

Tenneco Minerals

A Tenneco Company

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12/8/83

December 2, 1983

Mr. Lyle Randen, Administrator
Land Quality Division
Department of Environmental Quality
Equality State Bank Building
401 West 19th Street
Cheyenne, Wyoming 82002

Dear Mr. Randen:

In response to the recently issued Public Notice regarding FMC's proposed solution mining operation, Tenneco Minerals Company has completed a careful review of the non-confidential portions of FMC's permit application. On the basis of that review, Tenneco objects to the granting of a mining permit for FMC Corporation's proposed solution mining operation in Section 36, T17N, R110W, until our concerns regarding possible excursions from the production zone have been resolved.

Tenneco operates a dry trona mine and soda ash plant directly north of the proposed solution mine, being the closest such facility to it. Our southernmost mineral leases are within 3 miles of FMC's proposed activities. Furthermore, our tailings pond is located in the southern portion of our lease area. Tenneco has invested well over \$250,000,000 in the construction of our plant and mine, and plans to continue operation for many years to come. Approximately 320 people work at the Tenneco facility. Our concerns are threefold: The safety of our workers, protection of Tenneco's reserves and capital facility, and assurance to our customers that their source of supply is reliable. We must be absolutely satisfied that the FMC project does not threaten any of these.

After a careful review of FMC's permit application, we have concluded that the possibility of long range effects associated with solution excursions from the mining zone has not been addressed to our satisfaction. Some specific examples of our concerns follow.

FMC's calculations concerning solution migration make the assumption that the Bridger Formation, the Laney Member, the Wilkins Peak Member and the underlying Tipton Shale Member and New Fork Tongue are each homogeneous units of competent rock. Based on Tenneco's experience, this is not the case. During our shaft sinking, we found that various intervals within these sections appeared to vary widely in their permeabilities, due to the varying nature of the rock. FMC has not presented evidence that their calculations are based on the highest permeability zones, even though this is the conservative approach that should be taken. In our opinion though, a far more serious omission is FMC's apparent disregard for the effects of joints and fractures that occur in

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rocks throughout the Green River basin. Failure to acknowledge the presence of joints, fractures and cavities invalidates permeability calculations based on homogeneous rock properties. This fact is reinforced by referring to FMC's procedures for solution mining, wherein one of the first activities is establishing fractures within the trona between wells so that solution flows freely from one to the other. Permeability of solid trona is completely irrelevant in this example.

Tenneco personnel fully appreciate the importance of joints, fractures and cavities and their effect on groundwater movements. We recently sank two mine shafts at our Green River facility that penetrate most of the rock formations addressed in the FMC application. Both shafts encountered water at various locations, and they continue to produce water. The water flowed primarily along joints, fractures and voids, and to a much lesser degree through the homogeneous rock itself. Even extensive grouting is often ineffective at controlling water moving in fracture systems. Similar conditions were also encountered at the Cathedral Bluffs Oil Shale Project in northwestern Colorado, where Tenneco, along with its partner, Occidental Petroleum Corporation, has completed three mine shafts in the Green River formation.

We suspect that FMC may have had similar experiences in sinking shafts at their Green River facility. In addition, we believe that FMC has encountered substantial amounts of water in their mine. A review of these experiences might lend additional insight into the potential problem.

In the Tenneco trona mine, a system of joints exist within Trona Bed 17. It is not uncommon for small amounts of brine and gas to seep from these, whereas such never is observed coming from solid trona. We can document with shaft logs and photographs the nature of the rocks encountered in our shafts. Further, with a quick mine tour it is possible to observe water entering the shafts at various points, as well as the structural features within and adjoining the trona beds.

Tenneco has funded a consultant study based on an analysis of remote sensing imagery covering our trona leases. This study identified dense patterns of lineaments crossing the property in several directions. There are dominant north-south linear trends that may project into the FMC solution mine area. Lineaments can be an expression of various phenomena, but some may be surface traces of faults, joints and fractures that persist at depth. This study heightens our concern that it is possible for solution to migrate from the FMC mine into the Tenneco mine area.



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Tenneco is willing to share our shaft logs, photographs and reports with DEQ and FMC personnel. In addition, Tenneco invites interested parties to observe conditions in our hoisting shaft, within Bed 17, and in the interval between Bed 17 and Bed 12. We believe that a review of this material and a tour will make our concerns more understandable.

In view of Tenneco's experience with water migration through fractures, the inhomogeneity of the formations, and the recognition of dominant north-south linear trends, we feel the need of added assurance that the FMC solvent will not preferentially follow these potential avenues to our leaseholdings and jeopardize our operation.

Tenneco therefore believes that FMC should provide an objective evaluation of solution migration based on the most permeable zones in each formation, taking expected joint, fracture and cavity systems into consideration. Tenneco also believes a remote imagery study linking FMC's solution mine site with Tenneco's study may be of value in predicting possible solution migration routes.

Furthermore, in reviewing FMC's permit application, we were surprised to find that no monitor wells have been proposed outside of the designated production zone. Tenneco insists that additional monitor wells be installed north of Section 36 so as to better define and evaluate excursions. Well locations and details should be selected jointly by Tenneco and FMC, and monitoring data should be provided to Tenneco on a timely basis.

In addition, Tenneco expects that FMC be fully liable for any damages to our operation and mineral reserves resulting from their proposed activity. A suitable instrument might be the requirement that FMC post a bond in favor of Tenneco for the full replacement value of Tenneco's facilities and reserves, or an Indemnification Agreement to that effect. The exact nature of this instrument needs to be negotiated between FMC and Tenneco.

We are looking forward to hearing from you and repeat our offer to share relevant data and information with both the DEQ and FMC.

Sincerely,

TENNECO MINERALS COMPANY

Richard A. Hodgson

Richard A. Hodgson
Resident Manager

RAH:drf

cc: R. Kvidahl

