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40-8681

Umetco Minerals Corporation

P.O. BOX 1029 • GRAND JUNCTION, COLORADO 81502
☎ (303) 245-3700

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SEP 1989 RECEIVED

September 6, 1989

Mr. Ramon E. Hall, Director
U.S. Nuclear Regulatory Commission
Region IV
Uranium Recovery Field Office
Box 25325
Denver, Colorado 80225

Re: Umetco Minerals Corporation
SUA-1358, Docket No. 40-8681
White Mesa Mill, Utah

Dear Mr. Hall:

A meeting with you and your staff was held in URFO offices on August 30 concerning the historical operation of Cell 1-I freeboard at the White Mesa Mill. Following discussions of the design specifications and subsequent historical license conditions relative to cell 1-I freeboard, the USNRC requested for the licensee to submit replies to two questions. In accordance with your request, the following information is being submitted.

The primary question is: "Has the required freeboard capacity in Cell 1-I, without including the benefits of diversion ditches 2 & 3, been encroached upon in Umetco's license history?"

Umetco's USNRC license, as issued in October, 1985, references Umetco's tailing inspection protocol which defined the maximum operating pool elevation as 3.5 feet below dike crest. This was the limit authorized by USNRC in the previous license held by Energy Fuels Nuclear, Inc. The maximum operating pool specification was derived from previous design calculations performed by a consultant in 1982.

Umetco has recalculated the design freeboard based upon utilizing only diversion ditch 1. The freeboard calculations are attached for your review. These calculations indicate that the required depth of storage with only diversion ditch 1 for a 6-hour PMP event is 2.15 feet. Using the draft technical position paper WM8201, the required maximum operating pool is (2.15 feet + 1.00 feet) = 3.15 feet below the minimum dike crest. The former as-built spillway invert was approximately 0.7 feet below dike crest. Therefore, in comparison to the licensed freeboard of 3.5 feet below dike crest, the technical freeboard below dike crest would have been (3.15 feet + 0.7 feet) = 3.85 feet.

DF02
1/1

Add Info
89-0972

In review of Umetco's operation records since licensure in October 1985, the actual Cell 1-I freeboard depth has been between 3.5 feet and 3.85 feet during the following periods.

1. Late March 1986 - May 1986
2. August 1986
3. Late November 1986 - January 1987
4. Mid-November 1987 - April 1988
5. Mid-August - mid-September 1988
6. Mid-October - mid-November 1988
7. January 1989 - mid-April 1989

Mill operations and discharge to Cell 1-I ceased in mid-December, 1988 and resumed in June, 1989. At the time of mill operation cessation, the solution level in Cell 1-I was at 3.6 feet from the dike crest. Solution levels in Cell 1-I were subsequently elevated to 3.3 feet from the dike crest as a result of snowstorms in early January 1989. Precipitation totaled 3.09 inches in January and February, compared to a normal 1.9 inches. The majority of the precipitation occurred during the first week of January. The solution level receded to 3.5 feet by March 11, 1989. At no time during mill discharge operations has the solution level in Cell 1-I been closer than 3.5 feet from the dike crest.

The second question asked was: "What should be the maximum operating pool elevation without diversion ditches 2 & 3 in place?" Based upon the existence of diversion ditch 1 and a minimum current maintained as-built Cell 1-I dike elevation of 5618.4, the freeboard requirement of 3.15 feet below minimum dike crest elevation would place the maximum operating pool elevation at 5615.25. The current operating elevation is 5613.55.

Umetco has constructed diversion ditches 2 & 3 and will submit in the near future a license amendment request with revised PMF diversion and maximum operating pool calculations for the White Mesa mill.

J S Hamrick
J. S. Hamrick
Site Environmental Coordinator

D K Sparling
D. K. Sparling
Plant Manager

DKS/

Enclosures

WHITE MESA CELL 11
FREEBOARD LIMITS

Case 1: PMF occurs on drainage above Cell 1I with ditch 1 in place, the various low spots and tank berms storing water and a minimum soil retention rate.

Basin A	114 Acres
Basin B	112 Acres
Basin B Sedimentation Basin	14 Acre Feet (AF)
Additional Storage Areas	15.9 Acre Feet (AF)
Soil Retention Rate	.24 In./Hr.
Area Deduction from Basin A Due to Ditch 1	23 Acres

Volume: [203 Acres X 10"/12"] = 169 AF from 6 Hr. PMP

Minimum Retention Rate for Hydro Soil Group B = .24 In./Hr. (See Pg. 64 USBR Small Dams & White Mesa EI)

.24 In./Hr. X 6 Hrs. X 203 Acres = 292 In.-Acres = 24.4 AF

Total Volume to be Stored:
169 AF - 24.4 AF - 14 AF - 15.9 AF = 114.9 AF

From Area Capacity Curve:
Depth of Storage Required = 2.15'

WHITE MESA CELL 1I
FREEBOARD LIMITS

Case 2: PMF occurs on drainage above Cell 1I with ditch 1, 2 and 3 in place, the various low spots and tank berms storing water and a minimum soil retention rate:

Basin A	114 Acres
Basin B	112 Acres
Basin B Sedimentation Basin	14 Acre Feet (AF)
Additional Storage Areas	10.7 Acre Feed (AF)
Soil Retention Rate	.24 In./Hr.
Area Deduction from Basin A & B Due to Ditches 1, 2, & 3	23 + 49.4 = 72.4 Acre

Volume: [[226 - 72.4] Acres X 10"/12"] = 128 AF

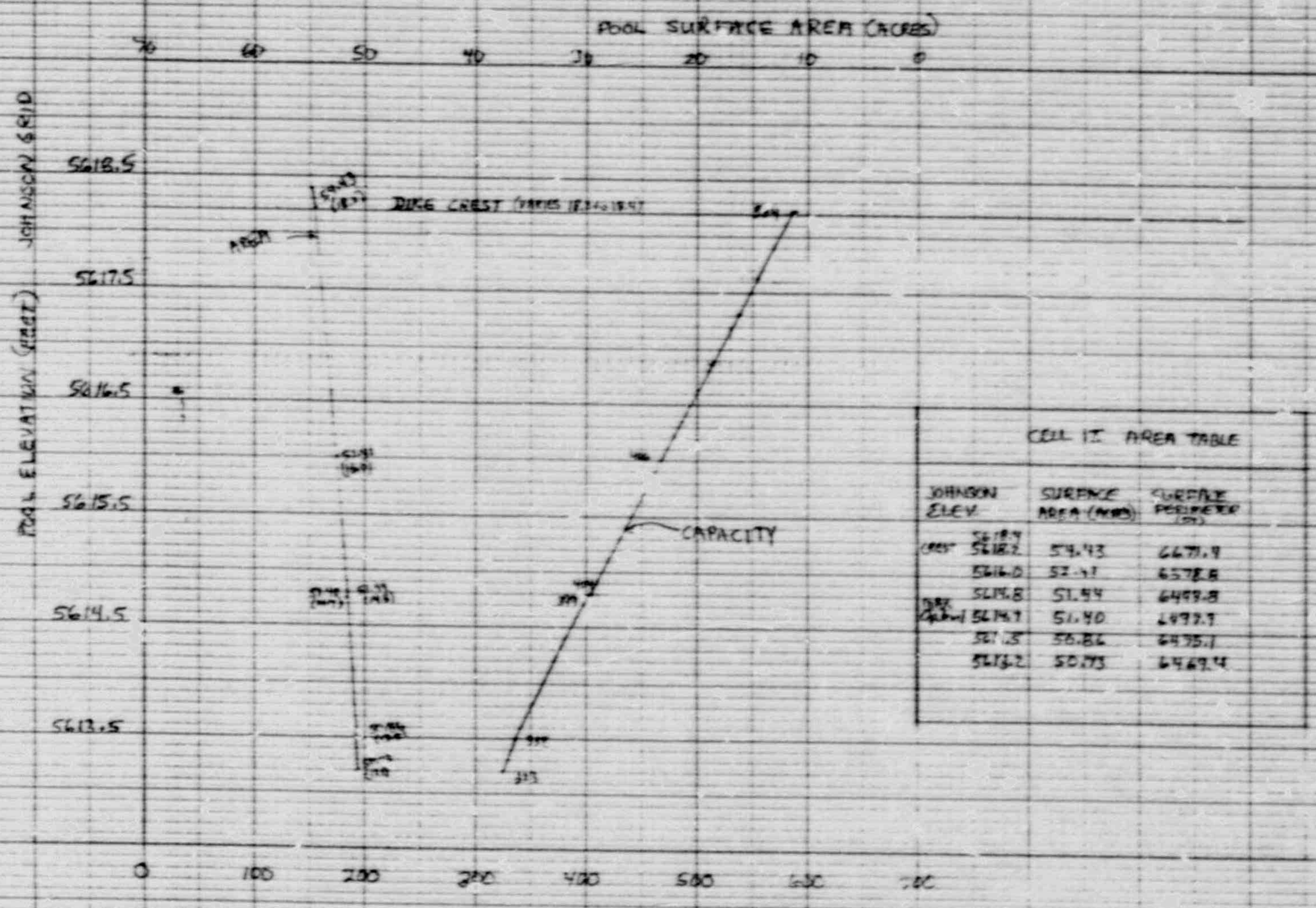
Minimum Soil Retention = 128 X .24 In./Hr. X 6 Hrs. = 184.3 In.-Acres = 15.4 AF

Total Volume to be Stored:
128 - 15.4 - 10.7 - 14 = 87.9 AF

From Area Capacity Curve:
Depth of Storage Required = 1.65 Ft. ~ 1.7 Ft.

WHITE MESA CELL II STORAGE CURVE*

8/31/89



CELL II AREA TABLE

	JOHNSON ELEV	SURFACE AREA (ACRES)	SURFACE PERIMETER (FT)
	5618.9		
CREST	5618.2	53.43	6671.9
	5616.0	52.41	6578.6
	5615.8	51.54	6499.8
[illegible]	5614.9	51.40	6497.7
	5614.3	50.86	6475.1
	5613.2	50.73	6469.4

* BASED ON AS-BUILT JOHNSON ELEVATIONS.

FROM WHITE MESA EI

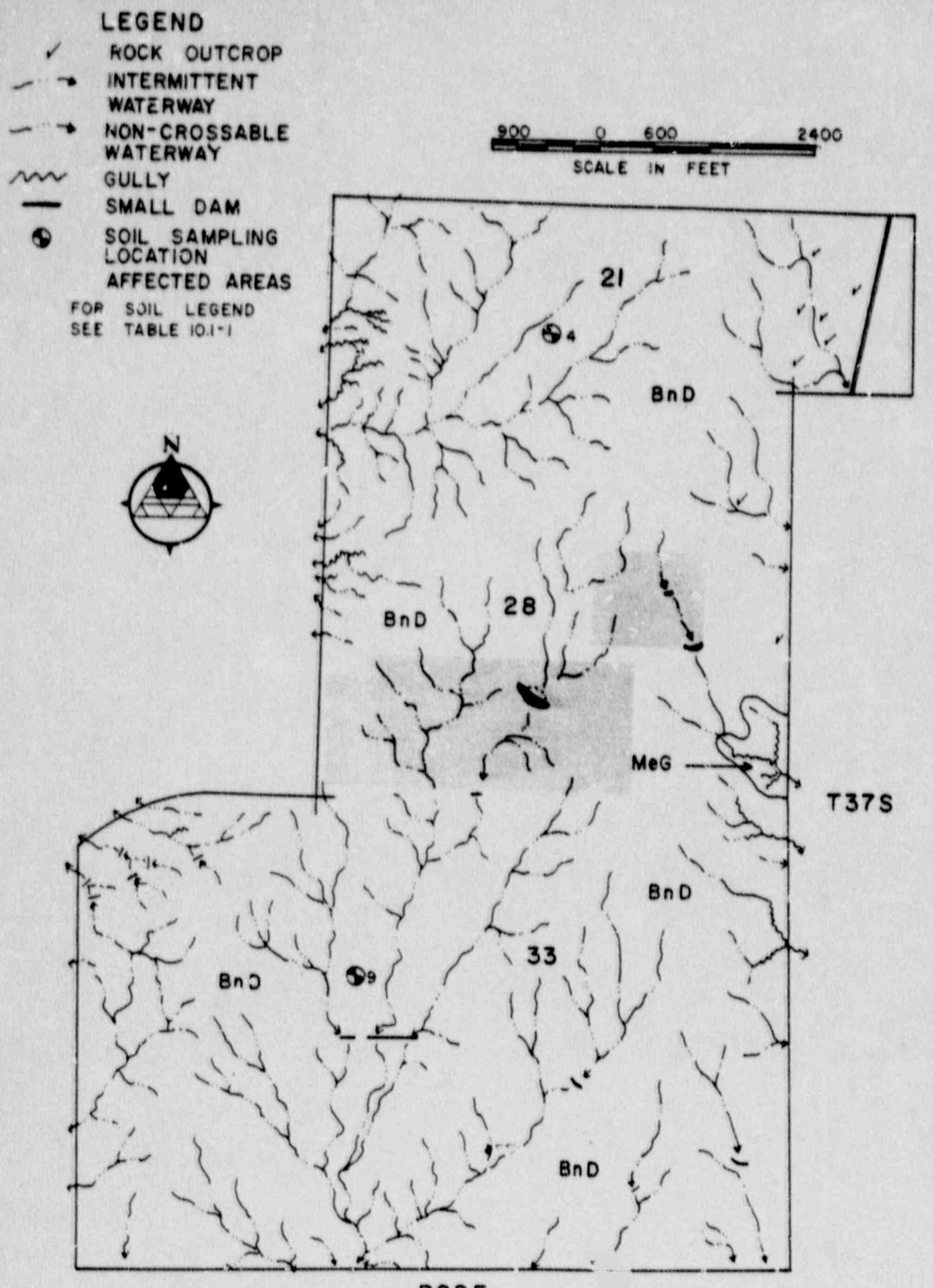
near the center and range up to 15-20 percent on the edges of the site (Table 2.10-1). Soils are formed in the windblown silts and sands that blanket the area. These materials range in depth from less than a foot on the edges to many feet on the ridgeline. The climate is semi-arid with 8-12 inches of precipitation per year. The Blanding soil is leached to a depth of 10-20 inches and is calcareous throughout the remainder of the parent material.

Rangeland is the most successful and common land use in this vicinity. Dry-farming has generally not been successful. A considerable amount of range improvement has been done on land in the site vicinity. Improvement methods have consisted primarily of removal of sagebrush, disking or plowing of the land, and reseeding with grasses. The land is easily tilled except where bedrock outcrops are encountered.

Published information about the soils of the Blanding site is available. A published soil survey report (Olsen, et al., 1962) contains a soil map that includes the project site and descriptions of the Blanding and associated soils. Results from laboratory tests of the major series are reported from various locations in the county.

Other literature is published (see for example Gates et al., 1956; or West and Ibrahim, 1968) which details soil-plant relationships in southwest and southeast Utah. These studies associate the upland desert types of vegetation occurring in these regions with moderately alkaline non-saline situations.

The Blanding soil series is the only soil occurring on the project site in significant proportions (Plate 2.10-1). A small area of Mellenthin very rocky fine sandy loam has been mapped on the eastern edge of the site. This soil is like the Blanding soil, except that bedrock occurs within 15-20 inches of the surface. Complete soil profile descriptions and results from laboratory analyses are contained in Appendix F.



SOIL SURVEY MAP- PROJECT SITE

SOURCE USDA SOIL CONSERVATION SERVICE

PB87-101580

United States
Department of
Agriculture

Soil
Conservation
Service

Engineering
Division

Technical
Release 55

June 1986

Urban Hydrology for Small Watersheds

Exhibit A-1, continued: Hydrologic soil groups for United States soils

BELMONT	B
BELMORE	B
BELPRE	C
BELSAC	B
BELTED	D
BELTON	C
BELTRAMI	B
BELTSVILLE	C
BELUGA	D
BELUGA, DRAINED, SLOPING	C
BELVOIR	C
BELZAR	C
BEMIDJI	A
BEN LOMOND	B
BENCHLEY	C
BENCLARE	C
BENCO	B
BENDER	B
BENDIRE	C
BENEVOLA	C
BENEWAH	D
BENFIELD	C
BENGAL	C
BENGE	B
BENHAM	B
BENIN	D
BENITO	D
BENJAMIN	D
BENKLIN	C
BENMAN	C
BENNDALE	B
BENNINGTON	C
BENRIDGE	B
BENSLEY	B
BENSON	D
BENTEEN	C
BENVY	B
BENZ	D
BEOR	D
BEOSKA	B
BEOTIA	B
BEOWAWE	B
BEQUINN	B
BERCUMB	B
BERDA	B
BEREA	C
BERENICETON	B
BERGHOLZ	C
BERGLAND	D
BERGQUIST	B
BERGSTROM	B
BERGSVIK	D
BERINO	B
BERIT	D
BERKS	C
BERKSHIRE	B
BERLAKE	B
BERLIN	C
BERMESA	C
BERMUDIAN	B
BERNAL	D
BERNALDO	B
BERNARD	D
BERNARDINO	C
BERNARDSTON	C
BERNHILL	B
BERNICE	A
BERNING	C
BERNOW	B
BERRYLAND	B/D
BERRYMAN	C
BERSON	B
BERTAG	C
BERTELSON	B
BERTHOUD	B
BERTIE	B
BERTO	D
BERTOLOTTI	B

BERTRAN	B
BERTRAND	B
BERVILLE	B/D
BERWOLF	B
BERYL	B
BERZATIC	D
BESEMAN	A/D
BESHERN	C
BESNER	B
BESSEMER	C
BESSIE	D
BESTROM	C
BETHANY	C
BETHEL	B
BETHERA	D
BETHESDA	C
BETHLEHEM	B
BETIS	A
BETONNIE	B
BETRA	C
BETTERAVIA	C
BETTS	B
BEULAH	B
BEVENT	A
BEVERIDGE	D
BEVERLY	B
BEVERLY, GRAVELLY	A
BEW	C
BEWLEYVILLE	B
BEXAR	D
BEZO	D
BEZZANT	B
BIBB	C
BIDDLESPRINGS	B
BICE	B
BICKERDYKE	D
BICKETT	D
BICKLETON	B
BICKMORE	C
BICONDOA	D
BICONDOA, DRAINED	C
BIDDEFORD	D
BIDDLEMAN	B
BIDMAN	C
BIDWELL	B
BIEBER	D
BIEDELL	D
BIEDSAW	C
BIENVILLE	A
BIG BLUE	D
BIG HORN	B
BIG TIMBER	D
BIGARM	B
BIGBEE	A
BIGBEND	B
BIGBROWN	C
BIGELOW	B
BIGETTY	B
BIGFLAT	D
BIGFOOT	C
BIGFORK	C
BIGHANS	B
BIGHILL	B
BIGLAKE	A
BIGMEADOW	C
BIGNELL	C
BIGRIVER	B
[illegible]	B
BIGSPRING	D
BIGWIN	C
BIGWINDER	D
BIJOJA	C
BIJOU	B
BILBO	C
BILGER	D
BILLETT	B
BILLINGS	C

BILLINGS, MODERATELY SLOW PERM	B
BILLYCREEK	C
BILLYHAW	D
BILTMORE	A
BIMMER	D
BINCO	D
BINDLE	B
BINFORD	B
BINGER	B
BINGHAM	B
BINGHAMPTON	B
BINGHAMVILLE	D
BINNA	B
BINNSVILLE	D
BINS	B
BINTON	C
BINTON, RECLAIMED	B
BIOYA	B
BIPPUS	B
BIRCHBAY	C
BIRCHFIELD	D
BIRCHWOOD	C
BIRDOW	B
BIRDS	C/D
BIRDSALL	D
BIRDSBORO	B
BIRDSLEY	D
BIRDSVIEW	A
BIRKBECK	B
BIRMINGHAM	B
BIRNEY	B
BIROME	C
BISBEE	A
BISCAPO	D
BISCAY	B/D
BISGANI, MODERATELY WET	B
BISGANI, FLOODED	C
BISHOP	D
BISMARCK	D
BISODDI	D
BISPING	B
BISSELL	B
BISSONNET	D
BIT	C
BITTER	B
BITTER SPRING	B
BITTERROOT	C
BITTERWATER	B
BITTON	B
BIVANS	D
BIXBY	B
BIZLER	C
BJORK	C
BLACHLY	B
BLACK BUTTE	B
BLACK CANYON	D
BLACK CANYON, DRAINED	C
BLACK RIDGE	D
BLACKA	C
BLACKBURN	B
BLACKDRAW	D
BLACKETT	B
BLACKFOOT	C
BLACKFOOT, DRAINED	B
BLACKHALL	D
BLACKHALL, WARM	C
BLACKHAMMER	B
BLACKHAWK	D
BLACKHOOF	D
BLACKHORSE	C
BLACKLEED	B
BLACKLEG	C
BLACKLOCK	D
BLACKMAN	C
BLACKMOUNT	B

BLACKNOLL	C
BLACKOAR	B/D
BLACKPIPE	C
BLACKPRINCE	B
BLACKROCK	B
BLACKSAN	B
BLACKSPAR	D
BLACKSPOT	D
BLACKSTON	B
BLACKTHORN	B
BLACKTOP	D
BLACKWATER	D
BLACKWELL	D
BLADEN	D
BLAG	D
BLAGO	D
BLAINE	C
BLAIR	C
BLAIRTON	C
BLAKABIN	C
BLAKE	B
BLAKELAND	A
BLAKENEY	C
BLAKEWELL	C
BLALOCK	D
BLANED	C
BLANCA	B
BLANCHARD	A
BLANCHE	B
BLANCHESTER	B/D
BLANCOT	B
BLAND	C
BLANDING	B
BLANEY	B
BLANKET	C
BLANTON	A
BLANTON, MODERATELY WET	B
BLANYON	C
BLAPPERT	D
BLAQUIERE	C
BLASDELL	A
BLASE	C
BLASINGAME	C
BLAYDEN	D
BLAZBINO	D
BLAZON	D
BLEAKWOOD	C
BLEDSOE	C
BLEIBLERVILLE	D
BLENCOE	D
BLEND	D
BLENDON	B
BLETHEN	B
BLEVINS	B
BLEVINTON	B
BLEWETT	D
BLICHTON	D
BLICKENSTAFF	B
BLIND	B
BLINSTER	C
BLINN	C
BLISS	C
BLITZEN	C
BLOCKHOUSE	D
BLOMFORD	B/D
BLOOM	D
BLOOMFIELD	A
BLOOMING	B
BLOOMSDALE	B
BLOOR	C
BLOOR, GRAVELLY SUBSTRATUM	D
BLOUNT	C
BLOVERS	B
BLUCHER	C
BLUE EARTH	B/D
BLUE EARTH, SLOPING	D

BLUE LAKE	A
BLUE STAR	B
BLUEBELL	C
BLUECHIEF	C
BLUECREEK	D
BLUEDOME	C
BLUEFLAT	C
BLUEGROVE	C
BLUEGULCH	B
BLUEHILL	C
BLUEHON	C
BLUEJOINT	B
BLUENOSE	B
BLUEPOINT	A
BLUERIM	C
BLUESLIDE	D
BLUESPRIN	C
BLUESTONE	D
BLUEWING	A
BLUFF	D
BLUFFDALE	C
BLUFFTON	C/D
BLUFORD	C
BLUM	C
BLY	B
BLYBURG	B
BLYTHE	B
BOARDMAN	D
BOARDTREE	C
BOASH	D
BOAZ	C
BOBBITT	C
BOBILLO	A
BOBWOOD	C
BOCS	D
BOBTAIL	C
BOBTOWN	B
BOCA	B/D
BOCA, DEPRESSIONAL	D
BOCA, TIDAL	D
BOCK	B
BOCKER	D
BOCKSTON	B
BODE	B
BODECKER	A
BODELL	D
BODEN	C
BODENBURG	B
BODINE	B
BODORUMPE	C
BODOT	C
BOEL	A
BOEL, OVERWASH	C
BOELUS	A
BOERNE	B
BOESEL	C
BOESEL, PROTECTED	B
BOETTCHER	C
BOGAN	C
BOGART	B
BOGGS	C
BOGGY	C
BOGRAP	B
BOGUE	D
BOGUS	C
BOHANNON	C
BOHEMIAN	B
BOHICKET	D
BOHNA	B
BOHNLY	D
BOHNSACK	B
BOISTFORT	B
BOJAC	B
BOJO	D
BOLAN	B
BOLAR	C
BOLD	B
BOLENT	A
BOLES	C

NOTES: TWO HYDROLOGIC SOIL GROUPS SUCH AS B/C INDICATES THE DRAINED/UNDRAINED SITUATION.
MODIFIERS SHOWN, E.G., BEDROCK SUBSTRATUM, REFER TO A SPECIFIC SOIL SERIES PHASE FOUND IN SOIL MAP LEGEND.

Appendix A: Hydrologic soil groups

Soils are classified into hydrologic soil groups (HSG's) to indicate the minimum rate of infiltration obtained for bare soil after prolonged wetting. The HSG's, which are A, B, C, and D, are one element used in determining runoff curve numbers (see chapter 2). For the convenience of TR-55 users, exhibit A-1 lists the HSG classification of United States soils.

The infiltration rate is the rate at which water enters the soil at the soil surface. It is controlled by surface conditions. HSG also indicates the transmission rate—the rate at which the water moves within the soil. This rate is controlled by the soil profile. Approximate numerical ranges for transmission rates shown in the HSG definitions were first published by Musgrave (USDA 1955). The four groups are defined by SCS soil scientists as follows:

Group A soils have low runoff potential and high infiltration rates even when thoroughly wetted. They consist chiefly of deep, well to excessively drained sands or gravels and have a high rate of water transmission (greater than 0.30 in/hr).

Group B soils have moderate infiltration rates when thoroughly wetted and consist chiefly of moderately deep to deep, moderately well to well drained soils with moderately fine to moderately coarse textures. These soils have a moderate rate of water transmission (0.15-0.30 in/hr).

Group C soils have low infiltration rates when thoroughly wetted and consist chiefly of soils with a layer that impedes downward movement of water and soils with moderately fine to fine texture. These soils have a low rate of water transmission (0.05-0.15 in/hr).

Group D soils have high runoff potential. They have very low infiltration rates when thoroughly wetted and consist chiefly of clay soils with a high swelling potential, soils with a permanent high water table, soils with a claypan or clay layer at or near the surface, and shallow soils over nearly impervious material. These soils have a very low rate of water transmission (0-0.05 in/hr).

In exhibit A-1, some of the listed soils have an added modifier; for example, "Abrazo, gravelly." This refers to a gravelly phase of the Abrazo series that is found in SCS soil map legends.

Disturbed soil profiles

As a result of urbanization, the soil profile may be considerably altered and the listed group classification may no longer apply. In these circumstances, use the following to determine HSG according to the texture of the new surface soil, provided that significant compaction has not occurred (Brakensiek and Rawls 1983):

HSG	*Soil textures*
A	Sand, loamy sand, or sandy loam
B	Silt loam or loam
C	Sandy clay loam
D	Clay loam, silty clay loam, sandy clay, silty clay, or clay

Drainage and group D soils

Some soils in the list are in group D because of a high water table that creates a drainage problem. Once these soils are effectively drained, they are placed in a different group. For example, Ackerman soil is classified as A/D. This indicates that the drained Ackerman soil is in group A and the undrained soil is in group D.

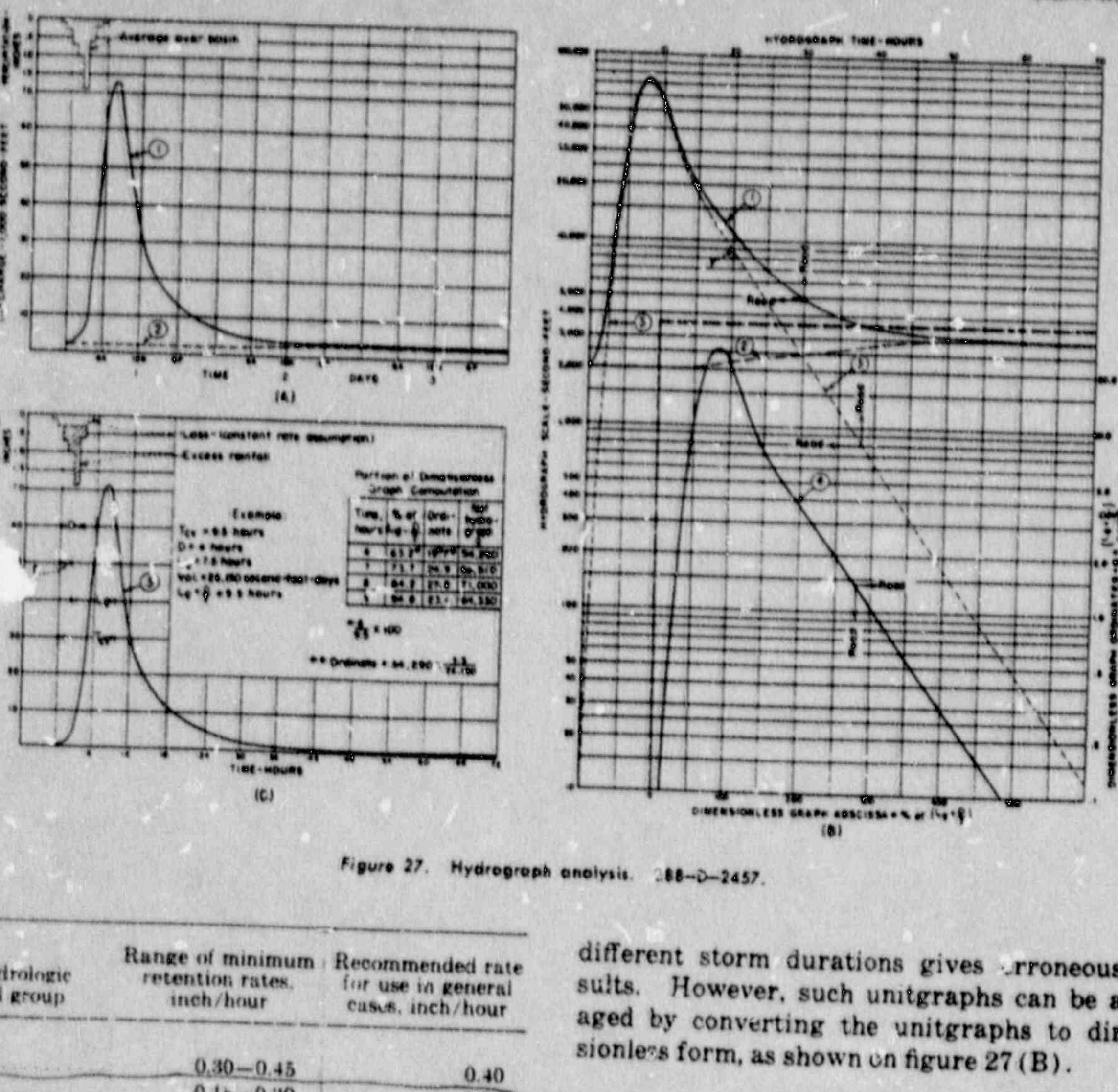


Figure 27. Hydrograph analysis. 288-D-2457.

Hydrologic soil group	Range of minimum retention rates, inch/hour	Recommended rate for use in general cases, inch/hour
A	0.30–0.45	0.40
B	0.15–0.30	0.24
C	0.08–0.15	0.12
D	0.02–0.08	0.04

An example of application of data in appendix A using the soil group minimum retention rate is given in section 58.

52. *Unitgraph Principles.*—The basic tool for hydrograph computation is the unitgraph. Its fundamental principles are presented in abbreviated form on figure 26.

53. *Hydrograph Analysis.*—A procedure of hydrograph analysis is presented on figure 27. Storm duration and distribution over a watershed affect the shape of the resulting unitgraphs. Direct averaging of unitgraphs of different storm durations gives erroneous results. However, such unitgraphs can be averaged by converting the unitgraphs to dimensionless form, as shown on figure 27 (B).

HYDROGRAPH ANALYSIS (Refer to Fig. 27)

Given: Recorded hydrograph at given point on a stream. Rainfall data may or may not be available.

Required: Factors for deriving unitgraph to be applied at point of derivation, at another point on stream if of comparable runoff characteristics, or to comparable ungaged watershed.

Procedures:

(a) Plot recorded hydrograph on cartesian coordinate paper and on semilog paper:

① on figure 27 (A), and
① on figure 27 (B).