# Doe Run Backgrounder

## Southeast Missouri Mining and Milling Division

The lifecycle of lead starts in the underground mines of The Doe Run Company's (Doe Run) Southeast Missouri Mining and Milling Division (SEMO). Employees travel deep underground where natural mineral deposits containing lead, zinc, copper and trace metals are methodically blasted, crushed and brought to the surface for processing at Doe Run's mills. SEMO operates in the Viburnum Trend in Southeast Missouri. Mining and milling has taken place here for nearly 60 years.

### Mining

- SEMO's mining operations take place up to 1,250 feet underground. The mines have extracted nearly 310 million tons of lead-bearing ore in the Viburnum Trend since production began in 1960.
- Doe Run's mines are large underground structures that extend for miles. Four of the company's mines – Buick, Brushy Creek, Casteel and Fletcher – are interconnected by 25 miles of roadway.
- Doe Run relies on a naturally stable environment, proactive safety initiatives, engineering controls and over a century of expertise to create a safe mining environment for more than 725 SEMO employees.
- Millions of dollars worth of equipment operates underground, including hydraulic drills, trucks, loaders, charging rigs and scalers – all of which are disassembled to transport down the shaft and reassembled underground. Any mechanical repairs are done in an underground maintenance shop.
- SEMO uses the room-and-pillar mining method, in which rock pillars (up to 35 feet wide and 120 feet tall) support the ground above.

**SEMO mines 5M tons of ore annually**

- SEMO also utilizes "remote mining," which involves remote operation of a 25-ton loader so blasted ore can be safely excavated from hundreds of feet away. This method is used to remove select pillars left behind after a mine's reserves are extracted.
- Loader operators load the ore into eco-friendly, low-emission biodiesel haul trucks or an electronic rail conveyor system for transport to our crusher shaft. It is fed into an underground crusher to break the ore into smaller pieces that are hoisted to the surface for further crushing at our mills.
- Each day, millions of gallons of groundwater enter our mines and are then pumped to the surface. This water is sent to one of five water treatment plants, to be treated and released according to permit levels.
- Ventilation in our underground mines is always of utmost importance. In 2019, we completed the addition of another vent shaft in the southern area of our mines. This shaft, the Big Bear Vent Shaft, supports more efficient development in the area.

### Milling

- Primary recovery of lead, zinc and copper-bearing ores takes place after the mineral-containing ore has been crushed and hoisted up the shaft to the surface mill facilities. The ore is then ground to the size of beach sand with rod and ball mills.
- Flotation separates the copper, zinc and lead. After separation, the various concentrates are dried to the consistency of a damp powder before being stored in our enclosed storage and shipping facility.
- Three concentrates are produced: lead, zinc and copper.

- Lead concentrate is transported for smelting and conversion into lead metal or lead alloys used primarily to produce automotive, industrial and ground storage batteries. The copper and zinc concentrates are sold to smelters and refineries throughout the world to produce copper and zinc metal and alloys.

## Exploration

- Doe Run employs geologists and contract partners who conduct geological services and drilling to identify and test exploration targets for promising ore bodies around the globe.
- New geology software, analytical tools and other technologies have increased Doe Run's ability to continue to find new ore resources by detecting elements at lower concentrations.

## Mine Safety

Operating safely is a hallmark of Doe Run's operations, and SEMO is often recognized for safety leadership. Doe Run and its predecessors have earned the National Mining Association's (NMA) prestigious Sentinels of Safety Award, the highest honor in the mining industry, a combined 28 times since 1971. Buick Mine most recently won this award in 2017. In 2013, Doe Run received two Sentinels of Safety in a single year. Buick Mine and No. 29 Mine received the award, and Brushy Creek Mine and Casteel Mine followed as runners-up.

- Doe Run relies on highly decorated mine rescue teams who train specifically to respond to emergency situations. Teams stay sharp by regularly competing in mine rescue competitions.
- Doe Run's recent wins from 2019 include an overall championship title by the Gray Team at the Northern Regional Metal/Non-Metal Mine Rescue Competition, overall championship title by the Maroon Team at the Southwest Regional Mine Rescue Contest, and both Gray and Maroon Teams took first place in multiple categories at the 2019 Missouri Regional Mine Rescue Contest in Rolla, Missouri.
- All new Doe Run employees complete 40 hours of in-depth training on MSHA guidelines and participate in follow-up training throughout their careers. Companywide, employees participate in approximately 16,000 hours of training each year.

## Community Involvement

- Employee expertise is shared with universities to help educate future mining professionals. Groups from Missouri University of Science & Technology (Missouri S&T), University of Missouri - Columbia and Iowa State University, to name a few, have toured the SEMO mines.
- Each summer, SEMO opens its mining operations to students participating in the Explosives Camp held by the Missouri S&T's Department of Mining Engineering.
- SEMO offers scholarships, internships and summer employment opportunities for students seeking engineering, chemistry, geology, mining or geoscience degrees.
- Employees contribute to Doe Run's Minerals Education Program, which includes minerals-related outreach initiatives, such as classroom visits, community presentations, facility tours, and professional development programs for educators.

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