PILLAR DESIGN IN

COMPETENT BEDDED FORMATIONS

by

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ABSTRACT

An experimental and analytical study was conducted to obtain information for the design of pillars in a competent bedded formation. Elastic theory, laboratory tests, and extensive underground measurements were used to obtain the mode of failure, loading conditions, stress distributions, and strength of oil shale pillars. The major phases of the project were:

1. Review of the state of the art of pillar design,
2. Review of mine design in the Piceance Creek Basin,
3. Organization and implementation of a rock mechanics program,
4. Discussion and detailed analysis of the experimental data,
5. Application of the field and laboratory tests to the development of a structural model to be used in future mine design.

Pillar behavior was studied during the process of failure for the determination of pillar strengths. Complete load-deformation curves were obtained from field measurements. These data were used in a finite element study which was developed to simulate the behavior of the rock mass both in an unfailed and failed condition. The model results were checked against the in situ measurements and were found to be in close agreement. The model provides quantitative
information regarding the transference of loads during the process of stable failure. Since pillar strength is known, a variety of mining layouts can be simulated both for no failure and stable failure conditions.