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Denver, Colorado 80204  
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# Woodward Clyde Consultants

February 28, 1978

Henningson, Durham and Richardson, Inc.  
310 Capital Life Center  
Denver, Colorado 80203

Attention: Mr. John P. Horst

Re: Consultation, Land Application System, near  
Fruita, Colorado.  
Job No. 19265

Gentlemen:

Your Mr. Horst visited with the undersigned and described a tentative proposal for several lagoons and water storage reservoirs, in the vicinity of Sections 22, 23, 24, 25 and 26, T. 1 N, R. 2 W, located about three miles southeast of Fruita, Colorado. We understand these lagoons and water storage reservoirs would be of the order of 20 feet deep, constructed by excavating approximately 2 feet and building earth dikes around the excavation to accomplish the desired depth. The lagoons and water storage reservoirs would be provided with an earth lining to minimize water lost to the underground by seepage. You asked us for an estimate of the seepage losses that might be expected from the lagoons and water storage reservoirs, based on a cursory review of the Soil Conservation Service data available for the area and our experience.

The literature suggests the shallow soils (of the order of 3 feet thick) will be clays and very silty clays (probably soils of the Billings and Ravola Series). Such clays should have upwards of 50 percent minus No. 200 sieve sizes and should be slightly plastic to medium plastic.

In our opinion, a 3 foot-thick lining constructed of the above clays, compacted to high density, should have a seepage factor ranging from 0.002 to 0.02 feet per day. A compacted

Consulting Engineers, Geologists  
and Environmental Scientists

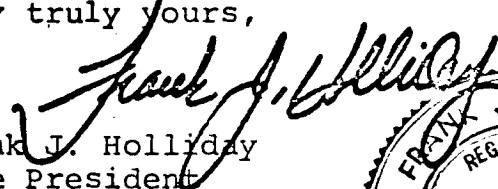
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clay lining has little ability to resist uplift caused by unbalanced groundwater pressures on the underside of the lining and are susceptible to shrinking and cracking when dried. Those earth lining characteristics along with others should be considered when thinking about earth linings.

Very truly yours,

  
Frank J. Holliday  
Vice President

FJH/prf

(2 copies sent)

