A Framework for Assessing Nonpoint Source Pollution Control Practices in the Evitt's Creek Watershed Bedford County, Pennsylvania

Final Report

(Incorporating comments by the Pennsylvania Department of Environmental Protection)

by

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A Framework for Assessing Nonpoint Source Pollution Control Practices in the Evitt's Creek Watershed, Bedford County, Pennsylvania

Introduction

A framework is developed to assist the assessment of the relative impact of alternative agricultural nonpoint source pollution control practices in a watershed. Farm data from selected properties in the Evitts Creek watershed in Bedford County, Pennsylvania, were used as the basis upon which the framework is developed.

It is intended that the framework be useful in prioritizing the farms for attention in reducing soil and nutrients from reaching nearby streams. The reduction of soil and nutrient mobilization in the watershed would serve two purposes. (1) The reservoirs of the Evitts Creek Water Company are considered to have eutrophied, causing the growth of algae and subsequent water treatment problems. Any decrease in incoming soil and nutrients would be helpful in reducing the treatment problem. This and other related issues are being addressed by the Evitts Creek Watershed Steering Committee which is composed of members from Pennsylvania and Maryland. (2) The Evitts Creek watershed is in the Potomac River basin of the Chesapeake Bay drainage area. Any reduction in nutrients reaching the Bay from its tributaries is considered beneficial to its biological recovery.

The framework is composed of several elements, including: field loss of soil and nutrients based on evaluation of the Universal Soil Loss Equation (USLE) with, and without, the application of agricultural Best Management Practices (BMPs); example comparison of results between the USLE and the Revised Universal Soil Loss Equation (RUSLE); presentation of technical and economic efficiencies of thirteen common BMPs; and a whole farm template for considering BMPs and their effectiveness. The USLE is an appropriate analytical tool, and has been used in prior studies of soil and nutrient effects on water quality (Ribando & Young, 1989). Data and information from several sources are drawn together in order to present comparative technical and economic efficiencies of the common BMPs. Ranges of values exist in the literature for all technical and economic parameters. The values depend upon prevailing site conditions and experimental/observational methods. Examples of these ranges are given for many BMPs in the section of the report which presents technical and economic efficiencies. Ranges are given for absolute and percent reductions of soil and nutrient losses resulting from to BMP implementation.

This framework essentially is concerned with reductions of soil and nutrients in surface runoff from farm fields. It does not consider infiltration of nutrients and consequential effect on ground water, fate and transport of soil and nutrients from the edge-of-field to the nearest stream, transport within streams, nor bio-availability or processes in the receiving lakes. The conditions which determine transport performance after soil and nutrients leave the field depend heavily on site specific conditions, and are beyond the scope of this work.

The structure of the framework is developed in EXCEL spreadsheet software. The first element provides the results of calculating the reduction of soil, nitrogen and phosphorus leaving individual

fields defined by size and USLE coefficients. The reduction in nutrients is calculated by applying enrichment factors to decreased erosion resulting from improvements in the cover factor, C, and the practice factor, P. The annual load reduction of soil and nutrients is calculated for each field and used to produce a standardized value in pounds or tons per acre for each farm. Nearly 6,000 tons of soil per year would be saved from erosion if the plans were fully implemented; and phosphorus and nitrogen runoff would be reduced by approximately 6,500 and 32,000 pounds per year, respectively. It is conventional practice to treat a whole farm when implementing BMPs. A full description of each farm is provided in Appendix I.

The second element of the framework provides three examples of ways to compare (rank or sort) the results of the USLE analysis by farm. Separate spreadsheets list farms: (1) by overall effectiveness in reducing soil and nutrient loss, (2) by farm identification number, and (3) by treatable acreage. The farm identification numbers (eg EV-003) were assigned in a limited survey of properties in the Evitts Creek watershed by the Bedford County Conservation District.

The first two elements can be used alone in order to determine farms that would benefit most from the implementation of soil conservation plans. The third and fourth elements would be useful in calculating the cost and effectiveness of implementing a wider range of BMPs on a number of farms for comparison and allocation of limited funding.

An example of soil loss using the Revised USLE is worked out in detail and compared with the USLE. The guidance for calculating soil loss by the RUSLE method is provided in Appendix II.

The third element of the framework is more a source of related information than a phase of analysis. This element lists annual unit cost figures for thirteen BMPs that might be implemented in addition to, or concurrently with, changed practices which affect the C and P factors of the USLE.

The fourth element presents an analysis for an example farm which incorporates cover, practice, and other BMPs in a hypothetical application. It shows the calculation of load of soil and nutrients reduced and concludes with unit costs of applying the selected BMPs.

In addition to these major elements of the study, four data layers were obtained for presentation in a geographic information system (GIS). Three of the layers: township boundaries, streams and lakes, and roads were entered into the GIS. The fourth data set consists of Chesapeake Bay Program land use information for the Evitts Creek watershed area. The boundaries of the watershed for three tributaries to the Evitts Creek Water Company reservoirs have been digitized, as well as the full watershed to the lower dam. These data sets and some available water quality data may be useful in supplementing the allocation of BMP resources.

Figure 1: Evitt's Creek Watershed Location Map

Figure 2: Map Showing Farm Locations for BMP Analysis

Figure 2: Map Showing Farm Locations for BMP Analysis

The WATERSHED Model

BACKGROUND

The WATERSHED (Walker et al., 1989) computerized spreadsheet model provides a flexible means to estimate nutrient loads from a wide range of sources. The spreadsheet format also facilitates the application of a range of nutrient management practices, allowing comparison and ranking of control measures. In fact, the WATERSHED spreadsheet model was originally developed for the Environmental Protection Agency and the Natural Resources Conservation Service as a tool with which planners could choose among different treatment practices. An important objective of this project is to develop a framework for prioritizing identified pollution problems and applicable best management practices (BMPs). It is anticipated that the resulting tool will be useful in efficiently targeting state and federal cost-shared funding of nutrient reduction practices. The framework presented here is developed on data from the Evitt's Creek watershed of Bedford County, Pennsylvania. While the spreadsheet provides a useful tool for evaluating management practices, most of the data required must be supplied by the user (see Table 1). EXCEL spreadsheet software is used in this development.

ORGANIZATION

The spreadsheet is divided into several components. It calculates loads of sediment and nutrients leaving a site both before and after BMPs are applied. In addition, it calculates the total cost of BMPs. Finally, it calculates the cost per pound of nutrient reduction at each site. This final step helps in the prioritization of BMP implementation. Figure 3 presents a conceptual flow chart of how these calculations are related to one another.

Load Calculation before BMP Implementation

The WATERSHED spreadsheet offers two primary methods by which loads can be calculated. First, loads can be calculated on a per unit area basis, as follows:

$$L = AR$$

where: L = load of nutrient leaving the site, mass
A = area, and
R = the loading rate in mass per unit area.

For cropland, erosion as well as sediment-associated nutrients have important water quality impacts. In the 1992 Pennsylvania Clean Water Act Section 305(b) water quality assessment report to EPA, siltation is classified as the leading cause of water quality impairment in rivers, followed by nutrients. In the WATERSHED spreadsheet, erosion to the *edge-of-field* is calculated using the Universal Soil Loss Equation (USLE), (Wischmeier and Smith, 1978):

$$E = R\,K\,LS\,C\,P\,A$$

where: E = erosion

R = the rainfall erosivity factor (accounts for rainfall patterns)
K = soil erosivity (accounts for soil properties)
LS = length-slope factor (accounts for slope and length of field slope)
C = cover factor (accounts for crop residue left on the surface)
P = practice factor (accounts for management practice on cropland).
A = land area

Load Calculation after BMPs

Best management practices may reduce nutrient losses either by reducing erosion and associated sediment-bound nutrients, or by other direct techniques. Sediment reduction may be achieved through certain on-field techniques, such as terracing, which change USLE parameter values. For these practices, load after BMP is calculated by substituting the "new" parameters into the USLE soil loss equation. Alternately, they may be changed through techniques whose effectiveness are represented by a percent efficiency. In addition, some techniques reduce nutrient loads without reducing sediment. Nutrient management provides one example. In these cases, the new load can be calculated using the original load and the removal efficiency of the nutrient management practice.

Cost Calculation

Candidate BMPs must be supplied, with their associated data, by the user. Costs of specific BMP applications are computed by multiplying the cost per unit area or length treated by the area or length treated.

$$C = RA$$

where: C = cost
R = rate (cost/area or length)
A = area or length

Cost Effectiveness of BMPs

The WATERSHED spreadsheet can be used to determine the cost effectiveness (cost per unit pound of sediment or nutrient reduced). This portion of the analysis uses information from calculations performed in other parts of the spreadsheet. The nutrient reduction is calculated by subtracting the load after implementation BMPs from the load before their implementation. Calculated costs of specific BMPs are used in the development of cost-effectiveness data.

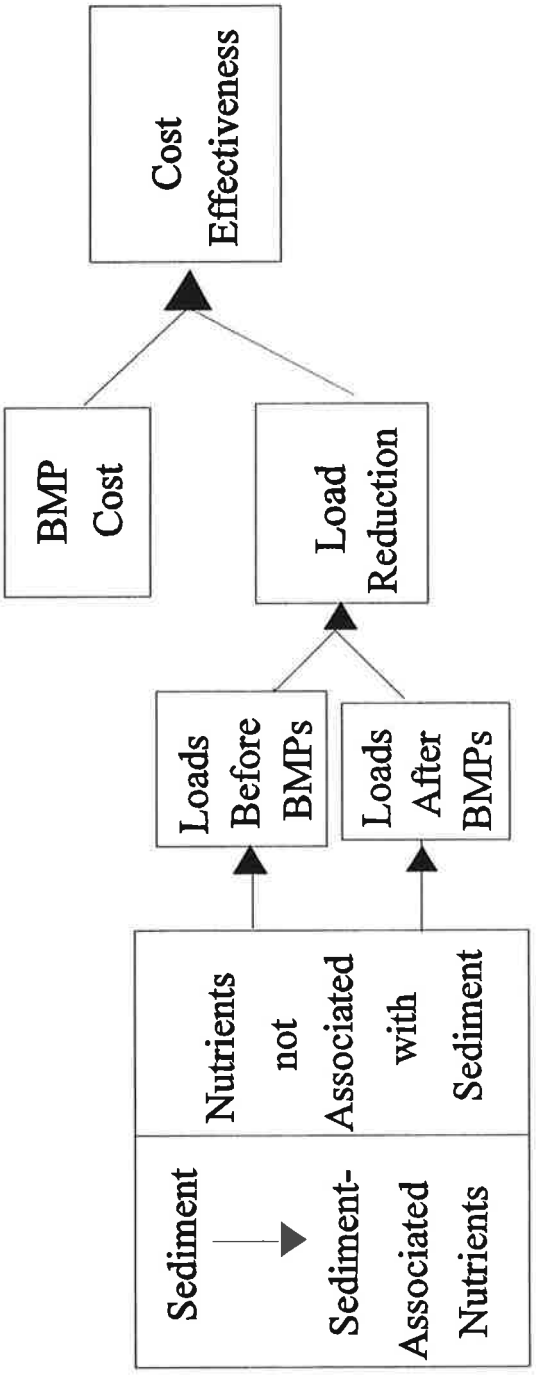
$$CE = C/[(L_{before}-L_{after})]$$

where: CE = cost effectiveness
L_{before} = load before BMP implementation
L_{after} = load after BMP implementation

Prioritization of BMPs

Cost-effectiveness can be used to prioritize spending for BMP implementation.

Figure 3: A Conceptual Diagram of the WATERSHED Spreadsheet



Data Requirements

Table 1 presents the data required for each step in the calculations described above. Much of the data required are readily available in natural resources conservation offices and related reference material.

Table 1: Data Requirements for the WATERSHED Spreadsheet

Calculation		External Data	Internal Data
Loads before BMPs	Sediment	1- Area 2- USLE factors (R, K, LS, C, P) 3- Sediment Delivery Ratio	
	Sediment-Associated Nutrients	2- Enrichment ratio or other relationship between sediment load	1- Sediment
	Other Nutrients	1- Area 2- Areal Loading Rate	
Load after BMP	Sediment	2- "New" USLE factors or 3- BMP efficiency	1- Sediment Load Before BMP
	Sediment-Associated Nutrients	2- Sediment Enrichment	1- Sediment Load after BMP
	Other Nutrients	2- BMP efficiency	1- Load Before BMP
Cost		1- Area treated 2- Cost of BMP	
Cost Effectiveness			1- Load Before BMP 2- Load After BMP 3- Cost of BMP

Flexibility

One of the advantages of the WATERSHED spreadsheet is the flexibility with which it can be used. This project takes advantage of the flexibility in scale as well as load calculation methods.

WATERSHED was originally designed with the goal of planning for an entire watershed, with the spreadsheet divided into several subwatersheds, each with an associated delivery ratio. For the Evitt's Creek project, several "priority sites" are identified. Therefore, loads from these individual sites, rather than from subwatersheds, are considered.

It is beyond the scope of this study to determine sediment delivery and bioavailibility from the selected sites which are dispersed throughout the watershed. Instead, edge-of-field reductions are compared for BMPs which reduce sediment and nutrients.

The USLE Spreadsheet

The USLE spreadsheet is used to determine the benefit of implementing soil conservation plans developed by the Bedford County Conservation District and the Natural Resources Conservation Service (NRCS). Twelve plans are evaluated. This exercise provides the basis for developing the Framework for assessing soil conservation plans and their associated nutrient reduction efficiencies. Further, by the use of example plans, it is helpful in assessing the value of current activities taking place in the Evitt's Creek watershed.

General Structure

The soil erosion reduction is determined for each field. The values of the cover and management factor, C, and the practice factor, P, from the Universal Soil Loss Equation (USLE) are likely to change when a plan is implemented. The annual soil loss per unit area (T/ac/yr) is computed using USLE for each field both before and after the conservation plan is implemented. Unit soil loss for each field is multiplied by the field's area. The difference between soil loss with and without the soil conservation plan determines the reduction in erosion resulting from the implementation of the plan.

The associated nutrient reduction is determined. Values of 5.4 pounds of nitrogen and 1.1 pounds of phosphorus per ton of soil are used to estimate the nutrient enrichment of soil (Chesapeake Bay Program, 1993). Nutrient reductions are determined by multiplying these nutrient enrichment factors by the soil loss reduction.

Nutrient and soil losses and reductions for a conservation plan are equal to the sum of values for all the fields in the plan. These total values are put into a table which reports soil and nutrient reductions in absolute terms (e.g., lbs/yr) as well as in unit values (e.g., lbs/ac/yr). The farms in the table are presented in three forms. First, they are ranked by the unit soil and nutrient reduction achieved, then by conservation district farm number, and finally alphabetically by the name of the owner/operator.

Input Data for the Conservation Plans

Generally, the values of the USLE coefficients are available from conservation plans. Full farm descriptions are provided in Appendix I. However, there are a few cases where external estimates or assumptions are needed. Below, unusual circumstances are reported for each farm.

EV-006

-Although the map of the site has seven fields, only one field (field 6) was included in the conservation plan. We assumed that the plan was only applied to field 6. The final table reflects data from this field only.

EV-007

-The K factor was not reported. This problem was solved using the soil map of the area. An area-weighted value of K was computed by determining the soil types represented in each field.

-The slope was not reported for any of the fields (only a range was included). We used a slope of 5.5% (the average of 3% and 8%, the slopes which bound the range presented.

-Slope length was not included for field 5. We used 300 feet, the average slope length among all fields investigated.

EV-012+EV-013

-These farms are both owned by the same person and are on the same conservation plan. Thus, they were treated as a single farm.

-Areas were not reported. Since there is an accompanying map, the area of each field is available. However, there are a few fields where different values of C or P are in the plan for different parts of the field. Generally, more effective controls are used on more erosive parts of the field. We assumed that each part of the field reported on the conservation plan is equal in area.

-Some of the fields were not reported on the conservation plan. We made the same assumption as for EV-006, and used information only from those fields on the plan.

-For fields 8 and 10, P is not reported. However, total soil erosion is reported. P was calculated by dividing the soil erosion by the other values in USLE: R, K, LS and C.

EV-014

-Areas are not reported, so the assumption of equal division of area within a field is made.

-Two values for the C factor are reported for each field. We assumed that two possible scenarios were being presented, and we treated these as two different plans.

-The plan was very difficult to read. In all cases, K and LS were legible. It appeared that the two possible management scenarios involved C values of 0.03 and 0.07. The "before" without the conservation plan, and "after" with the conservation plan, conditions were reported for these fields. The value of P stayed the same in both conditions for all fields where both conditions were legible. Therefore, in cases where the "after" condition was illegible, the P from the "before" condition was used. However, there was one field (field 14) where P was illegible both "before" and "after" the conservation plan. This field was eliminated from our analysis.

-There are some fields on the map which are not in the conservation plan and thus are eliminated from our analysis.

EV-018

-The areas were not reported on this plan, so it was assumed that each division of a field was equal in area.

-The slope length was also not reported. We used 300 feet, the average slope length among all fields investigated.

EV-020

-This plan divided fields into separate portions without reporting the acreage of each part. We assumed equal divisions.

EV-023

-There are two fields, 1 and 6, for which the C value is not in the plan. These fields were eliminated from analysis.

Input Data for Conditions Before Conservation Plans

In general, USLE information for conditions before the implementation of conservation plans is not available. However, some assumptions are made based on suggestions from Lou Pierce of the Bedford County Conservation District. For conditions before the implementation of the plan, the cover factor is set equal to 0.15 or the cover factor with the conservation plan, whichever is greater. The practice factor is set equal to twice the practice factor of the conservation plan or 1, whichever is lower. There are, however, a few instances where the "before" information is available. In EV-014, the C value for the "before" condition is 0.13. In addition, the P factor is the same in the "before" and "after" conditions. For EV-012 and EV-013, C is known before the conservation plan for some of the fields. For field 2a, C is 0.19, and for fields 8 and 10, C is 1.00.

Conclusion

Using the input information in the format described, the relative impacts of each conservation plan are determined and presented in Table 2.

Also calculated and presented in Table 2 are the total impacts of the conservation plans for each farm and for the total of all the farms considered. In summary, nearly 6,000 tons of soil per year would be saved from erosion if the plans were fully implemented; and phosphorus and nitrogen runoff would be reduced by approximately 6,500 and 32,000 pounds per year, respectively.

Table 2. Sediment and Nutrient Reduction from Conservation Plans

						BEFORE PLAN				AFTER PLAN				Edge of Field Reduction			
SOURCE	Field Numbers	Cropland Area (Acres)	R	USLE K	COEFFICIENTS LS	C	P	Soil (T/ac/yr)	Loss (T/yr)	USLE C	COEFFICIENTS P	Soil (T/ac/yr)	Loss (T/yr)	Soil Loss (T/yr)	%Reduction	P(lb/yr)	N(lb/yr)
EV-003																	
T-973	1	8.20	125	0.28	2.20	0.15	1.00	11.55	94.71	0.06	0.85	3.93	32.20	62.51	66	68.76	337.55
	2	19.30	125	0.38	1.40	0.15	1.00	9.98	192.52	0.06	0.85	3.39	65.46	127.06	66	139.77	686.13
	3	8.10	125	0.43	0.53	0.15	1.00	4.27	34.61	0.06	1.00	1.71	13.84	20.77	60	22.84	112.14
	4	17.70	125	0.38	1.20	0.15	1.00	8.55	151.34	0.06	1.00	3.42	60.53	90.80	60	99.88	490.33
T-975	1	6.40	125	0.38	1.00	0.15	1.00	7.13	45.60	0.06	1.00	2.85	18.24	27.36	60	30.10	147.74
	2	10.50	125	0.43	0.82	0.15	1.00	6.61	69.42	0.06	1.00	2.64	27.77	41.65	60	45.82	224.91
Total		70.20							588.19				218.04	370.15	63	407.17	1998.83
EV-005																	
T-979	1	12.00	125	0.43	0.40	0.15	1.00	3.23	38.70	0.12	0.50	1.29	15.48	23.22	60	25.54	125.39
	2	11.00	125	0.32	0.40	0.15	1.00	2.40	26.40	0.12	0.50	0.96	10.56	15.84	60	17.42	85.54
	3	30.00	125	0.32	0.70	0.15	1.00	4.20	126.00	0.12	1.00	3.36	100.80	25.20	20	27.72	136.08
	4	28.00	125	0.37	1.40	0.15	1.00	9.71	271.95	0.06	1.00	3.89	108.78	163.17	60	179.49	881.12
	5	48.00	125	0.28	1.80	0.15	0.50	4.73	226.80	0.06	0.25	0.95	45.36	181.44	80	199.58	979.78
	6	45.00	125	0.32	0.60	0.15	1.00	3.60	162.00	0.12	1.00	2.88	129.60	32.40	20	35.64	174.96
	7	10.00	125	0.32	3.50	0.15	0.70	14.70	147.00	0.06	0.35	2.94	29.40	117.60	80	129.36	635.04
	8	63.00	125	0.32	1.10	0.15	1.00	6.60	415.80	0.06	1.00	2.64	166.32	249.48	60	274.43	1347.19
	9	3.00	125	0.37	0.60	0.15	1.00	4.16	12.49	0.12	0.50	1.67	5.00	7.50	60	8.24	40.47
	10	5.00	125	0.32	2.60	0.15	1.00	15.60	78.00	0.06	0.60	3.74	18.72	59.28	76	65.21	320.11
T-8184	1	15.00	125	0.43	0.40	0.15	1.00	3.23	48.38	0.12	1.00	2.58	38.70	9.68	20	10.65	52.27
	2	22.00	125	0.32	2.80	0.15	0.70	11.76	258.72	0.06	0.35	2.35	51.74	206.98	80	227.67	1117.67
	3	3.00	125	0.43	0.50	0.15	1.00	4.03	12.09	0.12	1.00	3.23	9.68	2.42	20	2.66	13.04
Total		295.00							1824.33				730.13	1094.20	60	1203.62	5908.68
EV-006																	
	6	7.00	125	0.32	4.00	0.15	0.70	16.80	117.60	0.08	0.35	4.48	31.36	86.24	73.3	94.86	465.70
Total	6	7.00	125	0.32	4.00	0.15	0.70	16.80	117.60	0.08	0.35	4.48	31.36	86.24	73.3	94.86	465.70

Table 2. (continued) Sediment and Nutrient Reduction from Conservation Plans

						BEFORE PLAN				AFTER PLAN				Edge of Field Reduction			
SOURCE	Field Numbers	Cropland Area (Acres)	R	USLE K	COEFFICIENTS LS	C	P	Soil (T/ac/yr)	Loss (T/yr)	USLE C	COEFFICIENTS P	Soil (T/ac/yr	Loss (T/yr)	Soil Loss (T/yr)	%Reduction	P(lb/yr)	N(lb/yr)
EV-007																	
	1	47.00	125	0.38	1.10	0.16	1.00	8.36	392.92	0.16	0.75	6.27	294.69	98.23	25	108.05	530.44
	2	2.00	125	0.34	1.10	0.16	1.00	7.48	14.96	0.16	0.75	5.61	11.22	3.74	25	4.11	20.20
	3	4.00	125	0.31	1.10	0.15	1.00	6.39	25.58	0.09	0.75	2.88	11.51	14.07	55	15.48	75.98
	4	11.00	125	0.30	1.10	0.15	1.00	6.19	68.06	0.09	0.75	2.78	30.63	37.43	54	41.18	202.13
	5	18.00	125	0.27	1.10	0.15	1.00	5.57	100.24	0.09	0.75	2.51	45.11	55.13	55	60.65	297.72
	6	3.00	125	0.28	1.10	0.15	1.00	5.78	17.33	0.09	0.75	2.60	7.80	9.53	55	10.49	51.48
	7	40.00	125	0.33	1.10	0.16	1.00	7.26	290.40	0.16	0.75	5.45	217.80	72.60	25	79.86	392.04
Total		125.00							909.48				618.75	290.74	32	319.81	1570.00
EV-010																	
	1	12.20	125	0.30	2.40	0.15	0.80	10.80	131.76	0.08	0.40	2.84	34.70	97.06	74	106.77	524.14
	2	16.40	125	0.30	2.80	0.15	0.80	12.60	206.64	0.08	0.40	3.32	54.42	152.22	74	167.45	822.01
	3	8.50	125	0.28	1.10	0.15	1.00	5.78	49.09	0.08	1.00	3.04	25.85	23.24	47	25.56	125.48
	4	1.80	125	0.32	1.20	0.15	1.00	7.20	12.96	0.08	0.90	3.41	6.14	6.82	52.6	7.50	36.81
	5	5.80	125	0.28	0.85	0.15	1.00	4.46	25.88	0.08	0.90	2.12	12.27	13.61	53	14.97	73.50
	6	8.10	125	0.32	1.10	0.15	1.00	6.60	53.46	0.08	0.90	3.13	25.34	28.12	52.6	30.93	151.85
	7	8.90	125	0.32	2.60	0.15	0.80	12.48	111.07	0.08	0.40	3.29	29.25	81.82	74	90.00	441.83
Total		61.70							590.86				187.97	402.89	68.2	443.18	2175.63
EV-011																	
T-557	1	84.90	125	0.35	2.00	0.15	0.80	10.50	891.45	0.10	0.40	3.57	303.09	588.36	66	647.19	3177.13
	2	18.00	125	0.35	2.00	0.15	0.80	10.50	189.00	0.10	0.40	3.57	64.26	124.74	66	137.21	673.60
	3	3.20	125	0.24	0.92	0.15	0.80	3.31	10.60	0.10	0.40	1.13	3.60	7.00	66	7.70	37.78
	4	18.60	125	0.28	3.10	0.15	0.80	13.02	242.17	0.10	0.40	4.43	82.34	159.83	66	175.81	863.09
T-558		5.70	125	0.28	2.70	0.15	0.80	11.34	64.64	0.10	0.40	3.86	21.98	42.66	66	46.93	230.38
Total		130.40							1397.86				475.27	922.59	66	1014.85	4981.98

Table 2. (continued) Sediment and Nutrient Reduction from Conservation Plans

						BEFORE PLAN				AFTER PLAN				Edge of Field Reduction			
SOURCE	Field Numbers	Cropland Area (Acres)	R	USLE K	COEFFICIENTS LS	C	P	Soil (T/ac/yr)	Loss (T/yr)	USLE C	COEFFICIENTS P	Soil (T/ac/yr	Loss (T/yr)	Soil Loss (T/yr)	%Reduction	P(lb/yr)	N(lb/yr)
EV-012+013																	
T-979	1a	23.00	125	0.28	1.05	0.15	0.50	2.76	63.39	0.09	0.25	0.83	19.02	44.38	70	48.82	239.65
	1b	23.00	125	0.37	0.40	0.15	1.00	2.78	63.83	0.09	1.00	1.67	38.30	25.53	40	28.08	137.86
	1c	23.00	125	0.32	2.55	0.15	0.60	9.18	211.14	0.09	0.30	2.75	63.34	147.80	70	162.58	798.12
	2a	21.00	125	0.32	3.10	0.19	0.60	14.14	296.86	0.09	0.30	3.35	70.31	226.55	76	249.21	1223.37
	2a	21.00	125	0.28	0.40	0.19	1.00	2.66	55.86	0.09	1.00	1.26	26.46	29.40	53	32.34	158.76
	2b	40.00	125	0.43	0.17	0.15	1.00	1.37	54.83	0.14	0.60	0.77	30.70	24.12	44	26.53	130.25
	3	13.00	125	0.28	0.12	0.15	1.00	0.63	8.19	0.14	1.00	0.59	7.64	0.55	7	0.61	2.97
	7	19.00	125	0.20	0.22	0.15	1.00	0.83	15.68	0.14	0.60	0.46	8.78	6.90	44	7.59	37.26
	8	10.00	125	0.37	0.13	1.00	1.00	6.01	60.13	0.00	1.00	0.02	0.24	59.88	99.6	65.87	323.35
	10	10.00	125	0.37	0.13	1.00	1.00	6.01	60.13	0.00	1.00	0.02	0.24	59.88	99.6	65.87	323.35
	13a	4.00	125	0.32	3.25	0.15	0.70	13.65	54.60	0.09	0.35	4.10	16.38	38.22	70	42.04	206.39
	13a	4.00	125	0.28	1.60	0.15	0.50	4.20	16.80	0.09	0.25	1.26	5.04	11.76	70	12.94	63.50
	13b	13.00	125	0.43	0.70	0.15	0.50	2.82	36.68	0.14	0.25	1.32	17.12	19.57	53	21.53	105.68
	14	6.00	125	0.32	0.19	0.15	1.00	1.14	6.84	0.14	1.00	1.06	6.38	0.46	7	0.51	2.48
	16	5.00	125	0.24	0.93	0.15	0.50	2.09	10.46	0.14	0.25	0.98	4.88	5.58	53	6.14	30.13
Total		145.00							380.19				123.87	256.32	67.4	281.95	1384.13

Table 2. (continued) Sediment and Nutrient Reduction from Conservation Plans

						BEFORE PLAN				AFTER PLAN				Edge of Field Reduction			
SOURCE	Field Numbers	Cropland Area (Acres)	R	USLE K	COEFFICIENTS LS	C	P	Soil (T/ac/yr)	Loss (T/yr)	USLE C	COEFFICIENTS P	Soil (T/ac/yr	Loss (T/yr)	Soil Loss (T/yr)	%Reduction	P(lb/yr)	N(lb/yr)
EV-014 first plan	1	8.00	125	0.28	1.40	0.13	1.00	6.37	50.96	0.07	1.00	3.43	27.44	23.52	46.2	25.87	127.01
	2	2.00	125	0.35	1.20	0.13	0.60	4.10	8.19	0.07	0.60	2.21	4.41	3.78	46.2	4.16	20.41
	5	1.00	125	0.32	2.30	0.13	0.70	8.37	8.37	0.07	0.70	4.51	4.51	3.86	46.2	4.25	20.85
	6	10.00	125	0.28	1.15	0.13	1.00	5.23	52.33	0.07	1.00	2.82	28.18	24.16	46.2	26.57	130.44
	8	8.00	125	0.28	1.40	0.13	0.50	3.19	25.48	0.07	0.50	1.72	13.72	11.76	46.2	12.94	63.50
	9	8.00	125	0.35	1.05	0.13	1.00	5.97	47.78	0.07	1.00	3.22	25.73	22.06	46.2	24.26	119.10
	10	21.00	125	0.28	2.30	0.13	0.30	3.14	65.93	0.07	0.30	1.69	35.50	30.43	46.2	33.47	164.32
	11	2.00	125	0.37	1.70	0.13	0.60	6.13	12.27	0.07	0.60	3.30	6.60	5.67	46.2	6.23	30.59
	15	8.00	125	0.24	1.60	0.13	0.50	3.12	24.96	0.07	0.50	1.68	13.44	11.52	46.2	12.67	62.21
Total		68.00							296.26				159.52	136.75	46.2	150.42	738.43
second plan	1	8.00	125	0.28	1.40	0.13	1.00	6.37	50.96	0.03	1.00	1.47	11.76	39.20	77	43.12	211.68
	2	2.00	125	0.35	1.20	0.13	0.60	4.10	8.19	0.03	0.60	0.95	1.89	6.30	77	6.93	34.02
	5	1.00	125	0.32	2.30	0.13	0.70	8.37	8.37	0.03	0.70	1.93	1.93	6.44	77	7.08	34.77
	6	10.00	125	0.28	1.15	0.13	1.00	5.23	52.33	0.03	1.00	1.21	12.08	40.26	77	44.28	217.38
	8	8.00	125	0.28	1.40	0.13	0.50	3.19	25.48	0.03	0.50	0.74	5.88	19.60	77	21.56	105.84
	9	8.00	125	0.35	1.05	0.13	1.00	5.97	47.78	0.03	1.00	1.38	11.03	36.76	77	40.43	198.48
	10	21.00	125	0.28	2.30	0.13	0.30	3.14	65.93	0.03	0.30	0.72	15.21	50.72	77	55.79	273.86
	11	2.00	125	0.37	1.70	0.13	0.60	6.13	12.27	0.03	0.60	1.42	2.83	9.44	77	10.38	50.97
	15	8.00	125	0.24	1.60	0.13	0.50	3.12	24.96	0.03	0.50	0.72	5.76	19.20	77	21.12	103.68
Total		68.00							296.26				68.37	227.90	77	250.69	1230.68
EV-018	1a	32.00	125	0.17	4.50	0.15	0.80	11.48	367.20	0.08	0.40	3.06	97.92	269.28	73	296.21	1454.11
	1b	32.00	125	0.28	4.50	0.15	0.80	18.90	604.80	0.09	0.40	5.67	181.44	423.36	70	465.70	2286.14
	4	17.00	125	0.17	4.00	0.15	0.60	7.65	130.05	0.12	0.30	3.06	52.02	78.03	60	85.83	421.36
Total		81.00							1102.05				331.38	770.67	69.9	847.74	4161.62

Table 2. (continued) Sediment and Nutrient Reduction from Conservation Plans

						BEFORE PLAN				AFTER PLAN				Edge of Field Reduction			
SOURCE	Field Numbers	Cropland Area (Acres)	R	USLE K	COEFFICIENTS LS	C	P	Soil (T/ac/yr)	Loss (T/yr)	USLE C	COEFFICIENTS P	Soil (T/ac/yr	Loss (T/yr)	Soil Loss (T/yr)	%Reduction	P(lb/yr)	N(lb/yr)
EV-020																	
	1a	2.00	125	0.43	0.60	0.15	1.00	4.84	9.68	0.08	1.00	2.58	5.16	4.52	47	4.97	24.38
	1b	2.00	125	0.28	1.20	0.15	1.00	6.30	12.60	0.15	0.60	3.78	7.56	5.04	40	5.54	27.22
	2a	13.00	125	0.32	5.50	0.15	0.90	29.70	386.10	0.04	0.45	3.96	51.48	334.62	87	368.08	1806.95
	2b	13.00	125	0.37	1.60	0.15	1.00	11.10	144.30	0.08	0.50	2.96	38.48	105.82	73.3	116.40	571.43
	2c	13.00	125	0.32	3.10	0.15	0.60	11.16	145.08	0.06	0.30	2.23	29.02	116.06	80	127.67	626.75
	3	4.00	125	0.28	1.20	0.15	1.00	6.30	25.20	0.15	0.60	3.78	15.12	10.08	40	11.09	54.43
	5a	6.00	125	0.32	4.20	0.15	0.80	20.16	120.96	0.04	0.40	2.69	16.13	104.83	87	115.32	566.09
	5b	6.00	125	0.43	0.80	0.15	1.00	6.45	38.70	0.08	1.00	3.44	20.64	18.06	47	19.87	97.52
	9	8.00	125	0.28	1.20	0.15	1.00	6.30	50.40	0.15	0.60	3.78	30.24	20.16	40	22.18	108.86
T-234	1	5.00	125	0.28	0.70	0.15	1.00	3.68	18.38	0.15	1.00	3.68	18.38	0.00	0	0.00	0.00
Total		72.00							951.39				232.20	719.20	75.6	791.11	3883.63
EV-021																	
	1b	24.00	125	0.32	1.80	0.15	0.60	6.48	155.52	0.04	0.30	0.86	20.74	134.78	86.7	148.26	727.83
	1a	48.00	125	0.32	1.90	0.15	1.00	11.40	547.20	0.04	1.00	3.04	145.92	401.28	73.3	441.41	2166.91
	2	5.00	125	0.32	3.60	0.15	0.70	15.12	75.60	0.04	0.35	2.02	10.08	65.52	86.7	72.07	353.81
	3	11.00	125	0.32	1.90	0.15	1.00	11.40	125.40	0.04	1.00	3.04	33.44	91.96	73.3	101.16	496.58
	4	8.00	125	0.37	0.30	0.15	1.00	2.08	16.65	0.04	1.00	0.56	4.44	12.21	73.3	13.43	65.93
	6	10.00	125	0.28	3.10	0.15	0.60	9.77	97.65	0.04	0.30	1.30	13.02	84.63	86.7	93.09	457.00
Total		106.00							1018.02				227.64	790.38	78	869.42	4268.07
EV-023																	
	2	9.00	125	0.43	1.40	0.15	1.00	11.29	101.59	0.10	0.50	3.76	33.86	67.73	66.7	74.50	365.72
	3	6.00	125	0.32	0.70	0.15	1.00	4.20	25.20	0.10	1.00	2.80	16.80	8.40	33.3	9.24	45.36
	4	8.00	125	0.32	0.80	0.15	1.00	4.80	38.40	0.10	1.00	3.20	25.60	12.80	33.3	14.08	69.12
	5	5.00	125	0.32	0.80	0.15	1.00	4.80	24.00	0.10	1.00	3.20	16.00	8.00	33.3	8.80	43.20
Total		28.00							189.19				92.26	96.93	51	106.62	523.40
	Total Area (excluding EV-014 second plan)								9,365.42				3,428.39	5,937.07		6,530.75	32,060.10

Notes:

1 Farms are denoted "EV-###".

2 Tracts of land are denoted "T-###".

3 Multiple entries of the same field(s), ie. 1a, 1b imply divisions due to slope and crop differences.

4 Phosporus reduction based on 1.10 lb. P per T of soil loss.

5 Nitrogen reduction based on 5.40 lb. N per T of soil loss.

Inter-Farm Ranking

For efficiency of implementation considerations, all the fields on a farm are considered treated rather than some sub-set of fields based on criteria of need or convenience. The whole-farm treatment is consistent with that method employed in other analysis (Camacho, 1990), and with the implementation of farm soil conservation plans.

The results of the whole-farm USLE-based soil and nutrient loss reduction analysis may be compared in several useful ways. Three alternative comparisons are presented here as examples:

a. by soil and nutrient loss effectiveness (T/ac/yr)

b. by farm identifier (farm number)

c. by size of treated area (acreage)

These three methods of comparison present the results by farm in ways that can quickly be cross-referenced by likely search and implementation criteria.

Table 3 presents the total and unit soil and nutrient loss reductions ranked by effectiveness. Effectiveness here is based on load reduction only, without consideration of cost. The cost of implementing management practices which affect the USLE are primarily those developed in soil conservation plans, and are essentially associated with operation and maintenance, without appreciable capital expenditure. The rankings of nutrient loss reduction are proportional to soil loss reductions due to the application of uniform soil-associated nutrient enrichment factors:

N factor = 5.4 lb/T soil

P factor = 1.1 lb/T soil

These factors may be changed according to any chosen analytical criteria.

Table 4 presents the same results as those in Table 3; however, they are arranged in order by the assigned farm identification number. Table 5 also presents the same results; however, they are arranged in order by the size of the farms in acres.

Table 3. Edge of Field Sediment and Nutrient Reductions Arranged by Effectiveness

Edge of Field Soil Reductions

					N Factor=	5.4 lb/T		
					P Factor=	1.1 lb/T		
		<----------Total Reduction---------->			<----------Unit Reduction---------->			Effectiveness
Site	Area (ac)	Soil (T/yr)	Nitrogen (lb/yr)	Phosphorous (lb/yr)	Soil (T/ac/yr)	Nitrogen (lb/ac/yr)	Phosphorous (lb/ac/yr)	Rank
EV-006	7.00	86.24	465.70	94.86	12.32	66.53	13.55	1
EV-020	72.00	719.19	3883.63	791.11	9.99	53.94	10.99	2
EV-018	81.00	770.67	4161.62	847.74	9.51	51.38	10.47	3
EV-021	106.00	790.38	4268.07	869.42	7.46	40.26	8.20	4
EV-011	130.40	922.59	4981.97	1014.85	7.08	38.21	7.78	5
EV-010	61.70	402.90	2175.64	443.19	6.53	35.26	7.18	6
EV-003	70.20	370.15	1998.81	407.16	5.27	28.47	5.80	7
EV-005	295.00	1383.99	7473.56	1522.39	4.69	25.33	5.16	8
EV-023	28.00	96.93	523.40	106.62	3.46	18.69	3.81	9
EV-014-second plan	68.00	227.89	1230.61	250.68	3.35	18.10	3.69	10
EV-007	125.00	290.73	1569.94	319.80	2.33	12.56	2.56	11
EV-014-first plan	68.00	136.73	738.36	150.41	2.01	10.86	2.21	12
EV-012+013	145.00	196.46	1060.86	216.10	1.35	7.32	1.49	13

Table 4. Edge of Field Sediment and Nutrient Reductions Arranged by Farm

Edge of Field Soil Reductions

					N Factor=	5.4 lb/T		
					P Factor=	1.1 lb/T		
		<----------Total Reduction---------->			<----------Unit Reduction---------->			Effectiveness
Site	Area (ac)	Soil (T/yr)	Nitrogen (lb/yr)	Phosphorous (lb/yr)	Soil (T/ac/yr)	Nitrogen (lb/ac/yr)	Phosphorous (lb/ac/yr)	Rank
EV-003	70.20	370.15	1998.81	407.16	5.27	28.47	5.80	7
EV-005	295.00	1383.99	7473.56	1522.39	4.69	25.33	5.16	8
EV-006	7.00	86.24	465.70	94.86	12.32	66.53	13.55	1
EV-007	125.00	290.73	1569.94	319.80	2.33	12.56	2.56	11
EV-010	61.70	402.90	2175.64	443.19	6.53	35.26	7.18	6
EV-011	130.40	922.59	4981.97	1014.85	7.08	38.21	7.78	5
EV-012+013	145.00	196.46	1060.86	216.10	1.35	7.32	1.49	13
EV-014-first plan	68.00	136.73	738.36	150.41	2.01	10.86	2.21	12
EV-014-second plan	68.00	227.89	1230.61	250.68	3.35	18.10	3.69	10
EV-018	81.00	770.67	4161.62	847.74	9.51	51.38	10.47	3
EV-020	72.00	719.19	3883.63	791.11	9.99	53.94	10.99	2
EV-021	106.00	790.38	4268.07	869.42	7.46	40.26	8.20	4
EV-023	28.00	96.93	523.40	106.62	3.46	18.69	3.81	9

Table 5. Edge of Field Sediment and Nutrient Reductions Arranged by Acreage

Edge of Field Soil Reductions

					N Factor= 5.4 lb/T P Factor= 1.1 lb/T			
		<----Total Reduction---->			<----Unit Reduction---->			Effectiveness
Site	Area (ac)	Soil (T/yr)	Nitrogen (lb/yr)	Phosphorus (lb/yr)	Soil (T/ac/yr)	Nitrogen (lb/ac/yr)	Phosphorus (lb/ac/yr)	Rank
EV-005	295.00	1383.99	7473.56	1522.39	4.69	25.33	5.16	8
EV-012+013	145.00	196.46	1060.86	216.10	1.35	7.32	1.49	13
EV-011	130.40	922.59	4981.97	1014.85	7.08	38.21	7.78	5
EV-007	125.00	290.73	1569.94	319.80	2.33	12.56	2.56	11
EV-021	106.00	790.38	4268.07	869.42	7.46	40.26	8.20	4
EV-018	81.00	770.67	4161.62	847.74	9.51	51.38	10.47	3
EV-020	72.00	719.19	3883.63	791.11	9.99	53.94	10.99	2
EV-003	70.20	370.15	1998.81	407.16	5.27	28.47	5.80	7
EV-014-first plan	68.00	136.73	738.36	150.41	2.01	10.86	2.21	12
EV-014-second plan	68.00	227.89	1230.61	250.68	3.35	18.10	3.69	10
EV-010	61.70	402.90	2175.64	443.19	6.53	35.26	7.18	6
EV-023	28.00	96.93	523.40	106.62	3.46	18.69	3.81	9
EV-006	7.00	86.24	465.70	94.86	12.32	66.53	13.55	1

Comparison of USLE with RUSLE

The Universal Soil Loss Equation was developed to estimate the impact of the water erosion factors. The equation for soil loss prediction is as follows:

$$A = R*K*LS*C*P$$

where:
A = Predicted average annual soil loss (T/ac/yr)
R = Rainfall factor
K = Soil erodibility factor
L = Slope length factor
S = Slope gradient factor
C = Cropping management factor
P = Erosion control practice factor

The USLE assigns numerical values to all of the factors; the accuracy of the calculated soil loss is only as good as the numerical values representing these factors. RUSLE is the Revised Universal Soil Loss Equation which refines and improves on the USLE. Both the USLE and RUSLE use the same formula. Though the factors remain the same in both the formulae, the difference is the detail that went into the factors for computing the soil loss using RUSLE. The differences found in RUSLE are as follows:

Average annual soil loss (A)

Same as USLE but also accounts for the average soil loss over a field and the differences in the losses pertaining to the various parts of the field.

Rainfall and runoff factor (R)

Same as USLE with some modifications for the northwest area of Pennsylvania. Also based on more data and weather stations. Results in a decrease in R factors at most locations.

Soil Erodibility factor (K)

Same as USLE, but adjusted for seasonal changes such as freezing and thawing or soil consolidation. Results in a decrease in the K factors.

Slope length/slope steepness factor (LS)

Refines USLE by assigning LS values according to land use such as pasture, cropland, construction and mining sites. Results in the LS values varying slightly from USLE with some variance between land use.

Cover and management factor (C)

Uses independent subfactors for prior land use, canopy cover, surface cover, surface roughness, and soil moisture to calculate C factor. Refines USLE by dividing each year into 15 day intervals, calculating a soil loss ratio for each period. Recalculates a soil loss ratio each time a tillage operation changes one of the subfactors. RUSLE provides estimates of changes as they occur throughout the year, especially relating to surface and near surface residue and effects of climate on residue decomposition. Results in the final C factor being higher or lower than that obtained through USLE.

Supporting Practice Factor (P)

RUSLE P factors are based on soil hydrologic groups, slope, row grade, ridge height, cover-management condition, and the 10 year single storm index values. Results in P factors being higher or lower than that obtained through USLE.

The Pennsylvania data from the Pennsylvania manual is presented in Appendix II.

As an aid to understanding the impact of using the RUSLE and its difference from the USLE, a comprehensive example is worked below.

RUSLE and USLE Comprehensive Example

Given:
(From Table 2, used Source EV-011, Tract #557, Field #1, Acreage of 84.90)

Location:	Bedford County, PA
Soil Mapping Unit:	Edom Silt Clay Loam and Penlaw Silt Loam
	Hydrologic Soil Group C
Cropping Sequence:	4 Yrs. Grain Corn
	1 Yr. Oats
	3 Yrs. Alfalfa Hay
Tillage Method:	Yr. 1- No-Till Grain Corn/ Residue Left (RL)
	Yr. 2- No-Till Grain Corn/ Residue Removed (RR)
	Yr. 3- No-Till Grain Corn/(RL)
	Yr. 4- Reduced Tillage Grain Corn/(RR)
	Yr. 5- Oats (seeded)
	Yr. 6/8- Established Alfalfa Hay
	1st Grain Corn planted after 1st cutting of Hay
Landscape Profile:	Slope = 8%
	Length of Slope = 400 Ft.
Furrow (Row) Grade:	Not planned
Stripcropping System:	Not planned

Determine Average Annual Soil Loss Using RUSLE:

A=R*K*LS*C*P

Where: A = Average annual soil loss
R = Rainfall and runoff factor
K = Soil Erodibility factor
LS = Slope length/slope steepness factor
C = Cover and management factor
P = Supporting practice factor

1. Determine Climatic Information:

   A. R Factor = 110 from the Rainfall Factor Values For Pennsylvania Table. (See p. R-1)
   B. 10 Yr. EI = 50 from the Ten-Year Frequency Single-Storm Erosion Index Values For Pennsylvania. (See p. R-2)
   C. Climatic Zone = 115A from the Climatic Zones For Pennsylvania Table. (See p. R-3)

2. Determine K Factor:

   A. Obtain K from the Interpretative Groupings Table in Section II of the respective county's PA Technical Guide for soil mapping unit PeB-EdC. Unadjusted K = 0.35.
   B. Climate Adjusted Average Annual K = 0.33. Use Climate Adjusted - Average Annual K Factors Table.

3. Determine LS Factor:

   A. Use Cropland With Tillage Table LS-2.
   B. LS = 2.03 for 8% slope 400 Ft. long.

4. Determine C Factor:

   A. Cropping sequence is C/C/C/C/Oats/Hay/Hay/Hay.
   B. Use the following C Factor Tables:
      p. C-12 Double Cropping Following Hay
      p. C-9 Fall Grain After Fall Grain (Prior Year Residue Left)
      p. C-9 Fall Grain After Fall Grain (Prior Year Residue Removed)

p C-9 Fall Grain After Fall Grain (Prior Year Residue Left)
p. C-11 Hay Establishment
p. C-11 Established Hay and Pasture

C. No-till Grain Corn double cropped after 1st cutting of hay = 0.02
No-till Grain Corn with Residue Removed = 0.04
No-till Grain Corn with Residue Left = 0.04
Reduced tillage Grain Corn with Residue Removed = 0.08
Seeded Oats following Grain Corn = 0.05
Established Alfalfa Hay = 0.005

D. Calculate C Factors for complete rotation:
1. 1 Yr. @ 0.02 = 0.02
2. 1 Yr. @ 0.04 = 0.04
3. 1 Yr. @ 0.04 = 0.04
4. 1 Yr. @ 0.08 = 0.08
5. 1 Yr. @ 0.05 = 0.05
6. 3 Yrs. @ 0.005 = 0.015

8 Yr. Total = 0.245
0.245 / 8 Yrs. = 0.031

5. Determine P Factor:

P = Contour subfactor * Stripcropping subfactor * Terrace subfactor

A. Determine P subfactor for contouring "on-grade".
1. Select Cover-Management Condition for each year in crop rotation.
Use Table P-1.
Yr. 1 = 4
Yrs. 2/4 = 5
Yr. 5 = 7
Yrs. 6/8 = 3
2. Determine Ridge Height for each year in crop rotation (Table P-2).
Yr. 1 = 1 - Very Low (0.5-2in.) Ridges
Yrs. 2/4 = 2 - Low (2-3in.) Ridges
Yr. 5 = 1 - Very Low (0.5-2in) Ridges
Yrs. 6/8 = No ridges present.
3. Determine P subfactor for contouring "on-grade" for each year in crop rotation from Table P-3 where EI = 50.
Yr. 1 = 0.50
Yr. 2 = 0.33
Yr. 3 = 0.33
Yr. 4 = 0.33
Yr. 5 = 0.63
Yr. 6 = 1.00

Yr. 7 = 1.00
Yr. 8 = 1.00
Total = 5.12
5.12 / 8 = 0.64

4. Determine stripcropping P subfactor.
   For our example a value of 1.00 was assumed due to no mention of stripcropping/ buffers.
5. Determine terrace P subfactor.
   For our example a value of 1.00 was assumed due to no mention of terracing.

B. Compute composite P factor.
   P = Contour subfactor * Stripcropping subfactor * Terrace subfactor
   P = 0.64 * 1.00 * 1.00 = 0.64

6. Determine A (Average Annual Soil Loss):

A = R*K*LS*C*P
A = (110)(0.33)(2.03)(0.031)(0.64)
A = 1.462tons/acre/yr.

Determine Average Annual Soil Loss Using USLE

A = R*K*LS*C*P
A = (125)(0.35)(2.00)(0.10)(0.40)
A = 3.5tons/acre/yr.

BMPs and their Associated Benefits

Thirteen BMPs are considered for presentation of cost effectiveness. Table 6 serves as a general guideline in determining their relative benefits. The list includes thirteen BMPs. They are taken from Technical Report #8 (CBP, 1993). Twelve of these are implemented on the field; the thirteenth is a representative animal waste management system. Eleven of the twelve field BMPs primarily serve as erosion control measures. Nutrient management is the field BMP which does not generally result in erosion control.

For the field BMPs, data for the cost per unit area are taken from Technical Report #8. In addition, the report includes cost per ton of soil saved. Cost per pound of nutrient removed is derived from the assumption that there are 5.4 lbs of nitrogen and 1.1 lbs of phosphorus per ton of eroded soil.

For nutrient management, costs per pound of nitrogen and phosphorus removed are derived from edge-of-stream estimates from the Chesapeake Bay Model as reported in Technical Report #8. One source of concern is that the cost per pound reduction of edge-of-stream nitrogen and phosphorus is significantly higher than the edge-of-field costs. Edge-of-field costs do not account for the reduction of soil and nutrients in transit between field and stream. Statements of nutrient reduction in this report are accompanied by reference to the conditions to which they apply.

Waste management systems are dealt with differently. First, data for cost per animal and cost per ton of manure stored are obtained from Technical Report #8. This information is presented for dairy cattle, beef and swine. The nutrient content of these manures is taken from Anderson (1992), and a cost per pound of nutrient stored is developed. However, this only provides information on the cost per amount *stored.* Information on the cost per pound of nutrient saved is desired. General information on the cost per pound of nutrient reduction is available from Technical Report #8. Results are presented with and without nutrient management. The cost-effectiveness of animal waste systems would likely dramatically increase when employed with nutrient management .

The eleven erosion control BMPs are ranked by cost-effectiveness in reducing erosion in Table 7. Data here are for BMPs implemented singly. BMPs implemented in combination would likely achieve higher total effectiveness, but lower individual effectiveness.

Cost data with respect to the implementation of BMPs changes from time to time, and is different from place to place depending on local conditions. General cost data for the Chesapeake Bay region is available in Technical Report #8 (1993). The costs of implementing BMPs in Pennsylvania is monitored by the Department of Environmental Protection for each county in the Commonwealth.

Table 6. Presentation of Cost Effectiveness Data for Several BMPs

FIELD BMPs								5.4 lb N/T soil			1.1 lb P/T soil	
BMP		($/ac/yr)		($/ton soil saved/yr)				($/lb N/yr)			($/lb P/yr)	
	25 %ile	median	75%ile	25%ile	median	75%ile	25%ile	median	75%ile	25%ile	median	75%ile
Conservation Reserve		52-71			3.1-7.1			0.94			4.64	
Conservation Tillage		17.30		2.70	4.80	6.40	0.50	0.89	1.19	2.45	4.36	5.82
Cover Crops	10.00	10.00	20.00	1.90	3.60	5.80	0.35	0.67	1.07	1.73	3.27	5.27
Diversions	26.10	52.20	116.20	5.10	11.20	22.50	0.94	2.07	4.17	4.64	10.18	20.45
Filter Strips	4.30	7.10	10.50	0.90	2.00	4.40	0.17	0.37	0.81	0.82	1.82	4.00
Grassed Waterways		.39-1.50/lf		1.80	10.20	24.30	0.33	1.89	4.50	1.64	9.27	22.09
Grazing Land Protection	18.60	36.30	73.80	2.30	7.40	24.50	0.43	1.37	4.54	2.09	6.73	22.27
Sediment Retention	50.50	103.00	238.00	14.20	29.90	46.90	2.63	5.54	8.69	12.91	27.18	42.64
Strip-Cropping	5.80	11.60	11.60	0.50	0.90	1.70	0.09	0.17	0.31	0.45	0.82	1.55
Terraces	35.70	85.80	148.00	4.40	9.30	15.40	0.81	1.72	2.85	4.00	8.45	14.00
Veg. Cover of Critical Ar	38.90	69.50	225.70	2.50	4.80	9.50	0.46	0.89	1.76	2.27	4.36	8.64
Nutrient Management		2.40						.75			9.00	
ANIMAL WASTE MANAGEMENT												
Data on specific animals--Costs of storage												
animal	($/ton manure/yr)			lb N/ton	b P/ton	($/lb N/yr)			($/lb P/yr)			
	minimu	median	maximu	manure	manure	minimu	median	maximum	minimu	median	maximum	
dairy	18.3	23.7	26.5	10	1.74	1.83	2.37	2.65	10.49	13.59	15.19	
beef	6.8	9.2	11.6	11	3.05	.62	.84	3.01	.79	.84	3.01	
swine	6.34	9.6	16	14	4.80	.45	.69	2.00	.60	.69	2.00	
General Data--Costs of nutrient reduction												
Cost Effectiveness												
	with nutrient management							without nutrient management				
	($/lb N/yr)		($/lb P/yr)				($/lb N/yr)		($/lb P/yr)			
25 %ile	median	75%ile	25 %ile	median	75%ile	25 %ile	median	75%ile	25 %ile	median	75%ile	
2	2.5	4	16	20	24	5.5	5.8	6	27	30	32	
	Nutrient Management and animal waste management reductions are edge-of stream.											
	Reductions for other BMPs are edge-of field											

Table 7. Erosion Control BMPs Ranked by Cost Effectiveness

								5.4 lb N/T soil			1.1 lb P/T soil	
BMP		($/ac/yr)		($/ton soil saved/yr)				($/lb N/yr)			($/lb P/yr)	
	25 %ile	median	75%ile	25%ile	median	75%ile	25%ile	median	75%ile	25%ile	median	75%ile
Strip-Cropping	5.80	11.60	11.60	0.50	0.90	1.70	0.09	0.17	0.31	0.45	0.82	1.55
Filter Strips	4.30	7.10	10.50	0.90	2.00	4.40	0.17	0.37	0.81	0.82	1.82	4.00
Cover Crops	10.00	10.00	20.00	1.90	3.60	5.80	0.35	0.67	1.07	1.73	3.27	5.27
Conservation Tillage		17.30		2.70	4.80	6.40	0.50	0.89	1.19	2.45	4.36	5.82
Veg. Cover of Critical Areas	38.90	69.50	225.70	2.50	4.80	9.50	0.46	0.89	1.76	2.27	4.36	8.64
Conservation Reserve		52-71			3.1-7.1			0.94			4.64	
Grazing Land Protection	18.60	36.30	73.80	2.30	7.40	24.50	0.43	1.37	4.54	2.09	6.73	22.27
Terraces	35.70	85.80	148.00	4.40	9.30	15.40	0.81	1.72	2.85	4.00	8.45	14.00
Grassed Waterways		.39-1.50/lf		1.80	10.20	24.30	0.33	1.89	4.50	1.64	9.27	22.09
Diversions	26.10	52.20	116.20	5.10	11.20	22.50	0.94	2.07	4.17	4.64	10.18	20.45
Sediment Retention	50.50	103.00	238.00	14.20	29.90	46.90	2.63	5.54	8.69	12.91	27.18	42.64

The analysis conducted here determines nutrient reductions by associating reduced nutrients with reduced sediment. This assumption is commonly made (U.S. EPA, 1987). In addition, it assumes that sediment reductions are absolute. This assumption is made primarily because the Universal Soil Loss Equation is used to compute sediment reduction in many cases. This method does not account for site to site variability when computing, for example, cover factors. However, ranges of uncertainty are discussed below.

Table 8 provides reference percent reduction efficiency information from the literature for selected BMPs. Typically, three figures (or ranges), separated by commas, are given. They represent soil, nitrogen, and phosphorus removal efficiencies, respectively, given as percentages. Although nutrients are associated with sediment, they also have other modes by which they may reach a stream. For example, they may be dissolved in runoff or leach into groundwater. As Table 8 indicates, sediment, nitrogen and phosphorus reduction percentages are not the same within BMPs. Table 8 also indicates that there is considerable variability of effectiveness across different BMPs. If the first entry in a range is negative, an *increase* (not decrease) in the parameter by that percent is indicated. As might be expected, the sources listed derive effectiveness using methods slightly different from one another.

1. Penn State (1992) reports values from research literature to determine gross planning level effectiveness. The efficiency for diversions includes grassed waterways.

2. USDA-SCS (1988) reports reduction efficiencies for nutrients in several forms (for example, dissolved and adsorbed forms, and in percolate and surface runoff). The values reported in Table 8 are for adsorbed nitrogen and phosphorus. For the adsorbed form, the reduction efficiencies for nitrogen and phosphorus are generally similar.

3. Casman (1990) summarizes literature from several sources to estimate reductions in total nitrogen and phosphorus for each BMP.

4. For conservation tillage reported in Camacho (1990), no-till efficiencies from modeling and field studies are used. Efficiencies are for nitrogen and phosphorus are for surface water. For terracing, the efficiencies reported are from CREAMS modeling work completed by Shirmohammadi and Shoemaker (1988).

A good discussion of the effects of BMPs on sediment and nutrient losses is presented by Hamlett and Epp (1991). The effects on nutrient losses are presented for total, soluble and sediment-attached phases and are considered for BMPs in conjunction with nutrient management plans. This is particularly valuable information because the implementation of BMPs is likely to be accompanied by the implementation of nutrient management plans.

Table 8. Relative Benefits of BMPs

BMP	Percent Reduction of Soil, Nitrogen, and Phosphorus			
	Reference 1	**Reference 2**	**Reference 3**	**Reference 4**
Conservation Reserve				
Conservation Tillage	75, 55, 45	-95 - 99, 50 - 95, 51 - 95	na, 35, 35	46 - 99, -22 - 96, -151 - 97
Cover Crops				
Diversions	35, 10, 30		na, 0 - 50, 0	
Filter Strips	65, 70, 75		na, 30, 30 - 90	
Grassed Waterways			na, 0-2, 0-15	
Grazing Land Protection				
Sediment Retention		50 - 99, 95, 73		
Strip-Cropping		-90 - 99, 51 - 98, 52 - 99		
Terraces	85, 20, 70	87 - 98, 96 - 99, 96 - 99	na, 0, 40	
Veg. Cover of Critical Areas				

Reference 1 - Penn State, 1992
Reference 2 - USDA-SCS, 1988
Reference 3 - Casman, 1990
Reference 4 - Camacho, 1990

Notes:
(1) A '-' between numbers indicates a range of values.
(1) A '-' in front of the first number of a range indicates an increase.

Generic Farm Spreadsheet

The technique described in this section of the report incorporates the ideas in the USLE spreadsheet as well as the presentation of BMP cost-effectiveness. Although comparing general information about BMPs provides useful information, this comparison does not include certain field-specific information such as erosion rate before BMPs are implemented. Cost information from the Inter-BMP comparisons is combined with field-specific information used in the USLE spreadsheet. Using this information, the cost-effectiveness of each BMP is calculated for a hypothetical application to an example farm (EV-003).

Structure and Computation

There are three general sections of this spreadsheet, one input section and two output sections. The input section requires information on BMP cost and efficiency, field information and area of each field treated by a specific BMP. The first type of output uses field and BMP information to estimate effectiveness in erosion or nutrient reduction per unit area and in cost per unit reduction of erosion or nutrients. The second output includes information on total erosion and nutrient reduction and cost-effectiveness data for the entire farm and each field.

USER INPUT

Three categories of user input are required. These are field information, BMP data and decision variables for the implementation of BMPs. Table 9 summarizes the information included in each of these input categories.

Table 9: Data Requirements for the Generic Farm Spreadsheet

Data Category	Information	Provided For
Field Data	Area (ac)	field
	Field length parallel to slope (ft)	field
	Slope length (ft)	field
	Slope (%)	field
	Length of rotation (years)	field
	USLE C factor for each rotation year	field
	Average annual USLE C factor	field
	Erosion (T/ac/yr)	field
	Soil Nitrogen Enrichment (lb/ton)	farm
	Soil Phosphorus Enrichment (lb/ton)	farm

Table 9. (Continued)

Data Category	Information	Provided For
BMP Data	Cost ($/ac or $/ft) USLE P factor USLE C factor Reduction in C factor (%) Sediment Reduction (%)	All BMPs. Strip cropping, contouring and terraces Conservation Reserve and Grazing Land Protection Reduced Tillage and Cover Crop All other BMPs
BMP Implementation Choices	Acres treated Years applied	All BMPs Reduced Tillage and Cover Crop

BMP EFFECTIVENESS ON A PER UNIT BASIS

The calculation of BMP effectiveness on a per area basis requires field data as well as BMP data. This information is also used to compute the cost-effectiveness ($/mass) of erosion or nutrient reduction. BMP effectiveness is calculated for sediment, nitrogen and phosphorus.

Erosion

Erosion reduction is calculated for all BMPs. Note that all efficiencies and sediment reduction amounts refer to edge-of-field data. For all BMPs, the reduced sediment is calculated as:

$$S = E\ S_0$$

where: S = erosion reduction (T/ac/yr)
E = erosion reduction efficiency (fraction)
S_0 = erosion before BMP installation (T/ac/yr)

The calculation of E depends on what BMP data are provided.
For BMPs where the C factor is provided, E is calculated as:

$$E = (C_0 - C_{BMP})/C_0$$

where: C_0 = C factor before BMP installation
C_{BMP} = C factor after BMP installation

For reduced tillage and cover crops, the percent reduction in the cover factor is represented. This reduction occurs only in years where the treatment occurred. Therefore, the cover factor after BMP installation , C_{BMP}, is calculated as:

$$C_{BMP} = C_0 - \frac{R_C \Sigma C_{0i} T_i}{100\ Y}$$

where: R_C = Reduction in the C factor (%)
C_{0i} = C factor before the BMP in year i
T_i = Treatment variable (1 if treated in year i, 0 if not treated)
Y = length of the rotation (years)

For the generalized reduction rates, it is assumed that the practice is used in years where the cover factor is greater than 0.1. In the more specific spreadsheet, the user specifies the years where the BMP is implemented.

For BMPs where the P factor is provided, erosion reduction efficiency, E, is calculated as:

$$E = 1\text{-}P$$

where: P = practice factor for the BMP

The P factors for Contour Cropping and Contour Strip Cropping are determined from tables used by the Bedford County Conservation District. For terracing, the P factor is estimated as:

$$P = 0.2/\sqrt{n}$$

where: n = number of terraces

If the number of terraces is unknown:

$$n = l / 125$$

where: l = field length parallel to the slope.

We assume that terraces are approximately 125 feet apart based on a suggestion by the State Office of the Natural Resources Conservation Service in Harrisburg, Pennsylvania (Mahood, phone conversation).

For BMPs where the sediment removal efficiency as a percentage is available, E, is calculated as:

$$E = R_{SED}/100$$

where: R_{SED}= sediment removal efficiency expressed as a percentage.

Note that, for vegetative cover of critical areas, the reduction efficiency is applied as though the original cover factor were 1.0. This is attained by dividing the reduction in erosion, S, by the cover factor.

Nitrogen and Phosphorus Reduction

For all erosion and sediment control BMPs, nitrogen and phosphorus reduction are calculated based on their association with sediment. Thus, for all these BMPs, nutrient reduction is calculated by:

$$N = S\,F$$

where: N = nutrient reduction (lb/ac/yr)
F = soil nutrient enrichment (lb/T)

Calculation of Cost-Effectiveness

Cost-Effectiveness for erosion and sediment control is calculated as:

$$CE_X = U/X * Y_{TREAT}/Y$$

where: CE_X = cost-effectiveness of the BMP for parameter X ($/T or $/lb)
U = unit cost of the BMP ($/ac/yr)
X = Reduction (lb/ac/yr or T/ac/yr)
Y_{TREAT} = number of years in the rotation the BMP is used (years)
Y = length of the rotation (years)

FIELD EFFECTIVENESS

Erosion Reduction

The reductions and cost efficiencies calculated for each field have assumed that the BMP being implemented is the only BMP used on the field. Here, an incremental approach is used to evaluate the case where more than one BMP is implemented. That is, if a BMP is implemented after another, the second BMP can only treat the load which was not treated by the first BMP. The load reduction for a BMP, j, implemented after other BMPs, i, is calculated as:

$$TR_j = E_j \frac{A_j}{A}\left(L - \sum_{i=1}^{j-1} TR_i\right)$$

where: TR_j = Load reduction for BMP j (T/yr)

E_j = Efficiency for BMP j
A_j = Area treated with BMP j (ac)
A = Field area (ac)
L = Erosion before BMPs (T/yr)

The one exception to this rule is vegetative cover of critical areas, for which reduction is calculated:

$$TR_{VCA} = S_{VCA} A_{VCA}$$

where: TR = Erosion Reduction (T/yr)
S = Erosion Reduction Unit Rate (T/ac/yr)
A = area treated (ac)

Load reduction for the entire field is calculated as the sum of the load reductions from all BMPs:

$$TR = \sum_{j-1}^{n} TR_j \frac{Y_j}{Y}$$

where: Y_j = years BMP j is used
Y = length of the rotation (years)

Reductions in nitrogen and phosphorus are calculated by multiplying erosion reduction by the enrichment factor associated with that nutrient.

Cost effectiveness

In order to calculate the cost effectiveness of a system of BMPs installed on a field, the total cost is calculated as:

$$C = \sum_{j-1}^{n} U_j A_j$$

where: C = the cost for the field ($)
U_j = the unit cost of BMP j ($/ac)
A_j = the area treated by BMP j (ac)

The cost-effectiveness for the field is calculated as:

$$CE = C/TR$$

For nitrogen and phosphorus, the cost is divided by the pounds of nitrogen or phosphorus reduction.

FARM EFFECTIVENESS

After field results are calculated, the total sediment reduction can simply be determined as the sum of erosion or nutrient reduction in all fields. The total cost for the farm is the sum of the costs for the fields. Cost effectiveness for the farm, as for the fields, is calculated by dividing the cost by the erosion or nutrient reduction.

Simplifying Assumptions

Several assumptions are made in the spreadsheet. These assumptions can be divided into three categories. The first deals with the efficiencies of BMPs and the calculation of these efficiencies, the second deals with costs, and the third deals more general "process" issues.

BMP EFFICIENCIES

As discussed, BMP efficiencies are computed using several methods. As shown in Table 11, efficiencies could be computed using a P factor, a C factor, a sediment reduction percentage or a percentage change in the C factor.

The P factor used in this section for terracing is derived from Stewart et al. (1975), reported in Haith et al. (1992). The P factor reported is for contour terracing, and calculates erosion to the terrace channels. The P value reported is divided by the contour factor and multiplied by 0.2 to obtain off-field soil loss. The source from which the data are derived suggests this multiplication factor. For contour cropping and strip cropping, the P factors were derived from tables provided by the Bedford County Conservation District.

For conservation reserve and grazing land protection, it is assumed that treated land would have complete grass cover (C = 0.004).

Similarly, for vegetative cover of critical areas, the 90% efficiency is calculated by assuming a cover factor of 0.1 (Mahood, personal communication), and by additionally assuming that the initial cover factor is 1.0.

For diversions, the percent reduction is from US EPA (1993). For filter stirps, the efficiency is from Magette et al. (1987) as reported in Casman (1990). For sediment retention, the efficiency is taken from US EPA (1993).

Estimates of reduction in the cover factor given the use of a cover crop or reduced tillage are derived from the cover factor tables for Pennsylvania. The reductions in cover factors are estimated based on the differences in C factors with and without the BMP for corn crops.

It is important to note that BMP efficiencies may be site specific. For grassed waterways, no efficiency is provided because of this problem. In addition, the efficiency for diversions should be examined closely by the user. Generally, the user should supply any site-specific data available.

COSTS

The costs provided in Technical Report #8 (Camacho, 1990) refer to Chesapeake Bay Program treatment practices which may include several individual BMPs. It was assumed that the stripcropping referred to in the report had the same cost as contour farming, which was not included in the section of this report which provides efficiency information for BMPs. In addition, the general assumption is made that the price ranges reported in Technical Report 8 are appropriate for applications resulting from this framework. The alternative for many BMPs was to, in effect, "build" the BMP described and use the county specific cost information. In addition, when calculating the cost-effectiveness of grassed waterways, we assumed that one waterway was applied per field.

PROCESS ASSUMPTIONS

Some general assumptions about processes by which sediment and nutrients are transported are made in assembling the generic farm spreadsheet.

We assumed that sheet and rill erosion represents all erosion from a field. Gully erosion was not considered.

We assumed that erosion losses transfer directly into nutrient loads via the enrichment factors.

The assumption that BMP soil and nutrient loss reduction rates depend on previously installed BMPs implies that every BMP necessarily effects the efficiency of other BMPs, except in the case of vegetative cover of critical areas, as described above.

Limitations of this Method

There are limitations to the usefulness of the method described above, most related to the simplifying assumptions made in its development.

Assumptions on BMP efficiencies were made as stated; however, for some field specific cases, these assumptions may not be correct. In these cases, more field specific information should be used.

Cost assumptions similarly contribute to the likelihood that these data may not be applicable to a specific field. Again, more specific data can be used where available.

Where gully erosion is significant, the choice of the USLE to represent the total soil loss from a site may be inappropriate.

The values reported are for edge-of-field. Fate and transport assumptions depend on specific site considerations and are best left to the user.

Associating erosion directly with nutrient loads gives only a general impression of the effectiveness of certain BMPs in reducing nutrient loads. For example, cover crops, in addition to reducing annual erosion rates, "tie up" nitrate, preventing loss to groundwater and surface water. In addition, using a constant value for this association disregards the variability in nutrient association with sediment. Also, some BMPs may have negative effects which are not accounted for. For example, terracing may lead to leaching of nitrate to groundwater.

Because this method deals only with erosion, certain BMP interactions are overlooked. For example, as was mentioned, terracing may lead to increased nitrate leaching. However, this may be changed with the addition of nutrient management or a cover crop.

Although BMPs are presented, the spreadsheet should not be used as a "checklist." That is, one should not use the most cost effective, and go down the list until a goal is achieved. Rather, the method can be used in the context of other available information as one tool to be used in the evaluation of systems of BMPs.

Example Application

This general method is applied to site EV-003 (described in Appendix 1) to illustrate how the spreadsheet may be applied to a farm. The spreadsheets are presented as tables on the next several pages. A description of each table is given below.

Table 10 includes field information necessary to run the model. Fields are identified as being in larger tracts of land: Tract 973 contains field numbers 1-4, and Tract 975 contains different fields 1 and 2.

Table 11 includes BMP information. The median cost from Technical Report #8 is used. Other data is used as described previously. The P factors are not reported on this table because they are field specific, referring to tables used by the Bedford County Conservation District.

Table 12 provides for a wide specification of areas to by treated by BMPs, e.g. Field 4 in Tract T-973 receives 17.7 acres of conservation tillage with 30% cover in years 1 through 5.

Tables 13 through 15 include the calculation of unit reduction in sediment, nitrogen and phosphorus as well as the cost efficiencies. These are reference tables. The data relate to individual BMPs used singly. It is assumed in calculating these costs that one grassed waterway per field is applied.

Tables 16 through 18 report the sediment, nitrogen and phosphorus reduction associated with each BMP implemented as described in Table 11. As described in the erosion reduction portion of the field effectiveness section of this report, it is assumed that the first BMP implemented can treat all of the sediment eroded under the initial conditions but that subsequently implemented BMPs can only treat the amount of sediment remaining after other BMPs have been installed. In Table 16, it is assumed that the first BMPs on the list (those first in alphabetical order) are implemented first. This table, therefore, does not provide useful information about the individual BMPs. Rather, it is used to assemble information in order to evaluate systems of BMPs.

Table 10. Field Information for EV-003

		SOURCE	EV-003	T-973				T-975	
				1	2	3	4	1	2
	Area	(Acres)		8.20	19.30	8.10	17.70	6.40	10.50
	Downslope Field Length	(feet)		534.56	1420.46	460.11	1178.06	389.95	562.71
	Slope Length	(feet)		668.20	591.86	766.85	654.48	714.92	812.81
	Slope	(%)		10.00	6.00	4.00	5.00	5.00	4.00
	Rotation Length	(years)		8.00	8.00	8.00	8.00	8.00	8.00
		year:	1	0.13	0.13	0.13	0.13	0.13	0.13
			2	0.24	0.24	0.24	0.24	0.24	0.24
			3	0.28	0.28	0.28	0.28	0.28	0.28
			4	0.28	0.28	0.28	0.28	0.28	0.28
			5	0.28	0.28	0.28	0.28	0.28	0.28
			6	0.004	0.004	0.004	0.004	0.004	0.004
			7	0.004	0.004	0.004	0.004	0.004	0.004
			8	0.004	0.004	0.004	0.004	0.004	0.004
			9						
			10						
	USLE	C		0.15	0.15	0.15	0.15	0.15	0.15
	Soil --	(T/ac/yr)		11.55	9.98	4.27	8.55	7.13	6.61
N-enrichment	5.40								
P-enrichment	1.10								

Table 11. BMP Information Used In the Generic Farm Spreadsheet

BMP Information					
	Annual Costs	USLE Parameters		Sediment	Change in
	Base +Tech+O&M	C	P	Reduction	C Factor
BMP	($/ac/yr)			(%)	(%)
Conservation Reserve	62	0.004			
Conservation Tillage (% cover)					
(10)	17.3				45
(30)	17.3				65
(50)	17.3				75
(70)	17.3				85
(90)	17.3				95
Contour Cropping	11.6		field		
Contour Strip-Cropping					
Row Crop and Hay	11.6		field		
Row Crop and Grain	11.6		field		
Cover Crop	10				40
Diversions	52.2			35	
Filter Strips	7.1			76	
Grassed Waterways ($/lf)	1				
Grazing Land Protection	36.3	0.004			
Sediment Retention	103			95	
Terraces	326.00		field		
Veg. Cover of Critical Areas	69.5			90	

Table 12. Area Treated By Each BMP (acres)

		Acres Treated					
		T-973				T-975	
	BMP/Field	1	2	3	4	1	2
	Conservation Reserve						
	Conservation Tillage (%cover)						
	(10)						
Years Applied:	1						
	2						
	3						
	4						
	5						
	6						
	7						
	8						
	9						
	10						
	(30)						
Years Applied:	1				17.7		
	2				17.7		
	3		19.3		17.7		
	4		19.3		17.7		10.5
	5		19.3		17.7		10.5
	6						
	7						
	8						
	9						
	10						
	(50)						
Years Applied:	1						
	2						
	3						
	4					6.4	
	5					6.4	
	6						
	7						
	8						
	9						
	10						
	(70)						
Years Applied:	1						
	2						
	3						
	4						
	5						
	6						
	7						
	8						
	9						
	10						
	(90)						
Years Applied:	1						
	2						
	3						
	4						
	5						
	6						
	7						
	8						
	9						
	10						
	Contour Cropping	8.2	19.3				
	Contour Strip Cropping						
	Row Crop and Hay			8.1			
	Row Crop and Grain						
	Cover Crops						
Years Applied:	1		19.3				
	2		19.3				
	3						
	4						
	5						
	6						
	7						
	8						
	9						
	10						
	Diversions						
	Filter Strips		19.3				
	Grassed Waterways (acres treated)						
	Grassed Waterways (lf)						
	Grazing Land Protection						
	Sediment Retention						
	Terraces	8.2					
	Veg. Cover of Critical Areas				2		

Table 13. Unit Sediment Reduction and Cost Effectiveness for Each BMP on EV-003

	Sediment Removed for each practice, individually (tons/ac treated)					
	T-973				T-975	
BMP/Field	1.	2.	3.	4.	1.	2.
Conservation Reserve	11.25	9.71	4.16	8.33	6.94	6.44
Conservation Tillage (% cover)						
(10)	5.15	4.44	1.90	3.81	3.17	2.95
(30)	7.43	6.42	2.75	5.50	4.59	4.26
(50)	8.58	7.41	3.17	6.35	5.29	4.91
(70)	9.72	8.40	3.60	7.20	6.00	5.56
(90)	10.86	9.38	4.02	8.04	6.70	6.22
Contour Cropping	1.39	2.49	1.58	2.14	1.78	2.45
Contour Strip-Cropping						
Row Crop and Hay	3.00	5.49	2.56	3.93	3.06	3.70
Row Crop and Grain	1.73	3.59	1.71	2.65	2.07	2.45
Cover Crop	4.57	3.95	1.69	3.39	2.82	2.62
Diversions	4.04	3.49	1.50	2.99	2.49	2.31
Filter Strips	8.78	7.58	3.25	6.50	5.42	5.02
Grassed Waterways	.00	.00	.00	.00	.00	.00
Grazing Land Protection	11.25	9.71	4.16	8.33	6.94	6.44
Sediment Retention	10.97	9.48	4.06	8.12	6.77	6.28
Terraces	10.43	9.38	3.83	7.99	6.32	5.99
Veg. Cover of Critical Areas	68.05	58.77	25.18	50.38	41.98	38.95
	Cost of Sediment Removal for each practice, individually ($/ton saved)					
	T-973				T-975	
BMP/Field	1.00	2.00	3.00	4.00	1.00	2.00
Conservation Reserve	5.51	6.38	14.90	7.45	8.94	9.63
Conservation Tillage (% cover)						
(10)	2.10	2.43	5.68	2.84	3.41	3.67
(30)	1.45	1.68	3.93	1.96	2.36	2.54
(50)	1.26	1.46	3.41	1.70	2.04	2.20
(70)	1.11	1.29	3.01	1.50	1.80	1.94
(90)	1.00	1.15	2.69	1.34	1.61	1.74
Contour Cropping	8.37	4.65	7.34	5.43	6.51	4.74
Contour Strip-Cropping						
Row Crop and Hay	3.86	2.11	4.52	2.95	3.79	3.13
Row Crop and Grain	6.70	3.23	6.79	4.38	5.61	4.74
Cover Crop	1.37	2.53	5.91	2.95	3.54	3.82
Diversions	12.91	14.95	34.90	17.44	20.93	22.56
Filter Strips	.81	.94	2.19	1.09	1.31	1.41
Grassed Waterways ($/lf)	N/A	N/A	N/A	N/A	N/A	N/A
Grazing Land Protection	3.23	3.74	8.72	4.36	5.23	5.64
Sediment Retention	9.39	10.87	25.37	12.68	15.22	16.40
Terraces	31.25	34.74	85.17	40.79	51.60	54.44
Veg. Cover of Critical Areas	1.02	1.18	2.76	1.38	1.66	1.78

Table 14. Unit Nitrogen Reduction and Cost Effectiveness for Each BMP on EV-003

	Nitrogen Removed for each practice, individually (lbs/ac treated)					
	T-973				T-975	
BMP/Field	1.	2.	3.	4.	1.	2.
Conservation Reserve	60.74	52.45	22.47	44.96	37.47	34.77
Conservation Tillage (% cover)						
(10)	27.79	24.00	10.28	20.57	17.14	15.91
(30)	40.14	34.67	14.85	29.72	24.76	22.98
(50)	46.32	40.00	17.14	34.29	28.57	26.51
(70)	52.49	45.34	19.42	38.86	32.38	30.05
(90)	58.67	50.67	21.71	43.43	36.19	33.58
Contour Cropping	7.48	13.47	8.54	11.54	9.62	13.21
Contour Strip-Cropping						
Row Crop and Hay	16.22	29.63	13.84	21.24	16.54	19.99
Row Crop and Grain	9.36	19.39	9.23	14.31	11.16	13.21
Cover Crop	24.70	21.33	9.14	18.29	15.24	14.14
Diversions	21.83	18.85	8.08	16.16	13.47	12.50
Filter Strips	47.40	40.94	17.54	35.09	29.24	27.13
Grassed Waterways ($/lf)	.00	.00	.00	.00	.00	.00
Grazing Land Protection	60.74	52.45	22.47	44.96	37.47	34.77
Sediment Retention	59.25	51.17	21.92	43.86	36.55	33.92
Terraces	56.34	50.67	20.67	43.16	34.12	32.34
Veg. Cover of Critical Areas	367.48	317.37	135.96	272.03	226.69	210.35
	Cost of Nitrogen Removed for each practice, individually ($/lb)					
	T-973				T-975	
BMP/Field	1	2	3	4	1	2
Conservation Reserve	1.02	1.18	2.76	1.38	1.65	1.78
Conservation Tillage (% cover)						
(10)	.39	.45	1.05	.53	.63	.68
(30)	.27	.31	.73	.36	.44	.47
(50)	.23	.27	.63	.32	.38	.41
(70)	.21	.24	.56	.28	.33	.36
(90)	.18	.21	.50	.25	.30	.32
Contour Cropping	1.55	.86	1.36	1.00	1.21	.88
Contour Strip-Cropping						
Row Crop and Hay	.72	.39	.84	.55	.70	.58
Row Crop and Grain	1.24	.60	1.26	.81	1.04	.88
Cover Crop	.25	.47	1.09	.55	.66	.71
Diversions	2.39	2.77	6.46	3.23	3.88	4.18
Filter Strips	.15	.17	.40	.20	.24	.26
Grassed Waterways ($/lf)	N/A	N/A	N/A	N/A	N/A	N/A
Grazing Land Protection	.60	.69	1.62	.81	.97	1.04
Sediment Retention	1.74	2.01	4.70	2.35	2.82	3.04
Terraces						
Veg. Cover of Critical Areas	.19	.22	.51	.26	.31	.33

Table 15. Unit Phosphorous Reduction and Cost Effectiveness for Each BMP on EV-003

Phosphorous Removed for each practice, individually (lbs/ac treated)						
	T-973				T-975	
BMP/Field	1.	2.	3.	4.	1.	2.
Conservation Reserve	12.37	10.69	4.58	9.16	7.63	7.08
Conservation Tillage (% cover)						
(10)	5.66	4.89	2.09	4.19	3.49	3.24
(30)	8.18	7.06	3.03	6.05	5.04	4.68
(50)	9.44	8.15	3.49	6.98	5.82	5.40
(70)	10.69	9.24	3.96	7.92	6.60	6.12
(90)	11.95	10.32	4.42	8.85	7.37	6.84
Contour Cropping	1.52	2.74	1.74	2.35	1.96	2.69
Contour Strip-Cropping						
Row Crop and Hay	3.30	6.03	2.82	4.33	3.37	4.07
Row Crop and Grain	1.91	3.95	1.88	2.92	2.27	2.69
Cover Crop	5.03	4.35	1.86	3.73	3.10	2.88
Diversions	4.45	3.84	1.65	3.29	2.74	2.55
Filter Strips	9.66	8.34	3.57	7.15	5.96	5.53
Grassed Waterways ($/lf)	.00	.00	.00	.00	.00	.00
Grazing Land Protection	12.37	10.69	4.58	9.16	7.63	7.08
Sediment Retention	12.07	10.42	4.47	8.93	7.45	6.91
Terraces	11.48	10.32	4.21	8.79	6.95	6.59
Veg. Cover of Critical Areas	74.86	64.65	27.69	55.41	46.18	42.85
Cost of Phosphorous Removed for each practice, individually ($/lb)						
	T-973				T-975	
BMP/Field	**1**	**2**	**3**	**4**	**1**	**2**
Conservation Reserve	5.01	5.80	13.54	6.77	8.12	8.75
Conservation Tillage (% cover)						
(10)	1.91	2.21	5.16	2.58	3.10	3.34
(30)	1.32	1.53	3.57	1.79	2.14	2.31
(50)	1.15	1.33	3.10	1.55	1.86	2.00
(70)	1.01	1.17	2.73	1.37	1.64	1.77
(90)	.90	1.05	2.45	1.22	1.47	1.58
Contour Cropping	7.61	4.23	6.67	4.93	5.92	4.31
Contour Strip-Cropping						
Row Crop and Hay	3.51	1.92	4.11	2.68	3.44	2.85
Row Crop and Grain	6.09	2.94	6.17	3.98	5.10	4.31
Cover Crop	1.24	2.30	5.37	2.68	3.22	3.47
Diversions	11.74	13.59	31.73	15.86	19.03	20.51
Filter Strips	.74	.85	1.99	.99	1.19	1.28
Grassed Waterways ($/lf)	N/A	N/A	N/A	N/A	N/A	N/A
Grazing Land Protection	2.93	3.40	7.93	3.96	4.76	5.13
Sediment Retention	8.53	9.88	23.07	11.53	13.83	14.91
Terraces						
Veg. Cover of Critical Areas	.93	1.08	2.51	1.25	1.51	1.62

Table 16. Effectiveness of BMP Combinations in Reducing Erosion

	Sediment Removed for each practice (tons)					
	T-973				T-975	
BMP/Field	1	2	3	4	1	2
Conservation Reserve	.00	.00	.00	.00	.00	.00
Conservation Tillage (% cover)						
(10)	.00	.00	.00	.00	.00	.00
(30)	.00	4.46	.00	5.50	.00	1.97
(50)	.00	.00	.00	.00	2.45	.00
(70)	.00	.00	.00	.00	.00	.00
(90)	.00	.00	.00	.00	.00	.00
Contour Cropping	11.37	47.02	.00	.00	.00	.00
Contour Strip-Cropping						
Row Crop and Hay	.00	.00	20.77	.00	.00	.00
Row Crop and Grain	.00	.00	.00	.00	.00	.00
Cover Crop	.00	17.08	.00	.00	.00	.00
Diversions	.00	.00	.00	.00	.00	.00
Filter Strips	.00	94.21	.00	.00	.00	.00
Grassed Waterways	.00	.00	.00	.00	.00	.00
Grazing Land Protection	.00	.00	.00	.00	.00	.00
Sediment Retention	.00	.00	.00	.00	.00	.00
Terraces	75.28	.00	.00	.00	.00	.00
Veg. Cover of Critical Areas	.00	.00	.00	100.75	.00	.00
Total Reduction (tons)	86.65	162.77	20.77	106.26	2.45	1.97
Total Cost	2768.32	534.37	93.96	371.38	27.68	45.41
Unit Cost ($/ton)	31.95	3.28	4.52	3.50	11.30	23.06
Reduction (Tons)	380.857					
Cost ($)	3841.12					
Unit Cost ($/ton)	10.0855					

Table 17. Effectiveness of BMP Combinations in Reducing Nitrogen

	Nitrogen Removed for each practice (lbs)					
	T-973				T-975	
BMP/Field	1	2	3	4	1	2
Conservation Reserve	.00	.00	.00	.00	.00	.00
Conservation Tillage (% cover)						
(10)	.00	.00	.00	.00	.00	.00
(30)	.00	24.07	.00	29.72	.00	10.63
(50)	.00	.00	.00	.00	13.22	.00
(70)	.00	.00	.00	.00	.00	.00
(90)	.00	.00	.00	.00	.00	.00
Contour Cropping	61.37	253.88	.00	.00	.00	.00
Contour Strip-Cropping						
Row Crop and Hay	.00	.00	112.14	.00	.00	.00
Row Crop and Grain	.00	.00	.00	.00	.00	.00
Cover Crop	.00	92.25	.00	.00	.00	.00
Diversions	.00	.00	.00	.00	.00	.00
Filter Strips	.00	508.74	.00	.00	.00	.00
Grassed Waterways ($/lf)	.00	.00	.00	.00	.00	.00
Grazing Land Protection	.00	.00	.00	.00	.00	.00
Sediment Retention	.00	.00	.00	.00	.00	.00
Terraces	406.53	.00	.00	.00	.00	.00
Veg. Cover of Critical Areas	.00	.00	.00	544.07	.00	.00
Total Reduction (tons)	467.91	878.94	112.14	573.78	13.22	10.63
Total Cost	2768.32	534.37	93.96	371.38	27.68	45.41
Unit Cost ($/ton)	5.92	.61	.84	.65	2.09	4.27
Total N Removed=	2056.63					
Total Cost=	3841.12					
Cost ($/lb)=	1.87					

Table 18. Effectiveness of BMP Combinations in Reducing Phosphorous

	Phosphorous Removed for each practice (tons)					
	T-973				T-975	
BMP/Field	1	2	3	4	1	2
Conservation Reserve	.00	.00	.00	.00	.00	.00
Conservation Tillage (% cover)						
(10)	.00	.00	.00	.00	.00	.00
(30)	.00	4.90	.00	6.05	.00	2.17
(50)	.00	.00	.00	.00	2.69	.00
(70)	.00	.00	.00	.00	.00	.00
(90)	.00	.00	.00	.00	.00	.00
Contour Cropping	12.50	51.72	.00	.00	.00	.00
Contour Strip-Cropping						
Row Crop and Hay	.00	.00	22.84	.00	.00	.00
Row Crop and Grain	.00	.00	.00	.00	.00	.00
Cover Crop	.00	18.79	.00	.00	.00	.00
Diversions	.00	.00	.00	.00	.00	.00
Filter Strips	.00	103.63	.00	.00	.00	.00
Grassed Waterways ($/lf)	.00	.00	.00	.00	.00	.00
Grazing Land Protection	.00	.00	.00	.00	.00	.00
Sediment Retention	.00	.00	.00	.00	.00	.00
Terraces	82.81	.00	.00	.00	.00	.00
Veg. Cover of Critical Areas	.00	.00	.00	110.83	.00	.00
Total Reduction (tons)	95.31	179.04	22.84	116.88	2.69	2.17
Total Cost	2768.32	534.37	93.96	371.38	27.68	45.41
Unit Cost ($/ton)	29.04	2.98	4.11	3.18	10.28	20.96
Total P Removed=	418.94					
Total Cost=	3841.12					
Cost ($/lb)=	9.17					

Related Data on a Geographic Information System

An attempt was made to integrate some of the data for this project on a geographic information system (GIS). Four sets (layers) of data covering the Evitts Creek watershed area were obtained. Those sets which were successfully entered onto the GIS are shown in Table 19 below.

Table 19. Data for the Evitts Creek Watershed Area on a GIS

1. Township Boundaries
2. Streams and Lakes
3. Roads

These data sets were obtained from the Bedford County Planning Office, which maintains up-to-date GIS data for the county.

The fourth set, land use data for the area was obtained from the Chesapeake Bay Program Office in Annapolis, Maryland. The land use data, however, have not yet been entered to the GIS. The Chesapeake Bay Program land use classifications are shown in comparison with US EPA Environmental Monitoring and Assessment Program (EMAP) classifications in Table 20. Further, there exists the possibility of entering the locations of farms which are the examples in this study.

Some indication of the watershed wide impact of soil conservation plans on soil and nutrient loss could be estimated if the land use information is analyzed for total treatable area as compared with the 1,257.3 acres subject to analysis in this study.

Further analysis could be accomplished with water quality data from monitoring samples collected under contract for the City of Cumberland on three tributaries to the water supply reservoirs. The percentages of different land uses could be compared with loads of sediment and nutrients in the tributaries. The results may also help focus the implementation of BMPs.

Table 20: Chesapeake Bay Program vs EMAP Land Use Classifications

CBPLU Code	LU/LC Type
11	**High Intensity Urban**
	EMAP 11 - High Intensity Developed
12	**Low Intensity Urban**
	EMAP 12 - Low Intensity Developed
13	**Herbaceous Urban**
	GIRAS Urban + EMAP Herbaceous
14	**Forested Urban**
	GIRAS Urban + EMAP Woody
20	**Herbaceous**
	EMAP 22 - Herbaceous Cultivated
	EMAP 31 - Herbaceous
	EMAP 81 - Herbaceous Wetland
30	**Forested**
	EMAP 21 - Woody Cultivated
	EMAP 41 - Deciduous Forest
	EMAP 42 - Evergreen Forest
	EMAP 43 - Mixed Forest
	EMAP 71 - Deciduous Wetland
	EMAP 72 - Evergreen Wetland
	EMAP 73 - Mixed Forest Wetland
40	**Quarries, Mines and Exposed**
	EMAP 51 - Exposed Soil
	EMAP 52 - Exposed Sand
	EMAP 53 - Exposed Rock
	EMAP 91 - Non-vegetated Wetland
60	**Water**
	EMAP 100 - Water
70	**Herbaceous Emergent Wetland**
	C-CAP Emergent Herbaceous Wetlands

EMAP land use categories are those in the Level 2 Classification Scheme.

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APPENDIX I: Farm Descriptions

Farm: EV-003

Location: This site is about 4.5 miles North of Centerville on US 220 and about a half of a mile South of the Confluence of Spring Run and Evitts Creek. Evitts Creek runs through this site. Fields are in two tracts, T-973 and T-975. The site is on the Rainsburg USGS quad sheet.

Use: Hog Farm with crop fields.

Area: The site has six fields, totalling 70.2 acres. On T-973, there are four fields. Field 1 is 8.2 acres, field 2 is 19.3 acres, field 3 is 8.1 acres and field 4 is 17.7 acres. On T-975, there are two fields. Field 1 is 6.4 acres and field 2 is 6.4 acres.

Soils: Soils on all fields except field 1, T-973 are a mixture of Penlaw Silt Loam and Westmoreland Channery Silt Loam. Both soils are deep. However, while the Penlaw series is poorly drained with a seasonal high water table of less than one foot, the Westmoreland series is a well-drained soil. The Penlaw Silt Loam is also about one third more erodible than the Westmoreland (K=0.43 versus K=0.32).

Field 1, T-973 is a mixture of Morrison-Murrill complex and Blairton Channery silt loam. These two soils are significantly different from each other. The Morrison-Murrill complex is about five feet deep, while the Blairton soil has about a 20-40" depth to bedrock. In addition, while the Morrison-Murrill complex drains very quickly, leading to hazards of groundwater contamination, the Blairton soil does not drain as well and has a seasonally high water table of 0.5-3'. Finally, the Morrison-Murrill complex is a very stony soil. These soils have relatively low erosivity coefficients (K=0.32 for Blairton and K=0.23 for Morrison-Murrill).

Slope: All fields except field 1 are on B slopes, ranging from 4% to 6%. Field 1, on the other hand, is on C slopes, with a slope of 10%.

Conservation Plan: The conservation plan for this site was written in December of 1989 by H. Wingard. The plan suggests an eight-year rotation of No-till corn, minimal till corn, wheat and five years of hay. The soil loss resulting from this plan is about 2.7 tons per acre per year. The P factor is 0.85 on fields 1 and 2 of T-973 and 1.0 on all other fields.

Problems Identified: Nutrient and sediment runoff.

Solutions Suggested: Nutrient management plan.

Farm: EV-005

Location: This site is about 2.7 miles above Centerville along Route 220. The site is about *1000'* from Evitts Creek. Fields are in two tracts, T-979 and T-8184. The site is on the Beans Cove USGS quad sheet.

Use: Cropland.

Area: This farm has 13 fields totalling 295 acres. On T-979 there are ten fields. Field one is 12 acres, field 2 is 11 acres, field 3 is 30 acres, field 4 is 28 acres, field 5 is 48 acres, field 6 is 45 acres, field 7 is 10 acres, field 8 is 63 acres, field 9 is 3 acres and field 10 is 5 acres. On T-8184 there are four fields. Field 1 is 15 acres, field 2 is 22 acres and fields 3 and 4 are 3 acres. Field 4, T-8184 is not a part of the conservation plan, so no information on slope is available.

Soils: Field 1, T-979 is mainly Penlaw silt loam. Fields 2 and 3, T-979 are a mixture of Hagerstown silt loam, Clarksburg silt loam, Murill channery silt loam and Penlaw silt loam. Field 4, T-979 is a mixture of Albright's silt loam, Murill channery loam and Westmoreland channery silt loam. Field 5, T-979 is a mixture of Buchannan cobbly loam, Clarksburg silt loam, Murill channery loam and Mertz cherty silt loam. Field 6, T-979 has Clarksburg silt loam, Edom silty clay loam, Westmoreland channery silt loam and Penlaw silt loam. Field 7, T-979 has Westmoreland channery silt loam. Field 8, T-979 has Clarksburg silt loam, Edom silty clay loam, Penlaw silt loam and Westmoreland channery silt loam. Field 9, T-979 has Clarksburg silt loam and Penlaw silt loam. Field 10, T-979 has Opequan-Hagerstown complex and Hagerstown silt loam. Field 1, T-8184 is mostly Penlaw silt loam with some Westmoreland channery silt loam, Monongahela silt loam, Holly silt loam and Clarksburg silt loam. Field 2, T-8184 is mostly Westmoreland channery silt loam with some Penlaw silt loam. Field 3, T-8184 has Holly silt loam and Monongahela silt loam. Field 4, T-8184, has Penlaw silt loam and Holly silt loam.

Albright's: Moderately well and somewhat poorly drained. Shallow fragipan, moderately slow permeability. Depth to bedrock:>60". Depth to seasonally high water table: 0.5'-3'. K=0.32.

Buchanan: Moderately well and somewhat poorly drained soils. Moderately slowly permeable fragipan. Depth to bedrock >60". Depth to seasonally high water table 1.5'-3'. K=0.24.

Clarksburg: Moderately well drained soil. Slowly permeable fragipan. Depth to bedrock>60". Depth to seasonal high water table 1.5'-3'. K=0.37.

Edom: Well-drained. High clay content. Depth to bedrock: 40"- >60". Depth to seasonally high water table: >6'. K=0.28.

Hagerstown: Well drained soil. Moderately permeable soil. Depth to bedrock 40". Depth to seasonal high water table >6'. K=0.32.

Holly: Very poorly and poorly drained. Moderate to moderately slow permeability. Depth to bedrock: >60". Depth to seasonally high water table: 0'-1'. K=0.28.

Mertz: Well drained. Slow to moderately slow permeability. Depth to bedrock >60". Depth to seasonal high water table >6'. K=0.28.

Monongahela: Moderately well-drained. Slowly permeable fragipan. Depth to bedrock: >72". Depth to seasonally high water table: 1.5'-3'. K=0.43.

Murill: Well drained soils. Moderately permeable subsoil. Depth to bedrock >60". Depth to seasonal high water table >6'. K=0.28.

Opequan-Hagerstown Complex: Well drained soil. Moderately to slowly permeable subsoil. Depth to bedrock 12"-20". Depth to seasonally high water table >6'. K=0.34.

Penlaw: Somewhat poorly drained. Depth to bedrock: >72".Depth to seasonally high water table: 1.5'-3'. K=0.43.

Westmoreland: Well-drained. Moderately rapid permeability. Depth to bedrock: 40". K=0.32.

Slope: Fields 1-3,5,6,8 and 9 on T-979 and fields 1 and 3 on T-8184 have B slopes ranging from 3% to 7%. Fields 4 and 10 on T-979 and field 2 on T-8184 have C slopes ranging from 10% to 14%. Field 7, T-979 has a D slope of 16%.

Conservation Plan: The conservation plan for this site was prepared in June of 1988. Three alternate cropping systems are suggested. These include: 1) Two years of no-till corn with residue removed, one year of conventional till corn with residue removed, one year of oats and five years of hay 2) Three years of no-till corn with residue removed, one year of oats and five years of hay 3) Three years of no-till corn with residue removed and a cover crop, one year of oats and five years of hay. The current cropping system is: One year of no-till corn with residue removed, two years of conventional-till corn with residue removed an five years of alfalfa. The first alternative is applied to fields 1-3, 6 and 9 of T-973 and fields 1 and 3 of T-8148. The second is not applied to any fields. The third is applied to the remaining fields. The P factor in the plan is 0.5 for fields 1, 2 and 5 of T-979. The P factor is 1.0 for fields 3,4,6 and 8 for T-979 and fields 1 and 3 of T-8184. P is 0.25 for field 5 of T-979. P is 0.35 for field 7 of T-979 and field 2 of T-8184. P is 0.6 for field 10 of T-979.

Problems Identified: Nutrient and sediment runoff.

Solutions Suggested: Nutrient management plan, stream fencing.

Farm: EV-006

Location: Two miles above Centerville on US 220 and about .6 miles due east. About 500 feet from Evitts Creek. Located on the Beans Cove USGS quad sheet.

Use: Sheep, cropland and hayland. There are seven fields. Fields 1, 2, 4 and 6 are cropland and fields 3, 7 and 8 are hayland.

Area: The farm is 59 acres. Field 1 is 5 acres, field 2 is 6 acres, field 3 is 6 acres, field 4 is 5 acres, field 6 is 7 acres, field 7 is 20 acres and field 8 is 10 acres.

Soils: Field 1 is Lobdell loam and Holly silt loam. Field 2 is Purdy silty clay loam. Field 3 is Oppequan-Hagerstown complex and Hagerstown silty clay loam. Field 4 is Holly silt loam. Fiel d 6 is Hagerswotn silty clay loam and Murill channery loam. Firld 7 is Elliber very channery silt loam. Field 8 has Elliber very channery silt loam and Murill channery loam.

Elliber: Well drained. Moderately rapid permeability. Depth to bedrock>60". Depth to seasonally high water table >6'. K=0.17.

Hagerstown: Well drained soil. Moderately permeable soil. Depth to bedrock 40". Depth to seasonal high water table >6'. K=0.32.

Holly: Very poorly and poorly drained. Moderate to moderately slow permeability. Depth to bedrock: >60". Depth to seasonally high water table: 0'-1'. K=0.28.

Lobdell: Moderately well drained. Permeability moderately slow. Depth to bedrock 60". Depth to seasonal high water table 2'-3.5'. K=0.37.

Murill: Well drained soils. Moderately permeable subsoil. Depth to bedrock >60". Depth to seasonal high water table >6'.

Opequan-Hagerstown Complex: Well drained soil. Moderately to slowly permeable subsoil. Depth to bedrock 12"-20". Depth to seasonally high water table >6'. K=0.34.

Purdy: Poorly and very poorly drained soils. Slowly or very slowly permeable subsoil. Depth to bedrock >60". Depth to seasonal high water table 0'-1'. K=0.43.

Slope: Only one field, field 6, is discussed in the conservation plan, which is the source of our slope information. This field has a 14% slope.

Conservation Plan: This conservation plan suggests, for field 6, a rotation including 2 years of corn with residue left and five years of hay. The P factor is 0.35.

Problems Identified: Nutrient and sediment runoff.

Solutions Sugested: Stream fencing and nutrient management plan.

Farm: EV-007

Location: Just east of US220, about 1.7 miles above Centerville. On Hyndman USGS quad map.

Use: Agriculture- cropland

Area: This site consists of eight fields totalling 131 acres. Field 1 is 47 acres, field 2 is 2 acres, field 3 is 4 acres, field 4 is 11 acres, field 5 is 18 acres, field 6 is 3 acres, field 7 is 40 acres and field 9 is 6 acres. Field 9 is omitted form the conservation plan.

Soils: Many different soil types exist on this farm. Field 1 has a mixture of Albright's silt loam, Brinkerton silt loam, Edom silty clay loam, Holly silt loam, Monongahela silt loam, Penlaw silt loam, Tyler silt loam and Westmoreland channery silt loam. Fields 2 and 3 have a mixture of Penlaw silt loam and Edom silt loam. Field 4 has a mixture of Bedington-Berks complex, Blairton channery silt loam and Westmoreland channery silt loam. Field 5 has a mixture of Bedington-Berks complex and Westmoreland channery silt loam. Field 6 is entirely Edom silty clay loam. Field 7 has a mixture of Albright's silt loam, Allegheny loam, Blairton channery silt loam, Brinkerton silt loam, Edom silt loam, Holly silt loam, Penlaw silt loam and Westmoreland channery silt loam. Field 9 is a mixture of Brinkerton silt loam, Holly silt loam, Penlaw silt loam and Tyler silt loam.

Brief descriptions of these soils follow below:

Albright's: Moderately well and somewhat poorly drained. Shallow fragipan, moderately slow permeability. Depth to bedrock:>60". Depth to seasonally high water table: 0.5'-3'. K=0.32.

Allegheny: Well-drained. Moderate permeability. Depth to bedrock: >60". Depth to seasonally high water table: >6'. K=0.2

Bedington-Berks: Well-drained. Fast permeability. Depth to bedrock: 20"-40". Depth to seasonally high water table: >6'. K=0.24

Blairton: Somewhat poorly and moderately well-drained. Moderately slow permeability. Depth to bedrock: 20"-40". Depth to seasonally high water table: 0.5'-3'. K=0.32.

Brinkerton: Poorly drained. Slow permeability. Depth to bedrock: >60". Depth to seasonally high water table: 0'-0.5'. K=0.32.

Edom: Well-drained. High clay content. Depth to bedrock: 40"- >60". Depth to seasonally high water table: >6'. K=0.28.

Holly: Very poorly and poorly drained. Moderate to moderately slow permeability. Depth to bedrock: >60". Depth to seasonally high water table: 0'-1'. K=0.28.

Monongahela: Moderately well-drained. Slowly permeable fragipan. Depth to bedrock: >72". Depth to seasonally high water table: 1.5'-3'. K=0.43.

Penlaw: Somewhat poorly drained. Depth to bedrock: >72".Depth to seasonally high water table: 1.5'-3'. K=0.43.

Tyler: Somewhat poorly drained. Slow permeability. Depth to bedrock: >60". Depth to seasonally high water table: 0.5'-2'. K=0.43.

Westmoreland: Well-drained. Moderately rapid permeability. Depth to bedrock: 40". K=0.32.

Slope: Fields 1,2 and 7 are primarily on B slopes (3%-8%). Fields 3-6 are on C slopes (8%-15%)

Conservation Plan: Two alternatives for cropping patterns are presented and applied to fields 3-6. The first is two years of no-till corn with residue removed followed by three years of alfalfa. The second is a year of no-till corn with residue left followed by two years of no-till corn with residue remaining followed by three years of alfalfa. The practice factor is 0.75 for fields 1-7. Field 9 is not included in the conservation plan.

Problems Identified: Nutrient and sediment runoff.

Solutions Suggested: Stream fencing, nutrient management plan.

Farm: EV-010

Location: Just northeast of the intersection of US220 and SR3009. On the Hyndman USGS quad sheet.

Use: Crops and feedlot.

Area: Seven fields totaling 61.7 acres. Field 1 is 12.2 acres. Field 2 is 16.4 acres, field 3 is 8.5 acres, field 4 is 1.8 acres, field 5 is 5.8 acres, field 6 is 8.1 acres and field 7 is 8.9 acres.

Soils: Fields one and two have Albright's silt loam and Edom silty clay loam. Fields 3 and 5 are Murill Channery loam. Field 4 is Albright's silt loam. Field 6 has Clarksburg silt loam and Murill channery loam. Field 7 has Westmoreland channery silt loam and Edom silty clay loam.

Albright's: Moderately well and somewhat poorly drained. Shallow fragipan, moderately slow permeability. Depth to bedrock:>60". Depth to seasonally high water table: 0.5'-3'. K=0.32.

Clarksburg: Moderately well drained soil. Slowly permeable fragipan. Depth to bedrock>60". Depth to seasonal high water table 1.5'-3'. K=0.37.

Edom: Well-drained. High clay content. Depth to bedrock: 40"- >60". Depth to seasonally high water table: >6'. K=0.28.

Murill: Well drained soils. Moderately permeable subsoil. Depth to bedrock >60". Depth to seasonal high water table >6'. K=0.28.

Westmoreland: Well-drained. Moderately rapid permeability. Depth to bedrock: 40". K=0.32.

Slope: Fields 3-6 are on B slopes, ranging from 5% to 8%. Fields 1, 2 and 7 are on C slopes, ranging from 10% to 12%.

Conservation Plan: The conservation plan recommends the following rotation: one year of no-till corn with residue left, one year of no-till corn with residue removed followed by a cover crop, one year of no-till corn with residue left, one year of corn with chisel plow and residue removed, one year of oats and three years of hay. This is applied to all fields. The practice factor is 0.4 for fields 1,2 and 7, 1.0 for field 3 and 0.9 for fields 4-6.

Problems Identified: Nutrient and sediment runoff

Solutions Suggested: Stream fencing, cement pad.

Farm: EV-011

Location: Just north of T366 between US 220 and T334. Tributary to Evitt's Creek runs through the site. On the Hyndman USGS quad map.

Use: Dairy farm with cropland and some pasture. All fields in the conservation plan are cropland.

Area: There are 5 fields in 2 tracts totaling 130.4 acres. On T-557, field 1 is 84.9 acres, field 2 is 18 acres, field 3 is 3.2 acres and field 4 is 18.6 acres. On T-558, field 1 is 5.7 acres.

Soils: Fields 1 and 2, T-557 have a mixture of Edom silty clay loam and Penlaw silt loam. Field 3, T-557 has Buchananan cobbly loam. Field 4, T-557 and field 1, T-558 have Murill channery loam.

Buchanan: Moderately well and somewhat poorly drained soils. Moderately slowly permeable fragipan. Depth to bedrock >60". Depth to seasonally high water table 1.5'-3'. K=0.24.

Edom: Well-drained. High clay content. Depth to bedrock: 40"- >60". Depth to seasonally high water table: >6'. K=0.28.

Murill: Well drained soils. Moderately permeable subsoil. Depth to bedrock >60". Depth to seasonal high water table >6'. K=0.28.

Penlaw: Somewhat poorly drained. Depth to bedrock: >72".Depth to seasonally high water table: 1.5'-3'. K=0.43.

Slope: Field 3, T-557 has B slopes (5%). Fields 1 and 2, T-557 have a mixture of B and C slopes (average about 8%). Field 4, T-557 and field 1, T-558 have C slopes (10%).

Conservation Plan: The rotation suggested in this conservation plan is applied to all fields on the farm. The rotation includes: one year of no-till corn with residue left, one year of no-till corn with residue removed, one year of no-till corn with residue left, one year of corn with a chisel plow and residue removed, one year of oats and three years of hay. The practice factor is 0.4 for all fields on the farm.

Problems Identified: Sediment and nutrients, chemicals.

Solutions Suggested: Stream fencing and nutrient management plan.

Farm: EV-012

Location: 0.7 miles East of Centerville. North of SR 3009 midway between T344 and SR 3011. Tributary of Evitt's Creek runs through the site. On the Hyndman USGS quad sheet.

Note: Since sites 12 and 13 are adjacent, have the same owner and have a single conservation plan, area, soils, slope and conservation plan are discussed for both together.

Use: Crops, Dairy, Pasture and Woodland. 22 fields. Fields 1, 2a, 2b, 3, 7, 13a, 13b and 16 are cropland. Fields 4, 12 and 20 are woodland. Fields 5, 6, 8, 10, 11, 14, 17, 18 and 19 are in pasture. Field 9 is farmstead and field 15 is wildlife land. All fields in cropland as well as field 14 are in the conservation plan.

Area: 347 acres total. Field 1 is 70 acres, field 2a is 41 acres, field 2b is 40 acres, field 3 is 13 acres, field 4 is 34 acres, field 5 is 6 acres, field 6 is 31 acres, field 7 is 19 acres, field 8 is 10 acres, field 11 is 5 acres, field 12 is 10 acres, field 13a is 8 acres, field 13b is 13 acres, field 14 is 6 acres, field 15 is 2 acres, field 16 is 5 acres, field 17 is 8 acres, field 18 is 7 acres, field 19 is 2 acres and field 20 is 4 acres.

Soils: Field 1 is primarily Clarksburg silt loam, Murill channery loam, and Westmoreland channery silt loam. Field 2a has Brinkerton silt loam, Clarksburg silt loam, Edom silty clay loam, Murill channery slt loam and Westmoreland channery silt loam. Field 2b has Brinkerton silt loam, Purdy silt clay loam and Tyler silt loam. Field 3 has Holly silt loam, Opequan-Hagerstown complex and Tyler silt loam. Field 4 has Elliber very channery silt loam, Hagerstown silty clay loam, Murill channery loam and Opequan-Hagerstown complex. Field 5 has Holly silt loam. Field 6 has Hagerstown silty clay loam and Opequan-Hagerstown cmplex. Field 7 has Holly silt loam, Monongahela silt loam and Penlaw silt loam. Field 8 has Lobdell loam. Field 9 has Monongahela Silt loam. Field 10 has Holly silt loam. Field 11 has Monongahela silt loam and Purdy silt clay loam. Field 12 has Hagerstown silty clay loam and Opequan-Hagerstown complex.Field 13a has Hagerstown silty clay loam and Murill channery loam. Field 13b has Allegheny silt loam, Monongahela silt loam, Murill channery loam and Purdy silt loam. Fields 14 and 15 are entirely Basher silt loam. Field 16 has Basher silt loam, Buchanan cobbly loam and Holly silt loam. Field 17 has Monongahela silt loam. Field 18 has Allegheny silt loam, Basher silt loam and Lobdell loam. Field 19 has Buchanan cobbly loam.

Albright's: Moderately well and somewhat poorly drained. Shallow fragipan, moderately slow permeability. Depth to bedrock:>60". Depth to seasonally high water table: 0.5'-3'. K=0.32.

Allegheny: Well-drained. Moderate permeability. Depth to bedrock: >60". Depth to seasonally high water table: >6'. K=0.2

Basher: Moderately well to somewhat poorly drained. Depth to bedrock >60". Depth to seasonally high water table: 0.5'-2'. K=0.34.

Blairton: Somewhat poorly and moderately well-drained. Moderately slow permeability. Depth to bedrock: 20"-40". Depth to seasonally high water table: 0.5'-3'. K=0.32.

Brinkerton: Poorly drained. Slow permeability. Depth to bedrock: >60". Depth to seasonally high water table: 0'-0.5'. K=0.32.

Buchanan: Moderately well and somewhat poorly drained soils. Moderately slowly permeable fragipan. Depth to bedrock >60". Depth to seasonally high water table 1.5'-3'. K=0.24.

Clarksburg: Moderately well drained soil. Slowly permeable fragipan. Depth to bedrock>60". Depth to seasonal high water table 1.5'-3'. K=0.37.

Edom: Well-drained. High clay content. Depth to bedrock: 40"- >60". Depth to seasonally high water table: >6'. K=0.28.

Elliber: Well drained. Moderately rapid permeability. Depth to bedrock>60". Depth to seasonally high water table >6'. K=0.17.

Hagerstown: Well drained soil. Moderately permeable soil. Depth to bedrock 40". Depth to seasonal high water table >6'. K=0.32.

Lobdell: Moderately well drained. Permeability moderately slow. Depth to bedrock 60". Depth to seasonal high water table 2'-3.5'. K=0.37.

Holly: Very poorly and poorly drained. Moderate to moderately slow permeability. Depth to bedrock: >60". Depth to seasonally high water table: 0'-1'. K=0.28.

Monongahela: Moderately well-drained. Slowly permeable fragipan. Depth to bedrock: >72". Depth to seasonally high water table: 1.5'-3'. K=0.43.

Murill: Well drained soils. Moderately permeable subsoil. Depth to bedrock >60". Depth to seasonal high water table >6'. K=0.28.

Opequan-Hagerstown Complex: Well drained soil. Moderately to slowly permeable subsoil. Depth to bedrock 12"-20". Depth to seasonally high water table >6'. K=0.34.

Penlaw: Somewhat poorly drained. Depth to bedrock: >72".Depth to seasonally high water table: 1.5'-3'. K=0.43.

Purdy: Poorly and very poorly drained soils. Slowly or very slowly permeable subsoil. Depth to bedrock >60". Depth to seasonal high water table 0'-1'. K=0.43.

Tyler: Somewhat poorly drained. Slow permeability. Depth to bedrock: >60". Depth to seasonally high water table: 0.5'-2'. K=0.43.

Westmoreland: Well-drained. Moderately rapid permeability. Depth to bedrock: 40". K=0.32.

Slope: Fields 2b, 7 and 14 all have slopes of less than 1%. In addition, while fields 8 and 10 do not have slopes explicitly written in the plan, the LS value from the USLE is very low, suggesting it is probably also on an A slope. Thre remainder of the fields are divided into sub-sections. We have assumed that each sub-section represents an equal portion of the field area. Threfore, two thirds of field 1, half of field 2a, half of field 13a, all of field 13b and all of field 16 are on B slopes, ranging from 3% to 7%. One third of field 1, half of field 2a and half of field 13a have slopes between 12% and 14%.

Conservation Plan: Two possible rotations are suggested in the conservation plan. The first is a rotation of two years of corn with residue removed and a cover crop followed by a year of barley and two years of hay. This rotation is applied to fields 2b,3,7,13b,14 and 16. The other rotation is the same except that there are five years of hay instead of two. Fields 8 and 10 are treated differently. They are pasture fieldds that appear to have been rather bare (cover factor equals one). The plan calls for a permanent grass cover (c=0.04). The practice factor varies from field to field. One third of field 1, one half of field 13a and field 16 have practice factors of 0.25. One third of field 1 and one half of field 2a have practice factors of 0.3. One half of field 13a has a practice factor of 0.35. Fields 2b and 7 have practice factors of 0.6. One third of field 1, one half of field 2a, field 3 and field 14 have practice factors of 1.

Problems Identified: Sediment and nutrient runoff.

Solutions Suggested: Stream fencing, nutrient management plan, manure structure.

Farm: EV-013

Location: About 1.0 miles East of Centerville. North of SR 3009, about 0.2 miles West of the intersection of SR 3009 and SR 3011. On the Hyndman USGS quad sheet.

Use: See EV-012

Area: See EV-012

Soils: See EV-012

Slope: See EV-012

Conservation Plan: See EV-012

Problems Identified: Sediment and nutrient runoff.

Solutions Suggested: Conservation and Nutrient Plan.

Farm: EV-014

Location: About 1 mile Below Centerville, just West of US 220. Growden Run runs through the site. On the Hyndman USGS quad sheet.

Use: Pasture, woodland and crops. Fifteen fields. Fields 1, 2, 5, 6, 8, 9, 10, 11, 14 and 15 are cropland. Fields 3 and 12 are woodland. Field 4 is the farmstead. Fields 7 and 13 are pasture. Only cropland is included in the conservation plan.

Area: This site is 162 acres. Field 1 is 8 acres, field 2 is 2 acres, field 3 is 28 acres, field 4 is 2 acres, field 5 is 1 acre, field 6 is 10 acres, field 7is 4 acres, field 8 is 8 acres, field 9 is 8 acres, field 10 is 21 acres, field 11 is 2 acres, field 12 is 27 acres, field 13 is 29 acres, field 14 is 4 acres and field 15 is 8 acres.

Soils: Field 1 is a mixture of Edom silty clay loam and Penlaw silt loam. Fields 2 and 9 have Westmoreland channery silt loam. Field 3 has a mixture of Edom silty clay loam, Buchanan cobbly loam and Westmoreland channery silt loam. Field 4 has a mixture of Albright's silt loam and Buchanan cobbly loam. Field 5 has a mixture of Albright's silt loam and Westmoreland channery silt loam. Field 6 has a mixture of Edom silty clay loam, Penlaw silt loam and Westmoreland channery silt loam. Field 7 has Buchanan cobbly loam. Field 8 has a mixture of Albright's silt loam, Edom silty clay loam and Murill channery loam. Field 9 is entirely Westmoreland channery silt loam. Field 10 has Clarksburg silt loam, Edom silty clay loam, Monongahela silt loam and Murill channery loam. Field 11 has Opequan-Hagerstown complex. Field 12 has Lobdell loam, Monongahela silt loam, Opequan-Hagerstown complex and Westmoreland channery silt loam. Field 13 has Buchannan cobbly loam, Lobdell loam and Opequan-Hagerstown complex. Field 14 has Albright's silt loam, Clarksburg silt loam and Westmoreland channery silt loam. Field 15 is a mixture of Edom silt loam, Buchannan cobbly loam and Westmoreland channery silt loam.

Albright's: Moderately well and somewhat poorly drained. Shallow fragipan, moderately slow permeability. Depth to bedrock:>60". Depth to seasonally high water table: 0.5'-3'. K=0.32.

Buchanan: Moderately well and somewhat poorly drained soils. Moderately slowly permeable fragipan. Depth to bedrock >60". Depth to seasonally high water table 1.5'-3'. K=0.24.

Clarksburg: Moderately well drained soil. Slowly permeable fragipan. Depth to bedrock>60". Depth to seasonal high water table 1.5'-3'. K=0.37.

Edom: Well-drained. High clay content. Depth to bedrock: 40"- >60". Depth to seasonally high water table: >6'. K=0.28.

Lobdell: Moderately well drained. Permeability moderately slow. Depth to bedrock 60". Depth to seasonal high water table 2'-3.5'. K=0.37.

Monongahela: Moderately well-drained. Slowly permeable fragipan. Depth to bedrock: >72". Depth to seasonally high water table: 1.5'-3'. K=0.43.

Murill: Well drained soils. Moderately permeable subsoil. Depth to bedrock >60". Depth to seasonal high water table >6'. K=0.28.

Opequan-Hagerstown Complex: Well drained soil. Moderately to slowly permeable subsoil. Depth to bedrock 12"-20". Depth to seasonally high water table >6'. K=0.34.

Penlaw: Somewhat poorly drained. Depth to bedrock: >72".Depth to seasonally high water table: 1.5'-3'. K=0.43.

Westmoreland: Well-drained. Moderately rapid permeability. Depth to bedrock: 40". K=0.32.

Slope: Fields Fields 1, 2, 6, 8 and 15 have B slopes between 6% abd 8%. The remainder of the fields in the conservation plan have slopes greater than 8%.

Conservation Plan: The plan suggested includes two possible rotations. One is three years of no-till corn followed by a year of oats and five years of hay (C=0.03). The other is difficult to read on the plan, but appears to be one year of mulch till corn with residue removed and a cover crop, a year of oats and five years of hay (C=0.07). Each field has two suggested conditions, representing each of the options described above. The original rotation is three years of no till corn with residue removed followed by a year of oats and three years of hay (C=0.13). There is no change in practice factor in this plan. Fields 1, 6 and 9 have practice factors of 1. Fields 2 and 11 have practice factors of 0.6. Field 5 has a practice factor of 0.7. Fields 8 and 15 have practice factors of 0.5 and field 10 has a pracitce factor of 0.3. Field 14 is included in the plan, but the practice factor is illegible.

Problems Identified: Nutrient and sediment runoff.

Solutions Suggested: Stream fencing.

Farm: EV-018

Location: 1 mile below Centerville. Just West of T334 and 0.6 miles South of the intersection of T334 and T336. On the Hyndman USGS quad sheet.

Use: Crops and Livestock

Area: 81 Acres in two fields. Field 1 has 64 acres and field 4 has 17 acres.

Soils: Field 1 is a mixture of Buchannan cobbly loam, Elliber very channery silt loam, Mertz cherty silt loam and Opequan-Hagerstown complex. Field 4 has Elliber very channery silt loam.

Buchanan: Moderately well and somewhat poorly drained soils. Moderately slowly permeable fragipan. Depth to bedrock >60". Depth to seasonally high water table 1.5'-3'. K=0.24.

Elliber: Well drained. Moderately rapid permeability. Depth to bedrock>60". Depth to seasonally high water table >6'. K=0.17.

Mertz: Well drained. Slow to moderately slow permeability. Depth to bedrock >60". Depth to seasonal high water table >6'. K=0.28.

Opequan-Hagerstown Complex: Well drained soil. Moderately to slowly permeable subsoil. Depth to bedrock 12"-20". Depth to seasonally high water table >6'. K=0.34.

Slope: Field 1 has a 15% slope and field 4 has an 11% slope.

Conservation Plan: Three rotations are presented in the plan. The first has two years of corn with residue removed and a cover crop with 30% mulch till in the second year followed by 5 years of corn. The second rotation has one year of corn with residue removed and five years of hay. The last is one year of no-till corn with residue removed and a cover crop, one year of corn with residue removed, a cover crop and mulch till, oneyear of no-till corn with residue removed and a cover crop and three years of hay. The first rotation is applied to one portion of field one and the second to another. The third rotation is applied to field 4. The practice factor is 0.4 for field 1 and 0.3 for field 4.

Problems Identified: Nutrient and sediment runoff.

Solutions Suggested: Conservation Plan, Nutrient Plan.

Farm: EV-020

Location: 1.8 miles below Centerville and just West of US220. At the intersection of US 220 and T401. Growden Run runs through the site. On the Hyndman USGS quad sheet.

Use: Idle, Crops, Timber. All fields described here are cropland.

Area: This farm has 7 fields in 78 acres. In the first tract, field 1 is 4 acres, field 2 is 40 acres, field 3 is 4 acres, field 4 is 5 acres, field 5 is 12 acres and field 9 is 8 acres. In the second tract, field 1 is 5 acres. Field 4 is not incouded in the conservation plan, and is classified as "not highly erodible".

Soils: Field 1 of the first tract has Edom silty clay loam. Field 2 of the first tract has Blairton channery silt loam, Clarksburg silt loam, Penlaw silt loam and Westmoreland silty clay loam. Fiel d 3 of the first tract has Tyler silt loam and. Field 4 of the first tract has Penlaw silt loam and Tyler silt loam. Field 5 of the first tract has Blairton channery silt loam, Buchanan cobbly loam, Edom silty clay loam, Penlaw silt loam and Westmoreland silty clay loam. Field 9 in the first tract has Edom silty clay loam and Tyler silt loam. Field 1 in the second tract has Clarksburg silt loam and Edom silty clay loam.

Blairton: Somewhat poorly and moderately well-drained. Moderately slow permeability. Depth to bedrock: 20"-40". Depth to seasonally high water table: 0.5'-3'. K=0.32.

Buchanan: Moderately well and somewhat poorly drained soils. Moderately slowly permeable fragipan. Depth to bedrock >60". Depth to seasonally high water table 1.5'-3'. K=0.24.

Clarksburg: Moderately well drained soil. Slowly permeable fragipan. Depth to bedrock>60". Depth to seasonal high water table 1.5'-3'. K=0.37.

Edom: Well-drained. High clay content. Depth to bedrock: 40"- >60". Depth to seasonally high water table: >6'. K=0.28.

Penlaw: Somewhat poorly drained. Depth to bedrock: >72".Depth to seasonally high water table: 1.5'-3'. K=0.43.

Purdy: Poorly and very poorly drained soils. Slowly or very slowly permeable subsoil. Depth to bedrock >60". Depth to seasonal high water table 0'-1'. K=0.43.

Tyler: Somewhat poorly drained. Slow permeability. Depth to bedrock: >60". Depth to seasonally high water table: 0.5'-2'. K=0.43.

Westmoreland: Well-drained. Moderately rapid permeability. Depth to bedrock: 40". K=0.32.

Slope: One half of field 1 in the first tract, one third of field 2, one half of field 5, and field 1 in the second tract have B slopes ranging from 4% to 7%. One half of field 1 in the first tract, one third of field 2, field 3 and field 9 have C slopes ranging from 10% to 12%. One third of field 2 in the first tract and field 5 have slopes of 22% and 18%, respectively.

Conservation Plan: Four rotations are presented in this conservation plan. The first is continuous corn with residue removed and a cover crop with disc plowing (C=0.15). This rotation is applied to field 3, field 9 and field 1 in the second tract. The second rotation has two years of corn with residue removed and a cover crop and five years of corn (C=0.06). This rotation is applied to one third of field 2.The third rotation includes three years of corn with residue removed, one year of rye and two years of hay (C=0.08). This rotation is applied to one half of field one in the first tract, one third of field 2 and half of field 5. The last rotation includes one year of corn and five years of hay (C=0.04). This rotation is applied to one third of field 2 and field 5. Field one in the first tract has practice factors of 1.0 and 0.6. Field 2 has practice factors of 0.3, 0.45 and 0.5. Fields 3 and 9 have practice factors of 0.6. Field 5 has practice factors of 0.4 and 1.0. Field 1
.in the second tract has a practice factor of 1.0.

Problems Identified: Sediment and nutrient runoff.

Solutions Suggested: Stream fencing.

Farm: EV-021

Location: Along T337, 0.5 mile East of US 220. Growden run on site. About 0.9 miles West of the point where Growden Run empties into Lake Koon. On the Hyndman USGS quad map.

Use: Dairy. Crops and hayland. Seven fields. Fields 1a, 1b, 2, 3, 4 and 6 are cropland. Field 5 is hayland. Field 5 is not included in the conservation plan.

Area: This farm has 7 fields with 120 acres. Field 1a is 48 acres, field is 24 acres, field 1b is 24 acres, field 2 is 5 acres, field 3 is 11 acres, field 4 is 8 acres, field 5 is 14 acres and field 6 is 10 acres.

Soils: Field 1a is mostly Edom very channery silt loam, Penlaw silt loam, Murill channery silt loam and Westmoreland channery silt loam with some Clarksburg silt loam and Monongahela silt loam. Field 1b has Albright's silt loamk, Westmoreland channery silt loam, Penlaw silt loam and Edom very channery silt loam. Field 2 has Edom very channery silt loam and Westmoreland channery silt loam. Field 3 has Brinkerton silt loam, Westmoreland channery silt loam and Clarksburg silt loam. Field 4 has Clarksburg silt loam. Field t is mostly Elliber very channery silt loam with some Mertz cherty silt loam, Murillchannery loam, Hagerstown silty clay loam and Opequan -Hagerstown complex.

Slope: Field 5 is not included in the conservation plan, so no slope information is available. Field 4 has a slope of 2%. All other fields have C slopes ranging from 9% to 15%.

Conservation Plan: One rotation is presented in this plan, including one year of corn with residue left, one year of no-till ocrn with residue left, a year of oats and five years of hay (C=0.04). This rotation is applied to all fields in the conservation plan. (Field 5, which is not part of the conservation plan, is hayland). Practice factors are 0.3 for fields 1B and 6, 0.35 for field 2 and 1.0 for fields 1A, 3 and 4.

Problems Identified: Nutrient and sediment runoff.

Solutions Suggested: Nutrient and sedimentation plans.

Farm: EV-023

Location: 3.5 miles below Centerville on US 220. 300' from Growden Run at the edge of a jeep trail.

Use: Agriculture with beef or dairy. Idle land and crops.

Area: This farm has 6 fields totalling 52 acres. Fiels 1 is 13 acres, field 2 is 9 acres, field 3 is 6 acres, field 4 is 8 acres, field 5 is 5 acres and field 6 is 11 acres.

Soils: Field 1 is a mixture of Berks channery silt loam, Blairton channery silt loam, and Weikert channery silt loam. Field 2 is a mixture of Ernest silt loam and Westmoreland channery silt loam. Field 3 is mostly Blairton channery silt loam with some Berks channery silt loam. Field 4 is mostly Blairton channery silt loam. Field 5 is mostly Brinkerton silt loam. Field 6 is mostly Edom silty clay loam with some Berks channery silt loam.

Berks: Well drained Rapid permeability. Depth to bedrock 20"-40". Depth to seasonal high water table >6'. K=0.17.

Blairton: Somewhat poorly and moderately well-drained. Moderately slow permeability. Depth to bedrock: 20"-40". Depth to seasonally high water table: 0.5'-3'. K=0.32.

Weikert: Well drained. Moderately rapidly permeable subsoil. Bedrock is soft. Depth to bedrock 10"-20". Depth to seasonal high water table >6'. K=0.28.

Slope: Fields 1 and 6 have slopes of 18%. Field 2 has a slope of 7%. All other fields have a 5% slope.

Conservation Plan: This plan is difficult to read. It appears that two rotations are presented. One has a year of no-till corn with residue removed and a cover crop, three years of mulch till corn with residue removed, one year of oats and four years of hay. There are two C factor factors under this rotation (0.12 and 0.1). The other rotation hs a year of no-till corn with residue removed, a year of mulch till corn with a cover crop and residue removed and a cover crop, a year of oats and four years of hay (C=0.06). The first rotation, with a value of 0.1, is applied to fields 2 through 5. Fields 1 and 6 do not have a C factor. Under soil loss, field 1 says "use alt #4" and field 6 says "use alt #5". Practice factors are 0.4 for field 1, 0.5 for field 2, 1.0 for fields 3-5 and 0.8 for field 6.

Problems Identified: Sediment and nutrient runoff.

Solutions Suggested: none.

APPENDIX II: RUSLE Guidelines for Pennsylvania

United States Department of Agriculture
Natural Resources Conservation Service
Suite 340
One Credit Union Place
Harrisburg, PA 17110-2993

SUBJECT: TCH - TECHNICAL GUIDE NOTICE NO. 17

DATE: November 15, 1995

TO: All Holders of the PA Soil and Water Conservation Technical Guide

FILE CODE: 450-11

PURPOSE: To transmit a complete revision for Section I, Soil Erosion Prediction, for the purpose of final implementation of RUSLE. All previously distributed copies of RUSLE materials should be discarded. Before using the tables, be sure to thoroughly read the section entitled General Instructions. Without the use of these instructions, incorrect use of the tables is possible. Individuals not receiving training since the initial training last spring need to schedule both field and office follow-up training through their area conservationist. Because of the many new concepts, this training is essential to provide uniformity in the use of RUSLE in predicting soil loss.

Due to the need for access to USLE for completion of HEL Determinations, and in order to evaluate USLE based plans for compliance purposes, retain the current USLE material in Section I, behind the new RUSLE material.

This revised section is intended for use in implementing the hard copy version of RUSLE.

FILING INSTRUCTIONS: File this Technical Guide Notice behind the Change Notice Register and enter the appropriate information on the change notice register at the beginning of Section I.

File the attachment in Section I following the tab Soil Erosion Prediction in front of the current USLE material.

If you have any questions, they should be directed through your supervisor, to Robert T. Heidecker, State Resource Conservationist, at the Harrisburg State Office.

JANET L. OERTLY
State Conservationist

Enclosure

SECTION I EROSION PREDICTION
REVISED UNIVERSAL SOIL LOSS EQUATION (RUSLE)
TABLE OF CONTENTS

INTRODUCTION

RUSLE is the Revised Universal Soil Loss Equation, a new technology that refines and improves upon its predecessor the Universal Soil Loss Equation (USLE). RUSLE is an empirical equation derived from theory of erosion processes and more than 10,000 plot years of data from natural runoff plots and an estimated 2000 years of rainfall simulator data. Both USLE and RUSLE use the same formula:

$$A = R \times K \times LS \times C \times P$$

Where: A = Average annual soil loss
R = Rainfall and runoff factor
K = Soil Erodibility factor
LS = Slope length/slope steepness factor
C = Cover and management factor
P= Supporting practice factor

These factors represent the effect of climate, soil, topography, and land use on sheet and rill erosion. By assigning values to these factors based on site specific condition, RUSLE computes soil loss for specific sites, and it can be used to guide conservation planning tailored to individual field sites.

Factor values are obtained directly from the appropriate table(s) and are selected based on the county or on conditions that apply to that factor. The "K" values are obtained from soil survey data found in Section II of the respective county's PA Technical Guide and is modified for the climatic zone by referring to Table K - 1.

The effectiveness of a particular land treatment alternative can be evaluated when the predicted soil loss for that treatment is compared with the soil loss tolerance "T" for the specific soil. Soil loss tolerances denote the maximum level of soil erosion that allow high levels of sustainable economic crop productivity. By using RUSLE, numerous crop and tillage alternatives can be developed for a particular field or farm. These alternatives can be compared on the basis of predicted soil loss and they can also be evaluated for effectiveness using "T". This allows the operator to select his or her system based on the effectiveness to reduce soil loss, feasibility and economics.

RUSLE is an erosion model designed to predict the longtime average annual soil loss "A" carried by runoff from field specific cropping and management systems. RUSLE is to be used as a guide rather than as a precise estimator of soil loss. The soil loss computed by RUSLE is the amount of sediment lost from the landscape profile represented by the particular RUSLE computation; not the amount of sediment leaving a field or watershed. Because of the unpredictable short-time fluctuations in the levels of influential variables, RUSLE is less accurate in predicting specific events than for predicting average soil losses over the entire cropping sequence. It also is applicable to nonagricultural conditions such as construction sites. RUSLE does not address estimating soil loss from disturbed forested conditions.

RUSLE users need to be aware that "A" (in addition to being a longtime average annual soil loss) is the average soil loss over a field and that losses at various parts of the field may differ greatly from one to another. On a long uniform slope, the loss from the top part of the slope is much lower than the slope average, and the loss near the bottom of the slope is considerably higher. This suggests that even if a field is planned to "T", soil loss on some portion of the field may signficantly exceed T, even when the ephemeral gully and other types of erosion that are not estimated by RUSLE are ignored.

The RUSLE computer program maintains three separate databases; the CITY database, the CROP database, and the OPERATION database. The CITY database includes data such as monthly precipitation and temperature, frost-free

period, annual rainfall erosivity (R factor), and bimonthly distributions of storm intensity (EI). The CROP database contains information about each crop including yield, residue-to-yield ratios, decomposition rates, plant population, and data at 15 day intervals for below ground biomass, canopy cover, and raindrop fall height. The OPERATION database contains data reflecting soil and surface cover disturbances resulting from typical farming operations. This includes estimated effects of each operation on soil disturbance, surface roughness, tillage depth, and impacts to surface cover.

RUSLE Policy

Policy for RUSLE implementation and the impact of RUSLE regarding the Conservation Compliance Provisions of the 1985 Food Security Act and the 1990 Food, Agriculture, Conservation, and Trade Act may be found in Section 510.14 of the National Food Security Act Manual (NFSAM), Third Edition, Amendment 1.

Limitations of the Paper Version of RUSLE

The paper version of RUSLE includes information for the typical crops and crop rotations within the state. Field Offices should contact the State Office for assistance in developing RUSLE "C" factors for situations not included in the paper version of RUSLE.

Recordkeeping

Until RUSLE is incorporated into the Field Office Computer System (FOCS), the Pennsylvania RUSLE Worksheet should be used to record appropriate data and to document soil loss calculations. These Worksheets will be used as the source documents for inputting field data into the RUSLE module within FOCS. These worksheets may be modified and integrated into existing field office forms as long as all the information on these worksheets is recorded somewhere within the soil loss documentation.

References

This introduction is a compilation from the following sources:

Soil and Water Conservation Society, RUSLE User's Guide, Version 1.0, January, 1993.

USDA - Agricultural Research Service, Predicting Soil Erosion by Water: A Guide to Conservation Planning with the Revised Universal Soil Loss Equation (RUSLE).

RUSLE SWCS 1.04 pre_0 program was used to perform all computations.

GENERAL INSTRUCTIONS

These general instructions are essential to guide users in the interpretation and use of the material found in this document. Some information will be specific to a section, while other information will be more general in nature.

GENERAL COMMENTS

1. Even as soil loss becomes more specific, the authors of this document have considered the impact of rounding Vs carrying decimals in the overall sensitivity of the entire equation. In otherwords if something is less sensitive, the information can be more generalized and conversely if it is more sensitive to the end product it will merit more specific information being gathered and used in the calculation.

2. RUSLE is intended to be used as a planning tool. Gathering of field data for the equation includes cultural considerations such as residue management, the use of cover crops and determinations of cover condition, row grade and ridge height. These determinations are to be made using common planning tools and good professional judgment. The ability to use good judgment results from a thorough understanding of farming operations, physical conditions related to soils along with understanding of RUSLE concepts based on field training. This training should include determination of LS, P and C factors.

3. With the implementation of RUSLE certain data has been developed to be county specific. This includes climatic and soil conditions. This information affects both P and K factors in this document. Individuals working in more than one county need to access the appropriate information for the counties they cover through the Pennsylvania Technical Guide for those specific counties.

SPECIFIC COMMENTS BY SECTION

RAINFALL (R) FACTOR CONSIDERATIONS:

Rainfall factors are now county specific, not grouped by region, as was the case in former USLE versions. This explains why some county R values changed so radically.

SOIL ERODIBILITY (K) FACTOR CONSIDERATIONS:

Table K-1 provides the information needed to account for overall climatic conditions that affect K values. Adjusted values may be written on the current county listing of soils that has been prepared for use with RUSLE.

SLOPE LENGTH / SLOPE STEEPNESS (LS) FACTOR CONSIDERATIONS:

General: In most situations, Table LS-2 will be the one most commonly used. Table LS-1 is applicable for long term no-till, pasture and hayland when tillage is performed no more frequently than once in 7 years. Table LS-3 is used for construction sites and generally will not be applicable in agricultural situations.

Field Determination of Representative Conditions: Historically, "length of slope" has been considered to be measured from the top of the slope to the bottom. However with RUSLE more emphasis is placed on the type of flow that occurs on a given slope. Since RUSLE deals with sheet flows only, it is only the length of sheet flow that is measured to evaluate sheet and rill erosion. Slopes must be very uniform to retain sheet flow conditions for more than 100 to 150 feet. This is not to say that slope lengths of 200-300 feet are non-existent, but they certainly represent the exception rather than the rule in most counties.

In making judgments in slope length, consideration of uniformity or lack thereof should be the first clue as to the actual slope length that can "sustain sheet flow". It should be quickly obvious that in the rolling topography, common in much of Pennsylvania, slope lengths will be quite short since this conditions causes sheet flow to end and concentrated flow to begin.

Other factors affecting slope length include the point on the slope where surface runoff begins and any down slope condition where deposition occurs. The point where runoff starts is influenced by cover condition and the cropping system as well as the soil hydrologic group. This point could vary from the top of the hill to as much as 50 or 75 feet downslope.

Soil deposition occurs where sheet flow velocities decrease substantially. Slopes which become significantly flatter below a steep slope can act as areas of deposition. A general rule of thumb is if the steeper slope flattens by at least 50% then the point of change from steep to flat would determine where deposition occurs and the slope ends. In some instances vegetation or ridges in a field may also cause deposition to occur therefore ending the slope length.

The approach to planning and evaluating the need for diversions, cropland terraces, grassed waterways and stripcropping is affected by this approach in evaluating slopes. Traditionally these practices (especially diversions and terraces) were used when slope lengths were considered to be excessive (300 to 500 feet). With this approach the majority of these practices have been installed for the purpose of handling concentrated flows (many of which may be small drainage areas). Note that particularly for stripcropping, if slopes are short, benefits from stripcropping would not be reflected in RUSLE calculations. However they would be needed potential gully or ephemeral erosion from concentrated flow.

In summary, this approach does not diminish the need for structural practices and stripcropping. It does result in the use of professional judgment to decide specifically when the control of concentrated flows results in the need for additional treatment or if the practice is needed to reduce problems from sheet flow conditions.

COVER AND MANAGEMENT (C) FACTOR CONSIDERATIONS:

This set of "C" Tables are much more complex than former ones due to the effects from prior crop and tillage operations that RUSLE is able to model. A user of these tables will not only be able to obtain an accurate "C" value for various cropping and management conditions, they will also be able to learn how to effectively manage tillage, crop selection, residue and cover crops for optimum erosion and soil loss reductions.

Crop Residue: Cover and management factors have been assigned to a range of crop residue in most instances unless moldboard plowing is the means of primary tillage. It is these ranges that provide maximum flexibility in planning and/or compliance. These residue ranges are contained in brackets [ ] and represent the amount of crop residue that would be left after planting. In some instances this range is listed to be <15% and this would represent an average field condition residue level of 10%. Specified levels of crop residue should reflect those levels that are commonly attained by a producer using good crop management techniques and through his tillage operations. This is especially true with no-till when only residues are removed as indicated in the tables. However, with reduced tillage, actual residue levels may be more or less than the amounts indicated in the tables.

Many factors can cause these deviations, and the planner needs to keep them in mind in assuming specific residue levels with reduced tillage. In the preparation of Conservation Plans it is suggested that the minimum level (as contained in brackets) be used since this would be the minimum residue level needed for compliance.

When crop residues are considered removed from the fields the following amounts were determined to be removed: Wheat, 3,000 lbs.; Barley, 2500 lbs. and Oats, 2500 lbs. When residue left or removed is not specified, the number used was based on 50% of the above levels of residue being removed.

Cover Crops: In the development of these tables a considerable amount of time was spent on evaluating all the various methods of cover crop establishment. Values have been provided which should help a planner show a producer the benefits of cover crops as well as help him determine a method of establishment that will give him the maximum benefits in reducing soil loss on his operation. It should be noted that the real benefit of the cover crop is realized the following crop year.

Notations: Any notations or footnotes made are applicable to that specific page or table. General guidelines and considerations for the entire "C" subsection are contained in these general instructions.

Comparisons Of "C" Values Based On Corn Yields: In considering the different techniques and practices, generally .02 was the smallest number that was considered to have any significance. Yields of both silage and grain corn had a significant impact on the appropriate "C" factor values. It is important that planners obtain accurate yield information to be used in both nutrient management and soil loss calculations and planning. If a planners wishes to interpolate between the "C" factor values given for a yield range this is possible to do in order to obtain values more closely aligned to actual yield levels.

Use Of Manure:

-ADJUSTMENT FOR MANURE USE (ORGANIC MATTER CREDIT) The calculated C" factor for the rotation may be adjusted to credit the application of manure by multiplying the selected value by 0.8 for the addition of liquid, slurry or bedded pack manure. This adjustment is based on the application of 4000# of dry matter per acre every other year (at least half the years of the rotation) and reflects long term improved soil condition due to the increases in the organic matter levels. If manure is not applied in a least 50% of the years of the rotation, then apply the 0.8 multiplier to that portion of the rotation that does meet the 50% requirement. i.e. if manure is applied in 2 years of an 8 year rotation apply the multiplier to 4 years. Because the manure credit is given for improved soil condition and not surface residue cover the manure can be applied at any point in the year consistent with the producers manure management plan.

*-ADJUSTMENT FOR USE OF MANURE WITH SILAGE CORN **WITHOUT** COVER CROP (WINTER SURFACE COVER CREDIT)* When bedded pack (3/16 inch diameter residue) manure is applied at a rate that will provide 60% surface cover that is capable of raindrop interception until spring planting occurs, a credit is provided by multiplying the selected "C" factor by 0.5. **CAUTION:** This factor also includes credit for organic matter added to the soil, therefore no additional credit will be provided when the 0.5 adjustment factor is used.

GENERAL INSTRUCTIONS

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ALL FIELD APPLICATION OF MANURE SHOULD BE IN ACCORDANCE WITH THE PENNSYLVANIA DEP MANURE MANAGEMENT MANUAL (FIELD APPLICATION SECTION) AND ALL OTHER APPLICABLE REGULATIONS. NO CREDIT WILL BE ALLOWED FOR SOIL LOSS REDUCTIONS WHEN MANURE IS APPLIED AT RATES THAT EXCEED THOSE THAT ARE RECOMMENDED IN THE PRODUCERS NUTRIENT MANAGEMENT PLAN.

****

DEFINITION OF TERMS:

Moldboard (MB): Refers to the use of a moldboard plow and generally leaves<5% surface residue.

Reduced Tillage (RT): Refers to any tillage operation which does not include use of MB. It does refer to disturbance of 100% of the soil surface. Since significant benefits in soil loss can result from retention of less than 30% of the crop residue, therefore these values are considered. However, these residue levels by definition do not meet the minimum requirements for crop residue management.

No-Till (NT): Includes all systems where no planned tillage of any type is used in conjunction with planting or preparing fields for planting. Occasionally a cultivation operation may be used to control escape weeds and is used on an as needed basis (not regularly used).

Cover Crop (CC): An annual or perennial crop planted for the primary purpose of providing soil protection from raindrop impact during periods of low residue or canopy cover. To provide adequate soil protection during periods of critical soil exposure the cover crop must provide a minimum of 50% canopy or 6 inches of plant height. Cover crops may be harvested or grazed subject to their maintaining the above minimum conditions. Establishment is either immediately after harvest or by interseeding.

Interseeding: Refers to the establishment of a cover crop at time of last cultivation or by aerial or broadcast seeding prior to leaf drop (generally August 31).

SUPPORTING PRACTICE (P) FACTOR CONSIDERATIONS:

The conservation practice factor includes the following subfactors: Contour, stripcropping, terrace and pattern drainage. Credit for drainage conditions is not included with this version. For contour farming and stripcropping evaluation of row grade, cover condition and ridge height are essential components. Tables have been set up to facilitate these determinations. Consistency in the field determination of these factors is very essential. For users of this document, field training on the above components is essential to achieve this consistency. The following may serve as guidelines for planners in determining P factors.

General Consideration of Row Grade, Cover Condition and Ridge Height: This determination requires understanding of farm equipment and cultural operations. As with soils and slopes, overall conditions must be evaluated and some sort of a weighted average should be determined for each factor. It is not the intent to make this an exercise in engineering. Professional judgment and the use of tools used in planning should be all that is necessary to gather the needed data.

Ridge Height: Ridge height is an the most critical component of contouring. When contour farming is used care should be taken to represent this factor very accurately. Also a planner might work with a producer to increase ridge height where contour farming is used by modifying tillage and/or planting equipment. Generally ridge height should be evaluated after spring or fall planting.

Row Grade: Row grade deviation between 0 and 1% is sensitive. Average row grades used in RUSLE calculations should be based on the following: Length or distance that rows are off grade, amount of deviation in terms of respect to the entire field, "where" the off grade portion leads water(i.e. toward a sensitive area or toward a waterway or other protected area) whether the overall layout(contour or stripcropping) is as near the contour as possible and is still practical. Row grade is an essential part of evaluation contour farming and deviations from the contour.

Many considerations are included in making a judgment as to average row grade. In cases where overall row grade is within 1 to 1.5%, grades are short and the field is irregular enough to reduce these grades and still be practical, an average row grade of .5% might be very appropriate. Conversely if row grade is significant(5-10 percent) and/or water runs for distances of 300 feet or longer, then the actual row grade percentage may be the number used.

Cover Condition: Cover condition is reflected both in the contouring and stripcropping P subfactors. It's sensitivity however is primarily reflected in the stripcropping subfactor. Therefore when only contouring is used just select an average condition for the system. For stripcropping credit is primarilyl based on differences in cover conditions in alternate strips. When no or only one level of cover exists, then strips will be fairly ineffective. The maximum effectiveness generally reflected would be with alternate cover conditions of 2 and 6 or 7.

When crop residue management is involved, the alternate cover conditions would typically range between conditions 3 through 5. In some situations, with mixed tillage the differences in cover condition may vary from year to year. In this case an average value for the most common situation should be used.

Fall Tillage Effects on the P Factor: Fall tillage results in increased values for C factors. However, depending on the nature of the tillage and row grade, there may be a positive effect from ridge height and uniform roughness as they are evaluated from tillage until spring planting. Tillage on the contour, especially after hay or a crop with heavy residue would offer the most opportunity to reduce potential soil loss during this part of the rotation.

For the period of fall tillage a cover condition of from light to heavy could be assigned(based on the roughness). This over winter condition for roughness could impact the overall average cover condition for the rotation. Also ridge height itself could range from 3-6 inches depending on the type of cover and type of tillage equipment. This could be integrated into the overall ridge height used for the rotation. The combination of these two factors may offset or even more than offset the increase in C factor due to fall tillage. The closer to the contour, the more positive the effect from these factors. Generally uniform roughness would result from moldboard plowing and ridge height would result especially from the use of a chisel or similar tool.

Summary of P Factor Considerations: In summary, many considerations are integrated into assignment of the overall P factor. The intent of this section is for planners to use professional judgment both in assigning these factors and in using weighted averages to best capture the field conditions without spending extensive time to collect data. This is approach is also appropriate when considering that many of the conditions are subject to changes on an annual basis due to weather, equipment operations, soil moisture conditions and many other factors.

RAINFALL FACTOR VALUES FOR PENNSYLVANIA

ADAMS	-140	LACKAWANNA	-110
ALLEGHENY	-110	LANCASTER	-160
ARMSTRONG	-105	LAWRENCE	-105
BEAVER	-110	LEBANON	-140
BEDFORD	-110	LEHIGH	-150
BERKS	-150	LUZERNE	-115
BLAIR	-105	LYCOMING	-100
BRADFORD	-90	MCKEAN	-90
BUCKS	-165	MERCER	-100
BUTLER	-105	MIFFLIN	-110
CAMBRIA	-105	MONROE	-135
CAMERON	-95	MONTGOMERY	-165
CARBON	-135	MONTOUR	-110
CENTRE	-100	NORTHAMPTON	-150
CHESTER	-170	NORTHUMBERLAND	-120
CLARION	-100	PERRY	-125
CLEARFIELD	-100	PHILADELPHIA	-165
CLINTON	-100	PIKE	-125
COLUMBIA	-115	POTTER	-90
CRAWFORD	-95	SCHUYKILL	-130
CUMBERLAND	-130	SNYDER	-115
DAUPHIN	-135	SOMERSET	-110
DELAWARE	-170	SULLIVAN	-100
ELK	-95	SUSQUEHANNA	-95
ERIE	-90	TIOGA	-90
FAYETTE	-110	UNION	-110
FOREST	-95	VENANGO	-100
FRANKLIN	-125	WARREN	-90
FULTON	-115	WASHINGTON	-115
GREENE	-115	WAYNE	-105
HUNTINGDON	-110	WESTMORELAND	-110
INDIANA	-105	WYOMING	-100
JEFFERSON	-100	YORK	-150
JUNIATA	-115		

TEN-YEAR FREQUENCY SINGLE-STORM EROSION INDEX VALUES FOR PENNSYLVANIA

ADAMS	-70	LACKAWANNA	-60
ALLEGHENY	-60	LANCASTER	-70
ARMSTRONG	-50	LAWRENCE	-50
BEAVER	-60	LEBANON	-60
BEDFORD	-50	LEHIGH	-70
BERKS	-70	LUZERNE	-60
BLAIR	-50	LYCOMING	-50
BRADFORD	-50	MCKEAN	-50
BUCKS	-90	MERCER	-50
BUTLER	-50	MIFFLIN	-50
CAMBRIA	-50	MONROE	-70
CAMERON	-50	MONTGOMERY	-80
CARBON	-70	MONTOUR	-50
CENTRE	-50	NORTHAMPTON	-80
CHESTER	-70	NORTHUMBERLAND	-50
CLARION	-50	PERRY	-50
CLEARFIELD	-50	PHILADELPHIA	-80
CLINTON	-50	PIKE	-70
COLUMBIA	-50	POTTER	-50
CRAWFORD	-50	SCHUYKILL	-60
CUMBERLAND	-60	SNYDER	-50
DAUPHIN	-50	SOMERSET	-50
DELAWARE	-70	SULLIVAN	-50
ELK	-50	SUSQUEHANNA	-50
ERIE	-50	TIOGA	-50
FAYETTE	-50	UNION	-50
FOREST	-50	VENANGO	-50
FRANKLIN	-60	WARREN	-50
FULTON	-60	WASHINGTON	-60
GREENE	-50	WAYNE	-60
HUNTINGDON	-50	WESTMORELAND	-50
INDIANA	-50	WYOMING	-50
JEFFERSON	-50	YORK	-70
JUNIATA	-50		

CLIMATIC ZONES FOR PENNSYLVANIA

ADAMS	-115B	LACKAWANNA	-115A
ALLEGHENY	-111B	LANCASTER	-115B
ARMSTRONG	-111B	LAWRENCE	-111B
BEAVER	-111B	LEBANON	-115B
BEDFORD	-115A	LEHIGH	-115B
BERKS	-115B	LUZERNE	-115A
BLAIR	-115A	LYCOMING	-115A
BRADFORD	-115A	MCKEAN	-111C
BUCKS	-115B	MERCER	-111B
BUTLER	-111B	MIFFLIN	-115A
CAMBRIA	-111C	MONROE	-115B
CAMERON	-111C	MONTGOMERY	-115B
CARBON	-115B	MONTOUR	-115A
CENTRE	-115A	NORTHAMPTON	-115B
CHESTER	-115B	NORTHUMBERLAND	-115A
CLARION	-111C	PERRY	-115A
CLEARFIELD	-111C	PHILADELPHIA	-115B
CLINTON	-115A	PIKE	-115B
COLUMBIA	-115A	POTTER	-111C
CRAWFORD	-111B	SCHUYKILL	-115A
CUMBERLAND	-115B	SNYDER	-115A
DAUPHIN	-115A	SOMERSET	-111C
DELAWARE	-115B	SULLIVAN	-115A
ELK	-111C	SUSQUEHANNA	-115A
ERIE	-111A	TIOGA	-111C
FAYETTE	-111B	UNION	-115A
FOREST	-111C	VENANGO	-111B
FRANKLIN	-115A	WARREN	-111B
FULTON	-115A	WASHINGTON	-111B
GREENE	-111B	WAYNE	-115B
HUNTINGDON	-115A	WESTMORELAND	-111C
INDIANA	-111C	WYOMING	-115A
JEFFERSON	-111C	YORK	-115B
JUNIATA	-115A		

CLIMATE ADJUSTED - AVERAGE ANNUAL K FACTORS

K Factor	AVERAGE ANNUAL K FACTORS			
	CLIMATIC ZONE			
	111 A	111 B	111 C & 115 A	115 B
.02	.02	.02	.02	.02
.05	.05	.05	.05	.05
.10	.12	.10	.10	.08
.15	.17	.15	.12	.12
.17	.20	.17	.15	.15
.20	.22	.20	.17	.17
.24	.26	.24	.22	.20
.28	.30	.28	.26	.22
.32	.35	.32	.30	.26
.37	.40	.37	.35	.30
.43	.49	.43	.40	.35
.49	.55	.49	.46	.40
.55	.60	.55	.49	.43
.64	.70	.64	.60	.52

The Average Annual K factors from this table are to be used only for hand calculations prior to the use of the computerized version of RUSLE in FOCS.

Procedure:

1. Obtain K for each soil from the K factor column in the Interpretive Groupings Table in Section II of FOTG.

2. From the table above, read the Average Annual K for the proper climatic zone that corresponds to the K factor obtained in step 1. This is the K value that is to be used in RUSLE calculations.

TABLE LS - 1

PASTURE, HAYLAND AND CONTINUOUS NO-TILL

Low Ratio of Rill to Interrill Erosion for Consolidated Soil Conditions [1/]

Slope	Horizontal slope length (ft)									
(%)	25	50	75	100	150	200	250	300	400	600
0.2	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
0.5	0.08	0.08	0.08	0.09	0.09	0.09	0.09	0.09	0.09	0.09
1.0	0.13	0.13	0.14	0.14	0.15	0.15	0.15	0.15	0.16	0.16
2.0	0.21	0.23	0.25	0.26	0.27	0.28	0.29	0.30	0.31	0.33
3.0	0.29	0.33	0.36	0.38	0.40	0.43	0.44	0.46	0.48	0.52
4.0	0.36	0.43	0.46	0.50	0.54	0.58	0.61	0.63	0.67	0.74
5.0	0.44	0.52	0.57	0.62	0.68	0.73	0.78	0.81	0.87	0.97
6.0	0.50	0.61	0.68	0.74	0.83	0.90	0.95	1.00	1.08	1.21
8.0	0.64	0.79	0.90	0.99	1.12	1.23	1.32	1.40	1.53	1.74
10.0	0.81	1.03	1.19	1.31	1.51	1.67	1.80	1.92	2.13	2.45
12.0	1.01	1.31	1.52	1.69	1.97	2.20	2.39	2.56	2.85	3.32
14.0	1.20	1.58	1.85	2.08	2.44	2.73	2.99	3.21	3.60	4.23
16.0	1.38	1.85	2.18	2.46	2.91	3.28	3.60	3.88	4.37	5.17
20.0	1.74	2.37	2.84	3.22	3.85	4.38	4.83	5.24	5.95	7.13
25.0	2.17	3.00	3.63	4.16	5.03	5.76	6.39	6.96	7.97	9.65
30.0	2.57	3.60	4.40	5.06	6.18	7.11	7.94	8.68	9.99	12.19
40.0	3.30	4.73	5.84	6.78	8.37	9.71	10.91	11.99	13.92	17.19
50.0	3.95	5.74	7.14	8.33	10.37	12.11	13.65	15.06	17.59	21.88
60.0	4.52	6.63	8.29	9.72	12.16	14.26	16.13	17.84	20.92	26.17

[1/] Consolidated soils conditions apply to situations where no tillage has occured for a minimum of 7years.

TABLE LS - 2

CROPLAND WITH TILLAGE

Moderate Ratio of Rill to Interrill Erosion for Moderately Consolidated Soil Conditions [1/]

Slope	Horizontal slope length (ft)									
(%)	25	50	75	100	150	200	250	300	400	600
0.2	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.06
0.5	0.08	0.08	0.08	0.09	0.09	0.09	0.09	0.09	0.10	0.10
1.0	0.12	0.13	0.14	0.14	0.15	0.16	0.17	0.17	0.18	0.19
2.0	0.19	0.22	0.25	0.27	0.29	0.31	0.33	0.35	0.37	0.41
3.0	0.25	0.32	0.36	0.39	0.44	0.48	0.52	0.55	0.60	0.68
4.0	0.31	0.40	0.47	0.52	0.60	0.67	0.72	0.77	0.86	0.99
5.0	0.37	0.49	0.58	0.65	0.76	0.85	0.93	1.01	1.13	1.33
6.0	0.43	0.58	0.69	0.78	0.93	1.05	1.16	1.25	1.42	1.69
8.0	0.53	0.74	0.91	1.04	1.26	1.45	1.62	1.77	2.03	2.47
10.0	0.67	0.97	1.19	1.38	1.71	1.98	2.22	2.44	2.84	3.50
12.0	0.84	1.23	1.53	1.79	2.23	2.61	2.95	3.26	3.81	4.75
14.0	1.00	1.48	1.86	2.19	2.76	3.25	3.69	4.09	4.82	6.07
16.0	1.15	1.73	2.20	2.60	3.30	3.90	4.45	4.95	5.86	7.43
20.0	1.45	2.22	2.85	3.40	4.36	5.21	5.97	6.68	7.97	10.23
25.0	1.81	2.82	3.65	4.39	5.69	6.83	7.88	8.86	10.65	13.80
30.0	2.15	3.39	4.42	5.34	6.98	8.43	11.01	9.76	13.30	17.37
40.0	2.77	4.45	5.87	7.14	9.43	11.47	15.14	13.37	18.43	24.32
50.0	3.32	5.40	7.17	8.78	11.66	14.26	18.94	16.67	23.17	30.78
60.0	3.81	6.24	8.33	10.23	13.65	16.67	22.36	19.64	27.45	36.63

[1/] Moderately consolidated soil condition with tillage 1 or more years out of 7.

TABLE LS - 3

CONSTRUCTION AND MINING SITES

High Ratio of Rill to Interrill Erosion [1/]

Slope	Horizontal slope length (ft)									
(%)	25	50	75	100	150	200	250	300	400	600
0.2	0.05	0.05	0.05	0.05	0.05	0.06	0.06	0.06	0.06	0.06
0.5	0.07	0.08	0.08	0.09	0.09	0.10	0.10	0.10	0.11	0.12
1.0	0.10	0.13	0.14	0.15	0.17	0.18	0.19	0.20	0.22	0.24
2.0	0.16	0.21	0.25	0.28	0.33	0.37	0.40	0.43	0.48	0.56
3.0	0.21	0.30	0.36	0.41	0.50	0.57	0.64	0.69	0.80	0.96
4.0	0.26	0.38	0.47	0.55	0.68	0.79	0.89	0.98	1.14	1.42
5.0	0.31	0.46	0.58	0.68	0.86	1.02	1.16	1.28	1.51	1.91
6.0	0.36	0.54	0.69	0.82	1.05	1.25	1.43	1.60	1.90	2.43
8.0	0.45	0.70	0.91	1.10	1.43	1.72	1.99	2.24	2.70	3.52
10.0	0.57	0.91	1.20	1.46	1.92	2.34	2.72	3.09	3.75	4.95
12.0	0.71	1.15	1.54	1.88	2.51	3.07	3.60	4.09	5.01	6.67
14.0	0.85	1.40	1.87	2.31	3.09	3.81	4.48	5.11	6.30	8.45
16.0	0.98	1.64	2.21	2.73	3.68	4.56	5.37	6.15	7.60	10.26
20.0	1.24	2.10	2.86	3.57	4.85	6.04	7.16	8.23	10.24	13.94
25.0	1.56	2.67	3.67	4.59	6.30	7.88	9.38	10.81	13.53	18.57
30.0	1.86	3.22	4.44	5.58	7.70	9.67	11.55	13.35	16.77	23.14
40.0	2.41	4.24	5.89	7.44	10.35	13.07	15.67	18.17	22.95	31.89
50.0	2.91	5.16	7.20	9.13	12.75	16.16	19.42	22.57	28.60	39.95
60.0	3.36	5.97	8.37	10.63	14.89	18.92	22.78	26.51	33.67	47.18

[1/] Such as for freshly prepared construction and other highly disturbed soil condition.

COVER AND MANAGEMENT FACTORS

GRAIN CORN [1/]

GRAIN CORN TWO OR MORE YEARS

	YIELD RANGES IN BUSHELS PER ACRE			
TILLAGE	65 -75	75 - 100	100 - 125	125 - 150
Moldboard	.29	.23	.17	.12
Reduced Till	.21 [<15]	.18 [<15]	.12 [<15]	.09 [<15]
Reduced Till	.17 [15 - 30]	.14 [15 - 30]	.10 [15 - 30]	.06 [15 - 30]
Reduced Till	.12 [30 - 50]	.10 [30 - 50]	.07 [30 - 50]	.04 [30 - 50]
No-Till	.05 [45 - 50]	.03 [50 - 60]	.02 [60 - 70]	.01 [>70]

GRAIN CORN FOLLOWING HAY

TILLAGE	GRASS/LEG.	LEGUME
Moldboard	.10	.13
Reduced Till	.07 [20-30]	.11 [20-30]
No-Till spring kill	.02 [60-70]	.04 [60-70]
No-Till fall kill	.05 [35-45]	.09 [30-40]

GRAIN CORN FOLLOWING SOYBEANS

TILLAGE		
Moldboard	.26	
Reduced Till	.20 [10-20]	.16 [20-30] [2/]
No-Till	.10 [30-40]	.06 [40-50] [2/]

GR. CORN (100 Bu) AFTER SILAGE CORN

	YEARS AFTER SIL. CORN (18 ton)	
TILLAGE	FIRST	SECOND
Moldboard	.29	.22
Reduced Till	.28 [<15]	.12 [25-35]
No-Till	.24 [<15]	.03 [65-75]
No-Till after NT sil. corn	.14 [<15]	.02 [70-80]

GR. CORN (125 Bu) AFTER SILAGE CORN

	YEARS AFTER SIL. CORN (25 ton)	
TILLAGE	FIRST	SECOND
Moldboard	.22	.14
Reduced Till	.21 [<15]	.07 [25-35]
No-Till	.17 [<15]	.01 [75-85]
No-Till after NT sil. corn	.10 [<15]	.02 [75-85]

GRAIN CORN AFTER FALL GRAIN

	RESIDUE MGT. FOR FALL GRAIN	
TILLAGE	LEFT	REMOVED
Moldboard	.18	.20
Reduced Till	.08 [30-40]	.11[20-30]
No-Till	.02 [60-70]	.05[30-50]

GRAIN CORN AFTER SPRING GRAIN

	RESIDUE MGT. FOR SPRING GRAIN	
TILLAGE	LEFT	REMOVED
Moldboard	.22	.24
Reduced Till	.12 [20-30]	.18 [10-20]
No-Till	.04 [60-70]	.10 [30-40]

GRAIN CORN AFTER GRAIN SORGHUM

TILLAGE	
Moldboard	.23
Reduced Till	.17 [15-25]
No-Till	.10 [40-50]
No-Till after NT gr. sorg.	.06 [50-60]

GRAIN CORN AFTER FORAGE SORGHUM

TILLAGE	
Moldboard	.20
Reduced Till	.14 [15-25]
No-Till	.09 [35-45]
No-Till after NT for. sorg.	.06 [45-55]

[1/] Adjust "C" values for use of a no-till or interseeded cover crop for grain corn by reducing selected value by .01. Cover crops applied using tillage are not considered to appreciably reduce soil loss when residue is left.

[2/] Use only for high yielding soybeans (> 50 bu/acre) and/or where no-till soybeans precede the corn.

COVER AND MANAGEMENT FACTORS

GRAIN CORN (continued) [1/]

GRAIN CORN AFTER POTATOES

	POTATO COVER CROP MGT.	
TILLAGE	COVER CROP	NO COVER
Moldboard	.22	.28
Reduced Till	.14 [15-25]	.27
No-Till	.08 [>40]	.26 [2/]

GRAIN CORN (125 BU) AFTER TOBACCO

	TOBACCO COVER CROP MGT.	
TILLAGE	COVER CROP	NO COVER
Moldboard	.16	.23
Reduced Till	.10 [15-25]	.23
No-Till	.05 [>50]	.21

GRAIN CORN AFTER SNAP BEANS

	SNAP BEAN COVER CROP MGT.	
TILLAGE	COVER CROP	NO COVER
Moldboard	.20	.28
Reduced Till	.14 [15-25]	.27
No-Till	.07 [>50]	.25

GRAIN CORN AFTER SWEET CORN

	SWEET CORN COVER CROP MGT.	
TILLAGE	COVER CROP	NO COVER
Moldboard	.20	.25
Reduced Till	.13 [20-30]	.23 [<15]
No-Till	.06 [55-65]	.16 [20-30]

GRAIN CORN AFTER SUNFLOWERS

	SUNFLOWER COVER CROP MGT.	
TILLAGE	COVER CROP	NO COVER
Moldboard	.22	.26
Reduced Till	.13 [20-30]	.22 [<15]
No-Till	.07 [50-60]	.14 [25-35]

[1/] Adjust "C" values for use of a no-till or interseeded cover crop for grain corn by reducing selected value by .01. Cover crops applied using tillage are not considered to appreciably reduce soil loss when residue is left. Cover crops are established after crop harvest by disking.

[2/] Potato field disked after harvest in fall and no cover crop is established.

COVER AND MANAGEMENT FACTORS

SILAGE CORN WITHOUT COVER CROP [1/]

SILAGE CORN TWO OR MORE YEARS

TILLAGE	YIELD PER ACRE 18 tons	25 tons
Moldboard	.42	.34
Reduced Till [<15]	.42	.34
No-Till [<15]	.21	.16

SILAGE CORN AFTER SMALL GRAIN [2/]

TILLAGE	SMALL GRAIN RESIDUE MGT. LEFT	REMOVED
Moldboard	.32	.33
Reduced Till	.19 [20-30]	.26 [<15]
No-Till	.09 [55-65]	.18 [25-35]
No-Till after NT sm. gr.	.06 [60-70]	.11 [35-45]

SILAGE CORN FOLLOWING HAY

TILLAGE	GRASS/LEG.	LEGUME
Moldboard	.19	.22
Reduced Till	.15 [20-30]	.19 [20-30]
No-Till spring kill	.06 [60-70]	.08 [60-70]
No-Till fall kill	.10 [35-45]	.14 [30-40]

SILAGE CORN FOLLOWING SOYBEANS

TILLAGE	
Moldboard	.38
Reduced Till	.32 [15-20]
No-Till	.24 [25-35]
No-Till after NT soybeans	.23 [25-35]

SILAGE CORN (18 TONS) FOLLOWING GRAIN CORN

TILLAGE	YEARS FOLLOWING GRAIN CORN (100 Bu) FIRST	SECOND	THIRD
Moldboard	.29	.36	.39
Reduced Till	.20 [25-35]	.34 [<15]	.38 [<15]
No-Till	.07 [65-75]	.16 [25-35]	.22 [<15]
No-Till after NT grain corn	.03 [65-75]	.13 [25-35]	.17 [<15]

SILAGE CORN (25 TONS) FOLLOWING GRAIN CORN

TILLAGE	YEARS FOLLOWING GRAIN CORN (125 Bu) FIRST	SECOND	THIRD
Moldboard	.20	.28	.30
Reduced Till	.11 [25-35]	.25 [<15]	.29 [<15]
No-Till	.03 [75-85]	.10 [30-40]	.16 [10-20]
No-Till after NT grain corn	.01 [80-90]	.06 [40-50]	.12 [10-20]

SILAGE CORN AFTER FORAGE OR GRAIN SORGHUM

TILLAGE	
Moldboard	.31
Reduced Till	.25 [10-20]
No-Till	.19 [30-40]
No-Till after NT sorghum	.18 [35-45]

[1/] Adjust "C" values for the use of fall applied bedded pack manure for silage corn without cover crop if the applied rate provides 60% surface cover and is applied within two weeks of the time when normal cover crops are planted. Multiply the appropriate "C" factor by 0.5 to give credit for this surface cover that is capable of raindrop interception. **CAUTION**: This credit includes surface cover plus the credit for organic matter added to the soil, therefore no additional credits will be allowed when the 0.5 adjustment is used.

[2/] Includes fall and spring grain.

COVER AND MANAGEMENT FACTORS

SILAGE CORN WITH COVER CROP [1/]

SILAGE CORN TWO OR MORE YEARS
COVER CROP [2/]

TILLAGE	YIELD PER ACRE 18 tons	25 tons
Moldboard	.28	.22
Reduced Till	.22 [15-25]	.17 [15-25]
No-Till		
tillage for cover crop	.16 [30-50]	.13 [30-50]
no-till cover crop	.10 [30-50]	.08 [30-50]

SILAGE CORN TWO OR MORE YEARS
INTERSEEDED COVER CROP [3/]

TILLAGE	YIELD PER ACRE 18 tons	25 tons
Moldboard	.18	.15
Reduced Till	.13 [15-25]	.11 [15-25]
No-Till [30-50]	.04 [30-50]	.03 [30-50]

SILAGE CORN AFTER HAY

TILLAGE	GRASS/LEG.	LEGUME
Moldboard	.13	.17
Reduced Till	.09 [20-30]	.13 [20-30]
No-Till spring kill	.03 [60-70]	.04 [30-40]
No-Till fall kill	.06 [35-45]	.10 [30-40]

SILAGE CORN AFTER FORAGE SORGHUM

TILLAGE	
Moldboard	.27
Reduced Till	.22 [10-20]
No-Till	.18 [30-40]
No-Till after NT for. sorg.	.16 [35-45]

SILAGE CORN AFTER SOYBEANS

TILLAGE	
Moldboard	.34
Reduced Till	.30 [<15]
No-Till	.22 [30-40]
No-Till after NT soybeans	.19 [35-45]

SILAGE CORN AFTER SMALL GRAIN [4/]

TILLAGE	SMALL GRAIN RESIDUE MGT. LEFT	REMOVED
Moldboard	.28	.30
Reduced Till	.14 [25-35]	.22 [<15]
No-Till	.05 [55-65]	.13 [20-30]
No-Till after NT sm. gr.	.05 [55-65]	.11 [25-35]

SILAGE CORN AFTER GRAIN CORN

TILLAGE	
Moldboard	.27
Reduced Till	.16 [25-35]
No-Till	.08 [65-75]

[1/] Cover crop method of establishment is included for 2 or more years of silage corn. Unless specified the cover crop is established by disking. The "C" value may be reduced by.02 for no-till establishment and by.06 for interseeding.

[2/] Cover crop may be left or harvested.

[3/] Cover crop must be interseeded by August 31.

[4/] Includes fall and spring grain.

COVER AND MANAGEMENT FACTORS

SOYBEANS WITHOUT COVER CROP (all row widths)

SOYBEANS TWO OR MORE YEARS

TILLAGE	SOYBEAN RESIDUE MGT. LEFT	REMOVED [1/]
Moldboard	.29	.33
Reduced Till	.23 [<15]	.30 [<15]
No-Till	.13 [15-30]	.18 [15-30]

SOYBEANS AFTER HAY

TILLAGE	GRASS/LEG.	LEGUME
Moldboard	.09	.12
Reduced Till	.07 [20-30]	.09 [15-25]
No-Till spring kill	.03 [45-55]	.04 [35-45]
No-Till fall kill	.06 [20-30]	.09 [20-30]

SOYBEANS AFTER GRAIN CORN

TILLAGE	RESIDUE AFTER PLANTING RESIDUE RANGES	
Moldboard	.20	
Reduced Till	.12 [15-25]	.09 [25-35]
No-Till	.04 [50-60]	.06 [40-50]

SOYBEANS AFTER SILAGE CORN

TILLAGE	SIL. CORN COVER CROP MGT. COVER CROP	NO COVER
Moldboard	.18	.26
Reduced Till	.12 [15-25]	.25 [<15]
No-Till	.06 [50-60]	.16 [<15]

SOYBEANS AFTER SMALL GRAIN [2/]

TILLAGE	SM. GRAIN RESIDUE MGT. LEFT	REMOVED
Moldboard	.22	.23
Reduced Till	.13 [15-25]	.17 [<15]
No-Till	.05 [40-60]	.10 [15-35]

SOYBEANS AFTER FOR./GR. SORGHUM

TILLAGE	
Moldboard	.27
Reduced Till	.18 [15-30]
No-Till	.10 [30-40]

SOYBEANS WITH COVER CROP (all row widths) [3/]

SOYBEANS AFTER GRAIN CORN

TILLAGE	COVER CROP METHOD OF ESTABLISHMENT INTERSEEDED [4/]	REDUCED TILL	NO-TILL
Moldboard	.13	.19	.19
Reduced Till	.09 [20-30]	.11 [20-30]	.10 [20-30]
No-Till	.04 [50-60]	.05 [50-60]	.10 [50-60]

SOYBEANS TWO OR MORE YEARS

TILLAGE	COVER CROP METHOD OF ESTABLISHMENT INTERSEEDED [4/]	REDUCED TILL	NO-TILL
Moldboard	.15	.23	.24
Reduced Till	.10 [10-20]	.14 [20-30]	.13 [20-30]
No-Till	.03 [45-55]	.10 [35-45]	.08 [35-45]

[1/] Calculated based on the removal of 2000 pounds of residue per acre.

[2/] Include fall and spring grain.

[3/] If soybean residue is removed increase the selected "C" value by .02.

[4/] Interseeding must be completed prior to leaf drop.

COVER AND MANAGEMENT FACTORS

PERMANENT LIVING GROUND COVER

ESTABLISHMENT YEAR

TILLAGE	GRAIN CORN	SILAGE CORN	SOYBEANS
Moldboard	.20	.28	.30
Reduced Till	.11	.18	.16
No-Till	.02	.10	.11

FOLLOWING YEARS

TILLAGE	% GROUND COVER [1/]	GRAIN CORN	SILAGE CORN	SOYBEANS
No-Till	<20	.06	.06	.06
No-Till	20 - 40	.03	.03	.03
No-Till	40 - 60	.02	.02	.02
No-Till	60 - 80	.01	.01	.01
No-Till	>80	.005	.005	.005
Reduced Till	20 - 30 [2/]	.10	.13 [3/]	.11 [3/]
Reduced Till	30 - 40 [2/]	.06		

[1/] Refers to canopy from living ground cover.

[2/] Refers to canopy plus crop residue.

[3/] Normally this level cannot be achieved.

COVER AND MANAGEMENT FACTORS

SPRING GRAIN

SPRING GRAIN AFTER SOYBEANS

TILLAGE	SPRING GRAIN RESIDUE MGT. LEFT	REMOVED
Moldboard	.13	.19
Reduced Till	.10 [<15]	.16 [<15]
No-Till	.06 [30-40]	.11 [25-35]
No-Till after NT soybeans	.03 [40-50]	.07 [30-40]

SPRING GRAIN AFTER GRAIN CORN

TILLAGE	SPRING GRAIN RESIDUE MGT. LEFT	REMOVED
Moldboard	.10	.15
Reduced Till	.06 [15-25]	.10 [15-25]
No-Till	.03 [50-60]	.05 [50-60]
No-Till after NT gr. corn	.02 [55-65]	.03 [50-60]

SPRING GRAIN AFTER SILAGE CORN

TILLAGE	SPRING GRAIN RESIDUE MGT. LEFT	REMOVED
Moldboard	.14	.20
Reduced Till	.12 [<15]	.19 [<15]
No-Till	.09 [<15]	.15 [<15]
No-Till after NT sil. corn	.04 [20-30]	.09 [10-20]

SPRING GRAIN AFTER POTATOES

TILLAGE	SPRING GRAIN RESIDUE MGT. LEFT	REMOVED
Moldboard	.15	.22
Reduced Till	.15 [<15]	.21 [<15]
No-Till	.14 [<15]	.20 [<15]

SPRING GRAIN AFTER TOMATOES

TILLAGE	SPRING GRAIN RESIDUE MGT. LEFT	REMOVED
Moldboard	.15	.22
Reduced Till	.15 [<15]	.21 [<15]
No-Till	.14 [<15]	.20 [<15]

SPRING GRAIN AFTER SNAP BEANS

TILLAGE	SPRING GRAIN RESIDUE MGT. LEFT	REMOVED
Moldboard	.15	.22
Reduced Till	.14 [<15]	.21 [<15]
No-Till	.11 [<15]	.18 [<15]

SPRING GRAIN AFTER FALL GRAIN

FALL GRAIN RESIDUE LEFT

TILLAGE	SPRING GRAIN RESIDUE MGT. LEFT	REMOVED
Moldboard	.11	.17
Reduced Till	.06 [20-30]	.10 [20-30]
No-Till	.03 [45-55]	.05 [45-55]
No-Till after NT fall grain	.02 [55-65]	.04 [55-65]

FALL GRAIN RESIDUE REMOVED

TILLAGE	SPRING GRAIN RESIDUE MGT. LEFT	REMOVED
Moldboard	.12	.18
Reduced Till	.09 [<15]	.14 [<15]
No-Till	.07 [20-30]	.09 [20-30]
No-Till after NT fall grain	.04 [25-35]	.07 [25-35]

FALL GRAIN

CALCULATION OF "C" FACTORS FOR FALL PLANTED CROPS

Introduction: Generally spring planted crops are exposed to one full year (approximately 12 months) of erosivity. This period represents the time from spring tillage through harvest and concludes the following spring when tillage begins. However when a fall grain is introduced into the system, this 12 month interval is shortened to represent the time from spring tillage until tillage begins for the fall grain. This period is approximately 6 months but represents 75% of the erosivity.

Procedure: To represent this situation, select the appropriate "C" value for the preceding spring planted crop and multiply it by .75 to reflect planting of the fall crop. Use this value for the average annual "C" of the spring planted crop. The value for the fall planted crop is found the tables that follow. This value represents the time from the tillage of the fall crop through harvest the following summer and into the next spring when tillage begins. This represents a period approximately 15 months in length.

Summary: To calculate the rotational "C" value add the two values obtained through the above procedure to the values of all the other crops in the rotation and divide by the number of years of the rotation.

Example Rotation: Corn; Oats; Winter Wheat; (Double Crop) winter barley and soybeans.

Corn = Use value directly from tables.
Oats = Multiply the small grain value by .75 because the oats is followed by a fall grain.
Winter Wheat = Use values from the fall grain tables for fall grain following spring grain.
Double Crop = Use the appropriate value for fall grain following fall grain, multiply this value by .50 and add this calculated value to the value for double crop soybeans as per instructions contained in the double crop section.

FALL GRAIN AFTER GRAIN CORN

	FALL GRAIN RESIDUE MGT.	
TILLAGE	LEFT	REMOVED
Moldboard	.10	.14
Reduced Till	.05 [30-45]	.07 [30-50]
No-Till	.02 [60-75]	.04 [60-70]
No-Till after NT gr.. corn	.02 [60-75]	.03 [65-75]

FALL GRAIN AFTER SILAGE CORN

	FALL GRAIN RESIDUE MGT.	
TILLAGE	LEFT	REMOVED
Moldboard	.14	.19
Reduced Till	.11 [<15]	.18 [<15]
No-Till	.09 [<15]	.15 [<15]
No-Till after NT sil. corn	.05 [25-35]	.10 [10-20]

FALL GRAIN AFTER SOYBEANS

	FALL GRAIN RESIDUE MGT.	
TILLAGE	LEFT	REMOVED
Moldboard	.13	.19
Reduced Till	.10 [10-20]	.15 [10-20]
No-Till	.06 [25-35]	.12 [20-30]
No-Till after NT soybeans	05 [30-40]	.09 [25-35]

FALL GRAIN AFTER POTATOES

	FALL GRAIN RESIDUE MGT.	
TILLAGE	LEFT	REMOVED
Moldboard	.16	.22
Reduced Till	.15 [<15]	.21 [<15]

COVER AND MANAGEMENT FACTORS

FALL GRAIN (continued)

FALL GRAIN AFTER FALL GRAIN

PRIOR YEAR RESIDUE LEFT

TILLAGE	CURRENT YEAR RESIDUE MGT. LEFT	REMOVED
Moldboard	.11	.16
Reduced Till	.05 [30-50]	.08 [30-50]
No-Till	.02 [70-80]	.04 [70-80]

PRIOR YEAR RESIDUE REMOVED

TILLAGE	CURRENT YEAR RESIDUE MGT. LEFT	REMOVED
Moldboard	.13	.17
Reduced Till	.07 [20-30]	.12 [15-30]
No-Till	.04 [40-50]	.07 [40-50]

FALL GRAIN AFTER SPRING GRAIN

SPRING GRAIN RESIDUE LEFT

TILLAGE	FALL GRAIN RESIDUE MGT. LEFT	REMOVED
Moldboard	.12	.17
Reduced Till	.06 [20-35]	.10 [20-30]
No-Till	.03 [45-55]	.06 [45-55]

SPRING GRAIN RESIDUE REMOVED

TILLAGE	FALL GRAIN RESIDUE MGT. LEFT	REMOVED
Moldboard	.13	.18
Reduced Till	.08 [15-30]	.13 [10-20]
No-Till	.06 [25-35]	.10 [20-30]

FALL GRAIN AFTER TOMATOES

TILLAGE	FALL GRAIN RESIDUE MGT. LEFT	REMOVED
Moldboard	.15	.20
Reduced Till	.12 [15-25]	.17 [15-25]
No-Till	.10 [25-35]	.14 [25-35]
No-Till after NT tom.	.06 [40-50]	.09 [40-50]

FALL GRAIN AFTER SNAP BEANS

TILLAGE	FALL GRAIN RESIDUE MGT. LEFT	REMOVED
Moldboard	.16	.22
Reduced Till	.12 [10-20]	.17 [10-20]
No-Till	.10 [15-25]	.15 [15-25]
No-Till after NT sn. bns.	.06 [25-35]	.10 [25-35]

FALL GRAIN AFTER SWEET CORN

TILLAGE	FALL GRAIN RESIDUE MGT. LEFT	REMOVED
Moldboard	.12	.18
Reduced Till	.07 [25-35]	.12 [25-35]
No-Till	.05 [45-55]	.08 [45-55]
No-Till after NT sw. corn	.03 [55-65]	.06 [55-65]

FALL GRAIN AFTER PEAS

TILLAGE	FALL GRAIN RESIDUE MGT. LEFT	REMOVED
Moldboard	.18	.24
Reduced Till	.15 [<15]	.21 [<15]
No-Till	.11 [15-25]	.17 [15-25]

FALL GRAIN AFTER HAY

TILLAGE	FALL GRAIN RESIDUE MGT. LEFT	REMOVED
Moldboard	.05	.06
Reduced Till	.04 [15-30]	.05 [10-20]
No-Till	.01 [65-75]	.02 [45-55]

FALL GRAIN AFTER TOBACCO

TILLAGE	FALL GRAIN RESIDUE MGT. LEFT	REMOVED
Moldboard	.13	.18
Reduced Till	.12 [<15]	.18 [<15]
No-Till	.12 [<15]	.17 [<15]

COVER AND MANAGEMENT FACTORS

FALL GRAIN (continued)

FALL GRAIN AFTER SUNFLOWERS

TILLAGE	FALL GRAIN RESIDUE MGT. LEFT	REMOVED
Moldboard	.12	.18
Reduced Till	.08 [10-20]	.12 [10-20]
No-Till	.06 [25-40]	.11 [25-40]
No-Till after NT sunfls.	.03 [35-45]	.07 [35-45]

FALL GRAIN AFTER CANOLA

TILLAGE	FALL GRAIN RESIDUE MGT. LEFT	REMOVED
Moldboard	.16	.21
Reduced Till	.11 [10-20]	.18 [10-20]
No-Till	.07 [20-30]	.12 [20-30]
No-Till after NT canola	.07 [20-30]	.10 [30-40]

FALL GRAIN AFTER VINE CROPS [1/]

TILLAGE	FALL GRAIN RESIDUE MGT. LEFT	REMOVED
Moldboard	.17	.23
Reduced Till	.16 [10-15]	.22 [10-15]
No-Till	.14 [15-20]	.11 [15-20]

FALL GRAIN AFTER TUBER CROPS [2/]

TILLAGE	FALL GRAIN RESIDUE MGT. LEFT	REMOVED
Moldboard	.17	.23
Reduced Till	.16	.22

FALL GRAIN AFTER BUSH CROPS [3/]

TILLAGE	FALL GRAIN RESIDUE MGT. LEFT	REMOVED
Moldboard	.16	.23
Reduced Till	.13 [10-20]	.18 [10-20]
No-Till	.10 [15-25]	.15 [15-25]

[1/] Includes pumpkins, squash, melons and cucumbers.

[2/] Includes turnips, carrots, beets and radishes.

[3/] Includes cabbage, peppers, broccoli and cauliflower.

COVER AND MANAGEMENT FACTORS

HAY ESTABLISHMENT - SPRING [1/]

FOLLOWING SILAGE CORN

TILLAGE	DIRECT SEEDED	WITH OATS
All	.13	.06
No-Till	.10	.04

FOLLOWING GRAIN CORN

TILLAGE	DIRECT SEEDED	WITH OATS
All	.11	.05
No-Till	.02	.01

FOLLOWING SOYBEANS [2/]

TILLAGE	DIRECT SEEDED	WITH OATS
Moldboard	.13	.06
Reduced Till	.10	.05
No-Till	.04	.02

FOLLOWING VEGETABLES

TILLAGE	DIRECT SEEDED	WITH OATS
All	.16	.06
No-Till	.11	.04
No-Till into cover crop	.06	.02

HAY ESTABLISHMENT - SUMMER AND FALL [1/ 3/]

AFTER GRAIN CORN OR SMALL GRAIN

TILLAGE	DIRECT SEEDED	WITH FALL GR.
Moldboard	.11	.08
Reduced Till	.07 [15-30]	.06 [<15]
Reduced Till	.03 [30-50]	.04 [15-30]
No-Till	.02 [50-70]	.02 [30-50]

AFTER SOYBEANS OR VEGETABLES

TILLAGE	DIRECT SEEDED	WITH FALL GR.
Moldboard	.11	.11
Reduced Till	.07 [15-30]	.11 [<15]
Reduced Till	.03 [30-50]	.07 [15-30]
No-Till	.02 [50-70]	.05 [30-50]

ESTABLISHED HAY AND PASTURE

% GROUND COVER	DESCRIPTION	
80	Good Pasture / Hay (grass or grass/leg)	.005
60	Legume or Moderate Stand	.01
40	Poor Stand	.02
20	Very Poor Stand	.04

[1/] Use good judgment in selecting "C" values for conditions not specifically listed. Match cover and/or residue conditions as closely as is possible by considering the amount of the residue and how fragile that residue is.

[2/] Use this section for snap beans and other moderate residue vegetable crops.

[3/] Multiply the "C" value for the prior crop by O.5 and then add it to the value selected from this chart of an annual "C" value.

COVER AND MANAGEMENT FACTORS

DOUBLE CROPPING FOLLOWING HAY [1/]

GRAIN CORN

TILLAGE	
Moldboard	.10
Reduced Till	.07 [20-30]
No-Till	.02 [55-65]

SILAGE CORN

TILLAGE	
Moldboard	.15
Reduced Till	.12 [20-30]
No-Till	.04 [55-65]

CANOLA

TILLAGE	
Moldboard	.08
Reduced Till	.06 [10-20]
No-Till	.03 [30-50]

GRAIN SORGHUM

TILLAGE	
Moldboard	.07
Reduced Till	.05 [10-20]
No-Till	.02 [50-60]

SOYBEANS

TILLAGE	
Moldboard	.09
Reduced Till	.07 [10-20]
No-Till	.02 [55-65]

FORAGE SORGHUM

TILLAGE	
Moldboard	.07
Reduced Till	.05 [5-15]
No-Till	.02 [25-35]

POTATOES

TILLAGE	
Moldboard	.13

SWEET CORN

TILLAGE	
Moldboard	.09
No-Till	.02 [55-65]

DOUBLE CROPPING FOLLOWING SMALL GRAIN [2/]

GRAIN CORN (85 BU)

TILLAGE	
Moldboard	.14
Reduced Till	.04 [35-60]
No-Till	.01 [80-90]

SILAGE CORN (18 TONS)

TILLAGE	
Moldboard	.17
Reduced Till	.05 [35-60]
No-Till	.02 [80-90]

SOYBEANS (30 BU)

TILLAGE	
Moldboard	.19
Reduced Till	.05 [35-55]
No-Till	Use Fall Grain Value

CANOLA

TILLAGE	
Moldboard	.12
Reduced Till	.08 [35-55]
No-Till	Use Fall Grain Value

FORAGE SORGHUM

TILLAGE	
Moldboard	.12
Reduced Till	.06 [40-50]
No-Till [<15]	Use Fall Grain Value

GRAIN SORGHUM

TILLAGE	
Moldboard	.12
Reduced Till	.04 [40-50]
No-Till	Use Fall Grain Value

[1/] Use these average annual "C" values for the crop year.

[2/] For moldboard and reduced tillage values, multiply the appropriate fall grain "C" factor by 0.5 and add to the "C" factor for the double crop from these tables.

COVER AND MANAGEMENT FACTORS

OTHER CROPS [1/]

TOBACCO (moldboard)

	CROP FOLLOWING TOBACCO		
PREVIOUS CROP	ALFALFA	COVER CROP	NO COVER CROP
Grain Corn	.26	.36	.43
Silage Corn	.44	.50	.55
Small Grain [2/]	.40	.43	.51
Cover Crop	.29	.32	.39
Hay	.20	.24	.31

SUNFLOWERS

	TILLAGE FOR PRESENT CROP	
PREVIOUS CROP	MOLDBOARD	REDUCED TILLAGE
Grain Corn	.26	.19 [15-25]
Small Grain [2/]	.30	.21 [15-25]
Hay	.18	.14 [15-25]

FORAGE OR GRAIN SORGHUM

	TILLAGE FOR PRESENT CROP			
PREVIOUS CROP	MOLDBOARD	REDUCED TILL	NO-TILL	NO-TILL after NT prev. crop
Grain Corn	.26	.19 [15-25]	.03 [60-70]	.02 [65-75]
Small Grain [2/]	.21	.13 [15-25]	.06 [40-50]	.04 [45-55]
Low Residue	.24	.21 [<15]	.15 [10-20]	.11 [15-25]
Hay	.10	.06 [25-35]	.02 [65-75]	

STRAWBERRIES

FALL MULCH				
%	POUNDS	1st year	2nd year	3 or more years
0	0	.48	.35	.30
40	850	.40	.24	.20
60	1500	.36	.19	.16
80	2700	.34	.14	.11
90	4000	.34	.11	.09

[1/] Cover crop is established after harvest by disking. If cover crop is established by no-till reduce the selected "C" value by .02. If the cover crop is established by interseeding by August 31 reduce the selected "C" value by .06.

[2/] Includes fall and spring grain.

COVER AND MANAGEMENT FACTORS

VEGETABLE CROPS [1/]

POTATOES (moldboard)

PREVIOUS CROP	COVER CROP	NO COVER
Low Residue Crop	.36	.42
Grain Corn	.29	.34
Small Grain [2/]	.33	.39
Cover Crop	.27	.33
Hay	.21	.26

SNAP BEANS (moldboard)

PREVIOUS CROP	COVER CROP	NO COVER
Low Residue Crop	.37	.43
Grain Corn	.29	.34
Small Grain [2/]	.32	.39
Cover Crop	.26	.32
Hay	.21	.25

SNAP BEANS (reduced till)

PREVIOUS CROP	COVER CROP	NO COVER
Low Residue Crop	.36 [<15]	.42 [<15]
Grain Corn	.21 [15-25]	.24 [10-20]
Small Grain [2/]	.23 [15-25]	.26 [15-25]
Cover Crop	.20 [15-25]	.23 [15-25]
Hay	.15 [20-35]	.20 [20-35]

SNAP BEANS (no-till)

PREVIOUS CROP	COVER CROP	NO COVER
Low Residue Crop	.28 [10-20]	.31 [10-20]
Grain Corn	.08 [55-65]	.08 [55-65]
Small Grain [2/]	.14 [35-45]	.14 [35-45]
Cover Crop	.13 [45-55]	.13 [45-55]
Hay	.09 [60-70]	.10 [60-70]

SWEET CORN (moldboard)

PREVIOUS CROP	COVER CROP	NO COVER
Low Residue Crop	.25	.26
Small Grain [2/]	.19	.20
Grain Corn	.16	.17
Sweet Corn	.23	.24
Cover Crop	.17	.18
Hay	.11	.11

SWEET CORN (reduced till)

PREVIOUS CROP	COVER CROP	NO COVER
Low Residue Crop	.23 [<15]	.23 [<15]
Small Grain [2/]	.15 [15-25]	.15 [15-25]
Grain Corn	.10 [25-35]	.10 [25-35]
Sweet Corn	.19 [<15]	.19 [<15]
Cover Crop	.11 [20-30]	.11 [20-30]
Hay	.07 [30-40]	.07 [30-40]

SWEET CORN (no-till)

PREVIOUS CROP	COVER CROP	NO COVER
Low Residue Crop	.20 [<15]	.20 [<15]
Small Grain [2/]	.07 [45-55]	.07 [45-55]
Grain Corn	.05 [60-70]	.05 [60-70]
Sweet Corn	.11 [35-45]	.11 [35-45]
Cover Crop	.04 [70-80]	.04 [70-80]
Hay spring kill	.01 [65-75]	.01 [65-75]
Hay fall kill	.05 [35-45]	.05 [35-45]

TUBER CROP HARVESTED BY DIGGING [3/]

(moldboard)

PREVIOUS CROP	COVER CROP	NO COVER
Low Residue Crop	.54	.61
Small Grain [2/]	.45	.52
Grain Corn	.42	.48
Sweet Corn	.45	.52
Cover Crop	.34	.40
Hay	.25	.31

[1/] Cover crop is established after harvest by disking. If cover crop is established by no-till reduce the selected "C" value by .02. If the cover crop is established by interseeding by August 31 reduce the selected "C" value by .06.

[2/] Includes fall and spring grain, with and without residue removed.

[3/] Includes turnips, carrots, beets and radishes.

COVER AND MANAGEMENT FACTORS

VEGETABLE CROPS (continued) [1/]

BUSH CROPS (moldboard) [2/]

PREVIOUS CROP	COVER CROP	NO COVER
Low Residue Crop	.38	.40
Small Grain [3/]	.28	.32
Grain Corn	.28	.30
Sweet Corn	.28	.32
Cover Crop	.22	.24
Hay	.16	.17

BUSH CROPS (no-till) [2/]

PREVIOUS CROP	COVER CROP	NO COVER
Small Grain [3/]	.10 [30-50]	.10 [30-50]
Cover Crop	.08 [50-70]	.08 [50-70]
Hay	.05 [55-75]	.05 [55-75]

VINE CROPS (moldboard) [4/]

PREVIOUS CROP	COVER CROP	NO COVER
Low Residue Crop	.36	.40
Small Grain [3/]	.27	.30
Grain Corn	.27	.30
Sweet Corn	.27	.30
Cover Crop	.22	.24
Hay	.15	.18

VINE CROPS (no-till) [4/]

PREVIOUS CROP	COVER CROP	NO COVER
Small Grain [3/]	.12 [30-50]	.12 [30-50]
Cover Crop	.08 [50-70]	.08 [50-70]
Hay	.05 [55-75]	.05 [55-75]

TOMATOES (moldboard)

PREVIOUS CROP	COVER CROP	NO COVER
Low Residue Crop	.39	.42
Small Grain [3/]	.34	.35
Grain Corn	.27	.28
Sweet Corn	.36	.38
Cover Crop	.30	.32
Hay	.20	.24

TOMATOES (no-till)

PREVIOUS CROP	COVER CROP	NO COVER
Small Grain [3/]	.13 [40-50]	.13 [40-50]
Cover Crop	.12 [55-65]	.12 [55-65]
Hay	.08 [70-80]	.08 [70-80]

PEAS (moldboard)

PREVIOUS CROP	COVER CROP	NO COVER
Low Residue Crop	.22	.25
Small Grain [3/]	.20	.23
Grain Corn	.17	.21
Sweet Corn	.21	.24
Cover Crop	.18	.22
Hay	.14	.16

[1/] Cover crop is established after harvest by disking. If cover crop is established by no-till reduce the selected "C" value by .02. If the cover crop is established by interseeding by August 31 reduce the selected "C" value by .06.

[2/] Includes cabbage, peppers, broccoli and cauliflower.

[3/] Includes fall and spring grain, with and without residue removed.

[4/] Includes pumpkins, squash, melons and cucumbers.

FALL TILLAGE CONSIDERATIONS

ADJUSTMENT FOR FALL TILLAGE OPERATIONS CONSIDER MOLDBOARD PLOWING AND REDUCED TILLAGE WITH RESPECT TO LEVEL OF EXISTING RESIDUE ON THE SURFACE AFTER PRIOR CROP HARVEST AND IMMEDIATELY BEFORE FALL TILLAGE.

ADJUSTMENT FACTORS BASED ON PRIOR CROP RESIDUE

HIGH AND MODERATELY HIGH RESIDUE LEVELS: Includes grain corn, small grain, soybeans, hay, most vegetable crops and similar crops.

TILLAGE	ADJUSTMENT TO THE SPRING TILLAGE "C" FACTOR
Moldboard	+ .07
Reduced Till	+ .02

LOW AND VERY LOW RESIDUE LEVELS: Includes silage corn, soybeans with residue removed, tobacco and very low residue vegetable crops such as peppers.

TILLAGE	ADJUSTMENT TO THE SPRING TILLAGE "C" FACTOR
Moldboard	+ .09
Reduced Till	+ .07

ROW CULTIVATION CONSIDERATIONS

ADJUSTMENT FACTORS BASED ON PRIOR CROP RESIDUE

HIGH AND MODERATELY HIGH RESIDUE LEVELS: Includes grain corn, small grain, soybeans, hay, most vegetable crops and similar crops.

TILLAGE	ADJUSTMENT TO THE SPRING TILLAGE "C" FACTOR [1/]	
Moldboard	+ .01	
Reduced Till	+ .03	-approximaletly 65-75% residue LOST[2/]
No-Till	+ .06	-approximaletly 70-80% residue LOST[2/]

LOW AND VERY LOW RESIDUE LEVELS: Includes silage corn, soybeans with residue removed, tobacco and very low residue vegetable crops such as peppers.

TILLAGE	ADJUSTMENT TO THE SPRING TILLAGE "C" FACTOR[1/]	
Moldboard	none	
Reduced Till	+ .02	-approximately 75-85% residue LOST[2/]
No-Till	+ .11	-approximately 70-80% residue LOST[2/]

[1/] For 1 or 2 passes with the field cultivator.

[2/] Based on 2 passes of the field cultivator. Modern cultivators with sweeps may leave more residue. Contact the Harrisburg State Office for "C" adjustment factor.

TABLE P-1

COVER MANAGEMENT CONDITIONS

Select the cover management condition that best describes the condition after planting.

DESCRIPTION OF CONDITIONS

COVER MANGEMENT CONDITION	DESCRIPTION
(1) Unharvested Grass	Includes established hay and pasture that is not harvested
(2) Harvested Grass/Legume	Includes established hay and pasture that is harvested
(3) Heavy Cover	No-till into heavy cover with residue levels exceeding 50% or very rough surface condition
(4) Moderate Cover	No-till or mulch till with residue levels of 30-50% or rough surface conditions
(5) Light Cover	Reduced till or other cover condition with less than 30% residue or moderate roughness
(6) Clean Till	Generally moldboard plowed, not finely pulverized. Typical of ground preparation for field crops
(7) Clean Till (finely pulverized)	Generally moldboard plowed and finely pulverized. Typical for vegetable crops and some alfalfa seedings. Very smooth surface

TABLE P-2

GUIDELINES FOR SELECTING RIDGE HEIGHTS FOR CONTOURING WITH RUSLE

Select the ridge height that best describes the condition during the 1/4 of the year when rainfall and runoff are most erosive and the soil is most susceptible to erosion.

VERY LOW (0.5 - 2 in.) RIDGES

- Plants not closely spaced, but with a perceptible ridge height
- No-till planted row crops
- Fields that have been rolled, pressed or dragged after planting
- Conventionally drilled crops when erosive rains occur during or soon after planting
- and clear seeded hay that leaves a very low ridge

LOW (2 - 3 in.) RIDGES

- No-till drilled crops
- Mulch tilled row crops
- Conventionally planted row crops with no row cultivation
- Conventionally drilled small grain when erosive rains are uniformly distributed throughout the year
- Winter small grain when runoff from snowmelt occurs during winter and early spring
- Transplanted crops, widely spaced

MODERATE (3 - 4 in.) RIDGES)

- Conventionally (clean) tilled row crops with row cultivation
- High yielding winter small grain crops when erosive rains are concentrated in the late spring after plants have developed a stiff, upright stem
- Transplanted crops that are closely spaced and/or in narrow rows

HIGH (4 - 6 in.) RIDGES

- Ridge tilled crops with high (4-6") ridges during periods of erosive rain

VERY HIGH (Greater than 6 in.) RIDGES

- Ridge tilled crops with very high (6+") ridges during periods of erosive rains
- Hipping, bedding or ridging with very high ridges during periods of erosive rains

TABLE P - 3

CONTOUR (P) SUBFACTOR FOR ON-GRADE CONDITION

10-YEAR STORM EI=50

COVER-MANAGEMENT CONDITION--1

VERY LOW RIDGES (0.5-2")

	Slope %																					
Hyd.	0	1	2	3	4	5	6	8	10	12	14	16	18	20	24	28	32	36	40	45	50
A	1.00	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
B	1.00	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.52	0.59	0.67
C	1.00	0.54	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.53	0.66	0.79	0.93	1.00	1.00	1.00	1.00
D	1.00	0.60	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.53	0.61	0.68	0.77	0.95	1.00	1.00	1.00	1.00	1.00	1.00

LOW RIDGES (2-3")

	Slope %																					
Hyd.	0	1	2	3	4	5	6	8	10	12	14	16	18	20	24	28	32	36	40	45	50
A	1.00	0.48	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.33	0.40	0.46
B	1.00	0.52	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.34	0.39	0.45	0.51
C	1.00	0.57	0.34	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.33	0.37	0.45	0.54	0.64	0.74	0.84	0.97	1.00
D	1.00	0.61	0.40	0.30	0.30	0.30	0.30	0.30	0.30	0.33	0.37	0.42	0.47	0.53	0.65	0.78	0.92	1.00	1.00	1.00	1.00

MODERATE RIDGES (3-4")

	Slope %																					
Hyd.	0	1	2	3	4	5	6	8	10	12	14	16	18	20	24	28	32	36	40	45	50
A	1.00	0.54	0.26	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.18	0.22	0.27	0.33	0.39	0.46
B	1.00	0.56	0.30	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.17	0.22	0.26	0.31	0.36	0.42	0.48
C	1.00	0.59	0.35	0.21	0.15	0.15	0.15	0.15	0.15	0.15	0.17	0.20	0.22	0.25	0.31	0.38	0.45	0.52	0.60	0.69	0.79
D	1.00	0.62	0.39	0.26	0.20	0.18	0.17	0.18	0.19	0.22	0.25	0.28	0.32	0.36	0.44	0.54	0.64	0.74	0.85	0.98	1.00

HIGH RIDGES (4-6")

	Slope %																					
Hyd.	0	1	2	3	4	5	6	8	10	12	14	16	18	20	24	28	32	36	40	45	50
A	1.00	0.59	0.32	0.15	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.12	0.17	0.21	0.27	0.32	0.38	0.45
B	1.00	0.60	0.34	0.18	0.09	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.09	0.11	0.15	0.19	0.24	0.29	0.34	0.40	0.46
C	1.00	0.62	0.36	0.21	0.13	0.09	0.08	0.08	0.08	0.09	0.11	0.12	0.14	0.16	0.21	0.26	0.32	0.38	0.43	0.51	0.59
D	1.00	0.63	0.39	0.24	0.16	0.12	0.11	0.10	0.11	0.13	0.15	0.17	0.20	0.23	0.29	0.37	0.44	0.52	0.60	0.71	0.81

VERY HIGH RIDGES (>6")

	Slope %																					
Hyd.	0	1	2	3	4	5	6	8	10	12	14	16	18	20	24	28	32	36	40	45	50
A	1.00	0.59	0.32	0.15	0.06	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.06	0.08	0.12	0.17	0.21	0.27	0.32	0.38	0.45
B	1.00	0.59	0.32	0.16	0.07	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.07	0.09	0.13	0.18	0.22	0.27	0.32	0.39	0.45
C	1.00	0.60	0.33	0.17	0.09	0.05	0.05	0.05	0.05	0.05	0.05	0.07	0.09	0.10	0.14	0.19	0.24	0.29	0.34	0.40	0.46
D	1.00	0.60	0.34	0.18	0.10	0.06	0.05	0.05	0.05	0.06	0.07	0.09	0.11	0.13	0.18	0.23	0.29	0.34	0.40	0.48	0.56

10-YEAR STORM EI=50

COVER-MANAGEMENT CONDITION--2

VERY LOW RIDGES (0.5-2")

	Slope %																					
Hyd.	0	1	2	3	4	5	6	8	10	12	14	16	18	20	24	28	32	36	40	45	50
A	1.00	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
B	1.00	0.51	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.58	0.69	0.79	0.90	1.00	1.00
C	1.00	0.60	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.53	0.61	0.68	0.77	0.95	1.00	1.00	1.00	1.00	1.00	1.00
D	1.00	0.67	0.51	0.50	0.50	0.50	0.50	0.50	0.56	0.64	0.72	0.82	0.93	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

LOW RIDGES (2-3")

	Slope %																					
Hyd.	0	1	2	3	4	5	6	8	10	12	14	16	18	20	24	28	32	36	40	45	50
A	1.00	0.49	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.34	0.41	0.47
B	1.00	0.55	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.34	0.41	0.48	0.55	0.63	0.73	0.82
C	1.00	0.61	0.40	0.30	0.30	0.30	0.30	0.30	0.30	0.33	0.37	0.42	0.47	0.53	0.65	0.78	0.92	1.00	1.00	1.00	1.00
D	1.00	0.66	0.47	0.38	0.35	0.34	0.34	0.36	0.40	0.45	0.51	0.57	0.65	0.73	0.89	1.00	1.00	1.00	1.00	1.00	1.00

MODERATE RIDGES (3-4")

	Slope %																					
Hyd.	0	1	2	3	4	5	6	8	10	12	14	16	18	20	24	28	32	36	40	45	50
A	1.00	0.54	0.27	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.18	0.23	0.28	0.33	0.40	0.46
B	1.00	0.58	0.33	0.19	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.17	0.19	0.24	0.29	0.34	0.40	0.46	0.53	0.61
C	1.00	0.62	0.39	0.26	0.20	0.18	0.17	0.18	0.19	0.22	0.25	0.28	0.32	0.36	0.44	0.54	0.64	0.74	0.85	0.98	1.00
D	1.00	0.65	0.43	0.31	0.26	0.24	0.23	0.24	0.26	0.30	0.34	0.38	0.44	0.49	0.61	0.75	0.89	1.00	1.00	1.00	1.00

HIGH RIDGES (4-6")

	Slope %																					
Hyd.	0	1	2	3	4	5	6	8	10	12	14	16	18	20	24	28	32	36	40	45	50
A	1.00	0.59	0.32	0.16	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.09	0.13	0.17	0.22	0.27	0.32	0.39	0.45
B	1.00	0.61	0.35	0.20	0.11	0.08	0.08	0.08	0.08	0.08	0.08	0.10	0.11	0.13	0.17	0.21	0.26	0.30	0.35	0.42	0.48
C	1.00	0.63	0.39	0.24	0.16	0.12	0.11	0.10	0.11	0.13	0.15	0.17	0.20	0.23	0.29	0.37	0.44	0.52	0.60	0.71	0.81
D	1.00	0.64	0.41	0.27	0.19	0.16	0.14	0.14	0.15	0.17	0.20	0.24	0.27	0.32	0.41	0.51	0.61	0.72	0.84	0.98	1.00

VERY HIGH RIDGES (>6")

	Slope %																					
Hyd.	0	1	2	3	4	5	6	8	10	12	14	16	18	20	24	28	32	36	40	45	50
A	1.00	0.59	0.32	0.15	0.06	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.06	0.08	0.12	0.17	0.22	0.27	0.32	0.38	0.45
B	1.00	0.59	0.33	0.17	0.08	0.05	0.05	0.05	0.05	0.05	0.05	0.06	0.08	0.10	0.14	0.18	0.23	0.28	0.33	0.40	0.46
C	1.00	0.60	0.34	0.18	0.10	0.06	0.05	0.05	0.05	0.06	0.07	0.09	0.11	0.13	0.18	0.23	0.29	0.34	0.40	0.48	0.56
D	1.00	0.61	0.35	0.20	0.11	0.07	0.06	0.05	0.06	0.08	0.10	0.12	0.15	0.17	0.24	0.31	0.38	0.46	0.54	0.64	0.74

TABLE P - 3

CONTOUR (P) SUBFACTOR FOR ON-GRADE CONDITION

10-YEAR STORM EI=50

COVER-MANAGEMENT CONDITION--3

VERY LOW RIDGES (0.5-2")

Hyd.	Slope % 0	1	2	3	4	5	6	8	10	12	14	16	18	20	24	28	32	36	40	45	50
A	1.00	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
B	1.00	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.51	0.60	0.70	0.79	0.91	1.00
C	1.00	0.61	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.56	0.64	0.72	0.81	0.99	1.00	1.00	1.00	1.00	1.00	1.00
D	1.00	0.66	0.50	0.50	0.50	0.50	0.50	0.50	0.54	0.61	0.70	0.79	0.89	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

LOW RIDGES (2-3")

Hyd.	Slope % 0	1	2	3	4	5	6	8	10	12	14	16	18	20	24	28	32	36	40	45	50
A	1.00	0.51	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.32	0.37	0.43	0.49
B	1.00	0.54	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.36	0.42	0.49	0.56	0.64	0.73
C	1.00	0.62	0.41	0.31	0.30	0.30	0.30	0.30	0.31	0.34	0.39	0.44	0.49	0.55	0.68	0.82	0.97	1.00	1.00	1.00	1.00
D	1.00	0.65	0.46	0.37	0.33	0.32	0.32	0.34	0.38	0.43	0.49	0.55	0.62	0.69	0.86	1.00	1.00	1.00	1.00	1.00	1.00

MODERATE RIDGES (3-4")

Hyd.	Slope % 0	1	2	3	4	5	6	8	10	12	14	16	18	20	24	28	32	36	40	45	50
A	1.00	0.55	0.28	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.16	0.20	0.25	0.30	0.35	0.41	0.47
B	1.00	0.58	0.32	0.18	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.17	0.21	0.26	0.31	0.36	0.41	0.48	0.55
C	1.00	0.62	0.39	0.27	0.21	0.19	0.18	0.18	0.20	0.23	0.26	0.29	0.33	0.37	0.46	0.56	0.67	0.78	0.89	1.00	1.00
D	1.00	0.64	0.43	0.31	0.25	0.23	0.22	0.23	0.25	0.28	0.32	0.37	0.42	0.47	0.59	0.71	0.85	0.99	1.00	1.00	1.00

HIGH RIDGES (4-6")

Hyd.	Slope % 0	1	2	3	4	5	6	8	10	12	14	16	18	20	24	28	32	36	40	45	50
A	1.00	0.59	0.33	0.17	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.10	0.14	0.18	0.23	0.28	0.33	0.40	0.46
B	1.00	0.60	0.35	0.19	0.11	0.08	0.08	0.08	0.08	0.08	0.08	0.09	0.11	0.12	0.16	0.21	0.25	0.30	0.35	0.41	0.47
C	1.00	0.63	0.39	0.24	0.16	0.13	0.11	0.11	0.12	0.13	0.16	0.18	0.21	0.24	0.31	0.38	0.46	0.55	0.63	0.74	0.85
D	1.00	0.64	0.41	0.27	0.19	0.15	0.14	0.13	0.15	0.17	0.19	0.23	0.26	0.30	0.39	0.48	0.58	0.69	0.80	0.94	1.00

VERY HIGH RIDGES (>6")

Hyd.	Slope % 0	1	2	3	4	5	6	8	10	12	14	16	18	20	24	28	32	36	40	45	50
A	1.00	0.59	0.32	0.16	0.07	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.07	0.09	0.13	0.17	0.22	0.27	0.32	0.39	0.45
B	1.00	0.59	0.33	0.17	0.08	0.05	0.05	0.05	0.05	0.05	0.05	0.06	0.08	0.10	0.14	0.18	0.23	0.28	0.33	0.39	0.46
C	1.00	0.60	0.34	0.19	0.10	0.06	0.05	0.05	0.05	0.06	0.07	0.09	0.11	0.14	0.19	0.24	0.30	0.36	0.42	0.50	0.58
D	1.00	0.61	0.35	0.19	0.11	0.07	0.05	0.05	0.06	0.07	0.09	0.11	0.14	0.17	0.23	0.30	0.37	0.44	0.52	0.61	0.71

10-YEAR STORM EI=50

COVER-MANAGEMENT CONDITION--4

VERY LOW RIDGES (0.5-2")

Hyd.	Slope % 0	1	2	3	4	5	6	8	10	12	14	16	18	20	24	28	32	36	40	45	50
A	1.00	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.54
B	1.00	0.55	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.56	0.70	0.84	0.99	1.00	1.00	1.00	1.00
C	1.00	0.63	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.54	0.61	0.70	0.79	0.88	1.00	1.00	1.00	1.00	1.00	1.00	1.00
D	1.00	0.67	0.51	0.50	0.50	0.50	0.50	0.50	0.56	0.64	0.72	0.82	0.93	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

LOW RIDGES (2-3")

Hyd.	Slope % 0	1	2	3	4	5	6	8	10	12	14	16	18	20	24	28	32	36	40	45	50
A	1.00	0.51	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.32	0.37	0.43	0.49
B	1.00	0.58	0.35	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.31	0.35	0.39	0.48	0.57	0.67	0.78	0.89	1.00	1.00
C	1 00	0.63	0.43	0.33	0.30	0.30	0.30	0.30	0.34	0.38	0.43	0.48	0.54	0.61	0.75	0.90	1.00	1.00	1.00	1.00	1.00
D	1.00	0.66	0.47	0.38	0.35	0.34	0.34	0.36	0.40	0.45	0.51	0.57	0.65	0.73	0.89	1.00	1.00	1.00	1.00	1.00	1.00

MODERATE RIDGES (3-4")

Hyd.	Slope % 0	1	2	3	4	5	6	8	10	12	14	16	18	20	24	28	32	36	40	45	50
A	1.00	0.56	0.29	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.16	0.21	0.25	0.30	0.35	0.41	0.48
B	1.00	0.60	0.35	0.22	0.16	0.15	0.15	0.15	0.15	0.16	0.18	0.21	0.23	0.26	0.33	0.40	0.47	0.55	0.63	0.73	0.83
C	1.00	0.63	0.41	0.28	0.22	0.20	0.20	0.20	0.22	0.25	0.28	0.32	0.36	0.41	0.51	0.62	0.74	0.86	0.98	1.00	1.00
D	1.00	0.65	0.43	0.31	0.26	0.24	0.23	0.24	0.26	0.30	0.34	0.38	0.44	0.49	0.61	0.75	0.89	1.00	1.00	1.00	1.00

HIGH RIDGES (4-6")

Hyd.	Slope % 0	1	2	3	4	5	6	8	10	12	14	16	18	20	24	28	32	36	40	45	50
A	1.00	0.59	0.33	0.17	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.10	0.14	0.19	0.23	0.28	0.33	0.40	0.46
B	1.00	0.62	0.37	0.22	0.13	0.09	0.08	0.08	0.08	0.10	0.11	0.13	0.15	0.17	0.22	0.28	0.33	0.39	0.46	0.53	0.61
C	1.00	0.63	0.40	0.25	0.17	0.14	0.12	0.12	0.13	0.15	0.17	0.20	0.23	0.26	0.34	0.42	0.51	0.60	0.69	0.81	0.93
D	1.00	0.64	0.41	0.27	0.19	0.16	0.14	0.14	0.15	0.17	0.20	0.24	0.27	0.32	0.41	0.51	0.61	0.72	0.84	0.98	1.00

VERY HIGH RIDGES (>6")

Hyd.	Slope % 0	1	2	3	4	5	6	8	10	12	14	16	18	20	24	28	32	36	40	45	50
A	1.00	0.59	0.32	0.16	0.07	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.07	0.09	0.13	0.17	0.22	0.27	0.32	0.39	0.45
B	1.00	0.60	0.33	0.18	0.09	0.05	0.05	0.05	0.05	0.05	0.06	0.07	0.09	0.11	0.15	0.19	0.24	0.29	0.34	0.40	0.46
C	1.00	0.60	0.35	0.19	0.10	0.06	0.05	0.05	0.05	0.06	0.08	0.10	0.12	0.15	0.20	0.26	0.32	0.39	0.46	0.54	0.63
D	1.00	0.61	0.35	0.20	0.11	0.07	0.06	0.05	0.06	0.08	0.10	0.12	0.15	0.17	0.24	0.31	0.38	0.46	0.54	0.64	0.74

TABLE P - 3

CONTOUR (P) SUBFACTOR FOR ON-GRADE CONDITION

10-YEAR STORM EI=50

COVER-MANAGEMENT CONDITION--5

VERY LOW RIDGES (0.5-2")

	Slope %																					
Hyd.	0	1	2	3	4	5	6	8	10	12	14	16	18	20	24	28	32	36	40	45	50
A	1.00	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.56	0.64	0.74	0.84
B	1.00	0.58	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.52	0.59	0.66	0.82	0.98	1.00	1.00	1.00	1.00	1.00
C	1.00	0.65	0.50	0.50	0.50	0.50	0.50	0.50	0.51	0.59	0.67	0.76	0.86	0.96	1.00	1.00	1.00	1.00	1.00	1.00	1.00
D	1.00	0.69	0.55	0.50	0.50	0.50	0.50	0.54	0.60	0.69	0.78	0.89	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

LOW RIDGES (2-3")

	Slope %																					
Hyd.	0	1	2	3	4	5	6	8	10	12	14	16	18	20	24	28	32	36	40	45	50
A	1.00	0.53	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.35	0.41	0.46	0.54	0.61
B	1.00	0.59	0.37	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.32	0.36	0.41	0.45	0.56	0.67	0.79	0.92	1.00	1.00	1.00
C	1.00	0.64	0.45	0.35	0.32	0.31	0.31	0.33	0.37	0.41	0.47	0.53	0.59	0.66	0.82	0.99	1.00	1.00	1.00	1.00	1.00
D	1.00	0.67	0.49	0.41	0.37	0.37	0.37	0.39	0.43	0.49	0.55	0.62	0.70	0.79	0.97	1.00	1.00	1.00	1.00	1.00	1.00

MODERATE RIDGES (3-4")

	Slope %																					
Hyd.	0	1	2	3	4	5	6	8	10	12	14	16	18	20	24	28	32	36	40	45	50
A	1.00	0.57	0.31	0.16	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.19	0.23	0.27	0.32	0.37	0.43	0.49
B	1.00	0.61	0.37	0.24	0.18	0.15	0.15	0.15	0.17	0.19	0.21	0.24	0.27	0.31	0.38	0.46	0.55	0.64	0.73	0.85	0.96
C	1.00	0.64	0.42	0.30	0.24	0.22	0.21	0.22	0.24	0.27	0.31	0.35	0.40	0.45	0.56	0.68	0.81	0.94	1.00	1.00	1.00
D	1.00	0.66	0.45	0.33	0.28	0.26	0.25	0.26	0.29	0.32	0.37	0.42	0.47	0.54	0.67	0.82	0.97	1.00	1.00	1.00	1.00

HIGH RIDGES (4-6")

	Slope %																					
Hyd.	0	1	2	3	4	5	6	8	10	12	14	16	18	20	24	28	32	36	40	45	50
A	1.00	0.60	0.34	0.18	0.10	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.10	0.12	0.15	0.20	0.24	0.29	0.34	0.41	0.47
B	1.00	0.62	0.38	0.23	0.15	0.11	0.09	0.09	0.10	0.11	0.13	0.15	0.17	0.20	0.26	0.32	0.38	0.45	0.52	0.61	0.70
C	1.00	0.64	0.40	0.26	0.18	0.15	0.13	0.13	0.14	0.16	0.19	0.22	0.25	0.29	0.37	0.46	0.56	0.66	0.76	0.89	1.00
D	1.00	0.65	0.42	0.28	0.20	0.17	0.16	0.15	0.17	0.19	0.22	0.26	0.30	0.35	0.44	0.55	0.67	0.79	0.92	1.00	1.00

VERY HIGH RIDGES (>6")

	Slope %																					
Hyd.	0	1	2	3	4	5	6	8	10	12	14	16	18	20	24	28	32	36	40	45	50
A	1.00	0.59	0.32	0.16	0.08	0.05	0.05	0.05	0.05	0.05	0.05	0.06	0.07	0.09	0.13	0.18	0.23	0.28	0.33	0.39	0.46
B	1.00	0.60	0.34	0.18	0.09	0.05	0.05	0.05	0.05	0.05	0.06	0.08	0.10	0.12	0.16	0.20	0.25	0.31	0.36	0.43	0.50
C	1.00	0.60	0.35	0.19	0.11	0.07	0.05	0.05	0.06	0.07	0.09	0.11	0.13	0.16	0.22	0.28	0.35	0.42	0.50	0.59	0.68
D	1.00	0.61	0.35	0.20	0.11	0.07	0.06	0.06	0.07	0.08	0.10	0.13	0.16	0.19	0.26	0.34	0.42	0.50	0.59	0.70	0.81

10-YEAR STORM EI=50

COVER-MANAGEMENT CONDITION--6

VERY LOW RIDGES (0.5-2")

	Slope %																					
Hyd.	0	1	2	3	4	5	6	8	10	12	14	16	18	20	24	28	32	36	40	45	50
A	1.00	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.51	0.60	0.70	0.79	0.91	1.00
B	1.00	0.60	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.53	0.61	0.68	0.77	0.95	1.00	1.00	1.00	1.00	1.00	1.00
C	1.00	0.67	0.51	0.50	0.50	0.50	0.50	0.50	0.56	0.64	0.72	0.82	0.93	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
D	1.00	0.70	0.56	0.51	0.50	0.50	0.51	0.56	0.63	0.71	0.81	0.92	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

LOW RIDGES (2-3")

	Slope %																					
Hyd.	0	1	2	3	4	5	6	8	10	12	14	16	18	20	24	28	32	36	40	45	50
A	1.00	0.54	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.36	0.42	0.49	0.56	0.64	0.73
B	1.00	0.61	0.40	0.30	0.30	0.30	0.30	0.30	0.30	0.33	0.37	0.42	0.47	0.53	0.65	0.78	0.92	1.00	1.00	1.00	1.00
C	1.00	0.66	0.47	0.38	0.35	0.34	0.34	0.36	0.40	0.45	0.51	0.57	0.65	0.73	0.89	1.00	1.00	1.00	1.00	1.00	1.00
D	1.00	0.68	0.50	0.42	0.39	0.38	0.38	0.40	0.45	0.51	0.57	0.65	0.73	0.82	1.00	1.00	1.00	1.00	1.00	1.00	1.00

MODERATE RIDGES (3-4")

	Slope %																					
Hyd.	0	1	2	3	4	5	6	8	10	12	14	16	18	20	24	28	32	36	40	45	50
A	1.00	0.58	0.32	0.18	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.17	0.21	0.26	0.31	0.36	0.41	0.48	0.55
B	1.00	0.62	0.39	0.26	0.20	0.18	0.17	0.18	0.19	0.22	0.25	0.28	0.32	0.36	0.44	0.54	0.64	0.74	0.85	0.98	1.00
C	1.00	0.65	0.43	0.31	0.26	0.24	0.23	0.24	0.26	0.30	0.34	0.38	0.44	0.49	0.61	0.75	0.89	1.00	1.00	1.00	1.00
D	1.00	0.66	0.45	0.34	0.29	0.27	0.26	0.27	0.30	0.34	0.38	0.44	0.50	0.56	0.70	0.85	1.00	1.00	1.00	1.00	1.00

HIGH RIDGES (4-6")

	Slope %																					
Hyd.	0	1	2	3	4	5	6	8	10	12	14	16	18	20	24	28	32	36	40	45	50
A	1.00	0.60	0.35	0.19	0.11	0.08	0.08	0.08	0.08	0.08	0.08	0.09	0.11	0.12	0.16	0.21	0.25	0.30	0.35	0.41	0.47
B	1.00	0.63	0.39	0.24	0.16	0.12	0.11	0.10	0.11	0.13	0.15	0.17	0.20	0.23	0.29	0.37	0.44	0.52	0.60	0.71	0.81
C	1.00	0.64	0.41	0.27	0.19	0.16	0.14	0.14	0.15	0.17	0.20	0.24	0.27	0.32	0.41	0.51	0.61	0.72	0.84	0.98	1.00
D	1.00	0.65	0.42	0.29	0.21	0.17	0.16	0.16	0.17	0.20	0.23	0.27	0.31	0.36	0.47	0.58	0.70	0.83	0.96	1.00	1.00

VERY HIGH RIDGES (>6")

	Slope %																					
Hyd.	0	1	2	3	4	5	6	8	10	12	14	16	18	20	24	28	32	36	40	45	50
A	1.00	0.59	0.33	0.17	0.08	0.05	0.05	0.05	0.05	0.05	0.05	0.06	0.08	0.10	0.14	0.18	0.23	0.28	0.33	0.39	0.46
B	1.00	0.60	0.34	0.18	0.10	0.06	0.05	0.05	0.05	0.06	0.07	0.09	0.11	0.13	0.18	0.23	0.29	0.34	0.40	0.48	0.56
C	1.00	0.61	0.35	0.20	0.11	0.07	0.06	0.05	0.06	0.08	0.10	0.12	0.15	0.17	0.24	0.31	0.38	0.46	0.54	0.64	0.74
D	1.00	0.61	0.36	0.20	0.12	0.08	0.06	0.06	0.07	0.09	0.11	0.14	0.17	0.20	0.27	0.35	0.43	0.52	0.61	0.73	0.84

TABLE P - 3

CONTOUR (P) SUBFACTOR FOR ON-GRADE CONDITION

10-YEAR STORM EI=50

COVER-MANAGEMENT CONDITION--7

VERY LOW RIDGES (0.5-2")

Hyd.	Slope % 0	1	2	3	4	5	6	8	10	12	14	16	18	20	24	28	32	36	40	45	50
A	1.00	0.59	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.51	0.58	0.65	0.73	0.90	1.00	1.00	1.00	1.00	1.00	1.00
B	1.00	0.68	0.53	0.50	0.50	0.50	0.50	0.52	0.58	0.66	0.75	0.85	0.96	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
C	1.00	0.74	0.62	0.57	0.56	0.56	0.57	0.63	0.70	0.79	0.90	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
D	1.00	0.78	0.67	0.64	0.63	0.63	0.64	0.70	0.77	0.87	0.98	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

LOW RIDGES (2-3")

Hyd.	Slope % 0	1	2	3	4	5	6	8	10	12	14	16	18	20	24	28	32	36	40	45	50
A	1.00	0.60	0.39	0.30	0.30	0.30	0.30	0.30	0.30	0.31	0.35	0.40	0.45	0.50	0.62	0.74	0.88	1.00	1.00	1.00	1.00
B	1.00	0.66	0.48	0.39	0.36	0.35	0.35	0.37	0.41	0.47	0.53	0.60	0.67	0.76	0.93	1.00	1.00	1.00	1.00	1.00	1.00
C	1.00	0.70	0.54	0.46	0.43	0.43	0.43	0.45	0.51	0.57	0.64	0.73	0.82	0.92	1.00	1.00	1.00	1.00	1.00	1.00	1.00
D	1.00	0.73	0.58	0.51	0.48	0.48	0.48	0.51	0.56	0.64	0.72	0.81	0.92	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

MODERATE RIDGES (3-4")

Hyd.	Slope % 0	1	2	3	4	5	6	8	10	12	14	16	18	20	24	28	32	36	40	45	50
A	1.00	0.61	0.38	0.25	0.19	0.17	0.16	0.17	0.18	0.21	0.23	0.27	0.30	0.34	0.42	0.51	0.61	0.71	0.81	0.94	1.00
B	1.00	0.65	0.44	0.32	0.27	0.25	0.24	0.25	0.27	0.31	0.35	0.40	0.45	0.51	0.64	0.78	0.93	1.00	1.00	1.00	1.00
C	1.00	0.68	0.48	0.37	0.32	0.30	0.30	0.30	0.33	0.38	0.43	0.49	0.56	0.64	0.80	0.97	1.00	1.00	1.00	1.00	1.00
D	1.00	0.69	0.50	0.40	0.35	0.34	0.33	0.34	0.38	0.43	0.49	0.56	0.63	0.72	0.90	1.00	1.00	1.00	1.00	1.00	1.00

HIGH RIDGES (4-6")

Hyd.	Slope % 0	1	2	3	4	5	6	8	10	12	14	16	18	20	24	28	32	36	40	45	50
A	1.00	0.63	0.38	0.24	0.15	0.12	0.10	0.10	0.11	0.12	0.14	0.16	0.19	0.22	0.28	0.35	0.42	0.50	0.58	0.67	0.77
B	1.00	0.65	0.42	0.28	0.20	0.16	0.15	0.15	0.16	0.18	0.21	0.25	0.29	0.33	0.43	0.53	0.64	0.76	0.88	1.00	1.00
C	1.00	0.66	0.44	0.30	0.23	0.19	0.18	0.18	0.19	0.22	0.26	0.31	0.36	0.41	0.53	0.66	0.81	0.95	1.00	1.00	1.00
D	1.00	0.67	0.45	0.32	0.25	0.21	0.20	0.20	0.22	0.25	0.30	0.35	0.41	0.47	0.61	0.76	0.92	1.00	1.00	1.00	1.00

VERY HIGH RIDGES (>6")

Hyd.	Slope % 0	1	2	3	4	5	6	8	10	12	14	16	18	20	24	28	32	36	40	45	50
A	1.00	0.60	0.34	0.18	0.10	0.06	0.05	0.05	0.05	0.05	0.07	0.09	0.10	0.13	0.17	0.22	0.28	0.33	0.39	0.46	0.54
B	1.00	0.61	0.35	0.20	0.11	0.07	0.06	0.05	0.06	0.08	0.10	0.12	0.15	0.18	0.25	0.32	0.40	0.48	0.56	0.67	0.77
C	1.00	0.61	0.36	0.21	0.12	0.08	0.07	0.07	0.08	0.10	0.12	0.15	0.19	0.23	0.31	0.40	0.49	0.59	0.70	0.83	0.96
D	1.00	0.62	0.37	0.21	0.13	0.09	0.08	0.07	0.09	0.11	0.14	0.17	0.21	0.26	0.35	0.45	0.56	0.68	0.80	0.95	1.00

TABLE P - 3

CONTOUR (P) SUBFACTOR FOR ON-GRADE CONDITION

10-YEAR STORM EI=60

COVER-MANAGEMENT CONDITION--1

VERY LOW RIDGES (0.5-2")

Hyd.	Slope % 0	1	2	3	4	5	6	8	10	12	14	16	18	20	24	28	32	36	40	45	50
A	1.00	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
B	1.00	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.54	0.63	0.72	0.82	0.93
C	1.00	0.58	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.55	0.62	0.69	0.85	1.00	1.00	1.00	1.00	1.00	1.00
D	1.00	0.65	0.50	0.50	0.50	0.50	0.50	0.50	0.51	0.58	0.66	0.75	0.85	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00

LOW RIDGES (2-3")

Hyd.	Slope % 0	1	2	3	4	5	6	8	10	12	14	16	18	20	24	28	32	36	40	45	50
A	1.00	0.48	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.33	0.40	0.46
B	1.00	0.54	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.33	0.39	0.45	0.51	0.59	0.67
C	1.00	0.60	0.38	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.33	0.38	0.42	0.47	0.58	0.70	0.83	0.96	1.00	1.00	1.00
D	1.00	0.64	0.44	0.35	0.32	0.31	0.31	0.33	0.36	0.41	0.46	0.52	0.59	0.66	0.81	0.98	1.00	1.00	1.00	1.00	1.00

MODERATE RIDGES (3-4")

Hyd.	Slope % 0	1	2	3	4	5	6	8	10	12	14	16	18	20	24	28	32	36	40	45	50
A	1.00	0.54	0.26	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.18	0.22	0.27	0.33	0.39	0.46
B	1.00	0.57	0.31	0.17	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.16	0.20	0.24	0.29	0.33	0.38	0.45	0.51
C	1.00	0.61	0.37	0.24	0.18	0.16	0.16	0.16	0.17	0.20	0.22	0.25	0.28	0.32	0.40	0.48	0.57	0.67	0.76	0.88	1.00
D	1.00	0.64	0.42	0.30	0.24	0.22	0.21	0.22	0.24	0.27	0.31	0.35	0.39	0.44	0.55	0.67	0.80	0.93	1.00	1.00	1.00

HIGH RIDGES (4-6")

Hyd.	Slope % 0	1	2	3	4	5	6	8	10	12	14	16	18	20	24	28	32	36	40	45	50
A	1.00	0.59	0.32	0.15	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.12	0.17	0.21	0.27	0.32	0.38	0.45
B	1.00	0.60	0.34	0.19	0.10	0.08	0.08	0.08	0.08	0.08	0.08	0.09	0.10	0.12	0.16	0.20	0.25	0.30	0.35	0.41	0.47
C	1.00	0.62	0.38	0.23	0.15	0.11	0.10	0.09	0.10	0.12	0.13	0.16	0.18	0.21	0.27	0.33	0.40	0.47	0.55	0.64	0.73
D	1.00	0.64	0.40	0.26	0.18	0.14	0.13	0.13	0.14	0.16	0.18	0.21	0.25	0.29	0.37	0.46	0.55	0.65	0.75	0.88	1.00

VERY HIGH RIDGES (>6")

Hyd.	Slope % 0	1	2	3	4	5	6	8	10	12	14	16	18	20	24	28	32	36	40	45	50
A	1.00	0.59	0.32	0.15	0.06	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.06	0.08	0.12	0.17	0.21	0.27	0.32	0.38	0.45
B	1.00	0.59	0.33	0.17	0.08	0.05	0.05	0.05	0.05	0.05	0.05	0.06	0.08	0.09	0.14	0.18	0.23	0.28	0.33	0.39	0.46
C	1.00	0.60	0.34	0.18	0.09	0.05	0.05	0.05	0.05	0.05	0.07	0.08	0.10	0.12	0.16	0.21	0.26	0.32	0.37	0.44	0.51
D	1.00	0.60	0.35	0.19	0.11	0.07	0.05	0.05	0.06	0.07	0.09	0.11	0.13	0.16	0.22	0.28	0.35	0.42	0.49	0.58	0.68

10-YEAR STORM EI=60

COVER-MANAGEMENT CONDITION--2

VERY LOW RIDGES (0.5-2")

Hyd.	Slope % 0	1	2	3	4	5	6	8	10	12	14	16	18	20	24	28	32	36	40	45	50
A	1.00	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
B	1.00	0.54	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.53	0.65	0.78	0.92	1.00	1.00	1.00	1.00
C	1.00	0.65	0.50	0.50	0.50	0.50	0.50	0.50	0.51	0.58	0.66	0.75	0.85	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
D	1.00	0.72	0.59	0.54	0.53	0.53	0.54	0.59	0.66	0.75	0.86	0.97	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

LOW RIDGES (2-3")

Hyd.	Slope % 0	1	2	3	4	5	6	8	10	12	14	16	18	20	24	28	32	36	40	45	50
A	1.00	0.50	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.35	0.42	0.48
B	1.00	0.57	0.34	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.32	0.36	0.45	0.54	0.63	0.73	0.83	0.96	1.00
C	1.00	0.64	0.44	0.35	0.32	0.31	0.31	0.33	0.36	0.41	0.46	0.52	0.59	0.66	0.81	0.98	1.00	1.00	1.00	1.00	1.00
D	1.00	0.69	0.52	0.44	0.41	0.40	0.40	0.43	0.48	0.54	0.61	0.69	0.78	0.87	1.00	1.00	1.00	1.00	1.00	1.00	1.00

MODERATE RIDGES (3-4")

Hyd.	Slope % 0	1	2	3	4	5	6	8	10	12	14	16	18	20	24	28	32	36	40	45	50
A	1.00	0.55	0.27	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.19	0.24	0.29	0.34	0.40	0.47
B	1.00	0.59	0.35	0.21	0.15	0.15	0.15	0.15	0.15	0.15	0.17	0.19	0.22	0.25	0.31	0.37	0.44	0.52	0.59	0.68	0.78
C	1.00	0.64	0.42	0.30	0.24	0.22	0.21	0.22	0.24	0.27	0.31	0.35	0.39	0.44	0.55	0.67	0.80	0.93	1.00	1.00	1.00
D	1.00	0.67	0.47	0.36	0.30	0.28	0.28	0.29	0.32	0.36	0.41	0.46	0.53	0.60	0.75	0.91	1.00	1.00	1.00	1.00	1.00

HIGH RIDGES (4-6")

Hyd.	Slope % 0	1	2	3	4	5	6	8	10	12	14	16	18	20	24	28	32	36	40	45	50
A	1.00	0.59	0.32	0.16	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.09	0.13	0.18	0.22	0.27	0.33	0.39	0.45
B	1.00	0.61	0.36	0.21	0.13	0.09	0.08	0.08	0.08	0.09	0.10	0.12	0.14	0.16	0.21	0.26	0.32	0.37	0.43	0.51	0.58
C	1.00	0.64	0.40	0.26	0.18	0.14	0.13	0.13	0.14	0.16	0.18	0.21	0.25	0.29	0.37	0.46	0.55	0.65	0.75	0.88	1.00
D	1.00	0.65	0.43	0.29	0.22	0.18	0.17	0.17	0.18	0.21	0.25	0.29	0.33	0.39	0.50	0.62	0.75	0.89	1.00	1.00	1.00

VERY HIGH RIDGES (>6")

Hyd.	Slope % 0	1	2	3	4	5	6	8	10	12	14	16	18	20	24	28	32	36	40	45	50
A	1.00	0.59	0.32	0.16	0.07	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.07	0.08	0.13	0.17	0.22	0.27	0.32	0.39	0.45
B	1.00	0.60	0.33	0.17	0.09	0.05	0.05	0.05	0.05	0.05	0.05	0.07	0.09	0.10	0.14	0.19	0.24	0.28	0.34	0.40	0.46
C	1.00	0.60	0.35	0.19	0.11	0.07	0.05	0.05	0.06	0.07	0.09	0.11	0.13	0.16	0.22	0.28	0.35	0.42	0.49	0.58	0.68
D	1.00	0.61	0.36	0.20	0.12	0.08	0.07	0.06	0.07	0.09	0.12	0.14	0.18	0.21	0.29	0.37	0.46	0.56	0.65	0.78	0.90

TABLE P - 3

CONTOUR (P) SUBFACTOR FOR ON-GRADE CONDITION

10-YEAR STORM EI=60

COVER-MANAGEMENT CONDITION--3

VERY LOW RIDGES (0.5-2")

Hyd.	Slope % 0	1	2	3	4	5	6	8	10	12	14	16	18	20	24	28	32	36	40	45	50
A	1.00	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.53	0.61	0.69
B	1.00	0.53	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.58	0.69	0.82	0.94	1.00	1.00	1.00
C	1.00	0.66	0.50	0.50	0.50	0.50	0.50	0.50	0.53	0.60	0.69	0.78	0.88	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00
D	1.00	0.71	0.57	0.52	0.51	0.51	0.52	0.57	0.64	0.73	0.83	0.94	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

LOW RIDGES (2-3")

Hyd.	Slope % 0	1	2	3	4	5	6	8	10	12	14	16	18	20	24	28	32	36	40	45	50
A	1.00	0.52	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.35	0.39	0.46	0.52
B	1.00	0.56	0.32	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.32	0.40	0.48	0.56	0.65	0.74	0.85	0.97
C	1.00	0.65	0.45	0.36	0.33	0.32	0.32	0.34	0.38	0.43	0.48	0.54	0.61	0.69	0.85	1.00	1.00	1.00	1.00	1.00	1.00
D	1.00	0.68	0.51	0.43	0.40	0.39	0.39	0.41	0.46	0.52	0.59	0.66	0.75	0.84	1.00	1.00	1.00	1.00	1.00	1.00	1.00

MODERATE RIDGES (3-4")

Hyd.	Slope % 0	1	2	3	4	5	6	8	10	12	14	16	18	20	24	28	32	36	40	45	50
A	1.00	0.56	0.30	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.17	0.22	0.26	0.31	0.36	0.42	0.48
B	1.00	0.59	0.34	0.20	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.17	0.20	0.22	0.28	0.33	0.40	0.46	0.53	0.61	0.70
C	1.00	0.64	0.42	0.30	0.25	0.23	0.22	0.23	0.25	0.28	0.32	0.36	0.41	0.46	0.58	0.70	0.84	0.98	1.00	1.00	1.00
D	1.00	0.66	0.46	0.35	0.29	0.27	0.27	0.28	0.30	0.34	0.39	0.45	0.51	0.57	0.72	0.87	1.00	1.00	1.00	1.00	1.00

HIGH RIDGES (4-6")

Hyd.	Slope % 0	1	2	3	4	5	6	8	10	12	14	16	18	20	24	28	32	36	40	45	50
A	1.00	0.60	0.34	0.18	0.09	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.09	0.11	0.15	0.19	0.24	0.29	0.34	0.40	0.47
B	1.00	0.61	0.36	0.21	0.12	0.08	0.08	0.08	0.08	0.08	0.09	0.11	0.13	0.15	0.19	0.24	0.29	0.34	0.39	0.46	0.53
C	1.00	0.64	0.41	0.26	0.19	0.15	0.14	0.13	0.14	0.17	0.19	0.22	0.26	0.30	0.38	0.48	0.58	0.68	0.79	0.93	1.00
D	1.00	0.65	0.43	0.29	0.21	0.18	0.16	0.16	0.18	0.20	0.24	0.28	0.32	0.37	0.48	0.60	0.72	0.85	0.99	1.00	1.00

VERY HIGH RIDGES (>6")

Hyd.	Slope % 0	1	2	3	4	5	6	8	10	12	14	16	18	20	24	28	32	36	40	45	50
A	1.00	0.59	0.32	0.16	0.07	0.05	0.05	0.05	0.05	0.05	0.05	0.06	0.07	0.09	0.13	0.18	0.22	0.27	0.32	0.39	0.45
B	1.00	0.59	0.33	0.17	0.08	0.05	0.05	0.05	0.05	0.05	0.05	0.07	0.08	0.10	0.14	0.19	0.23	0.28	0.33	0.40	0.46
C	1.00	0.61	0.35	0.19	0.11	0.07	0.05	0.05	0.06	0.07	0.09	0.11	0.14	0.17	0.23	0.29	0.36	0.44	0.51	0.61	0.70
D	1.00	0.61	0.36	0.20	0.12	0.08	0.06	0.06	0.07	0.09	0.11	0.14	0.17	0.20	0.28	0.36	0.44	0.54	0.63	0.75	0.86

10-YEAR STORM EI=60

COVER-MANAGEMENT CONDITION--4

VERY LOW RIDGES (0.5-2")

Hyd	Slope % 0	1	2	3	4	5	6	8	10	12	14	16	18	20	24	28	32	36	40	45	50
A	1.00	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.57	0.66	0.75
B	1.00	0.59	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.51	0.57	0.65	0.73	0.90	1.00	1.00	1.00	1.00	1.00	1.00
C	1.00	0.68	0.52	0.50	0.50	0.50	0.50	0.51	0.57	0.65	0.74	0.84	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
D	1.00	0.72	0.59	0.54	0.53	0.53	0.54	0.59	0.66	0.75	0.86	0.97	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

LOW RIDGES (2-3")

Hyd.	Slope % 0	1	2	3	4	5	6	8	10	12	14	16	18	20	24	28	32	36	40	45	50
A	.00	0.52	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.32	0.37	0.42	0.49	0.55
B	1.00	0.60	0.39	0.30	0.30	0.30	0.30	0.30	0.30	0.31	0.35	0.40	0.45	0.50	0.61	0.74	0.87	1.00	1.00	1.00	1.00
C	1.00	0.66	0.48	0.39	0.35	0.35	0.35	0.37	0.41	0.46	0.52	0.59	0.67	0.75	0.92	1.00	1.00	1.00	1.00	1.00	1.00
D	1.00	0.69	0.52	0.44	0.41	0.40	0.40	0.43	0.48	0.54	0.61	0.69	0.78	0.87	1.00	1.00	1.00	1.00	1.00	1.00	1.00

MODERATE RIDGES (3-4")

Hyd.	Slope % 0	1	2	3	4	5	6	8	10	12	14	16	18	20	24	28	32	36	40	45	50
A	1.00	0.56	0.30	0.16	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.18	0.22	0.27	0.32	0.36	0.43	0.49
B	1.00	0.61	0.38	0.25	0.19	0.17	0.16	0.17	0.18	0.21	0.23	0.26	0.30	0.34	0.42	0.51	0.60	0.70	0.80	0.93	1.00
C	1.00	0.65	0.44	0.32	0.27	0.25	0.24	0.25	0.27	0.30	0.35	0.40	0.45	0.51	0.63	0.77	0.91	1.00	1.00	1.00	1.00
D	1.00	0.67	0.47	0.36	0.30	0.28	0.28	0.29	0.32	0.36	0.41	0.46	0.53	0.60	0.75	0.91	1.00	1.00	1.00	1.00	1.00

HIGH RIDGES (4-6")

Hyd.	Slope % 0	1	2	3	4	5	6	8	10	12	14	16	18	20	24	28	32	36	40	45	50
A	1.00	0.60	0.34	0.18	0.09	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.09	0.11	0.15	0.19	0.24	0.29	0.34	0.40	0.47
B	1.00	0.63	0.38	0.23	0.15	0.12	0.10	0.10	0.11	0.12	0.14	0.16	0.19	0.22	0.28	0.35	0.42	0.49	0.57	0.67	0.77
C	1.00	0.64	0.41	0.27	0.20	0.16	0.15	0.14	0.16	0.18	0.21	0.24	0.28	0.33	0.42	0.52	0.63	0.75	0.86	1.00	1.00
D	1.00	0.65	0.43	0.29	0.22	0.18	0.17	0.17	0.18	0.21	0.25	0.29	0.33	0.39	0.50	0.62	0.75	0.89	1.00	1.00	1.00

VERY HIGH RIDGES (>6")

Hyd.	Slope % 0	1	2	3	4	5	6	8	10	12	14	16	18	20	24	28	32	36	40	45	50
A	1.00	0.59	0.32	0.16	0.07	0.05	0.05	0.05	0.05	0.05	0.05	0.06	0.07	0.09	0.13	0.18	0.22	0.27	0.33	0.39	0.46
B	1.00	0.60	0.34	0.18	0.10	0.06	0.05	0.05	0.05	0.05	0.07	0.08	0.10	0.12	0.17	0.22	0.27	0.33	0.39	0.46	0.53
C	1.00	0.61	0.35	0.20	0.11	0.07	0.06	0.05	0.06	0.08	0.10	0.12	0.15	0.18	0.25	0.32	0.39	0.47	0.56	0.66	0.76
D	1.00	0.61	0.36	0.20	0.12	0.08	0.07	0.06	0.07	0.09	0.12	0.14	0.18	0.21	0.29	0.37	0.46	0.56	0.65	0.78	0.90

TABLE P - 3

CONTOUR (P) SUBFACTOR FOR ON-GRADE CONDITION

10-YEAR STORM EI=60

COVER-MANAGEMENT CONDITION--5

VERY LOW RIDGES (0.5-2")

	Slope %																					
Hyd.	0	1	2	3	4	5	6	8	10	12	14	16	18	20	24	28	32	36	40	45	50
A	1.00	0.51	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.57	0.67	0.78	0.88	1.00	1.00
B	1.00	0.62	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.51	0.58	0.66	0.75	0.84	1.00	1.00	1.00	1.00	1.00	1.00	1.00
C	1.00	0.70	0.56	0.50	0.50	0.50	0.50	0.55	0.62	0.70	0.80	0.91	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
D	1.00	0.74	0.62	0.58	0.57	0.57	0.58	0.63	0.71	0.80	0.91	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

LOW RIDGES (2-3")

	Slope %																					
Hyd.	0	1	2	3	4	5	6	8	10	12	14	16	18	20	24	28	32	36	40	45	50
A	1.00	0.55	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.33	0.40	0.47	0.54	0.62	0.71	0.81
B	1.00	0.62	0.41	0.32	0.30	0.30	0.30	0.30	0.32	0.36	0.40	0.46	0.51	0.58	0.71	0.85	1.00	1.00	1.00	1.00	1.00
C	1.00	0.68	0.50	0.41	0.38	0.38	0.37	0.40	0.44	0.50	0.57	0.64	0.72	0.81	1.00	1.00	1.00	1.00	1.00	1.00	1.00
D	1.00	0.71	0.55	0.47	0.44	0.43	0.43	0.46	0.51	0.58	0.66	0.74	0.84	0.94	1.00	1.00	1.00	1.00	1.00	1.00	1.00

MODERATE RIDGES (3-4")

	Slope %																					
Hyd.	0	1	2	3	4	5	6	8	10	12	14	16	18	20	24	28	32	36	40	45	50
A	1.00	0.58	0.32	0.18	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.17	0.19	0.23	0.28	0.34	0.39	0.45	0.52	0.60
B	1.00	0.63	0.40	0.27	0.21	0.19	0.19	0.19	0.21	0.24	0.27	0.30	0.34	0.39	0.48	0.59	0.70	0.81	0.93	1.00	1.00
C	1.00	0.66	0.45	0.34	0.28	0.26	0.26	0.27	0.29	0.33	0.38	0.43	0.49	0.55	0.69	0.84	1.00	1.00	1.00	1.00	1.00
D	1.00	0.68	0.48	0.37	0.32	0.31	0.30	0.31	0.34	0.39	0.44	0.50	0.57	0.65	0.81	0.99	1.00	1.00	1.00	1.00	1.00

HIGH RIDGES (4-6")

	Slope %																					
Hyd.	0	1	2	3	4	5	6	8	10	12	14	16	18	20	24	28	32	36	40	45	50
A	1.00	0.61	0.35	0.20	0.11	0.08	0.08	0.08	0.08	0.08	0.08	0.09	0.11	0.13	0.17	0.21	0.26	0.30	0.35	0.42	0.48
B	1.00	0.63	0.39	0.25	0.17	0.13	0.12	0.11	0.12	0.14	0.16	0.19	0.22	0.25	0.32	0.40	0.48	0.57	0.66	0.77	0.88
C	1.00	0.65	0.42	0.28	0.21	0.17	0.16	0.16	0.17	0.19	0.23	0.27	0.31	0.35	0.46	0.57	0.69	0.82	0.94	1.00	1.00
D	1.00	0.66	0.44	0.30	0.23	0.20	0.18	0.18	0.20	0.23	0.27	0.31	0.36	0.42	0.54	0.68	0.82	0.97	1.00	1.00	1.00

VERY HIGH RIDGES (>6")

	Slope %																					
Hyd.	0	1	2	3	4	5	6	8	10	12	14	16	18	20	24	28	32	36	40	45	50
A	1.00	0.59	0.33	0.17	0.08	0.05	0.05	0.05	0.05	0.05	0.05	0.06	0.08	0.10	0.14	0.18	0.23	0.28	0.33	0.39	0.46
B	1.00	0.60	0.34	0.19	0.10	0.06	0.05	0.05	0.05	0.06	0.08	0.10	0.12	0.14	0.19	0.25	0.31	0.37	0.44	0.52	0.60
C	1.00	0.61	0.35	0.20	0.12	0.08	0.06	0.06	0.07	0.08	0.11	0.13	0.16	0.20	0.27	0.34	0.43	0.51	0.60	0.72	0.83
D	1.00	0.61	0.36	0.21	0.12	0.09	0.07	0.07	0.08	0.10	0.13	0.16	0.19	0.23	0.31	0.41	0.50	0.61	0.71	0.84	0.98

10-YEAR STORM EI=60

COVER-MANAGEMENT CONDITION--6

VERY LOW RIDGES (0.5-2")

	Slope %																					
Hyd.	0	1	2	3	4	5	6	8	10	12	14	16	18	20	24	28	32	36	40	45	50
A	1.00	0.53	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.58	0.69	0.82	0.94	1.00	1.00	1.00
B	1.00	0.65	0.50	0.50	0.50	0.50	0.50	0.50	0.51	0.58	0.66	0.75	0.85	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
C	1.00	0.72	0.59	0.54	0.53	0.53	0.54	0.59	0.66	0.75	0.86	0.97	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
D	1.00	0.76	0.64	0.60	0.59	0.59	0.60	0.66	0.73	0.83	0.94	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

LOW RIDGES (2-3")

	Slope %																					
Hyd.	0	1	2	3	4	5	6	8	10	12	14	16	18	20	24	28	32	36	40	45	50
A	1.00	0.56	0.32	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.32	0.40	0.48	0.56	0.65	0.74	0.85	0.97
B	1.00	0.64	0.44	0.35	0.32	0.31	0.31	0.33	0.36	0.41	0.46	0.52	0.59	0.66	0.81	0.98	1.00	1.00	1.00	1.00	1.00
C	1.00	0.69	0.52	0.44	0.41	0.40	0.40	0.43	0.48	0.54	0.61	0.69	0.78	0.87	1.00	1.00	1.00	1.00	1.00	1.00	1.00
D	1.00	0.72	0.56	0.48	0.46	0.45	0.45	0.48	0.53	0.60	0.68	0.77	0.87	0.97	1.00	1.00	1.00	1.00	1.00	1.00	1.00

MODERATE RIDGES (3-4")

	Slope %																					
Hyd.	0	1	2	3	4	5	6	8	10	12	14	16	18	20	24	28	32	36	40	45	50
A	1.00	0.59	0.34	0.20	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.17	0.20	0.22	0.28	0.33	0.40	0.46	0.53	0.61	0.70
B	1.00	0.64	0.42	0.30	0.24	0.22	0.21	0.22	0.24	0.27	0.31	0.35	0.39	0.44	0.55	0.67	0.80	0.93	1.00	1.00	1.00
C	1.00	0.67	0.47	0.36	0.30	0.28	0.28	0.29	0.32	0.36	0.41	0.46	0.53	0.60	0.75	0.91	1.00	1.00	1.00	1.00	1.00
D	1.00	0.68	0.49	0.38	0.33	0.32	0.31	0.32	0.35	0.40	0.46	0.52	0.59	0.67	0.84	1.00	1.00	1.00	1.00	1.00	1.00

HIGH RIDGES (4-6")

	Slope %																					
Hyd.	0	1	2	3	4	5	6	8	10	12	14	16	18	20	24	28	32	36	40	45	50
A	1.00	0.61	0.36	0.21	0.12	0.08	0.08	0.08	0.08	0.08	0.09	0.11	0.13	0.15	0.19	0.24	0.29	0.34	0.39	0.46	0.53
B	1.00	0.64	0.40	0.26	0.18	0.14	0.13	0.13	0.14	0.16	0.18	0.21	0.25	0.29	0.37	0.46	0.55	0.65	0.75	0.88	1.00
C	1.00	0.65	0.43	0.29	0.22	0.18	0.17	0.17	0.18	0.21	0.25	0.29	0.33	0.39	0.50	0.62	0.75	0.89	1.00	1.00	1.00
D	1.00	0.66	0.44	0.31	0.24	0.20	0.19	0.19	0.20	0.24	0.28	0.32	0.38	0.44	0.57	0.71	0.86	1.00	1.00	1.00	1.00

VERY HIGH RIDGES (>6")

	Slope %																					
Hyd.	0	1	2	3	4	5	6	8	10	12	14	16	18	20	24	28	32	36	40	45	50
A	1.00	0.59	0.33	0.17	0.08	0.05	0.05	0.05	0.05	0.05	0.05	0.07	0.08	0.10	0.14	0.19	0.23	0.28	0.33	0.40	0.46
B	1.00	0.60	0.35	0.19	0.11	0.07	0.05	0.05	0.06	0.07	0.09	0.11	0.13	0.16	0.22	0.28	0.35	0.42	0.49	0.58	0.68
C	1.00	0.61	0.36	0.20	0.12	0.08	0.07	0.06	0.07	0.09	0.12	0.14	0.18	0.21	0.29	0.37	0.46	0.56	0.65	0.78	0.90
D	1.00	0.61	0.36	0.21	0.13	0.09	0.07	0.07	0.08	0.10	0.13	0.16	0.20	0.24	0.33	0.42	0.52	0.63	0.74	0.88	1.00

TABLE P - 3

CONTOUR (P) SUBFACTOR FOR ON-GRADE CONDITION

10-YEAR STORM EI=60

COVER-MANAGEMENT CONDITION--7

VERY LOW RIDGES (0.5-2")

	Slope %																				
Byd.	0	1	2	3	4	5	6	8	10	12	14	16	18	20	24	28	32	36	40	45	50
A	1.00	0.64	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.56	0.63	0.72	0.81	0.91	1.00	1.00	1.00	1.00	1.00	1.00	1.00
B	1.00	0.73	0.61	0.56	0.55	0.55	0.56	0.61	0.69	0.78	0.88	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
C	1.00	0.80	0.70	0.66	0.65	0.65	0.67	0.72	0.80	0.90	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
D	1.00	0.84	0.76	0.73	0.72	0.72	0.74	0.79	0.87	0.97	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

LOW RIDGES (2-3")

	Slope %																				
Byd.	0	1	2	3	4	5	6	8	10	12	14	16	18	20	24	28	32	36	40	45	50
A	1.00	0.63	0.43	0.34	0.30	0.30	0.30	0.31	0.35	0.39	0.44	0.50	0.56	0.63	0.78	0.93	1.00	1.00	1.00	1.00	1.00
B	1.00	0.70	0.53	0.46	0.43	0.42	0.42	0.45	0.50	0.56	0.63	0.72	0.81	0.90	1.00	1.00	1.00	1.00	1.00	1.00	1.00
C	1.00	0.74	0.60	0.53	0.51	0.50	0.50	0.53	0.59	0.66	0.75	0.85	0.96	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
D	1.00	0.77	0.64	0.58	0.56	0.55	0.55	0.59	0.65	0.73	0.82	0.93	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

MODERATE RIDGES (3-4")

	Slope %																				
Byd.	0	1	2	3	4	5	6	8	10	12	14	16	18	20	24	28	32	36	40	45	50
A	1.00	0.63	0.41	0.29	0.23	0.21	0.20	0.21	0.23	0.26	0.29	0.33	0.38	0.42	0.53	0.64	0.76	0.89	1.00	1.00	1.00
B	1.00	0.67	0.47	0.37	0.31	0.29	0.29	0.30	0.33	0.37	0.42	0.48	0.55	0.62	0.78	0.95	1.00	1.00	1.00	1.00	1.00
C	1.00	0.70	0.52	0.42	0.37	0.35	0.35	0.35	0.39	0.45	0.51	0.58	0.67	0.75	0.95	1.00	1.00	1.00	1.00	1.00	1.00
D	1.00	0.72	0.54	0.45	0.40	0.39	0.38	0.39	0.43	0.49	0.57	0.65	0.74	0.84	1.00	1.00	1.00	1.00	1.00	1.00	1.00

HIGH RIDGES (4-6")

	Slope %																				
Byd.	0	1	2	3	4	5	6	8	10	12	14	16	18	20	24	28	32	36	40	45	50
A	1.00	0.64	0.40	0.26	0.18	0.14	0.13	0.12	0.13	0.15	0.18	0.21	0.24	0.27	0.35	0.44	0.53	0.62	0.72	0.84	0.97
B	1.00	0.66	0.43	0.30	0.23	0.19	0.18	0.17	0.19	0.22	0.26	0.30	0.35	0.40	0.52	0.65	0.79	0.93	1.00	1.00	1.00
C	1.00	0.67	0.46	0.33	0.26	0.22	0.21	0.21	0.23	0.26	0.31	0.36	0.43	0.49	0.64	0.80	0.97	1.00	1.00	1.00	1.00
D	1.00	0.68	0.47	0.35	0.28	0.24	0.23	0.23	0.25	0.29	0.35	0.41	0.48	0.56	0.72	0.91	1.00	1.00	1.00	1.00	1.00

VERY HIGH RIDGES (>6")

	Slope %																				
Byd.	0	1	2	3	4	5	6	8	10	12	14	16	18	20	24	28	32	36	40	45	50
A	1.00	0.60	0.35	0.19	0.10	0.06	0.05	0.05	0.05	0.07	0.08	0.10	0.13	0.15	0.21	0.27	0.33	0.40	0.47	0.56	0.65
B	1.00	0.61	0.36	0.21	0.12	0.08	0.07	0.06	0.08	0.10	0.12	0.15	0.18	0.22	0.30	0.39	0.48	0.58	0.68	0.81	0.94
C	1.00	0.62	0.37	0.22	0.13	0.09	0.08	0.08	0.09	0.11	0.15	0.18	0.22	0.27	0.37	0.48	0.59	0.71	0.84	1.00	1.00
D	1.00	0.62	0.37	0.22	0.14	0.10	0.09	0.09	0.10	0.13	0.16	0.21	0.25	0.30	0.42	0.54	0.67	0.81	0.95	1.00	1.00

TABLE P - 3

CONTOUR (P) SUBFACTOR FOR ON-GRADE CONDITION

10-YEAR STORM EI=70

COVER-MANAGEMENT CONDITION--1

VERY LOW RIDGES (0.5-2")

Hyd.	Slope % 0	1	2	3	4	5	6	8	10	12	14	16	18	20	24	28	32	36	40	45	50
A	1.00	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
B	1.00	0.51	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.51	0.61	0.72	0.83	0.94	1.00	1.00
C	1.00	0.62	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.52	0.59	0.67	0.76	0.85	1.00	1.00	1.00	1.00	1.00	1.00	1.00
D	1.00	0.69	0.54	0.50	0.50	0.50	0.50	0.54	0.60	0.69	0.78	0.88	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

LOW RIDGES (2-3")

Hyd.	Slope % 0	1	2	3	4	5	6	8	10	12	14	16	18	20	24	28	32	36	40	45	50
A	1.00	0.48	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.33	0.40	0.46
B	1.00	0.55	0.31	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.35	0.42	0.50	0.58	0.66	0.76	0.86
C	1.00	0.62	0.42	0.32	0.30	0.30	0.30	0.30	0.32	0.36	0.41	0.46	0.52	0.58	0.72	0.87	1.00	1.00	1.00	1.00	1.00
D	1.00	0.67	0.49	0.40	0.37	0.37	0.36	0.39	0.43	0.49	0.55	0.62	0.70	0.79	0.97	1.00	1.00	1.00	1.00	1.00	1.00

MODERATE RIDGES (3-4")

Hyd.	Slope % 0	1	2	3	4	5	6	8	10	12	14	16	18	20	24	28	32	36	40	45	50
A	1.00	0.54	0.26	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.18	0.22	0.27	0.33	0.39	0.46
B	1.00	0.58	0.33	0.19	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.18	0.20	0.25	0.30	0.36	0.42	0.48	0.55	0.63
C	1.00	0.63	0.40	0.28	0.22	0.19	0.19	0.19	0.21	0.24	0.27	0.31	0.35	0.39	0.49	0.59	0.71	0.82	0.94	1.00	1.00
D	1.00	0.66	0.45	0.33	0.28	0.26	0.25	0.26	0.28	0.32	0.37	0.42	0.47	0.53	0.67	0.81	0.97	1.00	1.00	1.00	1.00

HIGH RIDGES (4-6")

Hyd.	Slope % 0	1	2	3	4	5	6	8	10	12	14	16	18	20	24	28	32	36	40	45	50
A	1.00	0.59	0.32	0.15	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.12	0.17	0.21	0.27	0.32	0.38	0.45
B	1.00	0.61	0.35	0.20	0.12	0.08	0.08	0.08	0.08	0.08	0.08	0.10	0.11	0.13	0.17	0.21	0.26	0.31	0.36	0.42	0.48
C	1.00	0.63	0.39	0.25	0.17	0.13	0.12	0.11	0.12	0.14	0.16	0.19	0.22	0.25	0.33	0.40	0.49	0.58	0.67	0.78	0.90
D	1.00	0.65	0.42	0.28	0.20	0.17	0.15	0.15	0.16	0.19	0.22	0.26	0.30	0.34	0.44	0.55	0.67	0.79	0.92	1.00	1.00

VERY HIGH RIDGES (>6")

Hyd.	Slope % 0	1	2	3	4	5	6	8	10	12	14	16	18	20	24	28	32	36	40	45	50
A	1.00	0.59	0.32	0.15	0.06	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.06	0.08	0.12	0.17	0.21	0.27	0.32	0.38	0.45
B	1.00	0.59	0.33	0.17	0.08	0.05	0.05	0.05	0.05	0.05	0.05	0.06	0.08	0.10	0.14	0.18	0.23	0.28	0.33	0.40	0.46
C	1.00	0.60	0.34	0.19	0.10	0.06	0.05	0.05	0.05	0.06	0.08	0.10	0.12	0.14	0.19	0.25	0.31	0.38	0.44	0.52	0.61
D	1.00	0.61	0.35	0.20	0.11	0.07	0.06	0.06	0.07	0.08	0.10	0.13	0.16	0.19	0.26	0.33	0.41	0.50	0.59	0.69	0.80

10-YEAR STORM EI=70

COVER-MANAGEMENT CONDITION--2

VERY LOW RIDGES (0.5-2")

Hyd.	Slope % 0	1	2	3	4	5	6	8	10	12	14	16	18	20	24	28	32	36	40	45	50
A	1.00	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
B	1.00	0.58	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.53	0.59	0.67	0.82	0.99	1.00	1.00	1.00	1.00	1.00
C	1.00	0.69	0.54	0.50	0.50	0.50	0.50	0.54	0.60	0.69	0.78	0.88	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
D	1.00	0.77	0.66	0.62	0.61	0.61	0.63	0.68	0.76	0.86	0.97	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

LOW RIDGES (2-3")

Hyd.	Slope % 0	1	2	3	4	5	6	8	10	12	14	16	18	20	24	28	32	36	40	45	50
A	1.00	0.51	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.32	0.36	0.43	0.49
B	1.00	0.59	0.37	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.32	0.36	0.41	0.46	0.56	0.68	0.80	0.92	1.00	1.00	1.00
C	1.00	0.67	0.49	0.40	0.37	0.37	0.36	0.39	0.43	0.49	0.55	0.62	0.70	0.79	0.97	1.00	1.00	1.00	1.00	1.00	1.00
D	1.00	0.72	0.57	0.50	0.47	0.47	0.47	0.50	0.55	0.62	0.71	0.80	0.90	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

MODERATE RIDGES (3-4")

Hyd.	Slope % 0	1	2	3	4	5	6	8	10	12	14	16	18	20	24	28	32	36	40	45	50
A	1.00	0.55	0.28	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.16	0.20	0.25	0.30	0.35	0.41	0.47
B	1.00	0.61	0.37	0.24	0.18	0.16	0.15	0.15	0.17	0.19	0.21	0.24	0.27	0.31	0.38	0.46	0.55	0.64	0.73	0.85	0.97
C	1.00	0.66	0.45	0.33	0.28	0.26	0.25	0.26	0.28	0.32	0.37	0.42	0.47	0.53	0.67	0.81	0.97	1.00	1.00	1.00	1.00
D	1.00	0.69	0.50	0.40	0.35	0.33	0.32	0.33	0.37	0.42	0.48	0.54	0.62	0.70	0.88	1.00	1.00	1.00	1.00	1.00	1.00

HIGH RIDGES (4-6")

Hyd.	Slope % 0	1	2	3	4	5	6	8	10	12	14	16	18	20	24	28	32	36	40	45	50
A	1.00	0.59	0.33	0.17	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.10	0.14	0.18	0.23	0.28	0.33	0.39	0.46
B	1.00	0.62	0.38	0.23	0.15	0.11	0.09	0.09	0.10	0.11	0.13	0.15	0.17	0.20	0.26	0.32	0.39	0.46	0.53	0.62	0.71
C	1.00	0.65	0.42	0.28	0.20	0.17	0.15	0.15	0.16	0.19	0.22	0.26	0.30	0.34	0.44	0.55	0.67	0.79	0.92	1.00	1.00
D	1.00	0.67	0.45	0.32	0.24	0.21	0.20	0.19	0.21	0.25	0.29	0.34	0.40	0.46	0.59	0.74	0.90	1.00	1.00	1.00	1.00

VERY HIGH RIDGES (>6")

Hyd.	Slope % 0	1	2	3	4	5	6	8	10	12	14	16	18	20	24	28	32	36	40	45	50
A	1.00	0.59	0.32	0.16	0.07	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.07	0.09	0.13	0.17	0.22	0.27	0.32	0.39	0.45
B	1.00	0.60	0.34	0.18	0.09	0.05	0.05	0.05	0.05	0.05	0.06	0.08	0.10	0.12	0.16	0.21	0.26	0.31	0.36	0.43	0.50
C	1.00	0.61	0.35	0.20	0.11	0.07	0.06	0.06	0.07	0.08	0.10	0.13	0.16	0.19	0.26	0.33	0.41	0.50	0.59	0.69	0.80
D	1.00	0.62	0.36	0.21	0.13	0.09	0.08	0.07	0.08	0.11	0.14	0.17	0.21	0.25	0.34	0.44	0.55	0.66	0.78	0.92	1.00

TABLE P - 3

CONTOUR (P) SUBFACTOR FOR ON-GRADE CONDITION

10-YEAR STORM EI=70

COVER-MANAGEMENT CONDITION--3

VERY LOW RIDGES (0.5-2")

	Slope %																				
Hyd.	0	1	2	3	4	5	6	8	10	12	14	16	18	20	24	28	32	36	40	45	50
A	1.00	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.54	0.62	0.71	0.81	0.92
B	1.00	0.56	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.53	0.60	0.74	0.89	1.00	1.00	1.00	1.00	1.00
C	1.00	0.70	0.56	0.51	0.50	0.50	0.51	0.56	0.63	0.71	0.81	0.91	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
D	1.00	0.76	0.64	0.60	0.59	0.59	0.61	0.66	0.74	0.83	0.94	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

LOW RIDGES (2-3")

	Slope %																				
Hyd.	0	1	2	3	4	5	6	8	10	12	14	16	18	20	24	28	32	36	40	45	50
A	1.00	0.53	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.33	0.38	0.44	0.51	0.58	0.66
B	1.00	0.58	0.35	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.33	0.37	0.41	0.50	0.61	0.71	0.82	0.94	1.00	1.00
C	1.00	0.68	0.50	0.42	0.39	0.38	0.38	0.40	0.45	0.50	0.57	0.65	0.73	0.82	1.00	1.00	1.00	1.00	1.00	1.00	1.00
D	1.00	0.72	0.56	0.49	0.46	0.45	0.45	0.48	0.53	0.60	0.68	0.77	0.87	0.98	1.00	1.00	1.00	1.00	1.00	1.00	1.00

MODERATE RIDGES (3-4")

	Slope %																				
Hyd.	0	1	2	3	4	5	6	8	10	12	14	16	18	20	24	28	32	36	40	45	50
A	1.00	0.57	0.31	0.17	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.19	0.24	0.28	0.33	0.38	0.44	0.50
B	1.00	0.60	0.36	0.23	0.16	0.15	0.15	0.15	0.15	0.17	0.19	0.22	0.25	0.28	0.35	0.42	0.50	0.58	0.66	0.77	0.87
C	1.00	0.66	0.45	0.34	0.29	0.27	0.26	0.27	0.30	0.33	0.38	0.43	0.49	0.56	0.70	0.85	1.00	1.00	1.00	1.00	1.00
D	1.00	0.68	0.49	0.39	0.34	0.32	0.31	0.32	0.35	0.40	0.46	0.53	0.60	0.68	0.85	1.00	1.00	1.00	1.00	1.00	1.00

HIGH RIDGES (4-6")

	Slope %																				
Hyd.	0	1	2	3	4	5	6	8	10	12	14	16	18	20	24	28	32	36	40	45	50
A	1.00	0.60	0.34	0.19	0.10	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.10	0.12	0.16	0.20	0.25	0.30	0.35	0.41	0.47
B	1.00	0.62	0.37	0.22	0.14	0.10	0.08	0.08	0.09	0.10	0.12	0.14	0.16	0.18	0.23	0.29	0.35	0.41	0.48	0.56	0.64
C	1.00	0.65	0.42	0.28	0.21	0.17	0.16	0.16	0.17	0.20	0.23	0.27	0.31	0.36	0.46	0.58	0.70	0.83	0.96	1.00	1.00
D	1.00	0.66	0.44	0.31	0.24	0.20	0.19	0.19	0.21	0.24	0.28	0.33	0.38	0.44	0.57	0.71	0.86	1.00	1.00	1.00	1.00

VERY HIGH RIDGES (>6")

	Slope %																				
Hyd.	0	1	2	3	4	5	6	8	10	12	14	16	18	20	24	28	32	36	40	45	50
A	1.00	0.59	0.33	0.16	0.08	0.05	0.05	0.05	0.05	0.05	0.05	0.06	0.08	0.09	0.14	0.18	0.23	0.28	0.33	0.39	0.46
B	1.00	0.60	0.34	0.18	0.09	0.05	0.05	0.05	0.05	0.05	0.06	0.07	0.09	0.11	0.15	0.19	0.24	0.29	0.34	0.40	0.46
C	1.00	0.61	0.36	0.20	0.12	0.08	0.06	0.06	0.07	0.09	0.11	0.13	0.16	0.20	0.27	0.35	0.43	0.52	0.61	0.72	0.84
D	1.00	0.61	0.36	0.21	0.13	0.09	0.07	0.07	0.08	0.10	0.13	0.16	0.20	0.24	0.33	0.42	0.53	0.64	0.75	0.89	1.00

10-YEAR STORM EI=70

COVER-MANAGEMENT CONDITION--4

VERY LOW RIDGES (0.5-2")

	Slope %																				
Hyd.	0	1	2	3	4	5	6	8	10	12	14	16	18	20	24	28	32	36	40	45	50
A	1.00	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.58	0.67	0.76	0.88	0.99
B	1.00	0.63	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.54	0.62	0.70	0.79	0.89	1.00	1.00	1.00	1.00	1.00	1.00	1.00
C	1.00	0.72	0.59	0.54	0.53	0.53	0.55	0.60	0.67	0.76	0.86	0.98	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
D	1.00	0.77	0.66	0.62	0.61	0.61	0.63	0.68	0.76	0.86	0.97	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

LOW RIDGES (2-3")

	Slope %																				
Hyd.	0	1	2	3	4	5	6	8	10	12	14	16	18	20	24	28	32	36	40	45	50
A	1.00	0.54	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.35	0.41	0.47	0.54	0.62	0.71
B	1.00	0.63	0.43	0.33	0.30	0.30	0.30	0.30	0.34	0.38	0.43	0.48	0.55	0.61	0.75	0.91	1.00	1.00	1.00	1.00	1.00
C	1.00	0.69	0.52	0.44	0.41	0.41	0.41	0.43	0.48	0.54	0.61	0.70	0.78	0.88	1.00	1.00	1.00	1.00	1.00	1.00	1.00
D	1.00	0.72	0.57	0.50	0.47	0.47	0.47	0.50	0.55	0.62	0.71	0.80	0.90	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

MODERATE RIDGES (3-4")

	Slope %																				
Hyd.	0	1	2	3	4	5	6	8	10	12	14	16	18	20	24	28	32	36	40	45	50
A	1.00	0.57	0.32	0.17	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.16	0.21	0.25	0.30	0.35	0.40	0.47	0.53
B	1.00	0.63	0.41	0.28	0.22	0.20	0.20	0.20	0.22	0.25	0.28	0.32	0.37	0.41	0.51	0.62	0.74	0.86	0.99	1.00	1.00
C	1.00	0.67	0.47	0.36	0.31	0.29	0.28	0.29	0.32	0.36	0.41	0.47	0.53	0.60	0.75	0.92	1.00	1.00	1.00	1.00	1.00
D	1.00	0.69	0.50	0.40	0.35	0.33	0.32	0.33	0.37	0.42	0.48	0.54	0.62	0.70	0.88	1.00	1.00	1.00	1.00	1.00	1.00

HIGH RIDGES (4-6")

	Slope %																				
Hyd.	0	1	2	3	4	5	6	8	10	12	14	16	18	20	24	28	32	36	40	45	50
A	1.00	0.60	0.35	0.19	0.10	0.08	0.08	0.08	0.08	0.08	0.08	0.09	0.10	0.12	0.16	0.20	0.25	0.30	0.35	0.41	0.47
B	1.00	0.63	0.40	0.25	0.17	0.14	0.12	0.12	0.13	0.15	0.17	0.20	0.23	0.26	0.34	0.42	0.51	0.60	0.70	0.82	0.94
C	1.00	0.66	0.43	0.30	0.22	0.19	0.17	0.17	0.18	0.21	0.25	0.29	0.34	0.39	0.50	0.63	0.76	0.90	1.00	1.00	1.00
D	1.00	0.67	0.45	0.32	0.24	0.21	0.20	0.19	0.21	0.25	0.29	0.34	0.40	0.46	0.59	0.74	0.90	1.00	1.00	1.00	1.00

VERY HIGH RIDGES (>6")

	Slope %																				
Hyd.	0	1	2	3	4	5	6	8	10	12	14	16	18	20	24	28	32	36	40	45	50
A	1.00	0.59	0.33	0.17	0.08	0.05	0.05	0.05	0.05	0.05	0.05	0.06	0.08	0.10	0.14	0.18	0.23	0.28	0.33	0.39	0.46
B	1.00	0.60	0.35	0.19	0.10	0.06	0.05	0.05	0.05	0.06	0.08	0.10	0.12	0.15	0.20	0.26	0.33	0.39	0.46	0.54	0.63
C	1.00	0.61	0.36	0.20	0.12	0.08	0.07	0.06	0.07	0.09	0.12	0.15	0.18	0.21	0.29	0.38	0.47	0.56	0.66	0.78	0.91
D	1.00	0.62	0.36	0.21	0.13	0.09	0.08	0.07	0.08	0.11	0.14	0.17	0.21	0.25	0.34	0.44	0.55	0.66	0.78	0.92	1.00

TABLE P - 3

CONTOUR (P) SUBFACTOR FOR ON-GRADE CONDITION

10-YEAR STORM EI=70

COVER-MANAGEMENT CONDITION--5

VERY LOW RIDGES (0.5-2")

	Slope %																					
Hyd.	0	1	2	3	4	5	6	8	10	12	14	16	18	20	24	28	32	36	40	45	50
A	1.00	0.54	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.62	0.74	0.87	1.00	1.00	1.00	1.00
B	1.00	0.66	0.50	0.50	0.50	0.50	0.50	0.50	0.54	0.61	0.70	0.79	0.89	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
C	1.00	0.75	0.63	0.58	0.57	0.57	0.58	0.64	0.72	0.81	0.92	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
D	1.00	0.80	0.70	0.66	0.66	0.65	0.67	0.72	0.80	0.90	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

LOW RIDGES (2-3")

	Slope %																				
Hyd.	0	1	2	3	4	5	6	8	10	12	14	16	18	20	24	28	32	36	40	45	50
A	1.00	0.57	0.33	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.31	0.35	0.42	0.51	0.60	0.69	0.79	0.91	1.00
B	1.00	0.65	0.46	0.37	0.33	0.32	0.32	0.34	0.38	0.43	0.49	0.55	0.62	0.70	0.86	1.00	1.00	1.00	1.00	1.00	1.00
C	1.00	0.71	0.55	0.47	0.44	0.44	0.44	0.47	0.52	0.58	0.66	0.75	0.84	0.94	1.00	1.00	1.00	1.00	1.00	1.00	1.00
D	1.00	0.74	0.60	0.53	0.51	0.50	0.50	0.53	0.59	0.66	0.75	0.85	0.96	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

MODERATE RIDGES (3-4")

	Slope %																				
Hyd.	0	1	2	3	4	5	6	8	10	12	14	16	18	20	24	28	32	36	40	45	50
A	1.00	0.59	0.34	0.21	0.15	0.15	0.15	0.15	0.15	0.15	0.16	0.18	0.21	0.24	0.29	0.36	0.42	0.49	0.56	0.65	0.74
B	1.00	0.64	0.43	0.31	0.25	0.23	0.22	0.23	0.25	0.28	0.32	0.37	0.42	0.47	0.59	0.71	0.85	0.99	1.00	1.00	1.00
C	1.00	0.68	0.48	0.38	0.33	0.31	0.30	0.31	0.34	0.39	0.44	0.51	0.58	0.65	0.82	1.00	1.00	1.00	1.00	1.00	1.00
D	1.00	0.70	0.52	0.42	0.37	0.35	0.35	0.36	0.39	0.45	0.51	0.58	0.67	0.75	0.95	1.00	1.00	1.00	1.00	1.00	1.00

HIGH RIDGES (4-6")

	Slope %																				
Hyd.	0	1	2	3	4	5	6	8	10	12	14	16	18	20	24	28	32	36	40	45	50
A	1.00	0.61	0.36	0.21	0.13	0.09	0.08	0.08	0.08	0.09	0.10	0.12	0.13	0.16	0.20	0.25	0.30	0.36	0.41	0.48	0.56
B	1.00	0.64	0.41	0.27	0.19	0.15	0.14	0.13	0.15	0.17	0.20	0.23	0.26	0.30	0.39	0.48	0.59	0.69	0.80	0.94	1.00
C	1.00	0.66	0.44	0.31	0.23	0.20	0.18	0.18	0.20	0.23	0.27	0.31	0.37	0.42	0.55	0.68	0.83	0.98	1.00	1.00	1.00
D	1.00	0.67	0.46	0.33	0.26	0.22	0.21	0.21	0.23	0.26	0.31	0.37	0.43	0.49	0.64	0.80	0.98	1.00	1.00	1.00	1.00

VERY HIGH RIDGES (>6")

	Slope %																				
Hyd.	0	1	2	3	4	5	6	8	10	12	14	16	18	20	24	28	32	36	40	45	50
A	1.00	0.60	0.33	0.17	0.09	0.05	0.05	0.05	0.05	0.05	0.05	0.07	0.08	0.10	0.14	0.19	0.23	0.28	0.33	0.40	0.46
B	1.00	0.61	0.35	0.19	0.11	0.07	0.05	0.05	0.06	0.07	0.09	0.11	0.14	0.17	0.23	0.30	0.37	0.44	0.52	0.62	0.71
C	1.00	0.61	0.36	0.21	0.13	0.09	0.07	0.07	0.08	0.10	0.13	0.16	0.19	0.23	0.32	0.41	0.51	0.61	0.72	0.85	0.99
D	1.00	0.62	0.37	0.22	0.13	0.10	0.08	0.08	0.09	0.11	0.15	0.18	0.22	0.27	0.37	0.48	0.59	0.72	0.84	1.00	1.00

10-YEAR STORM EI=70

COVER-MANAGEMENT CONDITION--6

VERY LOW RIDGES (0.5-2")

	Slope %																				
Hyd.	0	1	2	3	4	5	6	8	10	12	14	16	18	20	24	28	32	36	40	45	50
A	1.00	0.56	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.53	0.60	0.74	0.89	1.00	1.00	1.00	1.00	1.00
B	1.00	0.69	0.54	0.50	0.50	0.50	0.50	0.54	0.60	0.69	0.78	0.88	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
C	1.00	0.77	0.66	0.62	0.61	0.61	0.63	0.68	0.76	0.86	0.97	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
D	1.00	0.81	0.72	0.68	0.68	0.68	0.69	0.75	0.83	0.92	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

LOW RIDGES (2-3")

	Slope %																				
Hyd.	0	1	2	3	4	5	6	8	10	12	14	16	18	20	24	28	32	36	40	45	50
A	1.00	0.58	0.35	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.33	0.37	0.41	0.50	0.61	0.71	0.82	0.94	1.00	1.00
B	1.00	0.67	0.49	0.40	0.37	0.37	0.36	0.39	0.43	0.49	0.55	0.62	0.70	0.79	0.97	1.00	1.00	1.00	1.00	1.00	1.00
C	1.00	0.72	0.57	0.50	0.47	0.47	0.47	0.50	0.55	0.62	0.71	0.80	0.90	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
D	1.00	0.75	0.61	0.55	0.52	0.52	0.52	0.55	0.61	0.69	0.78	0.88	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

MODERATE RIDGES (3-4")

	Slope %																				
Hyd.	0	1	2	3	4	5	6	8	10	12	14	16	18	20	24	28	32	36	40	45	50
A	1.00	0.60	0.36	0.23	0.16	0.15	0.15	0.15	0.15	0.17	0.19	0.22	0.25	0.28	0.35	0.42	0.50	0.58	0.66	0.77	0.87
B	1.00	0.66	0.45	0.33	0.28	0.26	0.25	0.26	0.28	0.32	0.37	0.42	0.47	0.53	0.67	0.81	0.97	1.00	1.00	1.00	1.00
C	1.00	0.69	0.50	0.40	0.35	0.33	0.32	0.33	0.37	0.42	0.48	0.54	0.62	0.70	0.88	1.00	1.00	1.00	1.00	1.00	1.00
D	1.00	0.70	0.52	0.43	0.38	0.36	0.36	0.37	0.41	0.46	0.53	0.61	0.69	0.78	0.98	1.00	1.00	1.00	1.00	1.00	1.00

HIGH RIDGES (4-6")

	Slope %																				
Hyd.	0	1	2	3	4	5	6	8	10	12	14	16	18	20	24	28	32	36	40	45	50
A	1.00	0.62	0.37	0.22	0.14	0.10	0.08	0.08	0.09	0.10	0.12	0.14	0.16	0.18	0.23	0.29	0.35	0.41	0.48	0.56	0.64
B	1.00	0.65	0.42	0.28	0.20	0.17	0.15	0.15	0.16	0.19	0.22	0.26	0.30	0.34	0.44	0.55	0.67	0.79	0.92	1.00	1.00
C	1.00	0.67	0.45	0.32	0.24	0.21	0.20	0.19	0.21	0.25	0.29	0.34	0.40	0.46	0.59	0.74	0.90	1.00	1.00	1.00	1.00
D	1.00	0.67	0.46	0.33	0.26	0.23	0.22	0.21	0.24	0.27	0.32	0.38	0.44	0.51	0.67	0.84	1.00	1.00	1.00	1.00	1.00

VERY HIGH RIDGES (>6")

	Slope %																				
Hyd.	0	1	2	3	4	5	6	8	10	12	14	16	18	20	24	28	32	36	40	45	50
A	1.00	0.60	0.34	0.18	0.09	0.05	0.05	0.05	0.05	0.05	0.06	0.07	0.09	0.11	0.15	0.19	0.24	0.29	0.34	0.40	0.46
B	1.00	0.61	0.35	0.20	0.11	0.07	0.06	0.06	0.07	0.08	0.10	0.13	0.16	0.19	0.26	0.33	0.41	0.50	0.59	0.69	0.80
C	1.00	0.62	0.36	0.21	0.13	0.09	0.08	0.07	0.08	0.11	0.14	0.17	0.21	0.25	0.34	0.44	0.55	0.66	0.78	0.92	1.00
D	1.00	0.62	0.37	0.22	0.14	0.10	0.08	0.08	0.09	0.12	0.15	0.19	0.23	0.28	0.38	0.50	0.62	0.75	0.88	1.00	1.00

TABLE P - 3

CONTOUR (P) SUBFACTOR FOR ON-GRADE CONDITION

10-YEAR STORM EI=70

COVER-MANAGEMENT CONDITION--7

VERY LOW RIDGES (0.5-2")

Hyd.	Slope % 0	1	2	3	4	5	6	8	10	12	14	16	18	20	24	28	32	36	40	45	50
A	1.00	0.68	0.53	0.50	0.50	0.50	0.50	0.52	0.58	0.66	0.75	0.85	0.96	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
B	1.00	0.78	0.68	0.64	0.63	0.63	0.65	0.70	0.78	0.88	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
C	1.00	0.85	0.78	0.75	0.74	0.74	0.76	0.81	0.89	0.98	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
D	1.00	0.89	0.84	0.82	0.82	0.82	0.83	0.87	0.94	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

LOW RIDGES (2-3")

Hyd.	Slope % 0	1	2	3	4	5	6	8	10	12	14	16	18	20	24	28	32	36	40	45	50
A	1.00	0.66	0.48	0.39	0.36	0.35	0.35	0.37	0.41	0.47	0.53	0.60	0.67	0.76	0.93	1.00	1.00	1.00	1.00	1.00	1.00
B	1.00	0.73	0.59	0.52	0.49	0.48	0.48	0.52	0.57	0.64	0.73	0.82	0.93	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
C	1.00	0.78	0.65	0.60	0.57	0.57	0.57	0.60	0.67	0.75	0.85	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
D	1.00	0.80	0.70	0.65	0.63	0.62	0.62	0.66	0.73	0.81	0.91	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

MODERATE RIDGES (3-4")

Hyd.	Slope % 0	1	2	3	4	5	6	8	10	12	14	16	18	20	24	28	32	36	40	45	50
A	1.00	0.65	0.44	0.32	0.27	0.25	0.24	0.25	0.27	0.31	0.35	0.40	0.45	0.51	0.64	0.78	0.93	1.00	1.00	1.00	1.00
B	1.00	0.69	0.51	0.41	0.36	0.34	0.34	0.34	0.38	0.43	0.49	0.56	0.64	0.73	0.91	1.00	1.00	1.00	1.00	1.00	1.00
C	1.00	0.72	0.55	0.46	0.41	0.40	0.39	0.40	0.45	0.51	0.58	0.67	0.76	0.87	1.00	1.00	1.00	1.00	1.00	1.00	1.00
D	1.00	0.74	0.58	0.49	0.45	0.44	0.43	0.44	0.49	0.56	0.64	0.74	0.84	0.96	1.00	1.00	1.00	1.00	1.00	1.00	1.00

HIGH RIDGES (4-6")

Hyd.	Slope % 0	1	2	3	4	5	6	8	10	12	14	16	18	20	24	28	32	36	40	45	50
A	1.00	0.65	0.41	0.28	0.20	0.16	0.15	0.15	0.16	0.18	0.21	0.25	0.29	0.33	0.42	0.53	0.64	0.76	0.88	1.00	1.00
B	1.00	0.67	0.45	0.32	0.25	0.22	0.20	0.20	0.22	0.26	0.30	0.35	0.41	0.48	0.62	0.77	0.94	1.00	1.00	1.00	1.00
C	1.00	0.68	0.48	0.35	0.28	0.25	0.24	0.24	0.26	0.30	0.36	0.42	0.50	0.57	0.75	0.94	1.00	1.00	1.00	1.00	1.00
D	1.00	0.69	0.49	0.37	0.30	0.27	0.26	0.26	0.29	0.33	0.40	0.47	0.55	0.64	0.84	1.00	1.00	1.00	1.00	1.00	1.00

VERY HIGH RIDGES (>6")

Hyd.	Slope % 0	1	2	3	4	5	6	8	10	12	14	16	18	20	24	28	32	36	40	45	50
A	1.00	0.61	0.35	0.20	0.11	0.07	0.06	0.05	0.06	0.08	0.10	0.12	0.15	0.18	0.25	0.32	0.40	0.48	0.56	0.67	0.77
B	1.00	0.62	0.37	0.21	0.13	0.09	0.08	0.07	0.09	0.11	0.14	0.18	0.22	0.26	0.35	0.46	0.57	0.69	0.81	0.96	1.00
C	1.00	0.62	0.38	0.23	0.14	0.11	0.09	0.09	0.10	0.13	0.17	0.21	0.26	0.31	0.43	0.56	0.70	0.84	0.99	1.00	1.00
D	1.00	0.62	0.38	0.23	0.15	0.11	0.10	0.10	0.11	0.15	0.19	0.24	0.29	0.35	0.48	0.63	0.78	0.95	1.00	1.00	1.00

TABLE P - 3

CONTOUR (P) SUBFACTOR FOR ON-GRADE CONDITION

10-YEAR STORM EI=80

COVER-MANAGEMENT CONDITION--1

VERY LOW RIDGES (0.5-2")

Hyd.	Slope % 0	1	2	3	4	5	6	8	10	12	14	16	18	20	24	28	32	36	40	45	50
A	1.00	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
B	1.00	0.54	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.52	0.64	0.77	0.91	1.00	1.00	1.00	1.00
C	1.00	0.66	0.50	0.50	0.50	0.50	0.50	0.50	0.54	0.61	0.69	0.79	0.89	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
D	1.00	0.73	0.61	0.56	0.55	0.55	0.56	0.62	0.69	0.78	0.89	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

LOW RIDGES (2-3")

Hyd.	Slope % 0	1	2	3	4	5	6	8	10	12	14	16	18	20	24	28	32	36	40	45	50
A	1.00	0.48	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.33	0.40	0.46
B	1.00	0.57	0.33	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.32	0.36	0.44	0.53	0.62	0.72	0.82	0.95	1.00
C	1.00	0.65	0.46	0.37	0.33	0.32	0.32	0.34	0.38	0.43	0.49	0.55	0.62	0.69	0.86	1.00	1.00	1.00	1.00	1.00	1.00
D	1.00	0.70	0.53	0.46	0.43	0.42	0.42	0.45	0.50	0.56	0.64	0.72	0.81	0.91	1.00	1.00	1.00	1.00	1.00	1.00	1.00

MODERATE RIDGES (3-4")

Hyd.	Slope % 0	1	2	3	4	5	6	8	10	12	14	16	18	20	24	28	32	36	40	45	50
A	1.00	0.54	0.26	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.18	0.22	0.27	0.33	0.39	0.46
B	1.00	0.59	0.35	0.21	0.15	0.15	0.15	0.15	0.15	0.15	0.17	0.19	0.22	0.24	0.30	0.37	0.44	0.51	0.58	0.68	0.77
C	1.00	0.64	0.43	0.31	0.25	0.23	0.22	0.23	0.25	0.28	0.32	0.37	0.42	0.47	0.59	0.71	0.85	0.99	1.00	1.00	1.00
D	1.00	0.67	0.48	0.37	0.32	0.30	0.29	0.30	0.33	0.37	0.43	0.49	0.55	0.62	0.78	0.95	1.00	1.00	1.00	1.00	1.00

HIGH RIDGES (4-6")

Hyd.	Slope % 0	1	2	3	4	5	6	8	10	12	14	16	18	20	24	28	32	36	40	45	50
A	1.00	0.59	0.32	0.15	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.12	0.17	0.21	0.27	0.32	0.38	0.45
B	1.00	0.61	0.36	0.21	0.13	0.09	0.08	0.08	0.08	0.09	0.10	0.12	0.14	0.16	0.21	0.26	0.31	0.37	0.43	0.50	0.57
C	1.00	0.64	0.41	0.27	0.19	0.15	0.14	0.13	0.15	0.17	0.19	0.23	0.26	0.30	0.39	0.48	0.58	0.69	0.80	0.94	1.00
D	1.00	0.66	0.43	0.30	0.23	0.19	0.18	0.17	0.19	0.22	0.26	0.30	0.35	0.40	0.52	0.65	0.79	0.94	1.00	1.00	1.00

VERY HIGH RIDGES (>6")

Hyd.	Slope % 0	1	2	3	4	5	6	8	10	12	14	16	18	20	24	28	32	36	40	45	50
A	1.00	0.59	0.32	0.15	0.06	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.06	0.08	0.12	0.17	0.21	0.27	0.32	0.38	0.45
B	1.00	0.60	0.33	0.17	0.09	0.05	0.05	0.05	0.05	0.05	0.05	0.07	0.09	0.10	0.14	0.19	0.24	0.28	0.33	0.40	0.46
C	1.00	0.61	0.35	0.19	0.11	0.07	0.05	0.05	0.06	0.07	0.09	0.11	0.14	0.17	0.23	0.29	0.37	0.44	0.52	0.61	0.71
D	1.00	0.61	0.36	0.21	0.12	0.08	0.07	0.06	0.08	0.10	0.12	0.15	0.18	0.22	0.30	0.39	0.49	0.58	0.69	0.81	0.94

10-YEAR STORM EI=80

COVER-MANAGEMENT CONDITION--2

VERY LOW RIDGES (0.5-2")

Hyd.	Slope % 0	1	2	3	4	5	6	8	10	12	14	16	18	20	24	28	32	36	40	45	50
A	1.00	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.55	0.62
B	1.00	0.61	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.56	0.64	0.72	0.80	0.99	1.00	1.00	1.00	1.00	1.00	1.00
C	1.00	0.73	0.61	0.56	0.55	0.55	0.56	0.62	0.69	0.78	0.89	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
D	1.00	0.82	0.73	0.70	0.69	0.69	0.71	0.76	0.84	0.94	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

LOW RIDGES (2-3")

Hyd.	Slope % 0	1	2	3	4	5	6	8	10	12	14	16	18	20	24	28	32	36	40	45	50
A	1.00	0.52	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.33	0.38	0.44	0.50
B	1.00	0.62	0.41	0.31	0.30	0.30	0.30	0.30	0.31	0.34	0.39	0.44	0.49	0.55	0.68	0.82	0.97	1.00	1.00	1.00	1.00
C	1.00	0.70	0.53	0.46	0.43	0.42	0.42	0.45	0.50	0.56	0.64	0.72	0.81	0.91	1.00	1.00	1.00	1.00	1.00	1.00	1.00
D	1.00	0.76	0.62	0.56	0.54	0.53	0.53	0.56	0.62	0.70	0.79	0.90	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

MODERATE RIDGES (3-4")

Hyd.	Slope % 0	1	2	3	4	5	6	8	10	12	14	16	18	20	24	28	32	36	40	45	50
A	1.00	0.56	0.29	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.17	0.21	0.26	0.31	0.36	0.42	0.48
B	1.00	0.62	0.39	0.27	0.21	0.19	0.18	0.18	0.20	0.23	0.26	0.29	0.33	0.37	0.46	0.56	0.67	0.78	0.89	1.00	1.00
C	1.00	0.67	0.48	0.37	0.32	0.30	0.29	0.30	0.33	0.37	0.43	0.49	0.55	0.62	0.78	0.95	1.00	1.00	1.00	1.00	1.00
D	1.00	0.71	0.53	0.43	0.39	0.37	0.37	0.38	0.42	0.47	0.54	0.62	0.71	0.80	1.00	1.00	1.00	1.00	1.00	1.00	1.00

HIGH RIDGES (4-6")

Hyd.	Slope % 0	1	2	3	4	5	6	8	10	12	14	16	18	20	24	28	32	36	40	45	50
A	1.00	0.60	0.33	0.17	0.09	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.09	0.10	0.15	0.19	0.24	0.29	0.34	0.40	0.46
B	1.00	0.63	0.39	0.24	0.16	0.13	0.11	0.11	0.12	0.13	0.16	0.18	0.21	0.24	0.31	0.38	0.46	0.55	0.63	0.74	0.85
C	1.00	0.66	0.43	0.30	0.23	0.19	0.18	0.17	0.19	0.22	0.26	0.30	0.35	0.40	0.52	0.65	0.79	0.94	1.00	1.00	1.00
D	1.00	0.68	0.47	0.34	0.27	0.24	0.22	0.22	0.24	0.28	0.33	0.39	0.46	0.53	0.69	0.86	1.00	1.00	1.00	1.00	1.00

VERY HIGH RIDGES (>6")

Hyd.	Slope % 0	1	2	3	4	5	6	8	10	12	14	16	18	20	24	28	32	36	40	45	50
A	1.00	0.59	0.32	0.16	0.07	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.07	0.09	0.13	0.17	0.22	0.27	0.32	0.39	0.45
B	1.00	0.60	0.34	0.19	0.10	0.06	0.05	0.05	0.05	0.06	0.07	0.09	0.11	0.14	0.19	0.24	0.30	0.36	0.42	0.50	0.58
C	1.00	0.61	0.36	0.21	0.12	0.08	0.07	0.06	0.08	0.10	0.12	0.15	0.18	0.22	0.30	0.39	0.49	0.58	0.69	0.81	0.94
D	1.00	0.62	0.37	0.22	0.14	0.10	0.09	0.08	0.10	0.12	0.16	0.20	0.24	0.29	0.40	0.51	0.64	0.77	0.90	1.00	1.00

TABLE P - 3

CONTOUR (P) SUBFACTOR FOR ON-GRADE CONDITION

10-YEAR STORM EI=80

COVER-MANAGEMENT CONDITION--3

VERY LOW RIDGES (0.5-2")

	Slope %																					
Hyd.	0	1	2	3	4	5	6	8	10	12	14	16	18	20	24	28	32	36	40	45	50
A	1.00	0.51	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.59	0.69	0.80	0.91	1.00	1.00
B	1.00	0.59	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.51	0.58	0.65	0.73	0.90	1.00	1.00	1.00	1.00	1.00	1.00
C	1.00	0.75	0.63	0.58	0.57	0.57	0.58	0.64	0.71	0.81	0.91	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
D	1.00	0.81	0.71	0.68	0.67	0.67	0.69	0.74	0.82	0.92	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

LOW RIDGES (2-3")

	Slope %																					
Hyd.	0	1	2	3	4	5	6	8	10	12	14	16	18	20	24	28	32	36	40	45	50
A	1.00	0.55	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.34	0.41	0.48	0.56	0.63	0.73	0.83
B	1.00	0.60	0.39	0.30	0.30	0.30	0.30	0.30	0.30	0.31	0.35	0.40	0.45	0.50	0.62	0.74	0.87	1.00	1.00	1.00	1.00
C	1.00	0.71	0.55	0.47	0.44	0.44	0.44	0.46	0.52	0.58	0.66	0.74	0.84	0.94	1.00	1.00	1.00	1.00	1.00	1.00	1.00
D	1.00	0.75	0.61	0.54	0.52	0.51	0.51	0.55	0.61	0.68	0.77	0.87	0.98	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

MODERATE RIDGES (3-4")

	Slope %																					
Hyd.	0	1	2	3	4	5	6	8	10	12	14	16	18	20	24	28	32	36	40	45	50
A	1.00	0.58	0.33	0.19	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.17	0.19	0.24	0.29	0.35	0.40	0.46	0.54	0.61
B	1.00	0.61	0.38	0.25	0.19	0.17	0.16	0.17	0.18	0.21	0.23	0.26	0.30	0.34	0.42	0.51	0.60	0.70	0.80	0.93	1.00
C	1.00	0.68	0.48	0.38	0.33	0.31	0.30	0.31	0.34	0.39	0.44	0.50	0.57	0.65	0.81	0.99	1.00	1.00	1.00	1.00	1.00
D	1.00	0.70	0.52	0.42	0.38	0.36	0.36	0.37	0.40	0.46	0.53	0.60	0.69	0.78	0.98	1.00	1.00	1.00	1.00	1.00	1.00

HIGH RIDGES (4-6")

	Slope %																					
Hyd.	0	1	2	3	4	5	6	8	10	12	14	16	18	20	24	28	32	36	40	45	50
A	1.00	0.61	0.35	0.20	0.11	0.08	0.08	0.08	0.08	0.08	0.08	0.10	0.11	0.13	0.17	0.21	0.26	0.31	0.35	0.42	0.48
B	1.00	0.63	0.38	0.23	0.15	0.12	0.10	0.10	0.11	0.12	0.14	0.16	0.19	0.22	0.28	0.35	0.42	0.50	0.57	0.67	0.77
C	1.00	0.66	0.44	0.31	0.23	0.20	0.18	0.18	0.20	0.23	0.27	0.31	0.36	0.42	0.54	0.68	0.82	0.98	1.00	1.00	1.00
D	1.00	0.67	0.46	0.33	0.26	0.23	0.22	0.21	0.23	0.27	0.32	0.38	0.44	0.51	0.66	0.83	1.00	1.00	1.00	1.00	1.00

VERY HIGH RIDGES (>6")

	Slope %																					
Hyd.	0	1	2	3	4	5	6	8	10	12	14	16	18	20	24	28	32	36	40	45	50
A	1.00	0.59	0.33	0.17	0.08	0.05	0.05	0.05	0.05	0.05	0.05	0.06	0.08	0.10	0.14	0.18	0.23	0.28	0.33	0.40	0.46
B	1.00	0.60	0.34	0.18	0.10	0.06	0.05	0.05	0.05	0.05	0.07	0.09	0.10	0.13	0.17	0.22	0.27	0.33	0.39	0.46	0.53
C	1.00	0.61	0.36	0.21	0.12	0.09	0.07	0.07	0.08	0.10	0.13	0.16	0.19	0.23	0.31	0.41	0.51	0.61	0.71	0.85	0.98
D	1.00	0.62	0.37	0.22	0.14	0.10	0.08	0.08	0.09	0.12	0.15	0.19	0.23	0.28	0.38	0.49	0.61	0.74	0.87	1.00	1.00

10-YEAR STORM EI=80

COVER-MANAGEMENT CONDITION--4

VERY LOW RIDGES (0.5-2")

	Slope %																					
Hyd.	0	1	2	3	4	5	6	8	10	12	14	16	18	20	24	28	32	36	40	45	50
A	1.00	0.52	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.53	0.63	0.74	0.86	0.98	1.00	1.00
B	1.00	0.67	0.51	0.50	0.50	0.50	0.50	0.50	0.56	0.63	0.72	0.82	0.92	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
C	1.00	0.77	0.66	0.62	0.61	0.61	0.62	0.68	0.76	0.85	0.96	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
D	1.00	0.82	0.73	0.70	0.69	0.69	0.71	0.76	0.84	0.94	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

LOW RIDGES (2-3")

	Slope %																					
Hyd.	0	1	2	3	4	5	6	8	10	12	14	16	18	20	24	28	32	36	40	45	50
A	1.00	0.55	0.31	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.36	0.44	0.52	0.60	0.68	0.78	0.89
B	1.00	0.66	0.47	0.38	0.34	0.34	0.34	0.36	0.40	0.45	0.51	0.57	0.65	0.72	0.89	1.00	1.00	1.00	1.00	1.00	1.00
C	1.00	0.72	0.57	0.50	0.47	0.47	0.47	0.50	0.55	0.62	0.70	0.79	0.90	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
D	.00	0.76	0.62	0.56	0.54	0.53	0.53	0.56	0.62	0.70	0.79	0.90	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

MODERATE RIDGES (3-4")

	Slope %																					
Hyd.	0	1	2	3	4	5	6	8	10	12	14	16	18	20	24	28	32	36	40	45	50
A	1.00	0.58	0.33	0.19	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.16	0.18	0.20	0.25	0.31	0.37	0.43	0.49	0.57	0.65
B	1.00	0.65	0.43	0.31	0.26	0.24	0.23	0.24	0.26	0.30	0.34	0.38	0.43	0.49	0.61	0.74	0.88	1.00	1.00	1.00	1.00
C	1.00	0.69	0.50	0.39	0.35	0.33	0.32	0.33	0.37	0.41	0.47	0.54	0.62	0.70	0.88	1.00	1.00	1.00	1.00	1.00	1.00
D	1.00	0.71	0.53	0.43	0.39	0.37	0.37	0.38	0.42	0.47	0.54	0.62	0.71	0.80	1.00	1.00	1.00	1.00	1.00	1.00	1.00

HIGH RIDGES (4-6")

	Slope %																					
Hyd.	0	1	2	3	4	5	6	8	10	12	14	16	18	20	24	28	32	36	40	45	50
A	1.00	0.61	0.36	0.20	0.12	0.08	0.08	0.08	0.08	0.08	0.09	0.10	0.12	0.14	0.18	0.22	0.27	0.32	0.37	0.43	0.49
B	1.00	0.64	0.41	0.27	0.19	0.16	0.14	0.14	0.15	0.17	0.20	0.24	0.27	0.31	0.41	0.50	0.61	0.72	0.83	0.98	1.00
C	1.00	0.67	0.45	0.32	0.24	0.21	0.20	0.19	0.21	0.25	0.29	0.34	0.39	0.45	0.59	0.74	0.90	1.00	1.00	1.00	1.00
D	1.00	0.68	0.47	0.34	0.27	0.24	0.22	0.22	0.24	0.28	0.33	0.39	0.46	0.53	0.69	0.86	1.00	1.00	1.00	1.00	1.00

VERY HIGH RIDGES (>6")

	Slope %																					
Hyd.	0	1	2	3	4	5	6	8	10	12	14	16	18	20	24	28	32	36	40	45	50
A	1.00	0.59	0.33	0.17	0.08	0.05	0.05	0.05	0.05	0.05	0.05	0.06	0.08	0.10	0.14	0.18	0.23	0.28	0.33	0.40	0.46
B	1.00	0.61	0.35	0.20	0.11	0.07	0.06	0.05	0.06	0.08	0.10	0.12	0.15	0.17	0.24	0.31	0.38	0.46	0.54	0.64	0.74
C	1.00	0.61	0.36	0.21	0.13	0.09	0.08	0.07	0.08	0.11	0.14	0.17	0.21	0.25	0.34	0.44	0.55	0.66	0.77	0.92	1.00
D	1.00	0.62	0.37	0.22	0.14	0.10	0.09	0.08	0.10	0.12	0.16	0.20	0.24	0.29	0.40	0.51	0.64	0.77	0.90	1.00	1.00

TABLE P - 3

CONTOUR (P) SUBFACTOR FOR ON-GRADE CONDITION

10-YEAR STORM EI=80

COVER-MANAGEMENT CONDITION--5

VERY LOW RIDGES (0.5-2")

	Slope %																				
Hyd.	0	1	2	3	4	5	6	8	10	12	14	16	18	20	24	28	32	36	40	45	50
A	1.00	0.57	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.55	0.62	0.77	0.92	1.00	1.00	1.00	1.00	1.00
B	1.00	0.70	0.56	0.51	0.50	0.50	0.51	0.55	0.62	0.71	0.81	0.91	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
C	1.00	0.79	0.70	0.66	0.65	0.65	0.66	0.72	0.80	0.90	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
D	1.00	0.85	0.77	0.74	0.74	0.74	0.75	0.81	0.88	0.98	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

LOW RIDGES (2-3")

	Slope %																				
Hyd.	0	1	2	3	4	5	6	8	10	12	14	16	18	20	24	28	32	36	40	45	50
A	1.00	0.59	0.36	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.34	0.38	0.43	0.52	0.63	0.74	0.86	0.98	1.00	1.00
B	1.00	0.68	0.50	0.42	0.39	0.38	0.38	0.40	0.45	0.50	0.57	0.64	0.73	0.81	1.00	1.00	1.00	1.00	1.00	1.00	1.00
C	1.00	0.74	0.60	0.53	0.50	0.50	0.50	0.53	0.59	0.66	0.75	0.85	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
D	1.00	0.77	0.65	0.59	0.57	0.56	0.56	0.60	0.66	0.74	0.84	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

MODERATE RIDGES (3-4")

	Slope %																				
Hyd.	0	1	2	3	4	5	6	8	10	12	14	16	18	20	24	28	32	36	40	45	50
A	1.00	0.60	0.36	0.23	0.17	0.15	0.15	0.15	0.16	0.18	0.20	0.23	0.26	0.29	0.36	0.44	0.52	0.60	0.69	0.80	0.91
B	1.00	0.66	0.45	0.34	0.29	0.27	0.26	0.27	0.29	0.33	0.38	0.43	0.49	0.55	0.69	0.85	1.00	1.00	1.00	1.00	1.00
C	1.00	0.70	0.51	0.41	0.37	0.35	0.35	0.35	0.39	0.44	0.51	0.58	0.66	0.75	0.94	1.00	1.00	1.00	1.00	1.00	1.00
D	1.00	0.72	0.55	0.46	0.41	0.39	0.39	0.40	0.44	0.51	0.58	0.66	0.76	0.86	1.00	1.00	1.00	1.00	1.00	1.00	1.00

HIGH RIDGES (4-6")

	Slope %																				
Hyd.	0	1	2	3	4	5	6	8	10	12	14	16	18	20	24	28	32	36	40	45	50
A	1.00	0.62	0.37	0.22	0.14	0.10	0.09	0.08	0.09	0.10	0.12	0.14	0.16	0.19	0.24	0.30	0.36	0.43	0.50	0.58	0.67
B	1.00	0.65	0.42	0.28	0.21	0.17	0.16	0.16	0.17	0.20	0.23	0.27	0.31	0.36	0.46	0.58	0.70	0.82	0.95	1.00	1.00
C	1.00	0.67	0.46	0.33	0.26	0.22	0.21	0.21	0.23	0.26	0.31	0.36	0.42	0.49	0.64	0.80	0.97	1.00	1.00	1.00	1.00
D	.00	0.68	0.48	0.35	0.28	0.25	0.24	0.23	0.26	0.30	0.36	0.42	0.49	0.57	0.74	0.93	1.00	1.00	1.00	1.00	1.00

VERY HIGH RIDGES (>6")

	Slope %																				
Hyd.	0	1	2	3	4	5	6	8	10	12	14	16	18	20	24	28	32	36	40	45	50
A	1.00	0.60	0.34	0.18	0.09	0.05	0.05	0.05	0.05	0.05	0.06	0.07	0.09	0.11	0.15	0.20	0.24	0.29	0.34	0.41	0.47
B	1.00	0.61	0.35	0.20	0.12	0.08	0.06	0.06	0.07	0.09	0.11	0.13	0.16	0.20	0.27	0.35	0.43	0.52	0.61	0.72	0.84
C	1.00	0.62	0.37	0.22	0.13	0.09	0.08	0.08	0.09	0.11	0.15	0.18	0.22	0.27	0.37	0.48	0.59	0.71	0.84	0.99	1.00
D	1.00	0.62	0.37	0.23	0.14	0.10	0.09	0.09	0.10	0.13	0.17	0.21	0.26	0.31	0.43	0.55	0.69	0.83	0.98	1.00	1.00

10-YEAR STORM EI=80

COVER-MANAGEMENT CONDITION--6

VERY LOW RIDGES (0.5-2")

	Slope %																				
Hyd.	0	1	2	3	4	5	6	8	10	12	14	16	18	20	24	28	32	36	40	45	50
A	1.00	0.59	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.51	0.58	0.65	0.73	0.90	1.00	1.00	1.00	1.00	1.00	1.00
B	1.00	0.73	0.61	0.56	0.55	0.55	0.56	0.62	0.69	0.78	0.89	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
C	1.00	0.82	0.73	0.70	0.69	0.69	0.71	0.76	0.84	0.94	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
D	1.00	0.86	0.79	0.77	0.76	0.76	0.77	0.83	0.90	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

LOW RIDGES (2-3")

	Slope %																				
Hyd.	0	1	2	3	4	5	6	8	10	12	14	16	18	20	24	28	32	36	40	45	50
A	1.00	0.60	0.39	0.30	0.30	0.30	0.30	0.30	0.30	0.31	0.35	0.40	0.45	0.50	0.62	0.74	0.87	1.00	1.00	1.00	1.00
B	1.00	0.70	0.53	0.46	0.43	0.42	0.42	0.45	0.50	0.56	0.64	0.72	0.81	0.91	1.00	1.00	1.00	1.00	1.00	1.00	1.00
C	1.00	0.76	0.62	0.56	0.54	0.53	0.53	0.56	0.62	0.70	0.79	0.90	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
D	1.00	0.78	0.66	0.61	0.59	0.58	0.58	0.62	0.68	0.76	0.86	0.97	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

MODERATE RIDGES (3-4")

	Slope %																				
Hyd.	0	1	2	3	4	5	6	8	10	12	14	16	18	20	24	28	32	36	40	45	50
A	1.00	0.61	0.38	0.25	0.19	0.17	0.16	0.17	0.18	0.21	0.23	0.26	0.30	0.34	0.42	0.51	0.60	0.70	0.80	0.93	1.00
B	1.00	0.67	0.48	0.37	0.32	0.30	0.29	0.30	0.33	0.37	0.43	0.49	0.55	0.62	0.78	0.95	1.00	1.00	1.00	1.00	1.00
C	1.00	0.71	0.53	0.43	0.39	0.37	0.37	0.38	0.42	0.47	0.54	0.62	0.71	0.80	1.00	1.00	1.00	1.00	1.00	1.00	1.00
D	1.00	0.72	0.56	0.47	0.42	0.41	0.40	0.41	0.46	0.52	0.60	0.69	0.78	0.89	1.00	1.00	1.00	1.00	1.00	1.00	1.00

HIGH RIDGES (4-6")

	Slope %																				
Hyd.	0	1	2	3	4	5	6	8	10	12	14	16	18	20	24	28	32	36	40	45	50
A	1.00	0.63	0.38	0.23	0.15	0.12	0.10	0.10	0.11	0.12	0.14	0.16	0.19	0.22	0.28	0.35	0.42	0.50	0.57	0.67	0.77
B	1.00	0.66	0.43	0.30	0.23	0.19	0.18	0.17	0.19	0.22	0.26	0.30	0.35	0.40	0.52	0.65	0.79	0.94	1.00	1.00	1.00
C	1.00	0.68	0.47	0.34	0.27	0.24	0.22	0.22	0.24	0.28	0.33	0.39	0.46	0.53	0.69	0.86	1.00	1.00	1.00	1.00	1.00
D	.00	0.69	0.48	0.36	0.29	0.26	0.24	0.24	0.27	0.31	0.37	0.43	0.51	0.59	0.77	0.97	1.00	1.00	1.00	1.00	1.00

VERY HIGH RIDGES (>6")

	Slope %																				
Hyd.	0	1	2	3	4	5	6	8	10	12	14	16	18	20	24	28	32	36	40	45	50
A	1.00	0.60	0.34	0.18	0.10	0.06	0.05	0.05	0.05	0.05	0.07	0.09	0.10	0.13	0.17	0.22	0.27	0.33	0.39	0.46	0.53
B	1.00	0.61	0.36	0.21	0.12	0.08	0.07	0.06	0.08	0.10	0.12	0.15	0.18	0.22	0.30	0.39	0.49	0.58	0.69	0.81	0.94
C	1.00	0.62	0.37	0.22	0.14	0.10	0.09	0.08	0.10	0.12	0.16	0.20	0.24	0.29	0.40	0.51	0.64	0.77	0.90	1.00	1.00
D	1.00	0.62	0.38	0.23	0.15	0.11	0.09	0.09	0.11	0.14	0.17	0.22	0.27	0.32	0.44	0.58	0.72	0.86	1.00	1.00	1.00

TABLE P - 3

CONTOUR (P) SUBFACTOR FOR ON-GRADE CONDITION

10-YEAR STORM EI=80

COVER-MANAGEMENT CONDITION--7

VERY LOW RIDGES (0.5-2")

Hyd.	Slope % 0	1	2	3	4	5	6	8	10	12	14	16	18	20	24	28	32	36	40	45	50
A	1.00	0.72	0.59	0.54	0.53	0.53	0.54	0.60	0.67	0.76	0.86	0.97	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
B	1.00	0.83	0.75	0.72	0.72	0.72	0.73	0.78	0.86	0.96	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
C	1.00	0.90	0.85	0.83	0.83	0.83	0.84	0.89	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
D	1.00	0.94	0.92	0.91	0.90	0.90	0.91	0.94	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

LOW RIDGES (2-3")

Hyd.	Slope % 0	1	2	3	4	5	6	8	10	12	14	16	18	20	24	28	32	36	40	45	50
A	1.00	0.69	0.52	0.44	0.41	0.41	0.41	0.43	0.48	0.54	0.61	0.69	0.78	0.88	1.00	1.00	1.00	1.00	1.00	1.00	1.00
B	1.00	0.77	0.64	0.58	0.55	0.55	0.55	0.58	0.64	0.72	0.82	0.92	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
C	.00	0.81	0.71	0.66	0.64	0.64	0.63	0.67	0.74	0.83	0.93	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
D	1.00	0.84	0.75	0.71	0.69	0.69	0.69	0.73	0.80	0.88	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

MODERATE RIDGES (3-4")

Hyd.	Slope % 0	1	2	3	4	5	6	8	10	12	14	16	18	20	24	28	32	36	40	45	50
A	1.00	0.67	0.47	0.36	0.31	0.29	0.28	0.29	0.32	0.36	0.41	0.47	0.53	0.60	0.75	0.92	1.00	1.00	1.00	1.00	1.00
B	1.00	0.71	0.54	0.44	0.40	0.38	0.38	0.39	0.43	0.49	0.56	0.64	0.73	0.83	1.00	1.00	1.00	1.00	1.00	1.00	1.00
C	1.00	0.74	0.58	0.50	0.46	0.44	0.44	0.45	0.50	0.57	0.66	0.75	0.86	0.98	1.00	1.00	1.00	1.00	1.00	1.00	1.00
D	1.00	0.76	0.61	0.53	0.50	0.48	0.48	0.49	0.55	0.62	0.71	0.82	0.94	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

HIGH RIDGES (4-6")

Hyd.	Slope % 0	1	2	3	4	5	6	8	10	12	14	16	18	20	24	28	32	36	40	45	50
A	1.00	0.66	0.43	0.29	0.22	0.18	0.17	0.17	0.18	0.21	0.25	0.29	0.34	0.39	0.50	0.63	0.76	0.90	1.00	1.00	1.00
B	1.00	0.68	0.47	0.34	0.28	0.24	0.23	0.23	0.25	0.29	0.34	0.40	0.47	0.55	0.72	0.90	1.00	1.00	1.00	1.00	1.00
C	1.00	0.69	0.50	0.38	0.31	0.28	0.27	0.26	0.29	0.34	0.41	0.48	0.57	0.66	0.86	1.00	1.00	1.00	1.00	1.00	1.00
D	1.00	0.70	0.51	0.40	0.33	0.30	0.29	0.29	0.32	0.37	0.45	0.53	0.63	0.73	0.96	1.00	1.00	1.00	1.00	1.00	1.00

VERY HIGH RIDGES (>6")

Hyd.	Slope % 0	1	2	3	4	5	6	8	10	12	14	16	18	20	24	28	32	36	40	45	50
A	1.00	0.61	0.36	0.20	0.12	0.08	0.07	0.06	0.07	0.09	0.12	0.15	0.18	0.21	0.29	0.38	0.47	0.56	0.66	0.78	0.91
B	1.00	0.62	0.37	0.22	0.14	0.10	0.09	0.08	0.10	0.13	0.16	0.20	0.25	0.30	0.41	0.53	0.66	0.80	0.94	1.00	1.00
C	1.00	0.63	0.38	0.23	0.15	0.12	0.10	0.10	0.12	0.15	0.19	0.24	0.30	0.36	0.50	0.64	0.80	0.97	1.00	1.00	1.00
D	1.00	0.63	0.39	0.24	0.16	0.12	0.11	0.11	0.13	0.16	0.21	0.27	0.33	0.40	0.55	0.72	0.90	1.00	1.00	1.00	1.00

TABLE P - 3

CONTOUR (P) SUBFACTOR FOR ON-GRADE CONDITION

10-YEAR STORM EI=90

COVER-MANAGEMENT CONDITION--1

VERY LOW RIDGES (0.5-2")

	Slope %																					
Hyd.	0	1	2	3	4	5	6	8	10	12	14	16	18	20	24	28	32	36	40	45	50
A	1.00	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
B	1.00	0.57	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.56	0.63	0.78	0.94	1.00	1.00	1.00	1.00	1.00
C	1.00	0.70	0.55	0.50	0.50	0.50	0.50	0.55	0.62	0.70	0.79	0.90	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
D	1.00	0.78	0.67	0.63	0.62	0.62	0.64	0.69	0.77	0.87	0.98	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

LOW RIDGES (2-3")

	Slope %																					
Hyd.	0	1	2	3	4	5	6	8	10	12	14	16	18	20	24	28	32	36	40	45	50
A	1.00	0.48	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.33	0.40	0.46
B	1.00	0.59	0.36	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.31	0.35	0.39	0.43	0.53	0.64	0.76	0.87	0.99	1.00	1.00
C	1.00	0.67	0.50	0.41	0.38	0.37	0.37	0.40	0.44	0.50	0.56	0.63	0.72	0.80	0.99	1.00	1.00	1.00	1.00	1.00	1.00
D	1.00	0.73	0.58	0.51	0.48	0.48	0.48	0.51	0.56	0.63	0.72	0.81	0.91	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

MODERATE RIDGES (3-4")

	Slope %																					
Hyd.	0	1	2	3	4	5	6	8	10	12	14	16	18	20	24	28	32	36	40	45	50
A	1.00	0.54	0.26	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.18	0.22	0.27	0.33	0.39	0.46
B	1.00	0.60	0.36	0.23	0.17	0.15	0.15	0.15	0.16	0.18	0.20	0.23	0.26	0.29	0.36	0.44	0.53	0.61	0.70	0.81	0.92
C	1.00	0.66	0.45	0.34	0.28	0.26	0.26	0.26	0.29	0.33	0.37	0.43	0.48	0.55	0.68	0.83	0.99	1.00	1.00	1.00	1.00
D	1.00	0.69	0.50	0.40	0.35	0.33	0.33	0.34	0.37	0.42	0.48	0.55	0.63	0.71	0.90	1.00	1.00	1.00	1.00	1.00	1.00

HIGH RIDGES (4-6")

	Slope %																					
Hyd.	0	1	2	3	4	5	6	8	10	12	14	16	18	20	24	28	32	36	40	45	50
A	1.00	0.59	0.32	0.15	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.12	0.17	0.22	0.27	0.32	0.38	0.45
B	1.00	0.62	0.37	0.22	0.14	0.10	0.09	0.09	0.09	0.11	0.12	0.14	0.17	0.19	0.25	0.30	0.37	0.43	0.50	0.59	0.68
C	1.00	0.65	0.42	0.28	0.21	0.17	0.16	0.15	0.17	0.19	0.23	0.26	0.31	0.35	0.45	0.57	0.68	0.81	0.94	1.00	1.00
D	1.00	0.67	0.45	0.32	0.25	0.21	0.20	0.20	0.22	0.25	0.29	0.35	0.40	0.47	0.60	0.76	0.92	1.00	1.00	1.00	1.00

VERY HIGH RIDGES (>6")

	Slope %																					
Hyd.	0	1	2	3	4	5	6	8	10	12	14	16	18	20	24	28	32	36	40	45	50
A	1.00	0.59	0.32	0.15	0.06	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.06	0.08	0.12	0.17	0.21	0.27	0.32	0.38	0.45
B	1.00	0.60	0.34	0.18	0.09	0.05	0.05	0.05	0.05	0.05	0.06	0.08	0.09	0.11	0.15	0.20	0.25	0.30	0.35	0.41	0.48
C	1.00	0.61	0.35	0.20	0.12	0.08	0.06	0.06	0.07	0.08	0.11	0.13	0.16	0.19	0.26	0.34	0.42	0.51	0.60	0.71	0.82
D	1.00	0.62	0.37	0.21	0.13	0.09	0.08	0.07	0.09	0.11	0.14	0.17	0.21	0.25	0.35	0.45	0.56	0.67	0.79	0.94	1.00

10-YEAR STORM EI=90

COVER-MANAGEMENT CONDITION--2

VERY LOW RIDGES (0.5-2")

	Slope %																					
Hyd.	0	1	2	3	4	5	6	8	10	12	14	16	18	20	24	28	32	36	40	45	50
A	1.00	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.53	0.60	0.70	0.79
B	1.00	0.64	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.57	0.65	0.74	0.84	0.94	1.00	1.00	1.00	1.00	1.00	1.00	1.00
C	1.00	0.78	0.67	0.63	0.62	0.62	0.64	0.69	0.77	0.87	0.98	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
D	1.00	0.87	0.80	0.78	0.77	0.77	0.79	0.84	0.91	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

LOW RIDGES (2-3")

	Slope %																					
Hyd.	0	1	2	3	4	5	6	8	10	12	14	16	18	20	24	28	32	36	40	45	50
A	1.00	0.53	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.33	0.39	0.44	0.51	0.58
B	1.00	0.64	0.44	0.35	0.31	0.30	0.30	0.32	0.36	0.40	0.46	0.52	0.58	0.65	0.80	0.97	1.00	1.00	1.00	1.00	1.00
C	1.00	0.73	0.58	0.51	0.48	0.48	0.48	0.51	0.56	0.63	0.72	0.81	0.91	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
D	1.00	0.79	0.67	0.62	0.60	0.59	0.59	0.63	0.69	0.78	0.87	0.98	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

MODERATE RIDGES (3-4")

	Slope %																					
Hyd.	0	1	2	3	4	5	6	8	10	12	14	16	18	20	24	28	32	36	40	45	50
A	1.00	0.57	0.30	0.16	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.18	0.22	0.27	0.32	0.37	0.43	0.49
B	1.00	0.64	0.42	0.29	0.24	0.22	0.21	0.22	0.24	0.27	0.30	0.34	0.39	0.44	0.55	0.67	0.79	0.92	1.00	1.00	1.00
C	1.00	0.69	0.50	0.40	0.35	0.33	0.33	0.34	0.37	0.42	0.48	0.55	0.63	0.71	0.90	1.00	1.00	1.00	1.00	1.00	1.00
D	1.00	0.73	0.56	0.47	0.43	0.41	0.41	0.42	0.47	0.53	0.61	0.70	0.80	0.90	1.00	1.00	1.00	1.00	1.00	1.00	1.00

HIGH RIDGES (4-6")

	Slope %																					
Hyd.	0	1	2	3	4	5	6	8	10	12	14	16	18	20	24	28	32	36	40	45	50
A	1.00	0.60	0.34	0.18	0.10	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.09	0.11	0.15	0.20	0.24	0.29	0.34	0.40	0.47
B	1.00	0.64	0.40	0.26	0.18	0.14	0.13	0.13	0.14	0.16	0.18	0.21	0.25	0.28	0.36	0.45	0.55	0.64	0.75	0.87	1.00
C	1.00	0.67	0.45	0.32	0.25	0.21	0.20	0.20	0.22	0.25	0.29	0.35	0.40	0.47	0.60	0.76	0.92	1.00	1.00	1.00	1.00
D	1.00	0.69	0.48	0.36	0.29	0.26	0.25	0.25	0.27	0.32	0.37	0.44	0.52	0.60	0.79	0.99	1.00	1.00	1.00	1.00	1.00

VERY HIGH RIDGES (>6")

	Slope %																					
Hyd.	0	1	2	3	4	5	6	8	10	12	14	16	18	20	24	28	32	36	40	45	50
A	1.00	0.59	0.32	0.16	0.07	0.05	0.05	0.05	0.05	0.05	0.05	0.06	0.07	0.09	0.13	0.18	0.23	0.28	0.33	0.39	0.46
B	1.00	0.60	0.35	0.19	0.11	0.07	0.05	0.05	0.05	0.07	0.09	0.11	0.13	0.16	0.21	0.28	0.34	0.41	0.49	0.58	0.67
C	1.00	0.62	0.37	0.21	0.13	0.09	0.08	0.07	0.09	0.11	0.14	0.17	0.21	0.25	0.35	0.45	0.56	0.67	0.79	0.94	1.00
D	1.00	0.62	0.38	0.23	0.15	0.11	0.09	0.09	0.11	0.14	0.18	0.22	0.27	0.33	0.45	0.59	0.73	0.88	1.00	1.00	1.00

TABLE P - 3

CONTOUR (P) SUBFACTOR FOR ON-GRADE CONDITION

10-YEAR STORM EI=90

COVER-MANAGEMENT CONDITION--3

VERY LOW RIDGES (0.5-2")

	Slope %																					
Hyd.	0	1	2	3	4	5	6	8	10	12	14	16	18	20	24	28	32	36	40	45	50
A	1.00	0.53	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.61	0.73	0.86	0.99	1.00	1.00	1.00
B	1.00	0.62	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.53	0.60	0.68	0.77	0.86	1.00	1.00	1.00	1.00	1.00	1.00	1.00
C	1.00	0.79	0.69	0.65	0.64	0.64	0.66	0.71	0.79	0.89	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
D	1.00	0.85	0.78	0.76	0.75	0.75	0.76	0.82	0.89	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

LOW RIDGES (2-3")

	Slope %																				
Hyd.	0	1	2	3	4	5	6	8	10	12	14	16	18	20	24	28	32	36	40	45	50
A	1.00	0.57	0.33	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.34	0.42	0.50	0.59	0.68	0.78	0.90	1.00
B	1.00	0.63	0.42	0.32	0.30	0.30	0.30	0.30	0.33	0.37	0.42	0.47	0.53	0.59	0.73	0.88	1.00	1.00	1.00	1.00	1.00
C	1.00	0.74	0.59	0.52	0.50	0.49	0.49	0.52	0.58	0.65	0.74	0.84	0.94	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
D	1.00	0.78	0.66	0.60	0.58	0.57	0.57	0.61	0.67	0.76	0.85	0.96	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

MODERATE RIDGES (3-4")

	Slope %																				
Hyd.	0	1	2	3	4	5	6	8	10	12	14	16	18	20	24	28	32	36	40	45	50
A	1.00	0.59	0.34	0.21	0.15	0.15	0.15	0.15	0.15	0.15	0.16	0.18	0.21	0.23	0.29	0.35	0.42	0.49	0.56	0.64	0.73
B	1.00	0.63	0.40	0.28	0.22	0.20	0.19	0.20	0.22	0.24	0.28	0.31	0.35	0.40	0.50	0.61	0.72	0.84	0.96	1.00	1.00
C	1.00	0.70	0.51	0.41	0.36	0.35	0.34	0.35	0.39	0.44	0.50	0.57	0.65	0.74	0.93	1.00	1.00	1.00	1.00	1.00	1.00
D	1.00	0.72	0.55	0.46	0.42	0.40	0.40	0.41	0.45	0.51	0.59	0.68	0.77	0.88	1.00	1.00	1.00	1.00	1.00	1.00	1.00

HIGH RIDGES (4-6")

	Slope %																				
Hyd.	0	1	2	3	4	5	6	8	10	12	14	16	18	20	24	28	32	36	40	45	50
A	1.00	0.61	0.36	0.21	0.13	0.09	0.08	0.08	0.08	0.08	0.10	0.11	0.13	0.15	0.20	0.25	0.30	0.35	0.41	0.48	0.55
B	1.00	0.63	0.39	0.25	0.17	0.13	0.12	0.12	0.13	0.14	0.17	0.19	0.22	0.26	0.33	0.41	0.50	0.59	0.68	0.79	0.91
C	1.00	0.67	0.46	0.32	0.25	0.22	0.21	0.20	0.22	0.26	0.31	0.36	0.42	0.48	0.63	0.79	0.96	1.00	1.00	1.00	1.00
D	1.00	0.68	0.48	0.35	0.29	0.25	0.24	0.24	0.26	0.31	0.36	0.43	0.50	0.58	0.76	0.95	1.00	1.00	1.00	1.00	1.00

VERY HIGH RIDGES (>6")

	Slope %																				
Hyd.	0	1	2	3	4	5	6	8	10	12	14	16	18	20	24	28	32	36	40	45	50
A	1.00	0.60	0.33	0.17	0.09	0.05	0.05	0.05	0.05	0.05	0.05	0.07	0.08	0.10	0.14	0.19	0.23	0.28	0.33	0.40	0.46
B	1.00	0.60	0.34	0.19	0.10	0.06	0.05	0.05	0.05	0.06	0.08	0.10	0.12	0.14	0.20	0.26	0.32	0.38	0.45	0.53	0.62
C	1.00	0.62	0.37	0.22	0.13	0.09	0.08	0.08	0.09	0.11	0.14	0.18	0.22	0.26	0.36	0.47	0.58	0.70	0.82	0.98	1.00
D	1.00	0.62	0.38	0.23	0.14	0.11	0.09	0.09	0.10	0.13	0.17	0.21	0.26	0.32	0.44	0.57	0.71	0.85	1.00	1.00	1.00

10-YEAR STORM EI=90

COVER-MANAGEMENT CONDITION--4

VERY LOW RIDGES (0.5-2")

	Slope %																				
Hyd.	0	1	2	3	4	5	6	8	10	12	14	16	18	20	24	28	32	36	40	45	50
A	1.00	0.54	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.53	0.65	0.78	0.92	1.00	1.00	1.00	1.00
B	1.00	0.71	0.57	0.52	0.51	0.51	0.52	0.57	0.64	0.72	0.82	0.93	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
C	1.00	0.81	0.73	0.69	0.69	0.69	0.70	0.76	0.84	0.93	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
D	1.00	0.87	0.80	0.78	0.77	0.77	0.79	0.84	0.91	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

LOW RIDGES (2-3")

	Slope %																				
Hyd.	0	1	2	3	4	5	6	8	10	12	14	16	18	20	24	28	32	36	40	45	50
A	1.00	0.57	0.34	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.32	0.36	0.45	0.54	0.63	0.73	0.83	0.96	1.00
B	1.00	0.68	0.51	0.42	0.39	0.39	0.39	0.41	0.46	0.51	0.58	0.66	0.74	0.83	1.00	1.00	1.00	1.00	1.00	1.00	1.00
C	1.00	0.75	0.62	0.55	0.53	0.52	0.52	0.56	0.62	0.69	0.79	0.89	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
D	1.00	0.79	0.67	0.62	0.60	0.59	0.59	0.63	0.69	0.78	0.87	0.98	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

MODERATE RIDGES (3-4")

	Slope %																				
Hyd.	0	1	2	3	4	5	6	8	10	12	14	16	18	20	24	28	32	36	40	45	50
A	1.00	0.59	0.35	0.21	0.15	0.15	0.15	0.15	0.15	0.15	0.17	0.19	0.22	0.25	0.31	0.37	0.44	0.51	0.59	0.68	0.78
B	1.00	0.66	0.46	0.35	0.29	0.27	0.27	0.27	0.30	0.34	0.39	0.44	0.50	0.57	0.71	0.87	1.00	1.00	1.00	1.00	1.00
C	1.00	0.71	0.53	0.43	0.38	0.37	0.36	0.37	0.41	0.47	0.54	0.61	0.70	0.79	1.00	1.00	1.00	1.00	1.00	1.00	1.00
D	1.00	0.73	0.56	0.47	0.43	0.41	0.41	0.42	0.47	0.53	0.61	0.70	0.80	0.90	1.00	1.00	1.00	1.00	1.00	1.00	1.00

HIGH RIDGES (4-6")

	Slope %																				
Hyd.	0	1	2	3	4	5	6	8	10	12	14	16	18	20	24	28	32	36	40	45	50
A	1.00	0.61	0.36	0.21	0.13	0.09	0.08	0.08	0.08	0.09	0.10	0.12	0.14	0.16	0.21	0.26	0.31	0.37	0.43	0.50	0.58
B	1.00	0.65	0.43	0.29	0.21	0.18	0.16	0.16	0.17	0.20	0.23	0.27	0.32	0.37	0.47	0.59	0.72	0.85	0.98	1.00	1.00
C	1.00	0.68	0.46	0.34	0.27	0.23	0.22	0.22	0.24	0.28	0.33	0.39	0.45	0.52	0.68	0.85	1.00	1.00	1.00	1.00	1.00
D	1.00	0.69	0.48	0.36	0.29	0.26	0.25	0.25	0.27	0.32	0.37	0.44	0.52	0.60	0.79	0.99	1.00	1.00	1.00	1.00	1.00

VERY HIGH RIDGES (>6")

	Slope %																				
Hyd.	0	1	2	3	4	5	6	8	10	12	14	16	18	20	24	28	32	36	40	45	50
A	1.00	0.60	0.33	0.17	0.09	0.05	0.05	0.05	0.05	0.05	0.05	0.07	0.09	0.10	0.14	0.19	0.24	0.28	0.34	0.40	0.46
B	1.00	0.61	0.36	0.20	0.12	0.08	0.06	0.06	0.07	0.09	0.11	0.14	0.17	0.20	0.27	0.36	0.44	0.53	0.62	0.74	0.86
C	1.00	0.62	0.37	0.22	0.14	0.10	0.08	0.08	0.09	0.12	0.15	0.19	0.24	0.28	0.39	0.51	0.63	0.76	0.89	1.00	1.00
D	1.00	0.62	0.38	0.23	0.15	0.11	0.09	0.09	0.11	0.14	0.18	0.22	0.27	0.33	0.45	0.59	0.73	0.88	1.00	1.00	1.00

TABLE P - 3

CONTOUR (P) SUBFACTOR FOR ON-GRADE CONDITION

10-YEAR STORM EI=90

COVER-MANAGEMENT CONDITION--5

VERY LOW RIDGES (0.5-2")

	Slope %																					
Hyd.	0	1	2	3	4	5	6	8	10	12	14	16	18	20	24	28	32	36	40	45	50
A	1.00	0.60	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.52	0.59	0.66	0.74	0.92	1.00	1.00	1.00	1.00	1.00	1.00
B	1.00	0.74	0.62	0.57	0.56	0.56	0.58	0.63	0.70	0.80	0.90	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
C	1.00	0.84	0.76	0.74	0.73	0.73	0.74	0.80	0.88	0.97	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
D	1.00	0.89	0.84	0.82	0.82	0.82	0.83	0.88	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

LOW RIDGES (2-3")

	Slope %																					
Hyd.	0	1	2	3	4	5	6	8	10	12	14	16	18	20	24	28	32	36	40	45	50
A	1.00	0.61	0.39	0.30	0.30	0.30	0.30	0.30	0.30	0.32	0.36	0.41	0.46	0.51	0.63	0.76	0.89	1.00	1.00	1.00	1.00
B	1.00	0.70	0.54	0.47	0.44	0.43	0.43	0.46	0.51	0.57	0.65	0.73	0.83	0.93	1.00	1.00	1.00	1.00	1.00	1.00	1.00
C	1.00	0.77	0.64	0.58	0.56	0.56	0.56	0.59	0.65	0.74	0.83	0.94	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
D	1.00	0.81	0.70	0.65	0.63	0.63	0.63	0.66	0.73	0.82	0.92	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

MODERATE RIDGES (3-4")

	Slope %																					
Hyd.	0	1	2	3	4	5	6	8	10	12	14	16	18	20	24	28	32	36	40	45	50
A	1.00	0.62	0.38	0.26	0.19	0.17	0.17	0.17	0.19	0.21	0.24	0.27	0.31	0.34	0.43	0.52	0.62	0.72	0.82	0.95	1.00
B	1.00	0.68	0.48	0.37	0.32	0.30	0.30	0.31	0.34	0.38	0.44	0.50	0.57	0.64	0.80	0.98	1.00	1.00	1.00	1.00	1.00
C	1.00	0.72	0.55	0.45	0.41	0.39	0.39	0.40	0.44	0.50	0.57	0.66	0.75	0.85	1.00	1.00	1.00	1.00	1.00	1.00	1.00
D	1.00	0.74	0.58	0.49	0.45	0.44	0.43	0.45	0.49	0.56	0.65	0.74	0.85	0.96	1.00	1.00	1.00	1.00	1.00	1.00	1.00

HIGH RIDGES (4-6")

	Slope %																					
Hyd.	0	1	2	3	4	5	6	8	10	12	14	16	18	20	24	28	32	36	40	45	50
A	1.00	0.63	0.38	0.24	0.16	0.12	0.10	0.10	0.11	0.12	0.14	0.17	0.19	0.22	0.29	0.36	0.43	0.51	0.59	0.69	0.79
B	1.00	0.66	0.44	0.30	0.23	0.19	0.18	0.18	0.20	0.23	0.26	0.31	0.36	0.41	0.54	0.67	0.81	0.96	1.00	1.00	1.00
C	1.00	0.68	0.47	0.35	0.28	0.25	0.23	0.23	0.25	0.30	0.35	0.41	0.48	0.56	0.73	0.92	1.00	1.00	1.00	1.00	1.00
D	1.00	0.69	0.49	0.37	0.31	0.27	0.26	0.26	0.29	0.34	0.40	0.47	0.56	0.65	0.85	1.00	1.00	1.00	1.00	1.00	1.00

VERY HIGH RIDGES (>6")

	Slope %																					
Hyd.	0	1	2	3	4	5	6	8	10	12	14	16	18	20	24	28	32	36	40	45	50
A	1.00	0.60	0.34	0.18	0.10	0.06	0.05	0.05	0.05	0.05	0.07	0.09	0.11	0.13	0.17	0.22	0.28	0.34	0.39	0.47	0.54
B	1.00	0.61	0.36	0.21	0.12	0.08	0.07	0.07	0.08	0.10	0.12	0.15	0.19	0.23	0.31	0.40	0.50	0.60	0.70	0.83	0.97
C	1.00	0.62	0.37	0.22	0.14	0.10	0.09	0.09	0.10	0.13	0.17	0.21	0.25	0.31	0.42	0.55	0.68	0.82	0.96	1.00	1.00
D	1.00	0.63	0.38	0.23	0.15	0.11	0.10	0.10	0.11	0.15	0.19	0.24	0.29	0.35	0.49	0.63	0.79	0.95	1.00	1.00	1.00

10-YEAR STORM EI=90

COVER-MANAGEMENT CONDITION--6

VERY LOW RIDGES (0.5-2")

	Slope %																					
Hyd.	0	1	2	3	4	5	6	8	10	12	14	16	18	20	24	28	32	36	40	45	50
A	1.00	0.62	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.53	0.60	0.68	0.77	0.86	1.00	1.00	1.00	1.00	1.00	1.00	1.00
B	1.00	0.78	0.67	0.63	0.62	0.62	0.64	0.69	0.77	0.87	0.98	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
C	1.00	0.87	0.80	0.78	0.77	0.77	0.79	0.84	0.91	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
D	1.00	0.91	0.86	0.85	0.84	0.84	0.85	0.90	0.96	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

LOW RIDGES (2-3")

	Slope %																					
Hyd.	0	1	2	3	4	5	6	8	10	12	14	16	18	20	24	28	32	36	40	45	50
A	1.00	0.63	0.42	0.32	0.30	0.30	0.30	0.30	0.33	0.37	0.42	0.47	0.53	0.59	0.73	0.88	1.00	1.00	1.00	1.00	1.00
B	1.00	0.73	0.58	0.51	0.48	0.48	0.48	0.51	0.56	0.63	0.72	0.81	0.91	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
C	1.00	0.79	0.67	0.62	0.60	0.59	0.59	0.63	0.69	0.78	0.87	0.98	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
D	1.00	0.82	0.71	0.67	0.65	0.64	0.64	0.68	0.75	0.84	0.94	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

MODERATE RIDGES (3-4")

	Slope %																					
Hyd.	0	1	2	3	4	5	6	8	10	12	14	16	18	20	24	28	32	36	40	45	50
A	1.00	0.63	0.40	0.28	0.22	0.20	0.19	0.20	0.22	0.24	0.28	0.31	0.35	0.40	0.50	0.61	0.72	0.84	0.96	1.00	1.00
B	1.00	0.69	0.50	0.40	0.35	0.33	0.33	0.34	0.37	0.42	0.48	0.55	0.63	0.71	0.90	1.00	1.00	1.00	1.00	1.00	1.00
C	1.00	0.73	0.56	0.47	0.43	0.41	0.41	0.42	0.47	0.53	0.61	0.70	0.80	0.90	1.00	1.00	1.00	1.00	1.00	1.00	1.00
D	1.00	0.74	0.59	0.50	0.46	0.45	0.45	0.46	0.51	0.58	0.66	0.76	0.87	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00

HIGH RIDGES (4-6")

	Slope %																					
Hyd.	0	1	2	3	4	5	6	8	10	12	14	16	18	20	24	28	32	36	40	45	50
A	1.00	0.63	0.39	0.25	0.17	0.13	0.12	0.12	0.13	0.14	0.17	0.19	0.22	0.26	0.33	0.41	0.50	0.59	0.68	0.79	0.91
B	1.00	0.67	0.45	0.32	0.25	0.21	0.20	0.20	0.22	0.25	0.29	0.35	0.40	0.47	0.60	0.76	0.92	1.00	1.00	1.00	1.00
C	1.00	0.69	0.48	0.36	0.29	0.26	0.25	0.25	0.27	0.32	0.37	0.44	0.52	0.60	0.79	0.99	1.00	1.00	1.00	1.00	1.00
D	1.00	0.70	0.50	0.38	0.31	0.28	0.27	0.27	0.30	0.35	0.41	0.49	0.57	0.67	0.88	1.00	1.00	1.00	1.00	1.00	1.00

VERY HIGH RIDGES (>6")

	Slope %																					
Hyd.	0	1	2	3	4	5	6	8	10	12	14	16	18	20	24	28	32	36	40	45	50
A	1.00	0.60	0.34	0.19	0.10	0.06	0.05	0.05	0.05	0.06	0.08	0.10	0.12	0.14	0.20	0.26	0.32	0.38	0.45	0.53	0.62
B	1.00	0.62	0.37	0.21	0.13	0.09	0.08	0.07	0.09	0.11	0.14	0.17	0.21	0.25	0.35	0.45	0.56	0.67	0.79	0.94	1.00
C	1.00	0.62	0.38	0.23	0.15	0.11	0.09	0.09	0.11	0.14	0.18	0.22	0.27	0.33	0.45	0.59	0.73	0.88	1.00	1.00	1.00
D	1.00	0.63	0.38	0.24	0.15	0.12	0.10	0.10	0.12	0.15	0.20	0.25	0.30	0.37	0.50	0.66	0.82	0.99	1.00	1.00	1.00

TABLE P - 3

CONTOUR (P) SUBFACTOR FOR ON-GRADE CONDITION

10-YEAR STORM EI=90

COVER-MANAGEMENT CONDITION--7

VERY LOW RIDGES (0.5-2")

	Slope %																				
Hyd.	0	1	2	3	4	5	6	8	10	12	14	16	18	20	24	28	32	36	40	45	50
A	1.00	0.77	0.65	0.61	0.60	0.60	0.62	0.67	0.75	0.85	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
B	1.00	0.88	0.82	0.80	0.80	0.80	0.81	0.86	0.93	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
C	1.00	0.95	0.92	0.92	0.91	0.91	0.92	0.95	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
D	1.00	0.99	0.99	0.99	0.99	0.99	0.99	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

LOW RIDGES (2-3")

	Slope %																				
Hyd.	0	1	2	3	4	5	6	8	10	12	14	16	18	20	24	28	32	36	40	45	50
A	1.00	0.72	0.57	0.49	0.47	0.46	0.46	0.49	0.54	0.61	0.69	0.79	0.89	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00
B	1.00	0.80	0.69	0.63	0.61	0.61	0.61	0.64	0.71	0.80	0.90	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
C	1.00	0.84	0.76	0.72	0.70	0.70	0.70	0.74	0.80	0.89	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
D	1.00	0.87	0.80	0.77	0.76	0.76	0.76	0.79	0.86	0.94	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

MODERATE RIDGES (3-4")

	Slope %																				
Hyd.	0	1	2	3	4	5	6	8	10	12	14	16	18	20	24	28	32	36	40	45	50
A	1.00	0.69	0.50	0.39	0.34	0.32	0.32	0.33	0.36	0.41	0.47	0.54	0.61	0.69	0.86	1.00	1.00	1.00	1.00	1.00	1.00
B	1.00	0.73	0.57	0.48	0.44	0.43	0.42	0.43	0.48	0.55	0.63	0.72	0.82	0.93	1.00	1.00	1.00	1.00	1.00	1.00	1.00
C	1.00	0.76	0.62	0.54	0.50	0.49	0.48	0.50	0.55	0.63	0.72	0.83	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
D	1.00	0.78	0.65	0.57	0.54	0.53	0.52	0.54	0.60	0.68	0.78	0.90	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

HIGH RIDGES (4-6")

	Slope %																				
Hyd.	0	1	2	3	4	5	6	8	10	12	14	16	18	20	24	28	32	36	40	45	50
A	1.00	0.66	0.45	0.31	0.24	0.21	0.19	0.19	0.21	0.24	0.28	0.33	0.39	0.45	0.58	0.73	0.88	1.00	1.00	1.00	1.00
B	1.00	0.69	0.49	0.37	0.30	0.27	0.26	0.25	0.28	0.33	0.39	0.46	0.54	0.62	0.82	1.00	1.00	1.00	1.00	1.00	1.00
C	1.00	0.71	0.51	0.40	0.33	0.30	0.29	0.29	0.32	0.38	0.45	0.54	0.63	0.74	0.97	1.00	1.00	1.00	1.00	1.00	1.00
D	1.00	0.72	0.53	0.42	0.36	0.33	0.32	0.31	0.35	0.41	0.50	0.59	0.70	0.82	1.00	1.00	1.00	1.00	1.00	1.00	1.00

VERY HIGH RIDGES (>6")

	Slope %																				
Hyd.	0	1	2	3	4	5	6	8	10	12	14	16	18	20	24	28	32	36	40	45	50
A	1.00	0.61	0.36	0.21	0.13	0.09	0.07	0.07	0.08	0.11	0.13	0.17	0.20	0.24	0.33	0.43	0.54	0.65	0.76	0.90	1.00
B	1.00	0.62	0.38	0.23	0.15	0.11	0.10	0.09	0.11	0.14	0.18	0.23	0.28	0.34	0.47	0.61	0.76	0.92	1.00	1.00	1.00
C	1.00	0.63	0.39	0.24	0.16	0.12	0.11	0.11	0.13	0.17	0.22	0.27	0.34	0.41	0.56	0.73	0.91	1.00	1.00	1.00	1.00
D	1.00	0.63	0.39	0.25	0.17	0.13	0.12	0.12	0.14	0.18	0.24	0.30	0.37	0.45	0.63	0.82	1.00	1.00	1.00	1.00	1.00

TABLE P - 4

CONTOURING P SUBFACTOR VALUE ADJUSTED FOR ROW GRADE

Contour P Factor Value	Ratio of Row Grade / Field Slope									
	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
0.04	0.34	0.47	0.57	0.65	0.72	0.78	0.84	0.90	0.95	1.00
0.06	0.36	0.48	0.57	0.65	0.72	0.79	0.85	0.90	0.95	1.00
0.08	0.37	0.49	0.58	0.66	0.73	0.79	0.85	0.90	0.95	1.00
0.10	0.38	0.50	0.59	0.67	0.74	0.80	0.85	0.90	0.95	1.00
0.12	0.40	0.51	0.60	0.68	0.74	0.80	0.86	0.91	0.95	1.00
0.14	0.41	0.52	0.61	0.68	0.75	0.81	0.86	0.91	0.96	1.00
0.16	0.43	0.54	0.62	0.69	0.75	0.81	0.86	0.91	0.96	1.00
0.18	0.44	0.55	0.63	0.70	0.76	0.82	0.87	0.91	0.96	1.00
0.20	0.45	0.56	0.64	0.71	0.77	0.82	0.87	0.92	0.96	1.00
0.22	0.47	0.57	0.65	0.71	0.77	0.82	0.87	0.92	0.96	1.00
0.24	0.48	0.58	0.66	0.72	0.78	0.83	0.88	0.92	0.96	1.00
0.26	0.49	0.59	0.67	0.73	0.78	0.83	0.88	0.92	0.96	1.00
0.28	0.51	0.60	0.67	0.74	0.79	0.84	0.88	0.92	0.96	1.00
0.30	0.52	0.61	0.68	0.74	0.79	0.84	0.89	0.93	0.96	1.00
0.32	0.54	0.62	0.69	0.75	0.80	0.85	0.89	0.93	0.97	1.00
0.34	0.55	0.64	0.70	0.76	0.81	0.85	0.89	0.93	0.97	1.00
0.36	0.56	0.65	0.71	0.76	0.81	0.86	0.90	0.93	0.97	1.00
0.38	0.58	0.66	0.72	0.77	0.82	0.86	0.90	0.93	0.97	1.00
0.40	0.59	0.67	0.73	0.78	0.82	0.86	0.90	0.94	0.97	1.00
0.42	0.60	0.68	0.74	0.79	0.83	0.87	0.91	0.94	0.97	1.00
0.44	0.62	0.69	0.75	0.79	0.84	0.87	0.91	0.94	0.97	1.00
0.46	0.63	0.70	0.76	0.80	0.84	0.88	0.91	0.94	0.97	1.00
0.48	0.64	0.71	0.76	0.81	0.85	0.88	0.92	0.95	0.97	1.00
0.50	0.66	0.72	0.77	0.82	0.85	0.89	0.92	0.95	0.97	1.00

TABLE P - 4 (cont.)

CONTOURING P SUBFACTOR VALUE ADJUSTED FOR ROW GRADE

Contour P Factor Value	Ratio of Row Grade / Field Slope									
	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
0.52	0.67	0.73	0.78	0.82	0.86	0.89	0.92	0.95	0.98	1.00
0.54	0.69	0.75	0.79	0.83	0.87	0.90	0.92	0.95	0.98	1.00
0.56	0.70	0.76	0.80	0.84	0.87	0.90	0.93	0.95	0.98	1.00
0.58	0.71	0.77	0.81	0.85	0.88	0.91	0.93	0.96	0.98	1.00
0.60	0.73	0.78	0.82	0.85	0.88	0.91	0.93	0.96	0.98	1.00
0.62	0.74	0.79	0.83	0.86	0.89	0.91	0.94	0.96	0.98	1.00
0.64	0.75	0.80	0.84	0.87	0.89	0.92	0.94	0.96	0.98	1.00
0.66	0.77	0.81	0.85	0.88	0.90	0.92	0.94	0.96	0.98	1.00
0.68	0.78	0.82	0.86	0.88	0.91	0.93	0.95	0.97	0.98	1.00
0.70	0.79	0.83	0.86	0.89	0.91	0.93	0.95	0.97	0.98	1.00
0.72	0.81	0.85	0.87	0.90	0.92	0.94	0.95	0.97	0.99	1.00
0.74	0.82	0.86	0.88	0.90	0.92	0.94	0.96	0.97	0.99	1.00
0.76	0.84	0.87	0.89	0.91	0.93	0.95	0.96	0.97	0.99	1.00
0.78	0.85	0.88	0.90	0.92	0.94	0.95	0.96	0.98	0.99	1.00
0.80	0.86	0.89	0.91	0.93	0.94	0.95	0.97	0.98	0.99	1.00
0.82	0.88	0.90	0.92	0.93	0.95	0.96	0.97	0.98	0.99	1.00
0.84	0.89	0.91	0.93	0.94	0.95	0.96	0.97	0.98	0.99	1.00
0.86	0.90	0.92	0.94	0.95	0.96	0.97	0.98	0.99	0.99	1.00
0.88	0.92	0.93	0.95	0.96	0.96	0.97	0.98	0.99	0.99	1.00
0.90	0.93	0.94	0.95	0.96	0.97	0.98	0.98	0.99	0.99	1.00
0.92	0.95	0.96	0.96	0.97	0.98	0.98	0.99	0.99	1.00	1.00
0.94	0.96	0.97	0.97	0.98	0.98	0.99	0.99	0.99	1.00	1.00
0.96	0.97	0.98	0.98	0.99	0.99	0.99	0.99	1.00	1.00	1.00
0.98	0.99	0.99	0.99	0.99	0.99	1.00	1.00	1.00	1.00	1.00
1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

TABLE P - 4A

CONTOURING P SUBFACTOR RATIO ROW GRADE / FIELD SLOPE

FIELD SLOPE %	ROW GRADE %															
	0.5	1.0	2.0	3.0	4.0	5.0	6.0	7.0	8.0	9.0	10	12	14	16	18	20
2	.25	.50	1.0													
3	.17	.33	.67	1.0												
4	.13	.25	.50	.75	1.0											
5	.10	.20.	.40	.60	.80	1.0										
6	.08	.17	.33	.50	.66	.83	1.0									
7	.07	.14	.28	.43	.57	.71	.86	1.0								
8	.06	.13	.25	.38	.50	.62.	.75	.88	1.0							
9	.06	.11	.22	.33	.44	.55	.66	.77	.88	1.0						
10	.05	.10	.20	.30	.40	.50	.60	.70	.80	.90	1.0					
12	.04	.08	.17	.25	.33	.42	.50	.58	.66	.75	.83	1.0				
14	.04	.07	.14	.21	.28	.36	.43	.50	.57	.64	.71	.86	1.0			
16	.03	.06	.13	.19	.25	.31	.38	.44	.50	.56	.63	.75	.88	1.0		
18	.03	.06	.11	.17	.22	.28	.33	.39	.44	.50	.56	.67	.78	.89	1.0	
20	.03	.05	.10	.15	.20	.25	.30	.35	.40	.45	.50	.60	.70	.80	.90	1.0

TABLE P - 5A

CONTOUR STRIPCROPPING PRACTICE (P) SUBFACTOR

STRIPCROPPING (P) SUBFACTOR VALUES FOR SOD BASED ROTATIONS [1/]

STRIPS	CLEAR, SPRING SEEDED HAY [2/]					WITH SMALL GRAIN SEEDING [3/]		
2	1.0	.86	.82	.78	.77	.84	.79	.77
3	1.0	.84	.77	.74	.72	.81	.74	.72
4 [4/]	1.0	.81	.72	.69	.66	.77	.69	.67
	2-3	**2-4**	**2-5**	**2-6**	**2-7**	**2-4**	**2-5**	**2-6**
	COVER-MANAGEMENT CONDITION PAIRINGS							

STRIPCROPPING (P) SUBFACTOR VALUES FOR RESIDUE COVER OR SMALL GRAIN BASED ROTATIONS [5/]

STRIPS	HIGH RESIDUE [6/]				MODERATE RESIDUE, SMALL GRAIN [7/]				
2	.97	.87	.81	.79	.92	.85	.81	.91	.86
3	.96	.85	.78	.75	.90	.82	.77	.89	.83
4 [4/]	.95	.83	.75	.70	.88	.78	.73	.87	.80
	3-4	**3-5**	**3-6**	**3-7**	**4-5**	**4-6**	**4-7**	**5-6**	**5-7**
	COVER-MANAGEMENT CONDITION PAIRINGS								

[1/] Rotations where cross-slope sod strips are generally alternated with cross-slope cultivated strips on the specified slope.

[2/] Sod-based rotations where hay crop is established in the spring without a nurse or companion crop of small grain. One third to two thirds of the strips are in hay (condition 2).

[3/] Sod-based rotations where a companion crop of small grain is sown with hay, or hay crop in stubble after small grain harvest. One third to two thirds of the strips are in hay (condition 2).

[4/] Benefits from greater than 4 strip widths are not significantly different than for 4 strips on a specified slope.

[5/] Rotations where cross-slope strips of contrasting residue amounts or surface roughness are generally alternated on the specified slope, or strips of small grain are alternated with clean tilled row crops.

[6/] Rotations where strips with cover condition 3 are generally alternated with strips of lesser cover.

[7/] Rotations where strips with cover condition 4 are generally alternated with strips of lesser cover.

General Note:

On all conditions above, strips with the lower cover are considered to be sediment producing strips and strips with the greater cover induce sediment deposition.

TABLE P - 5B

FIELD STRIPCROPPING PRACTICE (P) SUBFACTOR TABLE

STRIPCROPPING (P) SUBFACTOR VALUES FOR SOD BASED ROTATIONS [1/]

STRIPS	CLEAR, SPRING SEEDED HAY [2/]					WITH SMALL GRAIN SEEDING [3/]		
2	1.0	.91	.88	.86	.85	.89	.86	.86
3	1.0	.87	.85	.83	.82	.86	.83	.83
4 [4/]	1.0	.83	.81	.80	.79	.82	.80	.79

2-3	2-4	2-5	2-6	2-7	2-4	2-5	2-6
COVER-MANAGEMENT CONDITION PAIRINGS							

STRIPCROPPING (P) SUBFACTOR VALUES FOR RESIDUE COVER OR SMALL GRAIN BASED ROTATIONS [5/]

STRIPS	HIGH RESIDUE [6/]				MODERATE RESIDUE, SMALL GRAIN [7/]				
2	.97	.92	.88	.87	.95	.90	.89	.94	.92
3	.96	.90	.86	.85	.93	.88	.87	.93	.91
4 [4/]	.95	.88	.84	.82	.91	.86	.84	.92	.89

3-4	3-5	3-6	3-7	4-5	4-6	4-7	5-6	5-7
COVER-MANAGEMENT CONDITION PAIRINGS								

[1/] Rotations where cross-slope sod strips are generally alternated with cross-slope cultivated strips on the specified slope.

[2/] Sod-based rotations where hay crop is established in the spring without a nurse or companion crop of small grain. One third to two thirds of the strips are in hay (condition 2).

[3/] Sod-based rotations where a companion crop of small grain is sown with hay, or hay crop in stubble after small grain harvest. One third to two thirds of the strips are in hay (condition 2).

[4/] Benefits from greater than 4 strip widths are not significantly different than for 4 strips on a specified slope.

[5/] Rotations where cross-slope strips of contrasting residue amounts or surface roughness are generally alternated on the specified slope, or strips of small grain are alternated with clean tilled row crops.

[6/] Rotations where strips with cover condition 3 are generally alternated with strips of lesser cover.

[7/] Rotations where strips with cover condition 4 are generally alternated with strips of lesser cover.

General Note:

On all conditions above, strips with the lower cover are considered to be sediment producing strips and strips with the greater cover induce sediment deposition.

TABLE P - 5C

BUFFER STRIPCROPPING PRACTICE (P) SUBFACTOR

UNHARVESTED BUFFERS

NO. OF STRIPS	CROP-BUFFER STRIP RATIOS [1/]									
	9:1	4:1	9:1	4:1	9:1	4:1	9:1	4:1	9:1	4:1
2	.90	.77	.89	.77	.90	.77	.90	.78	.92	.79
3	.72	.70	.72	.70	.72	.70	.73	.70	.75	.70
4	.74	.64	.71	.64	.73	.64	.74	.65	.80	.67
5	.65	.64	.65	.64	.65	.64	.68	.64	.73	.64
	3-1		4-1		5-1		6-1		7-1	
	COVER-MANAGEMENT CONDITION PAIRINGS									

HARVESTED BUFFERS

NO. OF STRIPS	CROP-BUFFER STRIP RATIOS [1/]									
	9:1	4:1	9:1	4:1	9:1	4:1	9:1	4:1	9:1	4:1
2	.99	.99	.93	.86	.92	.82	.92	.80	.94	.82
3	.98	.98	.82	.82	.78	.77	.76	.74	.78	.73
4	.98	.98	.81	.76	.79	.72	.78	.70	.83	.72
5	.98	.98	.75	.73	.74	.70	.73	.69	.77	.70
	3-2		4-2		5-2		6-2		7-2	
	COVER-MANAGEMENT CONDITION PAIRINGS									

POSITION OF STRIPS ON SPECIFIED SLOPE

2 STRIPS

CROP

BUFFER

3 STRIPS

CROP

BUFFER

CROP

4 STRIPS

CROP

BUFFER

CROP

BUFFER

5 STRIPS

CROP

BUFFER

CROP

BUFFER

CROP

[1/] Ratio of cultivated crop strip to perennial sod (buffer) strip. A 9:1 ratio means that 10% of the specified slope length is in buffer strip(s). A 4:1 ratio means that 20% of the specified slope length is in buffer strip(s).

General Notes:

1. Some deviation from the relative position of the strips as shown here is to be expected and is allowed.
2. Unharvested buffer strips may be mowed for maintenance purposes.

TABLE P - 6

TERRACE (P) SUBFACTOR

Horizontal Interval (ft)	Horizontal Interval (m)	Closed outlets [1/]	Open Outlets, with percent grade of [2/] 0.1 - 0.3	0.4 - 0.7	0.8
less than 110	less than 33	0.5	0.6	0.7	1.0
110 - 140	33 - 42	0.6	0.7	0.8	1.0
140 - 180	43 - 54	0.7	0.8	0.9	1.0
180 - 225	55 - 68	0.8	0.8	0.9	1.0
225 - 300	68 - 90	0.9	0.9	0.9	1.0
more than 300	more than 90	1.0	1.0	1.0	1.0

[1/] The "P" factors for closed outlet terraces also apply to terraces with underground outlets and to level terraces with open outlets.

[2/] The channel grade is measured on the 300 ft of terrace or the one-third of total terrace length closest to the outlet, whichever distance is less.

RUSLE DOCUMENTATION WORKSHEET FOR PENNSYLVANIA

OP ID _____ CLIENT _____ PLANNING PHASE _____ SYSTEM LEVEL _____

FIELD NO. _____ TRACT _____

CROP ROTATION INFORMATION

	CROP	TILLAGE	COVER	RIDGE HT	"C"
1.					
2.					
3.					
4.					
5.					
6.					
AVERAGE					

GENERAL INFORMATION

SOIL SERIES_____ HYD GROUP____

R_____ EI_____ CLIMATIC ZONE_____

K_____ CLIMATIC ADJ. K_____ T_____

L_____ S_____ LS_____

LIST COMPOUND SLOPES (top to bottom)

LEGEND:

CROPS: C = Corn, CS = Corn Silage, SB = Soybeans, SG = Small Grain, H = Hay, RR = Residue Removed, RL = Residue Left, CC = Cover Crop

TILLAGE: NT = No-Till, MB = moldboard Plow, RT = Reduced Till, MT = Mulch Till

COVER: 1 = Unharvested meadow, 2 = Harvested meadow, 3 = Good no-till, 4 = Average no-till or good mulch till 5 = Reduced till, 6 = Clean till, 7 = Clean till pulverized (see Table P - 1)

RIDGE HT: VL = (½ - 2"), L = (2 - 3"), M = (3 - 4"), H = (4 - 6"), VH = (>6") (see Table P - 2)

RUSLE P FACTOR CALCULATIONS

P FACTOR = _____ (A) X _____ (B) X _____ (C) = _____

CONTOUR SUBFACTOR (A)

P (on grade - Table P - 3) _____ Row Grade (%) _____ / Field Slope (%) _____ = Ratio _____

P Adjusted for row grade (from Table P - 4) = _____ **(A)**

STRIPCROPPING / BUFFER SUBFACTOR (B)

from Table P - 5___ Cover Condition Pairs _____, _____

Strip Width _____ ft Number of Strips _____ Crop - Buffer Strip Ratio ___ : ___

P Stripcropping / Buffer Subfactor = _____ **(B)**

TERRACE SUBFACTOR (C)

from Table P - 6 P Terrace Subfactor = _____ **(C)**

A = R K LS C P

BEFORE SOIL LOSS CALCULATION

A = _____ (R) X _____ (K) X _____ (LS) X _____ (C) X _____ (P) = _____

A = R K LS C P

AFTER SOIL LOSS CALCULATION

A = _____ (R) X _____ (K) X _____ (LS) X _____ (C) X _____ (P) = _____

RUSLE EXAMPLES

GENERAL INSTRUCTIONS USING THE RUSLE DOCUMENTATION WORKSHEET FOR PENNSYLVANIA

The following information outlines general steps to in utilizing RUSLE in calculating soil loss. The principles outlined will apply even if the documentation format is modified. Three examples with modifications follow this general section. These examples are described in a narrative format and are documented on the RUSLE Documentation Worksheet. In several instances reference is made to the specific examples in this general section in order to discuss specific points.

Step 1: Enter appropriate data in "crop rotation" and "general" blocks of the RUSLE Documentation Worksheet.

Step 2: In the crop rotation block, using Table P-1 as a reference, complete cover condition for each crop and an average for the rotation. The average may be done visually or by adding the numbers and dividing by the number of years in the rotation. If the average is closer to half way between two categories, document as in example 2A and average the numbers for the two cover conditions when using Table P-3. When first using this table, check the cover conditions above and below the one you are using to learn the sensitivity of this selection.

Step 3: In the crop rotation block, complete the ridge height information for each crop. Also document an average. If the average is closer to half way between two categories than it is to one category, document as in example 1A and average the values for very low and low ridges when using Table P-3. Use Table P-2 as your reference. From this table you will note that vegetation affects ridge height. In situations where small grains, grass or grass legumes are grown on very low or low ridge heights, increase the ridge height category by 1.

Step 4: Complete "C" factors for each crop in the rotation using the appropriate "C" factor table. Calculate the average "C" for the crop rotation. When planting a fall grain as in example 1A on line 3 the silage corn value from the tables is .24. However, this value must be multiplied by .75 and the resulting value of .18 is used for the silage corn. Line 6 represents three years of a hay crop. Therefore, .005 x 3 or .015 represents the three years of established hay in the rotation. An adjustment for fall tillage is shown in example 2A on line 1, where the value for silage corn after hay (.22) is increased by an adjustment factor of +.07 and gives the silage corn a value of .29.

Step 5: In the general information box the LS value is determined from one of three LS Tables. Generally Table P-2 will be used for cropland unless the system is continuous no-till, pasture or hay. Record the proper LS value. The compound slope section is provided to document compound slopes to be later evaluated when the computer version of RUSLE is available. The numbers provided are done as an example of how to list the information. Compound slopes consist of two or more distinct slope breaks within a given slope length.

Step 6: Record the numbers from this section in the calculation box at the bottom of the sheet where A will be calculated. Enter the R value as is. The K value listed above should be climate adjusted using Table K-1 and the appropriate county climatic zone from the Pennsylvania climatic zone chart. Enter the climatic adjusted K in the equation. Next enter the previously calculated LS factor.

Step 7: Using the "P" factor section of the worksheet, start by entering the appropriate "on grade" contouring P subfactor taken from Table P-3. For example, 1A the on grade contour P subfactor is .52. This was determined by usage the EI=70 tables, an average cover condition of 4, by averaging values from the tables for low and very low ridges with hydrologic group C and a field slope of 8 %.

Step 8: Dividing the row grade of 4% by the field slope of 8% you obtain a ratio of 0.5. From Table P-4 the contour P of .52 is adjusted using the ratio of 0.5 to a new value of .86. This is the contouring subfactor value and can be entered in the equation for final calculation of the "P" factor at the bottom of the "P" factor section.

Step 9: For the stripcropping subfactor with a row grade of 4% use Table 5-B for field stripcropping. Use the top portion of the table since hay is clear seeded. An observation of the cover conditions indicates that generally condition 2 will be alternated with conditions 4 and 5. Therefore, when using Table 5-B, average the values for these two cover conditions. Now enter the appropriate table designation and cover condition combination on the worksheet.

Step 10: From the slope length and strip width which should now be entered on the worksheet, determine the average number of strips on the appropriate slope length. The resulting "P" factor for stripcropping in example 1A is .90. The average between the cover conditions for 2, 4, and 2, 5 is the average of .88 and .91. Enter this number of .90 as the stripcropping subfactor and since no terraces or drainage were used, multiply A and B to get the final P value. Place this value in the equation at the bottom the page and calculate the predicted soil loss.

RUSLE EXAMPLES USING THE RUSLE DOCUMENTATION WORKSHEET

RUSLE Example 1A

ROTATION	TILLAGE	GENERAL INFORMATION
grain corn	plow	Hublersburg Si Lm hydrologic group C
soybeans [15-25]	mulch till	rainfall factor R = 150, EI = 70, K = .28,
silage corn [25-35]	no-till	climatic zone 115B, T = 4,
fall grain	no-till	L = 200, S = 8%, row grade = 4%
hay (August est.)	plow	corn yield 100 bu.
hay (3 years)	N/A	corn silage yield 18 tons
		wheat straw removed
		hay is alfalfa/grass mixture

RUSLE Example 1B

Modifications to example 1A were made for illustrative purposes. This row grade was reduced and the strip width was changed. Both of these changes increased the effectiveness of the "P" factor. This change of strip widths illustrates how to handle the situation when the strip width does not evenly match the slope length. In this example the average strip width was about 2.5 widths. In this case "P" was determined by averaging values for two strips and three strips as well as for the two different cover condition combinations.

RUSLE EXAMPLES

RUSLE Example 2A

ROTATION	TILLAGE	GENERAL INFORMATION
silage corn	fall moldboard plow	Berks shaly silt loam
silage corn	reduced till	hydrologic group C
silage corn	reduced till	rainfall factor R = 150
(cover crop)		EI = 70, K = .28,
silage corn	no-till	climatic zone 115B, T = 4,
small grain	plow	L= 200', S = 10%, row grade = 2%
(hay seeding)		cover crop = winter grain unharv
hay (3) years	N/A	corn silage yield = 18 tons
		hay is pure alfalfa, manure is applied
		as a slurry for all corn years

Follow guidance outlined in example 1A.

Note: Manure credit is taken due to the fact that manure is applied approximately 50% of the time. A 20% reduction is shown after the average "C" is determined. The reduction is based on the benefits in organic matter added to the soil when manure is applied regularly approximately half of the time.

RUSLE Example 3A

ROTATION	TILLAGE	GENERAL INFORMATION
grain corn	no-till	Pequa silt loam
grain corn	mulch till	hydrologic group B
soybeans [25-35]	mulch till	rainfall factor R = 150,
spring grain (RR)	no-till	EI = 70, K = .43, climatic zone 115B
		L = 200, S = 8%
		row grade = 4%
		corn grain yield 100 bu.

Follow guidance outlined in example 1A

RUSLE Example 3B

Credit for stripcropping was evaluated for this example. As noted, since cover conditions are very similar, there is very little benefit from this practice. Benefits from this practice increase as cover conditions become more different in the alternate strips. (i.e., The best stripcropping effect would result from alternating cover conditions of 1 and 7.)

RUSLE Example 3C

Reduce row grade from 4% to 0.5%. This is much more effective than trying to apply strips.

RUSLE Example 3D

Use of buffer strips in reducing "P". Since by definition, the upper edge of buffer strips must meet the contour strip cropping specification, the data for this example will be taken from 3C. For this example assume 20% of the slope will be in buffer strips. For a 200 foot slope length this would result in one 40 foot or two 20 foot strips on the given slope. From Table 5C (position of the buffer strips), use two or three strips for one 40 foot buffer depend ing on the width of the crop strips of 80 feet above and below the buffer. These widths may be documented as indicated on worksheet as shown in 4A. For this example assume that the buffer strip was harvested. NOTE: For percentages between 10% and 20% use an average "P" as appropriate.

RUSLE EXAMPLES

EXAMPLE 1A

RUSLE DOCUMENTATION WORKSHEET FOR PENNSYLVANIA

OP ID 111 CLIENT John Smith PLANNING PHASE ____ SYSTEM LEVEL BCS

FIELD NO. 1, 3, 5 TRACT 1886

CROP ROTATION INFORMATION

	CROP	TILLAGE	COVER	RIDGE HT	"C"	Pg.
1.	C	MB	6	L	.10	1
2.	SB	RT	5	VL	.12	5
3.	CS	NT	4	VL	.18* / .24	3
4.	SG	RT	4	L	.15	8
5.	H(EST)	MB	3	VL	.11	11
6.	H(3)	—	2	L	.005 } .015	11
	AVERAGE		4	4/VL	.08	

GENERAL INFORMATION

SOIL SERIES Hublersburg HYD GROUP C

R 150 EI 70 CLIMATIC ZONE 115B

K .28 CLIMATIC ADJ. K .22 T 4

L 200 S 8 LS 1.45

LIST COMPOUND SLOPES (top to bottom)

75' 6%

125' 9%

LEGEND: *.24 Adjusted x.75 For Fall Grain = .18

CROPS: C = Corn, CS = Corn Silage, SB = Soybeans, SG = Small Grain, H = Hay, RR = Residue Removed, RL = Residue Left, CC = Cover Crop

TILLAGE: NT = No-Till, MB = moldboard Plow, RT = Reduced Till, MT = Mulch Till

COVER: 1 = Unharvested meadow, 2 = Harvested meadow, 3 = Good no-till, 4 = Average no-till or good mulch till 5 = Reduced till, 6 = Clean till, 7 = Clean till pulverized (see Table P - 1)

RIDGE HT: VL = (½ - 2"), L = (2 - 3"), M = (3 - 4"), H = (4 - 6"), VH = (>6") (see Table P - 2)

RUSLE P FACTOR CALCULATIONS

P FACTOR = .86 (A) x .90 (B) x 1 (C) = .77

CONTOUR SUBFACTOR (A)

P (on grade - Table P - 3) .52 Row Grade (%) 4 / Field Slope (%) 8 = Ratio .5

P Adjusted for row grade (from Table P - 4) = .86 (A)

STRIPCROPPING / BUFFER SUBFACTOR (B)

from Table P - 5 B Cover Condition Pairs 2 , 4-5

Strip Width 100 ft Number of Strips 2 Crop - Buffer Strip Ratio ___ : ___

P Stripcropping / Buffer Subfactor = .90 (B)

TERRACE SUBFACTOR (C)

from Table P - 6 P Terrace Subfactor = — (C)

BEFORE SOIL LOSS CALCULATION

A = R K LS C P

A = 150 (R) x .22 (K) x 1.45 (LS) x .08 (C) x .77 (P) = 2.9

AFTER SOIL LOSS CALCULATION

A = R K LS C P

A = ____ (R) x ____ (K) x ____ (LS) x ____ (C) x ____ (P) = ____

RUSLE EXAMPLES

EXAMPLE 1B

RUSLE DOCUMENTATION WORKSHEET FOR PENNSYLVANIA

OP ID 111 CLIENT John Smith PLANNING PHASE ____ SYSTEM LEVEL ____

FIELD NO. ____ TRACT ____

CROP ROTATION INFORMATION

	CROP	TILLAGE	COVER	RIDGE HT	"C"
1.					
2.					
3.					
4.					
5.					
6.					
AVERAGE					

GENERAL INFORMATION

SOIL SERIES ____ HYD GROUP ____

R ____ EI ____ CLIMATIC ZONE ____

K ____ CLIMATIC ADJ. K ____ T ____

L ____ S ____ LS ____

LIST COMPOUND SLOPES (top to bottom)

LEGEND:

CROPS: C = Corn, CS = Corn Silage, SB = Soybeans, SG = Small Grain, H = Hay, RR = Residue Removed, RL = Residue Left, CC = Cover Crop

TILLAGE: NT = No-Till, MB = moldboard Plow, RT = Reduced Till, MT = Mulch Till

COVER: 1 = Unharvested meadow, 2 = Harvested meadow, 3 = Good no-till, 4 = Average no-till or good mulch till 5 = Reduced till, 6 = Clean till, 7 = Clean till pulverized (see Table P - 1)

RIDGE HT: VL = (½ - 2"), L = (2 - 3"), M = (3 - 4"), H = (4 - 6"), VH = (>6") (see Table P - 2)

RUSLE P FACTOR CALCULATIONS

P FACTOR = .67 (A) x .82 (B) x 1 (C) = .55

CONTOUR SUBFACTOR (A)

P (on grade - Table P - 3) .52 Row Grade (%) .5 / Field Slope (%) 8 = Ratio .06

P Adjusted for row grade (from Table P - 4) = .67 (A)

STRIPCROPPING / BUFFER SUBFACTOR (B)

from Table P - 5 A Cover Condition Pairs 2 , 4-5

Strip Width 80 ft Number of Strips 2.5 Crop - Buffer Strip Ratio ___ : ___

P Stripcropping / Buffer Subfactor = ____ (B)

TERRACE SUBFACTOR (C)

from Table P - 6 P Terrace Subfactor = ____ (C)

BEFORE SOIL LOSS CALCULATION

A = R K LS C P

A = 150 (R) x .22 (K) x 1.45 (LS) x .08 (C) x .55 (P) = 2.1

AFTER SOIL LOSS CALCULATION

A = R K LS C P

A = ____ (R) x ____ (K) x ____ (LS) x ____ (C) x ____ (P) = ____

RUSLE EXAMPLES

EXAMPLE 2A

RUSLE DOCUMENTATION WORKSHEET FOR PENNSYLVANIA

OP ID 114 CLIENT Jim Smith PLANNING PHASE ____ SYSTEM LEVEL BCS

FIELD NO. 2,4,6 TRACT 1885

CROP ROTATION INFORMATION

	CROP	TILLAGE	COVER	RIDGE HT	"C"	Pg.
1.	CS	MB(Fall)	6	VL	.29*	3
2.	CS	RT	5	VL	.42	3
3.	CS/CC	RT	5	VL	.22	4
4.	CS	NT	3	VL	.21	3
5.	SG/H	MB	3	L	.06	11
6.	H(3)	—	2	VL	.01} .03	4
	AVERAGE		3/4	VL	.15	

GENERAL INFORMATION

SOIL SERIES Berks HYD GROUP C

R 150 EI 70 CLIMATIC ZONE 115B

K .28 CLIMATIC ADJ. K .22 T 4

L 200 S 10 LS 1.98

LIST COMPOUND SLOPES (top to bottom)

100' 7%

100' 11%

LEGEND: * .22 + .07 (Fall Plow Adjustment) = .29 Manure Adjustment .15x.80 =.

CROPS: C = Corn, CS = Corn Silage, SB = Soybeans, SG = Small Grain, H = Hay, RR = Residue Removed, RL = Residue Left, CC = Cover Crop

TILLAGE: NT = No-Till, MB = moldboard Plow, RT = Reduced Till, MT = Mulch Till

COVER: 1 = Unharvested meadow, 2 = Harvested meadow, 3 = Good no-till, 4 = Average no-till or good mulch till 5 = Reduced till, 6 = Clean till, 7 = Clean till pulverized (see Table P - 1)

RIDGE HT: VL = (½ - 2"), L = (2 - 3"), M = (3 - 4"), H = (4 - 6"), VH = (>6") (see Table P - 2)

RUSLE P FACTOR CALCULATIONS

P FACTOR = .80 (A) x .79 (B) x — (C) = .63

CONTOUR SUBFACTOR (A)

P (on grade - Table P - 3) .65 Row Grade (%) 2 / Field Slope (%) 10 = Ratio .2

P Adjusted for row grade (from Table P - 4) = .86 (A)

STRIPCROPPING / BUFFER SUBFACTOR (B)

from Table P - 5 A Cover Condition Pairs 2 , 5

Strip Width 100 ft Number of Strips 2 Crop - Buffer Strip Ratio ___ : ___

P Stripcropping / Buffer Subfactor = .79 (B)

TERRACE SUBFACTOR (C)

from Table P - 6 P Terrace Subfactor = _____ (C)

BEFORE SOIL LOSS CALCULATION

A = R K LS C P

A = 150 (R) x .22 (K) x 1.98 (LS) x .12 (C) x .63 (P) = 4.9

AFTER SOIL LOSS CALCULATION

A = R K LS C P

A = _____ (R) x _____ (K) x _____ (LS) x _____ (C) x _____ (P) = _____

RUSLE EXAMPLES

EXAMPLE 3A

RUSLE DOCUMENTATION WORKSHEET FOR PENNSYLVANIA

OP ID 113 CLIENT Jack Smith PLANNING PHASE ____ SYSTEM LEVEL BCS

FIELD NO. 1, 5, 7 TRACT 1888

CROP ROTATION INFORMATION

	CROP	TILLAGE	COVER	RIDGE HT	"C"	Pg.
1.	C	NT	4	VL	.10	1
2.	C	MT	4	L	.085*	1
3.	SB	MT	5	VL	.095	
4.	SG/RR	NT	4	VL	.11	7
5.						
6.						
	AVERAGE		4	VL	.10	

GENERAL INFORMATION

SOIL SERIES Pequa HYD GROUP B

R 150 EI 70 CLIMATIC ZONE 115B

K .43 CLIMATIC ADJ. K .35 T 4

L 200 S 8 LS 1.45

LIST COMPOUND SLOPES (top to bottom)

100' 6%

100' 9%

LEGEND: * - Interpolated For 100 BO. Yield

CROPS: C = Corn, CS = Corn Silage, SB = Soybeans, SG = Small Grain, H = Hay, RR = Residue Removed, RL = Residue Left, CC = Cover Crop

TILLAGE: NT = No-Till, MB = moldboard Plow, RT = Reduced Till, MT = Mulch Till

COVER: 1 = Unharvested meadow, 2 = Harvested meadow, 3 = Good no-till, 4 = Average no-till or good mulch till 5 = Reduced till, 6 = Clean till, 7 = Clean till pulverized (see Table P - 1)

RIDGE HT: VL = (½ - 2"), L = (2 - 3"), M = (3 - 4"), H = (4 - 6"), VH = (>6") (see Table P - 2)

RUSLE P FACTOR CALCULATIONS

P FACTOR = .85 (A) x 1 (B) x — (C) = .85

CONTOUR SUBFACTOR (A)

P (on grade - Table P - 3) .5 Row Grade (%) 4 / Field Slope (%) 8 = Ratio .5

P Adjusted for row grade (from Table P - 4) = .85 (A)

STRIPCROPPING / BUFFER SUBFACTOR (B)

from Table P - 5___ Cover Condition Pairs _____ , _____

Strip Width _____ ft Number of Strips _____ Crop - Buffer Strip Ratio ___ : ___

P Stripcropping / Buffer Subfactor = _____ (B)

TERRACE SUBFACTOR (C)

from Table P - 6 P Terrace Subfactor = _____ (C)

BEFORE SOIL LOSS CALCULATION

A = R K LS C P

A = 150 (R) x .35 (K) x 1.45 (LS) x .10 (C) x .85 (P) = 6.5

AFTER SOIL LOSS CALCULATION

A = R K LS C P

A = _____ (R) x _____ (K) x _____ (LS) x _____ (C) x _____ (P) = _____

RUSLE EXAMPLES

EXAMPLE 3B

RUSLE DOCUMENTATION WORKSHEET FOR PENNSYLVANIA

OP ID 113 CLIENT Jack Smith PLANNING PHASE ____ SYSTEM LEVEL ____

FIELD NO. ____ TRACT ____

CROP ROTATION INFORMATION

	CROP	TILLAGE	COVER	RIDGE HT	"C"
1.					
2.					
3.					
4.					
5.					
6.					
AVERAGE					

GENERAL INFORMATION

SOIL SERIES ____ HYD GROUP ____

R ____ EI ____ CLIMATIC ZONE ____

K ____ CLIMATIC ADJ. K ____ T ____

L ____ S ____ LS ____

LIST COMPOUND SLOPES (top to bottom)

LEGEND:

CROPS: C = Corn, CS = Corn Silage, SB = Soybeans, SG = Small Grain, H = Hay, RR = Residue Removed, RL = Residue Left, CC = Cover Crop

TILLAGE: NT = No-Till, MB = moldboard Plow, RT = Reduced Till, MT = Mulch Till

COVER: 1 = Unharvested meadow, 2 = Harvested meadow, 3 = Good no-till, 4 = Average no-till or good mulch till 5 = Reduced till, 6 = Clean till, 7 = Clean till pulverized (see Table P - 1)

RIDGE HT: VL = (½ - 2"), L = (2 - 3"), M = (3 - 4"), H = (4 - 6"), VH = (>6") (see Table P - 2)

RUSLE P FACTOR CALCULATIONS

P FACTOR = .85 (A) x .95 (B) x — (C) = .80

CONTOUR SUBFACTOR (A)

P (on grade - Table P - 3) ____ Row Grade (%) ____ / Field Slope (%) ____ = Ratio ____

P Adjusted for row grade (from Table P - 4) = ____ (A)

STRIPCROPPING / BUFFER SUBFACTOR (B)

from Table P - 5 B Cover Condition Pairs 4 , 5

Strip Width 100 ft Number of Strips 2 Crop - Buffer Strip Ratio ___ : ___

P Stripcropping / Buffer Subfactor = ____ (B)

TERRACE SUBFACTOR (C)

from Table P - 6 P Terrace Subfactor = ____ (C)

BEFORE SOIL LOSS CALCULATION

A = R K LS C P

A = 150 (R) x .35 (K) x 1.45 (LS) x .10 (C) x .80 (P) = 6.1

AFTER SOIL LOSS CALCULATION

A = R K LS C P

A = ____ (R) x ____ (K) x ____ (LS) x ____ (C) x ____ (P) = ____

RUSLE EXAMPLES

EXAMPLE 3C

RUSLE DOCUMENTATION WORKSHEET FOR PENNSYLVANIA

OP ID 113 CLIENT Jack Smith PLANNING PHASE ____ SYSTEM LEVEL ____

FIELD NO. ____ TRACT ____

CROP ROTATION INFORMATION

	CROP	TILLAGE	COVER	RIDGE HT	"C"
1.					
2.					
3.					
4.					
5.					
6.					
AVERAGE					

GENERAL INFORMATION

SOIL SERIES ____ HYD GROUP ____

R ____ EI ____ CLIMATIC ZONE ____

K ____ CLIMATIC ADJ. K ____ T ____

L ____ S ____ LS ____

LIST COMPOUND SLOPES (top to bottom)

LEGEND:

CROPS: C = Corn, CS = Corn Silage, SB = Soybeans, SG = Small Grain, H = Hay, RR = Residue Removed, RL = Residue Left, CC = Cover Crop

TILLAGE: NT = No-Till, MB = moldboard Plow, RT = Reduced Till, MT = Mulch Till

COVER: 1 = Unharvested meadow, 2 = Harvested meadow, 3 = Good no-till, 4 = Average no-till or good mulch till 5 = Reduced till, 6 = Clean till, 7 = Clean till pulverized (see Table P - 1)

RIDGE HT: VL = (½ - 2"), L = (2 - 3"), M = (3 - 4"), H = (4 - 6"), VH = (>6") (see Table P - 2)

RUSLE P FACTOR CALCULATIONS

P FACTOR = .66 (A) x 1 (B) x — (C) = .66

CONTOUR SUBFACTOR (A)

P (on grade - Table P - 3) 5 Row Grade (%) .5 / Field Slope (%) 8 = Ratio .06

P Adjusted for row grade (from Table P - 4) = .66 (A)

STRIPCROPPING / BUFFER SUBFACTOR (B)

from Table P - 5 ___ Cover Condition Pairs ____ , ____

Strip Width ____ ft Number of Strips ____ Crop - Buffer Strip Ratio ___ : ___

P Stripcropping / Buffer Subfactor = ____ (B)

TERRACE SUBFACTOR (C)

from Table P - 6 P Terrace Subfactor = ____ (C)

BEFORE SOIL LOSS CALCULATION

A = R K LS C P

A = 150 (R) x .35 (K) x 1.45 (LS) x .10 (C) x .66 (P) = 5.0

AFTER SOIL LOSS CALCULATION

A = R K LS C P

A = ____ (R) x ____ (K) x ____ (LS) x ____ (C) x ____ (P) = ____

RUSLE EXAMPLES

EXAMPLE 3D

RUSLE DOCUMENTATION WORKSHEET FOR PENNSYLVANIA

OP ID 113 CLIENT Jack Smith PLANNING PHASE ____ SYSTEM LEVEL ____

FIELD NO. ____ TRACT ____

CROP ROTATION INFORMATION

	CROP	TILLAGE	COVER	RIDGE HT	"C"
1.					
2.					
3.					
4.					
5.					
6.					
AVERAGE					

GENERAL INFORMATION

SOIL SERIES ____ HYD GROUP ____

R ____ EI ____ CLIMATIC ZONE ____

K ____ CLIMATIC ADJ. K ____ T ____

L ____ S ____ LS ____

LIST COMPOUND SLOPES (top to bottom)

LEGEND:

CROPS: C = Corn, CS = Corn Silage, SB = Soybeans, SG = Small Grain, H = Hay, RR = Residue Removed, RL = Residue Left, CC = Cover Crop

TILLAGE: NT = No-Till, MB = moldboard Plow, RT = Reduced Till, MT = Mulch Till

COVER: 1 = Unharvested meadow, 2 = Harvested meadow, 3 = Good no-till, 4 = Average no-till or good mulch till 5 = Reduced till, 6 = Clean till, 7 = Clean till pulverized (see Table P - 1)

RIDGE HT: VL = (½ - 2"), L = (2 - 3"), M = (3 - 4"), H = (4 - 6"), VH = (>6") (see Table P - 2)

RUSLE P FACTOR CALCULATIONS

P FACTOR = .66 (A) x .82 (B) x — (C) = .54

CONTOUR SUBFACTOR (A)

P (on grade - Table P - 3) .5 Row Grade (%) .5 / Field Slope (%) 8 = Ratio .06

P Adjusted for row grade (from Table P - 4) = .66 (A)

STRIPCROPPING / BUFFER SUBFACTOR (B)

from Table P - 5 C Cover Condition Pairs 2 , 4

Strip Width N/A ft Number of Strips N/A Crop - Buffer Strip Ratio 4 : 1

P Stripcropping / Buffer Subfactor = .82 (B)

TERRACE SUBFACTOR (C)

from Table P - 6 P Terrace Subfactor = — (C)

1 Buffer Strip 40'
2 Crop Strips 80'

BEFORE SOIL LOSS CALCULATION

A = R K LS C P

A = 150 (R) x .35 (K) x 1.45 (LS) x .10 (C) x .54 (P) = 4.1

AFTER SOIL LOSS CALCULATION

A = R K LS C P

A = ____ (R) x ____ (K) x ____ (LS) x ____ (C) x ____ (P) = ____