201.6/GCP/82/10/07

OCT 18 1982

Distribution: WM82-651
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PDR

WM-9
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W. Jacobi, Section Chief
Radiation Control Division
Colorado Department of Health
4210 East 11th Avenue
Denver, CO 80220

Dear Mr. Jacobi:

As requested in your letter of August 20, 1982, I have had my staff review the F.M. Fox and Associates report entitled, "Preliminary Geological, Hydrological, and Geotechnical Evaluation of the Coke Oven Site, Montrose County, Colorado." The staff considered the adequacy and completeness of information in the report with respect to the site suitability and characterization requirements of the proposed 10 CFR Part 61. We recognize that the report covers only initial work at the site and, consequently, we have included in our comments suggestions for directing future work.

The enclosed staff comments include the general comments provided to you by telephone on September 22, 1982 as well as more specific technical and editorial comments.

Should you have any questions on the comments, please contact George Pangburn at (301) 427-4574.

Sincerely,

Original Signed By
Edward F. Hawkins

for

Ross A. Scarano, Chief
Low-Level Waste Licensing Branch

Enclosure:
As stated

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DATE	82/10/07	82/10/14	82/10/18				

NRC STAFF GENERAL COMMENTS ON

FOX REPORT FOR MONTROSE COUNTY SITE

A. Hydrology

1. Investigations to date have apparently not been designed or implemented to provide detailed hydrologic data for the various hydrologic units encountered. Such data would be required for the site to be adequately modeled.

2. Information on hydrology is lacking in several places due to the failure to perform relative inexpensive tests and inconsistency in recording information.

3. The report notes that the first major aquifer is at 200 feet depth and is not recharged from the site area. There is not, however, any evidence to support this contention.

4. The report states in several places that recharge occurs to Dry Creek and to a perched water table on site, but data on precipitation and evapotranspiration listed on page 7 of the report conflict with these recharge statements. The staff feels this conflict points out the need for an accurate site water balance to be developed.

5. Analysis of flood potential should be based on 100-year flood plain as per proposed 10 CFR Part 61.

6. The presence of an alluvial aquifer on-site is noted in the report which may intersect disposal units. It is not clear from the report whether engineering efforts would be required to isolate units.

B. Structural Stability

1. The processes which resulted in faults in the basin surrounding the site may in fact be ongoing. The staff believes that information on the liklihood of movement along the fault lines and

how such movement might affect site integrity should be included in future work.

C. Slope Stability

1. The report notes that slope instability in Mancos Shale was observed on site in the form of caving and slumping. This observation should be related to waste disposal activities as Mancos Shale is to be the geologic unit for disposal.

NRC STAFF TECHNICAL AND EDITORIAL COMMENTS ON FOX REPORT FOR MONTROSE COUNTY SITE

1. The data presented on aquifers under the site is contradictory. The discussion on ground-water hydrology starts with the basal portion of the Dakota Sandstone; however, the one on-site supply well (SW 1/4, SE 1/4, Sect. 27, T46N, R16W) yelds 30 gpm from 180-250 feet. Since the Mancos is 170 feet thick (See Table 8), the well presumably yields from the 60-75 feet thick sandstone and conglomerate upper unit in the Dakota Sandstone. Since this unit directly and comformably underlies the Mancos Shale, its role as an aquifer must be clearly defined. The description of the upper unit of the Dakota Sandstone as a coarse sand and conglomerate raises questions with the assumptions that it is not an aquifer and it is suitable for the bottoms of disposal units. Information is also needed on water use for these aquifers, if any.

2. Page 39 states that the shallow water is limited to the area north of Dry Creek in alluvium. Since the area south of Dry Creek is shale, at an equivalent elevation, it is not suprising that shallow borings did not discharge copious amounts of water. However, one would expect some discharge or recharge at the stream/shale interface and at least a locally saturated shale. There may be fracture flow associated with this. Borings in the shale were only checked for water on the day of the drilling. In the future, water levels should be checked 1 - 2 weeks after drilling and the results (negative or positive) recorded on the boring logs. This practice was not employed on the current logs.

3. Dry Creek is a potential discharge area for ground water within the Mancos Shale and the Dakota Sandstone, thereby providing discharge from the closed basin. Detailed investigations of aquifers in these units, including potentiometric surface maps, hydraulic properties, and ground-water chemistry are needed to define the flow systems. The statement on page 40 that ground-water quality improves with depth could imply increased circulation within the deeper units as well as the infiltration of meteoric water into the upper 200 feet.

4. Only peak flow measurement have been provided for Dry Creek. Long-term flow measurements, including low-flow conditions, should be provided and analyzed to determine the base flow contribution of ground water.

5. Well logs for the D-series boreholes were not provided, nor was an adequate discussion of the loss of borehold D-3 provided. Locations of the P-series boreholes were not shown on Figure 7; thereby, diminishing the usefulness of the cross-sections on Figure 10.

6. The report does not address how rapidly water percolates into the bedrock, nor does it address the implication of this percolation for trench design.

7. The report should consider the implications of the high sulfate content of the alluvial aquifer water for container integrity (corrosion) and other aspects of leachate formation in arriving at the conclusion that the site is a suitable one for a waste disposal facility.

8. The estimate of maximum probable earthquake event and an analysis of expected results on the facility should be performed.

9. Aerial photographs and landsat imagery should be analyzed to identify lineaments with which to define fracture systems and patterns in the Mancos Shale and Dakota Sandstone. The vertical hydraulic conductivity of these units is very important to the movement of infiltrating water and the occurrence of saturated sandstone units that may be encountered by excavations.

10. The fracture system should be carefully characterized unit-by-unit (and subunit-by-subunit for continuous subunits) with respect to orientation, spacing and aperature, if possible.

11. Figure 12 does not show the normal faults and anticlines mentioned on page 23. They are also not seen in Figure 10.

12. Information should also be provided on various characteristics of Mancos Shale and Dakota sandstone: How fissile are these units? How do they break? What are the characteristics of the joints? What is known about the interbeds of bentonite? What is the probability of fracture flow in the shale?

13. The permeabilities shown in Table 9 are low but show a great deal of variation. What is the effect of fractures on these values?

14. Alternatives to the conceptual disposal unit should be considered. These include: 1) not lining the disposal unit bottom, such that any water infiltrating through the sides and cover will not accumulate and saturate the waste and backfill; and 2) using coarse granular backfill to establish a capillary break such that moisture in the unsaturated zone moves around the disposal unit rather than through it. than through it.

15. A more detailed description of the heap leaching mining on the Rancher's property is needed. Page 31 indicates that the surface drainage has been modified; the effects of these and any other modifications must be included in site design.