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Underground and surface operations at the York Canyon mine, Raton, New Mexico

Kaiser Steel Corporation

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This is one of many related papers that were included in the 1976 NMGS Fall Field Conference Guidebook.

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UNDERGROUND AND SURFACE OPERATIONS AT THE YORK CANYON MINE

KAISER STEEL CORPORATION

INTRODUCTION

Kaiser Steel Corporation purchased the 530,000 acre coal property in northern New Mexico in August, 1955, from the St. Louis, Rocky Mountain & Pacific Company. At that time, the Koehler mine was the only operating mine on the property, and it was being worked on a very limited basis.

Kaiser Steel modernized and expanded the Koehler operation to a capacity of 2,000 tons per day. At the same time, the company began a long-term exploration program to determine the potential of the area. During the next eight years, this exploration program outlined several substantial deposits, with the most attractive prospect for development in the York Canyon region. Studies found the coal quality to be good; the coal was desirable for blending purposes and access to the coal seam was favorable.

A test mine was opened in 1963. The coal was trucked to the Koehler mine for washing and subsequent shipment to Fontana for verification of the quality of the coal for blast-furnace use. Plans for construction of the new mine at York Canyon were finalized in late 1964, and construction work began in 1965. Design called for a mine capable of producing 700,000 tons per year. A spur line was built by the Santa Fe Railway connecting the new mine with the railroad's main line. Equipment and men were transferred from the Koehler mine. The move to York Canyon was essentially completed by September, 1966, and the Koehler mine was closed.

MINING OPERATIONS

The main York Canyon seam ranges in thickness from 4 ft to 10 ft, is relatively flat and crops out along the canyon walls. The seam is thickest at the outcrop and pinches rather rapidly as it extends into the hillside. A large percentage of the seam is in the 4 to 6 ft range. Cover is not excessive, ranging from 30 ft near the outcrop to a maximum of 700 ft under the ridges. The roof rock is quite variable and may be classed as tender; it frequently requires supplementary steel beam support in addition to conventional roof bolting.

Production is divided between the underground mine opened in 1966 and a new strip mine started in 1972. Coal from these two mines is processed in the preparation plant adjacent to the mines.

UNDERGROUND MINE

The underground mine was developed with a four-entry system that extends in from the portal about 9,000 ft; entries are driven right and left to develop mining panels for continuous mining units and the newer longwall mining units. Underground equipment consists of five sets of continuous mining equipment and two longwall mining units.

Each set of continuous mining equipment consists of a continuous miner, loading machine, two shuttle cars, a twin-boom rotary roof bolter (Fig. 1), scoop-tram or supply tractor, feeder-breaker and a belt conveyor. Two types of continuous miners are in use: 16-year-old Joy 6CM ripper miners, and newer Joy 11-CM drum-head miners. New Lee-Norse HH-386

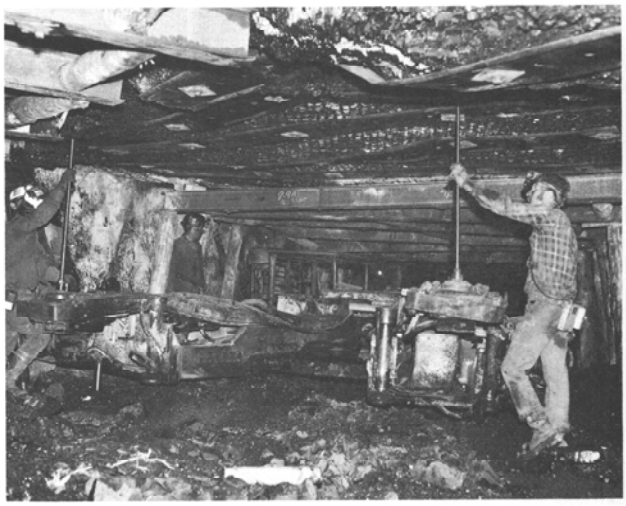


Figure 1. Twin-boom roof bolting machine.

continuous miners are being purchased to phase out the old ripper type. The older longwall mining unit consists of 110 chocks (Fig. 2), a double-drum bidirectional shearer (Fig. 3), armored face conveyor, stage loader, power pak, electrical power center and a belt conveyor. A new shield-type longwall mining unit has recently been put into operation.

Coal mined by the continuous miners is hauled by shuttle cars (Fig. 4) to a feeder-breaker. It breaks large lumps down to 8 in. size or less and discharges the coal onto a 36 in. wide conveyor belt, which carries the coal to the 48 in. main con-



Figure 2. View looking down the chocks of a longwall unit showing the hydraulic roof supports. Each hydraulic leg has a 110-ton capacity, two-stage hydraulic extension.

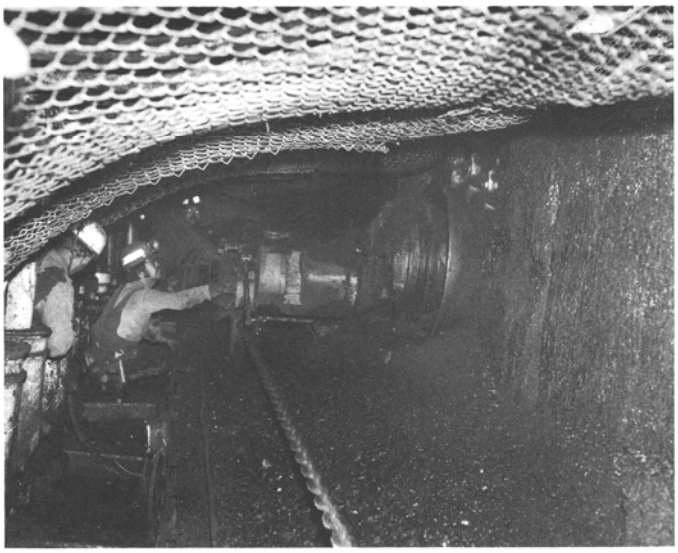


Figure 3. Looking at cutting end of 300 h.p., double-drum shearer on longwall face. Because of the weak friable nature of the roof in this part of the mine, 100 percent of the roof is covered with wire mesh.

veyor belt for transport to a 100 ton surge bin at the portal. Coal from the longwall shearer is conveyed on an armored flight conveyor to the stage loader at the head-gate of the face, then to a 42 in. extensible conveyor belt which discharges onto the 48 in. main conveyor.

STRIP MINING AND RECLAMATION

The strip mine is approximately 1 mile from the cleaning plant and is operating in the same seam as the underground mine. Overburden ranges from 30 ft to 240 ft; but mining is currently restricted to the low cover areas, having a maximum thickness of 70 ft, because of the limitation of overburden removal bulldozers and two front-end loaders (Fig. 5).

A 30 cubic yard walking dragline with a 275 ft boom is now being assembled on the ridge and will be used to strip the heavier overburden and bring capacity up to half a million tons per year of strip coal. The overburden is drilled with a 7¾-inch-diameter, truck-mounted blast-hole drill and blasted with an ammonium nitrate-fuel oil explosive. Bulldozers and front-end loaders remove the loose overburden down to the coal seam, which is then drilled with a twin-boom coal drill and blasted for loading by a front-end loader.

The coal is loaded into 67 cubic yard trucks and hauled to a truck dump station near the preparation plant. Coal from the truck-dump stockpile is carried by conveyor belt to the surge bin at the underground-mine portal and blended with the underground coal before cleaning.

Surface mining equipment serves double duty in reclaiming mined-out areas (Fig. 6). Reseeding is underway and reforestation will follow.

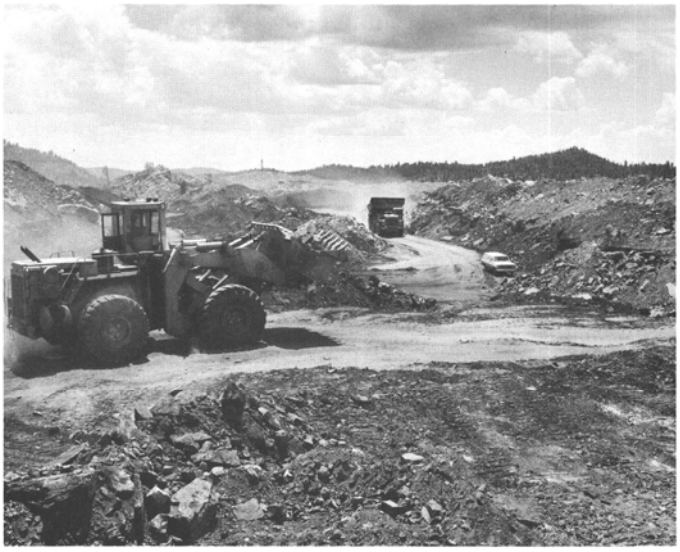


Figure 5. Fifteen-yard front-end loader awaits arrival of truck in the background to begin loading of overburden.

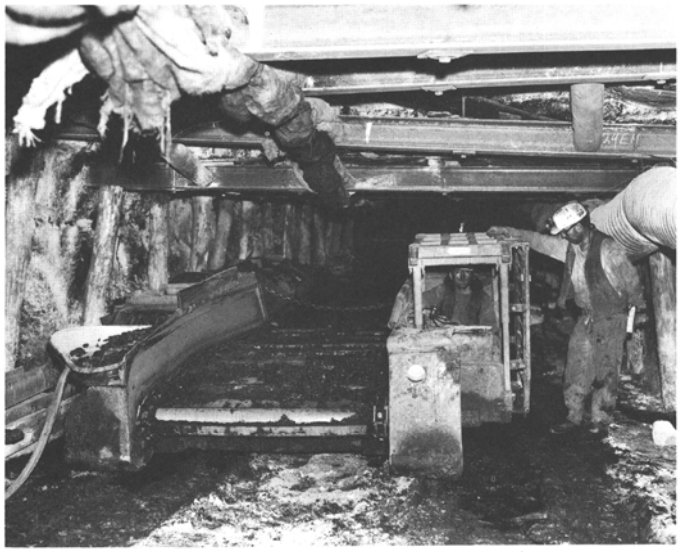


Figure 4. 10 SC shuttle car.



Figure 6. View to northeast across York Canyon showing mined-out areas that have been graded and covered with topsoil.

COAL PREPARATION

The first step in processing is to size the coal. The coal from the mine is broken in a 4 in. breaker station and then stored in a raw-coal stockpile. The 400 tons per hour feed rate preparation plant uses heavy-media and flotation cleaning circuits followed by screen, centrifuge and vacuum-filter dewatering. Clean coal then passes to a 70,000 ton stockpile located directly over the railroad-train-loadout track. The coal is carried to the stockpile by means of an elevated conveyor, which discharges coal 125 ft above the center of the cone-shaped pile.

PRODUCTION

The York Canyon mine presently produces high-quality coking coal from the underground and surface operations at a combined rate of approximately 1,000,000 tons per year. With the recent completion of a 120 ft diameter water clarification thickener (Fig. 7), the preparation plant has a capacity of about 1,300,000 tons. In the future, to meet the high demand for this coal, production can be raised to 1,500,000 tons annually by limited additions to the coal preparation plant and by placing additional strip and underground mining equipment in service.



Figure 7. New 120 ft diameter thickener for clarifying the water and settling out of flotation tailings.

TRANSPORTATION OF CLEAN COAL

Opening of the York Canyon mine was accompanied by an efficient railroad unit train system (Fig. 8) for transporting large volumes of coal a distance of 1,802 miles to KSC's steel plant in Fontana, California.

The Santa Fe Railway constructed a 37.5 mile spur line to connect the mine with their main line; they provided 100 100-ton flat-bottom gondola cars with attendant assignment of locomotive units to support the operation of the 84 car unit train between the mine and steel plant on a four day turn around basis.

With the clean coal stockpile positioned directly over the railroad tunnel, high capacity car loading is achieved. As the unit train proceeds through the tunnel at a controlled speed of about 3/4 mile per hour, the load-cut operator opens and closes a hydraulically operated gate, filling each car as it passes the loading chute. Typically, the 84 car trains are loaded in approximately 1.5 hours. When loading is completed, the operator raises the chute, and the train continues around the loop to start the journey to the steel plant.

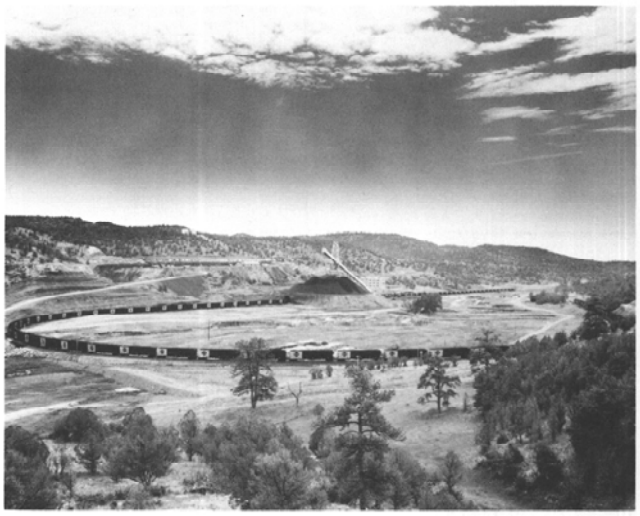


Figure 8. Mine and loading facility at York Canyon showing loaded 100 ton gondolas.