bulk solids handling Volume 2, Number 3, September 1982

Innovative Conveyor Design Solves Hoisting Problem for Illinois Coal Mine

James J. Anthony, USA

Turris Coal Company (a subsidiary of Shell Oil Company) faced a serious problem in early 1981 at their underground mine No. 1 in Elkhart, Illinois. They were attempting to determine the most cost-effective method to lift coal to the surface from a depth of approximately 300 ft. Their original design specified an inclined conveyor in a slope drift constructed at an angle of 17 degrees. However, the depth of unconsolidated material encountered made the prospect of driving an incline risky and expensive. The Turris engineers preferred to utilize a conveyor system due to its high reliability and continuous operation. If they chose to drive a vertical shaft to simplify their excavation problem, they would be forced into the unpleasant necessity of installing a skip hoist and foregoing the advantages of a conveyor system. Turris Coal Company was facing a dilemma — they wanted to construct a vertical shaft and use a conveyor system.

The materials handling specialists at Scholtz-EFS Corporation, Annandale, Virginia (an affiliate of Scholtz-EFS GmbH, Hamburg, West Germany), presented Turris Coal Company with an innovative solution. With a Scholtz Vertical Conveyor System, Turris Coal Company would have a cost-effective conveyor system installed in an economic vertical shaft.

The Scholtz engineers designed a system to accommodate two vertical conveyors positioned side-by-side within a 20 ft diameter shaft to provide total system lifting capacity of 1,300 short tons per hour of 5 inch minus Harrisburg-Springfield No. 5 coal. Scholtz-EFS Corporation designed and supplied the entire system including Flexowall® conveyor belts, mechanical drive system, mechanical components, and structural steel support members.

At the heart of the system are the two 1,600 mm wide ST-3150 8:8 type 400ES cross-rigid steelcord Flexowall® conveyor belts. Each belt features a cross-rigid steelcord reinforced base belt to which corrugated sidewalls and carrying cleats are bonded. The belts are fabricated to meet MSHA flame retardancy standards and are approved for use in underground mines. Flexowall® belting is a technology which was developed by Conrad Scholtz AG of Hamburg, West Germany. It has been in service for over 15 years solving difficult materials handling problems. The installation at Turris Coal Company is the first application of Flexowall® belting to remove coal from the production shaft of an underground mine. It also represents the largest vertical lift to date for a Scholtz conveyor system. Its capability to perform this difficult task had been proven in the vertical conveyor system installed in 1979 at the Chicago TARP Project to lift 900 short tons per hour of limestone muck from a 265 ft vertical shaft.

The Vertical Conveyor System at Turris Coal Company is charged by two vibratory feeders located beneath a pant leg surge hopper. The conveyors are loaded on a 35 ft long horizontal feed section before being deflected vertically. Each 400 HP conveyor is capable of transporting 650 short tons per hour of coal up the 320 ft vertical lift at a speed of 450 ft/min. Once the conveyor has reached ground level, it is deflected to the horizontal plane again to transfer coal to the 42 inch wide cross-belt which runs tangential to the shaft.

Structural design of the system required 300,000 pounds of steel. Major components included the below ground tail pulley support structure and the above ground head pulley support structure. Included in the system design is an emergency stairway for personnel evacuation and a vertical lift enclosure to prevent material spillage from the belt. The system has been designed in strict compliance with all federal and state mine safety regulations.

Phase I installation, which includes structural steel for both vertical conveyors and belting and mechanical components for the first conveyor, will be completed by October 1, 1982.

It will go into operation the same month. Phase II installation, which includes the belting and mechanical components for the second conveyor, is tentatively scheduled for 1986.

James J. Anthony, P.E., Manager of Engineering, Scholtz-EFS Corporation, 6926 Little River Turnpike, Annandale, VA 22003-3278, USA

General arrangement of dual S-conveyor system for Turris Coal Co.

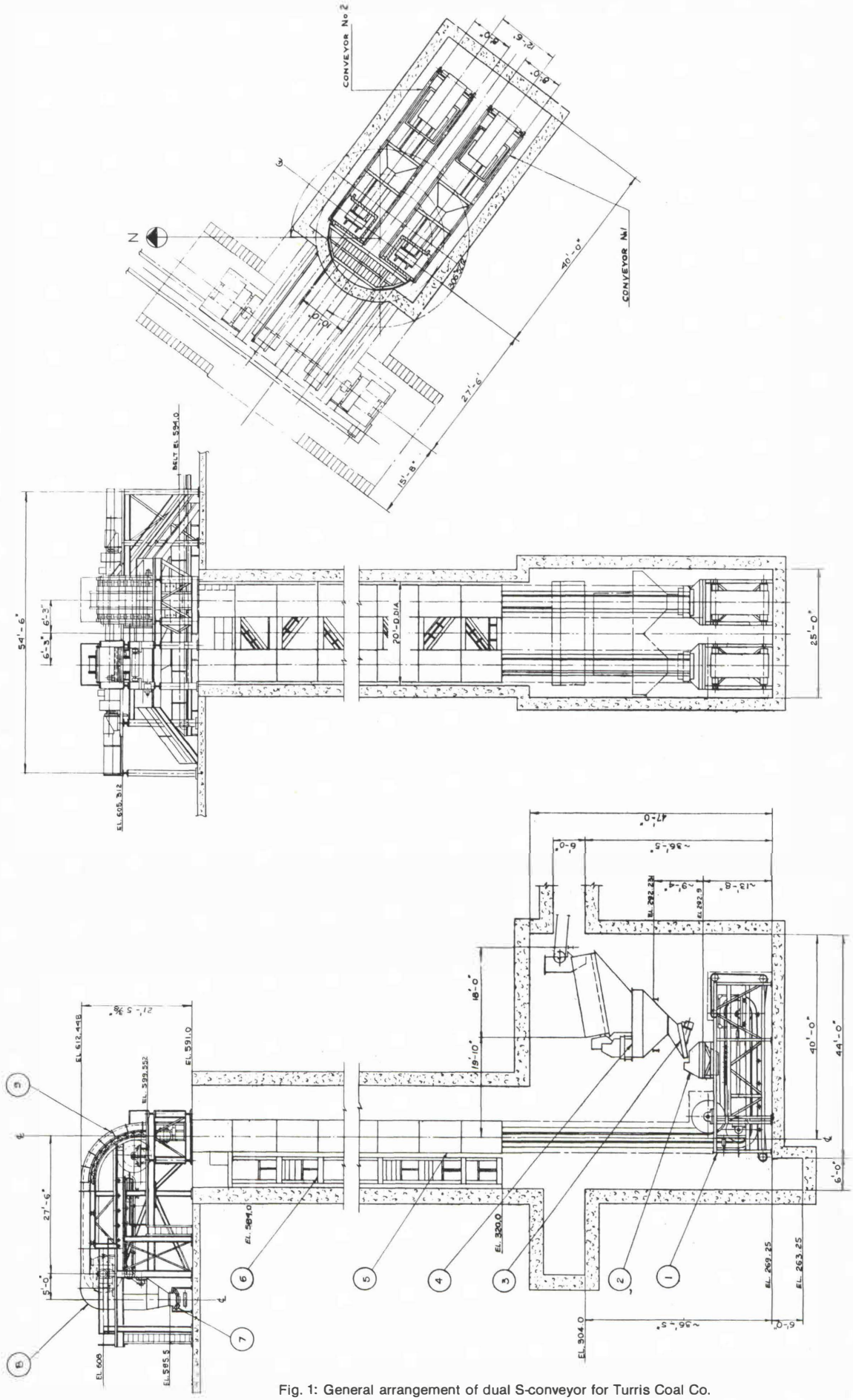

Fig. 1: General arrangement of dual S-conveyor for Turris Coal Co.