APPENDIX D

Calculations for Peak Discharge of Drainage Basins

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Basin #1

TABLE 3. COMPUTATION SHEET: TR-55 GRAPH METHOD

1. Estimate the volume of runoff

*a. T = 100 (years): return period for design

*b. P = 3.88 (inches): 24-hr, T-year precipitation volume (i.e., depth)

*c. CN = 79 : runoff curve number

d. Q = 1.8665 (inches): runoff volume obtained from Eq. 7 or Fig. 5

2. Drainage Area: A = 0.0885 (Square miles)

3. Estimate Time-of-Concentration (use either the lag method or the velocity method)

LAG METHOD

*a. CN = 79

*b. Slope = 13.8 (%)

*c. hydraulic length = 2624 (ft)

d. L = 0.20 (hours): from Fig. 7

e. t_c = 0.333 (hours) = $\frac{5}{3}$ L

VELOCITY METHOD

*a. land use Alluvial Fans: Western Mtn. Region

*b. slope = 13.8 (%)

*c. hydraulic length (HL) = 2624 (ft)

d. velocity (V) = 3.65 (fps): from Fig. 8

e. $t_c = \frac{HL}{3600V}$ 0.20 (hours)

4. Estimate unit peak discharge (q_p') = 645 (cfs/mi^2/in): use Fig. 9 750

5. Estimate peak discharge $q_p = q_p' AQ$ = 106.5 (cfs) 123.9

*indicates required input

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Basin #2

TABLE 3. COMPUTATION SHEET: TR-55 GRAPH METHOD

1. Estimate the volume of runoff

*a. T = 100 (years): return period for design

*b. P = 3.88 (inches): 24-hr, T-year precipitation volume (i.e., depth)

*c. CN = 79 : runoff curve number

d. Q = 1.8665 (inches): runoff volume obtained from Eq. 7 or Fig. 5

2. Drainage Area: A = 0.03765 (Square miles)

3. Estimate Time-of-Concentration (use either the lag method or the velocity method)

LAG METHOD

*a. CN = 79

*b. Slope = 18.6 (%)

*c. hydraulic length = 1093 (ft)

d. L = 0.082 (hours): from Fig. 7

e. t_c = 0.137 (hours) = $\frac{5}{3}$ L

VELOCITY METHOD

*a. land use Alluvial Fans: Western Mtn. Region

*b. slope = 18.6 (%)

*c. hydraulic length (HL) = 1093 (ft)

d. velocity (V) = 4.40 (fps): from Fig. 8

e. $t_c = \frac{HL}{3600V}$ 0.069 (hours)

4. Estimate unit peak discharge (q_p') = 920 (cfs/mi^2/in): use Fig. 9 ~1000 (off chart)

5. Estimate peak discharge $q_p = q_p' AQ$ = 64.7 (cfs) 70.3

*indicates required input

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Basin #3

TABLE 3. COMPUTATION SHEET: TR-55 GRAPH METHOD

1. Estimate the volume of runoff

*a. T = 100 (years): return period for design

*b. P = 3.88 (inches): 24-hr, T-year precipitation volume (i.e., depth)

*c. CN = 79 : runoff curve number

d. Q = 1.8665 (inches): runoff volume obtained from Eq. 7 or Fig. 5

2. Drainage Area: A = 0.0475 (Square miles)

3. Estimate Time-of-Concentration (use either the lag method or the velocity method)

LAG METHOD

*a. CN = 79

*b. Slope = 13.4 (%)

*c. hydraulic length = 2867 (ft)

d. L = 0.22 (hours): from Fig. 7

e. t_c = 0.37 (hours) = $\frac{5}{3}$ L

VELOCITY METHOD

*a. land use Alluvial Fans: Western Mtn. Region

*b. slope = 13.4 (%)

*c. hydraulic length (HL) = 2867 (ft)

d. velocity (V) = 3.6 (fps): from Fig. 8

e. $t_c = \frac{HL}{3600V}$ 0.22 (hours)

4. Estimate unit peak discharge (q_p') = 615 (cfs/mi^2/in): use Fig. 9 760

5. Estimate peak discharge $q_p = q_p' AQ$ = 54.5 (cfs) 67.4

*indicates required input

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Basin #4

TABLE 3. COMPUTATION SHEET: TR-55 GRAPH METHOD

1. Estimate the volume of runoff

*a. T = 100 (years): return period for design

*b. P = 3.88 (inches): 24-hr, T-year precipitation volume (i.e., depth)

*c. CN = 79 : runoff curve number

d. Q = 1.8665 (inches): runoff volume obtained from Eq. 7 or Fig. 5

2. Drainage Area: A = 0.1239 (Square miles)

3. Estimate Time-of-Concentration (use either the lag method or the velocity method)

LAG METHOD

*a. CN = 79

*b. Slope = 32.5 (%)

*c. hydraulic length = 2672 (ft)

d. L = 0.125 (hours): from Fig. 7

e. t_c = 0.21 (hours) = $\frac{5}{3}$ L

VELOCITY METHOD

*a. land use Alluvial Fans / Western Mtn Region

*b. slope = 32.5 (%)

*c. hydraulic length (HL) = 2672 (ft)

d. velocity (V) = 5.55 (fps): from Fig. 8

e. $t_c = \frac{HL}{3600V}$ 0.13 (hours)

4. Estimate unit peak discharge (q_p') = 785 (cfs/mi^2/in): use Fig. 9 915

5. Estimate peak discharge $q_p = q_p' AQ$ = 181.5 (cfs) 211.6

*indicates required input

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Basin #5

TABLE 3. COMPUTATION SHEET: TR-55 GRAPH METHOD

1. Estimate the volume of runoff

*a. T = 100 (years): return period for design

*b. P = 3.88 (inches): 24-hr, T-year precipitation volume (i.e., depth)

*c. CN = 79 : runoff curve number

d. Q = 1.8665 (inches): runoff volume obtained from Eq. 7 or Fig. 5

2. Drainage Area: A = 0.1158 (Square miles)

3. Estimate Time-of-Concentration (use either the lag method or the velocity method)

LAG METHOD

*a. CN = 79

*b. Slope = 27.4 (%)

*c. hydraulic length = 4044 (ft)

d. L = 0.195 (hours): from Fig. 7

e. t_c = 0.33 (hours) = $\frac{5}{3}$ L

VELOCITY METHOD

*a. land use Alluvial Fans; Western Mtn Region

*b. slope = 27.4 (%)

*c. hydraulic length (HL) = 4044 (ft)

d. velocity (V) = 5.25 (fps): from Fig. 8

e. $t_c = \frac{HL}{3600V}$ 0.21 (hours)

4. Estimate unit peak discharge (q_p') = 645 (cfs/mi^2/in): use Fig. 9 745

5. Estimate peak discharge $q_p = q_p' AQ$ = 139.4 (cfs) 161.0

*indicates required input

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Basin #6

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TABLE 3. COMPUTATION SHEET: TR-55 GRAPH METHOD

1. Estimate the volume of runoff

*a. T = 100 (years): return period for design

*b. P = 3.88 (inches): 24-hr, T-year precipitation volume (i.e., depth)

*c. CN = 79 : runoff curve number

d. Q = 1.8665 (inches): runoff volume obtained from Eq. 7 or Fig. 5

2. Drainage Area: A = 0.1812 (Square miles)

3. Estimate Time-of-Concentration (use either the lag method or the velocity method)

LAG METHOD

*a. CN = 79

*b. Slope = 24.4 (%)

*c. hydraulic length = 5063 (ft)

d. L = 0.25 (hours): from Fig. 7

e. t_c = 0.42 (hours) = $\frac{5}{3}$ L

VELOCITY METHOD

*a. land use Alluvial Fans; Western Mtn Region

*b. slope = 24.4 (%)

*c. hydraulic length (HL) = 5063 (ft)

d. velocity (V) = 5.0 (fps): from Fig. 8

e. $t_c = \frac{HL}{3600V}$ 0.28 (hours)

4. Estimate unit peak discharge (q_p') = 560 (cfs/mi^2/in): use Fig. 9 690

5. Estimate peak discharge $q_p = q_p' AQ$ = 189.4 (cfs) 233.4

*indicates required input

Gooseberry Mine, NV
641700072O
4/25/06 by TWJ

DESIGN MEMORANDUM

Client: NV DEP / EPA
Sheet ____ Of ____
Project: Gooseberry Mine
Date: 3/2/06
Data For: Drainage Basin Analysis
Work Order: ____
Prepared By: TWJ Checked By: KW 4/13/6
File No: 6417000720

Note: This form must be used for project calculations and original filed in project files

Area Determinations for Drainage Basins (Area determined in Autocad)

1. 1,840,537 sq ft => 0.0660 sq. miles
2. 702,378 sq ft => 0.0252 sq. miles

Soil Group Classification = Group C

(pg.12) Runoff Curve Number (CN) = fair condition = 79 ✓
for pasture or range

(pg.9) Initial Abstraction (I_a) = (0.2)(S)
where S = potential maximum retention

(pg.11) $S = \frac{1000}{CN} - 10 = \frac{1000}{79} - 10 = 2.6582$ ✓

$\therefore I_a = (0.2)(2.6582) = 0.5316$ ✓

Calculation of volume of precipitation (P)

use http://dipper.nws.noaa.gov/

Latitude = 39.4833N
Longitude = 119.4667
ELEVATION = 5412 feet

For 100 years and 24 hour precip frequency
P = inches 3.88 ✓

DESIGN MEMORANDUM

Client: NDEP/EPA

Project: Gooseberry Mine

Data For:

Prepared By: T. Johnson Checked By: KW 4/13/06

Sheet 2 Of

Date: 3/2/06

Work Order:

File No: 6417000720

Note: This form must be used for project calculations and original filed in project files

Calculation of volume of runoff (Q)

(pg. 11)

$$Q = \frac{(P-0.2(S))^2}{P+0.8(S)} = \frac{[3.88-(0.2)(2.6582)]^2}{3.88+(0.8)(2.6582)}$$

for T = 100 years

$$Q = \frac{11.2115}{6.0066} = 1.8665$$

DESIGN MEMORANDUM

Client: NDEP

Project: Gooseberry Mine

Data For: Drainage Analysis

Prepared By: TWJ Checked By:

Sheet Of

Date: 4/24/06

Work Order:

File No: 6417000720

Note: This form must be used for project calculations and original filed in project files

HL hydraulic length (ft)	Drainage basin Number	Slope (%)	Area (ft²)	Area (mi²)	Elevation hi (m)	Elevation low (m)	change (m)	change (ft)
2624	#1	13.75	2,468,373	0.08854	1770	1660	110m	361ft
1093	#2	18.57	1,049,811	0.03765	1722	1660	62m	203ft
2867	#3	13.4	1,323,071	0.047459	1735	1618	117	384
2672	#4	32.5	3,454,487	0.1239127	1903	1638	265	869
4044	#5	27.4	3,226,941	0.1157506	2018	1680	338	1109
5063	#6	24.4	5,051,882	0.1812113	2061	1685	376	1233

POINT PRECIPITATION FREQUENCY ESTIMATES FROM NOAA ATLAS 14

Nevada 39.4833 N 119.4667 W 5469 feet

from "Precipitation-Frequency Atlas of the United States" NOAA Atlas 14, Volume 1, Version 3
G.M. Bonnin, D. Todd, B. Lin, T. Parzybok, M. Yekta, and D. Riley
NOAA, National Weather Service, Silver Spring, Maryland, 2003

Extracted: Wed Apr 12 2006

Confidence Limits | Seasonality | Location Maps | Other Info. | GIS data | Maps | Help | D

Precipitation Frequency Estimates (inches)

ARI* (years)	5 min	10 min	15 min	30 min	60 min	120 min	3 hr	6 hr	12 hr	24 hr	48 hr	4 day	7 day	10 day	20 day	30 day	45 day	60 day
2	0.13	0.20	0.25	0.34	0.42	0.55	0.66	0.93	1.24	1.60	2.00	2.41	2.83	3.23	4.21	5.02	6.07	7.12
5	0.18	0.28	0.34	0.47	0.57	0.72	0.84	1.17	1.59	2.08	2.63	3.21	3.79	4.32	5.54	6.65	8.02	9.41
10	0.23	0.34	0.42	0.57	0.71	0.86	0.98	1.34	1.85	2.46	3.14	3.87	4.57	5.18	6.59	7.92	9.54	11.09
25	0.29	0.44	0.55	0.74	0.92	1.06	1.18	1.58	2.20	3.00	3.87	4.81	5.70	6.40	8.02	9.66	11.62	13.29
50	0.35	0.54	0.67	0.90	1.11	1.23	1.34	1.75	2.47	3.43	4.46	5.58	6.62	7.39	9.14	11.03	13.28	14.98
100	0.42	0.64	0.80	1.07	1.33	1.44	1.54	1.93	2.75	3.88	5.09	6.41	7.62	8.44	10.32	12.47	15.02	16.69
200	0.51	0.77	0.96	1.29	1.59	1.69	1.79	2.17	3.02	4.36	5.77	7.29	8.69	9.55	11.55	13.95	16.86	18.45
500	0.64	0.98	1.21	1.63	2.02	2.12	2.21	2.50	3.38	5.02	6.73	8.56	10.23	11.12	13.25	16.01	19.45	20.86
1000	0.77	1.17	1.45	1.95	2.41	2.51	2.60	2.84	3.73	5.56	7.51	9.60	11.51	12.40	14.62	17.64	21.56	22.80

Text version of table

* These precipitation frequency estimates are based on a partial duration series. ARI is the Average Recurrence Interval. Please refer to the documentation for more information. NOTE: Formatting forces estimates near zero to appear as zero.