I elected to consecutively fire two different kilns at the 2014 Southwest Kiln Conference held at Tijeras, New Mexico. The first kiln was fired in an oxidizing atmosphere and the second in reduction. Thanks to all participants who brought pots for the kilns, helped with the firings and those who provided additional photos for this report!

Both kilns were basically a hole in the ground with a canopy of juniper branches over the unfired pots, which when burned transforms them into ceramics. The firing process as outlined below begins by filling flat-bottomed pits with juniper fuel, which is then ignited (the preheating step). The pots to be fired are arranged around the edge of the pit and rotated occasionally to drive out the free water in the clay body.

The preheating fire burns down to a thick (approximately 6 inch) bed of live coals, upon which cold sandstone slabs (kiln furniture) are placed. They provide a platform on which to place the pots while isolating them from the hot coals. As illustrated in the photos below, jar forms are set upright or on their sides and bowls are stacked upside down to keep them from filling with coals and ash (the kiln setting). The pots are allowed to continue preheating until they become uncomfortably hot to the touch, a temperature at which the chemical water has been forced out of the clay bodies.
The next step of the firing process is to stack a loose framework of juniper branches over the pots (the fuel setting). At this point the two kilns diverge. The oxidation kiln fuel is stacked into a loose teepee shape, which ensures the free circulation of oxygen among the pots after the initial heat rise. The reduction kiln fuel is stacked by laying down a pair of long juniper branches on opposite sides of the long axis of the pit, followed by two perpendicular branches resting on the lower pair. The pattern is repeated and gradually worked inward to create a substantial cribbed structure that allows for a reducing (or at least neutral) atmosphere throughout the firing.

Once stacked, the fuel is ignited and allowed to burn down without further intervention.
Due to the lesser amount of fuel used in the oxidation firing, the final step (kiln opening) occurred later in the same day. The strong gust of wind that came up just as the fuel was fully aflame caused most of the larger pots to explode and the smaller ones to crack. The pink, false-bottomed rattle mug in the front of the display table below was a notable exception. Examination of some of the remaining pottery fragments and the ring of several pots indicates that a temperature in excess of 900 C was achieved during the firing.

Because of its larger charge of fuel, the reduction kiln took much longer to cool down, although it was partially opened in order to retrieve a small cooking jar needed to prepare posole on the firing coals for the after-firing meal. The next morning the kiln was formally opened, revealing both well-fired and slightly under-fired black-on-white pots with traces of light oxidation on two cooking jars.

Lessons Learned
➢ Tall pots, like the broken one on the back right of the display table above are very difficult to fire upright. Although it was placed on a cold sandstone slab, part of the pot was too close to a very hot coal, which resulted in a large spall on the bottom (barely visible on the lower right side as lighter gray color). Fortunately, it happened prior to setting the fuel and was removed and replaced with the somewhat shorter B/W olla in the Notable Survivors photo above. The best way of firing such tall pots appears to be on
their side, with one or more thick sandstone slabs supporting and elevating it well above the hot coals. Using thin slabs creates a black fire-cloud (easily seen on the utility ware jar in the same photo) due to the inability for the kiln gasses to flow under the pot.

➢ In reference to the Notable Survivors photo above, the Mesa Verde style bowl in the front and the small handled bowl in the back display impressive black designs on a dead-white surface. In contrast, the large olla and the small handled bowl in the back exhibit watery black paint on muddy white backgrounds. Although each pair has different paints, the fundamental reason for their different appearance stems from the different white slips. The bright B/W pots were slipped with Dolores White, Morrison Formation clay from near Dolores, Colorado. The paint is black iron oxide, which together were appropriate for the atmosphere and heat of the kiln. The underfired pair was slipped with Cannonball Mesa White, highly refractory clay from the same formation on Cannonball Mesa, Colorado. The paint is bee weed, a combination that exhibits classic signs of being under fired.

➢ On a related topic, there were not enough sandstone slabs available to line my B/W kiln prior to the firing process, which may partially explain the under fired pots noted above. Intuitively the slab lining seen in Ancestral Pueblo B/W kilns serves to contain and reflect some of the heat of firing back into the kiln, resulting in effectively higher temperatures given the same amount of fuel. In contrast, oxidation kilns do not require slab lining because red earthenware clays tend to bloat and deform at B/W temperatures, especially if also subjected to a reducing atmosphere.

➢ Both of the kilns suffered from being unbalanced – too many pots in too small a kiln. In other words, I sized my excavations to fit the pots I brought to fire without prior knowledge of how many attendees wanted to add their pots to the pile. My response was to place the pots on top of each other, resulting in a pyramidal stack that proved problematic. Simply put, the best kiln setting is probably a single layer of similar sized vessels, which precludes vessel wall deformation, minimizes top-to-bottom temperature variation and perhaps even ameliorates excessive heat shock to the vessels on top.

➢ Firing the two kilns on the same day made me realize that the firing process developed for replicating Black-on-white pottery is not appropriate for firing in oxidation. Slowing the process by adding additional fuel after igniting a minimal fuel tenting should result in an incremental heat rise over a period of hours rather than minutes. It is hoped that this change will minimize heat shock and ensure full oxidation throughout the firing.

➢ Finally, I realized that sequentially firing two kilns was exhausting. From now on I will concentrate on perfecting the oxidation firing routine and would hope that someone else would step up and take over (and hopefully refine) my cribbing approach to B/W replication firing. Of course I will bring B/W pots to fire and provide as much assistance as possible.