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The Peoria Lead-Zinc Mining Camp, Ottawa County, Oklahoma

Part I — Series on Early Lead-Zinc Mining Camps in Northeast Oklahoma

W. Ed Keheley, Engineer, Keheley & Associates, Inc., Quapaw, OK; and Kenneth V. Luza, OGS Engineering Geologist

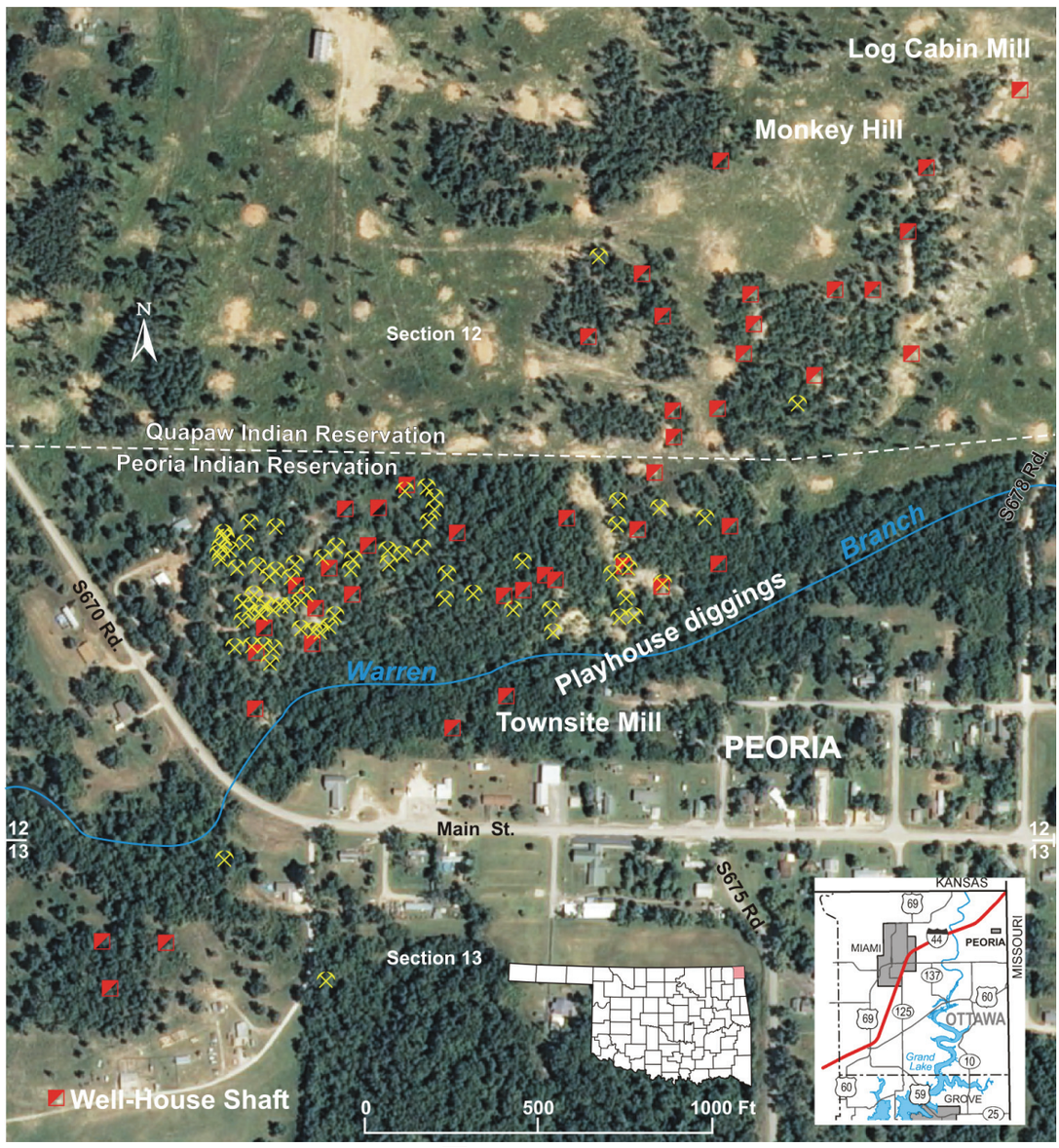

***Figure 1**. Distribution of some mine shafts ( ) and prospect pits ( ) in sections 12 and 13, T. 28 N., R. 24 E. near Peoria, Oklahoma.*

Introduction

Most of the Peoria lead-zinc camp, which was the oldest in Ottawa County, Oklahoma, was located slightly north and northwest of Peoria, Oklahoma, six miles south of the Kansas-Oklahoma and 2.5 miles west of the Missouri-Oklahoma state lines. The town of Peoria is located in a small valley surrounded by timbered hills. A small stream, Warren Branch, flows southward on the north side of the town. Peoria was a community with a population of 149 residents in 1890 prior to mining (Gibson, 1956). A "never failing spring east to town" (Nieberding, 1983) probably attracted the Peoria Indians to this area long before Peoria became a town.

By 1891, the lure of lead and zinc attracted hundreds of miners and their families to the area around Peoria. Peoria soon boasted a schoolhouse and three business establishments: a hotel, a blacksmith shop, and a store (Gibson, 1956; Sweezy,

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OGS Hosts Annual Coal Geology Forum

Brian J. Cardott, OGS Geologist

Coal geologists from the state geological surveys of Arkansas, Kansas, Missouri, and Oklahoma meet once a year to discuss coal production, utilization, research, and mutual interests. The Oklahoma Geological Survey hosted the **37th Annual Forum of Coal Geologists of the Western Region of the Interior Coal Province** at the Kerr Conference Center in Poteau, Oklahoma, on June 4-5, 2013. Invited guests included coal geologists from the U.S. Geological Survey and Oklahoma Department of Mines, and a coal operator who granted access to a local active surface coal mine for the half-day field trip.

The morning of the first day is set aside to discuss coal production and utilization in the four states.Information shared included operator, mine name, coal bed name, and tonnage produced in the previous calendar year with historical comparisons. **A summary of coal production from the four states during 2012 follows:**

Arkansas: 129,498 short tons of low volatile bituminous coal from one underground and one surface coal mine.

Kansas: 18,823 short tons of high volatile bituminous coal from two surface coal mines.

Missouri: 421,587 short tons of high volatile bituminous coal from two surface coal mines.

Oklahoma: 1,075,070 short tons of high volatile to low volatile bituminous coal from one underground and seven surface coal mines. The weighted average sulfur content of the produced coal in Oklahoma during 2012 was 0.8%.

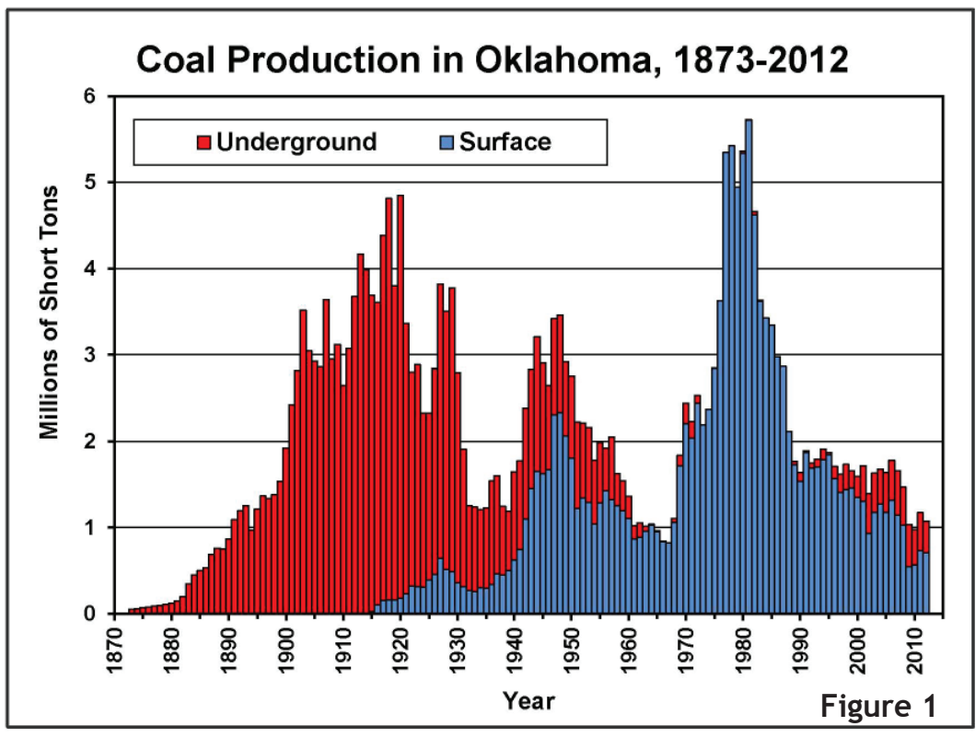

Figure 1

Historically, coal production in the four states follows the pattern shown in **Figure 1** for Oklahoma: coal production highs during World Wars I and II, lows during the Great Depression and the 1960s, and a peak of 5.72 million short tons in 1981 with a subsequent decline from switching to imported low sulfur subbituminous coal. From 1873 through 2012, 296,838,894 short tons of coal have been produced in Oklahoma. Production from surface coal mines in Oklahoma began in 1915.

In This Issue. . .

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According to the EIA (2012a, table 15), the demonstrated reserve base for Oklahoma, as of January 1, 2012, is a total of 1,542 million short tons (1,226 million short tons as underground mining and 316 million short tons as surface mining).

Statistics from the EIA (2012b, domestic coal distribution by destination state) also indicate the four states imported low sulfur subbituminous coal from Wyoming during 2011 in the following amounts: 17,497 thousand short tons to Arkansas; 19,963 thousand short tons to Kansas; 44,471 thousand short tons to Missouri; and 19,414 thousand short tons to Oklahoma. Coal is used at coal-fired electric power plants and cement plants in Oklahoma (Boyd and Cardott, 2001).

Figure 2. *View looking east of coal geologists in Farrell-Cooper Mining Company Bull Hill surface coal mine in Le Flore County, Oklahoma. Steeply dipping (37° north dip) Lower Hartshorne coal is at the base of the high wall in the right side of the photograph.*

The afternoon of the first day included discussions of coal-related research in the four states. Topics included work on the U.S. Geological Survey National Coal Resources Data System (NCRDS, **http://energy.usgs.gov/Tools/NationalCoalResourcesDataSystem.aspx**), surface mapping, structural cross-sections, measured sections, coalbed methane well completions, shale gas and oil well completions, Hartshorne coal rank, and Arkansas lignite resources for liquefaction.

A half-day field trip on the second day included the Farrell-Cooper Mining Company Bull Hill Mine in Le Flore County (NE ¼ SE¼ Section 36, Township 6 North, Range 23 East). Rain dampened the mood in the coal mine but did not stop the coal geologists from examining the coal and collecting coal samples (**Figure 2**). Coal channel samples collected in March 2013 during a planning trip provided the following data: Lower Hartshorne coal, 4.3 ft thick (corrected for 37° dip), vitrinite reflectance of 1.22% Ro (medium volatile bituminous), 4.1% moisture, 3.1% ash, 25.4% volatile matter, 67.4% fixed carbon, 15,061 Btu/lb (moist, mineral-matter-free basis), and 0.71% sulfur; Upper Hartshorne coal, 3.2 ft thick (corrected for 37° dip), 2.4% moisture, 2.2% ash, 26.0% volatile matter, 69.4% fixed carbon, 15,287 Btu/lb (moist, mineral-matter-free basis), and 0.97% sulfur.

For more information on Oklahoma coal, visit the Oklahoma Geological Survey web site **(http://www.ogs.ou.edu/level3-coal.php)**.

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EIA, 2012b, Annual coal distribution report 2011: U.S. Energy Information Administration, 110 p. **http://www.eia.gov/coal/distribution/annual/pdf/acdr_fullreport2011.pdf**

1934). On June 13, 1891, the Postal Department placed a post office in James Dent's (the first postmaster) store and designated it Peoria in honor of the Peoria Tribe (Shirk, 1948). The mining boom was short-lived and never achieved the wild aspect of other mining camps, which soon were to develop. By 1896, Peoria's population dropped to 205 (Doane, 1897).

A majority of the ore was produced along the slopes on either side of Warren Branch in secs. 12 and 13, T. 28 N., R. 24 E. (**Fig. 1**). Some mine prospects occurred in secs. 14 and 15, T. 28 N., R. 24 E. (Snider, 1912). In the Peoria area, the east-west boundary between Quapaw and Peoria Indian Reservations is about 1,000 ft north of the southern boundary of section 12, and north of Peoria's Main Street (**Fig. 1**).

***Figure 3**. Numerous waste piles from prospect pits and mine shafts northwest of Peoria.*

Prospecting and Development

John Patrick McNaughton was one of the first pioneers to come to Peoria Indian lands to prospect for minerals in 1877. He sought permission to prospect from Hiram Jones, United States Indian Agent in charge of the nearby Seneca Indian Agency (later it became the Quapaw Indian Agency). When Agent Jones denied him access to the reservation, he made a trip to Washington, DC, to seek a special permit from the Secretary of the Department of the Interior. The Secretary granted him a permit to search for minerals, but prohibited him from mining and/or selling any ore he discovered (McNaughton and McNaughton, 1937). In 1883, Agent Dyer of the Quapaw Indian Agency, reported that lead had been found in the eastern part of the agency.

***Figure 2**. The well-house shaft is a 120-deep shaft used as a source of water for livestock today.*

McNaughton had over 10 years to explore for minerals on Peoria lands. After the Peoria Tribal members became part of the allotment program under an Act of Congress on March 2, 1889 (Semple, 1952), he organized the Peoria Mining Company under Kansas laws of incorporation. McNaughton was vice president and manager of the company. He leased several thousand acres and began prospecting with a horse drill northwest of Peoria where he sank the company's first shaft (McNaughton and McNaughton, 1937). The Peoria Mining Company sold about $1,000 worth of ore during 1891 and 1892 (Snider, 1912). Legal difficulties over the validity of the company's leases, lack of nearby railroad and smelter facilities, and low price of ore discouraged McNaughton's associates. The company suspended operations. He next took an option on their holdings and went to New York City where he sold the holdings. In 1893, the company was reorganized as the Peoria Mining, Construction, and Land Company under New Jersey law (McNaughton and McNaughton, 1937). From May 1, 1893 to September 16, 1894, 2,726,418 pounds (1,363 tons) of galena (PbS, lead sulfide) were produced. The lead concentrates were hauled by wagon to the Joplin White Lead works where it was sold at $44 per ton (Snider, 1912). During the same time, 56 tons of sphalerite (ZnS, zinc sulfide) and 332 tons of zinc silicate (H_2ZnSiO_5, calamine) were hauled to the railhead in Baxter Springs, Kansas, where the sphalerite ore sold for $11 per ton and the silicate ore for $8 per ton (Snider, 1912). The value of the

***Figure 4**. A typical Peoria mining operation with their horse hoister that was used to bring equipment, ore, and personnel up and down the shaft (photograph courtesy of Larry Kropp).*

production of the Peoria Camp during this period was about $63,250 (Snider, 1912).

The ore was found in the Mississippian Boone formation, which is composed mostly of chert and limestone. The Short Creek oolite member crops out in the bottom of Warren Branch north of the Peoria town site (Snider, 1911). Fowler and Lyden's (1932) M-bed occurs just below the Short Creek oolite. Ironically, this bed was one the largest producers of lead-zinc ore in the Picher Field. In the early days of the camp, lead sulfide, zinc silicate, and zinc sulfide were the major sources of lead and zinc (Snider, 1911; Siebenthal, 1908). By 1903, most of the production of lead concentrates had already occurred (Martin, 1946). Some lead carbonate ($PbCO_3$, cerussite) and zinc carbonate ($ZnCO_3$, smithsonite) were mined in small quantities. Prospectors dug pits and shafts in search of ore. Almost no drilling was done to locate and delineate potential ore bodies. The mines were shallow, 25–75 ft deep at most sites. Prospectors looked for solution patches as possible indicators of ore. Solution patches are paleokarst features that contained younger rocks; and they were frequently mineralized.

In April 2012, the authors completed an inventory of prospect pits and mine shafts in the main part of Peoria Camp. The inventory included 73 prospect pits and 47 mine shafts. A pit that was over 20 ft deep was reported as a mine shaft. Many mine shafts were partially filled, filled, and/or concealed. Therefore, the number of shafts and prospect pits should be considered a minimum number. Prospect pits and mine shafts define a zone of mineralized ground that extended from a 120-ft-deep shaft in section 13 (well-house shaft on the south ridge of Warren Branch) northeastward to the Log Cabin mill in section 12 (**Figs. 1-2**). The close proximity of prospect pits and mine shafts suggests that the ground was worked on small leases (**Fig. 3**). In the early southwest Missouri mining camps and the Galena, Kansas, camp, land was leased at 3% to 5% royalty. Subsequently, the mineralized area was laid out in

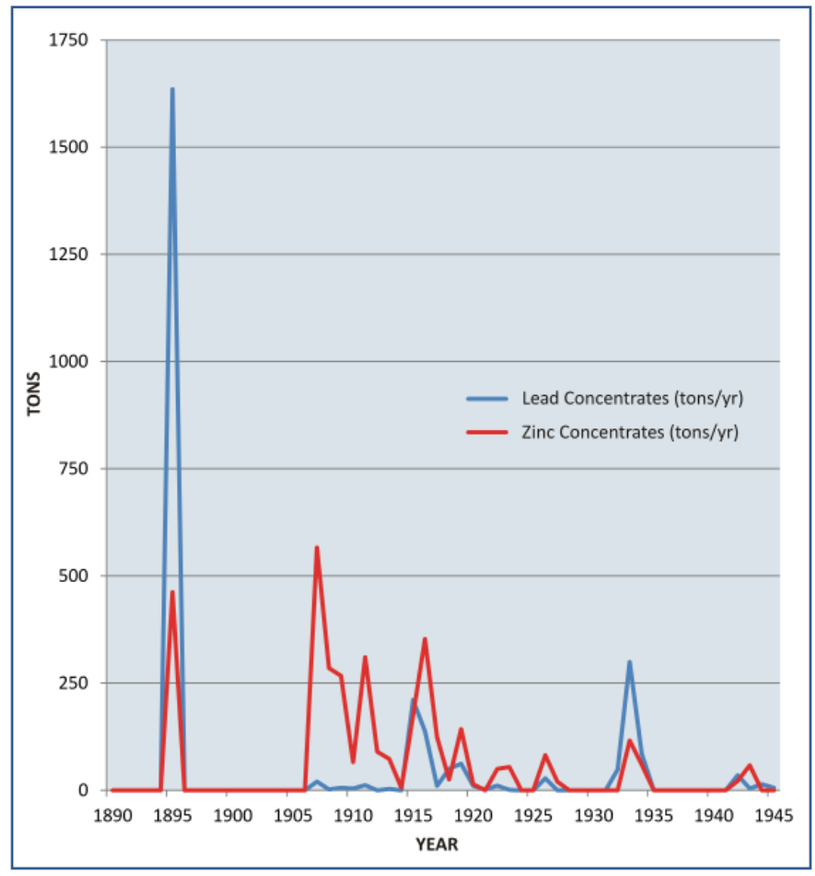

***Figure 5**. Graph that shows the production of lead and zinc concentrates for the Peoria Camp (Snider, 1912; Martin, 1946; ASARCO and others 1995). No distinction was made between sulfide and silicate ores.*

***Figure 6**. Foundation for the Log Cabin mill. The tallest pier (A) is where the primary crusher was located; and the mill shaft (B) was beneath the tilted concrete pad.*

one acre to 200-sq ft mining plots and subleased at higher royalty, 10% to 30% (Holibaugh, 1894; Stone, 1902; Gibson, 1956).

The small plots were worked by two or more miners (**Fig. 4**). Ore was brought to the surface by horse hoister and/or hand windlass (Nieberding, 1972); and concentrated primarily by hand jigs and/or hand sorting. The absence of transportation facilities made the marketing of ore very expensive. Concentrates were hauled by wagon to either Joplin or Seneca, Missouri, or to Galena, Kansas (Snider, 1911). The roads were almost impassable and up to three days were required to make the trip. A convoy of up to 20 wagons with heavy loads made the trip each time. The haulers often helped each other negotiate the poorly maintained roads (Nieberding, 1972).

Early Mining History

The early mining history of the Peoria camp was written by Siebenthal (1908) and Snider (1912). The following is a brief summary of their reports. One of the most productive areas adjoined Peoria on the northwest and occurred near the bottom and on the north bluff of Warren Branch. Workings were 300 ft long by 100 ft wide and were known as the Playhouse diggings. A solid sheet of galena was found in chert at a depth of 7–10 ft. This sheet narrowed to 60 ft in width and extended northward for 600 ft under Monkey Hill where it was 6–22 in. thick. Monkey Hill and nearby prospects were on the Quapaw Indian Reservation. In the vicinity of the Log Cabin Mill, numerous mine shafts were dug next to each other. Some shaft depths were probably over 80 ft. (The Joplin Globe, 1933). In the early years of the camp, the deeper shafts encountered large quantities of water that prevented development at deeper levels (Snider, 1911). Miners attempted to intercept the ore zone that began at the Playhouse diggings. It appears the shafts were dug on subleased ground that once belonged to Quapaw allotees.

Siebenthal (1908) visited the camp in 1907. He found three operating mining companies: Gordon & Wilkins, Chicago Syndicate, and Poor Boys. Several other companies were prospecting in the immediate vicinity of Peoria. The Gordon & Wilkins Mining Company operated the Silicate Mine in 1907. Their shaft was in the face of the hill just north of the creek about 50 ft west of the edge of the Playhouse diggings. The ore face was 1–7 ft in height and averaged 2.5 ft. The drifts were 6–8 ft high and 10–20 ft wide; and had a combined length of approximately 1,000 ft in a relatively small area. This suggested that multiple levels existed at this location. The ore occurred either in slabs or as a "fish-egg silicate" in red clay and in layers of soft, highly weathered chert. The ore was concentrated on hand jigs. Women and girls were employed to hand pick the screenings (Siebenthal, 1908; Nieberding, 1972). In 1908 and 1909, this mining company produced 165 tons of zinc concentrates in each year (ASARCO and others, 1995).

In 1907, the Chicago Syndicate Mining Company built a mill over some old workings one half mile northwest of Peoria. The mill shaft was 120 ft deep. A second shaft, 160 ft deep, was dug on a nearby solution patch of Chester shale and sandstone beds. Lead was taken from the base of the sandstone and shale beds at a depth of 12–22 ft. This mining company produced 24 tons of zinc concentrates in 1908 (ASARCO and others, 1995). No record of production for the Chicago Syndicate mine existed after 1908.

Production

Production records for the Peoria camp, which were compiled by Snider (1912), Martin (1946), and ASARCO and others (1995), were used to identify mine companies, mine name and/or property, and the quantity and value of lead and zinc concentrates (**Fig. 5**). Martin's (1946) compilation begins with the early years of mining, 1891–1903, and ends in 1945. The ASARCO and others (1995) compilation begins in 1907 and ends in 1949, the last year production was reported. In the years 1891–1903, 1,636 tons of lead concentrates with a value of $72,597 were produced (Martin, 1946). By 1903, about 60% of the lead concentrate

production had already occurred (Martin, 1946). Peoria Mining, Construction, and Land Company was responsible for the majority of the lead concentrates and value for this time period. After 1907, most mining was conducted by small, independent ore producers. In 1915–1916, there was an increase in lead-zinc production. Some of the other mining companies included Sullivan & Company, Gold Brick Company, Geboe & Company, Davis & Company, and Stevens & Company. There were 191 tons of lead concentrates and 172 zinc concentrates produced in 1915 (ASARCO and others, 1995). In 1916, 108 tons of lead and 172 tons of zinc concentrates were reported (ASARCO and others, 1995). From 1920 forward, G. G. McConkey was listed on the records as a company and/or property owner. Apparently, he formed several partnerships to mine the ore on his property. In 1933, J. R. and C. C. Cole from Tulsa leased 80 acres from McConkey (Miami News-Record, 1933; The Joplin Globe, 1933). The Coles built the first modern mill in the camp that became operational in October, 1933 (Miami News- Record, 1933). The mill had rougher and cleaner jigs, four tables, and primary and secondary crushers (The Joplin Globe, 1933). They named their mill and mine, the Log Cabin (**Fig. 6**). In 1933, the Log Cabin Mining Company produced 300 tons of lead and 116 tons of zinc concentrates (ASARCO and others, 1995). After 1934, no production was recorded until 1942, when mining was started to support the war effort. The Log Cabin Mill continued to produce concentrates through 1949. The Peoria Townsite mine, Lot 144, contained a smaller modern mill. In 1947, this mine produced one ton of lead concentrates (ASARCO and others, 1995). No production for this mine was reported after 1947.

The 1891–1945 production records indicated 2,698 tons of lead (galena and a small quantity of lead carbonate) had an average value of $50/ton (Snider, 1912; Martin, 1946). There was 220 tons of sphalerite concentrates produced with an average value of $42/ton. There was no record of sphalerite concentrates production after 1919. There were 3,200 tons of zinc silicate (calamine) and carbonate (smithsonite), produced with an average value of $25/ton. From 1946–1949, 24 tons of lead concentrates and 6 tons of zinc silicate concentrates were produced (ASARCO and others, 1995). No value per ton estimates were reported on the ASARCO and others (1995) compilation. There was no record of production for the years 1904–06, 1924–1925, 1928–1931, and 1935–1941.

Summary

Peoria had a population of 149 in 1890 (Gibson, 1956). After the 1891 discovery, miners flocked into the little village of Peoria. A post office was established in 1891 and named Peoria. James Dent, a store owner, was the first postmaster (Nieberding, 1972). Several hundred people were living in tents and log huts by 1893 (Nieberding, 1972). By the end of 1895, the Peoria Camp went from boom to bust. The population declined to 205 by 1896 (Doane, 1897). Peoria survived the early mining days to become incorporated on May 20, 1898.

The low grade ores and limited areal extent of the ore deposits brought into question the sustainability of the camp. Therefore, a rail line was never built to the camp. Snider (1911) speculated that deeper, unoxidized ores could revitalize the camp. Apparently, deeper lead-zinc deposits were either never found or the deposits were not economically feasible to mine. After 1895, the Peoria Camp became a poor man's mining camp until 1933. The Log Cabin Mining Company built a modern mill and derrick in 1933 near the center of sec. 12, T. 28 N., R. 24 E. During 1942–1949, the company produced lead-zinc concentrates from various leases (ASARCO and others, 1995; Martin, 1946). After 1949, there was no record of production from any mine operators. However, some small producers continued to produce lead-zinc concentrates in the early 1950s (Barnett, personnel communication, April 2012). Today, piles of mine and mill waste, abandoned mine workings, open mine shafts, and numerous unfilled prospect pits remain visible from the town. By 2010, Peoria's population had declined to 132 (U.S. Bureau of the Census, 2012); and in 2013, the only business that remains is a small convenience store.

Acknowledgements

The authors appreciated the information Peoria mayor, Dennis Trease, and his father-in-law, Tacker, gave about the location of mine shafts that they filled on their property in section 13. They provided some data on the well-house shaft. Land owner, Ron Briscoe, and Victor Hurley, foreman of Martin Livestock Company, provided access to land they own and/or manage for the inventory. Eula Ludlum, former Peoria mayor, told the authors about some of early Peoria history. Barney Barnett, convenience store owner, showed the authors the Townsite Mine location and provided the approximate depth for the mine's field shaft. Larry Kropp, local historian, gave permission to use a photograph of a typical mining operation in the Peoria Camp.

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Continued on pg.10

Earthquake Report 1st Quarter 2013

Austin Holland, OGS Research Seismologist; Amie Gibson, OGS Research Scientist II

The Oklahoma Geological Survey (OGS) located **272** earthquakes within Oklahoma from January 1 to March 31, 2013. There were **21** felt earthquakes in the first quarter of 2013 shown in **Table 1**. **122** earthquakes were located in Oklahoma county with most of those consistent with the ongoing Jones earthquake swarm. **45** earthquakes occurred in Lincoln County with the majority of those associated with aftershocks of the **Nov. 2011 M5.6 Prague Earthquake sequence**. Other counties that had significant numbers of earthquakes include Seminole (38), Okfuskee (14), Hughes (9), and Pittsburg (7) counties. All earthquakes located in Oklahoma for the first quarter of 2013 can be seen in **Figure 1**.

Current seismic activity continues to be concentrated within central Oklahoma. The largest earthquake to occur during this quarter was a magnitude 3.4 on January 4th located in Seminole county. There was a magnitude 3.3

Table 1 - Felt earthquakes for January 1 to March 31, 2013

(MMI is the maximum reported Modified Mercalli Intensity)

Origin Time (UTC)	Longitude	Latitude	Depth (km)	Magnitude	Type	MMI	County
1/4/13 1:59	-96.515	35.380	5.0	3.4	ML	IV	SEMINOLE
1/4/13 16:15	-96.527	35.411	5.0	2.1	ML	II	SEMINOLE
1/8/13 23:18	-97.275	35.454	3.0	2.9	ML	IV	OKLAHOMA
1/11/13 23:13	-97.403	35.484	4.1	2.2	ML	II	OKLAHOMA
1/14/13 17:41	-97.399	35.485	2.6	2.5	ML	I	OKLAHOMA
1/16/13 6:26	-97.352	35.599	5.7	3.3	ML	III	OKLAHOMA
1/16/13 20:51	-97.349	35.598	5.8	3.2	ML	V	OKLAHOMA
1/17/13 0:53	-97.345	35.599	4.8	2.8	ML	III	OKLAHOMA
1/17/13 17:53	-97.351	35.589	4.6	2.2	ML	I	OKLAHOMA
1/24/13 18:06	-97.394	35.583	5.0	2.4	ML	II	OKLAHOMA
2/1/13 8:03	-96.888	36.100	2.5	2	ML	II	PAYNE
2/2/13 3:44	-97.427	34.904	5.0	2.7	ML	V	MCCLAIN
2/5/13 20:55	-97.241	35.508	3.8	2.7	ML	II	OKLAHOMA
2/13/13 7:29	-97.234	35.508	4.6	2.9	ML	III	OKLAHOMA
2/13/13 9:15	-96.744	35.532	5.0	2.2	ML	II	LINCOLN
2/27/13 0:10	-96.762	35.541	5.0	2.4	ML	II	LINCOLN
2/27/13 12:30	-97.251	35.491	1.9	2.8	ML	III	OKLAHOMA
3/8/13 0:47	-97.287	35.552	5.0	2.2	ML	II	OKLAHOMA
3/9/13 2:02	-97.126	35.532	5.0	2.2	ML	II	LINCOLN
3/11/13 12:57	-96.808	35.513	5.0	2.5	ML	II	LINCOLN
3/21/13 2:23	-96.828	35.506	5.0	2.2	ML	II	LINCOLN

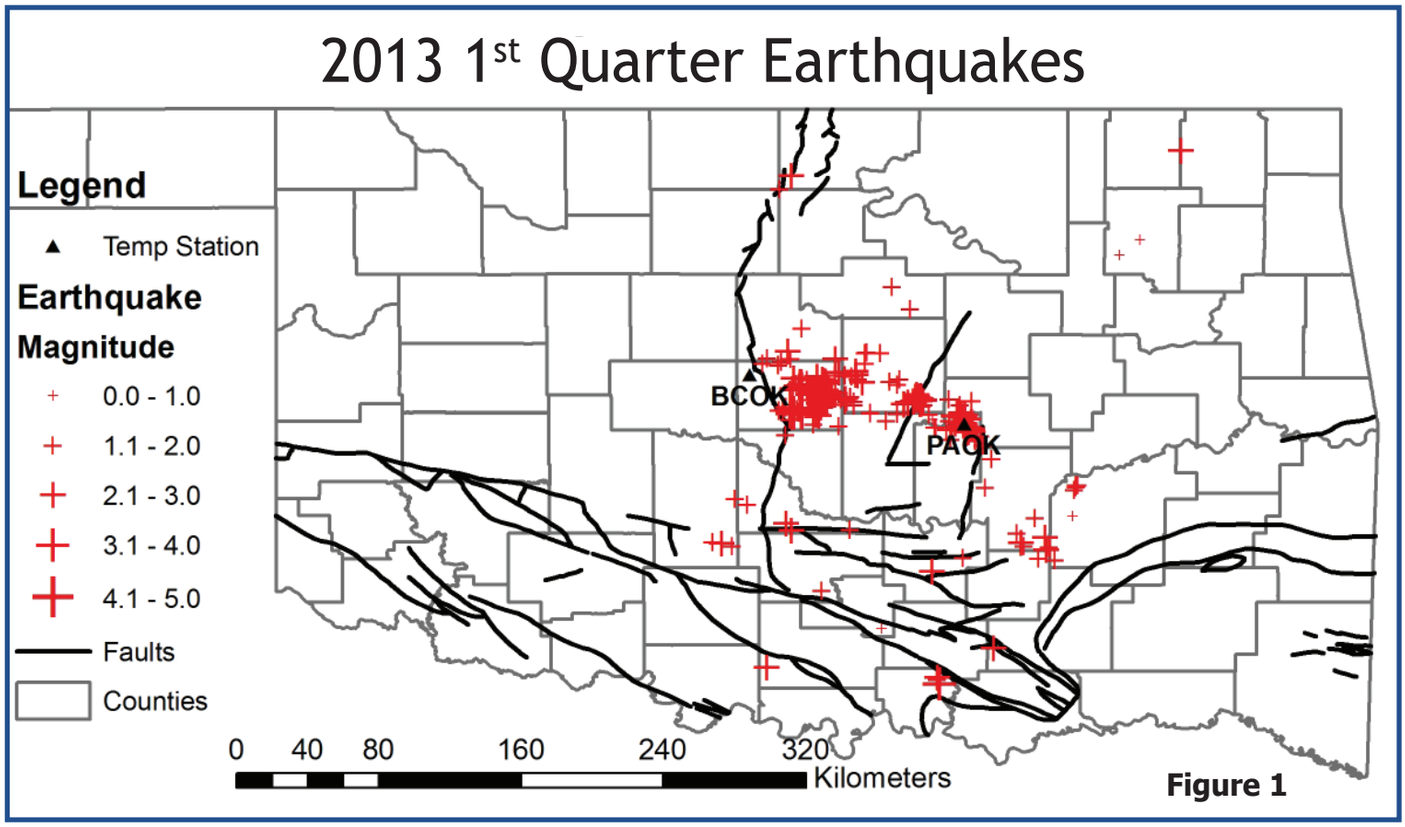

Figure 1

and a magnitude 3.2 on January 16th located in Oklahoma county. In response to the ongoing activity in the area of Seminole and Okfuskee counties south of Paden, a temporary seismic station was installed on January 17th with the station code PAOK. The PAOK station is a vertical component short period station. In addition, another temporary station BCOK, was installed in northern Oklahoma county on February 8th. The BCOK station is a 3-component broadband station.

Download 2013 1st quarter earthquake file and complete list of felt earthquakes (CSV):

http://www.okgeosurvey1.gov/media/quarterlies/2013qt1.csv

http://www.okgeosurvey1.gov/media/quarterlies/2013qt1_felt.csv

Oklahoma Geological Survey Mission Statement:

The Oklahoma Geological Survey is a state agency for research and public service located on the Norman Campus of the University of Oklahoma and affiliated with the University of Oklahoma Mewbourne College of Earth and Energy. The Survey is chartered in the Oklahoma Constitution and is charged with investigating the state's land, water, mineral, and energy resources and disseminating the results of those investigations to promote the wise use of Oklahoma's natural resources consistent with sound environmental practices.

Events Calendar

August 14-16 — **Summer North American Prospect Expo (NAPE)**
George R. Brown Convention Ctr; Houston, Texas; website: http://www.napeexpo.com

August 16-17 — **Tahlequah 2013 Rock & Mineral Show & Sale**
Tahlequah Community Building; Tahlequah, Oklahoma; contact: 918/284-5770

August 28 — **2013 Real Deal Mid-Continent Prospect Expo**
[Please see registration form on page 11 of this newsletter.]

Sept 4 — **The Society for Organic Petrology (TSOP)**
Sosnowiec, Poland; website: http://www.tsop.org

Sept 22-27 — **Society of Exploration Geophysicists (SEG) Annual Meeting**
Houston, Texas; website: http://www.seg.org

Sept 24-30 — **McCurtain Gem & Mineral Club Show**
Museum of the Red River; Idabel, Oklahoma;
Website: http://www.museumoftheredriver.org

Sept 30-Oct 2 — **Society of Petroleum Engineers (SPE)**
New Orleans, Louisiana; website: http://www.spe.org

The Peoria Lead-Zinc Mining Camp...*continued*

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