0013

ACT/007/004 #3

CASTLE GATE
COAL COMPANY

September 17, 1986

Dr. Dianne R. Nielson, Director
Division of Oil, Gas and Mining
355 West North Temple
Three Triad Center, Suite 350
Salt Lake City, UT 84180-1203

Re: Conditional Approval of Proposed Drainage Control Modifications Hardscrabble Canyon, Carbon County, Utah -- MRP ACT/007/004

Dear Dr. Nielson:

The following response is being submitted to address the conditional approval of the proposed drainage control modifications at our facilities in Hardscrabble Canyon near Helper. The condition of approval was presented in Mr. D. Wayne Hedberg's letter of April 21, 1986.

CONDITION: The applicant has submitted sufficient information to approve the drainage control modifications. However, the applicant has failed to include designs for an energy dissipator at the outlet of diversion-3A as it enters diversion D-5. Therefore, the approval should be given with the condition that the applicant submit designs for an energy dissipator at least 15 days prior to commencement of construction of the drainage control modifications in Hardscrabble Canyon.

RESPONSE: The rating of the proposed diversion contained in Table 3.3-5(d) indicates a flow velocity of approximately five feet per second. Table 3 contained in Design of Roadside Drainage Channels, Hydraulic Design Series No. 4 (U. S. Department of Commerce, Bureau of Public Roads, 1965) indicates a maximum permissible velocity of 5.5 feet/second for channels constructed in a graded material consisting of silt to cobbles for water carrying fine silts. The gradation of the valley fill materials in the canyon would fall within this gradation. Therefore, it was determined that an energy dissipator for D-3A was not necessary.

P. O. Box 449 • Helper, Utah 84526 • 801/472-5523

We hope the above response and attached information satisfy your agency's concerns regarding the proposed permit modification. If there are any questions regarding the information being submitted, please contact me at 472-8661. Thank you for your prompt consideration of the proposed modifications.

Sincerely,

CASTLE GATE COAL COMPANY

Richard H. Allison, Jr., P.E.
Project Supervisor

RHA:sk

Attachments

VI. Natural stream channels—Continued	Manning n range [2]
B. Flood plains (adjacent to natural streams):	
1. Pasture, no brush:	
a. Short grass	0.030–0.035
b. High grass	0.035–0.05
2. Cultivated areas:	
a. No crop	0.03–0.04
b. Mature row crops	0.035–0.045
c. Mature field crops	0.04–0.05
3. Heavy weeds, scattered brush	0.05–0.07
4. Light brush and trees: [9]	
a. Winter	0.05–0.06
b. Summer	0.06–0.08
5. Medium to dense brush: [9]	
a. Winter	0.07–0.11
b. Summer	0.10–0.16
6. Dense willows, summer, not bent over by current	0.15–0.20
7. Cleared land with tree stumps, 100–150 per acre:	
a. No sprouts	0.04–0.05
b. With heavy growth of sprouts	0.06–0.08
8. Heavy stand of timber, a few down trees, little undergrowth:	
a. Flood depth below branches	0.10–0.12
b. Flood depth reaches branches	0.12–0.16
C. Major streams (surface width at flood stage more than 100 ft.): Roughness coefficient is usually less than for minor streams of similar description on account of less effective resistance offered by irregular banks or vegetation on banks. Values of n may be somewhat reduced. Follow recommendation of note 7 if possible. The value of n for larger streams of most regular sections, with no boulders or brush, may be in the range of from	0.028–0.033

Footnotes to Table 2

[1] Estimates are by Bureau of Public Roads unless otherwise noted and are for straight alinement. A small increase in value of n may be made for channel alinement other than straight.

[2] Ranges for secs. I through III are for good to fair construction. For poor quality construction, use larger values of n.

[3] *Friction Losses in Corrugated Metal Pipe*, by M. J. Webster and L. R. Metcalf, Corps of Engineers, Department of the Army; published in Journal of the Hydraulics Division, Proceedings of the American Society of Civil Engineers, Vol. 85, No. HY 9, September 1959, Paper No. 2148, pp. 35–67.

[4] For important work and where accurate determination of water profiles is necessary, the designer is urged to consult the following references and to select n by comparison of the specific conditions with the channels tested: *Flow of Water in Irrigation and Similar Canals*, by F. C. Scobey, U.S. Department of Agriculture, Technical Bulletin No. 652, February 1939. *Flow of Water in Drainage Channels*, by C. E. Ramser, U.S. Department of Agriculture, Technical Bulletin No. 129, November 1929.

[5] *Handbook of Channel Design for Soil and Water Conservation*, prepared by the Stillwater Outdoor Hydraulic Laboratory in cooperation with the Oklahoma Agricultural Experiment Station, published by the Soil Conservation Service, U.S. Department of Agriculture, Publ. No. SCS-TP-61, March 1957, rev. June 1954.

[6] *Flow of Water in Channels Protected by Vegetative Linings*, by W. O. Ree and V. J. Palmer, Division of Drainage and Water Control, Research, Soil Conservation Service, U.S. Department of Agriculture, Tech. Bull. No. 967, February 1949.

[7] For calculations of stage or discharge in natural stream channels, it is recommended that the designer consult the local District Office of the Surface Water Branch of the U.S. Geological Survey, to obtain data regarding values of n applicable to streams of any specific locality. Where this procedure is not followed, the table may be used as a guide. The values of n tabulated have been derived from data reported by C. E. Ramser (see footnote 4) and from other incomplete data.

[8] The tentative values of n cited are principally derived from measurements made on fairly short but straight reaches of natural streams. Where slopes calculated from flood elevations along a considerable length of channel, involving meanders and bends, are to be used in velocity calculations by the Manning formula, the value of n must be increased to provide for the additional loss of energy caused by bends. The increase may be in the range of perhaps 3 to 15 percent.

[9] The presence of foliage on trees and brush under flood stage will materially increase the value of n. Therefore, roughness coefficients for vegetation in leaf will be larger than for bare branches. For trees in channels or on banks, and for brush on banks where submergence of branches increases with depth of flow, n will increase with rising stage.

Table 3.—Maximum permissible velocities in erodible channels, based on uniform flow in continuously wet, aged channels [1]

Material	Maximum permissible velocities for—		
	Clear water	Water carrying fine silts	Water carrying sand and gravel
	F.p.s.	*F.p.s.*	*F.p.s.*
Fine sand (noncolloidal)	1.5	2.5	1.5
Sandy loam (noncolloidal)	1.7	2.5	2.0
Silt loam (noncolloidal)	2.0	3.0	2.0
Ordinary firm loam	2.5	3.5	2.2
Volcanic ash	2.5	3.5	2.0
Fine gravel	2.5	5.0	3.7
Stiff clay (very colloidal)	3.7	5.0	3.0
Graded, loam to cobbles (noncolloidal)	3.7	5.0	5.0
Graded, silt to cobbles (colloidal)	4.0	5.5	5.0
Alluvial silts (noncolloidal)	2.0	3.5	2.0
Alluvial silts (colloidal)	3.7	5.0	3.0
Coarse gravel (noncolloidal)	4.0	6.0	6.5
Cobbles and shingles	5.0	5.5	6.5
Shales and hard pans	6.0	6.0	5.0

[1] As recommended by Special Committee on Irrigation Research, American Society of Civil Engineers, 1926, for channels with straight alinement. For sinuous channels multiply allowable velocity by 0.95 for slightly sinuous, by 0.9 for moderately sinuous channels, and by 0.8 for highly sinuous channels (*45*, p. 1257).

Table 4.—Maximum permissible velocities in channels lined with uniform stands of various grass covers, well maintained [1] [2]

Cover	Slope range	Maximum permissible velocity on—	
		Erosion-resistant soils	Easily eroded soils
	Percent	*f.p.s.*	*f.p.s.*
Bermudagrass	0–5	8	6
	5–10	7	5
	Over 10	6	4
Buffalograss	0–5	7	5
Kentucky bluegrass	5–10	6	4
Smooth brome	Over 10	5	3
Blue grama			
Grass mixture	0–5 [3]	5	4
	5–10 [4]	4	3
Lespedeza sericea			
Weeping lovegrass			
Yellow bluestem			
Kudzu	0–5 [4]	3.5	2.5
Alfalfa			
Crabgrass			
Common lespedeza [5]			
Sudangrass [5]	0–5 [4]	3.5	2.5

[1] From *Handbook of Channel Design for Soil and Water Conservation*. (See footnote 5, table 2.)

[2] Use velocities over 5 f.p.s. only where good covers and proper maintenance can be obtained.

[3] Do not use on slopes steeper than 10 percent.

[4] Use on slopes steeper than 5 percent is not recommended.

[5] Annuals, used on mild slopes or as temporary protection until permanent covers are established.

From: Design of Roadside Drainage Channels, Hydraulic Design Series No. 4
(U.S. Department of Commerce, Bureau of Public Roads, 1965)