 0.462$ $C/W = 0.147$

$Vol./W^3 = 0.223$

Average Brightness: COS = 74.4 % ISO = 85.4 %

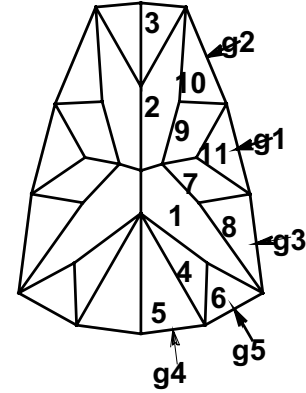
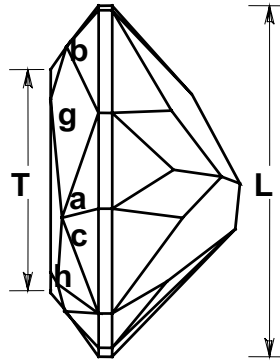
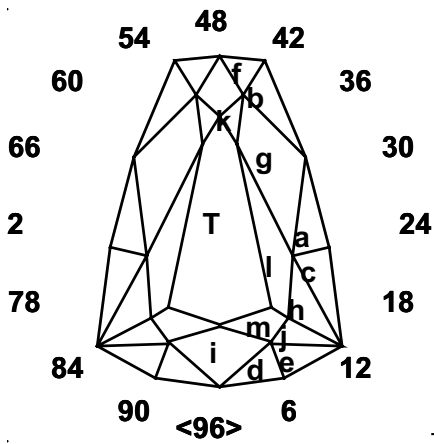


PAVILION

g1	90.00°	04-12-20-28-36-44- 52-60-68-76-84
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2	43.00°	88-08-16-24-32-40- 48-56-64-72-80
3	41.00°	02-10-18-26-34-42- 50-58-66-74-82

CROWN

a	42.00°	04-12-20-28-36-44- 52-60-68-76-84
b	36.00°	88-08-16-24-32-40- 48-56-64-72-80
c	28.00°	88-08-16-24-32-40- 48-56-64-72-80
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CUSHION KEYSTONE

By Dylan Houtman

Angles for R.I. = 1.746

49 + 12 girdles = 61 facets

1-fold, mirror-image symmetry

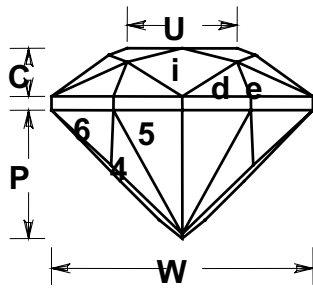
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$L/W = 1.355$ $T/W = 0.849$ $U/W = 0.412$

$P/W = 0.495$ $C/W = 0.190$

$Vol./W^3 = 0.350$

Average Brightness: COS = 53.9 % ISO 74.8 %



PAVILION

1	41.40°	22-74
2	42.00°	34-62
3	42.00°	46-50
4	42.00°	06-90
5	44.00°	02-94
6	44.00°	08-88
7	52.00°	27-69
8	52.00°	26-70
9	52.20°	29-67
10	53.00°	30-66
11	54.00°	28-68
g1	90.00°	28-68
g2	90.00°	30-66
g3	90.00°	26-70
g4	90.00°	02-46-50-94
g5	90.00°	08-88

CROWN

a	42.00°	28-68
b	42.00°	30-66
c	42.00°	26-70
d	41.85°	02-94
e	41.60°	08-88
f	39.50°	46-50
g	37.95°	29-67
h	37.75°	25-71
i	37.00°	96-48
j	36.55°	10-86
k	27.40°	33-63
l	21.10°	27-69
m	21.10°	05-91
T	0.00°	Table

having heard the news (which travels fast in those parts). It was apparently quite a find. Screening sapphires and picking them out occupied most of the afternoon. We plucked each one with a pair of tweezers. The buckets produced 960 sapphires weighing 425 carats (85 grams). A number of good cutters were found there. Most of them were small



The big one! One flip of the screen revealed a clean yellow sapphire weighing 6.86 carats.

Ray showed us some interesting samples that he collected. One showed a rare example of a sapphire still attached to the matrix, which appeared to be a finely brecciated intrusive. He also showed us some very fine quality rough and some cut stones that he had produced as part of his survey and mine development work.

At this point, we were beginning to feel the need to head south, as all good things must come to an end. Our eyes were red from smoke and dust, and our tents were beginning to collect falling ash from the sky. We thanked Ray and Deb profusely, bade them goodbye, and began the long drive home.

Ray continues his sapphire exploration work at Rock Creek and hopes to use his knowledge of the mining history there to locate more sapphires. Armed with his personal experience and the mining stories told by his Grandfather, Ray should obtain some interesting results from surveying the area. He hopes to identify a deposit large enough to justify a serious mining effort. He appears to certainly be on his way toward that goal, and we wish him all the best of luck finding it.

We stopped for dinner at the Alder Steak House in the town of Alder, located in south-central Montana. After dinner, we traveled east with the intention of camping in the nearby forests someplace. We passed through the town of Virginia City, the first state capitol of Montana. Steve and Nancy attempted to locate a resident there who Nancy had known since 1972.

This fellow, Roger Williams, was not to be found anywhere in town. Just before leaving the town's limits, we stopped at the Volunteer Fire Department and discovered Roger lurking among the engines. Roger graciously invited us to camp in his backyard in town. We played fiddle, guitar, and sang well into the night.

Roger was, at one time, a drag-line operator in many of the large gold mines located in the Virginia City area. Roger is a fourth-generation gold miner in Virginia City. He related a great deal of information to us about the history of those mines and described the methods they employed. Roger knew where a gold mine currently operated that he thought we might be able to visit, so he took us there in his 1941 Jeep. The mine was a placer-type operation that worked a drainage that a previous operation had been forced to leave, due to legal problems years ago. The current operator had secured permits in an attempt to recover the gold from this 200-yard long, rich section of creek bottom.

Gold mining there proved to be difficult. Quite a significant overburden needed to be removed. Roger's drag-line had taken it off easily, whereas the "modern approach" that uses a large excavator had a hard time. The machine appeared tilted and looked as if it might tumble into the mud pit at any time. Groundwater had rapidly invaded the working pit, and the miners were struggling to pump out the water with a pump unit that had no instructions, manuals, labels, or any standard wiring color code (it was from Sweden). The miners asked me to look at the power wiring, but I declined. It would have been absolutely pointless and also dangerous without a readable set of manuals. These miners were a tough bunch and were willing to risk their livelihood in the tradition of all miners, by sheer determination. It was a scene that has been replicated all over the west, where small mining operations attempt to make a "go" by wildcatting bypassed zones of rich deposits.

As we were about to pack up and head south (again), Roger sprang another surprise on us. Among the many and varied titles he holds in the town of Virginia City, Roger also serves as the head engineer on the Alder Gulch Steam Locomotive Line. This railroad line runs from Virginia City to Nevada City, carrying tourists during the summer weekends. The locomotive is a 1910 Baldwin 4-8-0 that had been originally in service in Mexicali until the early 1970s. It was brought to the U.S. and rebuilt through a one-million-dollar state grant and placed back into service. Roger noted that the next day was a big celebration weekend. If we wanted to stay for it, then we could assist with “firing up” the locomotive in the morning and “taking her out for a spin”. It was a done deal, indeed! No thinking required. When would you ever get the opportunity to do that?

I can honestly say that those steam locomotive engines are much more complicated than you might think. It takes a lot of skill to operate one without blowing yourself up, and everyone else around you. None of us got blown up, thanks to Roger’s consummate skill and keen knowledge of the machine. For Steve and I, both of us engineers by training, it was the treat of a lifetime. We spent hours dissecting the operation of

each component that morning. We also identified a few overlooked maintenance issues on the engine while crawling around. We were, at least, useful in some respect in finding more work for others to do!

We even got to run the locomotive! It was quite an exhilarating experience to move the throttle on a 90-ton steam locomotive by 1/8 inch and literally feel it jump underneath your feet. I found it similar to riding a big draft horse, where one can feel it move, breath, and pulse beneath you. Wow! It requires a lot of concentration to run the engine steadily, smoothly, efficiently, and safely. It found it hard to see how those “Old-time Western” engineers managed to operate these engines through all kinds of conditions, some unfriendly ones, at that. It gave me a new appreciation for their skills.

After a simply splendid morning that we will always remember, we simply had to get on the road. Our return time was getting very short. We bade Roger and his locomotive, the gold mines of Virginia City, Ray Hess and the sapphire mines of Rock Creek, all goodbye for this trip. We drove the trail home for an uneventful trip back to the land of enchantment. As I petted Dusty on the way home, I must admit to spending many hours dreaming about moving to Montana!



Nancy Attaway, Scott Wilson, and the noted Virginia City local, Roger Williams on the Alder Gulch Engine Number 12. The train was built in 1911 and was operated in Mexico until the 1950’s. The train started life as a wood burner but was later converted to burn oil.



In the News

Gemesis and Apollo Synthetic Diamonds

Source: Wired Magazine; September, 2003

Two US companies are successfully synthesizing diamonds. This fascinating and well-researched article describes the two different crystal growth methods, one used by Gemesis of Sarasota, Florida and the other used by Apollo Diamond of Boston, Massachusetts.

Gemesis manufactures diamonds by a high pressure/high temperature method, where a crystal is created in a chamber that mimics geologic conditions. Gemesis diamonds grow in a metal solvent, and tiny particles of those metals get caught in the diamond lattice as it grows. Such diamonds are usually detectable with expensive and advanced equipment. However, Apollo Diamond manufactures diamonds by chemical vapor deposition, where a diamond crystal is formed when a plasma cloud rains carbon onto diamond wafers. Chemical vapor deposition produces extremely pure diamond crystals, nearly 100% pure diamond, that are extremely difficult to determine from natural. Both companies currently manufacture yellow diamonds, since it is more expensive to make white diamonds.

Both Gemesis and Apollo Diamond entered the gem market in order to generate the necessary funds for the manufacture of diamond wafers for computers. The greatest potential for diamonds grown by chemical vapor deposition lies in the computing industry. Diamonds for semiconducting will need to be affordable and grown large enough to be used as wafers. Silicon wafers used by Intel now measure a foot in diameter. However, silicon will not be able to withstand the higher temperatures generated from faster computer speeds as processors run hotter and hotter. Diamond, as an inherent insulator, does not conduct electricity and can withstand the high temperatures that melt silicon. Both Gemesis and Apollo Diamond have been able to inject boron into the crystal lattice, creating a positive charge, an n-type diamond with sufficient conductivity.

The diamond industry is now realizing the threat posed from such companies as Gemesis and Apollo Diamond, who sell their manufactured yellow diamonds for a lot less than the market value of naturals. Although Gemesis discloses the nature of its diamonds, what happens when diamond wholesalers do not disclose the use of synthetic diamonds in jewelry? Only a small percentage of larger diamonds are lab-certified.

Diamonds smaller than 1/5 of a carat are rarely sent to a lab, due to the testing costs eating the stone's profit.

Reading this article is highly recommended.

New Enhancement for Blue Sapphire

Source: JCK on the Web; October, 20, 2003

AGTA reports a new treatment for blue sapphires. The AGTA Gemological Testing Center observed in some blue sapphires, the ones that recently entered the US gem market from Sri Lanka, indications of having been treated by a new method. Most of the gems showing these indications ranged from 2 to 17 carats. Microscopic observations on one of these gemstones showed indications of heating. Immersed in methylene iodide and illuminated with a diffused light source revealed a pale blue to near-colorless layer that closely followed the girdle outline. A much deeper rim of light blue surrounding a deep blue core was seen in other gemstones. The interface between the rim and the core is undulating and delineated by a white line. Similar characteristics have been seen in two rubies. The research testing method that has positively identified beryllium-treated padparadschas will not work with the new blue sapphires. Also, SIMS (secondary ion mass spectrometry) analysis performed on several of the blue sapphires have not revealed the presence of beryllium.

Identifying CVD Diamonds

Source: JCK November, 2003

Apollo Diamond submitted to GIA several CVD cut and rough diamonds for identification and research. GIA observed under a microscope characteristic strain patterns that were different from those seen in natural diamonds under magnification. GIA reported that the CVD diamonds displayed strong red fluorescence while exposed to high-energy UV radiation in the DeBeers' DiamondView, a machine designed to detect synthetic diamonds. GIA performed other diagnostic tests with special spectroscopy instrumentation, short-wave UV light, and longwave UV light. If a SWUV light is held over a type II diamond, the SWUV will pass through the gem and cause the platform of the Spotter to fluoresce green. As with HPHT diamonds, identifying CVD diamonds requires advanced instrumentation to positively identify the high quality single crystal Type II CVD diamonds. All CVD diamonds manufactured by Apollo Diamond will be laser-engraved and will be accompanied by a certificate. Apollo Diamond believes in full disclosure.



Facet Designer's Workshop

By Ernie Hawes



Dylan Houtman has created an unusual design that I really like. Dylan calls it simply **Cushion Keystone**. I think folks who cut this design will agree that the name, while accurate for the shape, does not really suggest the beauty of the finished gem. It will make a very attractive pendant stone, and a pair of them would be absolutely beautiful in earrings.

The instructions for the **Cushion Keystone**, at first glance, appear lengthy. However, the steps are all pairs, with the exception of one row of girdle facets. Dylan says that it is a fairly easy design to cut, and I would agree. Dylan's original stone was cut in chrysoberyl, but the angles would work well for corundum or other materials that use the same angles as corundum.

The second design for this issue is also unusual in that I designed it for an 88 index. Facetron makes this index, but I do not know if any other company does. Other than the index, the design is really very straight forward and should be an easy cut for most faceters. I was just playing around with GemCad when I designed this pattern, but I liked it well enough and decided to put it in the newsletter. If you have a Facetron or another machine that has an 88 index available, then I think that you will like the designs that you can cut with this index. I have decided to call the design **88 Swirl**. The scintillation produced by this design when cut in corundum, and the swirling reflections of light produced when the stone is moved about once again prove that a high average brightness is not always necessary to produce an attractive gem.



Faceting Designs by Ernie Hawes and Nancy Attaway Appear in Lapidary Journal

The December, 2003 issue of Lapidary Journal featured on pages 48, 49, and 50 a new faceting design by Ernie Hawes called the **Portuguese Cushion Triangle**. In the article, Ernie explained some history of facet designing and how his particular design evolved. He referred to Merrill O. Murphy as one of the early creators of faceting designs. Lapidary Journal printed a photograph of the lovely cushion cut triangle that Ernie cut in amethyst using this beautiful diagram.

Ernie Hawes has been actively faceting since 1974 and has been designing faceting diagrams for nearly twenty years. Ernie's designs have been recognized on three different occasions as being among the "Twelve Best" published that year. Ernie was a founding member of the New Mexico Faceters Guild. He has served as Guild President, Guild Vice-President and Editor of the *New Mexico Faceter*. The New Mexico Faceters Guild has been most fortunate these last twenty years to have such a creative designer of faceting diagrams as Ernie Hawes in the membership.

The October, 2003 issue of Lapidary Journal featured on pages 84 and 85 a unique faceting design by Nancy Attaway called the **Aspen Leaf**. Nancy explained in the article how the idea of her design became a reality. Lapidary Journal printed a photograph of the Aspen Leaf design that Nancy rendered from a large chunk of oro verde quartz.

Nancy began faceting in 1987 and has been creating original faceting designs about ten years. She prefers to work in natural gem material and enjoys solving problems encountered in faceting. One of Nancy's designs was selected among the "Twelve Best" one year. Two of her designs were chosen for a particular faceting category in two different gemstone faceting competitions. Nancy joined the New Mexico Faceters Guild in 1987. She has served as Guild President, Guild Vice-President, and is the current Editor, with her husband Steve Attaway, of the *New Mexico Faceter*.

