Tri-State Mining District legacy in northeastern Oklahoma

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The Tri-State Mining District (TSMD) covers approximately 2,500 square miles (6,475 km²) in southeastern Kansas, southwestern Missouri, and northeastern Oklahoma. As a leading producer worldwide of lead and zinc, this area yielded about 460 million tons of ore between 1885 and 1970. This production level exposed the TSMD to mining-related hazardous substances since the late 1800s which caused elevated concentrations of metals in the environment of mined areas, streams, and downstream rivers. By the 1930s, many miners and their families became ill due to poor air quality in the mines, processing facilities, and crowded living conditions. The TSMD had the highest rate of tuberculosis in the country. In 1991, concern about the environmental problems increased when residential soil contamination was accepted as a primary source of elevated blood lead test levels in area children. Long-term environmental effects include subsidence and mine collapse, extensive mining waste, contamination of residential air and soil, surface and groundwater, sediment, public water wells, and injury to terrestrial plants, fish and other aquatic life, wildlife, and human health. The impact of TSMD intertwines with the Quapaw, white miners, and other area residents from the early days of shallow ore mining in Missouri and Kansas, to the establishment of boomtowns and years of mining in vast underground caverns in Oklahoma, to life post-mining.

Keywords: Mining, Quapaw, Tri-State Mining District (TSMD), lead, zinc, Picher Field, Tar Creek.

INTRODUCTION

The Tri-State Mining District (TSMD) legacy relates to its capacity in global productivity in lead and zinc, environmental impact on its sizable geographic area, and significant interaction with a range of diverse cultural groups. Noted for its intricacy of mineral rights and non-uniform arrangement of the ore (Subsidence Evaluation Team 2006), estimates for the areal size of the TSMD vary from 1,188 to 2,500 square miles (3,077 to 6,475 km²), using the value of 2,500 square miles here (Chan et al. 2008). The district spans parts of southeastern Kansas, southwestern Missouri and northeastern Oklahoma (Fig. 1). Mineral rights in the Oklahoma portion of the district were complex as much of the ore was on Quapaw land and under the jurisdiction of the United States Bureau of Indian Affairs (Robertson 2006). Primary ore minerals included galena (lead sulfide) and sphalerite (zinc sulfide), also known as blende or zinc blende. Locally names for sphalerite were king jack, ruby jack or black jack; depending on the color. Other sulfide minerals found in ore veins included chalcopyrite, bornite, and covellite (Aber et al. 2010).

The district was the most productive site of lead and zinc mining in the United States from the mid-1800s to about 1970 (Andrews et al. 2009). The estimated total mine ore tonnage for the district is 498,000,000 (Assoc. of MO Geologists 1986). The mines pumped water at rates as high as >37,000,000 gallons (~142,000 m³) per day during peak production years to keep the mines dry (Subsidence Evaluation Team 2006). Pumps were stopped soon after active mining ceased and the underground mine workings gradually refilled with ground water. In 1979, mines with large concentrations of metals in the water began discharging it naturally through abandoned mine shafts, mining company wells, artesian wells, and springs (Aber et al. 2010).

Researchers have studied the effects of the contamination, subsidence and collapse features since mine waters began flowing freely from the mines within the TSMD. Governmental institutions including the Environmental Protection Agency, non-governmental agencies, and other organizations investigated and evaluated the nature and extent of contamination in the TSMD as risks to human health connected with exposure to contaminants and on environmental receptors existing within the TSMD (Ingersoll et al. 2008). As a result, numerous completed and ongoing remediation projects have addressed the district’s multitude of environmental challenges.

These research and remediation efforts afford considerable data and experiential activities for environmental and cultural learning opportunities. For example, it is possible to understand the daily lives of the miners and other residents and their resilience in the face of environmental and other hardships in the TSMD. The purpose of this study is to document the historical and environmental aspects of mining in the TSMD as it impacted the everyday life of diverse people within the district. The study uses historical records, informant oral histories, interviews, and field observations. The experiences of mine and mill personnel and their descendants as well as members of the Quapaw Tribe offer significant insight for remediation and legislation to moderate negative impacts of the TSMD.
HISTORY OF MINING IN THE TSMD

In the TSMD, there are a number of different accounts regarding the location of the first discovery of ore. Mining of lead ore has been described as beginning in 1853 near Granby, Missouri (Aber et al. 2010). Two other sites described as the location of the first discovery of ore in the district include a site on Joplin Creek within the city limits of present-day Joplin, Missouri and another site less than two miles away in an area once known as Leadville Hollow (see Fig. 1) (Johnson 2008).

Mining efforts expanded rapidly in the district after 1853. By the onset of the Civil War in 1861, mines were producing so much lead that both the North and South struggled to control the mining area to secure a source of lead for bullets. The fighting closed the mines for much of the war (Brosius and Sawin 2001).

Initially, only lead was mined due to the relative ease of identifying it, the demand for lead in bullets, and lead could be smelted in small furnaces in the vicinity of the mining sites (Aber et al. 2010). For this reason, until 1869 all mine shipments from the district were in the form of locally smelted metallic lead and miners cast zinc ores aside due to the lack of a ready market (Assoc. of MO Geologists 1986).

The mining boom

The mining boom period began in 1870, the year the railroad from St. Louis reached Baxter Springs, Kansas (see Fig. 1), and rich shallow ore deposits were revealed along Joplin Creek at Joplin, Missouri. Consequently, Joplin’s population grew rapidly, and with the new rail connections to zinc smelters, zinc was no longer cast aside and zinc production expanded so quickly that production of the element exceeded lead by the year 1880 (Assoc. of MO Geologists 1986). The Missouri state mineral is the lead ore, galena, the natural mineral form of lead sulfide, and an indication of the importance of lead to the area (Hannibal and Evans 2010).

Mining expanded westward when news spread about ore discoveries in Galena, Kansas in 1876 and in Picher, Oklahoma in the first decade of the twentieth century (see Fig. 1) (Beyer et al. 2004). The Kansas and Missouri portions of the district offered some shallow ore and were frequently described as “poor man’s camps” due to the prospects available for workers to secure mining properties without sophisticated equipment or a large workforce (Robertson 2006).

With so many operators conducting mining, drilling and milling, the result was a landscape dotted with numerous shafts, chat piles and related structures. Chat was the miners’ term for chert (flint) and is a local term for the mine tailings that collected in huge piles. Some mines in Cherokee and Jasper counties were in open pits in areas where the mineral was near the surface (Cook 2011, Fig. 2). Although shallow mining was used in Galena and some other areas of Cherokee County, most mining operations in the county were underground (van Geel et al. 2009; Chan et al. 2008).

The shallow mines in the Joplin-Galena region were essentially exhausted by the early 1900s (Aber et al. 2010). Lead-zinc mines were established in many more areas including Stark City and Waco in Missouri and Baxter Springs and Treece in Kansas, 1910-1919 (see Fig. 1) (Assoc. of MO Geologists 1986).

Small amounts of lead and zinc were extracted from Indian Territory in an area of the Picher Field as early as the 1890s, and one of the first examples was at Peoria on tribal land (see Fig. 1). Included in the new book, Pictures from the Mining Era—Cardin-Picher, OK Area, is an article from the Miami Record Herald, August 6, 1915, in which a documented
A description was provided of this reportedly earliest Indian Territory mining endeavor. A sheet of lead was chanced upon on a hillside, slightly north of Peoria and was mined with simply a small amount of dynamite, pick and shovel (Cook 2011). Cook noted people from early mining days claimed the sheet of ore was so plentiful that there was ore scattered around on the ground that you could see as you moved through the Peoria area (pers. com. GM).

In 1897, ore was discovered by accident on the Maud Abrams farm, southeast of present-day Quapaw, Oklahoma (see Fig. 1). More about the Abrams family will be discussed later. The first shaft sunk at this site led to the Sunnyside mine and the area was named Lincolnville (Johnson 2008).

In 1905, the brothers, George L. and Alfred Coleman, struck an exceptionally rich vein of ore about four miles north of present-day Miami, Oklahoma while churn drilling a water well on Emma Gordon’s 200-acre allotment (see Fig. 1). They encountered considerable lead and zinc in the borehole cuttings. Since Gordon was a member of the Eastern Miami tribe possessing an allotment with the Quapaw Tribe, she could not enter into a valid lease until August of 1907. Between 1905 and August 1907, the brothers formed a partnership with James Robinson and Charles Harvey and the four inconspicuously acquired leases neighboring the Gordon allotment (Johnson 2008).

The men did not obtain the lease of the Gordon property in August of 1907; rather, Amos Hatten was awarded the lease and deeper ore was discovered on the Gordon property resulting in the birth of Hattenville, now known as Commerce, Oklahoma (see Fig. 1) (Cuddeback 1980). This is an example of the complexity of mining in the Oklahoma portion of the district as the Gordon property was located on Quapaw tribal land, and was administered by the Bureau of Indian Affairs (BIA) (Robertson 2006).

The importance of the ore in the Oklahoma portion was elevated in 1912 with the discovery of rich ore on the Shorthorn lease two miles northeast of Commerce. Cuddeback noted some historians claimed the Shorthorn was the first ore discovery in the area of Picher, Oklahoma (Cuddeback 1980).

One of the most fortuitous discoveries in the Picher Field could be described as a happy accident when in 1913 the Picher Lead Company’s prospecting rig became mired in mud in a rain-soaked field. In 1915, with the equipment still entrenched in the swampy area, the crew was ordered to drill in that area and so the crew elevated the machinery out of the mud and began drilling.

The site was ¾ miles south of the Kansas/Oklahoma border and according to Johnson (2008), was ½ blocks west of Connell Avenue in Picher. The ore was so rich that by summer of 1915, the company had drilled approximately thirty holes reaching in all directions from the first site and by the close of the year there were more than 160 mines and mills within five-miles of the community (Johnson 2008). Due to resultant rapid growth, Picher was incorporated in 1918 (Fig. 3).

After the discovery of such rich ore in the Picher Field, the larger “sheet-ground” mining companies secured land holdings in the Picher, Oklahoma, and Baxter Springs and Treece, Kansas, areas. These three communities were all close to the Ottawa County, Oklahoma/Cherokee County, Kansas, border. The movement of the mining equipment to begin working these new areas essentially ended the large-scale “sheet-ground” mining in Missouri. Remaining endeavors in Missouri were restricted to small, upper-ground deposits with rich ore (Assoc. of MO Geologists 1986).
Random room and pillar mining

In the Picher Field, mining companies excavated rooms and left pillars in place to support the mine roof during mining (Subsidence Evaluation Team 2006). Some of the mined rock layers were saturated with ground water to the extent that constant pumping was required to keep the mines dry enough to allow mining operations to be completed (Chan et al. 2008). It has been estimated that between 1920-1945, 36 million gallons (136,260,000 L) of water were pumped every day from the mines by 63 major pumping stations just to keep the mines dry (Mine Shaft Subcommittee 2000).

Some former miners have claimed that several underground cavities were large enough to accommodate a baseball game and at such risk for collapse that grass roots could be seen growing from the ceiling (Fig. 4). The panoramic image of chat piles spanning Figures 5A and 5B offers a glimpse of the extent of mining in the Picher area.

Milling

In the initial mining era of the Picher Field, each mining company placed a mill at its most productive site, meaning there were more than 200 processing mills in the area. Valuable ore was separated from waste rock by water pumped from underground through the mill. In early years, an inefficient method known as jigging and tabling was the process for extracting ore. It was possible for mills to recover zinc and lead by jigging or shaking tables because of the differences in specific gravity of galena, zinc, flint and water. By jigging ore up and down in water, the heavier minerals settled faster and the sludge table was capable of recovering sand-sized particles of the minerals. In order to recover values lost by the jigs and tables all tailings piles were rerun at the mills and had to be deslimed repeatedly (Cuddeback, 1980).

Figure 4 (right). Mine cavity with dragline. Photograph used with permission, source: Pictures from the Mining Era, Cardin-Picher, OK Area, 2011, by Fredas Cook. Cook noted he does not agree that the mines were as fragile as described below. Notice the dragline in image. Mr. Cook explained that the dragline was not only used in the cavern of a mine but was also utilized above-ground to drag down portions of tailings piles.

Figure 5A. Extent of mining from Premier tailings pile in Picher, Oklahoma. Left side of image. Image spans 2-pgs. Used with permission from Fredas Cook’s personal collection.
By the 1920s, the flotation method was in place with recovery of 80-85 percent of metal contained in the crude ore. Differential flotation involved several steps. First, ore was fed into a machine that mixed the ore with water and reagents that floated only the lead and so allowed removal of the lead. Next, the remaining ore was fed to a machine for similar treatment with different reagents that allowed floating and removal of the zinc. Additional processing of the separate lead and zinc products was required to produce saleable concentrates. The separate concentrates also underwent dewatering prior to shipment to smelters. As mills recognized the value of the flotation method, many mills discontinued the use of the sludge table and installed large ball mills to grind product fine enough for recovery by flotation process (Cuddeback 1980). For a thorough account of mining and sealing methods, refer to the Mine Shaft Subcommittee (2000). For mining and milling methods, consult Cuddeback (1980).

The Commerce Mining and Royalty Company, the company formed by the Coleman brothers and two partners, was successful in obtaining the first revised leases on restricted Indian land to permit milling at a central mill with royalty settlement based on accurate weighing and sampling. As a result, the company constructed the first mill assembled for the processing of ore from multiple mines, the Bird Dog Mill, two miles east of Picher, in 1930 (Cuddeback 1980) (Fig. 6).

Between 1932-1935, Eagle-Picher constructed another mill for processing ore from multiple sites and the mill became known as Central Mill (AATA International, Inc. 2005; Mine Shaft Subcommittee 2000) (Fig. 7). Located in the southwestern corner of Picher Field, the larger mill was one mile south of Cardin, Oklahoma, a community at one time known as Tar River (see Fig. 1) (Cook 2011). Eventually, the newer Central Mill was able to process over six times the capacity of the Bird Dog mill, that is, 18,000 tons of ore a day (AATA International, Inc. 2005).

Even with the mill’s huge capacity, it was not possible to achieve production for all district mines. As an example, in 1947 there were 65 mining companies operating 135 mines and 46 mills in the district (Mine Shaft Subcommittee 2000).

Cuddeback (1980) stressed that the Central Mill was the most important influence in the rejuvenation of the district following

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Figure 5B. Extent of mining from Premier tailings pile in Picher, Oklahoma. Right side of image. Image spans 2-pgs. Used with permission from Fredas Cook’s personal collection.
the hard times faced during the Great Depression. The mill likely extended the life of the district.

During the years of the Great Depression, many mines closed down, their mills either dismantled or left in poor repair (Cuddeback 1980). Eagle-Picher Company had acquired so many companies by 1950 that over half of all production in the TSMD was in their control. After World War II, production gradually declined (Aber et al. 2010). In 1958, many of the companies were closing doors and moving out of the district, and by 1970, all mining had ceased.

MINING AND THE PEOPLE

The Quapaw (O-Gah-Pah)

Before describing the mining history of the Quapaw Tribe, their earlier history will be reviewed briefly. After splitting with the Dhegiha Sioux several hundred years ago, the Quapaw moved down the Mississippi River into Arkansas and this is the origin of the word, Ugaxpa, which translates into “downstream people” in the Quapaw language. Ugaxpa is now most often spelled O-Gah-Pah, essentially, the phonetic spelling of Ugaxpa (Quapaw Tribe).

The years 1824-1834 were particularly devastating to the tribe with the loss of their Arkansas homeland, and the tribe divided with some members moving to what is now northeastern Oklahoma and other tribal members to the Red River area. The members of the Quapaw Tribe that settled in the northern part of Indian Territory arrived in late 1835, leaving tribal traditions behind (Fig. 8).

In 1836, the United States government decided an error had been made and that the Quapaw should be located north of the Seneca and Shawnee but did not inform the tribe until 1838. By then the tribal members had made significant improvements to the land that would now belong to the Seneca. The tribe was not paid for the improvements (Johnson 2008).

There is debate regarding the reasons the Quapaw left their tribal rituals and songs behind in Arkansas. Some historians would likely say the tribe had assimilated into white culture and traditions were gradually lost over many years. A story is frequently shared here in northeastern Oklahoma, about the tribe’s relocation, as follows (paraphrased from Earl Hatley’s toxic tour lecture, 2010):

When the Quapaw reached their final area of relocation in northeastern Oklahoma, they first had to cross the Spring River. A number of tribal members died as they attempted to cross to reach their new settlement. As surviving members of the tribe stood on the shore, some claimed to see the Devil walking back and forth atop the bluff on the far bank of the river and commented that the land was cursed. The tribe agreed to leave

Figure 8. Indian Territory Marker erected by Oklahoma Historical Society. The marker reads, “In 1833, this area ceded Quapaw Tribe by U.S. lands near granted Indians of 20 tribes including Seneca, Shawnee, Peoria, Miami, Ottawa, Wyandotte. Wealth came to the Quapaw and to other Indians here, from discovery of rich lead and zinc mines beginning 1905.” Actually, wealth only came to some—not to all tribal members. Photograph used with permission, source: DVD accompanying book, Making a Difference at the Tar Creek Superfund Site—Community Efforts to Reduce Risk, R. Jim and M. Scott, editors, 2007.
their traditions behind if they were allowed to cross safely to their new settlement. The bluff was subsequently named Devil’s Promenade, and the area of the Spring River has sometimes been referred to as the Devil’s Kitchen.

From 1861-1865, many Quapaw along with other tribes fled their home to reside in Kansas refugee camps under great deprivations during the Civil War. When 265 Quapaw returned to their reservation in November 1865, they came to know that their homes had been looted or destroyed, fences were gone and their cattle had been stolen (Johnson 2008). Johnson noted there was repeated pressure for the tribe to become absorbed into the Osage to allow settlement of other tribes on the Quapaw Reservation. With continued pressure, many Quapaw moved west into the Osage reserve. Further numbers declined with illness until in 1880, only 35 Quapaw people reportedly remained on the reservation.

During the period from September 1886 to October 1887, the tribe adopted Indians from other tribes if they would settle on the reservation, for fear of losing status as a nation and the title to their reservation. After hearing about the adoptions, many absentee Quapaw living among the Osage returned to the reservation by 1887.

In 1889, the U.S. Secretary of the Interior ordered a Quapaw roll be established to include only approved adoptions. Abner W. Abrams had been adopted by the Quapaw and with keen negotiation skills represented the tribe regarding approval of the adoptions and the Quapaw roll.

Whites had been renting Indian lands since 1881 and their numbers were growing rapidly by the 1890s. The Quapaw Reservation was divided into hundreds of individually owned allotments under the Dawes Severalty Act, beginning in 1893 (Robertson 2006) (Fig. 9). With the movement of mining interests to Indian Territory, the BIA required the Quapaw to lease their land to mining interests (Aber et al. 2010). Only the tribal members with ore mined on their land received remuneration for the minerals and some of these landowners became exceptionally rich while many other tribal members lived in poverty (Robertson 2006). Also, if a tribal member

Figure 9. Native American-owned land (in red) in the Tar Creek Superfund area, Ottawa County, Oklahoma. Some boundaries are inconsistent in different records (pers. com. D Cates). Orange highlighted area indicates communities of Picher and Cardin, Oklahoma. Treece, Kansas is just beyond the map’s northern border on U.S. Highway 69. Black line indicates suggested wetland area boundary that now contains the University of Oklahoma Passive Treatment System. Adapted from Governor Frank Keating’s Tar Creek Superfund Task Force Final Report, 2000.
refused to allow exploration and mining to proceed, the individual was declared incompetent and the mining proceeded anyway (Johnson 2008; Aber et al. 2010).

By 1895, Abrams obtained mineral leases from a number of Quapaw allottees. He and Samuel Crawford, Quapaw lobbyist, sidestepped government opposition to the leases and secured congressional approval for Quapaw Tribal leasing of allotments for agricultural and business purposes with the exception of those who were extremely “old, idiots, imbeciles, or insane” (a clause that later hurt some allottees). With the passage of this legislation in 1897, the Quapaw became the only tribe to achieve self-allotment and could lease their lands without government supervision. However, the tribal members were restricted from selling their land without the government’s approval for 25 years. That same year it was on one of the Abrams farms that a heavy vein of lead ore was found serendipitously while digging a water well—at the Maud Abrams farm east of the family home (Johnson 2008).

During early Picher Field mining years, several Quapaw landowners became victims of fraud and schemes such as pyramiding of royalties. In some cases, the leasee could not read, write, or understand English, and/or was elderly and sickly. In 1915, the overlapping of leases and the assignment of future royalties by Indians were ruled illegal. The federal government also arranged the return to Quapaw leasees; roughly 9000 acres of mineral lands obtained by fraud and cancelled mineral and agricultural leases on nearly 30,000 additional acres. The restriction on Quapaw land was approved for three 25-year extensions with the support of the Quapaw and the final one expired in 1996 (Johnson 2008).

In reality, only ten Quapaw families received the majority of mining royalties. The few that became exceptionally wealthy squandered much of their fortune during the 1920s and 1930s. By 1963, only seven Quapaw had balances at the Indian Agency exceeding $45,000. If the Quapaw had pooled the mineral royalties for the benefit of all tribal members, as the Osage had done with oil royalties, the body of wealth would likely have been safeguarded rather than mostly lost (Johnson 2008).

Few Quapaw tribal members resided in Picher or worked in the mining industry even though Picher was on allotted tribal land. Most resided in the nearby community of Quapaw, several miles to the southeast of Picher.

Robertson (2006) noted the Quapaw held a moderately high social standing, patronized Picher businesses, and their children attended public schools. The early Indian schools were an advantage for many white children in the area, as they were allowed to attend the superior Indian schools with tuition (Johnson 2008). Between 1915 and 1927, Indian children and some white children attended a Catholic school, St. Mary’s, and were housed in a dormitory on 40 acres (~16 ha) in the Beaver Creek watershed (Nieberding 1953).

Robertson (2006) stressed other minority groups did not receive the same respect; in fact, the Ku Klux Klan (KKK) was influential in local politics, and for years foreign-born Europeans and African Americans were banned from living and working in the region (Robertson 2006). Area Catholics, including many Quapaw, were reminded of the KKK’s view of the Catholic faith, too, when fiery crosses were burned on chat piles in the neighborhood of the Quapaw Tribe’s Catholic mission (Nieberding 1953).

Additional abuse of tribal members’ rights occurred when chat accumulated on their property. The BIA policy required mining companies to leave chat piles on the land as the chat possibly had economic value. But in later years, the Quapaw tribe was prohibited from selling or removing the chat after the U.S. Environmental Protection Agency declared the chat toxic and named Tar Creek a Superfund site. At that point, the BIA placed a moratorium on the sale of chat owned by Indians. As a result, vast chat piles amassed over decades of mining, and many remain to this day.

James Luedecke, former Assistant Environmental Director for the Quapaw Tribe, noted the BIA lifted the chat sale moratorium several years ago and the chat is now being sold, some for roadway construction projects. There are ongoing frustrations regarding the chat sale issues and understandably, a number of Quapaw tribal members are angry. Rebecca Jim, executive director of Local Environmental Action Demanded, Inc. (LEAD), a local nonprofit environmental organization, noted private companies are receiving $6.00 per ton of chat while Indian chat sells for $0.86 per ton due to many governmental restrictions (pers. com. GM).

Only twenty years after the first official Quapaw roll listed 193 persons, the population of the Quapaw in 1910 was recorded as 231 and of those, 103 were at least ½ white. As with many cultures in modern society, the blood degree of Quapaw descendants becomes smaller with each succeeding generation. In 2008, 3,100 enrolled Quapaw were able to claim kinship with at least one of the 193 individuals on the 1890 roll (Johnson 2008).

White miners

Although some mine and mill owners became wealthy, the majority of miners worked for low wages, and many in the early days resided in substandard housing. With the establishment of so many mines in the Picher Field, the growth in population increased to meet the labor needs in the mines and mills. The majority of miners who moved to the Picher field area were from the Ozark Mountains. Most were of English,
Scottish and Irish descent (Johnson 2008). For labor in the Picher Field, workers commuted from as far away as Joplin, Missouri (Fig. 10). A trolley line connected the TSMD to facilitate the workers’ commute and mostly what remains now are remnants of track (Larry O’Neal conversation) (Fig. 11).

Mine and mill personnel had a sense of pride and identity connected with their experiences. It has been estimated that portions of the TSMD activities directly or indirectly affected as many as 250,000 people (Mine Shaft Subcommittee 2000).

With the boom in the Picher Field, communities such as Douthat, Oklahoma came into existence almost overnight (see Fig. 1). As boomtowns spread throughout the district to serve the needs of the burgeoning population there was indirect economic growth resulting from the establishment of other businesses such as banks, hospitals, saloons, restaurants, and more to serve people working in the mines and mills and their families. Due to overcrowding in substandard housing and poor air conditions and hazards in the mines, there were high rates of illness and death among the TSMD’s people. In considering the estimate for numbers of people directly or indirectly affected by mining activity, it is important to consider environmental impacts (pers. obs. GM). For example in 1995, it was estimated that the district’s abandoned mines and tailings piles presented severe environmental problems for approximately 695 square miles (1800 km²) (Aber et al. 2010).

Douthat was in its prime during the 1920s and now only has shells of buildings and a single complete structure standing, a church (Fig. 12). Relics such as these are a reminder of the district’s mining past and are a reminder that past mining activity has damaged the district’s environment and continues to impact area residents.

After the discovery of ore, mining towns grew so quickly that housing was always in short supply. In the Picher Field area, the ore was much deeper and organized companies moved in to establish mines and set up mills. Most building structures set on BIA leases, and the mining lease system was unpredictable for workers and merchants in the area as mineral development had priority on company-controlled areas. Most residents dwelled in small shanties next to the mines and set up mills. Most building structures set on BIA leases, and the mining lease system was
Most miners toiled under difficult conditions, and low wages were an established problem for the Tri-State workforce. Patience was a needed virtue in early years as each mill had a horn with a unique sound and workers would wait at home until they heard their mill’s horn and then would report to work when there was sufficient ore to process (Tri-State Survey Committee 1939).

INFORMANT INTERVIEWS

After reading the recollections of F.J. Cuddeback, as documented by his friend, Willie Osborn, and then talking informally with John Mott, former mill worker, the authors recognized the historical significance of the everyday memories of people who were associated with the mines and mills. Subsequently an oral history component was added to the project. The purpose of collecting personal memories, stories, and observations from some of the TSMD’s residents is to promote a better understanding of the worth of the district to area residents, and to bring its mining history and impact to life, while ensuring that the valued qualities of this place are not forgotten or lost in the future.

John Mott

John Mott was selected for interviews due to his experience working in the district’s mills and environmental work. Interviews were conducted at the LEAD office in Miami, Oklahoma (March and July 2011).

John Mott was a Picher, Oklahoma, resident until the government-funded voluntary buyout and relocation project for Picher residents. Mott, long-ago mill employee, was asked what single word he would use to describe people connected with the mines and mills (Fig. 13). This was his response:

“In 1946, I was visiting with friends at a service station at 7:00 a.m. A man in a 1936 truck pulled in and frantically began to hit the horn. When I went out to his truck to see what was wrong the man explained that he had been gouging at an old mine east of Picher near Martin Mill. He shouldn’t have legally sold the ore because it belonged to someone else but he was trying to help with the war effort.

He had been lowered down into the shaft in a can by a truck’s wench and his only partner at the mine was the person running the wench. He got down in the mine and there was water so his partner brought him back up. They lowered a 12-foot boat down into the mine by wench. Then they lowered him back down into the boat in the mine. All he had for light was the carbide light on his hat and he paddled using a 2-by-4. He stood up in the boat and pulled himself along the rock wall of the mine.

When he would see a piece of lead sticking out he’d break it off with the little pick in his right hand and then gently place the lead in the bottom of the boat. He went along “high-grading” like that. He got halfway down and the boat was halfway full of lead. He hit a rock on the wall. A slab fell and crushed the boat.

He was in the dark, 250 yards from the shaft, in the water with no light at 6 a.m. He had to feel the wall all the way back to the
can. He climbed into the can and rang the bell to tell his partner he was ready to come up. The partner brought him to within ten feet of the top of the shaft and the truck ran out of gas.

He noted after his partner added gas the truck sputtered for what seemed like forever before it finally started and continued bringing him to the surface. I don’t know why his partner didn’t accompany him to town but he said he drove himself to town in ten-degree weather, soaking wet. When he pulled into the gas station, and I walked to his truck to help him I noticed his driver’s side window was missing and his seat cushion was so tattered that the springs were exposed.

The reason he was hitting the horn was that he couldn’t get out—his overalls were frozen to the springs! I had to cut out the seat of his overalls so that he could come in to the gas station to warm up by the fire.

You asked me the one word that would describe people connected with the mines and mills—that word would be perseverance. You see, he was back out there doing it all again the next day!”

Mott added, “The people who worked in the mines and mills had an admirable work ethic. For example, cattails liked what was in the rock at the mines and a huge number of muskrats moved into the ponds at the mines in the late 1930s. Some retired miners trapped the muskrats to survive during hard times, and in 1939 or 1940, the Oklahoma Department of Wildlife bought 92,000 muskrats with the majority coming from the Picher, Oklahoma area.

On February 5, 1942, the C.Y. Semple Mining Company visited Picher School to recruit new workers. The Semple Company operated the Martin Mill about five miles east of Picher High School on A Street. The company also operated Early Bird Mill, ½ miles east of Treece, Kansas. I worked at both mills.

I worked as a roustabout doing everything. I filled in for workers who missed work. My job tasks involved every job in the mill except running the large engines. I learned electrical work, welding, and machinist work, whatever was needed.

The Martin Mill had large 2-cylinder engines that ran on natural gas and the engines were used to generate electricity. Mills had to have good quality water for steam engines because early mills used steam. Poor quality water would clog the steam boilers. I worked three years and four months for the company until I graduated from high school in May 1945.

The following month I was drafted but I was sent back home due to bad knees. After returning from the service, I worked one day, June 21, at the mill and then left to accept employment with B.F. Goodrich Company. Dr. Chase from Joplin told me when I was only 47 if I worked one more month I would lose my leg and so I retired due to my knee. Seventeen years later I received my new knee. Beginning in 1980, I accepted contract work from Oklahoma Water Board.

I was assigned the task to locate water wells in the Roubidoux that were 1100 feet deep. I used maps, interviewed old miners and used aerial photographs for reference. I found a 1932 aerial photograph of the Cardin Picher Field area and I could see a water tower and little pump house. I located many of the wells with Missouri Southern State University blueprints.

I remember a time when the EPA and Oklahoma Water Board arranged to plug wells and used video cameras for monitoring the process. USGS brought in monitors to x-ray rocks 20-25 feet every direction from located wells. The Halliburton Company plugged wells with special cement and at the bottom of the well, you could stir up a little mud with the camera by moving the camera up and down and could watch the cross-flow of water as it moved into the wall on the other side. The Roubidoux Aquifer at the bottom of an 1100-foot well looked white and sandy.

The USGS would place a “spinner” into a well below the Boone Aquifer at 400-500 feet. It had a monitoring gauge at the surface and displayed how much contaminated Boone water was getting into the Roubidoux.

There was a time when Eagle-Picher was unable to obtain enough water for their mill so their workers drilled to 1200 feet and placed 96 quarts of nitroglycerin into the hole. Seismographs at Kansas City and St. Louis felt the blast. The same process was used on the John Beaver well at Cardin and as a result, the flint cracked all the way to the Roubidoux.

At one time, I was hired on contract by Oklahoma Health Department to obtain water samples from twenty locations. Out of all the locations, only one location, on Elm Creek, contained silver in the analysis. Commerce Mining and Royalty Company constructed a dam twenty feet high ¼ mile south of Bird Dog chat pile to form a deep basin so their mill would have millions of gallons of water. Sludge on the bottom of the basin was heavy with lead. I would load mud into a dump truck and wash it out at the mill so that the mill could obtain ore from the sludge.

There were two ways mining companies placed chat on chat piles. Martin Mill’s owner foresaw that a chat pile could be worth money in the future and so he didn’t mix float material with it—it was pure chat without chemicals from the float plant. However, the process at Bird Dog pile was different. Most of the pile from Bird Dog was sold for railroad ballast (large rock), but much sludge (powdered rock) and sand (very small rock that could be picked up) remained. The ball mill at Bird Dog
mill was lined with cast iron 4 inches thick and the mill workers added steel balls as water came in carrying sand, gravel and rock. The ball mill turned much like a cement mixer that powdered the rock. The specific gravity of silicate acid and water made rock float and the lead sink.

The contents of a ball mill were toxic. In 1950, I mixed up some gravel from a ball mill for cement and poured a front porch with the mixture. Two days later, I discovered the cement would not set due to the chemicals from the float plant.” At a 2011 EPA Public Availability Session, a representative from Region 6 EPA asked Mr. Mott about the elevation of a pipe near the confluence of Tar and Lytle Creeks on 40 Road, and he answered without hesitation, “796” (pers. obs. GM).

Gary Brown

Gary Brown was interviewed in January 2011 at Miami Towers in Miami, OK. Brown was selected for an interview due to his experience working in the district’s mines.

Gary Brown, third generation former miner, also graciously agreed to an interview (Fig. 14). Brown shared regarding his mining experiences, “I ran railcars right out of the mill. The conveyor belts took the chat to the top of the chat pile from the mill. Eagle-Picher loaded railcars directly from the mill to transport all over the United States.

My father, Garold Brown, began working for the St. Louis Mining Company, Baxter Springs, Kansas around 1940. He was a hoisterman. He worked for the mine until it shut down in the 1950s. After that, he worked as a gouger and had other employment, as well.

In the early days in the Picher Field, mining progressed from shoveling the ore by hand, to dragging it up a ramp, to mining with a steam engine and a bucket such as at West Side and in later years using track-type loaders. During the 1940s, four or five men would ride in a safety can, and then would remove it to put on “dirty cans” for moving the rock and ore. Cans I pulled were called 1650s because the cans had a capacity of 1650 pounds. Eagle-Picher’s cans were larger with a capacity of a ton.

There was a time in 1960 when I went gouging with my father on the Brewster lease and we pulled a pillar with 44% zinc. Anyone that was mining only got paid for lead/zinc.” Pulling a pillar, that is, pillar removal, was performed to obtain residual ore from the mines and likely exacerbated subsidence and collapse of cap rock over the mines. The USGS and United States Bureau of Mines established a process for regulating pillar removal on Indian-owned lands in the final few years before mining ceased in 1970, though, numerous pillars had already been removed (Subsidence Evaluation Team 2006).

Brown also recalled, “The large mines eventually stopped using mules and instead used electric tuggers. The tuggers were cables wrapped around a drum like a wench to pull dirt and cans. The hooker would hook on the can and cars with round steel wheels held the can. My father would pull 700 cans in 8 hours. The hooker pulled the car over, landed it, hooked it onto the loading can and then it would be pulled up quickly.

I also worked in mining for Eagle-Picher in Joplin at Westside, driving a dump truck and trailer truck from the age of 20-22. Eagle-Picher removed pillars from mines at times— miners referred to the process as “shooting the pillars out.”

When I would mine zinc the value was $80-$90 per ton, but lead during the Korean Conflict was worth $300 per ton if it was high-grade lead. C.Y. Semple reran tailings through another mill. The ball mill was important (see John Mott’s explanation of a ball mill).

There was a cave-in during the 1930s on the Dobson lease on A Street Road, two and one-half miles from Picher. The mining company filled the mine with chat, and then a heavy rain came and washed the chat away so the area caved in again and the cavern was later filled with old car bodies and boulders.

To my knowledge, the deepest shaft was approximately 400 feet (~120 m) deep in the Picher Field at state line. It was located in Kansas, past Bingham’s trucking, turn right on 19th Street and it is 1-2 blocks on the right—start up the road and it is off the road.
My brother-in-law was a miner at Velie-Leopard in the days when the mines were using compressed air for drilling. The metal building where air was produced was located out of Commerce, past Central Mill the road curved to the right; head toward Cardin but go straight instead. Go about one mile and the building was on the left.

A miner removed the pillars in the area of Picher High School. Mining companies would leave pillars around the shaft but often removed other pillars since the pillars often contained high-grade ore.

Have you ever heard of water coarse? It contains large boulders the size of trucks in the mines. Hockerville’s mines, located east and north of Douthat, had a lot of water coarse under the ground.

The ground boss at St. Louis #4 in the 1930s was Ross Brown. My grandfather worked in St. Louis #4 mine in that decade, and he told me there was a lot of water coarse with rich ore. I went gouging with my grandfather on the Camel lease during the Great Depression.

Crystal Mine contained soapstone high in the roof of the cavern, and if you burned the roof, it would fill a whole drift up. Eagle-Picher leased the upper ground to the company I worked for and we pulled high-grade millings out of the mine. If the miners went after ore that was too shallow and hit soapstone, the roof would just start pouring in on us.

There was a tragedy at the Velie-Leopard mine while my brother-in-law was at work. Pillars were being pulled and the upper level of 40 feet of rock caved in on the truck driver and loader in the mid-1960s, killing both men.

When Central Mill pond was drained lead and zinc sludge was recovered, and it was remilled, and then dried in a large gas dryer. The particles were very refined like powder.

I heard once that the ground under the railroad tracks for the Central Mill was unstable. The tracks ran beside 40 Road, and then curved around along the road to the mill. I was told the tracks sank three feet during the 1950s and had to be raised back up.

My father and I mixed at Skelton #7. The Skelton chat pile has a large mill pond and a caved-in shaft. Eagle-Picher donated the park at Picher to the community and the area had been undermined extensively with a very deep cavern under the park area.

Blue Goose had extremely high-grade ore. Commerce, Oklahoma was unique due to the configuration of the ore—vertical in some areas and horizontal in others. Swalley Mine, two miles (3.2 km) from Baxter Springs, was the last mine to close in the TSMD and it truly was amazing to behold due to its huge incline tunnel. The tunnel was so large that people drove down the incline, three-eighths to one-half mile long and 300 feet (~90 m) deep.

I stopped mining on December 31, 1970.” Like John Mott, he stressed “One quality that describes mine and mill staff is perseverance. My uncle did some gouging during World War II to scrape by and as a result fed his entire neighborhood with the small amount of money he was able to earn through his efforts.”

Fredas Cook

Fredas Cook was interviewed in March 2011 at the LEAD office in Miami OK. Cook was selected for an interview due to his extensive work preserving mining photography and other important memorabilia for the Baxter Springs, Kansas Cultural Center.

Fredas Cook, former Cardin resident, and an area historian, helped preserve mining history by painstakingly restoring documents and photographs for the Baxter Springs Heritage Center and Museum (BSHCM). Cook noted, “I became interested in researching the history of Cardin after my two friends and I realized we could not remember everyone in our second grade class and we generally lacked in-depth knowledge of the community. William Oscar Cardin was adopted into the Quapaw Tribe and the community of Cardin was named for him.

My father, grandfather, great-grandfather, and great-great-grandfather were all miners. My father was born at Cassville and mined at Stott City and Granby, Missouri. Most people east of Highway 69 went to Picher School and those to the west of the highway went to Commerce unless you lived in Whitebird, a small community west of Cardin, in the area where the power plant was located. The last Whitebird resident, Darrell Hatfield, moved out of Whitebird in 2010.

The mining communities had a lot of pride in their mining heritage. Communities other than the mining towns often looked down their noses at our mining towns and our residents but also promoted their own communities by identifying with the mines. For example, postcards with images of mines and mills were used to promote the name of non-mining communities. They also promoted their communities with a souvenir from the mines.

Through my research I discovered that the earliest tract housing was not constructed after World War II for housing veterans returning home, but actually much earlier for housing mine and mill employees (Fig. 15). Also, I found that mine mules
lived their entire lives underground, but were properly cared for as far as possible.” More will be discussed about the mules in Willie Osborn’s interview below.

Cook has restored many group photographs of miners in Oklahoma, Kansas and Missouri and stressed, “It is unfortunate that few photos contain the names of all the miners. The Commerce Mining and Royalty Company built a power plant in the 1920s and the plant supplied 25-cycle electricity to the mines and surrounding area, including Cardin, Oklahoma (Fig. 16). Residents needed time to get used to the lighting as lights powered by 25-cycle electricity flicker constantly.

Each mine had a flower garden and some were quite beautiful. The Tri-State Zinc and Lead Ore Producers Association (TSZLOPA) sponsored an annual flower garden contest for the mining district. For a number of years an annual Picher Mining Field reunion was held. The American Zinc Institute had a welfare department before the United States government had formally instituted such services, with assistance available in 1929.”

Willie Osborn

Willie Osborn was interviewed in August 2011 by telephone based on his experience documenting F.J. Cuddeback’s oral history. Osborn passed away in February 2014.

Another former mining employee who contributed much to the preservation of mining history was Frank J. Cuddeback, Eagle-Picher engineer, deceased. His close friend, Willie Osborn, Miami Oklahoma area pharmacist, helped organize Cuddeback’s oral history, notes and photographic record of the area’s mining history to accompany a tour of the Tar Creek Superfund site years ago.

Osborn emphasized “I was fortunate Cuddeback was organized in everything he did, and so it was easy and a pleasure to assist him in compiling his notes and photographs into printable handouts and compact disc. Cuddeback was likely around 90 years old when he prepared the documents in 1980.” In the documents, Cuddeback offered his thoughts on mining and the Great Depression, which follow:

“As I remember it, the Tri-State mines were hard hit by the depression about a year earlier than most industries. In 1930, my company, the Consolidated Lead and Zinc Company had only one of their 16 mines running and finally shut it down. In 1931, the Eagle-Picher Company took over the Consolidated. I had been chief engineer and churn drill foreman but like all of the rest of the staff from the general manager on down I expected to be laid off. One of the lucky breaks of my career was that Eagle-Picher had already begun work on the design of the Central Mill and had actually hired outside engineers experienced in drafting and mill design. I had done considerable machinery and plant design so was fortunate enough to be transferred to their engineering staff (Cuddeback 1980).” Willie Osborn noted Cuddeback was being modest, that he was one of the key engineers who designed the Central Mill.
“I doubt if many people now living remember what the Central Mill meant to the hundreds of men who had jobs during the depression on its design, construction, and early operation. And too, I doubt if many realize the foresight and courage that it took for George Potter and other Eagle-Picher officials to undertake such an enormous project during the worst of the depression” (Cuddeback 1980).

Osborn also discussed the mine mules, “Mining companies usually employed a man with experience handling mules to make certain the mules worked as safely as possible. They were provided well-lighted barns and ample amounts of feed and water. Contrary to a common myth, mules did not go blind in the mines after many years underground.

I have two mining mule related stories. McFerron Feed Store had stores in Picher and Miami. The McFerrons sold 1,000 bales of hay each week for the mine mules. Mules in the mines would walk back and forth doing their work, but one miner’s mule would not cooperate. He commented to another miner that his mule would not work. The second miner extended his hand with some chewing tobacco and the first miner replied, “Thanks, but I don’t chew.” The second miner replied, “No, but your mule does.” The first miner gave his mule the tobacco and then the mule went to work. My father-in-law, E.C. Mabon, was personnel director for Eagle-Picher and initiated the safety program, including the requirement to wet the muck piles.”

Larry O’Neal

Larry O’Neal was interviewed on November 3, 2010, at the Baxter Springs Heritage and Cultural Center (BSHCM) in Baxter Springs, Kansas, and while conducting a tour of part of the mining district. O’Neal was selected for an interview due to his role as museum historian and extensive experience working with mining documents and photographs.

Larry O’Neal, historian for the BSHCM, also has roots in the Tri-State Mining District. He recalled, “When I was a child they called the creek at the bottom of the hill from the Baxter Springs museum, Alkali Creek, because it ran yellow and orange during the 1950s and 1960s” (Fig. 17). I learned later that the water was contaminated by mine water from the Ballard Mine. A spring just below the stream bubbled out orange and east of town springs would bubble out a yellowish-orange. The orange-yellow coloring of local streams is largely due to oxidation of the mine water and subsequent flocculation of iron oxide and oxyhydroxide minerals as mine water seeps to the land surface (pers. obs. GM).

O’Neal noted, “Most adults my age who grew up in the area laugh about their memory of swimming in mill ponds and climbing on tailings piles for fun. I am pleased to say progress is being made. The Ballard mine has been remediated, the Sonny Boy mine is being reclaimed and remediation is currently taking place south of the Kansas-Oklahoma state line and at Blue Mound, Kansas.

Royalty rights were an interesting aspect of mining. The leases were often divided among a number of mining companies, divided by the first 100 feet, then the next layer, and so on.

Pittsburg State University has assisted the Baxter Springs Museum with archiving of old mining records and Dr. Lawson’s history class is making great use of the historical documents. There are still 145 boxes cataloged, but not yet digitized.”

A challenge mentioned by both Fredas Cook and Larry O’Neal is trying to follow the history of the mines due to mine leases moving from one company to another, and some mines are known by the names of property owners. For example, O’Neal pointed out the Ballard mine was the Huntly mine in 1926, and Cook noted the Blue Goose was also known as the Big Chief. The Mahuska mine is listed on some documents and maps as the Mahutska and its tailings pile is often referred to as the Fisher pile (pers. obs. GM).

Archival efforts

Dr. Charles Nodler, Jr., archivist at Missouri Southern State University (MSSU), Joplin, Missouri, noted his department is archiving mining maps and other mining-related documents for the Missouri Digital Heritage Project thanks to funds from Oklahoma Conservation Commission (MDHP 2011). With the funds, they were able to scan maps using a loaned 54-inch color scanner. The Environmental Task Force of Jasper and Newton Counties provided a computer station with two monitors for looking at maps and metadata simultaneously. Between the years 2004-2008, three people worked on the project about 12-16 hours per day to scan 5000 maps. Two years were required for logging of the metadata alone.
Now the project staff endeavors to secure funds for digitizing drill logs. There is also a section of mining photography, Riches of the Earth, which is a collaborative project by the Joplin Museum Complex, the Spiva Library Archives and Special Collections at Missouri Southern State University, the Powers Museum, and the State Historical Society of Missouri-Rolla at Missouri University of Science and Technology. Nodler stressed these maps and documents are not only used by the public and for research about the mines, but also by realtors and law enforcement.

In another effort to preserve history, in 2009, when the community of Picher was at the close of relocation and the community was preparing to cease as an incorporated town, the town donated $578,000 to the Northeastern Oklahoma (NEO) A & M College Development Foundation in Miami, OK. The funds established the Picher Mining Project, which will ensure records related to the community are available for research. The investigative and archival work required for compiling and maintaining the historical record of the district’s history is staggering.

Early mining industry impacts

Before the discovery of subsidence and contamination, in the early mining days there was the realization that many miners were becoming ill. Many of the miners developed silicosis, which damages lung tissue and it may have helped, along with crowded living conditions, to increase the incidence of tuberculosis (TB) to above typical rates. As many as six to eight people lived in miners housing that today’s society would refer to as shacks. There was a significant public health push in the 1920s to reduce the incidence of TB in the district. Yet, due to the poor air quality in the mines and processing facilities as well as substandard housing conditions, the rate of silicosis and TB, known by miners as “miners con,” far exceeded the national average. By the 1930s, the district’s rate for TB was highest in the country and many family members of miners became ill with TB as well (Tri-State Survey Committee, Inc. 1939).

Fredas Cook recalled, “My grandfather developed silicosis of the lung and I always wondered why he was hospitalized in Clinton, OK rather than Talihina, OK after he developed TB. He died from his illness in 1932” (pers. com. GM). Willie Osborn stressed, “My family suffered losses from the mines. My father died by age 40 and both of my grandfathers died in their early 50s from mining-related silicosis” (pers. com. GM).

The heartbreak of mining

The heart of mining

Few individuals became wealthy due to mining in the Tri-State Mining District; however, mine and mill personnel and their descendants have a sense of pride and identity connected with their experiences and legacy. Long-term residents and their descendants have an incredible emotional attachment to place and Tribes in particular have an extremely strong attachment to their land. As a result, a complex relationship exists between the district’s residents and the wounded environment in which they live.

A prediction of mining contamination

In 1946, the TSZLOPA lobbied in the U.S. Congress for economic assistance to facilitate the mining of marginal ore reserves in the TSMD (Mine Shaft Subcommittee 2000). The organization warned that stoppage of pumps would cause the major interconnected mine openings to fill with water from current influxes (TSZLOPA 1947). TSZLOPA predicted the rising water table would dissolve great quantities of soluble sulphates, and would come to be high in carbon dioxide, minerals, acids and salts (particularly sulphates of iron and aluminum) that hydrolize to produce acidic water.

TSZLOPA warned that, “If this acid water is discharged in any quantity into stream drainage, it is neutralized by excess alkalinity and oxygen in the streams and precipitates are formed of heavy, sticky, unsightly and insoluble hydroxides. In as much as all stream drainage from the entire district flows through Oklahoma into Grand Lake coupled with the fact that in Oklahoma stream pollution is a misdemeanor with enforcement vested in the Fish and Game Commission, a serious stream pollution would exist. This would not be abatable as the cost of treatment to neutralize this water in any quantity before discharge into streams would be prohibitive.” Below this argument are the words, “It Would Take Many Months ... Even Years ... and Many Millions of Dollars to Re-open These Mines” (TSZLOPA 1947). Of course, TSZLOPA’s argument focused on the importance of mining the remaining mineralized reserves but their warning of contamination was sadly prophetic.

TSZLOPA’s 1946 lobbying efforts were unsuccessful, and rather, Congress passed the Strategic Minerals Act of 1949, which paid companies a subsidy for tonnage without consideration of ore content. Tragically, this offered financial incentive to remove mine pillars (the support columns). Subsequent removal of pillars would eventually fulfill longtime miners’ and TSZLOPA’s prophecies of mines collapsing, water filling mine caverns, and contaminated acid water reaching Grand Lake in northeastern Oklahoma (Mine Shaft Subcommittee 2000).

As mines closed, companies turned off the pumps used to dewater the mine cavities and the water levels rose. As a result, it became increasingly difficult and expensive for remaining mining operations to continue. Eagle-Picher was last to close
their company’s mines and initiated subleasing to gougers in the late 1950s. Gougers mined out remnants of ore and removed remaining pillars as pillars often contained marketable ore, and in so doing increased the likelihood of subsidence and eventual collapse (Mine Shaft Subcommittee 2000) (Fig. 18).

Positive developments

The mining industry has received a fair share of criticism, however, it is important to stress there have been some positive developments resulting from the area’s mining. Two Ottawa County examples follow.

The Tri-state area would have one less institution of higher learning if it were not for the efforts of James S. Mabon, a representative in the fourth through ninth Oklahoma legislatures. Mabon petitioned the state’s government to establish a college dedicated to the study of mining and metals to further develop Oklahoma’s mining industry. On March 17, 1919, the Oklahoma senate passed a bill to officially establish the Miami School of Mines, which would eventually become NEO.

In the March 25, 2011, Grand Lake Business Journal, Mabon’s granddaughter, Jane Osborn (wife of Willie Osborn), was quoted as saying her brother, her children, grandchildren, and Mrs. Osborn have all earned a college education at NEO (Sweeten 2011). The area’s legacy of mining has also graced the community of Miami with the Coleman Theatre Beautiful, an ornate venue with an exterior in Spanish Mission Revival style, built by George L. Coleman, Sr. It opened in 1929 and is now on the National Register of Historic Places (Figs. 19 and 20). It was donated to the City of Miami in 1989.

Mining’s legacy

By the close of the mining era, open pits, tailings piles, and ore-smelter waste transformed landscapes in a number of areas. Mining and smelting activity was so devastating in Galena, Kansas, that one area of the community became known as “Hell’s half acre” (Juracek 2008).

In late 1979, seeps of metals-laden water began to flow from the mine shafts, vent holes, dewatering wells and collapsed areas. Water from Tar and Lytle creeks flows into the collapses, which increases flow through mine workings, and consequently intensifies the problem (pers obs. GM).

The 40 acres that formerly featured the Quapaw Catholic mission, school and dormitory are known as the Catholic Forty, but are also known as a Quapaw waste site. The Mission mine is on the acreage and was one of the two most important Peoria District mines. Beaver Creek runs through this area of
contamination, then on through the Quapaw pow-wow grounds, and into Spring River (Wahnee et al. 2000).

Another contributing environmental factor—Tar, Lytle and Elm creeks are all underlain by Pennsylvanian shale and, so, are subject to rapid runoff, flooding and intermittent flow. In fact, Ottawa County is the most flood-prone county in Oklahoma (Manders 2009), with Miami the community of special concern due to backwater effects at the confluence of Neosho River and Tar Creek. Tar Creek meanders through the community and through the campus of Northeastern Oklahoma A&M College, and its frequent floodwaters stain the land and trees orange (Fig. 21).

The confluence of the creek and river occurs at the community’s Riverview Park. The Neosho subsequently flows southeastward to the confluence with Spring River just above Grand Lake.

**Current health concerns**

Numerous studies have determined that the smallest particles in the district’s mine tailings tend to have the highest concentrations of metals, facilitating erosion and transport of metals by air and water (Juracek 2008; Schaider et al. 2010). Robert Lynch, University of Oklahoma Health Sciences Center, stressed that the contamination of surface water in the former mining towns of Oklahoma first prompted the Oklahoma portion of the district to be placed on the National Priority List (NPL) as the Tar Creek Superfund site. However, in 1991, the scope of the environmental problems broadened after elevated blood lead levels were discovered in children. Years of mining and the practice of using chat in construction and road building have resulted in widespread soil contamination in the area (Lynch et al. 2000).

Mining also has had an impact on animals. George Mayer, rancher at Commerce, Oklahoma, worried that his prized horses would become sick due to the orange mine water that was staining their coats and tails. On November 10, 1979, mine water began flowing out of the ground on his property and has continued since (Kennedy 2008). The property now contains the University of Oklahoma passive treatment system, a current and ongoing remediation project (Nairn, LaBar and Strevett 2011).

There is also an alarming quantity of waste being dumped into open mine shafts, subsidence features (Subsidence Evaluation Team 2006), and even in the district’s streams. For years, when LEAD took students on a “toxic tour” there have been abandoned toys, appliances and even furniture dumped in Tar Creek (Fig. 22).

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**Figure 21.** Two baseball fields on the eastern side of NEO A&M College campus. Tar Creek is the tree-lined channel just behind the fields with the college’s horse pasture beyond the creek. Image acquired by the authors and S.W. Aber with kite aerial photography, 2008.
In the Picher Mining Field Subsidence Report of 2006 it was noted waste found in the field included animal carcasses, chemicals, human waste, non-municipal sewage discharges, tires, construction materials, and motor oil. Open mine shafts on private land have been used as waste dumps and the researchers for the study found that most of the shafts were partially filled with water. John Mott expressed concern that during the 1980s a scrap metal business dumped the liquid out of transformers into the northeastern corner of the Mahuska/Fisher chat pile in Picher, OK (pers. com. GM). The effect on water quality from waste disposal in the district is a threat in need of evaluation.

Remediation challenges continue

The Oklahoma portion of the district still has mountains of chat that dominate the landscape and are constant reminders that remediation is far from complete. Even now, the locations of some of the old ponds contain tailings and some have ponded water (Chan et al. 2008).

There are conceivably in excess of 300 mineshafts in the Picher-Cardin area alone and in the TSMD more than 2,600 shaft collapses (Mine Shaft Subcommittee 2000), as illustrated by a sinkhole in Picher (Fig. 23).

The Luza report of 1986 and the more recent subsidence study of 2006 have pinpointed numerous subsidence areas in the Oklahoma portion of the district and the researchers stressed that the field can no longer be viewed as a Superfund site where residential lead exposure and mill tailings are the only primary hazards being addressed. With the increased knowledge gained from the combination of these two evaluations, the multidisciplinary subsidence evaluation team for the 2006 study emphasized it is reasonable to question and reevaluate the assumption that all parts of the field are appropriate for development if the ground surface is remediated or reclaimed. The researchers recommend reassessing priorities for remediation based on their findings—a logical step (Luza 1986; Subsidence Evaluation Team 2006).

Buyout of Picher, Cardin, Hockerville and Treece

In 2005, the State of Oklahoma spent about $3 million dollars moving out 52 Picher, Oklahoma, families with children ages 6 and younger. Legislation was subsequently passed in 2006 for federal funding of the voluntary buyout of residents in Picher, Cardin, and Hockerville, Oklahoma, all within the Tar Creek Superfund Site (Gillham 2011). The risk of subsidence prompted the more extensive voluntary buyout and relocation of residents. Environmental contamination and human health risks were also concerns of local residents, Indian tribes, and state and federal officials (Aber et al. 2010). The relocation plan involved 878 buyout offers, with a 96 percent acceptance rate. Thirty-six offers were rejected or declined, including nine offers declined because of homeowner insurance settlements related to the Picher tornado of 2008 (Gillham 2011).

Before the buyouts began, Picher had 1,640 residents and Cardin had 150 residents. Following the buyouts, approximately six residents remained in the Picher area (Gillham 2011). Neighboring community, Treece, Kansas was initially excluded from the buyout option and was scheduled for cleanup activities. In 2009, federal funding was approved for the buyout of Treece residents. The Treece buyout involved 66 residential owners, 12 renters, two businesses, a church and 14 vacant properties. One resident elected to stay (McKinney 2012).
Remediation funding

Rebecca Jim noted the district’s Superfund programs continue to be funded by Congress and sites are continuing to be cleaned up. Beginning in the early 1980s, polluters were required to pay a tax that had been levied through the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980. The CERCLA law is commonly known as Superfund. Since the tax was not reauthorized in 1995 and polluters are no longer required to pay the tax, the stream of funding from the tax was depleted.

Jim stressed some projects are now funded by potentially responsible parties (PRPs) and some are funded by federal funds allocated by Congress. One of the PRPs, Asarco, has funded some projects (pers. com GM). The case summary for Asarco’s bankruptcy settlement designated funding in the TSMD for the Cherokee County, Kansas site, the Newton County, Missouri Mine Tailings site, the Oronogo-Duenweg Mining Belt site in Jasper County, Missouri, and the Tar Creek site in Ottawa County, Oklahoma (USEPA 2009). Jim offered clarification on the current funding state, “Oklahoma Senator Inhofe requested funding and that is how the Picher area buyout was accomplished. Superfund projects continue but due to budget constraints are occurring in small pieces at a time. Although progress continues it is at a slower pace” (pers. com. GM).

Attachment to place

Dr. David Robertson found a common problem occurs in communities going through buyout—there needs to be a line drawn between the people who accept the buyout and those who do not. He offered the example of Love Canal—people adjacent to a landfill received the buyout, but people across the street did not qualify and yet their property values plummeted. He also discussed the attitude of denial of some area residents regarding the contamination and explained the reaction of downplaying environmental problems is often due to worry that it will hurt the local economy (pers. com. GM).

To the researcher or legislator visiting former mining communities and abandoned areas, preconceived stereotypes of mining camps may influence their view of the disfigured landscape and prevent them from recognizing the value of these former mining communities as hubs for human activity. Robertson warned that this misconception is not a trivial matter as the struggle between a harsh environment and a loyalty to place promotes a challenging future for residents of historic mining areas (Robertson 2006).

Robertson noted he has realized as a cultural geographer that these mining areas may have incredible emotional value attached, yet that value is not always enough to sustain the population in the communities. Problems may be so severe and troubling that the problems can cause the death of a community, such as in the more recent demise of Picher, and as evidenced by the few remnants of buildings that remain in such communities as Hockerville (Fig. 24) (pers. com. GM).

Using Picher as an example, Robertson related he initially predicted that 10-20% of Picher residents would resist relocation—but that was before the tornado of 2008 (Fig. 25) (pers. com. GM). On May 10, 2008, an EF-4 tornado traveled from the Chetopa, Kansas area to Picher, then on to Seneca, Neosho, Newtonia and Purdy, Missouri. The tornado caused devastating damage in Picher. Of 800 residents remaining in the community, 150 were injured, 30 were treated at the hospital, 6 lost their lives, and 114 homes were destroyed (Manders, 2011).

Subsequently, the federal government decided not to offer money to rebuild Picher since voluntary relocation for the area was already in process. In 2009, the community’s school, post office and city government closed. In essence, the tornado resulted in the end of Picher as a community (Manders, 2011). Robertson’s guess is, if the tornado had not happened, a significant number of residents would have resisted the buyout (pers. com. GM).

Conclusions

The Tri-State Mining District’s history demonstrates that with rapid mining expansion, dependent communities initially experienced rapid growth then following depletion of the natural resource most dwindled rapidly and some were abandoned. Individuals, committees and task forces having the authority to recommend legislation to protect the land, and its inhabitants are urged to prioritize human experience associated with the area’s land in future decisions regarding
safe practices, consequences for unsafe practices, and in planning remediation. Careful planning will not ensure the survival of communities, however, the decisions involved in planning certainly influence their future sustainability.

Archival efforts are important, time consuming and require a concerted effort of a number of dedicated people. By preserving the mining records, photographs and other documents, archivists are making documents available for future historians, environmental researchers, legislators, and others interested in the TSMD. If it were not for these major archiving projects, much of the district’s mining history likely would be lost.

Historically, the Quapaw people have offered a model of fortitude and perseverance while facing great adversity. The Quapaw and other residents of this historic mining area have a profound connection to the district’s landscape and its rugged harshness. Their lives have been abundant, persistently challenged, and they have the strength to endure.

The Tri-State Zinc and Lead Ore Producers Association’s warning to the U.S. Congress in 1946 that stoppage of pumps in the mines would result in stream pollution indicates the zinc and lead mining companies were well aware that the mining techniques then in use posed significant risks to the district’s future environment. The warning was predictive of the eventual consequences to the area’s environmental health, especially to vegetation, wildlife and people.

While investigating the TSMD it is important to recognize that the land that presents environmental and economic challenges to some also represents family history and legacy to those that call the land home. The people that lived in the district helped shape it into the place it is today and there have been some positive changes in the area resulting from mining.

The mine and mill personnel, their descendants, and the Quapaw are an important resource for researchers and legislators addressing the TSMD’s environmental and related challenges such as remediation. By sharing their knowledge and experiences, residents can help planners gain a better understanding of and appreciation for the worth of the district’s land and of its residents.

Progress is occurring with remediation efforts in the TSMD. Numerous projects have been completed. Nonetheless, contamination persists and is pervasive. Remediation projects are continuing, and many more will be necessary in the future to deal with the TSMD’s array of environmental challenges.

Budget constraints have slowed progress on the district’s remediation projects. Reauthorization of the CERCLA (Superfund) Tax should be considered. The tax serves a three-

Figure 25. Picher, Oklahoma. View toward southwest showing area damaged by tornado. Image acquired by JSA and S.W. Aber with a small helium blimp, 2009.
We would like to convey thanks to Fredas Cook, Kindel Kirkley, Rebecca Jim, Barbara Smith, Monica Vaughn, and Dr. Susan W. Aber for the use of their images, which enriched this paper. We wish to express sincere gratitude to the individuals who gave of their time, knowledge, experience and support to help us gain a better understanding of the Tri-State Mining District’s history, including Fredas Cook, James Luedecke, Larry O’Neal, Dr. David Robertson, Dr. Kenneth V. Luza, David Cates, Gary Brown, Willie Osborn, Dr. Charles Nodler, Jr., Earl Hatley, Rebecca Jim, and especially John Mott, whose enthusiasm and profound connection with our area’s history inspired and motivated us.

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