
APPENDIX F

Theoretical Irrigation System Flow Requirements

Combined Overall Irrigation Effectiveness = 65%

Area	Total Area (ft ²)	Total Area (acres)	1] July Net Irrig. Requirement (in./month)	Total Volume Rqrd.		Days/mo (days)	3] 3:1 dry:wet ratio 4-day cycles/mo	Area Per Cycle (25% of Total) (acres)	1] Application Per Cycle (in)	1] Daily Volume Required		4] Delivery Period	1] Flow Rate Rqrd (gpm)
				2] (ac-ft/mo.)	(gal/mo.)					(ac-ft)	(gal)		
Greycliff EB	40,404	0.93	5.34	0.64	206,920	31.00	7.75	0.23	1.06	0.02	6,675	8	14
Greycliff WB	38,872	0.89	5.34	0.61	199,074	31.00	7.75	0.22	1.06	0.02	6,422	8	13
Custer EB	9,679	0.22	6.05	0.17	56,162	31.00	7.75	0.06	1.20	0.01	1,812	8	4
Custer WB	11,334	0.26	6.05	0.20	65,764	31.00	7.75	0.07	1.20	0.01	2,121	8	4
Hysham EB	83,021	1.91	6.05	1.48	481,706	31.00	7.75	0.48	1.20	0.05	15,539	8	32
Hysham WB	92,234	2.12	6.05	1.64	535,159	31.00	7.75	0.53	1.20	0.05	17,263	8	36
Hathaway EB	28,231	0.65	6.10	0.51	165,157	31.00	7.75	0.16	1.21	0.02	5,328	8	11
Hathaway WB	10,388	0.24	6.10	0.19	60,772	31.00	7.75	0.06	1.21	0.01	1,960	8	4

1] Refer to tables from Montana Irrigation Guide for net irrigation during a dry year/ pasture grass.

2] Includes applied efficiency and uniformity factors.

3] 3-days:1-day drying/wetting ratio. Under this scenario the system would apply water to a given area on Monday and then dry on Tuesday, Wednesday and Thursday and then water again on Friday. At a 3:1 drying/wetting ratio, 25% of the total area must be watered each day. One "cycle" includes one (1) watering day and three (3) drying days. 31 days in July divided by 4 days per cycle; 7.75 cycles/month.

4] The assumed delivery period for the required irrigation volume is eight (8) hours per day.

APPENDIX B
ESTIMATED MONTHLY AND SEASONAL CONSUMPTIVE USE
(SCS, TR-21 Balaney-Criddle Method)

County Rosebud
Weather Station Forsyth 2E N, W
Climatic zone High (1) Elevation

MONTH	CONSUMPTIVE USE INCHES	EFFECTIVE PRECIPITATION: INCHES		NET IRRIGATION ^{1/} INCHES	
		Normal Year (50%)	Dry Year (80%)	Normal Year (50%)	Dry Year (80%)
Crop <u>Pasture Grasses</u>		Normal net irrigation application		<u>3.0</u> in	
Planting date <u>April 11</u>		Harvest date		<u>October 23</u>	
JAN					
FEB					
MAR					
APR	1.05	.53	.37	.00	.00
MAY	3.41	1.32	.91	1.12	1.69
JUN	4.90	2.16	1.49	2.75	3.41
JUL	6.81	1.03	.71	5.78	6.10
AUG	5.85	.90	.62	4.95	5.23
SEP	3.12	.77	.53	1.65	1.99
OCT	1.13	.33	.23	.00	.00
NOV					
DEC					
TOTAL	26.28	7.04	4.87	16.24	18.41

Crop Beans, Dry Normal net irrigation application 3.0 in
Planting date May 18 Harvest date August 26

JAN					
FEB					
MAR					
APR					
MAY	.88	.51	.35	.00	.00
JUN	4.55	2.12	1.46	1.31	2.12
JUL	7.97	1.10	.76	6.87	7.21
AUG	4.23	.72	.50	2.01	2.23
SEP					
OCT					
NOV					
DEC					
TOTAL	17.64	4.45	3.08	10.19	11.56

^{1/} Included in computations is carry-over moisture which is assumed to be available within crop root zone at planting time or spring growth time. This value represents non-growing season precipitation equal to a normal net irrigation application, and is split between beginning and end of growing season.

APPENDIX B
ESTIMATED MONTHLY AND SEASONAL CONSUMPTIVE USE
(SCS, TR-21 Balaney-Criddle Method)

County Sweet Grass
Weather Station Big Timber 4550 N, 10957 W
Climatic zone Moderately High(2) Elevation 4100 FT

	:	CONSUMPTIVE USE	:	EFFECTIVE PRECIPITATION:	:	NET IRRIGATION 1/ :
	:	INCHES	:	INCHES	:	INCHES
MONTH	:	INCHES	:	Normal	:	Dry
	:		:	Year	:	Year
	:		:	(50%)	:	(80%)
Crop	:	<u>Pasture Grasses</u>	:	Normal net irrigation application	:	<u>2.7</u> in
Planting date	:	<u>April 13</u>	:	Harvest date	:	<u>October 25</u>

JAN	:		:		:		:
FEB	:		:		:		:
MAR	:		:		:		:
APR	:	.88	:	.50	:	.42	:
MAY	:	3.10	:	1.92	:	1.62	:
JUN	:	4.58	:	1.89	:	1.60	:
JUL	:	6.10	:	.90	:	.76	:
AUG	:	5.17	:	.92	:	.78	:
SEP	:	2.93	:	.94	:	.80	:
OCT	:	1.32	:	.66	:	.56	:
NOV	:		:		:		:
DEC	:		:		:		:
TOTAL	:	24.07	:	7.73	:	6.53	:
	:		:		:	13.64	:
	:		:		:	14.85	:

Crop _____ Normal net irrigation application _____ in
Planting date _____ Harvest date _____

JAN	:		:		:		:
FEB	:		:		:		:
MAR	:		:		:		:
APR	:		:		:		:
MAY	:		:		:		:
JUN	:		:		:		:
JUL	:		:		:		:
AUG	:		:		:		:
SEP	:		:		:		:
OCT	:		:		:		:
NOV	:		:		:		:
DEC	:		:		:		:
TOTAL	:		:		:		:

1/ Included in computations is carry-over moisture which is assumed to be available within crop root zone at planting time or spring growth time. This value represents non-growing season precipitation equal to a normal net irrigation application, and is split between beginning and end of growing season.

APPENDIX B
ESTIMATED MONTHLY AND SEASONAL CONSUMPTIVE USE
(SCS, TR-21 Balaney-Criddle Method)

County Treasure
Weather Station Hysham 4618 N, 10714 W
Climatic zone High (1) Elevation 2660 FT

MONTH	CONSUMPTIVE USE INCHES	EFFECTIVE PRECIPITATION: INCHES		NET IRRIGATION 1/ INCHES	
		Normal Year (50%)	Dry Year (80%)	Normal Year (50%)	Dry Year (80%)
Crop	<u>Pasture Grasses</u>	Normal net irrigation application		<u>3.0</u> in	
Planting date	<u>April 12</u>	Harvest date		<u>October 22</u>	
JAN					
FEB					
MAR					
APR	1.03	.58	.40	.00	.00
MAY	3.53	1.51	1.06	.97	1.60
JUN	5.13	1.72	1.20	3.41	3.93
JUL	6.71	.95	.66	5.76	6.05
AUG	5.66	.81	.57	4.85	5.09
SEP	3.13	.84	.58	1.46	1.86
OCT	1.13	.46	.32	.00	.00
NOV					
DEC					
TOTAL	26.32	6.87	4.79	16.45	18.53

Crop Beans, Dry Normal net irrigation application 3.0 in
Planting date May 14 Harvest date August 22

JAN					
FEB					
MAR					
APR					
MAY	1.24	.77	.54	.00	.00
JUN	5.09	1.72	1.20	2.34	3.09
JUL	7.71	1.00	.70	6.71	7.01
AUG	3.34	.55	.38	1.29	1.46
SEP					
OCT					
NOV					
DEC					
TOTAL	17.38	4.04	2.82	10.35	11.57

1/ Included in computations is carry-over moisture which is assumed to be available within crop root zone at planting time or spring growth time. This value represents non-growing season precipitation equal to a normal net irrigation application, and is split between beginning and end of growing season.