

May 2, 1983

Kerr-McGee Corporation  
Oklahoma City, Oklahoma 73215

Attention: Mr. William Shelley

Re: Riprap Search, Kerr-McGee Tailing Dam, Near Grants, New Mexico.  
Job No. 20594

Gentlemen:

This will confirm verbal opinions expressed by the undersigned to your Mr. William Shelley concerning our field study of the Todilto limestone southwest of Mesa Montanosa and LaJara Mesa south of the Kerr-McGee tailing dam and pond near Grants, New Mexico. Our objective was to delineate and preliminarily evaluate outcropping units of the Todilto limestone that potentially could be quarried and processed to yield material that would protect the dam and pond from wind and surface water runoff erosion for at least 200 years. We understand the dam ultimately will be about 200 feet high with 2.5:1 side slopes bermed at 20 foot elevation intervals. As tentatively planned the top of the pond will be blanketed with 6 inches of gravel ranging in size from 1/2 inch to 1 1/2 inches. The side slopes of the dam would be blanketed with a 6 inch thick base of gravel ranging in size from 1/2 inch to 1 1/2 inches capped by a 12 inch thick layer of cobble size rock ranging from 6 inches to 12 inches in maximum dimension. We understand about 1 million cubic yards of rock riprap will be needed.

During the course of this preliminary investigation we have researched published and open file geologic literature, as well as geologic data in our own files pertinent to the study area, and have conducted a field reconnaissance to view the physical condition of the Todilto limestone, which crops out in a narrow, sinuous band about 3 to 5 miles south and southwest of the Kermac tailing dam.

The Todilto limestone appears to have the engineering performance characteristics appropriate to riprap and appears to be available in a quantity greatly in excess of the million cubic yards required. The limestones cap the back slope of a low, topographically disjointed (by ravines) cuesta ridge that extends generally northwestward immediately southwest and parallel to the foot of the fore-slopes of La Jara Mesa, Mesa Montanosa and Haystack Mountain from the center of T. 12 N., R. 9 W. to the northeastern

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sector of T. 13 N., R. 11 W. and beyond. The outcrop ranges from a few hundred feet to 1/2 mile wide. The largest single exposure is in Section 25, T. 13 N., R. 9 W.

Within that general outcrop area, the Todilto limestone generally is about 20 to 25 feet thick. It is shaly bedded to thick bedded, with individual beds as much as 18 inches to 2 feet thick. Joints are widely spaced. The limestone is microcrystalline, moderately hard (can be scratched with a knife) and appears to be very strong. We estimate its unconfined compressive strength for the thicker bedded units to range from 20,000 psi to as much as 40,000 psi. As the rock has not been subjected to appreciable tectonic stress, a system of rock weakening microfractures is unlikely and none were observed.

Some of the rock along all of the larger outcrop areas has been removed (quarried) already, especially across the crest of the ridge, but much remains. Across large sectors of the backslope of the several ridge sections, the limestone is blanketed by a few inches to a few tens of feet of alluvial and wind-deposited soils. The soil-blanketed limestone within those areas appears to have been untouched for the most part.

Conceivably, several quarries in several sectors might have to be developed, but the amount of the limestone available within the study area undoubtedly exceeds the required amount by at least 1 to 2 orders of magnitude. A quarry could be developed to take advantage of proximity to the tailing dam at either the northwestern end or the southeastern end of Mesa Montenosa. From the northwestern site the riprap could be transported by an adjacent existing road that would require very little improvement out around the northwestern end of the mesa, then eastward along the backslope of the mesa to the tailing dam. Similarly, rock from a quarry developed at the southeastern end of the mesa could be transported by an existing road that joins Highway 53 around the southeastern end of the mesa, then northward to the tailing dam site by Highway 509. Hauling distance from a northwestern site would approximate 6 to 7 miles. Hauling distance from a southeastern site would approximate 12 miles, but on paved roads for the most part. Both haulages would be uphill with rises of about 400 feet for a northwestern haulage route and about 200 feet for the southeastern haulage route.

Probably about 70 percent of the quarried limestone could be processed into usable rock, thus a million cubic yards of gravel cobbles could be recovered from about 40 to 45 acres given an average of 21 feet of limestone. Most of the limestone would have to be blasted to facilitate its excavation but some, possibly 25 percent, should be rippable.

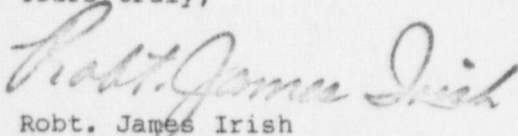
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The processed limestone, gravel and cobbles should be angular but the larger size pieces are likely to be tabular. The surface of the limestone gravels and cobbles should be smooth.

If you decide to obtain riprap from the Todilto limestone outcrops we suggest you augment our studies by appropriate subsurface investigations, including test borings and laboratory testing of representative rock samples, to obtain quantitative information on the thickness and lateral extent of the limstones, as well as on pertinent engineering performance characteristics of that rock.

We have appreciated the opportunity to work with you on this project. If you have any questions or would like to discuss any aspects of our work, please feel free to call.

Yours truly,



Robt. James Irish  
Senior Associate and Chief, Geology Division

REV:FJH

RJI:jam

(2 copies sent)



Attachment 5

Drawing SK-601

Reclamation Plan for  
Ultimate Tailings Pile

