

A REVIEW OF ROCK SLOPE DEVELOPMENT WITH EXPLOSIVES SINCE THE 1960'S

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ABSTRACT

Pre-splitting was substituted for line drilling to achieve stable rock slopes and reduce excavation beyond the pay line on a Connecticut highway project in 1962-63. Changes have occurred in developing rock slopes that were not foreseen by Alan Bauer and Jim Scott who in the early days understood the relationship of explosive energy to stable slopes. Cushion blasting as currently used produces slopes designed to blend or complement the natural landscape with slope holes detonated after the main body of holes. Pre-splitting is the opposite. The best results have been achieved by detonating the pre-split line of the holes first to allow readjustment of the slope plane fracture and a separate blast for the main body of loaded holes.

Stable slope design for civil works projects may require a comprehensive investigation to determine the rock quality and defect structure. The selection of the appropriate blasting system can be made from this information. Mining may not require the same exploration effort as data should be available from other mine departments. The end product is safe and stable slopes consistent with OSHA and MSHA requirements.

Explosive products are available that assist in slope development. Drilling equipment is available to produce accurate boreholes. Personnel experienced in the application of explosive energy to develop slopes should be responsible for the rock excavation.

Slope development considerations are:

- When is the air gap method appropriate?
- Use of detonating cord only as a pre-split explosive
- Type of stemming material
- Utilization of a buffer zone
- Rock features that affect global stability
- Vibration considerations
- Survey requirements

Taping 1-1/4" x 8" cartridges on detonating cord or sliding them down the cord are rarely utilized.

Controlling rock fragmentation has been a cost effective investment for the safety of employees, equipment and the traveling public.

Today, the blaster and driller might be considered rock sculptors.