USING THE USDA WIND EROSION EQUATION FOR COMPARATIVE MODELING OF NATURAL AND ANTHROPOGENIC SOURCES OF PARTICULATES MEASURED AT THE FORT GREELY PM_{10} MONITORING STATION, ALASKA

A CASE STUDY

By

Steven R. Becker, C.E.P.

RECOMMENDED:

Dr. Srijan Aggarwal

Keith Whitaker, J.D.

Dr. David Barnes, P.E.
Advisory Committee Co-Chair

Dr. Robert Perkins, P.E.
Advisory Committee Co-Chair
Chair, Department of Civil & Environmental Engineering

April 28, 2015

Date

USING THE USDA WIND EROSION EQUATION FOR COMPARATIVE MODELING OF NATURAL AND ANTHROPOGENIC SOURCES OF PARTICULATES MEASURED AT THE FORT GREELY PM_{10} MONITORING STATION, ALASKA
A CASE STUDY

A

PROJECT

Presented to the Faculty

of the University of Alaska Fairbanks

in Partial Fulfillment of the Requirements

for the Degree of

MASTER OF SCIENCE

By

Steven R. Becker, B.S., M.A.

Fairbanks, Alaska

May 2015

EXECUTIVE SUMMARY

In April of 2010, the Alaska Department of Environmental Conservation (ADEC) opened a compliance case against the U.S. Army Garrison Fort Greely, Alaska (FGA), for their repeated failure to comply with a permit condition requiring the collection of one year of Prevention of Significant Deterioration (PSD)-quality data on ambient levels of particulate matter less than 10 microns in effective aerodynamic diameter (PM_{10}). During the monitoring period of 2012-2013, background levels of PM_{10} were more than 80% the Alaska Ambient Air Quality Standards (AAAQS) for a total of seven days in the winter of 2012-2013. On March 17, 2014, ADEC requested that FGA provide substantive documentation that PM_{10} exceedances observed during the monitoring period were of natural provenance and not from anthropogenic sources.

In response to this request, the author used Geographic Information System (GIS) technology to analyze basic meteorological data and outputs from the USDA Wind Erosion Equation (WEQ) to generate a simple back-trajectory model for determining the sources and relative contributions to PM_{10} experienced at a given receptor. Using this model, the author was able to show that the vast majority of PM_{10} at Fort Greely was natural rather than anthropogenic in nature. The ADEC Division of Air Quality determined that results of this study constituted substantive documentation that PM_{10} exceedances observed during the monitoring period were of natural provenance and not from anthropogenic sources, and issued a compliance case closure letter on June 20, 2014.

In addition to the direct results of the study, the project also serves to demonstrate a low-complexity model that can be used to assess the relative contribution of anthropogenic and natural sources of PM_{10} at a given receptor. Additionally, it can be used in complex situations as a screening tool to focus data collection efforts on significant sources of PM_{10} and facilitate the prioritization of PM_{10} sources for more precise quantitative dispersion or receptor models when precise quantitative data are required.

Table of Contents

List of Tables

List of Figures

List of Appendices

ACRONYMS AND ABBREVIATIONS

~ ..... Approximately
° ..... Degrees
% ..... percent
[PM_{10}] ..... Concentration of PM_{10}
AAAQS ..... Alaska Ambient Air Quality Standard
AAC ..... Alaska Administrative Code
ac ..... Acres
ADEC ..... Alaska Department of Environmental Conservation
ASOS ..... Automated Surface Observing System
BAM ..... Beta Attenuation Mass
BKSS ..... Bering-KAYA Support Services
°C ..... degrees Celsius
DPW ..... Directorate of Public Works
DTA ..... Donnelly Training Area
E ..... East
ENE ..... East-northeast
EPA ..... U.S. Environmental Protection Agency
ESE ..... East-southeast
FAA ..... Federal Aviation Administration
FEM ..... Federal Equivalent Method
FGA ..... Fort Greely, Alaska
FWA ..... Fort Wainwright, Alaska
$g/m^2/yr$ ..... Grams per square meter per year
GIS ..... Geographic Information System
hrs ..... hours
L/min ..... liters per minute
mg/m^3 ..... milligrams per cubic meter
$\mu g/m^3$ ..... micrograms per cubic meter
mmHg ..... millimeters of mercury

mph ..... miles per hour

N ..... North

NE ..... Northeast

NNE ..... North-northeast

NNW ..... North-northwest

NOAA ..... National Oceanic and Atmospheric Administration

NW ..... Northwest

NR ..... not recorded

PM ..... Particulate Matter

PM_{10} ..... Particulate Matter < 10 microns in effective aerodynamic diameter

PSD ..... Prevention of Significant Deterioration

PABI ..... Allen Army Airfield

QA Contractor ..... Sivuniq, Inc.

QAPP ..... Quality Assurance Project Plan

QC ..... quality control

S ..... South

s/n ..... Serial Number

SE ..... Southeast

Sivuniq ..... Sivuniq, Inc. (merged with WHPacific during monitoring period)

SSE ..... South-southeast

SSW ..... South-southwest

SW ..... Southwest

T/ac/yr ..... Tons per acre per year

T ..... Tons (imperial)

TSP ..... Total Suspended Particulates

T/yr ..... Tons per year

US ..... United States of America

USACE ..... United States Army Corps of Engineers

USDA ..... United States Department of Agriculture

W ..... West

WNW ..... West-northwest

WSW .... West-southwest

WEQ .... Wind Erosion Equation

WS_B .... Base Wind Speed

WS_G .... Gusting Wind Speed

yr .... Year

USING THE USDA WIND EROSION EQUATION FOR COMPARATIVE MODELING OF NATURAL AND ANTHROPOGENIC SOURCES OF PARTICULATES MEASURED AT THE FORT GREELY PM_{10} MONITORING STATION, ALASKA
A CASE STUDY

1. Introduction

1.1 Background

Beginning in November of 2004, U.S. Army Garrison Fort Greely, Alaska (FGA) had an obligation under its State of Alaska Air Quality Operating Permit to obtain 12 consecutive months of background data on ambient levels of particulate matter less than 10 microns in effective aerodynamic diameter (PM_{10}). This data was required to be of sufficient quality to meet the criteria identified in the U.S. Environmental Protection Agency's *Ambient Monitoring Guidelines for Prevention of Significant Deterioration* (EPA, 1987). For a variety of reasons FGA proved unable to meet the EPA Prevention of Significant Deterioration (PSD) data quality standards. Thus the monitoring requirement was carried forward into subsequent permits, most recently as Permit Condition #8 of Air Permit Number AQ0238TVP02, issued to Fort Greely on 29 October 2008 (ADEC, 2008).

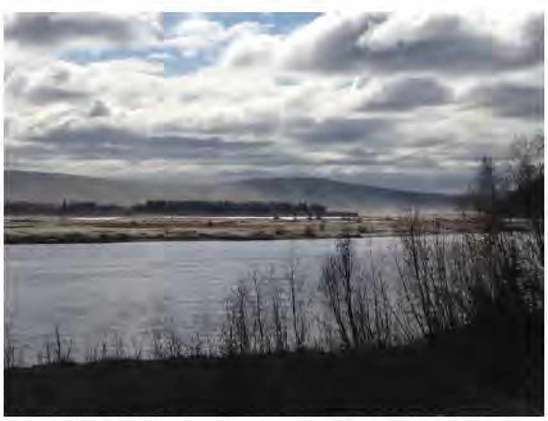
In April of 2010, the Alaska Department of Environmental Conservation (ADEC) opened a compliance case against FGA for their repeated failure to comply with the permit condition. FGA made another attempt to at monitoring from May 2010 – April 2011, but was again unsuccessful at meeting PSD quality criteria. From August 1, 2012, to July 31, 2013, FGA conducted a new PM_{10} monitoring effort using a BAM-1020 particulate monitor (MetOne Instruments®, Grants Pass, OR, USA), and submitted the annual monitoring report (BKSS, 2013) to ADEC on November 20, 2013.

While the 2013 annual monitoring report met the PSD data quality criteria, background levels of PM_{10} were more than 80% the Alaska Ambient Air Quality Standards (AAAQS) for a total of seven days in the winter of 2012-2013. The report documented that these exceedances were caused by dust generated during periods of high winds from southeast or east-southeast, however it did not sufficiently address the provenance of the PM_{10} experienced at the FGA monitoring station. On March 17, 2014, ADEC requested that FGA provide substantive documentation that PM_{10} exceedances observed during the monitoring period were of natural provenance and not from anthropogenic sources. In response to this request, the author was asked by FGA to conduct a reconnaissance-level analysis of potential sources of PM_{10} for the exceedance events.

1.2 Correlation between Wind, Dust, and PM_{10}

Wind-Blown Dust on Fort Greely Snow Berms February 2015

High winds and associated wind-blown dust have been identified as a source of PM_{10} (Hagen et al., 1996). PM_{10} generation due to wind erosion is both from PM_{10}-sized particles that are part of the initial soil composition (Sharratt et al., 2007) as well as through the breakage of mobile soil aggregates during erosion (Hagen, 2004). The extent of wind erosion, and the resulting PM_{10} load, depends on a number of factors, including multiple soil factors (Fryrear et al., 1998) and consideration of both average wind speed and gusting wind speeds during the wind event (Countess et al., 2001). Wind-blown dust has been shown to contribute to non-compliance with the National Ambient Air Quality Standard (NAAQS) for PM_{10} in the Pacific Northwest (Sharratt et al., 2007; Feng and Sharratt, 2007).



Wind-Blown Dust on Tanana River Floodplain April 2014

The Fort Greely and Delta Junction Area is known for its high winds. These 'katabatic' winds have their origins in the glacier valleys of the Alaska Range, and commonly have gusting velocities of greater than 100 miles per hour (mph). These winds pick-up fine-grained sediments from the floodplains of glacial-fed streams and deposit them as fine-grained loess material (NRCS, 2004).

The braided rivers and streams common in Alaska have outwash plains that are laden with glacial flour and are exposed during periods of low water. The saltation of sand-size particles during high wind events ejects silt- and clay-sized particles that are carried into the air by turbulence (Bettis, 2012). Glacier-fed braided rivers and streams in Alaska can generate this dust year-round, even under frozen conditions, resulting in the deposition of sand and silt particles as much as several hundred yards from the floodplain, perceptible deposition as much as two miles from the floodplain, and dust visible to the naked eye several miles from the source (Trainer, 1961). It has been frequently documented that high winds in the Delta Junction area result in large amounts of dust being generated off of the floodplains of braided rivers (Bettis, 2012; Clark, 2005; NRCS, 2004; Muhs et al., 2003; Pewe, 1975, and others). Although the author could not identify recent data regarding the rate of active loess deposition in the Delta River area (which includes Fort Greely), historical rates of deposition have been estimated to be over 1,500 grams/m^2/year, or approximately 6.6 tons/acre/year (Muhs et al., 2003).

1.3 Determining the Source of PM_{10}

There are a variety of models available for determining the source of PM_{10} experienced in a given location (Viana et al., 2008). Generally speaking, these models fall into two primary categories: Dispersion models and receptor models (Cooper and Watson, 1980; Gordon, 1980). The dispersion model approach looks at the transport pattern of PM_{10} from individual sources. While this modeling approach is good for identifying potential receptors of PM_{10} from a given source, it is unwieldly for assessing all of the potential sources of PM_{10} experienced at a given receptor (Cooper and Watson, 1980), as you would have to individually model all potential sources for the receptor in order to determine whether and to what extent the source contributes to PM_{10} levels at the receptor.

Receptor models are commonly used to identify sources of PM_{10} experienced at a given location (Countess et al., 2001). Common receptor models include back-trajectory analysis (Viana et al., 2008) and wind direction analysis (Henry et al., 2002). Back-trajectory and wind direction analysis was successfully used in a major air pollution modeling effort for the Grand Canyon National Park (Ashbaugh, 1983).

There are a variety of tools and techniques available to provide data for these models (Cooper and Watson, 1980). These include comparative microscopic or chemical analysis of PM_{10} at the receptor and multiple sources, enrichment studies, as well as multivariate statistical techniques and spatial modeling (Cooper and Watson, 1980; Gordon, 1980). One of the most detailed techniques for receptor modeling is the chemical mass balance approach (Almeida et al., 2006). This approach relies on an estimation of critical chemical elements and comparison between sources and receptor. However there is a persistent difficulty in achieving mass balance in these studies, with many studies showing unable to account for as much as 30-50% of PM_{10} mass (Vautard et al., 2005). In addition, the chemical mass balance approach is resource and data intensive: "The use of the mass balance approach in the identification of sources and in the estimation of their contribution is too time consuming and expensive to be applicable in a routine basis (Almeida et al., 2006)." Because of this, chemical mass balance studies tend to be conducted only when precise quantitative data are required.

Recently, geographic information system (GIS) technology has been incorporated into back trajectory and wind direction analysis. GIS technology has also been used to estimate wind erosion contributions to PM_{10} exceedances in the Pacific Northwest (Gao et al., 2013), as well to create a 'hazard map' for PM_{10} emissions from agricultural lands in the Columbia River Plateau (Saxton et al., 2000). Various methods have been used in these models for determining the rates of erosion from developed lands, however most are variations of the Wind Erosion Equation (WEQ), developed by the U.S. Department of Agriculture (USDA)'s Agriculture Research Service (Fryrear et al., 1998). WEQ has been shown to be a reliable model for long term predictions of wind erosion (Buschiazzo & Zobeck, 2008).

1.4 Project Approach

The author conducted a back trajectory receptor model to determine sources and their relative contribution to PM_{10} experienced at the Fort Greely BAM-1020 PM_{10} Monitoring Station during AAAQS exceedance events in December 2012 and January and March 2013 (Appendix A, Map 1). Using meteorological data gathered at the FGA Allen Army Air Field (PABI) during the exceedance events, the author used GIS to identify potential anthropogenic and natural dust sources within a 5-mile windshed for the FGA BAM-1020 PM_{10} Monitoring Station (Appendix A, Map 1). The total acreage of potential natural and anthropogenic PM_{10} sources within the windshed were identified. A subset of both anthropogenic and natural sources (Appendix A, Map 2) were modeled for wind erosion, and data on potential emission units in structures on the Donnelly Training Area was gathered from the Fort Wainwright, Alaska (FWA) Environmental Division.

Wind erosion was modeled using the Wind Erosion Equation (WEQ) developed by the U.S. Department of Agriculture, Agricultural Research Service (Fryrear et al. 1998), and updated in 2005. The WEQ was run using the official USDA Natural Resources Conservation Service wind erosion parameters for Delta Junction, Alaska. The levels of potential PM_{10} from all sources were then calculated using a conservative ratio of total suspended particulates (TSP) to PM_{10} reported in an extensive study conducted by Environment Canada (2000). While useful for comparative purposes, the assumptions and limitation within the WEQ substantially increase the percentage of PM_{10} attributable to anthropogenic sources, as will be discussed in Chapter 5.

This report details the review and analysis of meteorological data to characterize local winds (Chapter 2), the characterization of the 'windshed' using of geographic information system (GIS) technology (Chapter 3), modeling of both natural and anthropogenic sources within the windshed using the Wind Erosion Equation (WEQ) model (Chapters 4 and 5). The results of the study are presenting in Chapter 6, and Chapter 7 discusses the implications of the FGA case study, both for future PM_{10} modeling efforts and for other communities experiencing PM_{10} exceedances in Interior Alaska.

2. Wind Characterization

Meteorological data for Fort Greely is collected at least hourly by the U.S. Federal Aviation Administration (FAA) Automated Surface Observing System (ASOS) at Allen Army Airfield (PABI). The PABI ASOS is located approximately 3,000 meters to the northwest of the PM_{10} monitoring station at 63.99° North latitude, 145.72° West longitude, at an elevation of approximately 398 meters above sea level. Table 1 shows multi-year aggregate average daily wind speed data gathered at the Allen Army Airfield weather station (PABI) between 2005 and 2014 (RP5, 2014). The table includes mean average daily and maximum average daily values for base wind speed (WSb) and gusting wind speed (WSg) for the 10-year period as well as multi-year aggregate data for the months of the year in which PM_{10} exceedances occurred.

Table 1: Allen Army Air Field (AAAF) Average Daily Wind Speeds, 2005-2014

Average Daily Wind Speed		All Months		December		January		March	
		m/s	mph	m/s	mph	m/s	mph	m/s	mph
WS_b	Mean	4	9	5	11	5	11	4	9
	Max	27	60	19	43	27	60	17	38
Max Dates		1/22/2014		12/4/2011		1/22/2014		3/18/2006	
WS_g	Mean	23	52	26	58	25	55	25	55
	Max	56	125	56	125	54	121	49	110
Max Dates		4/22/2005 12/4/2007		12/4/2007		1/2/2011		3/8/2008	
NOTES:		WSb: Wind Speed (base) WSg: Wind Speed (gusting) m/s: meters per second, rounded to nearest whole number mph: miles per hour, rounded to nearest whole number							

The wind blows approximately 80% of the year at Fort Greely (Table 2). The year-round average daily base wind speed at Fort Greely is 9 miles per hour (mph), with the maximum daily average base wind speed of 60 mph occurring on January 22, 2014. The year-round average daily gusting wind speed is 52 mph, with the maximum daily average gusting wind speed of 125 mph being recorded on April 22, 2005, and December 4, 2007. Winds come out of the east-southeast or southeast approximately 26% of the time.

Table 2: Wind Direction Data[1] for Allen Army Air Field (AAAF), 2005-2014

	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	Calm
Annual[2]	0.7	0.6	1.1	1.6	4.9	**19.6**	**6.8**	1.8	4.6	4.9	8.2	6.5	6.5	8.0	3.1	1.6	19.7
December[2]	0.0	0.1	0.5	1.2	4.7	**37.7**	**10.7**	1.1	2.3	2.9	4.5	2.7	2.9	4.1	0.8	0.4	23.6
January[2]	0.3	0.0	0.2	1.0	5.8	**34.0**	**9.8**	1.0	2.7	1.7	3.5	3.7	4.8	5.1	1.1	0.3	25.0
March[2]	0.3	0.3	0.4	0.7	5.5	**26.8**	**7.5**	1.0	3.9	2.8	6.7	5.0	8.1	8.8	3.0	1.3	17.9
Notes	[1]PABI Aggregate Data from January 2005 – May 2014 [2]Units are % of time winds blow from a given direction																

For purposes of this analysis, it is also useful to analyze the wind characteristics experienced in the months of the year in which the PM_{10} exceedances occurred: December, January, and March. A description of characteristic winds for these months, as well as a discussion of the high wind events associated with the exceedance events, follows below. Full-page copies of each wind rose and associated data are presented in Appendix B.

2.1.1 December

In December, the wind typically blows ~76% of the time, with winds coming out of the east-southeast to southeast ~48% of the time. The total number of windy days per month is lower than the annual average. However, the average daily base wind speed is 11 mph with an average daily gusting wind speed of 58 mph, both of which are greater than the annual average values. The maximum average daily base wind speed of 43 mph occurred on December 4, 2011, and the maximum daily average gusting wind speed of 125 mph was experienced on December 4, 2007.

The exceedance events of December 24-26, 2012, were associated with a high wind event that began December 23rd at approximately 1900 hours and lasted until December 27th at approximately 1200 hours. The event was characterized by winds from the east-southeast (100°-120°) with a mean base wind speed of 33 mph and a maximum base wind speed of 41 mph (Figure 1). During the wind event, gusting wind speeds averaged 46 mph and surged to a maximum of 58 mph (Figure 2).

Figure 1: Base Wind Speeds, 23-27 December 2012

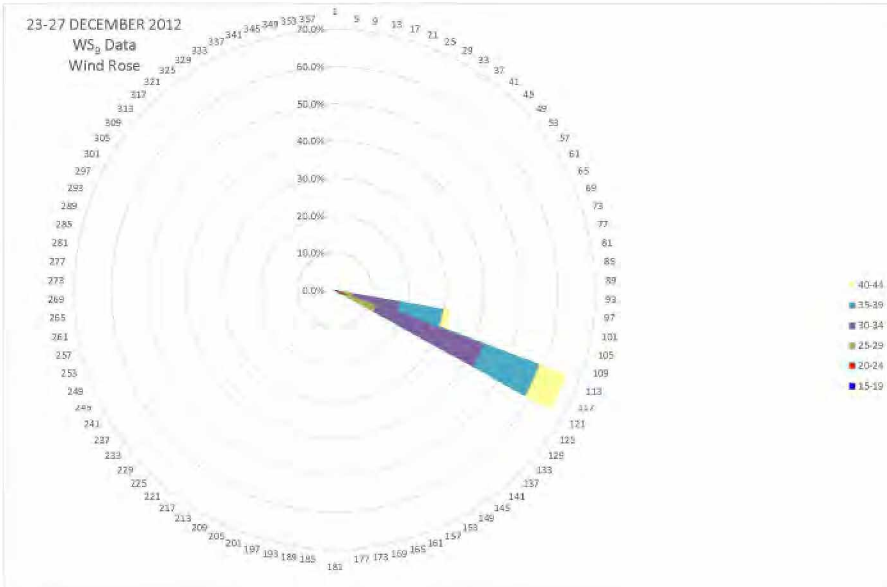
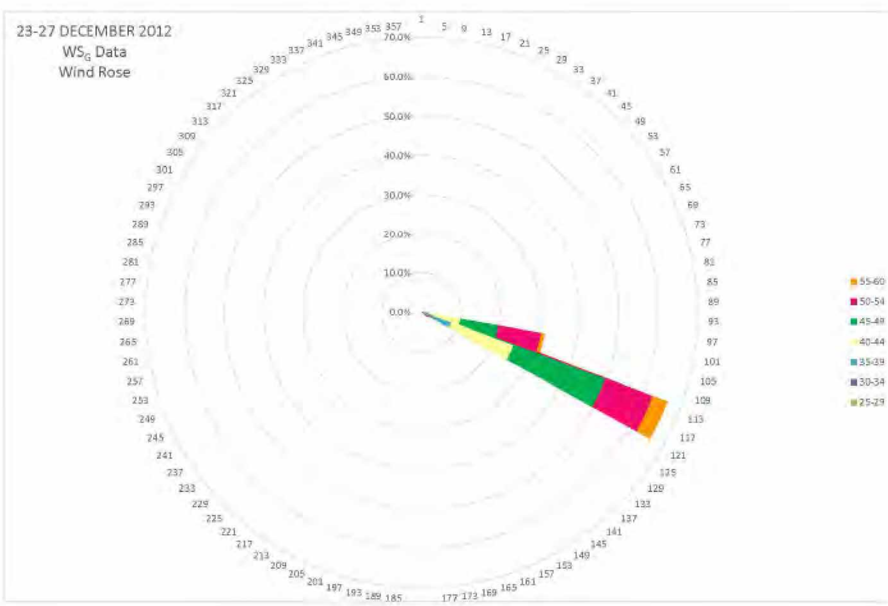


Figure 2: Gusting Wind Speeds, 23-27 December 2012

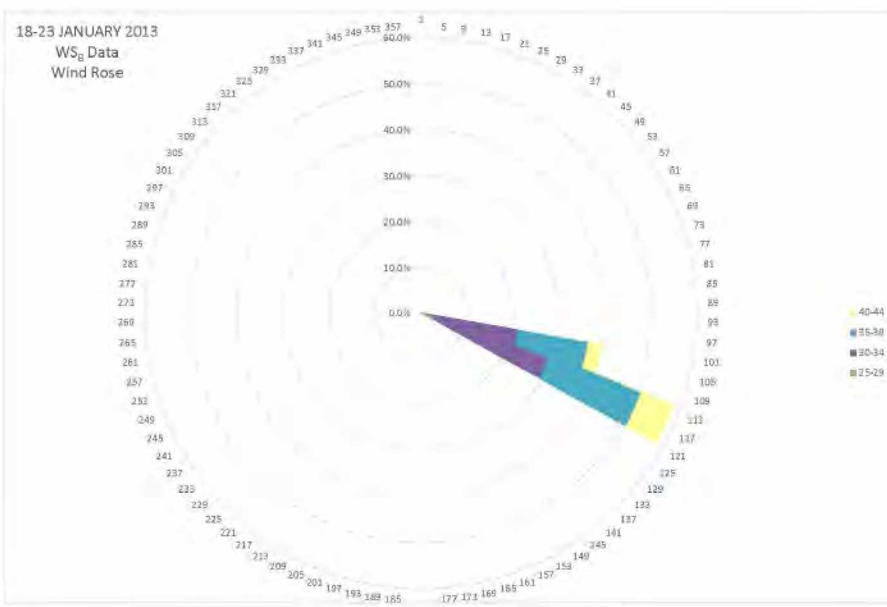


2.1.1 January

The wind typically blows ~75% of the time during the month of January, with winds coming out of the east-southeast or southeast ~44% of the time. Similar to December, the total number of windy days in January is less than the annual average. Also similar to December, the average daily base wind and gusting wind speeds are higher than the annual average. The January average daily base wind speed is 11 mph, with a maximum daily average base wind speed of 60 mph occurring on January 22, 2014. January winds have an average daily gusting wind speed of 55 mph, with a maximum daily average gusting wind speed of 121 mph occurring on January 2, 2011.

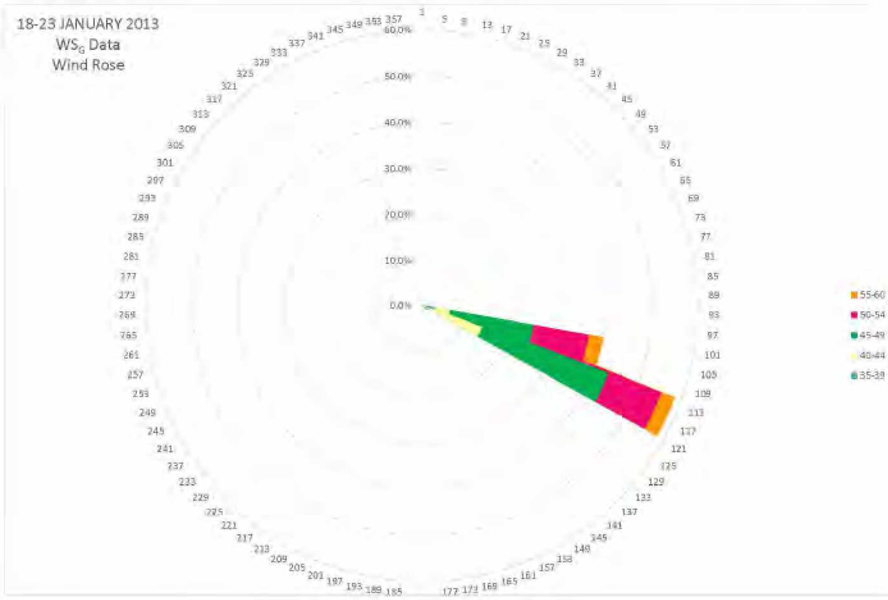
The exceedance event of January 19, 2013, was associated with a high wind event that began on January 18th at approximately 2330 hours and ended on January 20th at approximately 1200 hours. Winds during this event were from the east-southeast (100°-120°) with a mean base wind speed of 35 mph and a maximum base wind speed of 43 mph (Figure 3).

Figure 3: Base Wind Speeds, 18-20 January 2013



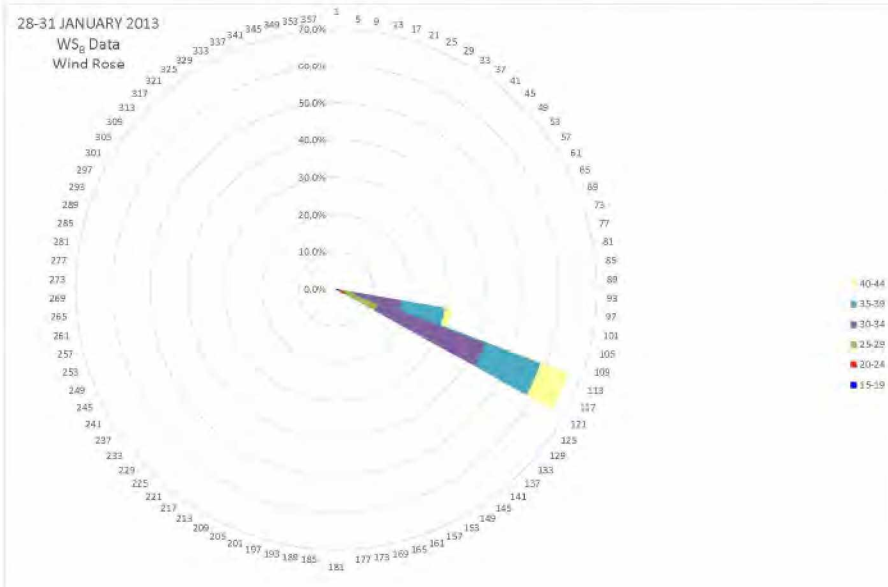
Gusting wind speeds during the event averaged 48 mph, with a maximum gusting wind speed of 60 mph (Figure 4).

Figure 4: Gusting Wind Speeds, 18-20 January 2013



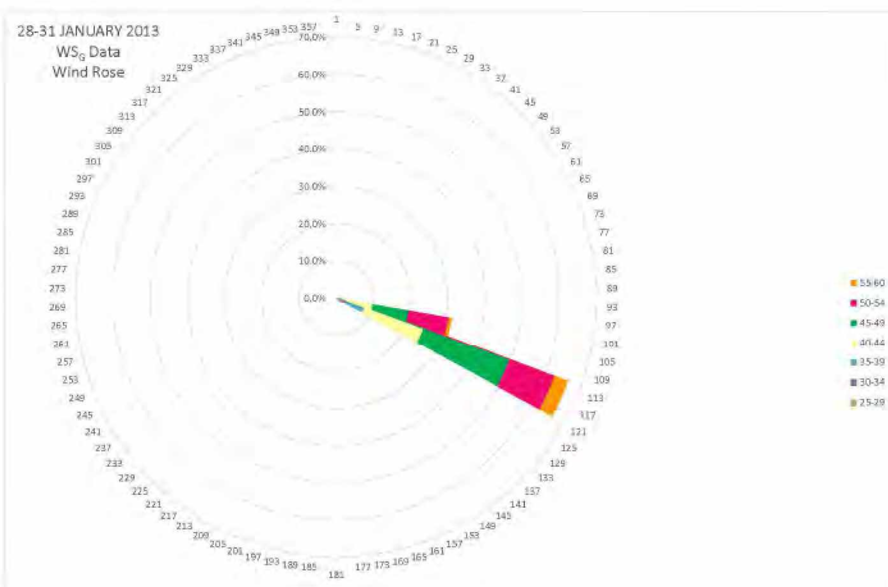
The exceedance event of January 29, 2013, was associated with a high wind event that began on January 28th at approximately 1900 hours and continued through January 30th at approximately 2200 hours. This event was characterized by winds coming from the east-southeast (100°-120°) with a mean base wind speed of 32 mph and a maximum base wind speed of 45 mph (Figure 5).

Figure 5: Base Wind Speeds, 28-31 January 2013



Gusting wind speeds during this event averaged 44 mph, with a maximum gusting wind speed of 56 mph (Figure 6).

Figure 6: Gusting Wind Speeds, 28-31 January 2013

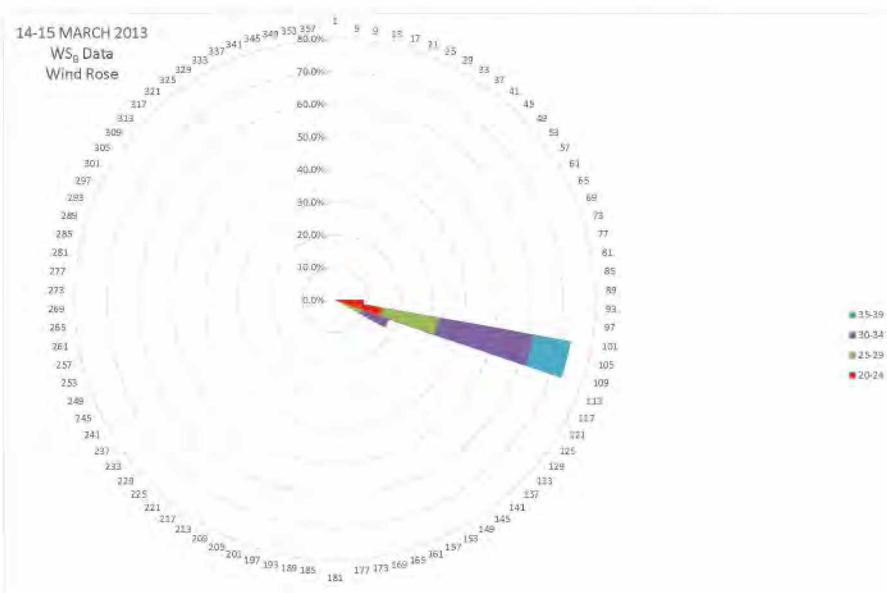


2.1.1 March

The total number of windy days typically increases in March to ~82%, which is greater than the annual average, and the winds directions become more variable, with only ~34% of days having winds from the east-southeast to southeast. The average daily base wind speed in March is down to 9 mph (same as the annual average) with the maximum daily average base wind speed of 38 mph occurring on March 18, 2006. The average daily gusting wind speed remains at 55 mph, however, with the maximum daily average gusting wind speed of 110 mph occurring on March 8, 2008.

The exceedances of March 14 and 15, 2013, were associated with a high wind event that began on March 14th at approximately 0700 hours and continued through March 15th at approximately 1600 hours. During this event winds came from the east to east-southeast (90°-110°), and hourly wind speeds fluctuated more when compared to the other exceedance events. The overall mean base wind speed for this event was only 29 mph, but frequently exceeded 30 mph and surged to a maximum of 38 mph (Figure 7).

Figure 7: Base Wind Speeds, 14-15 March 2013



Gusting wind speeds for this event averaged 41 mph, with a maximum gusting wind speed of 52 mph (Figure 8).

Figure 8: Gusting Wind Speeds, 14-15 March 2013

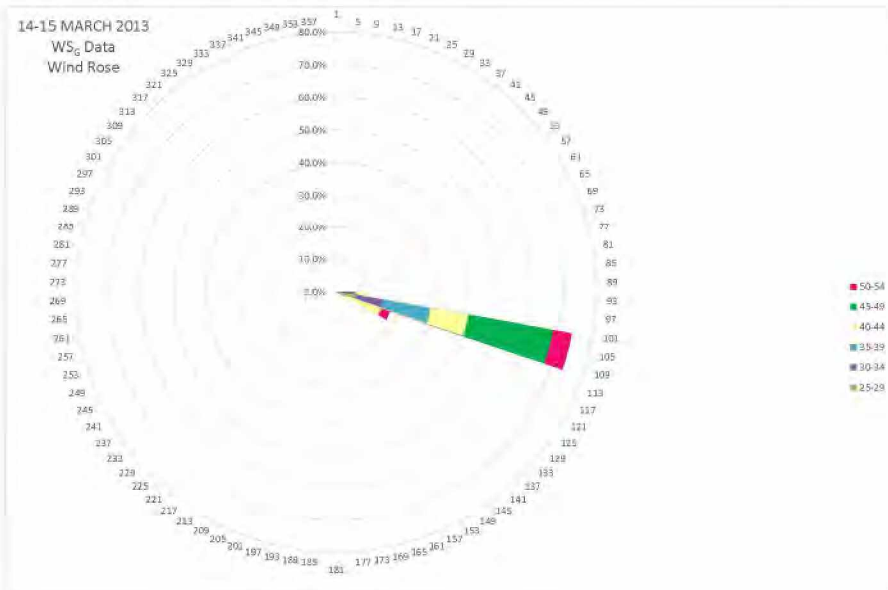


Table 3 below provides a summary of wind characteristics for high wind events associated with the PM_{10} exceedances.

Table 3: Exceedance Event Summary

High Wind Event	Exceedance Dates	Mean 24-hour [PM_{10}] µg/m3	Wind Direction Mode (degrees)	Wind Direction Range (degrees)	Mean WS_B (mph)	Max WS_B (mph)	Mean WS_G (mph)	Max WS_G (mph)
December 2012								
12/23/14 @ 1900 hrs – 12/27/2012 @ 1200 hrs	12/24/2012	151.6	110	100 – 120	33	41	46	58
	12/25/2012	215.7						
	12/26/2012	145.7						
January 2013								
01/18/13 @ 2330 hrs – 01/20/13 @ 1200 hrs	1/19/2013	149.5	110	100 – 120	35	43	48	60

High Wind Event	Exceedance Dates	Mean 24-hour $[PM_{10}]$ µg/m3	Wind Direction Mode (degrees)	Wind Direction Range (degrees)	Mean WS_B (mph)	Max WS_B (mph)	Mean WS_G (mph)	Max WS_G (mph)
01/28/13 @ 1900 hrs – 01/30/13 @ 2200 hrs	1/29/2013	151.9	110	100 – 120	32	45	44	56
March 2013								
3/14/13 @ 0700 hrs – 3/15/13 @ 1600 hrs	3/14/2013	288.7	100	90 - 110	29	38	41	52
	3/15/2013	277.7						
Notes:		Wind Event = Base Winds consistently > 30 mph $[PM_{10}]$ = Concentration of PM_{10} µg/m^3 = microgram per cubic meter WS_B = Base Wind Speed WS_G = Gust Wind Speed						

3. Potential PM_{10} Sources

Potential sources of PM_{10} identified within the windshed of the FGA BAM-1020 include the Jarvis Creek floodplain, man-made bare earth areas, structures within the Donnelly Training Area (DTA), cleared and revegetated areas, and areas of native vegetation. The relative proportion of these areas within the windshed are identified in Table 4 and discussed below.

Table 4: Potential PM_{10} Source Summary

Feature	Surface Type	Area (Ac)	% of Windshed	Potential PM_{10} Source
Natural				
Jarvis Creek Floodplain	Bare Earth	51	2	Yes
Forest & Sedge Meadow	Native Vegetation	2,404	88	No[1]
Anthropogenic				
Gravel Road	Bare Earth	37	1	Yes[2]
DTA Structures	N/A	1	negligible	No[3]
Cleared Areas	Vegetative Cover	243	9	No[4]
NOTES:	[1] Areas with native vegetative cover are presumed not to be a substantial source of erosion. [2] Assumes gravel roads graded to surface bare conditions for worst-case scenario. This is not the actual condition on the DTA. [3] DTA structures within the FGA BAM-1020 windshed do not house emission units. [4] Cleared and revegetated areas were modeled using the WEQ to confirm that they were not a potential source of PM_{10}.			

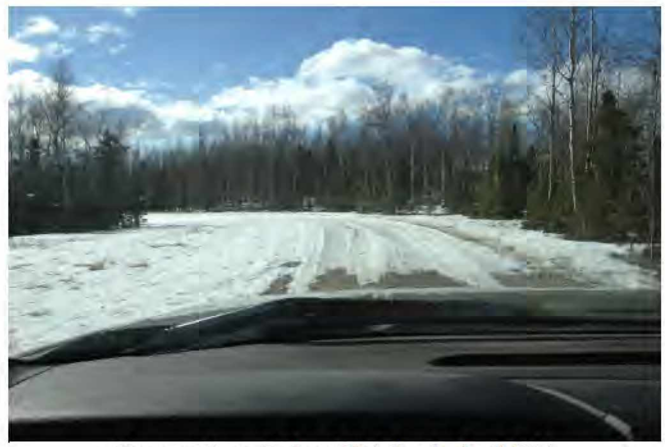
3.1 Jarvis Creek Floodplain


Jarvis Creek Floodplain, April 2014

Jarvis Creek, fed predominately by a combination of snow- and glacier-melt, has a broad, braided channel that cuts through glacial moraine deposits (USACE, 2007). The Jarvis Creek floodplain is immediately upwind of the FGA PM_{10} Monitoring Station (Appendix A, Map 1). That portion of the floodplain within the windshed is approximately 51 acres (Appendix A, Map 2, Area A), being a polygon ~470 linear feet on its western boundary; ~1,950 linear feet on its eastern boundary; ~2,290 linear feet on its northern boundary, and ~3,400 linear feet on its southern boundary. The average width of the area is ~875 linear feet, with an average length of ~2,940 linear feet. These average values were used in the WEQ model to provide a conservatively low estimate of PM_{10} contribution from this source. Due to the prevalence of high winds blowing down the Jarvis Creek floodplain, this area is largely free of snow and ice during the winter.

3.2 Man-made Bare Earth Areas

There are ~37 acres of man-made bare earth areas in the windshed of the FGA PM_{10} monitor. These areas consist predominately of gravel roads on the DTA, with small localized areas of gravel pad around the structures maintained by FWA Range Control. Four representative gravel road areas with different orientations were identified and modeled using the WEQ in order to represent potential wind erosion rates from gravel roads. These erosion rates were then aggregated and averaged in order to provide a representative erosion rate for man-made bare earth areas. Although illustrative for a total potential to emit, this is not reflective of actual conditions. Snow removal on DTA gravel roads and pads is performed in such a manner as to retain a hard pack of snow and ice to protect the gravel surface.



Remnant Snow Pack on DTA Roads, April 2014

3.3 Donnelly Training Area Structures

FWA Range Control maintains a number of structures within that portion of the DTA east of Jarvis Creek. In an email dated May 19, 2014, FWA Range Control indicated that all of the structures that are within the windshed of the PM_{10} monitor are either training aids (empty buildings with no emission units) or are heated with electric power, and therefore are not potential sources of PM_{10}. The gravel pads for these structures have been included with the acreage for gravel roads.

3.4 Cleared Ground with Vegetation


DTA Vehicle Offloading Area, April 2014

Approximately 243 acres of the windshed consists of cleared ground that is vegetated with a mix of grasses and shrubs. These areas include winter trails, bivouac areas, and vehicle offloading areas that have been revegetated. A site visit to the DTA in April 2014 indicates that vegetative cover is at or near 100% on these sites. Two cleared and vegetated areas, one former trail and one bivouac area, were modeled using WEQ to confirm that they are not potential sources of PM_{10} due to minimal wind erosion from these sites. Additionally, snow removal is not performed at these sites, and the snow pack results in additional erosion protection for these locations.

3.5 Native Vegetated Areas

The majority of the FGA BAM-1020 windshed consists of ~2,404 acres of undisturbed lands, including ~2,321 acres of taiga forest and ~83 acres of pond and sedge meadow. Due to the presence of native vegetation and their undisturbed condition, these lands are presumed not be a substantial source of PM_{10}.

4. Wind Erosion Equation (WEQ) Modeling

The Wind Erosion Equation (WEQ) was developed by the USDA Agricultural Research Service in 1961 by Dr. W.S. Chepil (Woodruff and Siddoway, 1965), and has been updated once or twice a decade since in order to address identified shortfalls (Fryrear et al., 1998). The current WEQ combines empirical and process modeling based on a primary factor of wind characteristics, and involving soil erodibility, crusting, surface roughness, and vegetative cover factors (Fryrear et al., 2001). These factors are used to determine the maximum transport capacity and transport mass based on field length. The WEQ estimates the average soil erosion for various field lengths, and the revised equation has been shown to have a strong correlation to actual soil erosion conditions on the ground (Fryrear et al., 2001).

4.1 Modeled Areas

One natural and six anthropogenic potential PM_{10} source areas were identified for purposes of running the WEQ. These areas were selected to be representative of the various source features as well as providing a variety of orientations of potential source features, as applicable to the feature type. The seven areas are listed in Table 5 below, and shown graphically in Appendix A, Map 2.

Table 5: WEQ Modeled Areas

Area	Description
A	That portion of the Jarvis Creek floodplain located within the windshed. This area is immediately upwind of the FGA PM_{10} Monitoring Station (Natural Source) and is the primary natural source of PM_{10} in the windshed.
B	This is the first gravel road encountered upwind of the FGA PM_{10} Monitoring Station. This section runs approximately 15° off of N-S, and is used to represent erosion rates on predominately N-S sections of road within the windshed (Anthropogenic Source).
C	This is the first gravel road encountered upwind of the FGA PM_{10} Monitoring Station. This section runs at a bearing of 137° and is used to represent erosion rates on NW-SE sections of road within the windshed (Anthropogenic Source).
D	This is a longer section of gravel road running at a bearing of 120°, which is parallel to some of the dominant winds during the exceedance events. This section is used to represent maximum erosion rates from NW-SE sections of road (Anthropogenic Source).
E	This is a section of winter road that has been revegetated. This feature has a bearing of 121°, roughly parallel to some of the dominant winds during the exceedance events, and was therefore selected as having a high potential to exhibit wind erosion. This area is used to represent cleared and revegetated areas that are linear in shape (Anthropogenic Source).

Area	Description
F	This is a bivouac area that has been revegetated. This feature has a bearing of 125° on its long dimension, which is approximately parallel to dominant winds during the exceedance events and therefore having a high potential for wind erosion. This area is used to represent cleared and revegetated areas that are shaped more like a field or clearing (Anthropogenic Source).
G	This is a section of gravel road bearing 87°, and is used to represent erosion rates on sections of road running predominately E-W within the windshed (Anthropogenic Source).

4.2 Model Factors and Inputs

The WEQ was run using data for the Delta Junction area provided by the USDA Natural Resources Conservation Service (NRCS). The following is a brief synopsis of the factors included in the WEQ (NRCS, 2002) and their input values or calculations.

4.2.1 Soil Erodibility Index (I)

The soil erodibility index (I) is expressed as the average annual soil loss in tons per acre for a given soil when site conditions are optimum for soil erosion. The soil erodibility index is derived based on the wind erodibility group (WEG) of area soils, which is tied to soil texture and moisture regimes. NRCS uses a 'I' factor of 86 tons/acre/year for soils in the Delta Junction area.

4.2.2 Soil Roughness Factor (K)

Soil roughness (K) can reduce soil erosion considerably due to micro-turbulence effects at the ground surface. The 'K' factor in the WEQ model considers soil roughness due to management regimes such as grading or tilling as well as random roughness that results from the interaction of management regimes and soil structure. Agronomic management regimes were selected based on those which would best approximate the roughness of each modeled area. For the Jarvis Creek floodplain (Appendix A, Map 2, Area A), a surface aerator tillage regime was used to approximated the roughness in the braided stream channel. For gravel road areas (Appendix A, Map 2, Areas B, C, D, and G), a smooth roller tillage regime was used to approximate a graded gravel road surface. A corrugated seeder/packer tillage regime was used to model areas that had been cleared but now had perennial vegetative cover by grasses (Appendix A, Map 2, Areas E and F), as the seeding pattern observed during the site visit was consistent with that piece of equipment.

4.2.3 Climatic Factor (C)

The climatic factor (C) is an index of climatic erosivity, and is tied to the average annual wind velocity and a correlation between average precipitation quantity and timing as an index of average soil moisture. A 'C' factor for Delta Junction has been developed by NRCS using data from the PABI ASOS to determine inputs for prevailing wind direction, wind preponderance, and erosive wind energy. The C factor for the Delta Junction Area is 32.

4.2.4 Unsheltered Distance (L)

The unsheltered distance, or 'L' factor, is calculated based on the shape and orientation of the area in comparison to the direction of the prevailing wind erosion direction, and represents the maximum unsheltered distance for the field or area being evaluated. This factor is calculated in WEQ using the width, width-to-length ratio, and orientation data for each modeled area and the wind data used to develop the 'C' factor.

4.2.5 Vegetative Cover (V)

The presence of vegetative cover protects soil from erosion both through binding and shielding effects as well as the creation of micro-turbulence conditions that reduce transport load. The effect of vegetative cover in WEQ relates the kind, amount, and orientation of vegetative cover to a standard reference condition based on agronomic crop residues. For purposes of this model, bare earth areas are assumed to be in a fallow condition, which includes a 'crop' of small weeds. Cleared and revegetated areas assume a vegetated cover of pasture grasses. Snow cover was also included for some model runs as appropriate.

4.3 Mechanics of the WEQ Model

The Universal Wind Erosion Equation established a predictive relationship of annual rate of soil erosion in tons/acre/year (E) between the five factors discussed in Section 4.2 above (Woodruff and Siddoway, 1965; see Appendix C). The underlying formula for the 1965 model is describes as $E = f(IKCLV)$, and while improvements have been made to how each factor is determined the overall formula remains the same (Fryrear, 1998). The WEQ is solved through a five-step solution where each step evaluates the affect of an additional factor:

1. Determine maximum soil erodibility: $E_1 = I$
2. Account for the effect of field roughness: $E_2 = E_1 \, x \, K$
3. Account for effect of local climatic conditions: $E_3 = E_2 \, x \, C$
4. Account for field length: $E_4 = E_3 \, x \, f(L)$. NOTE: Calculation of E_4 is not simple multiplication because L, E_2, and E_3 are all interrelated.
5. Account for effect of vegetative cover: $E = E_4 \, x \, f(V)$. NOTE: Calculation of E is not simple multiplication because E_4, V, and E are interrelated.

While the complex effects of field length [$f(L)$] and vegetative cover [$f(V)$] were originally determined using graphic representations of the mathematical relationships developed by USDA soil scientists (Woodruff and Siddoway, 1965), the formulae were later incorporated into computerized WEQ models. In 1998, the USDA Natural Resources Conservation Service (NRCS) first released a version of the WEQ based in Microsoft Excel (https://infosys.ars.usda.gov/WindErosion/nrcs/weq.html).

This Excel spreadsheet tool was incorporated into the NRCS Field Office Technical Guide (FOTG) for each county and field office in the United States (example at http://efotg.nrcs.usda.gov/references/public/CO/WEQvs8.05_CO_FieldVersion.xls). The FOTG also includes the 'official' values and maps for each of the five WEQ factors based on local soils and conditions. The most recent version of this spreadsheet tool, along with the WEQ factors from the NRCS FOTG for the Delta Junction area, were used to run the WEQ for this project.

4.4 Model Limitations and Assumptions

Because the WEQ is an agronomic erosion model, certain artificialities and assumptions needed to be made in order to apply the model to this situation. These artificialities and assumptions are presented in Table 6 below, and the impacts of these on the results are discussed in Section 5.

Table 6: WEQ Artificialities, Assumptions, and Limitations

WEQ Model Characteristics or Parameters	Artificiality or Assumption Used in Modeling Effort
Models erosion on a field-by-field basis.	Representative areas were identified for modeling and the resulting rates extrapolated over the entire acreage for that area type.
Model parameters are for fields oriented either north-south or east-west with ridge features running either north-south or east-west.	For each N-S or E-W area, ran model with ridge features running in both directions. Used arithmetic mean for purposes of comparison.
	For NE-SW gravel roads sections, ran models with N-S and E-W orientation, each with N-S and E-W ridge features. Used arithmetic mean of orientation values for each section.
Model parameters are for rectangular fields.	For areas not predominately square, used an average width and length for the area.
Model parameters assume a maximum length:width ratio of 6:1.	Areas with a length:width ratio of greater than 6:1 use the maximum ration for modeling purposes.
Model requires a tillage operation be conducted at the beginning of each management period.	Tillage operations were chosen to most closely approximate actual roughness features observed during site visit.
Requires that a cropping system be associated with each field.	A fallow cropping system was used as the most representative cropping system for bare earth areas.
	A pasture cropping system was used as the most representative cropping system for revegetated areas.
Develops erosion estimates for a 1-year management period running January 1 – December 31.	Presents annual erosion estimates in units of tons per acre per year.
Assumes wind erosion occurs during all months of the year. Snow cover is treated as a "crop".	Area A ran with no snow cover, as majority of Jarvis Creek floodplain is snow-free in winter.
	Ran two scenarios for gravel roads: 1) Snow removal to surface bare condition (worst-case) and 2) snow removal to hardpack snow & ice (actual condition).

WEQ Model Characteristics or Parameters	Artificiality or Assumption Used in Modeling Effort
Does not have provisions for natural or artificial wind breaks to model a reduction in sediment transport mass.	Estimates are for the mass of soil coming off of each area, and do not represent the amount of sediment that makes it to the PM_{10} monitor.

5. WEQ Model Results

Multiple WEQ models were run for the seven representative areas, identified in Appendix A, Maps 1 and 2. The number of different runs for each area is based on the assumptions and artificialities identified in Table 6 above. The results of the different runs are summarized below and discussed in Section 5. Copies of the WEQ run outputs are presented in Appendix D.

5.1 Area A: Jarvis Creek Floodplain

Area A consists of a section of the Jarvis Creek floodplain immediately upwind of the FGA PM_{10} Monitoring Station. The area averages 875 feet wide by 2,940 feet long with a long orientation running approximately east-west. Two WEQ models were run with tillage directions being the only differing factor. A tillage operation of "Aerator, Surface" was selected to provide a ridge roughness factor and spacing of zero (0) inches and a random roughness factor of 0.3 inches. A cropping system of "Weeds, winter, <6 weeks" was selected to reflect minimal vegetative growth on the bare earth area. No snow cover periods were identified in these runs, as the vast majority of the floodplain is blown bare during the winter months, with the creek aufice being the only protective cover. Both WEQ model runs gave an average annual wind erosion rate of 24.7 tons/acre/year.

5.2 Area B: North-South Gravel Road

Area B is a 910-foot section of gravel road with a width of 45 feet (0.9 acres) that runs approximately 15° off of north-south. A tillage operation of "Roller, smooth" was selected to provide a ridge roughness factor and spacing of zero (0) inches and a random roughness factor of 0.3 inches to represent graded conditions. A cropping system of "Weeds, winter, <6 weeks" was selected to reflect minimal vegetative growth on the road surface. Four runs of the WEQ were conducted on this section representing two tillage orientations on each of two scenarios. The first scenario represents the "worst-case", which assumes that the gravel roads are graded to surface bare conditions during winter months. The second scenario is the 'actual' scenario, which assumes that a hardpack of compound snow and ice is maintained during winter grading operations. The results of the WEQ for each scenario are shown in Table 7 below:

Table 7: WEQ Results for Area B

Scenario	Tillage Orientation	Erosion Rate (T/ac/yr)
Worst Case	N-S	5.7
Worst Case	E-W	5.7
Actual	N-S	1.3
Actual	E-W	1.3

For purposes of calculating representative erosion rates for gravel roads, this segment contributed a value of 5.7 T/ac/yr and 1.3 T/ac/yr for worst case and actual, respectively.

5.3 Area C: Northeast-Southwest Gravel Road #1

Area C is a 1,280-foot section of gravel road approximately 35 feet wide (1.0 acres) that runs approximately NW-SE (137.5°). A tillage operation of "Roller, smooth" was selected to provide a ridge roughness factor and spacing of zero (0) inches and a random roughness factor of 0.3 inches to represent graded conditions. A cropping system of "Weeds, winter, <6 weeks" was selected to reflect minimal vegetative growth on the road surface. Because the WEQ only allows for N-S and E-W field orientation, two sets of four WEQ runs were performed for this area. Each set included both N-S and E-W tillage directions and both 'actual' (hardpack) and 'worst-case' (surface bare) scenarios. The results of the WEQ for each scenario are shown in Table 8 below:

Table 8: WEQ Results for Area C

Scenario	Field Orientation	Tillage Orientation	Erosion Rate (T/ac/yr)
Worst Case	N-S	N-S	4.4
Worst Case	N-S	E-W	4.4
Worst Case	E-W	N-S	8.2
Worst Case	E-W	E-W	8.2
Actual	N-S	N-S	1.1
Actual	N-S	E-W	1.1
Actual	E-W	N-S	0.7
Actual	E-W	E-W	0.7

For purposes of establishing erosion rates from gravel roads, an average between the N-S and the E-W road orientations above, or 0.9 tons/acre/year (actual) and 6.3 tons/acre/year (worst-case), was used to represent NW-SE or NE-SW sections in establishing the overall mean erosion rate for gravel roads.

5.4 Area D: Northeast-Southwest Gravel Road #2

Area D is a 2,840-foot section of gravel road approximately 35 feet wide (2.3 acres) that runs approximately NW-SE (119°). A tillage operation of "Roller, smooth" was selected to provide a ridge roughness factor and spacing of zero (0) inches and a random roughness factor of 0.3 inches to represent graded conditions. A cropping system of "Weeds, winter, <6 weeks" was selected to reflect minimal vegetative growth on the road surface. Because the WEQ only allows for N-S and E-W field orientation, two sets of four WEQ runs were performed for this area. Each set included both N-S and E-W tillage directions and both 'actual' (hardpack) and 'worst-case' (surface bare) scenarios. The results of the WEQ for each scenario are shown in Table 9 below:

Table 9: WEQ Results for Area D

Scenario	Field Orientation	Tillage Orientation	Erosion Rate (T/ac/yr)
Worst Case	N-S	N-S	4.4
Worst Case	N-S	E-W	4.4
Worst Case	E-W	N-S	8.2
Worst Case	E-W	E-W	8.2
Actual	N-S	N-S	1.1
Actual	N-S	E-W	1.0
Actual	E-W	N-S	0.7
Actual	E-W	E-W	0.7

For purposes of establishing erosion rates from gravel roads, an average between the N-S and the E-W road orientations for area D above, or 0.9 tons/acre/year (actual) and 6.3 tons/acre/year (worst-case), was used to represent NW-SE or NE-SW sections in establishing the overall mean erosion rate for gravel roads.

5.5 Area E: Winter Trail

Area E is a 4,590-foot section of revegetated winter trail with a width of 115 feet (12.1 acres) that runs approximately NW-SE (121°). A tillage operation of "Seeder, corrugated packer" was selected to provide a ridge roughness factor of one (1) inch with a ridge spacing of six (6) inches and a random roughness factor of 0.4 inches, which corresponds to the tillage pattern observed on-site. A cropping system of "Pasture/Hay, spring" was selected to reflect the vegetative growth on the area. Winter snow cover periods were identified in these runs.

Because the WEQ only allows for N-S and E-W field orientation, two sets of WEQ runs were performed for this area, with each set representing N-S and E-W tillage orientations. The WEQ runs resulted in a maximum erosion rate of 0.1 tons/acre/year.

5.6 Area F: Bivouac Area

Area F is a 2,550-foot section of revegetated bivouac area with an average width of 650 feet (33.3 acres) that run approximately NW-SE (125°). A tillage operation of "Seeder, corrugated packer" was selected to provide a ridge roughness factor of one (1) inch with a ridge spacing of six (6) inches and a random roughness factor of 0.4 inches, which corresponds to the tillage pattern observed on-site. A cropping system of "Pasture/Hay, spring" was selected to reflect the vegetative growth on the area. Winter snow cover periods were identified in these runs.

Because the WEQ only allows for N-S and E-W field orientation, two sets of WEQ runs were performed for this area, with each set representing N-S and E-W tillage orientations. All WEQ runs resulted in an annual erosion rate of 0.1 tons/acre/year.

5.7 Area G: East-West Gravel Road

Area G is a 4,970-foot section of gravel road with a width of 30 feet (2.4 acres) that runs approximately 3° off of east-west. A tillage operation of "Roller, smooth" was selected to provide a ridge roughness factor and spacing of zero (0) inches and a random roughness factor of 0.3 inches to represent graded conditions. A cropping system of "Weeds, winter, <6 weeks" was selected to reflect minimal vegetative growth on the road surface. Four runs of the WEQ were conducted on this section representing two tillage orientations on each of two scenarios. The first scenario represents the "worst-case", which assumes that the gravel roads are graded to surface bare conditions during winter months. The second scenario is the 'actual' scenario, which assumes that a hardpack of compound snow and ice is maintained during winter grading operations. The results of the WEQ for each scenario are shown in Table 10 below:

Table 10: WEQ Results for Area B

Scenario	Tillage Orientation	Erosion Rate (T/ac/yr)
Worst Case	N-S	7.4
Worst Case	E-W	7.4
Actual	N-S	0.6
Actual	E-W	0.6

For purposes of calculating representative erosion rates for gravel roads, this segment contributed a value of 7.4 T/ac/yr and 0.6 T/ac/yr for worst case and actual, respectively.

6. PM_{10} Source Analysis

Representative wind erosion rates for each area were calculated taking the arithmetic mean of the annual wind erosion rates for each category of modeled area.

Table 11: Representative Erosion Rates

Area	Jarvis Creek	Gravel Roads (Bare)	Gravel Roads (Snow)	Cleared & Revegetated
A	24.7			
B		5.7	1.3	
C		6.3	0.9	
D		6.3	0.9	
E				0.1
F				0.1
G		7.4	0.6	
Mean	24.7	6.4	0.9	0.1
NOTES:	All erosion rates above are in Tons/acre/year.			

These representative erosion rates were then applied to each of the potential PM_{10} source categories within the windshed of the FGA PM_{10} Monitoring Station to provide a total amount of wind erosion per year from that source category, represented as tons per year of total suspended particulates. Estimated PM_{10} contribution from each source category was then calculated using a factor of 60% of total suspended particulates as PM_{10} (see Table 12). This factor is a conservatively high percentage based on the results of an extensive wind erosion study conducted by Environment Canada (2000).

Table 12: Wind Erosion Summary Data

Model Area	Surface Type	Area (Ac)	Erosion Rate (T/Ac/yr)	Total Suspended Particulates (T/yr)	Total PM_{10} (T/yr)[1]
Natural Sources					
Jarvis Creek Floodplain	Bare Earth	51	24.7	1259.7	755.8
Forest & Sedge Meadow[5]	Native Vegetation	2,404	-	-	-
Anthropogenic Sources					
Gravel Road	Bare Earth	37	6.4[2]	236.8	142.1
	Snow Cover		0.9[3]	33.3	20.0
Cleared Area[4]	Vegetative Cover	243	0.1	24.3	14.6

Model Area	Surface Type	Area (Ac)	Erosion Rate (T/Ac/yr)	Total Suspended Particulates (T/yr)	Total PM_{10} (T/yr)[1]
NOTES:	[1] Assumes a total of 60% of Total Suspended Particulates as PM_{10} based on the high-end ratio developed by Environment Canada (2000). [2] Arithmetic mean of gravel road erosion rates assuming snow removal on gravel roads to surface bare conditions (worst-case). [3] Arithmetic mean of gravel road erosion rates assuming compact snow & ice hardpack maintained on gravel roads (actual). [4] Cleared and revegetated areas were modeled to confirm that they are not a substantial source of PM_{10}. [5] Areas with native vegetative cover are presumed not to be a substantial source of erosion.				

The values above for the anthropogenic contribution remain artificially high due to the model limitations and assumptions identified in Section 4.3 of this report and discussed in Table 13 below.

Table 13: Effects of WEQ Artificialities, Assumptions, and Limitations

WEQ Model Characteristics or Parameters	Artificiality or Assumption Used in Modeling Effort	Corresponding Effects on or Limitations of Results
Models erosion on a field-by-field basis.	Representative areas were identified for modeling and the resulting rates extrapolated over the entire acreage for that area type.	Rates are comparative across source categories only, and cannot be considered predictive in nature.
Model parameters are for fields oriented either north-south or east-west with ridge features running either north-south or east-west.	For each N-S or E-W area, ran model with ridge features running in both directions. Used arithmetic rates for purposes of comparison.	Only the model runs from cleared and revegetated areas (Areas F and G) showed any variation with tillage orientation. Used highest modeled value (0.1 T/ac/yr) for comparison.
	For NE-SW gravel roads sections, ran models with N-S and E-W orientation, each with N-S and E-W ridge features. Used average of values for N-S and E-W for each section.	Analysis assumes the average orientation of features not predominately N-S or E-W will trend to NW-SE or NE-SW. Actual rates will vary based on field orientation.
Model parameters are for rectangular fields.	For areas not predominately square, used an average width and length for the area.	Rates for non-rectangular areas (Areas A and F) may be artificially low based on a lower unsheltered distance.
Model parameters assume a maximum length:width ratio of 6:1.	Areas with a length:width ratio of greater than 6:1 use the maximum ration for modeling purposes.	Negligible. USDA data shows that the effect of longer unsheltered distances on rate of erosion is negligible due to maximum transport capacity being reached (Fryrear 2001).

WEQ Model Characteristics or Parameters	Artificiality or Assumption Used in Modeling Effort	Corresponding Effects on or Limitations of Results
Model requires a tillage operation be conducted at the beginning of each management period.	Tillage operations were chosen to most closely approximate actual roughness features observed during April 2014 site visit.	Tillage operations inputs at the beginning of management periods resulted in artificially high erosion rates for gravel roads (Areas B, C, D, and G) during periods of snow cover.
Requires that a cropping system be associated with each field.	A fallow cropping system was used as the most representative cropping system for bare earth areas.	Fallow assumes a minimal level of weed growth, which will slightly reduce rates off of these sections (Areas A, B, C, D, G).
	A pasture cropping system was used as the most representative cropping system for revegetated areas.	Pasture cropping system consistent with site vegetation pattern observed on April 2014 site visit.
Develops erosion estimates for a 1-year management period running January 1 – December 31.	Presents annual erosion estimates in units of tons per acre per year.	Annual rates can be used for comparison of total suspended particulates between modeled areas, but are not predictive for specific events.
Assumes wind erosion occurs during all months of the year. Snow cover is treated as a "crop".	Area A ran with no snow cover, as the vast majority of the Jarvis Creek floodplain is snow-free in winter.	Rates for Area A will be slightly high due to erosion being calculated for iced-over water channels.
	Ran two scenarios for gravel roads: 1) Snow removal to surface bare condition (worst-case) and 2) snow removal to hardpack snow & ice (actual conditions).	Rate for surface bare gravel roads (Areas B, C, D, and G) are not representative of actual conditions, but are useful for comparison with Area A. Modeled rates for hardpack will reflect near-actual conditions.
Does not have provisions for natural or artificial wind breaks to model a reduction in sediment transport mass.	Estimates are for the mass of soil coming off of each area, and do not represent the amount total suspended particulates that make it to the PM_{10} monitor.	Contributions of wind erosion from Areas B-G to PM_{10} sampled at the BAM-1020 will be artificially high.

Using the Total PM_{10} values shown in Table 12 above, the estimated percent contribution of PM_{10} by source category is presented in Table 14 below, broken out by the two gravel road scenarios.

Table 14: Percent PM_{10} Contributions by Source Area

	Gravel Roads- Bare (T/ac/yr)	% Total PM_{10}	Gravel Roads- Snow (T/ac/yr)	% Total PM_{10}
Natural Sources				
Jarvis Creek Floodplain	755.8	82.8	755.8	95.6
Forest & Sedge Meadow[5]	0	0	0	0
Anthropogenic Sources				

	Gravel Roads- Bare (T/ac/yr)	% Total PM_{10}	Gravel Roads- Snow (T/ac/yr)	% Total PM_{10}
Gravel Road	142.1	15.6	20.0	2.5
Cleared Area[4]	14.6	1.6	14.6	1.9
TOTAL Anthropogenic	156.7	17.2	34.6	4.4
NOTES:	All results above are based on annual estimates from the WEQ model runs in Appendix D.			

The majority of the assumptions identified in Table 13 tend to overestimate the anthropogenic contributions to PM_{10}, especially during periods of snow cover. Also, these values account for neither the greater distance between the anthropogenic PM_{10} sources and the FGA monitoring station nor the presence of natural vegetation features that act as wind breaks on the DTA.

Based on the results presented in Table 14 and the assumptions presented in Table 15, it can be conservatively estimated that anthropogenic sources of dust contribute less than 5% of the annual PM_{10} experienced at the FGA monitoring station, with a "worst-case" scenario of just over 17% based on the assumption that gravel roads are graded to surface bare conditions during the winter months. This supports the conclusions of the *U.S. Army Garrison Fort Greely, Fort Greely, Alaska PM_{10} Annual Data Report 01 August 2012 – 31 July 2013* that the vast majority of PM_{10} experienced at the FGA PM_{10} Monitoring Station during exceedance events is from natural sources and is not anthropogenic in nature.

7. Implications of Project Results

In conducting this study, the author used GIS technology to analyze basic meteorological data and outputs from the USDA WEQ to generate a simple back-trajectory model for determining the sources and relative contributions to PM_{10} experienced at a given receptor. Using this model, the author was able to show that the vast majority of PM_{10} at Fort Greely was natural rather than anthropogenic in nature, and that U.S. Army activities at Fort Greely or the Fort Wainwright Donnelly Training Area were not significant contributors to PM_{10} concentrations at FGA. The ADEC Division of Air Quality determined that results of this study constituted substantive documentation that PM_{10} exceedances observed during the monitoring period were of natural provenance and not from anthropogenic sources, and issued a compliance case closure letter on June 20, 2014.

In addition to the direct results of the study, the project also serves to demonstrate a low-complexity model that can be used to assess the relative contribution of anthropogenic and natural sources of PM_{10} at a given receptor. The model described in this project is not data intensive, and the data required are readily available or easily gathered. Running the model requires only basic skills with Microsoft Excel and GIS technology. Although the model only provides relative data, it can be quickly and effectively used in other locations to support air quality compliance programs. Additionally, the model can be used in complex situations as a screening tool to focus data collection efforts on significant sources of PM_{10}. This use as a screening tool could facilitate the prioritization of PM_{10} sources for more precise quantitative dispersion or receptor models when precise quantitative data are required.

Literature Cited

ADEC. 2008. Air Quality Operating Permit AQ0238TVP02. Alaska Department of Environmental Conservation. Juneau, AK.

Almeida, S.M., C.A. Pio, M.C. Freitas, M.A. Reis, and M.A. Trancoso. 2006. Approaching PM2.5 and PM2.5-10 source apportionment by mass balance analysis, principal component analysis and particle size distribution. Science of the Total Environment 368:663-674.

Ashbaugh, L.L. 1983. A statistical trajectory technique for determining air pollution source regions. Journal of the Air Pollution Control Association 33(11):1096-1098.

Bettis III, E.A. 2012. Climatic and biotic controls on silt production and accumulation of loess. Nature Education Knowledge 3(10):25.

BKSS. 2013. U.S. Army Garrison Fort Greely, Alaska PM_{10} Annual Data Report 01 August 2012 – 31 July 2013. Bering-KAYA Support Services. Fort Greely, Alaska.

Buschiazzo, D.E. and T.M. Zobeck. 2008. Validation of WEQ, RWEQ, and WEPS wind erosion for different arable land management systems in the Argentinean Pampas. Earth Surface Processes and Landforms 33:1839-1850.

Clark, M.H. 2005. Soil Survey of the Delta River Area, Alaska. Technical Report 55:16.8947. U.S. Bureau of Land Management. Anchorage, AK

Cooper, J.A. and J.G. Watson Jr. 1980. Receptor oriented methods of air particulate source apportionment. Journal of the Air Pollution Control Association 30(10): 1116-1125.

Countess, R., W. Barnard, C. Claiborn, D. Gillette, D. Latimer, T. Pace, and J. Watson. 2001. Methodology for Estimating Fugitive Windblown and Mechanically Resuspended Road Dust Emissions Applicable for Regional Scale Air Quality Modeling. Final Report. WGA Contract No. 30203-9. 113 pp.

Environment Canada. 2000. Priority Substances List Assessment Report: Respirable Particulate Matter Less Than or Equal to 10 Microns. Environment Canada and Health Canada. Ontario, QC.

EPA. 1987. Ambient Monitoring Guidelines for Prevention of Significant Deterioration. EPA Manual 450/4-87-007. U.S. Environmental Protection Agency. Research Triangle Park, NC.

Feng, G. and B. Sharratt. 2007. Validation of WEPS for soil and PM_{10} loss from agricultural fields within the Columbia Plateau of the United States. Earth Surface Processes and Landforms 32:743-753.

Fryrear, D.W., P.L. Sutherland, G. Davis, G. Hardee, and M. Dollar. 2001. Wind erosion estimates with RWEQ and WEQ. *In* D.E. Stott, R.H. Mohtar, and G.C. Steinhardt (eds). Sustaining the Global Farm: Selected Papers from the 10th International Soil Conservation Organization Meeting, conducted May 24-29, 2001 at Purdue University. Lafayette, Indiana.

Fryrear, D.W., Ali Saleh, J.D. Bilbro, H.M. Schomberg, J.E. Stout, and T.M. Zobeck. 1998. Revised Wind Erosion Equation (WEQ). Wind Erosion and Water Conservation Research Unit, USDA-ARS, Southern Plains Area Cropping Systems Research Laboratory. Technical Bulletin No. 1.

Gao, J., L.E. Wagner, F. Fox, S.H. Chung, J.K. Vaughan, and B.K. Lamb. 2013. Spatial application of WEPS for estimating wind erosion in the Pacific Northwest. Transactions of the American Society of Agricultural and Biological Engineers 56(2):613-624.

Gordon, G.E. 1980. Receptor models. Environmental Science and Technology 14(7):792-800.

Hagen, L.J. 2004. Fine particulates (PM_{10} and $PM_{2.5}$) generated by breakage of mobile aggregates during simulated wind erosion. Transactions of the American Society of Agricultural Engineers 47(1):107-112.

Hagen, L.J., N. Mirzamostafa, and A. Hawkins. 1996. PM-10 generation by wind erosion. *In* Proceedings of the International Conference on Air Pollution from Agricultural Operations, conducted February 7-9, 1996 at Westin Crown Center, Kansas City, Missouri.

Henry, R.C., Y.S. Chang, and C.H. Spiegelman. 2002. Locating nearby sources of air pollution by nonparametric regression of atmospheric concentrations on wind direction. Atmospheric Environment 36: 2237-2244.

Muhs, D.R., T.A. Ager, E.A. Bettis III, J. McGeehin, J.M. Been, J.E. Beget, M.J. Pavich, T.W. Stafford Jr., and D.S.P. Stevens. 2003. Stratigraphy and palaeoclimatic significance of Late Quaternary loess-palaoesol sequences of the Last Interglacial-Glacial cycle in central Alaska. Quaternary Science Reviews 22:1947-1986.

NRCS. 2004. Soil Survey of Fort Greely and Donnelly Training Area, Alaska. National Cooperative Soil Survey. Alaska State Office, USDA Natural Resources Conservation Service. Palmer, Alaska.

NRCS. 2002. National Agronomy Manual. Washington, D.C.

Pewe, T.L. 1975. Quaternary Geology of Alaska. Geological Survey Professional Paper 835:37-42.

RP5. 2014. Weather Archive in Delta Junction / Allen Army Airport. URL: http://rp5.by/Weather_archive_in_Delta_Junction,_Allen_Army_(airport). Reliable Prognosis. Raspisaniye Pogodi Ltd. Accessed May 8, 2014.

Saxton, K., D. Chandler, L. Stetler, B. Lamb, C. Claiborn, and B.-H. Lee. 2000. Wind erosion and fugitive dust fluxes on agricultural lands in the Pacific Northwest. Transactions of the American Society of Agricultural Engineers 43(3):623-630.

Sharratt, B., G. Feng, and L. Wendling. 2007. Loss of soil and PM_{10} from agricultural fields associated with high winds on the Columbia Plateau. Earth Surface Processes and Landforms 32:621-630.

Trainer, F.W. 1961. Eoilian Deposits of the Matanuska Valley Agricultural Area Alaska. Geological Survey Bulletin 1121-C.

USACE. 2007. Erosion Information Paper – Delta Junction, Alaska. Alaska Baseline Erosion Assessment. Alaska District, U.S. Army Corps of Engineers. Anchorage, Alaska.

Vautard, R., B. Bessagnet, M. Chin, and L. Menut. 2005. On the contribution of natural Aeolian sources to particulate matter concentrations in Europe: Testing hypotheses with a modeling approach. Atmospheric Environment 39:3291-3303.

Viana, M., T.A.J. Kuhlbusch, X. Querol, A. Alastuey, R.M. Harrison, P.K. Hopke, W. Winiwarter, M. Vallius, S. Szidat, A.S.H. Prevot, C. Hueglin, H. Bloemen, P. Wahlin, R. Vecchi, A.I. Miranda, A. Kasper-Giebl, W. Maenhaut, and R. Hitzenberger. 2008. Source apportionment of particulate matter in Europe: A review of methods and results. Journal of Aerosol Science 39:827-849.

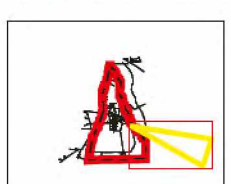
Woodruff, N.P. and F.H. Siddoway. 1965. A Wind Erosion Equation. Soil Science Society of America Journal 29:602-608.

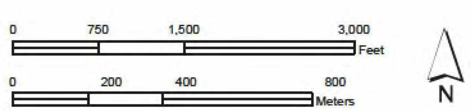
APPENDIX A

MAPS

[THIS PAGE LEFT INTENTIONALLY BLANK]

For Official Use Only





Map 1
Fort Greely BAM-1020 Windshed
December 2012, January & March 2013

For Official Use Only

[THIS PAGE LEFT INTENTIONALLY BLANK]

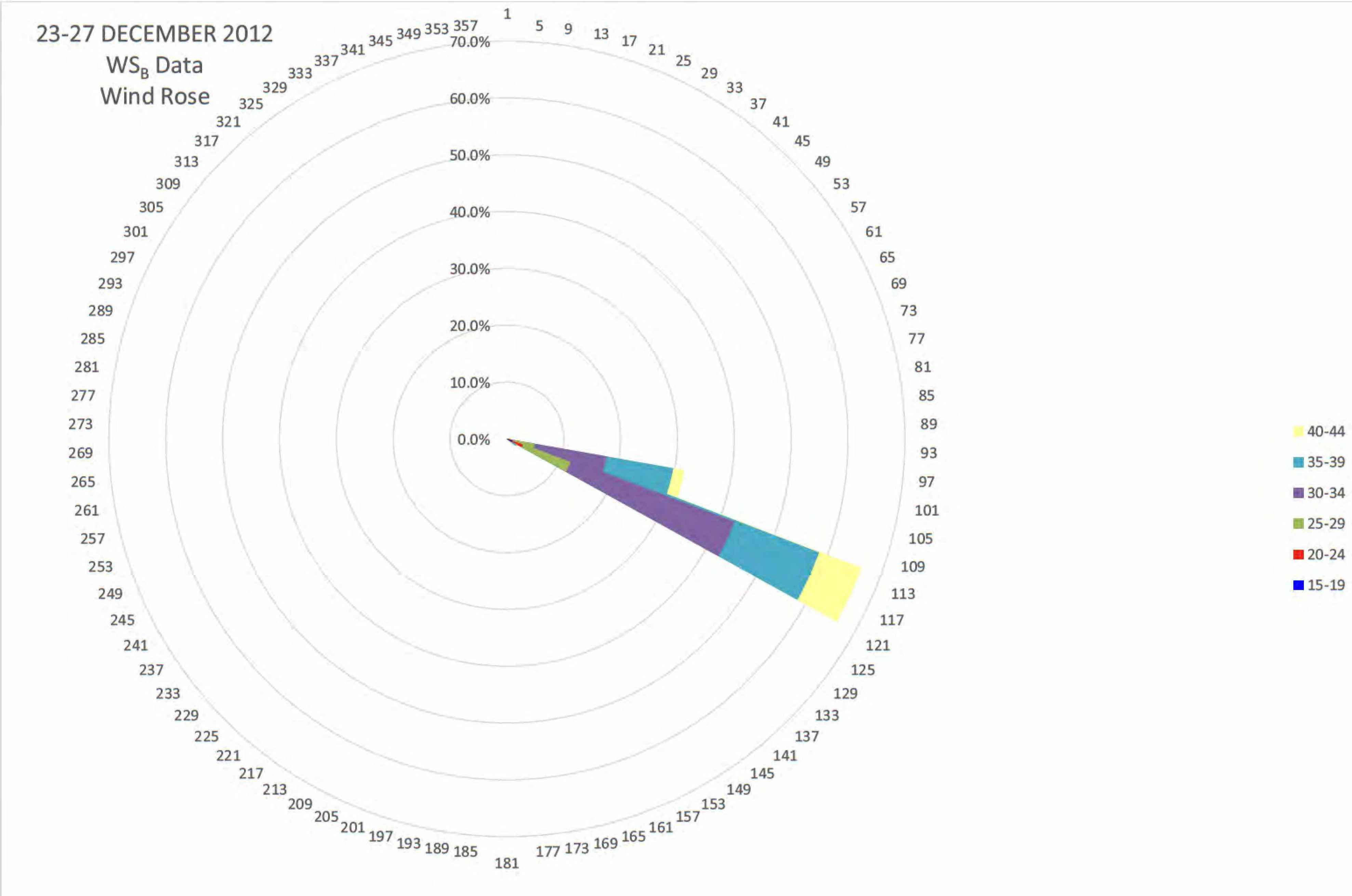
Map 2
Modeled Area Details
December 2012, January & March 2013

[THIS PAGE LEFT INTENTIONALLY BLANK]

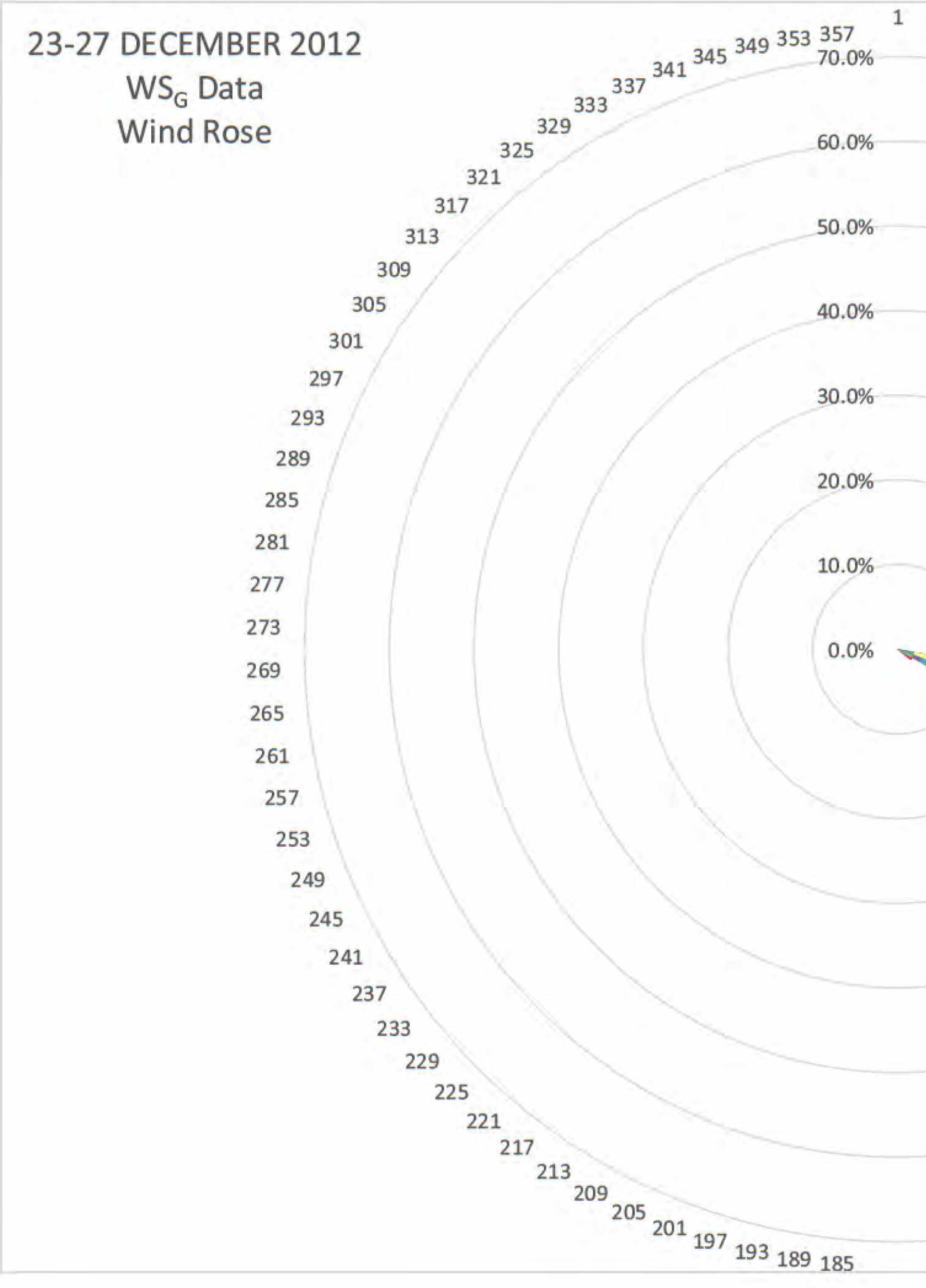
APPENDIX B

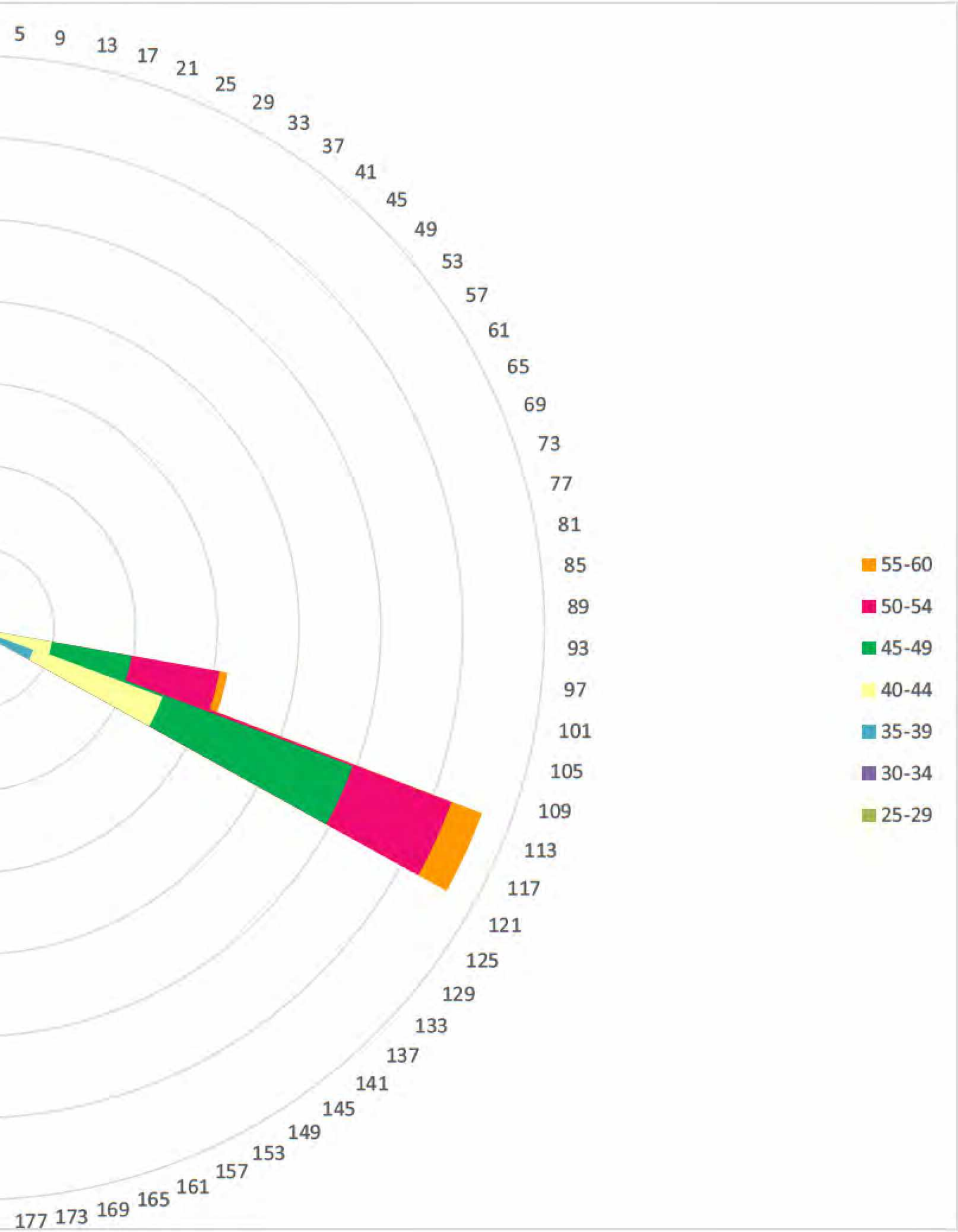
WIND ROSE DATA

[THIS PAGE LEFT INTENTIONALLY BLANK]



23-27 DECEMBER 2012
WS_B Data
Wind Rose
0.0%
10.0%
20.0%
30.0%
40.0%
50.0%
60.0%
70.0%
40-44
35-39
30-34
25-29
20-24
15-19


23-27 DECEMBER 2012
WS_G Data
Wind Rose
1
357
353
349
345
341
337
333
329
325
321
317
313
309
305
301
297
293
289
285
281
277
273
269
265
261
257
253
249
245
241
237
233
229
225
221
217
213
209
205
201
197
193
189
185
70.0%
60.0%
50.0%
40.0%
30.0%
20.0%
10.0%
0.0%



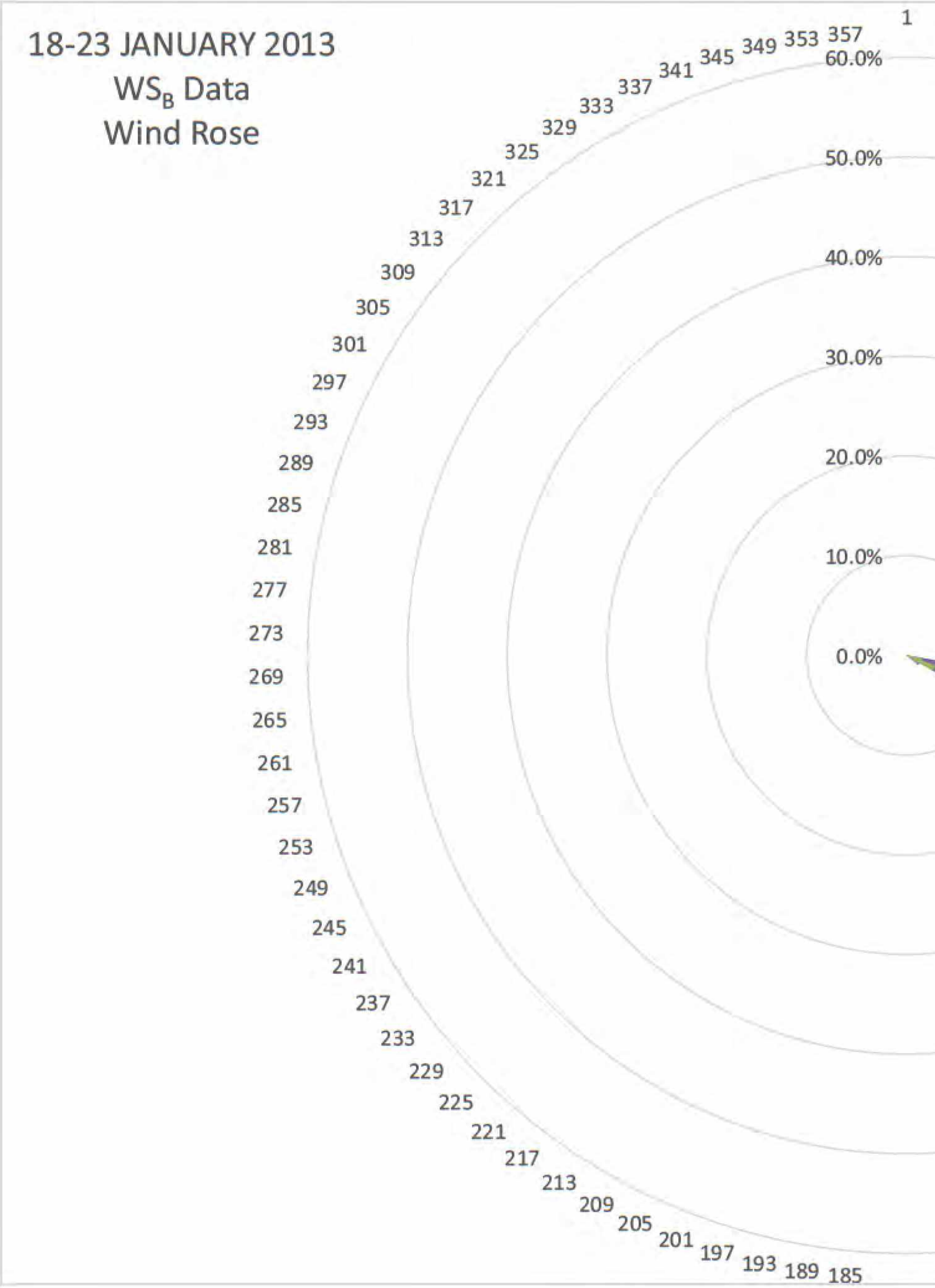
5
9
13
17
21
25
29
33
37
41
45
49
53
57
61
65
69
73
77
81
85
89
93
97
101
105
109
113
117
121
125
129
133
137
141
145
149
153
157
161
165
169
173
177
55-60
50-54
45-49
40-44
35-39
30-34
25-29

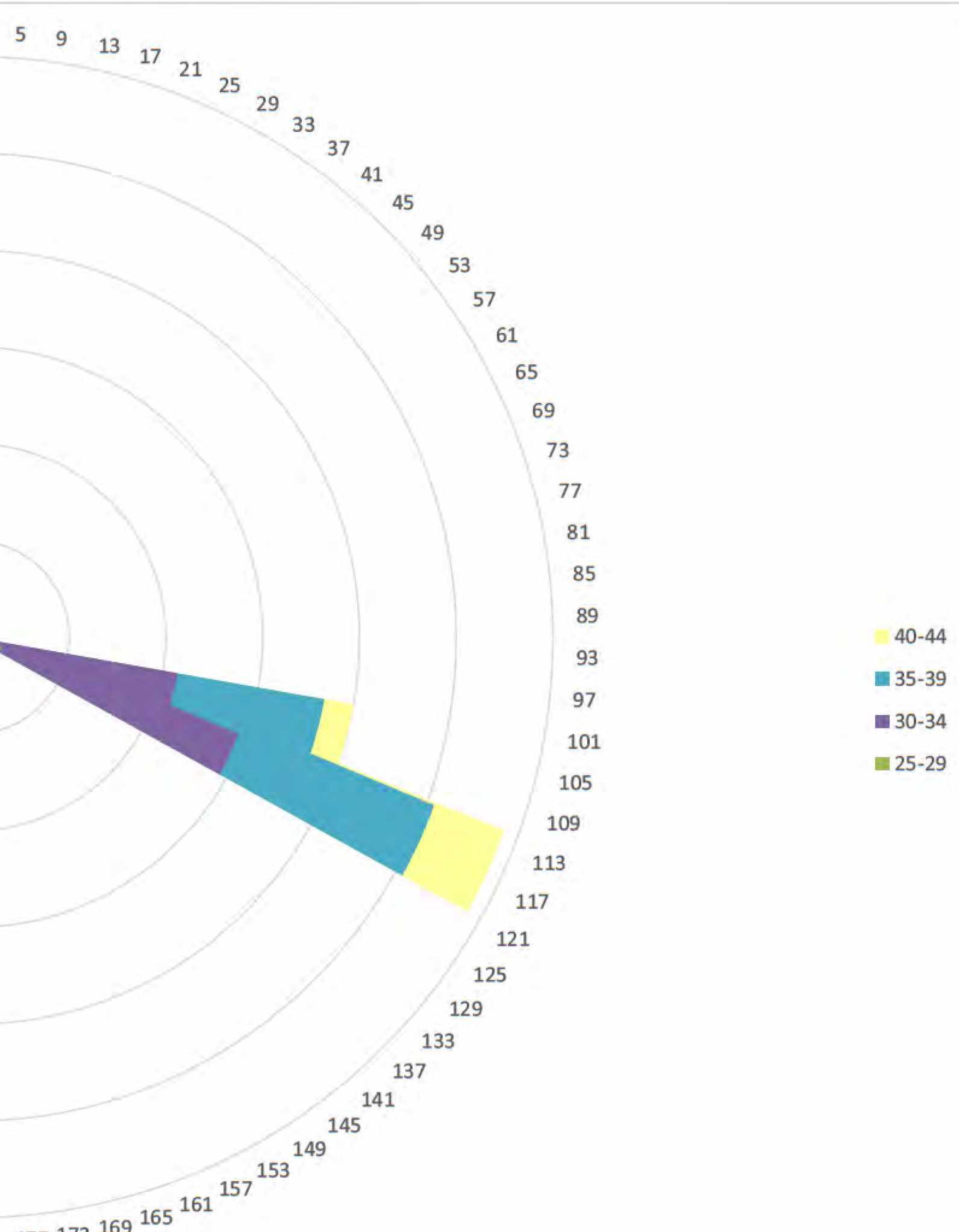
Date	Time	WD	WS(B)	WS(G)
20121223	1853	100	32	44
20121223	1953	100	38	54
20121223	2053	100	25	43
20121223	2153	100	22	34
20121223	2253	120	25	30
20121223	2353	110	26	45
20121224	53	110	30	43
20121224	153	110	36	47
20121224	253	110	32	49
20121224	353	110	36	45
20121224	453	110	33	45
20121224	553	110	37	51
20121224	629	110	40	53
20121224	653	110	40	54
20121224	740	100	39	52
20121224	753	110	40	54
20121224	819	110	40	56
20121224	853	100	38	47
20121224	932	110	39	47
20121224	941	110	39	54
20121224	953	110	37	52
20121224	1053	110	37	55
20121224	1100	110	32	55
20121224	1108	110	36	45
20121224	1114	110	40	53
20121224	1123	110	32	48
20121224	1153	100	34	47
20121224	1253	100	26	39
20121224	1353	100	34	46
20121224	1453	100	41	51
20121224	1553	100	38	52
20121224	1653	110	36	48
20121224	1753	100	33	47
20121224	1853	100	31	46
20121224	1953	100	34	47
20121224	2053	100	33	49
20121224	2153	110	39	52
20121224	2253	100	36	51
20121224	2353	100	34	43
20121225	53	100	33	48
20121225	153	110	29	45
20121225	253	100	29	44
20121225	353	110	34	47
20121225	453	100	37	52
20121225	553	100	33	51
20121225	653	100	37	48
20121225	753	100	39	51
20121225	853	110	34	49

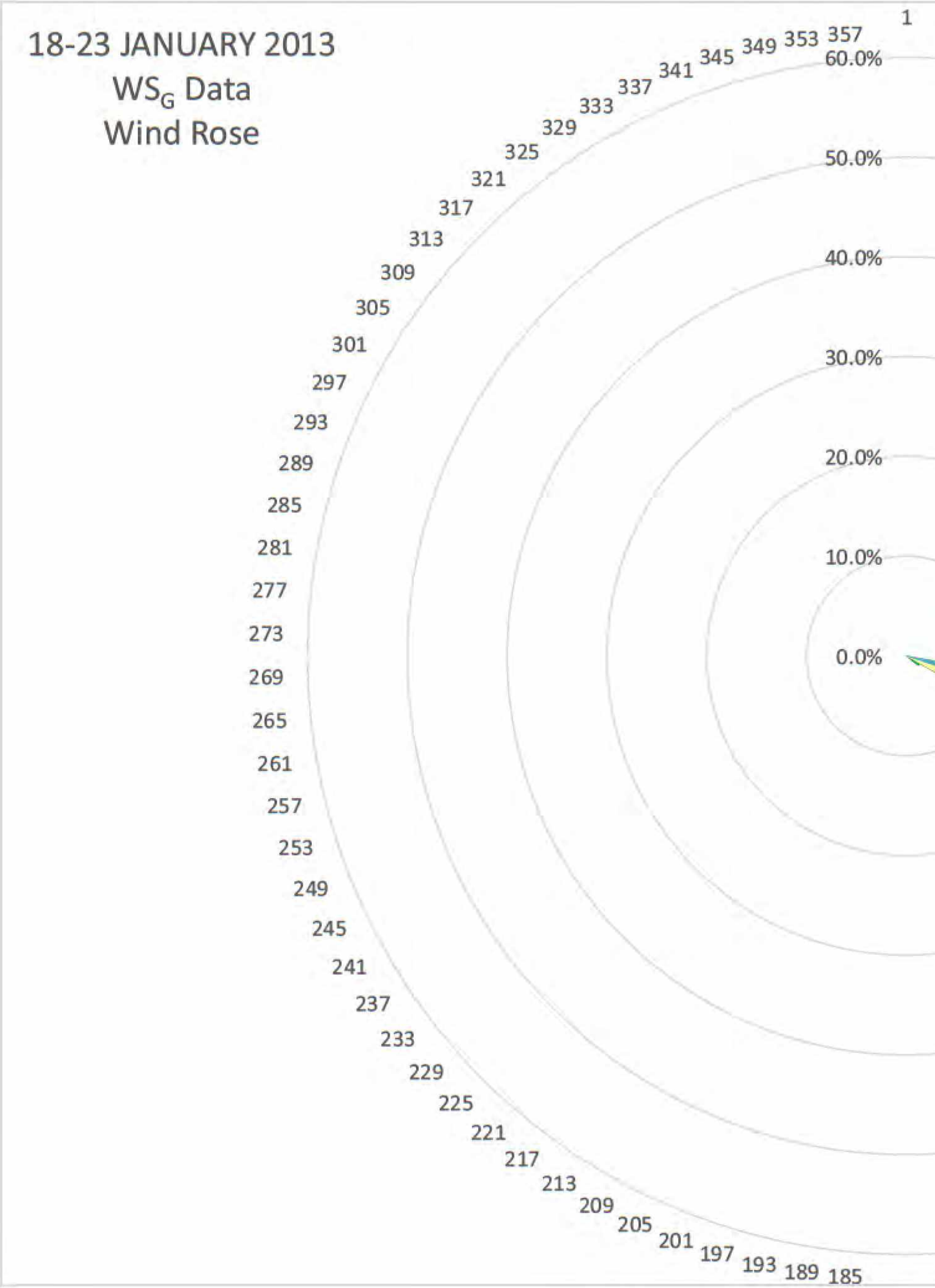
WDMode	110
WDRange	
Min	100
Max	120
Avg WSb	33
Max WSb	41
Avg WSg	46
Max WSg	58

20121225	953	110	37	58
20121225	1053	110	40	53
20121225	1153	100	39	53
20121225	1253	100	36	58
20121225	1353	100	41	48
20121225	1453	110	32	44
20121225	1553	110	40	51
20121225	1653	110	40	53
20121225	1753	110	29	48
20121225	1853	110	36	51
20121225	1953	100	34	44
20121225	2053	110	28	36
20121225	2127	100	28	44
20121225	2153	110	29	41
20121225	2253	110	29	44
20121225	2353	110	33	45
20121226	53	110	36	48
20121226	153	110	30	43
20121226	253	110	32	43
20121226	353	110	31	40
20121226	453	110	30	41
20121226	553	110	30	38
20121226	653	110	32	44
20121226	753	110	29	43
20121226	853	110	31	46
20121226	953	110	31	43
20121226	1053	110	31	46
20121226	1153	100	34	44
20121226	1253	110	30	43
20121226	1353	100	32	43
20121226	1453	110	32	44
20121226	1553	110	34	46
20121226	1653	110	34	47
20121226	1753	110	38	48
20121226	1853	110	32	48
20121226	1953	110	39	48
20121226	2053	120	37	52
20121226	2153	100	37	54
20121226	2253	110	34	51
20121226	2353	100	39	53
20121227	53	110	36	48
20121227	153	110	33	47
20121227	253	110	34	43
20121227	353	110	30	43
20121227	453	110	32	45
20121227	553	110	28	43
20121227	653	110	30	39
20121227	753	110	31	39
20121227	853	110	32	41

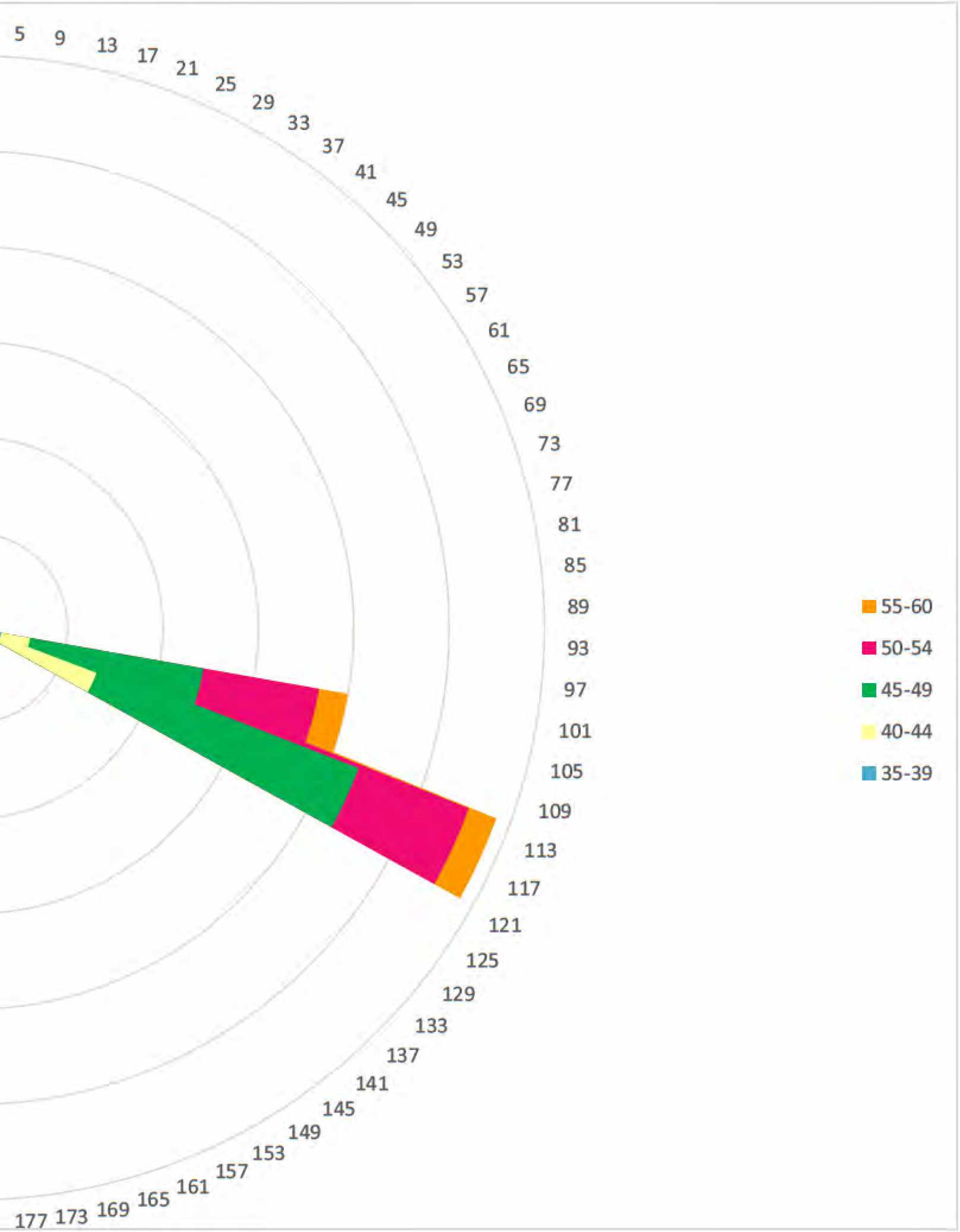
20121227	953	110	28	38
20121227	1053	110	24	33
20121227	1153	110	18	29
20121227	1253	110	21	29


18-23 JANUARY 2013
WS_B Data
Wind Rose
1
357
353
349
345
341
337
333
329
325
321
317
313
309
305
301
297
293
289
285
281
277
273
269
265
261
257
253
249
245
241
237
233
229
225
221
217
213
209
205
201
197
193
189
185
60.0%
50.0%
40.0%
30.0%
20.0%
10.0%
0.0%


5
9
13
17
21
25
29
33
37
41
45
49
53
57
61
65
69
73
77
81
85
89
93
97
101
105
109
113
117
121
125
129
133
137
141
145
149
153
157
161
165
169
173
177
40-44
35-39
30-34
25-29



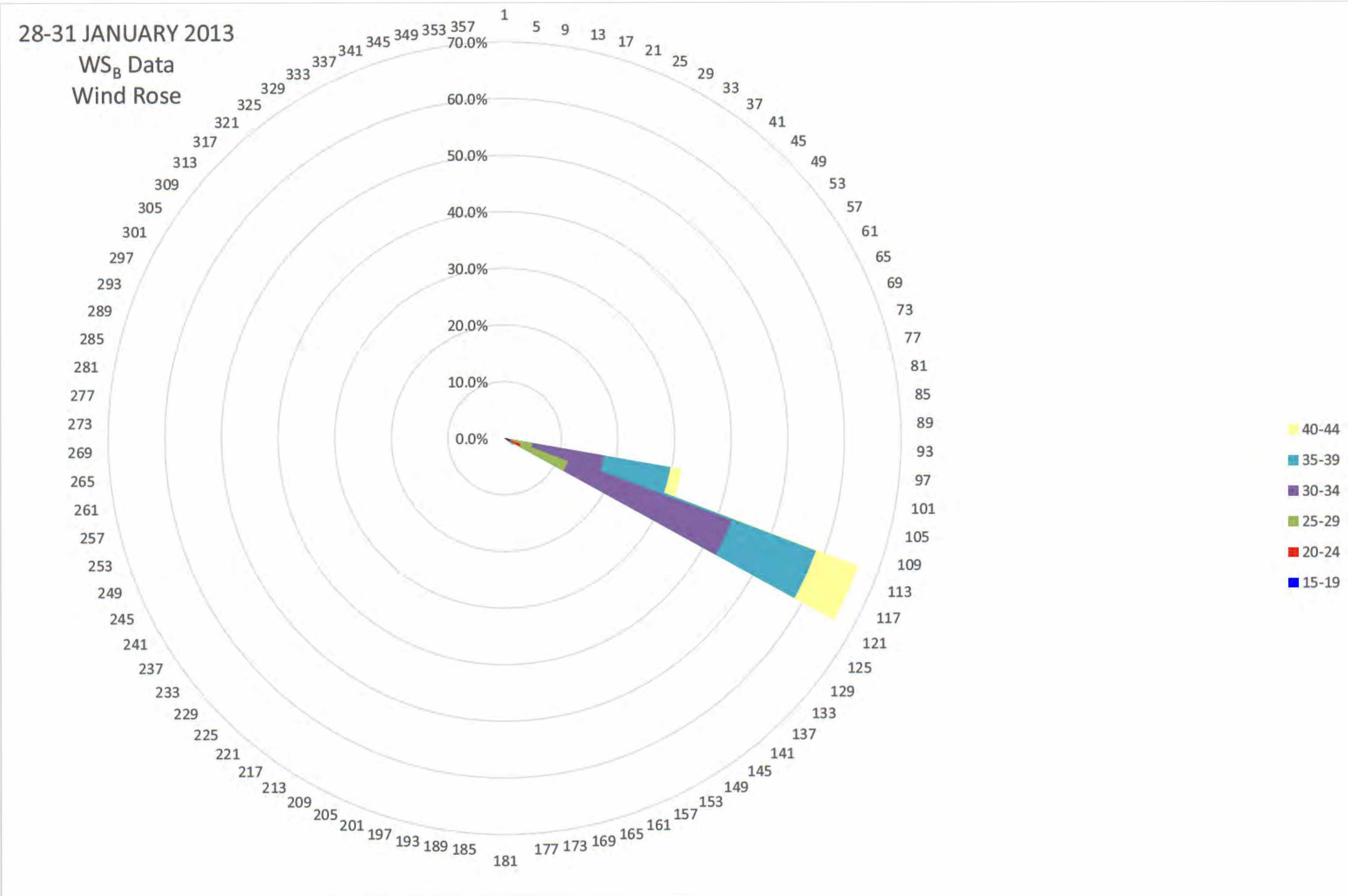
18-23 JANUARY 2013
WS_G Data
Wind Rose
1
357
353
349
345
341
337
333
329
325
321
317
313
309
305
301
297
293
289
285
281
277
273
269
265
261
257
253
249
245
241
237
233
229
225
221
217
213
209
205
201
197
193
189
185
60.0%
50.0%
40.0%
30.0%
20.0%
10.0%
0.0%


5
9
13
17
21
25
29
33
37
41
45
49
53
57
61
65
69
73
77
81
85
89
93
97
101
105
109
113
117
121
125
129
133
137
141
145
149
153
157
161
165
169
173
177
55-60
50-54
45-49
40-44
35-39

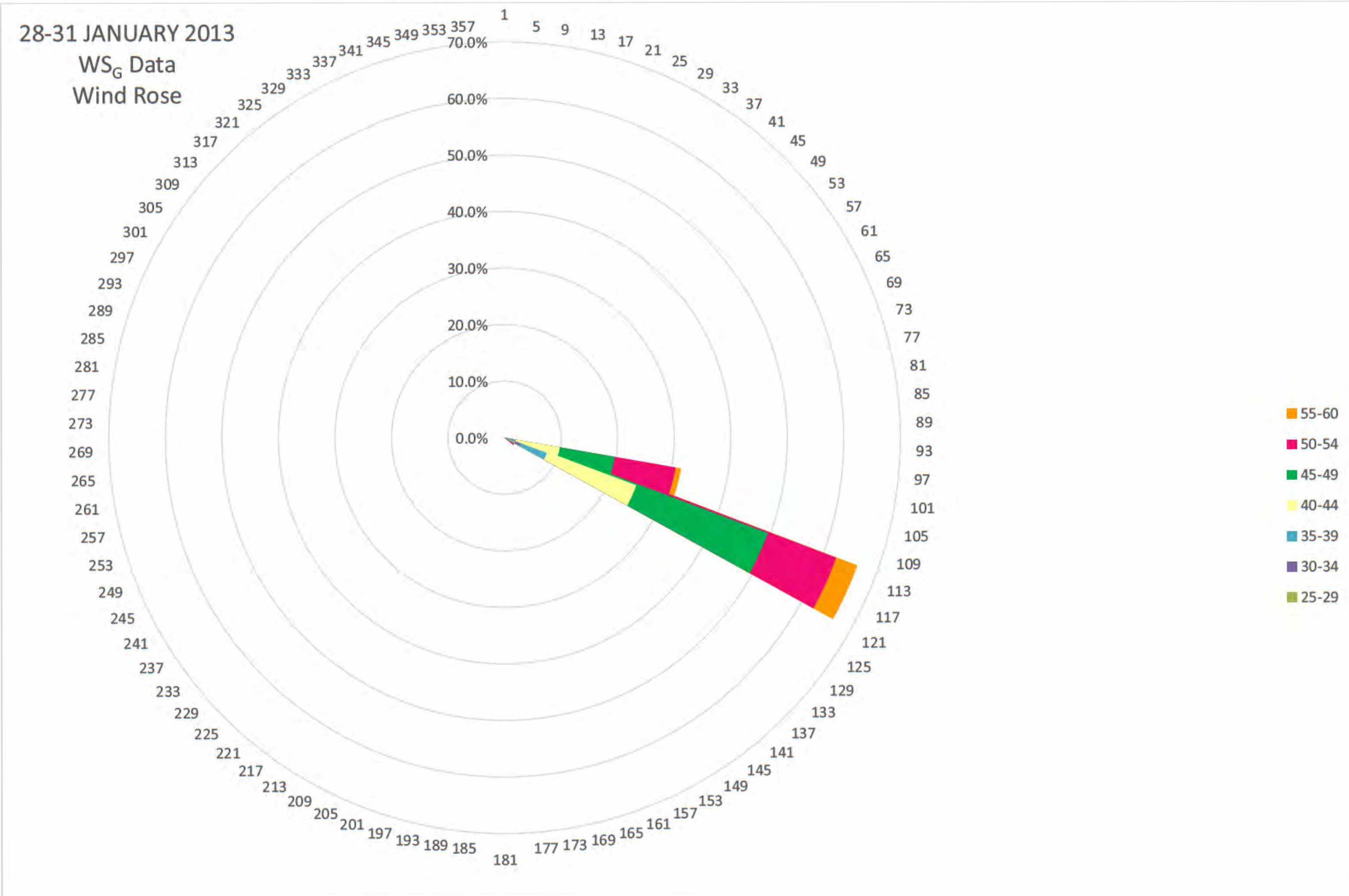
Date	Time	WD	WS(B)	WS(G)
20130118	2330	110	34	43
20130118	2348	100	30	38
20130118	2353	100	30	38
20130119	26	110	34	44
20130119	48	110	28	40
20130119	53	110	29	44
20130119	104	110	40	51
20130119	122	110	37	51
20130119	140	120	37	49
20130119	151	110	36	48
20130119	153	110	32	48
20130119	217	110	38	47
20130119	227	110	36	51
20130119	244	110	38	46
20130119	251	100	33	47
20130119	253	100	33	47
20130119	324	100	36	49
20130119	353	100	34	47
20130119	453	100	33	43
20130119	553	100	34	52
20130119	620	110	33	45
20130119	651	100	33	49
20130119	653	100	31	46
20130119	751	110	36	48
20130119	753	110	39	49
20130119	810	100	33	47
20130119	853	110	30	41
20130119	953	110	34	44
20130119	1011	110	38	47
20130119	1036	110	33	44
20130119	1053	100	29	44
20130119	1128	110	37	53
20130119	1153	110	41	54
20130119	1218	110	33	51
20130119	1241	110	37	45
20130119	1253	110	33	41
20130119	1353	110	31	46
20130119	1413	110	30	48
20130119	1428	110	32	47
20130119	1453	110	31	46
20130119	1553	100	32	51
20130119	1653	110	33	44
20130119	1753	110	31	47
20130119	1853	110	34	49
20130119	1953	100	38	49
20130119	2053	110	36	52
20130119	2150	100	38	51
20130119	2153	100	38	47

WDMode	110
WDRange	
Min	100
Max	120
Avg WSb	35
Max WSb	43
Avg WSg	48
Max WSg	60

20130119	2253	100	38	47
20130119	2353	100	38	51
20130120	53	110	43	60
20130120	153	100	39	54
20130120	253	100	40	56
20130120	307	110	40	53
20130120	318	110	43	55
20130120	335	100	37	55
20130120	353	100	38	51
20130120	453	100	40	54
20130120	553	100	34	52
20130120	653	100	37	47
20130120	753	110	33	45
20130120	853	110	37	47
20130120	953	110	36	47
20130120	1053	110	36	45
20130120	1153	100	30	47



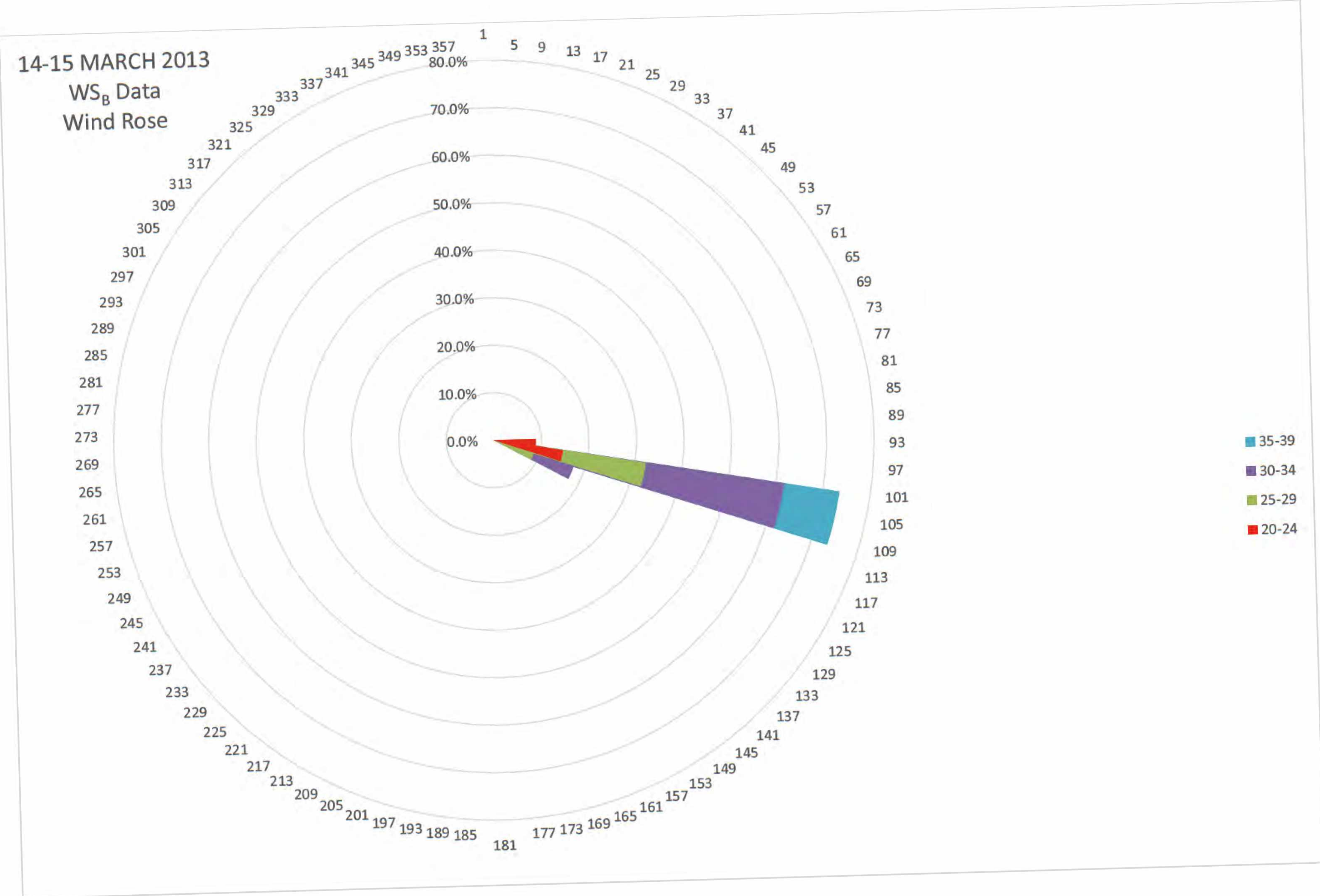
28-31 JANUARY 2013
WS$_B$ Data
Wind Rose
0.0%
10.0%
20.0%
30.0%
40.0%
50.0%
60.0%
70.0%
1
5
9
13
17
21
25
29
33
37
41
45
49
53
57
61
65
69
73
77
81
85
89
93
97
101
105
109
113
117
121
125
129
133
137
141
145
149
153
157
161
165
169
173
177
181
185
189
193
197
201
205
209
213
217
221
225
229
233
237
241
245
249
253
257
261
265
269
273
277
281
285
289
293
297
301
305
309
313
317
321
325
329
333
337
341
345
349
353
357
40-44
35-39
30-34
25-29
20-24
15-19

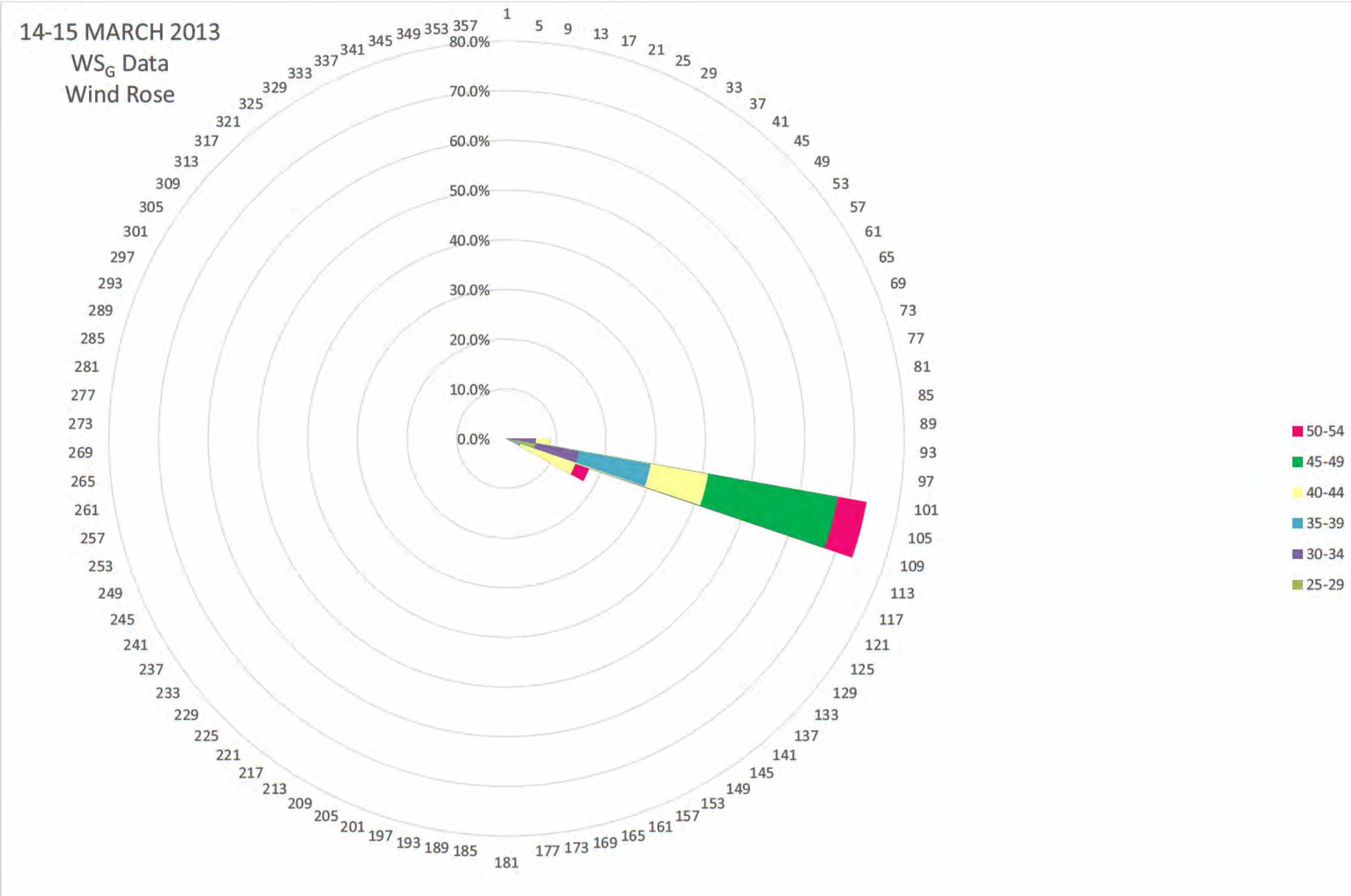

28-31 JANUARY 2013
WS_G Data
Wind Rose
70.0%
60.0%
50.0%
40.0%
30.0%
20.0%
10.0%
0.0%
55-60
50-54
45-49
40-44
35-39
30-34
25-29

Date	Time	WD	WS(B)	WS(G)
20130128	1853	110	32	43
20130128	1953	100	33	43
20130128	2053	100	33	45
20130128	2133	100	32	49
20130128	2140	110	32	49
20130128	2150	100	33	46
20130128	2153	100	31	43
20130128	2202	100	33	46
20130128	2223	100	37	49
20130128	2253	110	34	48
20130128	2326	110	34	47
20130128	2334	110	28	44
20130128	2351	110	36	46
20130128	2353	110	38	46
20130129	11	100	37	51
20130129	53	110	31	45
20130129	118	110	41	54
20130129	144	100	43	54
20130129	153	110	41	56
20130129	203	110	45	55
20130129	217	110	41	55
20130129	253	100	36	52
20130129	302	100	33	49
20130129	314	100	38	52
20130129	336	110	37	47
20130129	353	110	34	48
20130129	402	110	34	48
20130129	410	100	38	49
20130129	428	110	33	49
20130129	434	110	33	46
20130129	451	110	31	47
20130129	453	110	31	47
20130129	502	110	29	47
20130129	509	110	37	48
20130129	542	100	34	44
20130129	553	110	30	52
20130129	648	110	33	48
20130129	651	110	32	46
20130129	653	110	29	45
20130129	745	110	30	41
20130129	753	110	29	43
20130129	853	110	28	46
20130129	953	120	29	41
20130129	1053	110	29	41
20130129	1153	120	33	43
20130129	1253	110	31	39
20130129	1353	110	25	34
20130129	1453	110	28	36

WDMode	110
WDRange	
Min	100
Max	120
Avg WSb	32
Max WSb	45
Avg WSg	44
Max WSg	56

20130129	1553	110	21	33
20130129	1653	110	23	34
20130129	1753	110	26	36
20130129	1853	110	29	41
20130129	1953	110	29	38
20130129	2053	110	31	40
20130129	2153	110	26	37
20130129	2253	110	26	39
20130129	2353	100	28	37
20130130	53	110	24	32
20130130	153	110	29	33
20130130	253	100	20	33
20130130	353	110	23	32
20130130	453	110	25	36
20130130	553	110	25	37
20130130	653	100	28	37
20130130	753	100	29	36
20130130	853	100	29	40
20130130	953	110	33	44
20130130	1053	110	28	44
20130130	1153	110	29	51
20130130	1253	100	32	43
20130130	1353	100	39	47
20130130	1453	110	33	46
20130130	1553	110	37	48
20130130	1653	110	37	48
20130130	1753	100	37	47
20130130	1853	100	33	44
20130130	1953	110	26	40
20130130	2053	100	29	38
20130130	2153	100	28	37


14-15 MARCH 2013
WS_B Data
Wind Rose
80.0%
70.0%
60.0%
50.0%
40.0%
30.0%
20.0%
10.0%
0.0%
35-39
30-34
25-29
20-24


14-15 MARCH 2013
WS_G Data
Wind Rose
80.0%
70.0%
60.0%
50.0%
40.0%
30.0%
20.0%
10.0%
0.0%
1
5
9
13
17
21
25
29
33
37
41
45
49
53
57
61
65
69
73
77
81
85
89
93
97
101
105
109
113
117
121
125
129
133
137
141
145
149
153
157
161
165
169
173
177
181
185
189
193
197
201
205
209
213
217
221
225
229
233
237
241
245
249
253
257
261
265
269
273
277
281
285
289
293
297
301
305
309
313
317
321
325
329
333
337
341
345
349
353
357
50-54
45-49
40-44
35-39
30-34
25-29

Date	Time	WD	WS(B)	WS(G)
20130314	653	100	30	45
20130314	753	110	32	44
20130314	853	100	37	47
20130314	953	110	33	51
20130314	1053	100	34	51
20130314	1153	100	34	49
20130314	1253	100	38	48
20130314	1353	100	28	40
20130314	1453	100	36	44
20130314	1553	100	36	45
20130314	1653	100	29	37
20130314	1753	100	25	36
20130314	1853	90	21	31
20130314	1953	90	23	30
20130314	2053	100	22	32
20130314	2153	100	22	32
20130314	2253	100	22	29
20130314	2353	100	21	29
20130315	53	100	22	32
20130315	153	100	26	38
20130315	253	100	31	39
20130315	353	100	26	38
20130315	453	110	28	39
20130315	553	100	29	40
20130315	653	100	31	48
20130315	753	110	29	40
20130315	853	100	32	44
20130315	953	100	33	49
20130315	1053	100	33	52
20130315	1153	100	34	45
20130315	1253	100	30	49
20130315	1353	90	24	40
20130315	1453	110	33	44
20130315	1553	110	25	44

WDMode	100
WDRange	
Min	90
Max	110
Avg WSb	29
Max WSb	38
Avg WSg	41
Max WSg	52

APPENDIX C

WOODRUFF & SIDDOWAY

1965

[THIS PAGE LEFT INTENTIONALLY BLANK]

Published September, 1965

A Wind Erosion Equation[1]

N. P. Woodruff and F. H. Siddoway[2]

ABSTRACT

The amount of erosion, E, expressed in tons per acre per annum, that will occur from a given agricultural field can be expressed in terms of equivalent variables as: E = f(I′, K′, C′, L′, V) where I′ is a soil erodibility index, K′ is a soil ridge rougness factor, C′ is a climatic factor, L′ is field length along the prevailing wind erosion direction, and V is equivalent quantity of vegetative cover. The 5 equivalent variables are obtained by grouping some and converting others of the 11 primary variables now known to govern wind erodibility. Relations among variables are extremely complex. Charts and tables have been developed to permit graphical solutions of the equation. The equation is designed to serve the twofold purpose of providing a tool to (i) determine the potential erosion from a particular field, and (ii) determine what field conditions of soil cloddiness, roughness, vegetative cover, sheltering by barriers, or width and orientation of field are necessary to reduce potential erosion to a tolerable amount. Examples of these applications of the equation are presented. Weaknesses in the equation and areas needing further research are discussed.

The wind erosion equation was developed by the late Dr. W. S. Chepil. It is the result of nearly 30 years of research to determine the primary variables or factors that influence erosion of soil by wind.

The first wind erosion equation was a simple exponential expressing the amount of soil loss in a wind tunnel as a function of per cent soil cloddiness, amount of surface residue, and degree of surface roughness. The equation has been modified continually as new research data became available and now is a complex equation indicating the relation between potential soil loss from a field and some 11 individual primary field and climatic variables.

The equation is designed to serve the twofold purpose of determining (i) if a particular field is adequately protected from wind erosion, and (ii) the different field conditions of cloddiness, roughness, vegetative cover, sheltering from wind barriers, or width and orientation of field required to reduce potential soil loss to a tolerable amount under different climates.

This paper discusses the present status of the equation, points out some applications and uses of the equation, and indicates some weaknesses and areas needing further research.

PRIMARY WIND EROSION VARIABLES

The wind erodibility of land surfaces is governed by 11 primary variables. A brief description of each follows.

Soil Erodibility Index, I, and Knoll Erodibility, I_s

Soil erodibility, I, is the potential soil loss in tons per acre per annum from a *wide, unsheltered,* isolated field with a *bare, smooth,* noncursted surface. It has been developed from wind tunnel and field measures of erodibility and is based on climatic conditions for the vicinity of Garden City, Kans., during 1954–56 (4, 7, 8, 9, 10). It is related to soil cloddiness and its value increases as the percentage of soil fractions greater than 0.84 mm in diameter decreases. It can be determined by standard dry sieving procedure and use of Table 1.

Knoll erodibility, I_s, is a factor needed to compute erodibility for windward slopes less than about 500 feet long. It varies with slope and is expressed in terms of per cent slope, Fig. 1. The erosion rate for windward slopes longer than 500 feet is about the same as from level land; therefore, I_s is taken as 100% for this situation (13, 14).

Surface Crust Stability, F_s

The mechanical stability of the surface crust, F_s, if a crust is present, is of little consequence because it disintegrates readily due to abrasion after wind erosion has started.

Table 1—Soil erodibility I for soils with different percentages of nonerodible fractions as determined by standard dry sieving*

Percentage of dry soil fractions > 0.84 mm	Units									
	0	1	2	3	4	5	6	7	8	9
tens	tons/acre									
0	---	310	250	220	195	180	170	160	150	140
10	134	131	128	125	121	117	113	109	106	102
20	98	95	92	90	88	86	83	81	79	76
30	74	72	71	69	67	65	63	62	60	58
40	56	54	52	51	50	48	47	45	43	41
50	38	36	33	31	29	27	25	24	23	22
60	21	20	19	18	17	16	16	15	14	13
70	12	11	10	8	7	6	4	3	3	2
80	2	---	---	---	---	---	---	---	---	---

* For a fully crusted soil surface, regardless of soil texture, the erodibility I is, on the average, about 1/6 of that shown.

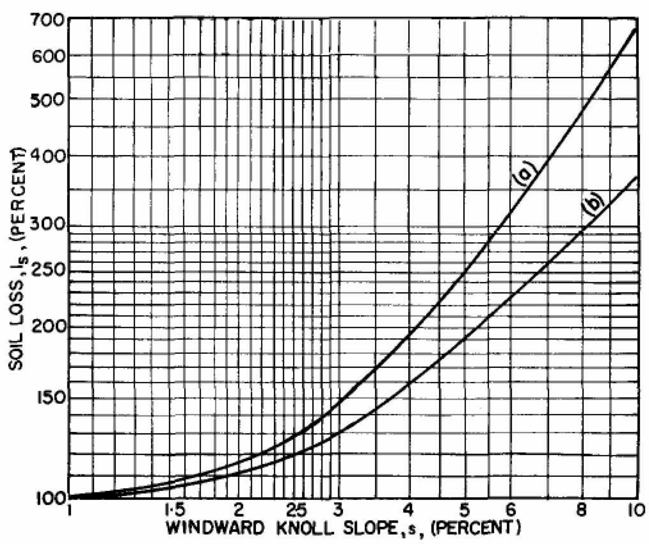


Fig. 1—Potential soil loss from knolls, expressed as per cent of that on level ground: (*a*) from top of knoll, (*b*) from that portion of windward slope where drag velocity and wind drag are the same as on top of knoll (from about the upper third of the slope).

[1] Contribution from the Soil and Water Conservation Research Division, ARS, USDA, and the Kansas Agr. Exp. Sta., Department of Agronomy Contribution no. 897. Received Jan. 6, 1965. Approved Mar. 30, 1965.

[2] Agricultural Engineer, USDA, Manhattan, Kan., and Soil Scientist, USDA, Sidney, Mont., respectively.

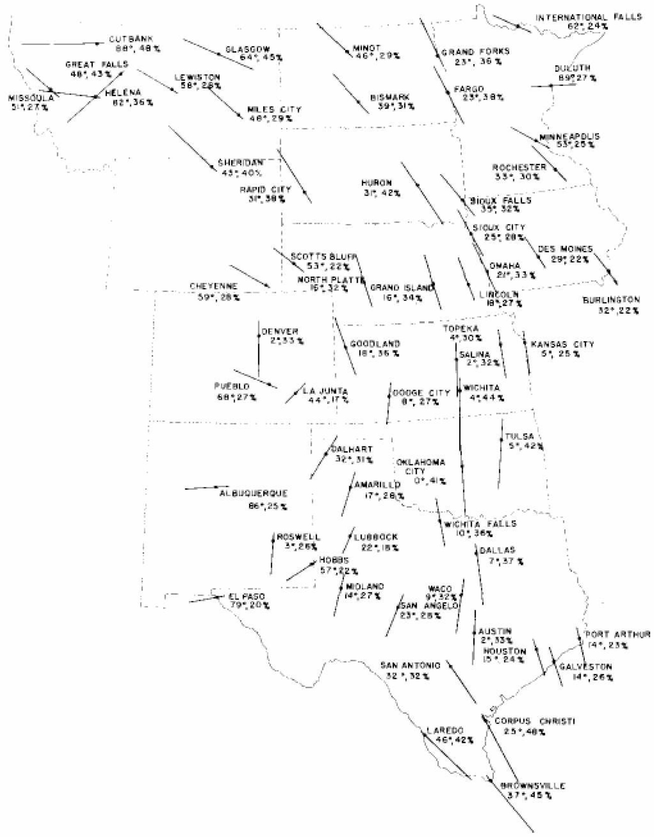


Fig. 2—Prevailing wind erosion directions in the Great Plains. Degrees indicate deviation of the prevailing wind erosion direction from north-south and percentages indicate per cent of erosion that occurs along that direction.

It is also transitory and would be significant only where erodibility of a field at a given moment is considered. Where the average erodibility for the entire soil drifting period is being determined, which is usually the case, this condition should be disregarded.

Soil Ridge Roughness, K_r

K_r is a measure of soil surface roughness other than that caused by clods or vegetation, i.e., it is the natural or artificial roughness of the soil surface in the form of ridges or small undulations. It can be determined from a linear measure of surface roughness.

Velocity of Erosive Wind, v

The rate of soil movement varies directly as the cube of the wind velocity (2, 3, 17). Where average annual soil loss determinations are desired, the mean annual wind velocity corrected to a standard height of 30 feet is used. Atmospheric wind velocities are normally distributed; thus the higher the mean annual velocity the greater the probability of receiving high winds.

Soil Surface Moisture, M

The rate of soil movement varies approximately inversely as the square of effective surface soil moisture (5). Since detailed surface soil moisture is not generally available for different geographic locations, the wind erosion equation M is assumed to be proportional to the Thornthwaite P-E Index (15).

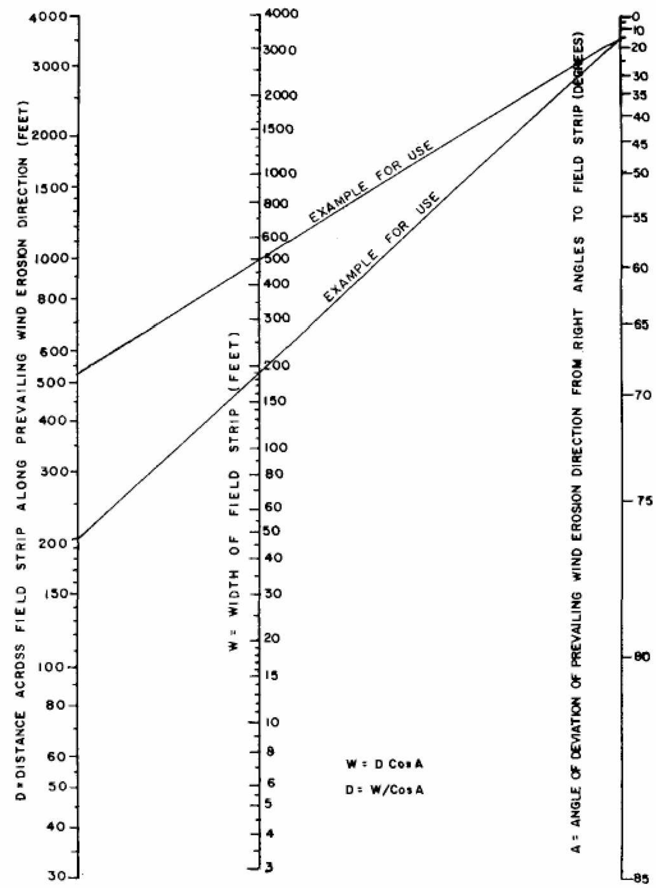


Fig. 3—Alignment chart to determine: (i) distance across field strip along the prevailing wind erosion direction from width of field strip and prevailing wind erosion direction, and (ii) width of field strip from prevailing wind erosion direction and distance across field strip along prevailing wind erosion direction.

Distance Across Field, D_f

D_f is the total distance across a given field measured along the prevailing wind erosion direction. On an unprotected, eroding field the rate of soil flow is zero on the windward edge and increases with distance to leeward until, if the field is large enough, the flow reaches a maximum that a wind of a particular velocity can sustain. The distance required for soil flow to reach this maximum on a given soil is the same for any erosive winds. It varies only and inversely with erodibility of a field surface (11). It can be computed from width of field if prevailing wind erosion direction is known (6). Figure 2 provides data on prevailing wind erosion direction in the Great Plains (12). Similar maps giving this information for other geographc locations are being prepared. Figure 3 presents an alignment chart for determining the distance, D_f, along the wind direction for different widths of fields.

Sheltered Distance, D_b

D_b is the distance along the prevailing wind erosion direction that is sheltered by a barrier, if any, adjoining the field. Data on the effectiveness of different kinds of barriers in shielding the soil surface from erosion are meager but the distance is presently determined in a very general way by multiplying the height of the barrier by 10 (16).

Quantity of Vegetative Cover, R′

Surface residue amounts are determined by sampling, cleaning, drying, and weighing in accordance with Agricultural Research Service standardized procedure.[3] All quantities of vegetative residue, R′, connected with the wind erosion equation are based on washed, ovendry residue multiplied by 1.2 to make them comparable to the usual field measurements where samples are drycleaned and air-dried.

Kind of Vegetative Cover, S

S is a factor denoting the total cross-sectional area of the vegetative material. The finer the material and the greater its surface area, the more it reduces the wind velocity and the more it reduces wind erosion.

Assigned values of S for different kinds of vegetative material so far investigated are:

Small grain stubble and stover	1.00
Sorghum stubble and stover	.25
Corn stubble and stover	.20
Small grain in seedling and stooling stage, dead or alive	2.50

Orientation or Vegetative Cover Variable, K_o

K_o is in effect the vegetative surface roughness variable. The more erect the vegetative matter, the higher it stands above the ground, the more it slows the wind velocity near the ground, and the lower is the rate of soil erosion. K_o includes the influence of distribution and location of vegetation such as width and direction of rows, uniformity of distribution, and whether the vegetation is in a furrow or on a ridge. K_o has been assigned a value of 1.0 for absolutely flat, small grain stubble with straw aligned parallel with wind direction on smooth ground in rows 10 inches apart at right angles to wind direction. For other orientations and other residues, K_o varies as a power function of amount of residue, R′, for values of R′ greater than 1,000 lb/acre. The exponent ranges from approximately 0.5 for flattened small grain or sorghum to 0.25 for standing small grain and 20-inch-high sorghum. In the equation the variable, K_o, is combined with variables S and R′ and expressed in terms of an equivalent vegetative factor which is discussed in a subsequent section of this paper.

[3] Committee Report, July 1962. A standardized procedure for residue sampling. ARS 41-68. 10 p.

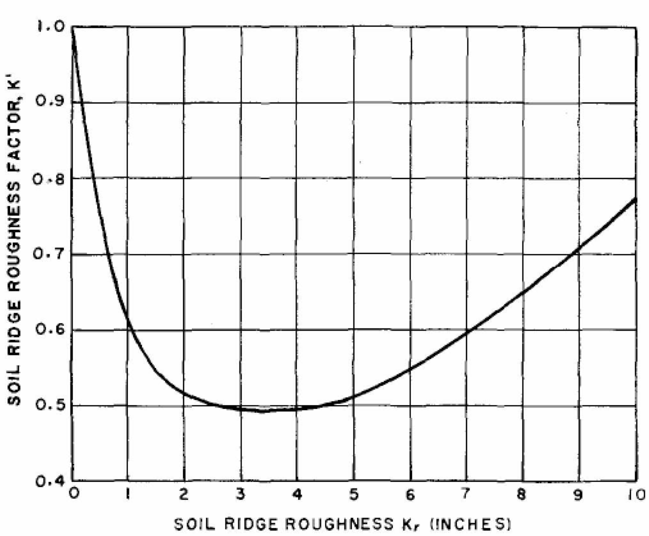


Fig. 4—Chart to determine soil ridge roughness factor K′ from the soil ridge roughness K_r.

EQUIVALENT WIND EROSION VARIABLES

Because of the nature of the relationship between soil erodibility, E, and some of the 11 primary variables, it has been found convenient to disregard some variables, group some, and convert others to equivalents as follows:

Soil erodibility, I Knoll erodibility, I_s	Soil and knoll erodibility, I′
Surface crust stability, F_s	Disregard, crust transient
Soil ridge roughness, K_r	Soil ridge roughness factor, K′
Wind velocity, v Surface soil moisture, M	Local wind erosion climatic factor, C′
Distance across field, D_f Sheltered distance, D_b	Field length, L′
Quantity of vegetative cover, R′ Kind of vegetative cover, S Orientation of vegetative cover, K_o	Equivalent quantity of vegetative cover, V

Soil and knoll erodibility, I′, is obtained simply by multiplying soil erodibility, I, (Table 1) by knoll erodibility, I_s, (Fig. 1) if a knoll or hill is involved. For level land or slopes longer than 500 feet, I_s is equal to 100%; therefore, I = I′.

The soil ridge roughness factor, K′, is expressed in terms of height of standard soil ridges spaced at right

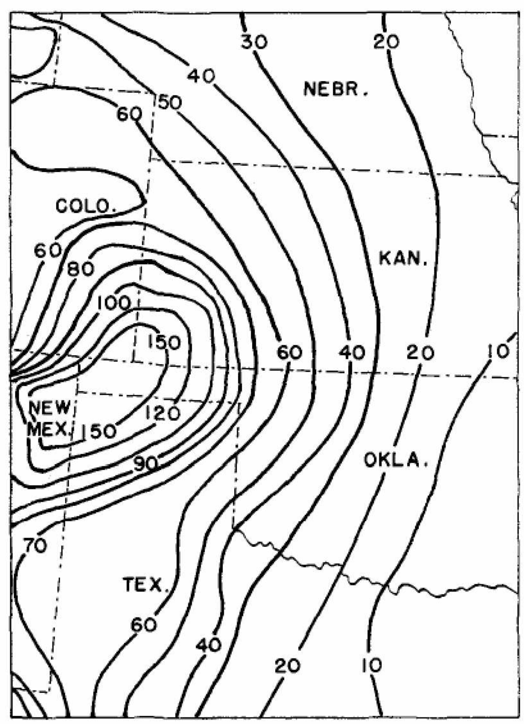


Fig. 5—Wind erosion climatic factor C′ (per cent) for Kansas and parts of Nebraska, Colorado, Oklahoma, New Mexico, and Texas. Similar maps for other parts of the USA are available from the Erosion Research Laboratory at Manhattan, Kans.

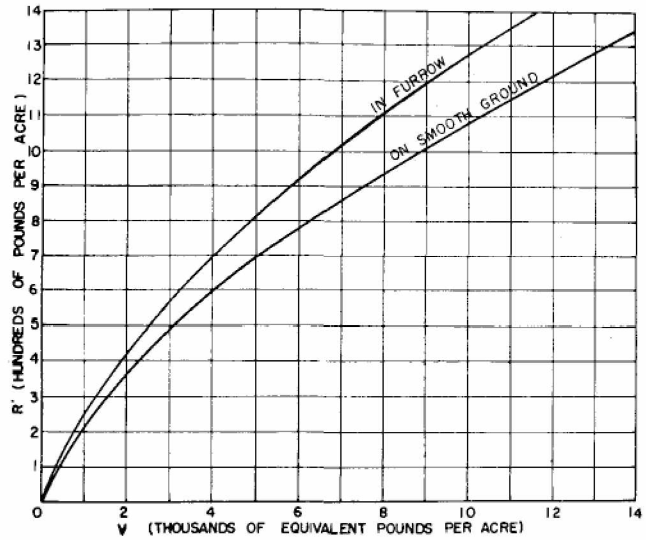


Fig. 6—Chart to determine V from R′ or R′ from V of live or dead small grain crops in seedling and stooling stage, above the surface of the ground, for crop in 3-inch-deep furrow (as created by a deep furrow drill) and on smooth ground.

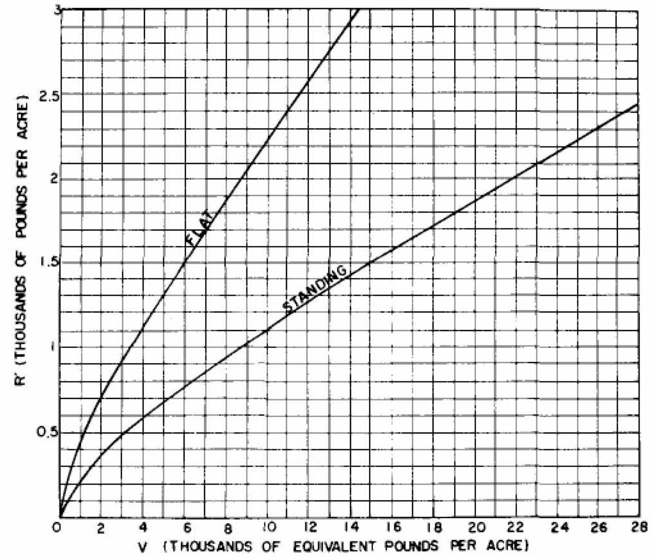


Fig. 7—Chart to determine V from R′ or R′ from V of standing and flat anchored small grain stubble with any row width up to 10 inches, including stover.

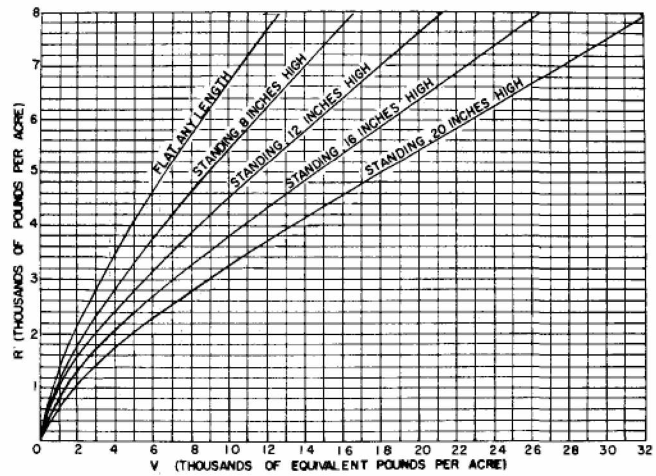


Fig. 8—Chart to determine V from R′ or R′ from V of standing and flat grain sorghum stubble of average stalk thickness, leafiness, and quantity of tops on the ground.

angles to the wind and with a height-spacing ratio of 1:4 (18). The rate of soil flow varies with ridge height, degree of cloddiness of ridges, and wind velocity (1). The relationship between soil flow and ridge height, within prescribed limits, follows an approximate catenary curve. Ridges 2 to 4 inches high are most effective in controlling erosion. Rate of flow increases with ridges greater than 4 inches or less than 2 inches high. Figure 4 presents a curve for obtaining the equivalent soil ridge roughness factor, K′, from a measure of K_r. The curve is based on a design velocity of 50 miles/hour at 50-foot height with wind direction at 45 degress to the ridges.

The local wind erosion climatic factor, C′, has been developed from the relationship stating that rate of soil flow varies directly as the cube of the wind velocity and inversely as the square of the effective moisture or for reasons stated previously, the P-E index. The climatic factor was computed from the equation

$$C' = 34.483 \frac{v^3}{(P\text{-}E)^2} \qquad [1]$$

where v = mean annual wind velocity for a particular geographic location corrected to a standard height of 30 feet and P-E = Thornthwaite's P-E ratio = 10(P/E) = $115(P/T - 10)^{1.111}$. Factor C′ has been computed for many locations throughout the USA. A map giving general ranges of values of C′ for the western half of the USA will be found in a previous publication (10). Detailed maps have also been prepared and are available from the Erosion Research Laboratory at Manhattan, Kans. Figure 5 is such a map for the center of the "dust bowl" area of the 1930's.

The equivalent field length, L′, is the unsheltered distance across the field along the prevailing wind erosion direction, thus $L' = D_f - D_b$.

The equivalent vegetative cover variable, V, is obtained by multiplying the variables R′, S, and $K_o = f(R')$ together. Values of V have been computed for various kinds and amounts of residue and are presented in Fig. 6, 7, and 8.

RELATIONSHIPS BETWEEN VARIABLES

The general functional relationship between the dependent variable, E, the potential average annual soil loss in tons per acre per annum, and the equivalent variables may be expressed as

$$E = f(I', C', K', L', V). \qquad [2]$$

Mathematical relationships have been established between individual variables. However, because of the complexity of these relations, e.g., the relation between E and V is an exponential equation of the form $E = f(e^V)$ while that between E and L′ is a power equation of the form $E = f(L' - b)^n$, a single equation expressing E as a function of the 5 dependent variables has not yet been derived. The equation can be solved in the following 5 steps, the latter 2 involving graphical solutions, with each step evaluating the effect of an additional variable.

Step 1—Determine erodibility $E_1 = I'$ that would occur from a wide, isolated, smooth, unsheltered, bare field having a determined percentage of dry aggregates greater than 0.84 mm in diameter and located under climatic conditions as at Garden City, Kans.

Step 2—Account for effect of roughness, K′, and find erodibility $E_2 = I' \times K'$.

Step 3—Account for effect of local wind velocity and surface soil moisture, C′, and find erodibility $E_3 = I' \times K' \times C'$.

Step 4—Account for effect of length of field, L′, and determine $E_4 = I' \times K' \times C' \times f(L')$. Determination of E_4 is not a simple multiplication because L′, I′K′C′, and I′K′ are all interrelated. A graphical solution of this portion of the equation is given in Fig. 9.

Step 5—Account for effect of vegetative cover, V′, and determine the actual annual erosion for a specific field, $E_5 = E = I' \times K' \times C' \times f(L') \times f(V')$. Here again the relationships among E_4, V′, and E are not simple. A graphical solution is given in Fig. 10.

In considering the significance of the value of E, the potential annual erosion determined in these 5 steps, it is important to recall that the first step was to determine the erodibility of a wide, bare, smooth field having a certain cloddiness as if it were located at Garden City, Kans., during 1954–56 when there were 38 seasonal, (January 1 to April 30) severe duststorms and 61 annual storms. The next 4 steps then adjust this erodibility in accordance with specific roughness, climatic, field length, and vegetative cover conditions. Thus, even though average annual values of certain factors such as wind velocity may be used in the computations, the equation actually evaluates the erodibility of a field having certain L′, K′, and V values in terms of what it would have been during severe soil blowing time. Therefore, when the equation is used to design erosion control measures, as is done in subsequent sections of this paper, the design is based on actual erosive condition, not averages.

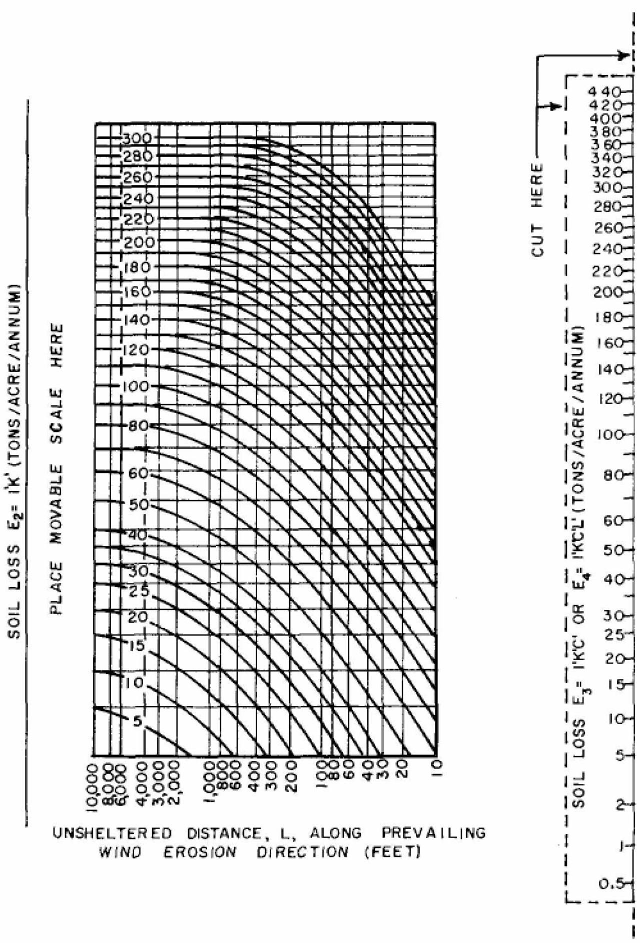


Fig. 9—Chart to determine soil loss $E_4 = I'K'C'L'$ from soil loss $E_2 = I'K'$ and $E_3 = I'K'C'$ and from unsheltered distance L′ across the field.

APPLICATIONS OF THE EQUATION

The wind erosion equation can be used to estimate the potential average annual soil loss, E, or solved in reverse to determine the condition of any one of I′, K′, L′, or V needed to control erosion. The only conditions that cannot be controlled are those associated with the climatic variable, C′. Examples of use of the equation follow to (i) determine potential average annual soil loss, E, (ii) determine vegetative cover needed to control erosion at a tolerable level, and (iii) determine width of strips needed to control erosion at a tolerable level.

Determining Potential Average Annual Soil Loss, E

A. Conditions

Assume a large field with a 2,640-foot north-south width, mostly flat but with a significant knoll with an average windward slope of 3% located in the vicinity of Pratt, Kans. The field has 800 lb/acre of cleaned, air-dry, flat wheat stubble. Dry sieving indicated 25% of soil fractions were >0.84 mm in diameter. There is a 60-foot-high shelterbelt on the south side of the field. There are no ridges, so soil ridge roughness equals zero.

B. Steps to Determine E

1) Determine $E_1 = I'$. Use Table 1: I= 86 tons/acre per annum.

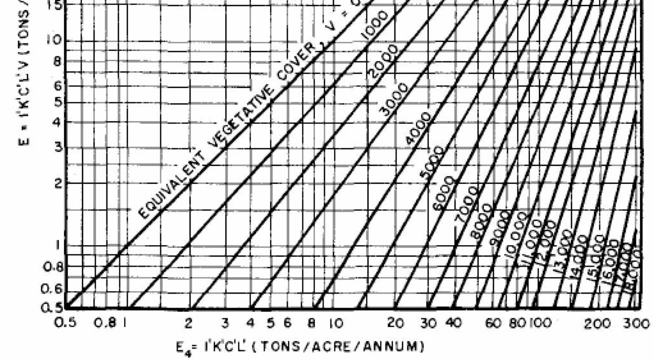


Fig. 10—Chart to determine soil loss $E = I'K'C'L'V$ from soil loss $E_4 = I'K'C'L'$ and from the vegetative cover factor, V. The chart can be used in reverse to determine V needed to reduce soil loss to any degree.

Use Fig. 1 to determine I_s. I_s = 145% for top of knoll, 130% for windward slope, and 100% for rest of field. To be safe, use 145%; therefore, $E_1 = I \times I_s = 86 \times 1.45 = 125$ tons/acre per annum.

2) Determine $E_2 = I'K'$. Use Fig. 4 to determine K'. K' = 1.0. $E_2 = 125 \times 1 = 125$ tons/acre per annum.
3) Determine $E_3 = I'K'C'$. Use Fig. 5 to determine C'. C' = 50% for vicinity of Pratt, Kansas. $E_3 = 125 \times 1 \times .50 = 62.5$ tons/acre per annum.
4) Determine E_4 = I', K', C', f(L')
   a) Determine prevailing wind erosion direction from Fig. 2. Map shows 8° deviation from N-S direction for Dodge City and 4° deviation for Wichita; therefore, Pratt would have about 6° deviation west of south.
   b) Determine distance D_f from Fig. 3. D_f = 2,750 feet.
   c) Determine L' by subtracting D_b. D_b, as stated earlier, equals 10 times the height of the barrier or $10 \times 60 = 600$ feet. $L' = D_f - D_b = 2{,}750 - 600 = 2{,}150$ feet.
   d) Use Fig. 9 to obtain E_4 = I', K', C', f(L'). Cut out movable $E_3 = I'K'C'$ scale. Place it along $E_2 = I'K'$ ordinate so that 62.5 on movable scale coincides with 125 on ordinate. Move to right, down along curved 125 line to intersection of L' = 2,150 feet, then move horizontally left to movable E_3 scale and read E_4 = I', K', C', f(L') = 60 tons/acre per annum.
5) Determine E_5 = E = I', K', C', f(L'), f(V)
   a) Determine V from Fig. 7. V= 2,500 equivalent lb/acre.
   b) Use Fig. 10 to determine E_5 = E. Start with E_4 = 60 on abscissa of Fig. 10. Move vertically upward to intersection of V = 2,500, then move horizontally to left to ordinate, E. E = 25 tons/acre.

If the knoll had not been on the field, E_1 would have equalled 86 instead of 125 and the equation would give a final erodibility, E, of 15 tons/acre per annum. Thus erodibility, although quite high on the entire field, was substantially greater when evaluated for the knoll condition.

Determining Vegetative Cover, R′, Needed to Control Erosion at a Tolerable Level

A. Conditions

E_1 = I' = 86 tons/acre per annum (I = 86 and I_s with no knolls = 100%)
K' = 1.0 (K_r = 0)
C' = 50%
L' = 2,200 feet (prevailing wind direction from south and no barriers)
S = small grain stubble
K_o = flat
E = tolerable soil loss = 5 tons/acre per annum. (What constitutes a tolerable loss varies with kind of crop, economic choice, and soil reserves. Five tons per acre is more or less a judgement value based on present knowledge of erosive effects.)

B. Steps to Determine R'

1) Determine $E_2 = 86 \times 1.0 = 86$ tons/acre per annum.
2) Determine $E_3 = 86 \times 1.0 \times .5 = 43$ tons/acre per annum.
3) Determine E_4 from Fig. 9. E_4 = 40 tons/acre per annum.
4) Determine V using Fig. 10 and a tolerable E of 5 tons/acre per annum. Enter ordinate E of Fig. 10 at 5. Proceed horizontally to intersection of E_4 = 40 and read V = 4,500 equivalent lb/acre.
5) Determine R' needed by using Fig. 7 (flat small grain stubble). R' = 1,200 lb/acre which is the amount required to reduce the erosion to a 5-ton/acre per annum level.

Determining Width of Strips Needed to Control Erosion

A. Conditions

Assume same field conditions as previous example except that it is decided that it would be possible to maintain only 800 lb/acre of vegetative cover and it was decided to use a combination of this vegetative cover and field strips to control erosion. The problem, therefore, is to determine required width of strips, L', needed to reduce soil loss to 5 tons/acre per annum.

B. Steps to Determine L'

1) Determine $E_2 = 86 \times 1.0 = 86$ tons/acre per annum.
2) Determine $E_3 = 86 \times 1.0 \times .5 = 43$ tons/acre per annum.
3) Determine V from Fig. 7. V = 2,500 equivalent lb/acre.
4) Determine E_4 from Fig. 10 for a tolerable E of 5 tons/acre per annum. Enter ordinate E at 5, proceed horizontally to right to V = 2,500, then move vertically downward to E_4 = 18 tons/acre per annum.
5) Determine L' from Fig. 9. Place E_3 = 43 on movable scale so it coincides with E_2 = 86. Find E_4 = 18 on movable scale and from this point move horizontally to right to intersection of curved line coming down from point (43, 86), then proceed vertically downward to L' = 150 feet.

The wind erosion equation can be used to consider other possible conditions or combinations of conditions that could be used to most effectively control erosion. The preceding examples serve only to illustrate possible applications.

NEEDED RESEARCH

The general framework of the wind erosion equation has been developed but many details are still lacking. Further research is needed to more thoroughly evaluate some of the primary variables that influence wind erosion —especially the interacting influence of combinations of these variables.

More information is needed on the influence of different implements on soil cloddiness, soil ridge roughness, and vegetative cover. This information would be important in prescribing effective methods of tillage to control erosion.

Information is needed on the average distance, D_b, of full and partial protection from wind erosion afforded by barriers of various widths and spacings in various geographic locations and for various soils.

Prevailing wind erosion direction needs to be determined for areas outside of the Great Plains.

Better information on surface soil moisture in relation to climatic conditions is also needed to improve the reliability of the climatic factor, C′. The Thornthwaite Index can be considered only as a rough estimate of moisture conditions. Climatic factor, C′, also should be computed on a monthly or seasonal basis to permit better evaluation of short-time, highly erosive periods.

Seasonal and annual soil erodibility, I, based on dry sieving, needs to be determined for various soil types wherever wind erosion is a problem.

Information is also needed on values of vegetative cover factor, S, and orientation, K_o, for crops other than those already investigated.

Further information on any one or all of these factors will help to eliminate weaknesses and increase the accuracy and usefulness of the wind erosion equation.

LITERATURE CITED

1. Armbrust, D. V., W. S. Chepil, and F. H. Siddoway. 1964. Effects of ridges on erosion of soil by wind. Soil Sci. Soc. Amer. Proc. 28:557–560.
2. Bagnold, R. A. 1943. The physics of blown sand and desert dunes. Wm. Morrow & Co., New York, N. Y. 265 p.
3. Chepil, W. S. 1945. The transport capacity of the wind. Soil Sci. 60:475–480.
4. ————. 1950. Properties of soil which influence wind erosion: II. Dry aggregate structure as an index of erodibility. Soil Sci. 69:403–414.
5. ————. 1956. Influence of moisture on erodibility of soil by wind. Soil Sci. Soc. Amer. Proc. 20:288–292.
6. ————. 1959. Wind erodibility of farms fields. J. Soil Water Conserv. 14:214–219.

7. ———. 1960. Conversion of relative field erodibility to annual soil loss by wind. Soil Sci. Soc. Amer. Proc. 24:143–145.

8. ———, and N. P. Woodruff. 1954. Estimations of wind erodibility of field surfaces. J. Soil Water Conserv. 9: 257–285.

9. ———, and ———. 1959. Estimations of wind erodibility of farm fields. USDA Prod. Res. Rep. no. 25, 21 p.

10. ———, F. H. Siddoway, and D. V. Armbrust. 1962. Climatic factor for estimating wind erodibility of farm fields. J. Soil Water Conserv. 17:162–165.

11. ———, and N. P. Woodruff. 1963. The physics of wind erosion and its control. Advance. Agron. 15:211–302.

12. ———, F. H. Siddoway, and D. V. Armbrust. 1964. In the Great Plains prevailing wind erosion direction. J. Soil Water Conserv. 19:67–70.

13. ———, ———, and ———. 1964. Wind erodibility of knolly and level terrains. J. Soil Water Conserv. 19:179–181.

14. Doughty, J. L., and staff. 1943. Report of Investigations, Soil Research Laboratory, Can. Dep. of Agr., Swift Current, Sask., 37–39.

15. Thornthwaite, C. W. 1931. Climates of North America according to a new classification. Geograph. Rev. 21:633–655.

16. Woodruff, N. P., and A. W. Zingg. 1952. Wind-tunnel studies of fundamental problems related to windbreaks, USDA, SCS-TP-112.

17. Zingg, A. W. 1953. Wind-tunnel studies of the movement of sedimentary materials. Proc. 5th Hydraul. Conf., Iowa State Univ., Bull. 34. p. 111–135.

18. ———, and N. P. Woodruff. 1951. Calibration of a portable wind tunnel for the simple determination of roughness and drag on field surfaces. Agron. J. 43:191–193.

[THIS PAGE LEFT INTENTIONALLY BLANK]

APPENDIX D

WIND EROSION EQUATION

DATA RUNS

[THIS PAGE LEFT INTENTIONALLY BLANK]

NRCS - WEQ INPUT WORKSHEET

Version 9.00 1-12-2005

Producer:	Fort Wainwright Range Control	Climate Data Station:	AK, BIG DELTA	Tract:	
				Field:	A
Planner:	Steven R. Becker, CEP	Field Width (Ft.):	875	Tillage Direct (NS/EW):	NS
				Irrigated? (y or n):	N
Crop Rot:	Jarvis Creek Floodplain	Field Direction (NS/EW):	EW	Length/Width Ratio:	4.0
				Wind Erodibility Group:	4 (1-7)
Location:	Donnelly Training Area East	Adjusted Soil "I":	86	Site "C" Value:	32

Average Annual Wind Erosion (t/ac):	24.7	Yrs in Rotation:	1.0	Sum Period Erosion:	24.7 (tons/ac)

Crop and Operation Management Records/Residue Calculations (green and dry)

Operation Date (date)	Crop (name)	Operation (name)	No. of Irr./Period (#)	Flat Res. (%)	Yield Adjustment (%)	Yield (units/ac)	Ridge Height (in)	Ridge Spacing (in)	Est. Res Retention (fact)	Est. Res. Dry Matter (lb/ac)	Est. Ground Cover (%)	SGe Dry Residue (lb/ac)	Green Dry Matter (lb/ac)	SGe Green Growth (lb/ac)	Random Roughness (in)
1/1/2013	Weeds, winter, <6 weeks	Start Rotation			-	- -	0	0	-	150	10	0	0	0	0.30
1/2/2013	Weeds, winter, <6 weeks	Over winter loss F	0	0%			0	0	0.60	90	6	22	0	0	0.30
1/3/2013	Weeds, winter, <6 weeks	Aerator, surface F	0	0%			0	0	0.75	68	5	17	0	0	0.60
5/1/2013	Weeds, winter, <6 weeks	Grow	0	0%			0	0	1.00	68		17	0	0	0.60
9/30/2013	Weeds, winter, <6 weeks	Harvest	0	0%	-50%	250 lbs/ac	0	0	1.00	250	16	54	0	0	0.60
10/1/2013	Weeds, winter, <6 weeks	Grow	0	0%			0	0	1.00	250		54	0	0	0.60
10/2/2013	Weeds, winter, <6 weeks	Over winter loss F	0	0%			0	0	0.60	150	10	34	0	0	0.30
12/31/2013		End Rotation					0	0	1.00	150	10				0.30

NRCS - WEQ CALCULATIONS

Version 9.00 1-12-2005

Producer: Fort Wainwright Range Contr | Planner: Steven R. Becker, CEP | Location: Donnelly Training | Tract: | Field: A

Crop Rotation: Jarvis Creek Floodplain | Climate Data Station: AK, BIG DELTA | Site "C" Value: 32

Tillage Direction (NS/EW): NS | Length/width ratio: 4 | Field Direction (NS/EW): EW | Field Width (Ft.): 875

Irrigation (Y or N): N | Soil "I": 86 | Wind Erodibility Group: 4 (1-7) | TWF: 3 (see instr.)

Sum Period Erosion (t/ac): 24.7 | No. Yrs in Rotation: 1.0 | Av. Annual Wind Erosion: 24.7 (t/ac/yr)

Calculations and Output

Mgt Periods		Irr.	Soil	Ridge Roughness				Random Roughness	Unsheltered Distance				SGe	Erosion			
Dates		No. of	"I"	Dev.	Ht.	Sp.	"Krd"	"Krr"	Dev.	Prep.	WED	"L"	"V"	"E"	EWE	"IF"	Loss
Begin	End	(#)	(t/ac)	(deg)	(in.)	(in.)	(factor)	(factor)	(deg)	(factor)	(factor)	(ft)	(lbs/ac)	(t/ac)	(%)	(%)	(t/ac)
1/1	01/02/13	0	86	22.5	0	0	1.00	0.94	67.5	27.5	4.000	3500	0	25.4	1.1	1.00	0.28
1/2	01/03/13	0	86	22.5	0	0	1.00	0.94	67.5	27.5	4.000	3500	22	25.0	1.1	1.00	0.28
1/3	05/01/13	0	86	22.5	0	0	1.00	0.94	67.5	27.5	4.000	3500	17	25.1	63.8	1.00	16.02
5/1	09/30/13	0	86	90.0	0	0	1.00	0.94	0.0	12.2	1.010	884	17	20.3	9.3	1.00	1.88
9/30	10/01/13	0	86	90.0	0	0	1.00	0.74	0.0	7.2	1.010	884	54	14.0	0.1	1.00	0.02
10/1	10/02/13	0	86	22.5	0	0	1.00	0.74	67.5	6.4	2.490	2179	54	17.5	0.2	1.00	0.04
10/2	12/31/13	0	86	22.5	0	0	1.00	0.99	67.5	6.4	2.490	2179	34	25.2	24.4	1.00	6.14
		0			0	0											
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															

NRCS - WEQ INPUT WORKSHEET

Version 9.00 1-12-2005

Producer:	Fort Wainwright Range Control	Climate Data Station:	AK, BIG DELTA	Tract:	
				Field:	A
Planner:	Steven R. Becker, CEP	Field Width (Ft.):	875	Tillage Direct (NS/EW):	EW
				Irrigated? (y or n):	N
Crop Rot:	Jarvis Creek Floodplain	Field Direction (NS/EW):	EW	Length/Width Ratio:	4.0
				Wind Erodibility Group:	4 (1-7)
Location:	Donnelly Training Area East	Adjusted Soil "I":	86	Site "C" Value:	32

Average Annual Wind Erosion (t/ac): **24.7** | Yrs in Rotation: **1.0** | Sum Period Erosion: **24.7** (tons/ac)

Crop and Operation Management Records/Residue Calculations (green and dry)

Operation Date (date)	Crop (name)	Operation (name)	No. of Irr./Period (#)	Flat Res. (%)	Yield Adjustment (%)	Yield (units/ac)	Ridge Height (in)	Ridge Spacing (in)	Est. Res Retention (fact)	Est. Res. Dry Matter (lb/ac)	Est. Ground Cover (%)	SGe Dry Residue (lb/ac)	Green Dry Matter (lb/ac)	SGe Green Growth (lb/ac)	Random Roughness (in)
1/1/2013	Weeds, winter, <6 weeks	Start Rotation			-	- -	0	0	-	150	10	0	0	0	0.30
1/2/2013	Weeds, winter, <6 weeks	Over winter loss F	0	0%			0	0	0.60	90	6	22	0	0	0.30
1/3/2013	Weeds, winter, <6 weeks	Aerator, surface F	0	0%			0	0	0.75	68	5	17	0	0	0.60
5/1/2013	Weeds, winter, <6 weeks	Grow	0	0%			0	0	1.00	68		17	0	0	0.60
9/30/2013	Weeds, winter, <6 weeks	Harvest	0	0%	-50%	250 lbs/ac	0	0	1.00	250	16	54	0	0	0.60
10/1/2013	Weeds, winter, <6 weeks	Grow	0	0%			0	0	1.00	250		54	0	0	0.60
10/2/2013	Weeds, winter, <6 weeks	Over winter loss F	0	0%			0	0	0.60	150	10	34	0	0	0.30
12/31/2013		End Rotation					0	0	1.00	150	10				0.30

NRCS - WEQ CALCULATIONS

Version 9.00 1-12-2005

Producer: Fort Wainwright Range Contr | Planner: Steven R. Becker, CEP | Location: Donnelly Training | Tract: | Field: A

Crop Rotation: Jarvis Creek Floodplain | Climate Data Station: AK, BIG DELTA | Site "C" Value: 32

Tillage Direction (NS/EW): EW | Length/width ratio: 4 | Field Direction (NS/EW): EW | Field Width (Ft.): 875

Irrigation (Y or N): N | Soil "I": 86 | Wind Erodibility Group: 4 (1-7) | TWF: 3 (see instr.)

Sum Period Erosion (t/ac): 24.7 | No. Yrs in Rotation: 1.0 | Av. Annual Wind Erosion: 24.7 (t/ac/yr)

Calculations and Output

Mgt Periods		Irr.	Soil	Ridge Roughness				Random Roughness	Unsheltered Distance				SGe	Erosion			
Dates		No. of	"I"	Dev.	Ht.	Sp.	"Krd"	"Krr"	Dev.	Prep.	WED	"L"	"V"	"E"	EWE	"IF"	Loss
Begin	End	(#)	(t/ac)	(deg)	(in.)	(in.)	(factor)	(factor)	(deg)	(factor)	(factor)	(ft)	(lbs/ac)	(t/ac)	(%)	(%)	(t/ac)
1/1	01/02/13	0	86	67.5	0	0	1.00	0.94	67.5	27.5	4.000	3500	0	25.4	1.1	1.00	0.28
1/2	01/03/13	0	86	67.5	0	0	1.00	0.94	67.5	27.5	4.000	3500	22	25.0	1.1	1.00	0.28
1/3	05/01/13	0	86	67.5	0	0	1.00	0.94	67.5	27.5	4.000	3500	17	25.1	63.8	1.00	16.02
5/1	09/30/13	0	86	0.0	0	0	1.00	0.94	0.0	12.2	1.010	884	17	20.3	9.3	1.00	1.88
9/30	10/01/13	0	86	0.0	0	0	1.00	0.74	0.0	7.2	1.010	884	54	14.0	0.1	1.00	0.02
10/1	10/02/13	0	86	67.5	0	0	1.00	0.74	67.5	6.4	2.490	2179	54	17.5	0.2	1.00	0.04
10/2	12/31/13	0	86	67.5	0	0	1.00	0.99	67.5	6.4	2.490	2179	34	25.2	24.4	1.00	6.14
		0			0	0											
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															

NRCS - WEQ INPUT WORKSHEET

Version 9.00 1-12-2005

Producer:	Fort Wainwright Range Control	Climate Data Station:	AK, BIG DELTA		Tract:		Field: B
Planner:	Steven R. Becker, CEP	Field Width (Ft.):	45	Tillage Direct (NS/EW): NS		Irrigated? (y or n):	N
Crop Rot:	Gravel Road	Field Direction (NS/EW):	NS	Length/Width Ratio: 6.0		Wind Erodibility Group:	4 (1-7)
Location:	Donnelly Training Area East	Adjusted Soil "I":	86	Site "C" Value: 32			

Average Annual Wind Erosion (t/ac): 5.7 | Yrs in Rotation: 1.0 | Sum Period Erosion: 5.7 (tons/ac)

Crop and Operation Management Records/Residue Calculations (green and dry)

Operation Date (date)	Crop (name)	Operation (name)	No. of Irr./Period (#)	Flat Res. (%)	Yield Adjustment (%)	Yield (units/ac)	Ridge Height (in)	Ridge Spacing (in)	Est. Res Retention (fact)	Est. Res. Dry Matter (lb/ac)	Est. Ground Cover (%)	SGe Dry Residue (lb/ac)	Green Dry Matter (lb/ac)	SGe Green Growth (lb/ac)	Random Roughness (in)
1/1/2013	Weeds, winter, <6 weeks	Start Rotation			-	- -	0	0	-	150	10	0	0	0	0.30
1/2/2013	Weeds, winter, <6 weeks	Over winter loss F	0	0%			0	0	0.60	90	6	22	0	0	0.30
1/3/2013	Weeds, winter, <6 weeks	Roller, smooth F	0	0%			0	0	0.95	86	6	21	0	0	0.40
5/1/2013	Weeds, winter, <6 weeks	Grow	0	0%			0	0	1.00	86		21	0	0	0.40
9/30/2013	Weeds, winter, <6 weeks	Harvest	0	0%	-50%	250 lbs/ac	0	0	1.00	250	16	54	0	0	0.40
10/1/2013	Weeds, winter, <6 weeks	Grow	0	0%			0	0	1.00	250		54	0	0	0.40
10/2/2013	Weeds, winter, <6 weeks	Over winter loss F	0	0%			0	0	0.60	150	10	34	0	0	0.30
12/31/2013		End Rotation					0	0	1.00	150	10				0.30

NRCS - WEQ CALCULATIONS

Version 9.00 1-12-2005

Producer:	Fort Wainwright Range Contr	Planner:	Steven R. Becker, CEP	Location:	Donnelly Trainin	Tract:	
						Field:	B
Crop Rotation:	Gravel Road	Climate Data Station:	AK, BIG DELTA			Site "C" Value:	32
Tillage Direction (NS/EW):	NS	Length/width ratio:	6	Field Direction (NS/EW):	NS	Field Width (Ft.):	45
Irrigation (Y or N):	N	Soil "I":	86	Wind Erodibility Group:	4 (1-7)	TWF:	3 (see instr.)
Sum Period Erosion (t/ac):	5.7	No. Yrs in Rotation:	1.0			Av. Annual Wind Erosion:	5.7 (t/ac/yr)

Calculations and Output

Mgt Periods Dates		Irr.	Soil	Ridge Roughness				Random Roughness	Unsheltered Distance				SGe	Erosion			
		No. of	"I"	Dev.	Ht.	Sp.	"Krd"	"Krr"	Dev.	Prep.	WED	"L"	"V"	"E"	EWE	"IF"	Loss
Begin	End	(#)	(t/ac)	(deg)	(in.)	(in.)	(factor)	(factor)	(deg)	(factor)	(factor)	(ft)	(lbs/ac)	(t/ac)	(%)	(%)	(t/ac)
1/1	01/02/13	0	86	22.5	0	0	1.00	0.94	22.5	27.5	1.480	67	0	5.1	1.1	1.00	0.06
1/2	01/03/13	0	86	22.5	0	0	1.00	0.94	22.5	27.5	1.480	67	22	5.0	1.1	1.00	0.06
1/3	05/01/13	0	86	22.5	0	0	1.00	0.99	22.5	27.5	1.480	67	21	5.6	63.8	1.00	3.56
5/1	09/30/13	0	86	90.0	0	0	1.00	0.99	90.0	12.2	4.000	180	21	11.1	9.3	1.00	1.03
9/30	10/01/13	0	86	90.0	0	0	1.00	0.86	90.0	7.2	4.000	180	54	8.5	0.1	1.00	0.01
10/1	10/02/13	0	86	22.5	0	0	1.00	0.86	22.5	6.4	1.110	50	54	2.8	0.2	1.00	0.01
10/2	12/31/13	0	86	22.5	0	0	1.00	0.99	22.5	6.4	1.110	50	34	4.0	24.4	1.00	0.98
		0			0	0											
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															

NRCS - WEQ INPUT WORKSHEET

Version 9.00 1-12-2005

Producer:	Fort Wainwright Range Control	Climate Data Station:	AK, BIG DELTA	Tract:	
				Field:	B
Planner:	Steven R. Becker, CEP	Field Width (Ft.):	45	Tillage Direct (NS/EW):	NS
				Irrigated? (y or n):	N
Crop Rot:	Gravel Road w/ Snow	Field Direction (NS/EW):	NS	Length/Width Ratio:	6.0
				Wind Erodibility Group:	4 (1-7)
Location:	Donnelly Training Area East	Adjusted Soil "I":	86	Site "C" Value:	32

Average Annual Wind Erosion (t/ac):	1.3	Yrs in Rotation:	1.0	Sum Period Erosion:	1.3 (tons/ac)

Crop and Operation Management Records/Residue Calculations (green and dry)

Operation Date (date)	Crop (name)	Operation (name)	No. of Irr./Period (#)	Flat Res. (%)	Yield Adjustment (%)	Yield (units/ac)	Ridge Height (in)	Ridge Spacing (in)	Est. Res Retention (fact)	Est. Res. Dry Matter (lb/ac)	Est. Ground Cover (%)	SGe Dry Residue (lb/ac)	Green Dry Matter (lb/ac)	SGe Green Growth (lb/ac)	Random Roughness (in)
1/1/2013	Weeds, winter, <6 weeks	Start Rotation			-	- -	0	0	-	150	10	0	0	0	0.30
1/2/2013	Weeds, winter, <6 weeks	Over winter loss F	0	0%			0	0	0.60	90	6	22	0	0	0.30
1/3/2013	Weeds, winter, <6 weeks	Roller, smooth F	0	0%			0	0	0.95	86	6	21	0	0	0.40
1/4/2013	Snow Cover	Grow	0	0%			0	0	1.00	86		15	2000	3057	0.40
5/1/2013	Weeds, winter, <6 weeks	Grow	0	0%			0	0	1.00	86		21	0	0	0.40
9/30/2013	Weeds, winter, <6 weeks	Harvest	0	0%	-50%	250 lbs/ac	0	0	1.00	250	16	54	0	0	0.40
10/1/2013	Weeds, winter, <6 weeks	Grow	0	0%			0	0	1.00	250		54	0	0	0.40
10/2/2013	Weeds, winter, <6 weeks	Over winter loss F					0	0	0.60	150	10	34	0	0	0.30
10/15/2013	Snow Cover	Grow					0	0	1.00	150		26	2000	3037	0.30
12/31/2013		End Rotation					0	0	1.00	150	10				0.30

NRCS - WEQ CALCULATIONS

Version 9.00 1-12-2005

Producer:	Fort Wainwright Range Contr	Planner:	Steven R. Becker, CEP	Location:	Donnelly Trainin
Tract:		Field:	B		
Crop Rotation:	Gravel Road w/ Snow	Climate Data Station:	AK, BIG DELTA	Site "C" Value:	32
Tillage Direction (NS/EW):	NS	Length/width ratio:	6	Field Direction (NS/EW):	NS
Field Width (Ft.):	45				
Irrigation (Y or N):	N	Soil "I":	86	Wind Erodibility Group:	4 (1-7)
TWF:	3 (see instr.)				
Sum Period Erosion (t/ac):	1.3	No. Yrs in Rotation:	1.0	Av. Annual Wind Erosion:	1.3 (t/ac/yr)

Calculations and Output

Mgt Periods Dates		Irr.	Soil	Ridge Roughness				Random Roughness	Unsheltered Distance				SGe	Erosion			
		No. of	"I"	Dev.	Ht.	Sp.	"Krd"	"Krr"	Dev.	Prep.	WED	"L"	"V"	"E"	EWE	"IF"	Loss
Begin	End	(#)	(t/ac)	(deg)	(in.)	(in.)	(factor)	(factor)	(deg)	(factor)	(factor)	(ft)	(lbs/ac)	(t/ac)	(%)	(%)	(t/ac)
1/1	01/02/13	0	86	22.5	0	0	1.00	0.94	22.5	27.5	1.480	67	0	5.1	1.1	1.00	0.06
1/2	01/03/13	0	86	22.5	0	0	1.00	0.94	22.5	27.5	1.480	67	22	5.0	1.1	1.00	0.06
1/3	01/04/13	0	86	22.5	0	0	1.00	0.86	22.5	27.5	1.480	67	21	4.1	1.1	1.00	0.05
1/4	05/01/13	0	86	22.5	0	0	1.00	0.99	22.5	27.5	1.480	67	3071	0.0	62.7	1.00	0.00
5/1	09/30/13	0	86	90.0	0	0	1.00	0.99	90.0	12.2	4.000	180	21	11.1	9.3	1.00	1.03
9/30	10/01/13	0	86	90.0	0	0	1.00	0.86	90.0	7.2	4.000	180	54	8.5	0.1	1.00	0.01
10/1	10/02/13	0	86	22.5	0	0	1.00	0.86	22.5	6.4	1.110	50	54	2.8	0.2	1.00	0.01
10/2	10/15/13	0	86	22.5	0	0	1.00	0.94	22.5	6.4	1.110	50	34	3.6	2.7	1.00	0.10
10/15	12/31/13	0	86	22.5	0	0	1.00	0.99	22.5	6.4	1.110	50	3063	0.0	21.7	1.00	0.00
		0			0	0											
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															

NRCS - WEQ INPUT WORKSHEET

Version 9.00 1-12-2005

Producer:	Fort Wainwright Range Control	Climate Data Station:	AK, BIG DELTA	Tract:	
				Field:	B
Planner:	Steven R. Becker, CEP	Field Width (Ft.):	45	Tillage Direct (NS/EW):	EW
				Irrigated? (y or n):	N
Crop Rot:	Gravel Road	Field Direction (NS/EW):	NS	Length/Width Ratio:	6.0
				Wind Erodibility Group:	4 (1-7)
Location:	Donnelly Training Area East	Adjusted Soil "I":	86	Site "C" Value:	32

Average Annual Wind Erosion (t/ac):	5.7	Yrs in Rotation:	1.0	Sum Period Erosion:	5.7 (tons/ac)

Crop and Operation Management Records/Residue Calculations (green and dry)

Operation Date (date)	Crop (name)	Operation (name)	No. of Irr./Period (#)	Flat Res. (%)	Yield Adjustment (%)	Yield (units/ac)	Ridge Height (in)	Ridge Spacing (in)	Est. Res Retention (fact)	Est. Res. Dry Matter (lb/ac)	Est. Ground Cover (%)	SGe Dry Residue (lb/ac)	Green Dry Matter (lb/ac)	SGe Green Growth (lb/ac)	Random Roughness (in)
1/1/2013	Weeds, winter, <6 weeks	Start Rotation			-	- -	0	0	-	150	10	0	0	0	0.30
1/2/2013	Weeds, winter, <6 weeks	Over winter loss F	0	0%			0	0	0.60	90	6	22	0	0	0.30
1/3/2013	Weeds, winter, <6 weeks	Roller, smooth F	0	0%			0	0	0.95	86	6	21	0	0	0.40
5/1/2013	Weeds, winter, <6 weeks	Grow	0	0%			0	0	1.00	86		21	0	0	0.40
9/30/2013	Weeds, winter, <6 weeks	Harvest	0	0%	-50%	250 lbs/ac	0	0	1.00	250	16	54	0	0	0.40
10/1/2013	Weeds, winter, <6 weeks	Grow	0	0%			0	0	1.00	250		54	0	0	0.40
10/2/2013	Weeds, winter, <6 weeks	Over winter loss F	0	0%			0	0	0.60	150	10	34	0	0	0.30
12/31/2013		End Rotation					0	0	1.00	150	10				0.30

NRCS - WEQ CALCULATIONS

Version 9.00 1-12-2005

Producer:	Fort Wainwright Range Contr	Planner:	Steven R. Becker, CEP	Location:	Donnelly Training	Tract:		Field:	B
Crop Rotation:	Gravel Road		Climate Data Station:	AK, BIG DELTA			Site "C" Value:	32	
Tillage Direction (NS/EW):	EW	Length/width ratio:	6	Field Direction (NS/EW):	NS		Field Width (Ft.):	45	
Irrigation (Y or N):	N	Soil "I":	86	Wind Erodibility Group:	4	(1-7)	TWF:	3	(see instr.)
Sum Period Erosion (t/ac):	5.7		No. Yrs in Rotation:	1.0		Av. Annual Wind Erosion:	5.7	(t/ac/yr)	

Calculations and Output

Mgt Periods Dates		Irr.	Soil	Ridge Roughness				Random Roughness	Unsheltered Distance				SGe	Erosion			
		No. of	"I"	Dev.	Ht.	Sp.	"Krd"	"Krr"	Dev.	Prep.	WED	"L"	"V"	"E"	EWE	"IF"	Loss
Begin	End	(#)	(t/ac)	(deg)	(in.)	(in.)	(factor)	(factor)	(deg)	(factor)	(factor)	(ft)	(lbs/ac)	(t/ac)	(%)	(%)	(t/ac)
1/1	01/02/13	0	86	67.5	0	0	1.00	0.94	22.5	27.5	1.480	67	0	5.1	1.1	1.00	0.06
1/2	01/03/13	0	86	67.5	0	0	1.00	0.94	22.5	27.5	1.480	67	22	5.0	1.1	1.00	0.06
1/3	05/01/13	0	86	67.5	0	0	1.00	0.99	22.5	27.5	1.480	67	21	5.6	63.8	1.00	3.56
5/1	09/30/13	0	86	0.0	0	0	1.00	0.99	90.0	12.2	4.000	180	21	11.1	9.3	1.00	1.03
9/30	10/01/13	0	86	0.0	0	0	1.00	0.86	90.0	7.2	4.000	180	54	8.5	0.1	1.00	0.01
10/1	10/02/13	0	86	67.5	0	0	1.00	0.86	22.5	6.4	1.110	50	54	2.8	0.2	1.00	0.01
10/2	12/31/13	0	86	67.5	0	0	1.00	0.99	22.5	6.4	1.110	50	34	4.0	24.4	1.00	0.98
		0			0	0											
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															

NRCS - WEQ INPUT WORKSHEET

Version 9.00 1-12-2005

Producer:	Fort Wainwright Range Control	Climate Data Station:	AK, BIG DELTA	Tract:	
				Field:	B
Planner:	Steven R. Becker, CEP	Field Width (Ft.):	45	Tillage Direct (NS/EW):	EW
				Irrigated? (y or n):	N
Crop Rot:	Gravel Road w/ Snow	Field Direction (NS/EW):	NS	Length/Width Ratio:	6.0
				Wind Erodibility Group:	4 (1-7)
Location:	Donnelly Training Area East	Adjusted Soil "I":	86	Site "C" Value:	32

Average Annual Wind Erosion (t/ac): 1.3 | Yrs in Rotation: 1.0 | Sum Period Erosion: 1.3 (tons/ac)

Crop and Operation Management Records/Residue Calculations (green and dry)

Operation Date (date)	Crop (name)	Operation (name)	No. of Irr./Period (#)	Flat Res. (%)	Yield Adjustment (%)	Yield (units/ac)	Ridge Height (in)	Ridge Spacing (in)	Est. Res Retention (fact)	Est. Res. Dry Matter (lb/ac)	Est. Ground Cover (%)	SGe Dry Residue (lb/ac)	Green Dry Matter (lb/ac)	SGe Green Growth (lb/ac)	Random Roughness (in)
1/1/2013	Weeds, winter, <6 weeks	Start Rotation			-	- -	0	0	-	150	10	0	0	0	0.30
1/2/2013	Weeds, winter, <6 weeks	Over winter loss F	0	0%			0	0	0.60	90	6	22	0	0	0.30
1/3/2013	Weeds, winter, <6 weeks	Roller, smooth F	0	0%			0	0	0.95	86	6	21	0	0	0.40
1/4/2013	Snow Cover	Grow	0	0%			0	0	1.00	86		15	2000	3057	0.40
5/1/2013	Weeds, winter, <6 weeks	Grow	0	0%			0	0	1.00	86		21	0	0	0.40
9/30/2013	Weeds, winter, <6 weeks	Harvest	0	0%	-50%	250 lbs/ac	0	0	1.00	250	16	54	0	0	0.40
10/1/2013	Weeds, winter, <6 weeks	Grow	0	0%			0	0	1.00	250		54	0	0	0.40
10/2/2013	Weeds, winter, <6 weeks	Over winter loss F					0	0	0.60	150	10	34	0	0	0.30
10/15/2013	Snow Cover	Grow					0	0	1.00	150		26	2000	3037	0.30
12/31/2013		End Rotation					0	0	1.00	150	10				0.30

NRCS - WEQ CALCULATIONS

Version 9.00 1-12-2005

Producer: Fort Wainwright Range Contr(
Planner: Steven R. Becker, CEP
Location: Donnelly Trainin(
Tract:
Field: B

Crop Rotation: Gravel Road w/ Snow
Climate Data Station: AK, BIG DELTA
Site "C" Value: 32

Tillage Direction (NS/EW): EW
Length/width ratio: 6
Field Direction (NS/EW): NS
Field Width (Ft.): 45

Irrigation (Y or N): N
Soil "I": 86
Wind Erodibility Group: 4 (1-7)
TWF: 3 (see instr.)

Sum Period Erosion (t/ac): 1.3
No. Yrs in Rotation: 1.0
Av. Annual Wind Erosion: 1.3 (t/ac/yr)

Calculations and Output

Mgt Periods Dates		Irr.	Soil	Ridge Roughness				Random Roughness	Unsheltered Distance				SGe	Erosion			
		No. of	"I"	Dev.	Ht.	Sp.	"Krd"	"Krr"	Dev.	Prep.	WED	"L"	"V"	"E"	EWE	"IF"	Loss
Begin	End	(#)	(t/ac)	(deg)	(in.)	(in.)	(factor)	(factor)	(deg)	(factor)	(factor)	(ft)	(lbs/ac)	(t/ac)	(%)	(%)	(t/ac)
1/1	01/02/13	0	86	67.5	0	0	1.00	0.94	22.5	27.5	1.480	67	0	5.1	1.1	1.00	0.06
1/2	01/03/13	0	86	67.5	0	0	1.00	0.94	22.5	27.5	1.480	67	22	5.0	1.1	1.00	0.06
1/3	01/04/13	0	86	67.5	0	0	1.00	0.86	22.5	27.5	1.480	67	21	4.1	1.1	1.00	0.05
1/4	05/01/13	0	86	67.5	0	0	1.00	0.99	22.5	27.5	1.480	67	3071	0.0	62.7	1.00	0.00
5/1	09/30/13	0	86	0.0	0	0	1.00	0.99	90.0	12.2	4.000	180	21	11.1	9.3	1.00	1.03
9/30	10/01/13	0	86	0.0	0	0	1.00	0.86	90.0	7.2	4.000	180	54	8.5	0.1	1.00	0.01
10/1	10/02/13	0	86	67.5	0	0	1.00	0.86	22.5	6.4	1.110	50	54	2.8	0.2	1.00	0.01
10/2	10/15/13	0	86	67.5	0	0	1.00	0.94	22.5	6.4	1.110	50	34	3.6	2.7	1.00	0.10
10/15	12/31/13	0	86	67.5	0	0	1.00	0.99	22.5	6.4	1.110	50	3063	0.0	21.7	1.00	0.00
		0			0	0											
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															

NRCS - WEQ INPUT WORKSHEET

Version 9.00 1-12-2005

Producer: Fort Wainwright Range Control	Climate Data Station: AK, BIG DELTA			Tract:	Field: C
Planner: Steven R. Becker, CEP	Field Width (Ft.): 35	Tillage Direct (NS/EW): NS		Irrigated? (y or n): N	
Crop Rot: Gravel Road	Field Direction (NS/EW): NS	Length/Width Ratio: 6.0		Wind Erodibility Group: 4 (1-7)	
Location: Donnelly Training Area East	Adjusted Soil "I": 86	Site "C" Value: 32			

Average Annual Wind Erosion (t/ac): 4.4 | Yrs in Rotation: 1.0 | Sum Period Erosion: 4.4 (tons/ac)

Crop and Operation Management Records/Residue Calculations (green and dry)

Operation Date (date)	Crop (name)	Operation (name)	No. of Irr./Period (#)	Flat Res. (%)	Yield Adjustment (%)	Yield (units/ac)	Ridge Height (in)	Ridge Spacing (in)	Est. Res Retention (fact)	Est. Res. Dry Matter (lb/ac)	Est. Ground Cover (%)	SGe Dry Residue (lb/ac)	Green Dry Matter (lb/ac)	SGe Green Growth (lb/ac)	Random Roughness (in)
1/1/2013	Weeds, winter, <6 weeks	Start Rotation			-	- -	0	0	-	150	10	0	0	0	0.30
1/2/2013	Weeds, winter, <6 weeks	Over winter loss F	0	0%			0	0	0.60	90	6	22	0	0	0.30
1/3/2013	Weeds, winter, <6 weeks	Roller, smooth F	0	0%			0	0	0.95	86	6	21	0	0	0.40
5/1/2013	Weeds, winter, <6 weeks	Grow	0	0%			0	0	1.00	86		21	0	0	0.40
9/30/2013	Weeds, winter, <6 weeks	Harvest	0	0%	-50%	250 lbs/ac	0	0	1.00	250	16	54	0	0	0.40
10/1/2013	Weeds, winter, <6 weeks	Grow	0	0%			0	0	1.00	250		54	0	0	0.40
10/2/2013	Weeds, winter, <6 weeks	Over winter loss F	0	0%			0	0	0.60	150	10	34	0	0	0.30
12/31/2013		End Rotation					0	0	1.00	150	10				0.30

NRCS - WEQ CALCULATIONS

Version 9.00 1-12-2005

Producer:	Fort Wainwright Range Contr	Planner:	Steven R. Becker, CEP	Location:	Donnelly Training	Tract:	
						Field:	C
Crop Rotation:	Gravel Road	Climate Data Station:	AK, BIG DELTA			Site "C" Value:	32
Tillage Direction (NS/EW):	NS	Length/width ratio:	6	Field Direction (NS/EW):	NS	Field Width (Ft.):	35
Irrigation (Y or N):	N	Soil "I":	86	Wind Erodibility Group:	4 (1-7)	TWF:	3 (see instr.)
Sum Period Erosion (t/ac):	4.4	No. Yrs in Rotation:	1.0			Av. Annual Wind Erosion:	4.4 (t/ac/yr)

Calculations and Output

Mgt Periods Dates		Irr.	Soil	Ridge Roughness				Random Roughness	Unsheltered Distance				SGe	Erosion			
		No. of	"I"	Dev.	Ht.	Sp.	"Krd"	"Krr"	Dev.	Prep.	WED	"L"	"V"	"E"	EWE	"IF"	Loss
Begin	End	(#)	(t/ac)	(deg)	(in.)	(in.)	(factor)	(factor)	(deg)	(factor)	(factor)	(ft)	(lbs/ac)	(t/ac)	(%)	(%)	(t/ac)
1/1	01/02/13	0	86	22.5	0	0	1.00	0.94	22.5	27.5	1.480	52	0	3.8	1.1	1.00	0.04
1/2	01/03/13	0	86	22.5	0	0	1.00	0.94	22.5	27.5	1.480	52	22	3.8	1.1	1.00	0.04
1/3	05/01/13	0	86	22.5	0	0	1.00	0.99	22.5	27.5	1.480	52	21	4.2	63.8	1.00	2.70
5/1	09/30/13	0	86	90.0	0	0	1.00	0.99	90.0	12.2	4.000	140	21	9.4	9.3	1.00	0.87
9/30	10/01/13	0	86	90.0	0	0	1.00	0.86	90.0	7.2	4.000	140	54	7.2	0.1	1.00	0.01
10/1	10/02/13	0	86	22.5	0	0	1.00	0.86	22.5	6.4	1.110	39	54	2.0	0.2	1.00	0.00
10/2	12/31/13	0	86	22.5	0	0	1.00	0.99	22.5	6.4	1.110	39	34	3.0	24.4	1.00	0.73
		0			0	0											
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															

NRCS - WEQ INPUT WORKSHEET

Version 9.00 1-12-2005

Producer:	Fort Wainwright Range Control	Climate Data Station:	AK, BIG DELTA	Tract:	
				Field:	C
Planner:	Steven R. Becker, CEP	Field Width (Ft.):	35	Tillage Direct (NS/EW):	NS
				Irrigated? (y or n):	N
Crop Rot:	Gravel Road w/ Snow	Field Direction (NS/EW):	NS	Length/Width Ratio:	6.0
				Wind Erodibility Group:	4 (1-7)
Location:	Donnelly Training Area East	Adjusted Soil "I":	86	Site "C" Value:	32

Average Annual Wind Erosion (t/ac):	1.1	Yrs in Rotation:	1.0	Sum Period Erosion:	1.1 (tons/ac)

Crop and Operation Management Records/Residue Calculations (green and dry)

Operation Date (date)	Crop (name)	Operation (name)	No. of Irr./Period (#)	Flat Res. (%)	Yield Adjustment (%)	Yield (units/ac)	Ridge Height (in)	Ridge Spacing (in)	Est. Res Retention (fact)	Est. Res. Dry Matter (lb/ac)	Est. Ground Cover (%)	SGe Dry Residue (lb/ac)	Green Dry Matter (lb/ac)	SGe Green Growth (lb/ac)	Random Roughness (in)
1/1/2013	Weeds, winter, <6 weeks	Start Rotation			-	- -	0	0	-	150	10	0	0	0	0.30
1/2/2013	Weeds, winter, <6 weeks	Over winter loss F	0	0%			0	0	0.60	90	6	22	0	0	0.30
1/3/2013	Weeds, winter, <6 weeks	Roller, smooth F	0	0%			0	0	0.95	86	6	21	0	0	0.40
1/4/2013	Snow Cover	Grow	0	0%			0	0	1.00	86		15	2000	3057	0.40
5/1/2013	Weeds, winter, <6 weeks	Grow	0	0%			0	0	1.00	86		21	0	0	0.40
9/30/2013	Weeds, winter, <6 weeks	Harvest	0	0%	-50%	250 lbs/ac	0	0	1.00	250	16	54	0	0	0.40
10/1/2013	Weeds, winter, <6 weeks	Grow	0	0%			0	0	1.00	250		54	0	0	0.40
10/2/2013	Weeds, winter, <6 weeks	Over winter loss F	0	0%			0	0	0.60	150	10	34	0	0	0.30
10/15/2013	Snow Cover	Grow	0	0%			0	0	1.00	150		26	2000	3037	0.30
12/31/2013		End Rotation					0	0	1.00	150	10				0.30

NRCS - WEQ CALCULATIONS

Version 9.00 1-12-2005

Producer: Fort Wainwright Range Contr | Planner: Steven R. Becker, CEP | Location: Donnelly Trainin | Tract: | Field: C

Crop Rotation: Gravel Road w/ Snow | Climate Data Station: AK, BIG DELTA | Site "C" Value: 32

Tillage Direction (NS/EW): NS | Length/width ratio: 6 | Field Direction (NS/EW): NS | Field Width (Ft.): 35

Irrigation (Y or N): N | Soil "I": 86 | Wind Erodibility Group: 4 (1-7) | TWF: 3 (see instr.)

Sum Period Erosion (t/ac): 1.1 | No. Yrs in Rotation: 1.0 | Av. Annual Wind Erosion: 1.1 (t/ac/yr)

Calculations and Output

Mgt Periods Dates		Irr.	Soil	Ridge Roughness				Random Roughness	Unsheltered Distance				SGe	Erosion			
		No. of	"I"	Dev.	Ht.	Sp.	"Krd"	"Krr"	Dev.	Prep.	WED	"L"	"V"	"E"	EWE	"IF"	Loss
Begin	End	(#)	(t/ac)	(deg)	(in.)	(in.)	(factor)	(factor)	(deg)	(factor)	(factor)	(ft)	(lbs/ac)	(t/ac)	(%)	(%)	(t/ac)
1/1	01/02/13	0	86	22.5	0	0	1.00	0.94	22.5	27.5	1.480	52	0	3.8	1.1	1.00	0.04
1/2	01/03/13	0	86	22.5	0	0	1.00	0.94	22.5	27.5	1.480	52	22	3.8	1.1	1.00	0.04
1/3	01/04/13	0	86	22.5	0	0	1.00	0.86	22.5	27.5	1.480	52	21	3.0	1.1	1.00	0.03
1/4	05/01/13	0	86	22.5	0	0	1.00	0.99	22.5	27.5	1.480	52	3071	0.0	62.7	1.00	0.00
5/1	09/30/13	0	86	90.0	0	0	1.00	0.99	90.0	12.2	4.000	140	21	9.4	9.3	1.00	0.87
9/30	10/01/13	0	86	90.0	0	0	1.00	0.86	90.0	7.2	4.000	140	54	7.2	0.1	1.00	0.01
10/1	10/02/13	0	86	22.5	0	0	1.00	0.86	22.5	6.4	1.110	39	54	2.0	0.2	1.00	0.00
10/2	10/15/13	0	86	22.5	0	0	1.00	0.94	22.5	6.4	1.110	39	34	2.6	2.7	1.00	0.07
10/15	12/31/13	0	86	22.5	0	0	1.00	0.99	22.5	6.4	1.110	39	3063	0.0	21.7	1.00	0.00
		0			0	0											
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															

NRCS - WEQ INPUT WORKSHEET

Version 9.00 1-12-2005

Producer:	Fort Wainwright Range Control	Climate Data Station:	AK, BIG DELTA			Tract:	
						Field:	C
Planner:	Steven R. Becker, CEP	Field Width (Ft.):	35	Tillage Direct (NS/EW):	NS	Irrigated? (y or n):	N
Crop Rot:	Gravel Road	Field Direction (NS/EW):	NS	Length/Width Ratio:	6.0	Wind Erodibility Group:	4 (1-7)
Location:	Donnelly Training Area East	Adjusted Soil "I":	86	Site "C" Value:	32		

Average Annual Wind Erosion (t/ac): 4.4 | Yrs in Rotation: 1.0 | Sum Period Erosion: 4.4 (tons/ac)

Crop and Operation Management Records/Residue Calculations (green and dry)

Operation Date (date)	Crop (name)	Operation (name)	No. of Irr./Period (#)	Flat Res. (%)	Yield Adjustment (%)	Yield (units/ac)	Ridge Height (in)	Ridge Spacing (in)	Est. Res Retention (fact)	Est. Res. Dry Matter (lb/ac)	Est. Ground Cover (%)	SGe Dry Residue (lb/ac)	Green Dry Matter (lb/ac)	SGe Green Growth (lb/ac)	Random Roughness (in)
1/1/2013	Weeds, winter, <6 weeks	Start Rotation			-	- -	0	0	-	150	10	0	0	0	0.30
1/2/2013	Weeds, winter, <6 weeks	Over winter loss F	0	0%			0	0	0.60	90	6	22	0	0	0.30
1/3/2013	Weeds, winter, <6 weeks	Roller, smooth F	0	0%			0	0	0.95	86	6	21	0	0	0.40
5/1/2013	Weeds, winter, <6 weeks	Grow	0	0%			0	0	1.00	86		21	0	0	0.40
9/30/2013	Weeds, winter, <6 weeks	Harvest	0	0%	-50%	250 lbs/ac	0	0	1.00	250	16	54	0	0	0.40
10/1/2013	Weeds, winter, <6 weeks	Grow	0	0%			0	0	1.00	250		54	0	0	0.40
10/2/2013	Weeds, winter, <6 weeks	Over winter loss F	0	0%			0	0	0.60	150	10	34	0	0	0.30
12/31/2013		End Rotation					0	0	1.00	150	10				0.30

NRCS - WEQ CALCULATIONS

Version 9.00 1-12-2005

Producer: Fort Wainwright Range Contr
Planner: Steven R. Becker, CEP
Location: Donnelly Training
Tract:
Field: C

Crop Rotation: Gravel Road
Climate Data Station: AK, BIG DELTA
Site "C" Value: 32

Tillage Direction (NS/EW): NS
Length/width ratio: 6
Field Direction (NS/EW): NS
Field Width (Ft.): 35

Irrigation (Y or N): N
Soil "I": 86
Wind Erodibility Group: 4 (1-7)
TWF: 3 (see instr.)

Sum Period Erosion (t/ac): 4.4
No. Yrs in Rotation: 1.0
Av. Annual Wind Erosion: 4.4 (t/ac/yr)

Calculations and Output

Mgt Periods		Irr.	Soil	Ridge Roughness				Random Roughness	Unsheltered Distance				SGe	Erosion			
Dates		No. of	"I"	Dev.	Ht.	Sp.	"Krd"	"Krr"	Dev.	Prep.	WED	"L"	"V"	"E"	EWE	"IF"	Loss
Begin	End	(#)	(t/ac)	(deg)	(in.)	(in.)	(factor)	(factor)	(deg)	(factor)	(factor)	(ft)	(lbs/ac)	(t/ac)	(%)	(%)	(t/ac)
1/1	01/02/13	0	86	22.5	0	0	1.00	0.94	22.5	27.5	1.480	52	0	3.8	1.1	1.00	0.04
1/2	01/03/13	0	86	22.5	0	0	1.00	0.94	22.5	27.5	1.480	52	22	3.8	1.1	1.00	0.04
1/3	05/01/13	0	86	22.5	0	0	1.00	0.99	22.5	27.5	1.480	52	21	4.2	63.8	1.00	2.70
5/1	09/30/13	0	86	90.0	0	0	1.00	0.99	90.0	12.2	4.000	140	21	9.4	9.3	1.00	0.87
9/30	10/01/13	0	86	90.0	0	0	1.00	0.86	90.0	7.2	4.000	140	54	7.2	0.1	1.00	0.01
10/1	10/02/13	0	86	22.5	0	0	1.00	0.86	22.5	6.4	1.110	39	54	2.0	0.2	1.00	0.00
10/2	12/31/13	0	86	22.5	0	0	1.00	0.99	22.5	6.4	1.110	39	34	3.0	24.4	1.00	0.73
		0			0	0											
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															

NRCS - WEQ INPUT WORKSHEET

Version 9.00 1-12-2005

Producer:	Fort Wainwright Range Control	Climate Data Station:	AK, BIG DELTA	Tract:	
				Field:	C
Planner:	Steven R. Becker, CEP	Field Width (Ft.):	35	Tillage Direct (NS/EW):	EW
				Irrigated? (y or n):	N
Crop Rot:	Gravel Road w/ Snow	Field Direction (NS/EW):	NS	Length/Width Ratio:	6.0
				Wind Erodibility Group:	4 (1-7)
Location:	Donnelly Training Area East	Adjusted Soil "I":	86	Site "C" Value:	32

Average Annual Wind Erosion (t/ac): 1.1 | Yrs in Rotation: 1.0 | Sum Period Erosion: 1.1 (tons/ac)

Crop and Operation Management Records/Residue Calculations (green and dry)

Operation Date (date)	Crop (name)	Operation (name)	No. of Irr./Period (#)	Flat Res. (%)	Yield Adjustment (%)	Yield (units/ac)	Ridge Height (in)	Ridge Spacing (in)	Est. Res Retention (fact)	Est. Res. Dry Matter (lb/ac)	Est. Ground Cover (%)	SGe Dry Residue (lb/ac)	Green Dry Matter (lb/ac)	SGe Green Growth (lb/ac)	Random Roughness (in)
1/1/2013	Weeds, winter, <6 weeks	Start Rotation			-	- -	0	0	-	150	10	0	0	0	0.30
1/2/2013	Weeds, winter, <6 weeks	Over winter loss F	0	0%			0	0	0.60	90	6	22	0	0	0.30
1/3/2013	Weeds, winter, <6 weeks	Roller, smooth F	0	0%			0	0	0.95	86	6	21	0	0	0.40
1/4/2013	Snow Cover	Grow	0	0%			0	0	1.00	86		15	2000	3057	0.40
5/1/2013	Weeds, winter, <6 weeks	Grow	0	0%			0	0	1.00	86		21	0	0	0.40
9/30/2013	Weeds, winter, <6 weeks	Harvest	0	0%	-50%	250 lbs/ac	0	0	1.00	250	16	54	0	0	0.40
10/1/2013	Weeds, winter, <6 weeks	Grow	0	0%			0	0	1.00	250		54	0	0	0.40
10/2/2013	Weeds, winter, <6 weeks	Over winter loss F	0	0%			0	0	0.60	150	10	34	0	0	0.30
10/15/2013	Snow Cover	Grow	0	0%			0	0	1.00	150		26	2000	3037	0.30
12/31/2013		End Rotation					0	0	1.00	150	10				0.30

NRCS - WEQ CALCULATIONS

Version 9.00 1-12-2005

Producer:	Fort Wainwright Range Contr	Planner:	Steven R. Becker, CEP	Location:	Donnelly Training	Tract:		Field:	C
Crop Rotation:	Gravel Road w/ Snow	Climate Data Station:	AK, BIG DELTA			Site "C" Value:	32
Tillage Direction (NS/EW):	EW	Length/width ratio:	6	Field Direction (NS/EW):	NS	Field Width (Ft.):	35
Irrigation (Y or N):	N	Soil "I":	86	Wind Erodibility Group:	4 (1-7)	TWF:	3 (see instr.)
Sum Period Erosion (t/ac):	1.1	No. Yrs in Rotation:	1.0			Av. Annual Wind Erosion:	1.1 (t/ac/yr)

Calculations and Output

Mgt Periods		Irr.	Soil	Ridge Roughness				Random Roughness	Unsheltered Distance				SGe	Erosion			
Dates		No. of	"I"	Dev.	Ht.	Sp.	"Krd"	"Krr"	Dev.	Prep.	WED	"L"	"V"	"E"	EWE	"IF"	Loss
Begin	End	(#)	(t/ac)	(deg)	(in.)	(in.)	(factor)	(factor)	(deg)	(factor)	(factor)	(ft)	(lbs/ac)	(t/ac)	(%)	(%)	(t/ac)
1/1	01/02/13	0	86	67.5	0	0	1.00	0.94	22.5	27.5	1.480	52	0	3.8	1.1	1.00	0.04
1/2	01/03/13	0	86	67.5	0	0	1.00	0.94	22.5	27.5	1.480	52	22	3.8	1.1	1.00	0.04
1/3	01/04/13	0	86	67.5	0	0	1.00	0.86	22.5	27.5	1.480	52	21	3.0	1.1	1.00	0.03
1/4	05/01/13	0	86	67.5	0	0	1.00	0.99	22.5	27.5	1.480	52	3071	0.0	62.7	1.00	0.00
5/1	09/30/13	0	86	0.0	0	0	1.00	0.99	90.0	12.2	4.000	140	21	9.4	9.3	1.00	0.87
9/30	10/01/13	0	86	0.0	0	0	1.00	0.86	90.0	7.2	4.000	140	54	7.2	0.1	1.00	0.01
10/1	10/02/13	0	86	67.5	0	0	1.00	0.86	22.5	6.4	1.110	39	54	2.0	0.2	1.00	0.00
10/2	10/15/13	0	86	67.5	0	0	1.00	0.94	22.5	6.4	1.110	39	34	2.6	2.7	1.00	0.07
10/15	12/31/13	0	86	67.5	0	0	1.00	0.99	22.5	6.4	1.110	39	3063	0.0	21.7	1.00	0.00
		0			0	0											
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															

NRCS - WEQ INPUT WORKSHEET

Version 9.00 1-12-2005

Producer:	Fort Wainwright Range Control	Climate Data Station:	AK, BIG DELTA	Tract:	
				Field:	C
Planner:	Steven R. Becker, CEP	Field Width (Ft.):	35	Tillage Direct (NS/EW):	EW
				Irrigated? (y or n):	N
Crop Rot:	Gravel Road	Field Direction (NS/EW):	NS	Length/Width Ratio:	6.0
				Wind Erodibility Group:	4 (1-7)
Location:	Donnelly Training Area East	Adjusted Soil "I":	86	Site "C" Value:	32

Average Annual Wind Erosion (t/ac): 4.4 | Yrs in Rotation: 1.0 | Sum Period Erosion: 4.4 (tons/ac)

Crop and Operation Management Records/Residue Calculations (green and dry)

Operation Date (date)	Crop (name)	Operation (name)	No. of Irr./Period (#)	Flat Res. (%)	Yield Adjustment (%)	Yield (units/ac)	Ridge Height (in)	Ridge Spacing (in)	Est. Res Retention (fact)	Est. Res. Dry Matter (lb/ac)	Est. Ground Cover (%)	SGe Dry Residue (lb/ac)	Green Dry Matter (lb/ac)	SGe Green Growth (lb/ac)	Random Roughness (in)
1/1/2013	Weeds, winter, <6 weeks	Start Rotation			-	- -	0	0	-	150	10	0	0	0	0.30
1/2/2013	Weeds, winter, <6 weeks	Over winter loss F	0	0%			0	0	0.60	90	6	22	0	0	0.30
1/3/2013	Weeds, winter, <6 weeks	Roller, smooth F	0	0%			0	0	0.95	86	6	21	0	0	0.40
5/1/2013	Weeds, winter, <6 weeks	Grow	0	0%			0	0	1.00	86		21	0	0	0.40
9/30/2013	Weeds, winter, <6 weeks	Harvest	0	0%	-50%	250 lbs/ac	0	0	1.00	250	16	54	0	0	0.40
10/1/2013	Weeds, winter, <6 weeks	Grow	0	0%			0	0	1.00	250		54	0	0	0.40
10/2/2013	Weeds, winter, <6 weeks	Over winter loss F	0	0%			0	0	0.60	150	10	34	0	0	0.30
12/31/2013		End Rotation					0	0	1.00	150	10				0.30

NRCS - WEQ CALCULATIONS

Version 9.00 1-12-2005

Producer:	Fort Wainwright Range Contr	Planner:	Steven R. Becker, CEP	Location:	Donnelly Training
Tract:		Field:	C		
Crop Rotation:	Gravel Road	Climate Data Station:	AK, BIG DELTA	Site "C" Value:	32
Tillage Direction (NS/EW):	EW	Length/width ratio:	6	Field Direction (NS/EW):	NS
Field Width (Ft.):	35				
Irrigation (Y or N):	N	Soil "I":	86	Wind Erodibility Group:	4 (1-7)
TWF:	3 (see instr.)				
Sum Period Erosion (t/ac):	4.4	No. Yrs in Rotation:	1.0	Av. Annual Wind Erosion:	4.4 (t/ac/yr)

Calculations and Output

Mgt Periods Dates Begin	End	Irr. No. of (#)	Soil "I" (t/ac)	Ridge Roughness Dev. (deg)	Ht. (in.)	Sp. (in.)	"Krd" (factor)	Random Roughness "Krr" (factor)	Unsheltered Distance Dev. (deg)	Prep. (factor)	WED (factor)	"L" (ft)	SGe "V" (lbs/ac)	Erosion "E" (t/ac)	EWE (%)	"IF" (%)	Loss (t/ac)
1/1	01/02/13	0	86	67.5	0	0	1.00	0.94	22.5	27.5	1.480	52	0	3.8	1.1	1.00	0.04
1/2	01/03/13	0	86	67.5	0	0	1.00	0.94	22.5	27.5	1.480	52	22	3.8	1.1	1.00	0.04
1/3	05/01/13	0	86	67.5	0	0	1.00	0.99	22.5	27.5	1.480	52	21	4.2	63.8	1.00	2.70
5/1	09/30/13	0	86	0.0	0	0	1.00	0.99	90.0	12.2	4.000	140	21	9.4	9.3	1.00	0.87
9/30	10/01/13	0	86	0.0	0	0	1.00	0.86	90.0	7.2	4.000	140	54	7.2	0.1	1.00	0.01
10/1	10/02/13	0	86	67.5	0	0	1.00	0.86	22.5	6.4	1.110	39	54	2.0	0.2	1.00	0.00
10/2	12/31/13	0	86	67.5	0	0	1.00	0.99	22.5	6.4	1.110	39	34	3.0	24.4	1.00	0.73
		0			0	0											
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															

NRCS - WEQ INPUT WORKSHEET

Version 9.00 1-12-2005

Producer:	Fort Wainwright Range Control	Climate Data Station:	AK, BIG DELTA	Tract:	
				Field:	C
Planner:	Steven R. Becker, CEP	Field Width (Ft.):	35	Tillage Direct (NS/EW):	NS
				Irrigated? (y or n):	N
Crop Rot:	Gravel Road w/ Snow	Field Direction (NS/EW):	EW	Length/Width Ratio:	6.0
				Wind Erodibility Group:	4 (1-7)
Location:	Donnelly Training Area East	Adjusted Soil "I":	86	Site "C" Value:	32

Average Annual Wind Erosion (t/ac): 0.7 | Yrs in Rotation: 1.0 | Sum Period Erosion: 0.7 (tons/ac)

Crop and Operation Management Records/Residue Calculations (green and dry)

Operation Date (date)	Crop (name)	Operation (name)	No. of Irr./Period (#)	Flat Res. (%)	Yield Adjustment (%)	Yield (units/ac)	Ridge Height (in)	Ridge Spacing (in)	Est. Res Retention (fact)	Est. Res. Dry Matter (lb/ac)	Est. Ground Cover (%)	SGe Dry Residue (lb/ac)	Green Dry Matter (lb/ac)	SGe Green Growth (lb/ac)	Random Roughness (in)
1/1/2013	Weeds, winter, <6 weeks	Start Rotation			-	- -	0	0	-	150	10	0	0	0	0.30
1/2/2013	Weeds, winter, <6 weeks	Over winter loss F	0	0%			0	0	0.60	90	6	22	0	0	0.30
1/3/2013	Weeds, winter, <6 weeks	Roller, smooth F	0	0%			0	0	0.95	86	6	21	0	0	0.40
1/4/2013	Snow Cover	Grow	0	0%			0	0	1.00	86		15	2000	3057	0.40
5/1/2013	Weeds, winter, <6 weeks	Grow	0	0%			0	0	1.00	86		21	0	0	0.40
9/30/2013	Weeds, winter, <6 weeks	Harvest	0	0%	-50%	250 lbs/ac	0	0	1.00	250	16	54	0	0	0.40
10/1/2013	Weeds, winter, <6 weeks	Grow	0	0%			0	0	1.00	250		54	0	0	0.40
10/2/2013	Weeds, winter, <6 weeks	Over winter loss F	0	0%			0	0	0.60	150	10	34	0	0	0.30
10/15/2013	Snow Cover	Grow	0	0%			0	0	1.00	150		26	2000	3037	0.30
12/31/2013		End Rotation					0	0	1.00	150	10				0.30

NRCS - WEQ CALCULATIONS

Version 9.00 1-12-2005

Producer:	Fort Wainwright Range Contr	Planner:	Steven R. Becker, CEP	Location:	Donnelly Trainin	Tract:	
						Field:	C
Crop Rotation:	Gravel Road w/ Snow	Climate Data Station:	AK, BIG DELTA			Site "C" Value:	32
Tillage Direction (NS/EW):	NS	Length/width ratio:	6	Field Direction (NS/EW):	EW	Field Width (Ft.):	35
Irrigation (Y or N):	N	Soil "I":	86	Wind Erodibility Group:	4 (1-7)	TWF:	3 (see instr.)
Sum Period Erosion (t/ac):	0.7	No. Yrs in Rotation:	1.0			Av. Annual Wind Erosion:	0.7 (t/ac/yr)

Calculations and Output

Mgt Periods Dates		Irr.	Soil	Ridge Roughness				Random Roughness	Unsheltered Distance				SGe	Erosion			
		No. of	"I"	Dev.	Ht.	Sp.	"Krd"	"Krr"	Dev.	Prep.	WED	"L"	"V"	"E"	EWE	"IF"	Loss
Begin	End	(#)	(t/ac)	(deg)	(in.)	(in.)	(factor)	(factor)	(deg)	(factor)	(factor)	(ft)	(lbs/ac)	(t/ac)	(%)	(%)	(t/ac)
1/1	01/02/13	0	86	22.5	0	0	1.00	0.94	67.5	27.5	4.000	140	0	8.8	1.1	1.00	0.10
1/2	01/03/13	0	86	22.5	0	0	1.00	0.94	67.5	27.5	4.000	140	22	8.6	1.1	1.00	0.10
1/3	01/04/13	0	86	22.5	0	0	1.00	0.86	67.5	27.5	4.000	140	21	7.4	1.1	1.00	0.08
1/4	05/01/13	0	86	22.5	0	0	1.00	0.99	67.5	27.5	4.000	140	3071	0.0	62.7	1.00	0.00
5/1	09/30/13	0	86	90.0	0	0	1.00	0.99	0.0	12.2	1.010	35	21	2.7	9.3	1.00	0.25
9/30	10/01/13	0	86	90.0	0	0	1.00	0.86	0.0	7.2	1.010	35	54	1.8	0.1	1.00	0.00
10/1	10/02/13	0	86	22.5	0	0	1.00	0.86	67.5	6.4	2.490	87	54	5.2	0.2	1.00	0.01
10/2	10/15/13	0	86	22.5	0	0	1.00	0.94	67.5	6.4	2.490	87	34	6.4	2.7	1.00	0.17
10/15	12/31/13	0	86	22.5	0	0	1.00	0.99	67.5	6.4	2.490	87	3063	0.0	21.7	1.00	0.00
		0			0	0											
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															

Mgt Periods		Irr.	Soil	Ridge Roughness				Random Roughness	Unsheltered Distance				SGe	Erosion			
Dates		No. of	"I"	Dev.	Ht.	Sp.	"Krd"	"Krr"	Dev.	Prep.	WED	"L"	"V"	"E"	EWE	"IF"	Loss
Begin	End	(#)	(t/ac)	(deg)	(in.)	(in.)	(factor)	(factor)	(deg)	(factor)	(factor)	(ft)	(lbs/ac)	(t/ac)	(%)	(%)	(t/ac)
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															

Mgt Periods Dates		Irr.	Soil	Ridge Roughness				Random Roughness	Unsheltered Distance				SGe	Erosion			
Begin	End	No. of (#)	"I" (t/ac)	Dev. (deg)	Ht. (in.)	Sp. (in.)	"Krd" (factor)	"Krr" (factor)	Dev. (deg)	Prep. (factor)	WED (factor)	"L" (ft)	"V" (lbs/ac)	"E" (t/ac)	EWE (%)	"IF" (%)	Loss (t/ac)
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															

NRCS - WEQ INPUT WORKSHEET

Version 9.00 1-12-2005

Producer:	Fort Wainwright Range Control	Climate Data Station:	AK, BIG DELTA	Tract:	
				Field:	C
Planner:	Steven R. Becker, CEP	Field Width (Ft.):	35	Tillage Direct (NS/EW):	EW
				Irrigated? (y or n):	N
Crop Rot:	Gravel Road	Field Direction (NS/EW):	EW	Length/Width Ratio:	6.0
				Wind Erodibility Group:	4 (1-7)
Location:	Donnelly Training Area East	Adjusted Soil "I":	86	Site "C" Value:	32

Average Annual Wind Erosion (t/ac):	8.2	Yrs in Rotation:	1.0	Sum Period Erosion:	8.2 (tons/ac)

Crop and Operation Management Records/Residue Calculations (green and dry)

Operation Date (date)	Crop (name)	Operation (name)	No. of Irr./Period (#)	Flat Res. (%)	Yield Adjustment (%)	Yield (units/ac)	Ridge Height (in)	Ridge Spacing (in)	Est. Res Retention (fact)	Est. Res. Dry Matter (lb/ac)	Est. Ground Cover (%)	SGe Dry Residue (lb/ac)	Green Dry Matter (lb/ac)	SGe Green Growth (lb/ac)	Random Roughness (in)
1/1/2013	Weeds, winter, <6 weeks	Start Rotation			-	- -	0	0	-	150	10	0	0	0	0.30
1/2/2013	Weeds, winter, <6 weeks	Over winter loss F	0	0%			0	0	0.60	90	6	22	0	0	0.30
1/3/2013	Weeds, winter, <6 weeks	Roller, smooth F	0	0%			0	0	0.95	86	6	21	0	0	0.40
5/1/2013	Weeds, winter, <6 weeks	Grow	0	0%			0	0	1.00	86		21	0	0	0.40
9/30/2013	Weeds, winter, <6 weeks	Harvest	0	0%	-50%	250 lbs/ac	0	0	1.00	250	16	54	0	0	0.40
10/1/2013	Weeds, winter, <6 weeks	Grow	0	0%			0	0	1.00	250		54	0	0	0.40
10/2/2013	Weeds, winter, <6 weeks	Over winter loss F	0	0%			0	0	0.60	150	10	34	0	0	0.30
12/31/2013		End Rotation					0	0	1.00	150	10				0.30

NRCS - WEQ CALCULATIONS

Version 9.00 1-12-2005

Producer:	Fort Wainwright Range Contro	Planner:	Steven R. Becker, CEP	Location:	Donnelly Training	Tract:	
						Field:	C
Crop Rotation:	Gravel Road	Climate Data Station:	AK, BIG DELTA			Site "C" Value:	32
Tillage Direction (NS/EW):	EW	Length/width ratio:	6	Field Direction (NS/EW):	EW	Field Width (Ft.):	35
Irrigation (Y or N):	N	Soil "I":	86	Wind Erodibility Group:	4 (1-7)	TWF:	3 (see instr.)
Sum Period Erosion (t/ac):	8.2	No. Yrs in Rotation:	1.0			Av. Annual Wind Erosion:	8.2 (t/ac/yr)

Calculations and Output

Mgt Periods		Irr.	Soil	Ridge Roughness				Random Roughness	Unsheltered Distance				SGe	Erosion			
Dates		No. of	"I"	Dev.	Ht.	Sp.	"Krd"	"Krr"	Dev.	Prep.	WED	"L"	"V"	"E"	EWE	"IF"	Loss
Begin	End	(#)	(t/ac)	(deg)	(in.)	(in.)	(factor)	(factor)	(deg)	(factor)	(factor)	(ft)	(lbs/ac)	(t/ac)	(%)	(%)	(t/ac)
1/1	01/02/13	0	86	67.5	0	0	1.00	0.94	67.5	27.5	4.000	140	0	8.8	1.1	1.00	0.10
1/2	01/03/13	0	86	67.5	0	0	1.00	0.94	67.5	27.5	4.000	140	22	8.6	1.1	1.00	0.10
1/3	05/01/13	0	86	67.5	0	0	1.00	0.99	67.5	27.5	4.000	140	21	9.4	63.8	1.00	5.99
5/1	09/30/13	0	86	0.0	0	0	1.00	0.99	0.0	12.2	1.010	35	21	2.7	9.3	1.00	0.25
9/30	10/01/13	0	86	0.0	0	0	1.00	0.86	0.0	7.2	1.010	35	54	1.8	0.1	1.00	0.00
10/1	10/02/13	0	86	67.5	0	0	1.00	0.86	67.5	6.4	2.490	87	54	5.2	0.2	1.00	0.01
10/2	12/31/13	0	86	67.5	0	0	1.00	0.99	67.5	6.4	2.490	87	34	7.0	24.4	1.00	1.71
		0			0	0											
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															

NRCS - WEQ INPUT WORKSHEET

Version 9.00 1-12-2005

Producer:	Fort Wainwright Range Control	Climate Data Station:	AK, BIG DELTA	Tract:	
				Field:	C
Planner:	Steven R. Becker, CEP	Field Width (Ft.):	35	Tillage Direct (NS/EW):	EW
				Irrigated? (y or n):	N
Crop Rot:	Gravel Road w/ Snow	Field Direction (NS/EW):	EW	Length/Width Ratio:	6.0
				Wind Erodibility Group:	4 (1-7)
Location:	Donnelly Training Area East	Adjusted Soil "I":	86	Site "C" Value:	32

Average Annual Wind Erosion (t/ac): 0.7 | Yrs in Rotation: 1.0 | Sum Period Erosion: 0.7 (tons/ac)

Crop and Operation Management Records/Residue Calculations (green and dry)

Operation Date (date)	Crop (name)	Operation (name)	No. of Irr./Period (#)	Flat Res. (%)	Yield Adjustment (%)	Yield (units/ac)	Ridge Height (in)	Ridge Spacing (in)	Est. Res Retention (fact)	Est. Res. Dry Matter (lb/ac)	Est. Ground Cover (%)	SGe Dry Residue (lb/ac)	Green Dry Matter (lb/ac)	SGe Green Growth (lb/ac)	Random Roughness (in)
1/1/2013	Weeds, winter, <6 weeks	Start Rotation			-	- -	0	0	-	150	10	0	0	0	0.30
1/2/2013	Weeds, winter, <6 weeks	Over winter loss F	0	0%			0	0	0.60	90	6	22	0	0	0.30
1/3/2013	Weeds, winter, <6 weeks	Roller, smooth F	0	0%			0	0	0.95	86	6	21	0	0	0.40
1/4/2013	Snow Cover	Grow	0	0%			0	0	1.00	86		15	2000	3057	0.40
5/1/2013	Weeds, winter, <6 weeks	Grow	0	0%			0	0	1.00	86		21	0	0	0.40
9/30/2013	Weeds, winter, <6 weeks	Harvest	0	0%	-50%	250 lbs/ac	0	0	1.00	250	16	54	0	0	0.40
10/1/2013	Weeds, winter, <6 weeks	Grow	0	0%			0	0	1.00	250		54	0	0	0.40
10/2/2013	Weeds, winter, <6 weeks	Over winter loss F	0	0%			0	0	0.60	150	10	34	0	0	0.30
10/15/2013	Snow Cover	Grow	0	0%			0	0	1.00	150		26	2000	3037	0.30
12/31/2013		End Rotation					0	0	1.00	150	10				0.30

NRCS - WEQ CALCULATIONS

Version 9.00 1-12-2005

Producer:	Fort Wainwright Range Contr	Planner:	Steven R. Becker, CEP	Location:	Donnelly Training	Tract:		Field:	C
Crop Rotation:	Gravel Road w/ Snow		Climate Data Station:	AK, BIG DELTA		Site "C" Value:	32
Tillage Direction (NS/EW):	EW	Length/width ratio:	6	Field Direction (NS/EW):	EW	Field Width (Ft.):	35
Irrigation (Y or N):	N	Soil "I":	86	Wind Erodibility Group:	4 (1-7)	TWF:	3 (see instr.)
Sum Period Erosion (t/ac):	0.7		No. Yrs in Rotation:	1.0		Av. Annual Wind Erosion:	0.7 (t/ac/yr)

Calculations and Output

Mgt Periods Dates		Irr.	Soil	Ridge Roughness				Random Roughness	Unsheltered Distance				SGe	Erosion			
Begin	End	No. of (#)	"I" (t/ac)	Dev. (deg)	Ht. (in.)	Sp. (in.)	"Krd" (factor)	"Krr" (factor)	Dev. (deg)	Prep. (factor)	WED (factor)	"L" (ft)	"V" (lbs/ac)	"E" (t/ac)	EWE (%)	"IF" (%)	Loss (t/ac)
1/1	01/02/13	0	86	67.5	0	0	1.00	0.94	67.5	27.5	4.000	140	0	8.8	1.1	1.00	0.10
1/2	01/03/13	0	86	67.5	0	0	1.00	0.94	67.5	27.5	4.000	140	22	8.6	1.1	1.00	0.10
1/3	01/04/13	0	86	67.5	0	0	1.00	0.86	67.5	27.5	4.000	140	21	7.4	1.1	1.00	0.08
1/4	05/01/13	0	86	67.5	0	0	1.00	0.99	67.5	27.5	4.000	140	3071	0.0	62.7	1.00	0.00
5/1	09/30/13	0	86	0.0	0	0	1.00	0.99	0.0	12.2	1.010	35	21	2.7	9.3	1.00	0.25
9/30	10/01/13	0	86	0.0	0	0	1.00	0.86	0.0	7.2	1.010	35	54	1.8	0.1	1.00	0.00
10/1	10/02/13	0	86	67.5	0	0	1.00	0.86	67.5	6.4	2.490	87	54	5.2	0.2	1.00	0.01
10/2	10/15/13	0	86	67.5	0	0	1.00	0.94	67.5	6.4	2.490	87	34	6.4	2.7	1.00	0.17
10/15	12/31/13	0	86	67.5	0	0	1.00	0.99	67.5	6.4	2.490	87	3063	0.0	21.7	1.00	0.00
		0			0	0											
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															

NRCS - WEQ INPUT WORKSHEET

Version 9.00 1-12-2005

Producer:	Fort Wainwright Range Control	Climate Data Station:	AK, BIG DELTA			Tract:		Field: D
Planner:	Steven R. Becker, CEP	Field Width (Ft.):	35	Tillage Direct (NS/EW):	NS	Irrigated? (y or n):	N
Crop Rot:	Gravel Road	Field Direction (NS/EW):	NS	Length/Width Ratio:	6.0	Wind Erodibility Group:	4 (1-7)
Location:	Donnelly Training Area East	Adjusted Soil "I":	86	Site "C" Value:	32		

Average Annual Wind Erosion (t/ac): 4.4 | Yrs in Rotation: 1.0 | Sum Period Erosion: 4.4 (tons/ac)

Crop and Operation Management Records/Residue Calculations (green and dry)

Operation Date (date)	Crop (name)	Operation (name)	No. of Irr./Period (#)	Flat Res. (%)	Yield Adjustment (%)	Yield (units/ac)	Ridge Height (in)	Ridge Spacing (in)	Est. Res Retention (fact)	Est. Res. Dry Matter (lb/ac)	Est. Ground Cover (%)	SGe Dry Residue (lb/ac)	Green Dry Matter (lb/ac)	SGe Green Growth (lb/ac)	Random Roughness (in)
1/1/2013	Weeds, winter, <6 weeks	Start Rotation			-	- -	0	0	-	150	10	0	0	0	0.30
1/2/2013	Weeds, winter, <6 weeks	Over winter loss F	0	0%			0	0	0.60	90	6	22	0	0	0.30
1/3/2013	Weeds, winter, <6 weeks	Roller, smooth F	0	0%			0	0	0.95	86	6	21	0	0	0.40
5/1/2013	Weeds, winter, <6 weeks	Grow	0	0%			0	0	1.00	86		21	0	0	0.40
9/30/2013	Weeds, winter, <6 weeks	Harvest	0	0%	-50%	250 lbs/ac	0	0	1.00	250	16	54	0	0	0.40
10/1/2013	Weeds, winter, <6 weeks	Grow	0	0%			0	0	1.00	250		54	0	0	0.40
10/2/2013	Weeds, winter, <6 weeks	Over winter loss F	0	0%			0	0	0.60	150	10	34	0	0	0.30
12/31/2013		End Rotation					0	0	1.00	150	10				0.30

NRCS - WEQ CALCULATIONS

Version 9.00 1-12-2005

Producer: Fort Wainwright Range Contr | Planner: Steven R. Becker, CEP | Location: Donnelly Training | Tract: | Field: D

Crop Rotation: Gravel Road | Climate Data Station: AK, BIG DELTA | Site "C" Value: 32

Tillage Direction (NS/EW): NS | Length/width ratio: 6 | Field Direction (NS/EW): NS | Field Width (Ft.): 35

Irrigation (Y or N): N | Soil "I": 86 | Wind Erodibility Group: 4 (1-7) | TWF: 3 (see instr.)

Sum Period Erosion (t/ac): 4.4 | No. Yrs in Rotation: 1.0 | Av. Annual Wind Erosion: 4.4 (t/ac/yr)

Calculations and Output

Mgt Periods		Irr.	Soil	Ridge Roughness				Random Roughness	Unsheltered Distance				SGe	Erosion			
Dates		No. of	"I"	Dev.	Ht.	Sp.	"Krd"	"Krr"	Dev.	Prep.	WED	"L"	"V"	"E"	EWE	"IF"	Loss
Begin	End	(#)	(t/ac)	(deg)	(in.)	(in.)	(factor)	(factor)	(deg)	(factor)	(factor)	(ft)	(lbs/ac)	(t/ac)	(%)	(%)	(t/ac)
1/1	01/02/13	0	86	22.5	0	0	1.00	0.94	22.5	27.5	1.480	52	0	3.8	1.1	1.00	0.04
1/2	01/03/13	0	86	22.5	0	0	1.00	0.94	22.5	27.5	1.480	52	22	3.8	1.1	1.00	0.04
1/3	05/01/13	0	86	22.5	0	0	1.00	0.99	22.5	27.5	1.480	52	21	4.2	63.8	1.00	2.70
5/1	09/30/13	0	86	90.0	0	0	1.00	0.99	90.0	12.2	4.000	140	21	9.4	9.3	1.00	0.87
9/30	10/01/13	0	86	90.0	0	0	1.00	0.86	90.0	7.2	4.000	140	54	7.2	0.1	1.00	0.01
10/1	10/02/13	0	86	22.5	0	0	1.00	0.86	22.5	6.4	1.110	39	54	2.0	0.2	1.00	0.00
10/2	12/31/13	0	86	22.5	0	0	1.00	0.99	22.5	6.4	1.110	39	34	3.0	24.4	1.00	0.73
		0			0	0											
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															

NRCS - WEQ INPUT WORKSHEET

Version 9.00 1-12-2005

Producer:	Fort Wainwright Range Control	Climate Data Station:	AK, BIG DELTA			Tract:	
						Field:	D
Planner:	Steven R. Becker, CEP	Field Width (Ft.):	35	Tillage Direct (NS/EW):	NS	Irrigated? (y or n):	N
Crop Rot:	Gravel Road w/ Snow	Field Direction (NS/EW):	NS	Length/Width Ratio:	6.0	Wind Erodibility Group:	4 (1-7)
Location:	Donnelly Training Area East	Adjusted Soil "I":	86	Site "C" Value:	32		

Average Annual Wind Erosion (t/ac): 1.1 | Yrs in Rotation: 1.0 | Sum Period Erosion: 1.1 (tons/ac)

Crop and Operation Management Records/Residue Calculations (green and dry)

Operation Date (date)	Crop (name)	Operation (name)	No. of Irr./Period (#)	Flat Res. (%)	Yield Adjustment (%)	Yield (units/ac)	Ridge Height (in)	Ridge Spacing (in)	Est. Res Retention (fact)	Est. Res. Dry Matter (lb/ac)	Est. Ground Cover (%)	SGe Dry Residue (lb/ac)	Green Dry Matter (lb/ac)	SGe Green Growth (lb/ac)	Random Roughness (in)
1/1/2013	Weeds, winter, <6 weeks	Start Rotation			-	- -	0	0	-	150	10	0	0	0	0.30
1/2/2013	Weeds, winter, <6 weeks	Over winter loss F	0	0%			0	0	0.60	90	6	22	0	0	0.30
1/3/2013	Weeds, winter, <6 weeks	Roller, smooth F	0	0%			0	0	0.95	86	6	21	0	0	0.40
1/4/2013	Snow Cover	Grow	0	0%			0	0	1.00	86		15	2000	3057	0.40
5/1/2013	Weeds, winter, <6 weeks	Grow	0	0%			0	0	1.00	86		21	0	0	0.40
9/30/2013	Weeds, winter, <6 weeks	Harvest	0	0%	-50%	250 lbs/ac	0	0	1.00	250	16	54	0	0	0.40
10/1/2013	Weeds, winter, <6 weeks	Grow	0	0%			0	0	1.00	250		54	0	0	0.40
10/2/2013	Weeds, winter, <6 weeks	Over winter loss F	0	0%			0	0	0.60	150	10	34	0	0	0.30
10/15/2013	Snow Cover	Grow	0	0%			0	0	1.00	150		26	2000	3037	0.30
12/31/2013		End Rotation					0	0	1.00	150	10				0.30

NRCS - WEQ CALCULATIONS

Version 9.00 1-12-2005

Producer: Fort Wainwright Range Contr | Planner: Steven R. Becker, CEP | Location: Donnelly Trainin | Tract: | Field: D

Crop Rotation: Gravel Road w/ Snow | Climate Data Station: AK, BIG DELTA | Site "C" Value: 32

Tillage Direction (NS/EW): NS | Length/width ratio: 6 | Field Direction (NS/EW): NS | Field Width (Ft.): 35

Irrigation (Y or N): N | Soil "I": 86 | Wind Erodibility Group: 4 (1-7) | TWF: 3 (see instr.)

Sum Period Erosion (t/ac): 1.1 | No. Yrs in Rotation: 1.0 | Av. Annual Wind Erosion: 1.1 (t/ac/yr)

Calculations and Output

Mgt Periods Dates		Irr.	Soil	Ridge Roughness				Random Roughness	Unsheltered Distance				SGe	Erosion			
		No. of	"I"	Dev.	Ht.	Sp.	"Krd"	"Krr"	Dev.	Prep.	WED	"L"	"V"	"E"	EWE	"IF"	Loss
Begin	End	(#)	(t/ac)	(deg)	(in.)	(in.)	(factor)	(factor)	(deg)	(factor)	(factor)	(ft)	(lbs/ac)	(t/ac)	(%)	(%)	(t/ac)
1/1	01/02/13	0	86	22.5	0	0	1.00	0.94	22.5	27.5	1.480	52	0	3.8	1.1	1.00	0.04
1/2	01/03/13	0	86	22.5	0	0	1.00	0.94	22.5	27.5	1.480	52	22	3.8	1.1	1.00	0.04
1/3	01/04/13	0	86	22.5	0	0	1.00	0.86	22.5	27.5	1.480	52	21	3.0	1.1	1.00	0.03
1/4	05/01/13	0	86	22.5	0	0	1.00	0.99	22.5	27.5	1.480	52	3071	0.0	62.7	1.00	0.00
5/1	09/30/13	0	86	90.0	0	0	1.00	0.99	90.0	12.2	4.000	140	21	9.4	9.3	1.00	0.87
9/30	10/01/13	0	86	90.0	0	0	1.00	0.86	90.0	7.2	4.000	140	54	7.2	0.1	1.00	0.01
10/1	10/02/13	0	86	22.5	0	0	1.00	0.86	22.5	6.4	1.110	39	54	2.0	0.2	1.00	0.00
10/2	10/15/13	0	86	22.5	0	0	1.00	0.94	22.5	6.4	1.110	39	34	2.6	2.7	1.00	0.07
10/15	12/31/13	0	86	22.5	0	0	1.00	0.99	22.5	6.4	1.110	39	3063	0.0	21.7	1.00	0.00
		0			0	0											
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															

NRCS - WEQ INPUT WORKSHEET

Version 9.00 1-12-2005

Producer:	Fort Wainwright Range Control	Climate Data Station:	AK, BIG DELTA	Tract:	
				Field:	D
Planner:	Steven R. Becker, CEP	Field Width (Ft.):	35	Tillage Direct (NS/EW):	EW
				Irrigated? (y or n):	N
Crop Rot:	Gravel Road	Field Direction (NS/EW):	NS	Length/Width Ratio:	6.0
				Wind Erodibility Group:	4 (1-7)
Location:	Donnelly Training Area East	Adjusted Soil "I":	86	Site "C" Value:	32

Average Annual Wind Erosion (t/ac): 4.4 | Yrs in Rotation: 1.0 | Sum Period Erosion: 4.4 (tons/ac)

Crop and Operation Management Records/Residue Calculations (green and dry)

Operation Date (date)	Crop (name)	Operation (name)	No. of Irr./Period (#)	Flat Res. (%)	Yield Adjustment (%)	Yield (units/ac)	Ridge Height (in)	Ridge Spacing (in)	Est. Res Retention (fact)	Est. Res. Dry Matter (lb/ac)	Est. Ground Cover (%)	SGe Dry Residue (lb/ac)	Green Dry Matter (lb/ac)	SGe Green Growth (lb/ac)	Random Roughness (in)
1/1/2013	Weeds, winter, <6 weeks	Start Rotation			-	- -	0	0	-	150	10	0	0	0	0.30
1/2/2013	Weeds, winter, <6 weeks	Over winter loss F	0	0%			0	0	0.60	90	6	22	0	0	0.30
1/3/2013	Weeds, winter, <6 weeks	Roller, smooth F	0	0%			0	0	0.95	86	6	21	0	0	0.40
5/1/2013	Weeds, winter, <6 weeks	Grow	0	0%			0	0	1.00	86		21	0	0	0.40
9/30/2013	Weeds, winter, <6 weeks	Harvest	0	0%	-50%	250 lbs/ac	0	0	1.00	250	16	54	0	0	0.40
10/1/2013	Weeds, winter, <6 weeks	Grow	0	0%			0	0	1.00	250		54	0	0	0.40
10/2/2013	Weeds, winter, <6 weeks	Over winter loss F	0	0%			0	0	0.60	150	10	34	0	0	0.30
12/31/2013		End Rotation					0	0	1.00	150	10				0.30

NRCS - WEQ CALCULATIONS

Version 9.00 1-12-2005

Producer:	Fort Wainwright Range Contr	Planner:	Steven R. Becker, CEP	Location:	Donnelly Trainin	Tract:	
						Field:	D
Crop Rotation:	Gravel Road	Climate Data Station:	AK, BIG DELTA			Site "C" Value:	32
Tillage Direction (NS/EW):	EW	Length/width ratio:	6	Field Direction (NS/EW):	NS	Field Width (Ft.):	35
Irrigation (Y or N):	N	Soil "I":	86	Wind Erodibility Group:	4 (1-7)	TWF:	3 (see instr.)
Sum Period Erosion (t/ac):	4.4	No. Yrs in Rotation:	1.0			Av. Annual Wind Erosion:	4.4 (t/ac/yr)

Calculations and Output

Mgt Periods		Irr.	Soil	Ridge Roughness				Random Roughness	Unsheltered Distance				SGe	Erosion			
Dates		No. of	"I"	Dev.	Ht.	Sp.	"Krd"	"Krr"	Dev.	Prep.	WED	"L"	"V"	"E"	EWE	"IF"	Loss
Begin	End	(#)	(t/ac)	(deg)	(in.)	(in.)	(factor)	(factor)	(deg)	(factor)	(factor)	(ft)	(lbs/ac)	(t/ac)	(%)	(%)	(t/ac)
1/1	01/02/13	0	86	67.5	0	0	1.00	0.94	22.5	27.5	1.480	52	0	3.8	1.1	1.00	0.04
1/2	01/03/13	0	86	67.5	0	0	1.00	0.94	22.5	27.5	1.480	52	22	3.8	1.1	1.00	0.04
1/3	05/01/13	0	86	67.5	0	0	1.00	0.99	22.5	27.5	1.480	52	21	4.2	63.8	1.00	2.70
5/1	09/30/13	0	86	0.0	0	0	1.00	0.99	90.0	12.2	4.000	140	21	9.4	9.3	1.00	0.87
9/30	10/01/13	0	86	0.0	0	0	1.00	0.86	90.0	7.2	4.000	140	54	7.2	0.1	1.00	0.01
10/1	10/02/13	0	86	67.5	0	0	1.00	0.86	22.5	6.4	1.110	39	54	2.0	0.2	1.00	0.00
10/2	12/31/13	0	86	67.5	0	0	1.00	0.99	22.5	6.4	1.110	39	34	3.0	24.4	1.00	0.73
		0			0	0											
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															

NRCS - WEQ INPUT WORKSHEET

Version 9.00 1-12-2005

Producer:	Fort Wainwright Range Control	Climate Data Station:	AK, BIG DELTA		Tract:		Field: D
Planner:	Steven R. Becker, CEP	Field Width (Ft.):	35	Tillage Direct (NS/EW):	EW	Irrigated? (y or n):	N
Crop Rot:	Gravel Road w/ Snow	Field Direction (NS/EW):	NS	Length/Width Ratio:	6.0	Wind Erodibility Group:	4 (1-7)
Location:	Donnelly Training Area East	Adjusted Soil "I":	86	Site "C" Value:	32		

Average Annual Wind Erosion (t/ac): 1.0 | Yrs in Rotation: 1.0 | Sum Period Erosion: 1.0 (tons/ac)

Crop and Operation Management Records/Residue Calculations (green and dry)

Operation Date (date)	Crop (name)	Operation (name)	No. of Irr./Period (#)	Flat Res. (%)	Yield Adjustment (%)	Yield (units/ac)	Ridge Height (in)	Ridge Spacing (in)	Est. Res Retention (fact)	Est. Res. Dry Matter (lb/ac)	Est. Ground Cover (%)	SGe Dry Residue (lb/ac)	Green Dry Matter (lb/ac)	SGe Green Growth (lb/ac)	Random Roughness (in)
1/1/2013	Weeds, winter, <6 weeks	Start Rotation			-	- -	0	0	-	150	10	0	0	0	0.30
1/2/2013	Weeds, winter, <6 weeks	Over winter loss F	0	0%			0	0	0.60	90	6	22	0	0	0.30
1/3/2013	Weeds, winter, <6 weeks	Roller, smooth F	0	0%			0	0	0.95	86	6	21	0	0	0.40
1/4/2013	Snow Cover	Grow	0	0%			0	0	1.00	86		15	2000	3057	0.40
5/1/2013	Weeds, winter, <6 weeks	Grow	0	0%			0	0	1.00	86		21	0	0	0.40
9/30/2013	Weeds, winter, <6 weeks	Harvest	0	0%	-50%	250 lbs/ac	0	0	1.00	250	16	54	0	0	0.40
10/1/2013	Weeds, winter, <6 weeks	Grow	0	0%			0	0	1.00	250		54	0	0	0.40
10/2/2013	Weeds, winter, <6 weeks	Over winter loss F	0	0%			0	0	0.60	150	10	34	0	0	0.30
10/3/2013	Snow Cover	Grow	0	0%			0	0	1.00	150		26	2000	3037	0.30
12/31/2013		End Rotation					0	0	1.00	150	10				0.30

NRCS - WEQ CALCULATIONS

Version 9.00 1-12-2005

Producer:	Fort Wainwright Range Contr	Planner:	Steven R. Becker, CEP	Location:	Donnelly Trainin	Tract:	
Field:	D						
Crop Rotation:	Gravel Road w/ Snow	Climate Data Station:	AK, BIG DELTA			Site "C" Value:	32
Tillage Direction (NS/EW):	EW	Length/width ratio:	6	Field Direction (NS/EW):	NS	Field Width (Ft.):	35
Irrigation (Y or N):	N	Soil "I":	86	Wind Erodibility Group:	4 (1-7)	TWF:	3 (see instr.)
Sum Period Erosion (t/ac):	1.0	No. Yrs in Rotation:	1.0			Av. Annual Wind Erosion:	1.0 (t/ac/yr)

Calculations and Output

Mgt Periods Dates		Irr.	Soil	Ridge Roughness				Random Roughness	Unsheltered Distance				SGe	Erosion			
		No. of	"I"	Dev.	Ht.	Sp.	"Krd"	"Krr"	Dev.	Prep.	WED	"L"	"V"	"E"	EWE	"IF"	Loss
Begin	End	(#)	(t/ac)	(deg)	(in.)	(in.)	(factor)	(factor)	(deg)	(factor)	(factor)	(ft)	(lbs/ac)	(t/ac)	(%)	(%)	(t/ac)
1/1	01/02/13	0	86	67.5	0	0	1.00	0.94	22.5	27.5	1.480	52	0	3.8	1.1	1.00	0.04
1/2	01/03/13	0	86	67.5	0	0	1.00	0.94	22.5	27.5	1.480	52	22	3.8	1.1	1.00	0.04
1/3	01/04/13	0	86	67.5	0	0	1.00	0.86	22.5	27.5	1.480	52	21	3.0	1.1	1.00	0.03
1/4	05/01/13	0	86	67.5	0	0	1.00	0.99	22.5	27.5	1.480	52	3071	0.0	62.7	1.00	0.00
5/1	09/30/13	0	86	0.0	0	0	1.00	0.99	90.0	12.2	4.000	140	21	9.4	9.3	1.00	0.87
9/30	10/01/13	0	86	0.0	0	0	1.00	0.86	90.0	7.2	4.000	140	54	7.2	0.1	1.00	0.01
10/1	10/02/13	0	86	67.5	0	0	1.00	0.86	22.5	6.4	1.110	39	54	2.0	0.2	1.00	0.00
10/2	10/03/13	0	86	67.5	0	0	1.00	0.94	22.5	6.4	1.110	39	34	2.6	0.2	1.00	0.01
10/3	12/31/13	0	86	67.5	0	0	1.00	0.99	22.5	6.4	1.110	39	3063	0.0	24.2	1.00	0.00
		0			0	0											
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															

NRCS - WEQ INPUT WORKSHEET

Version 9.00 1-12-2005

Producer:	Fort Wainwright Range Control	**Climate Data Station:**	AK, BIG DELTA			**Tract:**	
						Field:	D
Planner:	Steven R. Becker, CEP	**Field Width (Ft.):**	35	**Tillage Direct (NS/EW):**	NS	**Irrigated? (y or n):**	N
Crop Rot:	Gravel Road	**Field Direction (NS/EW):**	EW	**Length/Width Ratio:**	6.0	**Wind Erodibility Group:**	4 (1-7)
Location:	Donnelly Training Area East	**Adjusted Soil "I":**	86	**Site "C" Value:**	32		

Average Annual Wind Erosion (t/ac):	**8.2**	**Yrs in Rotation:**	**1.0**	**Sum Period Erosion:**	**8.2** (tons/ac)

Crop and Operation Management Records/Residue Calculations (green and dry)

Operation Date (date)	Crop (name)	Operation (name)	No. of Irr./Period (#)	Flat Res. (%)	Yield Adjustment (%)	Yield (units/ac)	Ridge Height (in)	Ridge Spacing (in)	Est. Res Retention (fact)	Est. Res. Dry Matter (lb/ac)	Est. Ground Cover (%)	SGe Dry Residue (lb/ac)	Green Dry Matter (lb/ac)	SGe Green Growth (lb/ac)	Random Roughness (in)
1/1/2013	Weeds, winter, <6 weeks	Start Rotation			-	- -	0	0	-	150	10	0	0	0	0.30
1/2/2013	Weeds, winter, <6 weeks	Over winter loss F	0	0%			0	0	0.60	90	6	22	0	0	0.30
1/3/2013	Weeds, winter, <6 weeks	Roller, smooth F	0	0%			0	0	0.95	86	6	21	0	0	0.40
5/1/2013	Weeds, winter, <6 weeks	Grow	0	0%			0	0	1.00	86		21	0	0	0.40
9/30/2013	Weeds, winter, <6 weeks	Harvest	0	0%	-50%	250 lbs/ac	0	0	1.00	250	16	54	0	0	0.40
10/1/2013	Weeds, winter, <6 weeks	Grow	0	0%			0	0	1.00	250		54	0	0	0.40
10/2/2013	Weeds, winter, <6 weeks	Over winter loss F	0	0%			0	0	0.60	150	10	34	0	0	0.30
12/31/2013		End Rotation					0	0	1.00	150	10				0.30

NRCS - WEQ CALCULATIONS

Version 9.00 1-12-2005

Producer:	Fort Wainwright Range Contr	Planner:	Steven R. Becker, CEP	Location:	Donnelly Trainin	Tract:	
Field:	D						
Crop Rotation:	Gravel Road	Climate Data Station:	AK, BIG DELTA	Site "C" Value:	32		
Tillage Direction (NS/EW):	NS	Length/width ratio:	6	Field Direction (NS/EW):	EW	Field Width (Ft.):	35
Irrigation (Y or N):	N	Soil "I":	86	Wind Erodibility Group:	4 (1-7)	TWF:	3 (see instr.)
Sum Period Erosion (t/ac):	8.2	No. Yrs in Rotation:	1.0	Av. Annual Wind Erosion:	8.2 (t/ac/yr)		

Calculations and Output

Mgt Periods Dates		Irr.	Soil	Ridge Roughness				Random Roughness	Unsheltered Distance				SGe	Erosion			
		No. of	"I"	Dev.	Ht.	Sp.	"Krd"	"Krr"	Dev.	Prep.	WED	"L"	"V"	"E"	EWE	"IF"	Loss
Begin	End	(#)	(t/ac)	(deg)	(in.)	(in.)	(factor)	(factor)	(deg)	(factor)	(factor)	(ft)	(lbs/ac)	(t/ac)	(%)	(%)	(t/ac)
1/1	01/02/13	0	86	22.5	0	0	1.00	0.94	67.5	27.5	4.000	140	0	8.8	1.1	1.00	0.10
1/2	01/03/13	0	86	22.5	0	0	1.00	0.94	67.5	27.5	4.000	140	22	8.6	1.1	1.00	0.10
1/3	05/01/13	0	86	22.5	0	0	1.00	0.99	67.5	27.5	4.000	140	21	9.4	63.8	1.00	5.99
5/1	09/30/13	0	86	90.0	0	0	1.00	0.99	0.0	12.2	1.010	35	21	2.7	9.3	1.00	0.25
9/30	10/01/13	0	86	90.0	0	0	1.00	0.86	0.0	7.2	1.010	35	54	1.8	0.1	1.00	0.00
10/1	10/02/13	0	86	22.5	0	0	1.00	0.86	67.5	6.4	2.490	87	54	5.2	0.2	1.00	0.01
10/2	12/31/13	0	86	22.5	0	0	1.00	0.99	67.5	6.4	2.490	87	34	7.0	24.4	1.00	1.71
		0			0	0											
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															

NRCS - WEQ INPUT WORKSHEET

Version 9.00 1-12-2005

Producer:	Fort Wainwright Range Control	Climate Data Station:	AK, BIG DELTA	Tract:	
				Field:	D
Planner:	Steven R. Becker, CEP	Field Width (Ft.):	35	Tillage Direct (NS/EW):	NS
				Irrigated? (y or n):	N
Crop Rot:	Gravel Road w/ Snow	Field Direction (NS/EW):	EW	Length/Width Ratio:	6.0
				Wind Erodibility Group:	4 (1-7)
Location:	Donnelly Training Area East	Adjusted Soil "I":	86	Site "C" Value:	32

Average Annual Wind Erosion (t/ac): 0.7 | Yrs in Rotation: 1.0 | Sum Period Erosion: 0.7 (tons/ac)

Crop and Operation Management Records/Residue Calculations (green and dry)

Operation Date (date)	Crop (name)	Operation (name)	No. of Irr./Period (#)	Flat Res. (%)	Yield Adjustment (%)	Yield (units/ac)	Ridge Height (in)	Ridge Spacing (in)	Est. Res Retention (fact)	Est. Res. Dry Matter (lb/ac)	Est. Ground Cover (%)	SGe Dry Residue (lb/ac)	Green Dry Matter (lb/ac)	SGe Green Growth (lb/ac)	Random Roughness (in)
1/1/2013	Weeds, winter, <6 weeks	Start Rotation			-	- -	0	0	-	250	16	0	0	0	0.40
1/2/2013	Weeds, winter, <6 weeks	Over winter loss F	0	0%			0	0	0.60	150	10	34	0	0	0.30
1/3/2013	Weeds, winter, <6 weeks	Roller, smooth F	0	0%			0	0	0.95	143	10	33	0	0	0.40
1/4/2013	Snow Cover	Grow	0	0%			0	0	1.00	143		24	2000	3039	0.40
5/1/2013	Weeds, winter, <6 weeks	Grow	0	0%			0	0	1.00	143		33	0	0	0.40
9/30/2013	Weeds, winter, <6 weeks	Harvest	0	0%	-50%	250 lbs/ac	0	0	1.00	250	16	54	0	0	0.40
10/1/2013	Weeds, winter, <6 weeks	Grow	0	0%			0	0	1.00	250		54	0	0	0.40
10/15/2013	Snow Cover	Grow	0	0%			0	0	1.00	250		43	2000	3009	0.40
12/31/2013		End Rotation					0	0	1.00	250	16				0.40

NRCS - WEQ CALCULATIONS

Version 9.00 1-12-2005

Producer:	Fort Wainwright Range Contr	Planner:	Steven R. Becker, CEP	Location:	Donnelly Trainin	Tract:		Field:	D		
Crop Rotation:	Gravel Road w/ Snow			Climate Data Station:	AK, BIG DELTA	Site "C" Value:	32				
Tillage Direction (NS/EW):	NS	Length/width ratio:	6	Field Direction (NS/EW):	EW	Field Width (Ft.):	35				
Irrigation (Y or N):	N	Soil "I":	86	Wind Erodibility Group:	4	(1-7)		TWF:	3	(see instr.)	
Sum Period Erosion (t/ac):	0.7	No. Yrs in Rotation:	1.0	Av. Annual Wind Erosion:	0.7	(t/ac/yr)					

Calculations and Output

Mgt Periods Dates Begin	End	Irr. No. of (#)	Soil "I" (t/ac)	Ridge Roughness Dev. (deg)	Ht. (in.)	Sp. (in.)	"Krd" (factor)	Random Roughness "Krr" (factor)	Unsheltered Distance Dev. (deg)	Prep. (factor)	WED (factor)	"L" (ft)	SGe "V" (lbs/ac)	Erosion "E" (t/ac)	EWE (%)	"IF" (%)	Loss (t/ac)
1/1	01/02/13	0	86	22.5	0	0	1.00	0.86	67.5	27.5	4.000	140	0	7.5	1.1	1.00	0.08
1/2	01/03/13	0	86	22.5	0	0	1.00	0.94	67.5	27.5	4.000	140	34	8.5	1.1	1.00	0.09
1/3	01/04/13	0	86	22.5	0	0	1.00	0.86	67.5	27.5	4.000	140	33	7.3	1.1	1.00	0.08
1/4	05/01/13	0	86	22.5	0	0	1.00	0.99	67.5	27.5	4.000	140	3064	0.0	62.7	1.00	0.00
5/1	09/30/13	0	86	90.0	0	0	1.00	0.99	0.0	12.2	1.010	35	33	2.7	9.3	1.00	0.25
9/30	10/01/13	0	86	90.0	0	0	1.00	0.86	0.0	7.2	1.010	35	54	1.8	0.1	1.00	0.00
10/1	10/15/13	0	86	22.5	0	0	1.00	0.86	67.5	6.4	2.490	87	54	5.2	2.9	1.00	0.15
10/15	12/31/13	0	86	22.5	0	0	1.00	0.99	67.5	6.4	2.490	87	3051	0.0	21.7	1.00	0.00
		0			0	0											
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															

NRCS - WEQ INPUT WORKSHEET

Version 9.00 1-12-2005

Producer:	Fort Wainwright Range Control	Climate Data Station:	AK, BIG DELTA	Tract:	
				Field:	D
Planner:	Steven R. Becker, CEP	Field Width (Ft.):	35	Tillage Direct (NS/EW):	EW
				Irrigated? (y or n):	N
Crop Rot:	Gravel Road	Field Direction (NS/EW):	EW	Length/Width Ratio:	6.0
				Wind Erodibility Group:	4 (1-7)
Location:	Donnelly Training Area East	Adjusted Soil "I":	86	Site "C" Value:	32

Average Annual Wind Erosion (t/ac):	8.2	Yrs in Rotation:	1.0	Sum Period Erosion:	8.2 (tons/ac)

Crop and Operation Management Records/Residue Calculations (green and dry)

Operation Date (date)	Crop (name)	Operation (name)	No. of Irr./Period (#)	Flat Res. (%)	Yield Adjustment (%)	Yield (units/ac)	Ridge Height (in)	Ridge Spacing (in)	Est. Res Retention (fact)	Est. Res. Dry Matter (lb/ac)	Est. Ground Cover (%)	SGe Dry Residue (lb/ac)	Green Dry Matter (lb/ac)	SGe Green Growth (lb/ac)	Random Roughness (in)
1/1/2013	Weeds, winter, <6 weeks	Start Rotation			-	- -	0	0	-	150	10	0	0	0	0.30
1/2/2013	Weeds, winter, <6 weeks	Over winter loss F	0	0%			0	0	0.60	90	6	22	0	0	0.30
1/3/2013	Weeds, winter, <6 weeks	Roller, smooth F	0	0%			0	0	0.95	86	6	21	0	0	0.40
5/1/2013	Weeds, winter, <6 weeks	Grow	0	0%			0	0	1.00	86		21	0	0	0.40
9/30/2013	Weeds, winter, <6 weeks	Harvest	0	0%	-50%	250 lbs/ac	0	0	1.00	250	16	54	0	0	0.40
10/1/2013	Weeds, winter, <6 weeks	Grow	0	0%			0	0	1.00	250		54	0	0	0.40
10/2/2013	Weeds, winter, <6 weeks	Over winter loss F	0	0%			0	0	0.60	150	10	34	0	0	0.30
12/31/2013		End Rotation					0	0	1.00	150	10				0.30

NRCS - WEQ CALCULATIONS

Version 9.00 1-12-2005

Producer:	Fort Wainwright Range Contr	Planner:	Steven R. Becker, CEP	Location:	Donnelly Trainin	Tract:	
						Field:	D
Crop Rotation:	Gravel Road	Climate Data Station:	AK, BIG DELTA			Site "C" Value:	32
Tillage Direction (NS/EW):	EW	Length/width ratio:	6	Field Direction (NS/EW):	EW	Field Width (Ft.):	35
Irrigation (Y or N):	N	Soil "I":	86	Wind Erodibility Group:	4 (1-7)	TWF:	3 (see instr.)
Sum Period Erosion (t/ac):	8.2	No. Yrs in Rotation:	1.0			Av. Annual Wind Erosion:	8.2 (t/ac/yr)

Calculations and Output

Mgt Periods		Irr.	Soil	Ridge Roughness				Random Roughness	Unsheltered Distance				SGe	Erosion			
Dates		No. of	"I"	Dev.	Ht.	Sp.	"Krd"	"Krr"	Dev.	Prep.	WED	"L"	"V"	"E"	EWE	"IF"	Loss
Begin	End	(#)	(t/ac)	(deg)	(in.)	(in.)	(factor)	(factor)	(deg)	(factor)	(factor)	(ft)	(lbs/ac)	(t/ac)	(%)	(%)	(t/ac)
1/1	01/02/13	0	86	67.5	0	0	1.00	0.94	67.5	27.5	4.000	140	0	8.8	1.1	1.00	0.10
1/2	01/03/13	0	86	67.5	0	0	1.00	0.94	67.5	27.5	4.000	140	22	8.6	1.1	1.00	0.10
1/3	05/01/13	0	86	67.5	0	0	1.00	0.99	67.5	27.5	4.000	140	21	9.4	63.8	1.00	5.99
5/1	09/30/13	0	86	0.0	0	0	1.00	0.99	0.0	12.2	1.010	35	21	2.7	9.3	1.00	0.25
9/30	10/01/13	0	86	0.0	0	0	1.00	0.86	0.0	7.2	1.010	35	54	1.8	0.1	1.00	0.00
10/1	10/02/13	0	86	67.5	0	0	1.00	0.86	67.5	6.4	2.490	87	54	5.2	0.2	1.00	0.01
10/2	12/31/13	0	86	67.5	0	0	1.00	0.99	67.5	6.4	2.490	87	34	7.0	24.4	1.00	1.71
		0			0	0											
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															

NRCS - WEQ INPUT WORKSHEET

Version 9.00 1-12-2005

Producer:	Fort Wainwright Range Control	Climate Data Station:	AK, BIG DELTA	Tract:	
				Field:	D
Planner:	Steven R. Becker, CEP	Field Width (Ft.):	35	Tillage Direct (NS/EW):	EW
				Irrigated? (y or n):	N
Crop Rot:	Gravel Road w/ Snow	Field Direction (NS/EW):	EW	Length/Width Ratio:	6.0
				Wind Erodibility Group:	4 (1-7)
Location:	Donnelly Training Area East	Adjusted Soil "I":	86	Site "C" Value:	32

Average Annual Wind Erosion (t/ac): 0.7 | Yrs in Rotation: 1.0 | Sum Period Erosion: 0.7 (tons/ac)

Crop and Operation Management Records/Residue Calculations (green and dry)

Operation Date (date)	Crop (name)	Operation (name)	No. of Irr./Period (#)	Flat Res. (%)	Yield Adjustment (%)	Yield (units/ac)	Ridge Height (in)	Ridge Spacing (in)	Est. Res Retention (fact)	Est. Res. Dry Matter (lb/ac)	Est. Ground Cover (%)	SGe Dry Residue (lb/ac)	Green Dry Matter (lb/ac)	SGe Green Growth (lb/ac)	Random Roughness (in)
1/1/2013	Weeds, winter, <6 weeks	Start Rotation			-	- -	0	0	-	150	10	0	0	0	0.30
1/2/2013	Weeds, winter, <6 weeks	Over winter loss F	0	0%			0	0	0.60	90	6	22	0	0	0.30
1/3/2013	Weeds, winter, <6 weeks	Roller, smooth F	0	0%			0	0	0.95	86	6	21	0	0	0.40
1/4/2013	Snow Cover	Grow	0	0%			0	0	1.00	86		15	2000	3057	0.40
5/1/2013	Weeds, winter, <6 weeks	Grow	0	0%			0	0	1.00	86		21	0	0	0.40
9/30/2013	Weeds, winter, <6 weeks	Harvest	0	0%	-50%	250 lbs/ac	0	0	1.00	250	16	54	0	0	0.40
10/1/2013	Weeds, winter, <6 weeks	Grow	0	0%			0	0	1.00	250		54	0	0	0.40
10/2/2013	Weeds, winter, <6 weeks	Over winter loss F	0	0%			0	0	0.60	150	10	34	0	0	0.30
10/15/2013	Snow Cover	Grow					0	0	1.00	150		26	2000	3037	0.30
12/31/2013		End Rotation					0	0	1.00	150	10				0.30

NRCS - WEQ CALCULATIONS

Version 9.00 1-12-2005

Producer:	Fort Wainwright Range Contr	Planner:	Steven R. Becker, CEP	Location:	Donnelly Trainin	Tract:	Field: D
Crop Rotation:	Gravel Road w/ Snow	Climate Data Station:	AK, BIG DELTA			Site "C" Value:	32
Tillage Direction (NS/EW):	EW	Length/width ratio:	6	Field Direction (NS/EW):	EW	Field Width (Ft.):	35
Irrigation (Y or N):	N	Soil "I": 86	Wind Erodibility Group:	4	(1-7)	TWF: 3	(see instr.)
Sum Period Erosion (t/ac):	0.7		No. Yrs in Rotation:	1.0		Av. Annual Wind Erosion: 0.7	(t/ac/yr)

Calculations and Output

Mgt Periods		Irr.	Soil	Ridge Roughness				Random Roughness	Unsheltered Distance				SGe	Erosion			
Dates		No. of	"I"	Dev.	Ht.	Sp.	"Krd"	"Krr"	Dev.	Prep.	WED	"L"	"V"	"E"	EWE	"IF"	Loss
Begin	End	(#)	(t/ac)	(deg)	(in.)	(in.)	(factor)	(factor)	(deg)	(factor)	(factor)	(ft)	(lbs/ac)	(t/ac)	(%)	(%)	(t/ac)
1/1	01/02/13	0	86	67.5	0	0	1.00	0.94	67.5	27.5	4.000	140	0	8.8	1.1	1.00	0.10
1/2	01/03/13	0	86	67.5	0	0	1.00	0.94	67.5	27.5	4.000	140	22	8.6	1.1	1.00	0.10
1/3	01/04/13	0	86	67.5	0	0	1.00	0.86	67.5	27.5	4.000	140	21	7.4	1.1	1.00	0.08
1/4	05/01/13	0	86	67.5	0	0	1.00	0.99	67.5	27.5	4.000	140	3071	0.0	62.7	1.00	0.00
5/1	09/30/13	0	86	0.0	0	0	1.00	0.99	0.0	12.2	1.010	35	21	2.7	9.3	1.00	0.25
9/30	10/01/13	0	86	0.0	0	0	1.00	0.86	0.0	7.2	1.010	35	54	1.8	0.1	1.00	0.00
10/1	10/02/13	0	86	67.5	0	0	1.00	0.86	67.5	6.4	2.490	87	54	5.2	0.2	1.00	0.01
10/2	10/15/13	0	86	67.5	0	0	1.00	0.94	67.5	6.4	2.490	87	34	6.4	2.7	1.00	0.17
10/15	12/31/13	0	86	67.5	0	0	1.00	0.99	67.5	6.4	2.490	87	3063	0.0	21.7	1.00	0.00
		0			0	0											
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															

NRCS - WEQ INPUT WORKSHEET

Version 9.00 1-12-2005

Producer:	Fort Wainwright Range Control	Climate Data Station:	AK, BIG DELTA			Tract:	
						Field:	E
Planner:	Steven R. Becker, CEP	Field Width (Ft.):	115	Tillage Direct (NS/EW):	NS	Irrigated? (y or n):	N
Crop Rot:	Winter Trail	Field Direction (NS/EW):	NS	Length/Width Ratio:	6.0	Wind Erodibility Group:	4 (1-7)
Location:	Donnelly Training Area East	Adjusted Soil "I":	86	Site "C" Value:	32		

Average Annual Wind Erosion (t/ac): 0.0 | Yrs in Rotation: 1.0 | Sum Period Erosion: 0.0 (tons/ac)

Crop and Operation Management Records/Residue Calculations (green and dry)

Operation Date (date)	Crop (name)	Operation (name)	No. of Irr./Period (#)	Flat Res. (%)	Yield Adjustment (%)	Yield (units/ac)	Ridge Height (in)	Ridge Spacing (in)	Est. Res Retention (fact)	Est. Res. Dry Matter (lb/ac)	Est. Ground Cover (%)	SGe Dry Residue (lb/ac)	Green Dry Matter (lb/ac)	SGe Green Growth (lb/ac)	Random Roughness (in)
1/1/2013		Start Rotation			-	- -	1	6	-	2000	67	0	0	0	0.40
1/2/2013	Pasture/Hay, spring	Over winter loss F					1	6	0.60	1200	50	3339	0	0	0.30
5/1/2013	Pasture/Hay, spring 15	Seeder, corrugated packer F					1	6	0.95	1140	49	3173	50	87	0.40
5/15/2013	Pasture/Hay, spring 15	Grow					1	6	1.00	1140		3173	50	87	0.40
5/30/2013	Pasture/Hay, spring 30	Grow					1	6	1.00	1140		3169	100	175	0.40
6/15/2013	Pasture/Hay, spring 45	Grow					1	6	1.00	1140		3114	1000	1982	0.40
6/30/2013	Pasture/Hay, spring 60	Grow					1	6	1.00	1140		3059	2600	5836	0.40
7/15/2013	Pasture/Hay, spring 75	Grow					1	6	1.00	1140		3059	2600	5836	0.40
10/15/2013	Pasture/Hay, spring	Harvest			-50%	1 ton/ac	1	6	1.00	2000	67	5476	0	0	0.40
10/16/2013	Snow Cover	Grow					1	6	1.00	2000		5356	2000	2668	0.40
12/31/2013		End Rotation					1	6	1.00	2000	67				0.40

NRCS - WEQ CALCULATIONS

Version 9.00 1-12-2005

Producer: Fort Wainwright Range Contr
Planner: Steven R. Becker, CEP
Location: Donnelly Trainin
Tract:
Field: E

Crop Rotation: Winter Trail
Climate Data Station: AK, BIG DELTA
Site "C" Value: 32

Tillage Direction (NS/EW): NS
Length/width ratio: 6
Field Direction (NS/EW): NS
Field Width (Ft.): 115

Irrigation (Y or N): N
Soil "I": 86
Wind Erodibility Group: 4 (1-7)
TWF: 3 (see instr.)

Sum Period Erosion (t/ac): 0.0
No. Yrs in Rotation: 1.0
Av. Annual Wind Erosion: 0.0 (t/ac/yr)

Calculations and Output

Mgt Periods		Irr.	Soil	Ridge Roughness				Random Roughness	Unsheltered Distance				SGe	Erosion			
Dates		No. of	"I"	Dev.	Ht.	Sp.	"Krd"	"Krr"	Dev.	Prep.	WED	"L"	"V"	"E"	EWE	"IF"	Loss
Begin	End	(#)	(t/ac)	(deg)	(in.)	(in.)	(factor)	(factor)	(deg)	(factor)	(factor)	(ft)	(lbs/ac)	(t/ac)	(%)	(%)	(t/ac)
1/1	01/02/13	0	86	22.5	1	6	0.60	0.86	22.5	27.5	1.480	170	0	2.7	1.1	1.00	0.03
1/2	05/01/13	0	86	22.5	1	6	0.60	0.99	22.5	27.5	1.480	170	3339	0.0	64.9	1.00	0.00
5/1	05/15/13	0	86	90.0	1	6	0.97	0.86	90.0	12.2	4.000	460	3260	0.0	1.9	1.00	0.00
5/15	05/30/13	0	86	90.0	1	6	0.97	0.86	90.0	12.2	4.000	460	3260	0.0	2.0	1.00	0.00
5/30	06/15/13	0	86	90.0	1	6	0.97	0.99	90.0	12.2	4.000	460	3344	0.0	0.5	1.00	0.00
6/15	06/30/13	0	86	90.0	1	6	0.97	0.86	90.0	13.3	4.000	460	5096	0.0	0.3	1.00	0.00
6/30	07/15/13	0	86	90.0	1	6	0.97	0.86	90.0	13.3	4.000	460	6999	0.0	0.1	1.00	0.00
7/15	10/15/13	0	86	90.0	1	6	0.99	0.99	90.0	34.1	4.000	460	6999	0.0	7.6	1.00	0.00
10/15	10/16/13	0	86	22.5	1	6	0.64	0.86	22.5	6.4	1.110	128	5476	0.0	0.2	1.00	0.00
10/16	12/31/13	0	86	22.5	1	6	0.64	0.99	22.5	6.4	1.110	128	6999	0.0	21.5	1.00	0.00
		0			1	6											
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															

NRCS - WEQ INPUT WORKSHEET

Version 9.00 1-12-2005

Producer:	Fort Wainwright Range Control	Climate Data Station:	AK, BIG DELTA			Tract:	
						Field:	E
Planner:	Steven R. Becker, CEP	Field Width (Ft.):	115	Tillage Direct (NS/EW):	EW	Irrigated? (y or n):	N
Crop Rot:	Winter Trail	Field Direction (NS/EW):	NS	Length/Width Ratio:	6.0	Wind Erodibility Group:	4 (1-7)
Location:	Donnelly Training Area East	Adjusted Soil "I":	86	Site "C" Value:	32		

Average Annual Wind Erosion (t/ac): 0.0 | Yrs in Rotation: 1.0 | Sum Period Erosion: 0.0 (tons/ac)

Crop and Operation Management Records/Residue Calculations (green and dry)

Operation Date (date)	Crop (name)	Operation (name)	No. of Irr./Period (#)	Flat Res. (%)	Yield Adjustment (%)	Yield (units/ac)	Ridge Height (in)	Ridge Spacing (in)	Est. Res Retention (fact)	Est. Res. Dry Matter (lb/ac)	Est. Ground Cover (%)	SGe Dry Residue (lb/ac)	Green Dry Matter (lb/ac)	SGe Green Growth (lb/ac)	Random Roughness (in)
1/1/2013		Start Rotation			-	- -	1	6	-	2000	67	0	0	0	0.40
1/2/2013	Pasture/Hay, spring	Over winter loss F					1	6	0.60	1200	50	3339	0	0	0.30
5/1/2013	Pasture/Hay, spring 15	Seeder, corrugated packer F					1	6	0.95	1140	49	3173	50	87	0.40
5/15/2013	Pasture/Hay, spring 15	Grow					1	6	1.00	1140		3173	50	87	0.40
5/30/2013	Pasture/Hay, spring 30	Grow					1	6	1.00	1140		3169	100	175	0.40
6/15/2013	Pasture/Hay, spring 45	Grow					1	6	1.00	1140		3114	1000	1982	0.40
6/30/2013	Pasture/Hay, spring 60	Grow					1	6	1.00	1140		3059	2600	5836	0.40
7/15/2013	Pasture/Hay, spring 75	Grow					1	6	1.00	1140		3059	2600	5836	0.40
10/15/2013	Pasture/Hay, spring	Harvest			-50%	1 ton/ac	1	6	1.00	2000	67	5476	0	0	0.40
10/16/2013	Snow Cover	Grow					1	6	1.00	2000		5356	2000	2668	0.40
12/31/2013		End Rotation					1	6	1.00	2000	67				0.40

NRCS - WEQ CALCULATIONS

Version 9.00 1-12-2005

Producer:	Fort Wainwright Range Contro	Planner:	Steven R. Becker, CEP	Location:	Donnelly Training	Tract:	Field: E
Crop Rotation:	Winter Trail		Climate Data Station:	AK, BIG DELTA		Site "C" Value:	32
Tillage Direction (NS/EW):	EW	Length/width ratio:	6	Field Direction (NS/EW):	NS	Field Width (Ft.):	115
Irrigation (Y or N):	N	Soil "I":	86	Wind Erodibility Group:	4 (1-7)	TWF:	3 (see instr.)
Sum Period Erosion (t/ac):	0.0	No. Yrs in Rotation:	1.0	Av. Annual Wind Erosion:	0.0 (t/ac/yr)		

Calculations and Output

Mgt Periods		Irr.	Soil	Ridge Roughness				Random Roughness	Unsheltered Distance				SGe	Erosion			
Dates		No. of	"I"	Dev.	Ht.	Sp.	"Krd"	"Krr"	Dev.	Prep.	WED	"L"	"V"	"E"	EWE	"IF"	Loss
Begin	End	(#)	(t/ac)	(deg)	(in.)	(in.)	(factor)	(factor)	(deg)	(factor)	(factor)	(ft)	(lbs/ac)	(t/ac)	(%)	(%)	(t/ac)
1/1	01/02/13	0	86	67.5	1	6	0.62	0.86	22.5	27.5	1.480	170	0	3.0	1.1	1.00	0.03
1/2	05/01/13	0	86	67.5	1	6	0.62	0.99	22.5	27.5	1.480	170	3339	0.0	64.9	1.00	0.00
5/1	05/15/13	0	86	0.0	1	6	0.62	0.86	90.0	12.2	4.000	460	3260	0.0	1.9	1.00	0.00
5/15	05/30/13	0	86	0.0	1	6	0.62	0.86	90.0	12.2	4.000	460	3260	0.0	2.0	1.00	0.00
5/30	06/15/13	0	86	0.0	1	6	0.62	0.99	90.0	12.2	4.000	460	3344	0.0	0.5	1.00	0.00
6/15	06/30/13	0	86	0.0	1	6	0.61	0.86	90.0	13.3	4.000	460	5096	0.0	0.3	1.00	0.00
6/30	07/15/13	0	86	0.0	1	6	0.61	0.86	90.0	13.3	4.000	460	6999	0.0	0.1	1.00	0.00
7/15	10/15/13	0	86	0.0	1	6	0.60	0.99	90.0	34.1	4.000	460	6999	0.0	7.6	1.00	0.00
10/15	10/16/13	0	86	67.5	1	6	0.70	0.86	22.5	6.4	1.110	128	5476	0.0	0.2	1.00	0.00
10/16	12/31/13	0	86	67.5	1	6	0.70	0.99	22.5	6.4	1.110	128	6999	0.0	21.5	1.00	0.00
		0			1	6											
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															

NRCS - WEQ INPUT WORKSHEET

Version 9.00 1-12-2005

Producer: Fort Wainwright Range Control
Planner: Steven R. Becker, CEP
Crop Rot: Winter Trail
Location: Donnelly Training Area East

Climate Data Station: AK, BIG DELTA
Field Width (Ft.): 115
Field Direction (NS/EW): NS
Adjusted Soil "I": 86

Tillage Direct (NS/EW): EW
Length/Width Ratio: 6.0
Site "C" Value: 32

Tract:
Field: E
Irrigated? (y or n): N
Wind Erodibility Group: 4 (1-7)

Average Annual Wind Erosion (t/ac): 0.0
Yrs in Rotation: 1.0
Sum Period Erosion: 0.0 (tons/ac)

Crop and Operation Management Records/Residue Calculations (green and dry)

Operation Date (date)	Crop (name)	Operation (name)	No. of Irr./Period (#)	Flat Res. (%)	Yield Adjustment (%)	Yield (units/ac)	Ridge Height (in)	Ridge Spacing (in)	Est. Res Retention (fact)	Est. Res. Dry Matter (lb/ac)	Est. Ground Cover (%)	SGe Dry Residue (lb/ac)	Green Dry Matter (lb/ac)	SGe Green Growth (lb/ac)	Random Roughness (in)
1/1/2013		Start Rotation			-	- -	1	6	-	2000	67	0	0	0	0.40
1/2/2013	Pasture/Hay, spring	Over winter loss F					1	6	0.60	1200	50	3339	0	0	0.30
5/1/2013	Pasture/Hay, spring 15	Seeder, corrugated packer F					1	6	0.95	1140	49	3173	50	87	0.40
5/15/2013	Pasture/Hay, spring 15	Grow					1	6	1.00	1140		3173	50	87	0.40
5/30/2013	Pasture/Hay, spring 30	Grow					1	6	1.00	1140		3169	100	175	0.40
6/15/2013	Pasture/Hay, spring 45	Grow					1	6	1.00	1140		3114	1000	1982	0.40
6/30/2013	Pasture/Hay, spring 60	Grow					1	6	1.00	1140		3059	2600	5836	0.40
7/15/2013	Pasture/Hay, spring 75	Grow					1	6	1.00	1140		3059	2600	5836	0.40
10/15/2013	Pasture/Hay, spring	Harvest			-50%	1 ton/ac	1	6	1.00	2000	67	5476	0	0	0.40
10/16/2013	Snow Cover	Grow					1	6	1.00	2000		5356	2000	2668	0.40
12/31/2013		End Rotation					1	6	1.00	2000	67				0.40

NRCS - WEQ CALCULATIONS

Version 9.00 1-12-2005

Producer:	Fort Wainwright Range Contr	Planner:	Steven R. Becker, CEP	Location:	Donnelly Training	Tract:	
Field:	E						
Crop Rotation:	Winter Trail	Climate Data Station:	AK, BIG DELTA	Site "C" Value:	32		
Tillage Direction (NS/EW):	EW	Length/width ratio:	6	Field Direction (NS/EW):	NS	Field Width (Ft.):	115
Irrigation (Y or N):	N	Soil "I":	86	Wind Erodibility Group:	4 (1-7)	TWF:	3 (see instr.)
Sum Period Erosion (t/ac):	0.0	No. Yrs in Rotation:	1.0	Av. Annual Wind Erosion:	0.0 (t/ac/yr)		

Calculations and Output

Mgt Periods Dates		Irr.	Soil	Ridge Roughness				Random Roughness	Unsheltered Distance				SGe	Erosion			
		No. of	"I"	Dev.	Ht.	Sp.	"Krd"	"Krr"	Dev.	Prep.	WED	"L"	"V"	"E"	EWE	"IF"	Loss
Begin	End	(#)	(t/ac)	(deg)	(in.)	(in.)	(factor)	(factor)	(deg)	(factor)	(factor)	(ft)	(lbs/ac)	(t/ac)	(%)	(%)	(t/ac)
1/1	01/02/13	0	86	67.5	1	6	0.62	0.86	22.5	27.5	1.480	170	0	3.0	1.1	1.00	0.03
1/2	05/01/13	0	86	67.5	1	6	0.62	0.99	22.5	27.5	1.480	170	3339	0.0	64.9	1.00	0.00
5/1	05/15/13	0	86	0.0	1	6	0.62	0.86	90.0	12.2	4.000	460	3260	0.0	1.9	1.00	0.00
5/15	05/30/13	0	86	0.0	1	6	0.62	0.86	90.0	12.2	4.000	460	3260	0.0	2.0	1.00	0.00
5/30	06/15/13	0	86	0.0	1	6	0.62	0.99	90.0	12.2	4.000	460	3344	0.0	0.5	1.00	0.00
6/15	06/30/13	0	86	0.0	1	6	0.61	0.86	90.0	13.3	4.000	460	5096	0.0	0.3	1.00	0.00
6/30	07/15/13	0	86	0.0	1	6	0.61	0.86	90.0	13.3	4.000	460	6999	0.0	0.1	1.00	0.00
7/15	10/15/13	0	86	0.0	1	6	0.60	0.99	90.0	34.1	4.000	460	6999	0.0	7.6	1.00	0.00
10/15	10/16/13	0	86	67.5	1	6	0.70	0.86	22.5	6.4	1.110	128	5476	0.0	0.2	1.00	0.00
10/16	12/31/13	0	86	67.5	1	6	0.70	0.99	22.5	6.4	1.110	128	6999	0.0	21.5	1.00	0.00
		0			1	6											
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															

NRCS - WEQ INPUT WORKSHEET

Version 9.00 1-12-2005

Producer:	Fort Wainwright Range Control	Climate Data Station:	AK, BIG DELTA	Tract:	
				Field:	E
Planner:	Steven R. Becker, CEP	Field Width (Ft.):	115	Tillage Direct (NS/EW):	EW
				Irrigated? (y or n):	N
Crop Rot:	Winter Trail	Field Direction (NS/EW):	EW	Length/Width Ratio:	6.0
				Wind Erodibility Group:	4 (1-7)
Location:	Donnelly Training Area East	Adjusted Soil "I":	86	Site "C" Value:	32

Average Annual Wind Erosion (t/ac):	0.1	Yrs in Rotation:	1.0	Sum Period Erosion:	0.1 (tons/ac)

Crop and Operation Management Records/Residue Calculations (green and dry)

Operation Date (date)	Crop (name)	Operation (name)	No. of Irr./Period (#)	Flat Res. (%)	Yield Adjustment (%)	Yield (units/ac)	Ridge Height (in)	Ridge Spacing (in)	Est. Res Retention (fact)	Est. Res. Dry Matter (lb/ac)	Est. Ground Cover (%)	SGe Dry Residue (lb/ac)	Green Dry Matter (lb/ac)	SGe Green Growth (lb/ac)	Random Roughness (in)
1/1/2013		Start Rotation			-	- -	1	6	-	2000	67	0	0	0	0.40
1/2/2013	Pasture/Hay, spring	Over winter loss F					1	6	0.60	1200	50	3339	0	0	0.30
5/1/2013	Pasture/Hay, spring 15	Seeder, corrugated packer F					1	6	0.95	1140	49	3173	50	87	0.40
5/15/2013	Pasture/Hay, spring 15	Grow					1	6	1.00	1140		3173	50	87	0.40
5/30/2013	Pasture/Hay, spring 30	Grow					1	6	1.00	1140		3169	100	175	0.40
6/15/2013	Pasture/Hay, spring 45	Grow					1	6	1.00	1140		3114	1000	1982	0.40
6/30/2013	Pasture/Hay, spring 60	Grow					1	6	1.00	1140		3059	2600	5836	0.40
7/15/2013	Pasture/Hay, spring 75	Grow					1	6	1.00	1140		3059	2600	5836	0.40
10/15/2013	Pasture/Hay, spring	Harvest			-50%	1 ton/ac	1	6	1.00	2000	67	5476	0	0	0.40
10/16/2013	Snow Cover	Grow					1	6	1.00	2000		5356	2000	2668	0.40
12/31/2013		End Rotation					1	6	1.00	2000	67				0.40

NRCS - WEQ CALCULATIONS

Version 9.00 1-12-2005

Producer:	Fort Wainwright Range Contr	Planner:	Steven R. Becker, CEP	Location:	Donnelly Training	Tract:	
						Field:	E
Crop Rotation:	Winter Trail	Climate Data Station:	AK, BIG DELTA			Site "C" Value:	32
Tillage Direction (NS/EW):	EW	Length/width ratio:	6	Field Direction (NS/EW):	EW	Field Width (Ft.):	115
Irrigation (Y or N):	N	Soil "I":	86	Wind Erodibility Group:	4 (1-7)	TWF:	3 (see instr.)
Sum Period Erosion (t/ac):	0.1	No. Yrs in Rotation:	1.0			Av. Annual Wind Erosion:	0.1 (t/ac/yr)

Calculations and Output

Mgt Periods Dates		Irr.	Soil	Ridge Roughness				Random Roughness	Unsheltered Distance				SGe	Erosion			
		No. of	"I"	Dev.	Ht.	Sp.	"Krd"	"Krr"	Dev.	Prep.	WED	"L"	"V"	"E"	EWE	"IF"	Loss
Begin	End	(#)	(t/ac)	(deg)	(in.)	(in.)	(factor)	(factor)	(deg)	(factor)	(factor)	(ft)	(lbs/ac)	(t/ac)	(%)	(%)	(t/ac)
1/1	01/02/13	0	86	67.5	1	6	0.62	0.86	67.5	27.5	4.000	460	0	6.6	1.1	1.00	0.07
1/2	05/01/13	0	86	67.5	1	6	0.62	0.99	67.5	27.5	4.000	460	3339	0.0	64.9	1.00	0.00
5/1	05/15/13	0	86	0.0	1	6	0.62	0.86	0.0	12.2	1.010	116	3260	0.0	1.9	1.00	0.00
5/15	05/30/13	0	86	0.0	1	6	0.62	0.86	0.0	12.2	1.010	116	3260	0.0	2.0	1.00	0.00
5/30	06/15/13	0	86	0.0	1	6	0.62	0.99	0.0	12.2	1.010	116	3344	0.0	0.5	1.00	0.00
6/15	06/30/13	0	86	0.0	1	6	0.61	0.86	0.0	13.3	1.010	116	5096	0.0	0.3	1.00	0.00
6/30	07/15/13	0	86	0.0	1	6	0.61	0.86	0.0	13.3	1.010	116	6999	0.0	0.1	1.00	0.00
7/15	10/15/13	0	86	0.0	1	6	0.60	0.99	0.0	34.1	1.110	128	6999	0.0	7.6	1.00	0.00
10/15	10/16/13	0	86	67.5	1	6	0.70	0.86	67.5	6.4	2.490	286	5476	0.0	0.2	1.00	0.00
10/16	12/31/13	0	86	67.5	1	6	0.70	0.99	67.5	6.4	2.490	286	6999	0.0	21.5	1.00	0.00
		0			1	6											
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															

NRCS - WEQ INPUT WORKSHEET

Version 9.00 1-12-2005

Producer:	Fort Wainwright Range Control	Climate Data Station:	AK, BIG DELTA			Tract:		Field: F
Planner:	Steven R. Becker, CEP	Field Width (Ft.):	650	Tillage Direct (NS/EW):	NS	Irrigated? (y or n):	N
Crop Rot:	Bivouac Areas	Field Direction (NS/EW):	NS	Length/Width Ratio:	4.0	Wind Erodibility Group:	4 (1-7)
Location:	Donnelly Training Area East	Adjusted Soil "I":	86	Site "C" Value:	32		

Average Annual Wind Erosion (t/ac): 0.1 | Yrs in Rotation: 1.0 | Sum Period Erosion: 0.1 (tons/ac)

Crop and Operation Management Records/Residue Calculations (green and dry)

Operation Date (date)	Crop (name)	Operation (name)	No. of Irr./Period (#)	Flat Res. (%)	Yield Adjustment (%)	Yield (units/ac)	Ridge Height (in)	Ridge Spacing (in)	Est. Res Retention (fact)	Est. Res. Dry Matter (lb/ac)	Est. Ground Cover (%)	SGe Dry Residue (lb/ac)	Green Dry Matter (lb/ac)	SGe Green Growth (lb/ac)	Random Roughness (in)
1/1/2013		Start Rotation			-	- -	1	6	-	2000	67	0	0	0	0.40
1/2/2013	Pasture/Hay, spring	Over winter loss F					1	6	0.60	1200	50	3339	0	0	0.30
5/1/2013	Pasture/Hay, spring 15	Seeder, corrugated packer F					1	6	0.95	1140	49	3173	50	87	0.40
5/15/2013	Pasture/Hay, spring 15	Grow					1	6	1.00	1140		3173	50	87	0.40
5/30/2013	Pasture/Hay, spring 30	Grow					1	6	1.00	1140		3169	100	175	0.40
6/15/2013	Pasture/Hay, spring 45	Grow					1	6	1.00	1140		3114	1000	1982	0.40
6/30/2013	Pasture/Hay, spring 60	Grow					1	6	1.00	1140		3059	2600	5836	0.40
7/15/2013	Pasture/Hay, spring 75	Grow					1	6	1.00	1140		3059	2600	5836	0.40
10/15/2013	Pasture/Hay, spring	Harvest			-50%	1 ton/ac	1	6	1.00	2000	67	5476	0	0	0.40
10/16/2013	Snow Cover	Grow					1	6	1.00	2000		5356	2000	2668	0.40
12/31/2013		End Rotation					1	6	1.00	2000	67				0.40

NRCS - WEQ CALCULATIONS

Version 9.00 1-12-2005

Producer: Fort Wainwright Range Contro | Planner: Steven R. Becker, CEP | Location: Donnelly Training | Tract: | Field: F

Crop Rotation: Bivouac Areas | Climate Data Station: AK, BIG DELTA | Site "C" Value: 32

Tillage Direction (NS/EW): NS | Length/width ratio: 4 | Field Direction (NS/EW): NS | Field Width (Ft.): 650

Irrigation (Y or N): N | Soil "I": 86 | Wind Erodibility Group: 4 (1-7) | TWF: 3 (see instr.)

Sum Period Erosion (t/ac): 0.1 | No. Yrs in Rotation: 1.0 | Av. Annual Wind Erosion: 0.1 (t/ac/yr)

Calculations and Output

Mgt Periods		Irr.	Soil	Ridge Roughness				Random Roughness	Unsheltered Distance				SGe	Erosion			
Dates		No. of	"I"	Dev.	Ht.	Sp.	"Krd"	"Krr"	Dev.	Prep.	WED	"L"	"V"	"E"	EWE	"IF"	Loss
Begin	End	(#)	(t/ac)	(deg)	(in.)	(in.)	(factor)	(factor)	(deg)	(factor)	(factor)	(ft)	(lbs/ac)	(t/ac)	(%)	(%)	(t/ac)
1/1	01/02/13	0	86	22.5	1	6	0.60	0.86	22.5	27.5	1.480	962	0	9.1	1.1	1.00	0.10
1/2	05/01/13	0	86	22.5	1	6	0.60	0.99	22.5	27.5	1.480	962	3339	0.0	64.9	1.00	0.00
5/1	05/15/13	0	86	90.0	1	6	0.97	0.86	90.0	12.2	4.000	2600	3260	0.0	1.9	1.00	0.00
5/15	05/30/13	0	86	90.0	1	6	0.97	0.86	90.0	12.2	4.000	2600	3260	0.0	2.0	1.00	0.00
5/30	06/15/13	0	86	90.0	1	6	0.97	0.99	90.0	12.2	4.000	2600	3344	0.0	0.5	1.00	0.00
6/15	06/30/13	0	86	90.0	1	6	0.97	0.86	90.0	13.3	4.000	2600	5096	0.0	0.3	1.00	0.00
6/30	07/15/13	0	86	90.0	1	6	0.97	0.86	90.0	13.3	4.000	2600	6999	0.0	0.1	1.00	0.00
7/15	10/15/13	0	86	90.0	1	6	0.99	0.99	90.0	34.1	4.000	2600	6999	0.0	7.6	1.00	0.00
10/15	10/16/13	0	86	22.5	1	6	0.64	0.86	22.5	6.4	1.110	722	5476	0.0	0.2	1.00	0.00
10/16	12/31/13	0	86	22.5	1	6	0.64	0.99	22.5	6.4	1.110	722	6999	0.0	21.5	1.00	0.00
		0			1	6											
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															

NRCS - WEQ INPUT WORKSHEET

Version 9.00 1-12-2005

Producer: Fort Wainwright Range Control	**Climate Data Station:** AK, BIG DELTA			**Tract:**	**Field:** F
Planner: Steven R. Becker, CEP	**Field Width (Ft.):** 650	**Tillage Direct (NS/EW):** EW		**Irrigated? (y or n):** N	
Crop Rot: Bivouac Areas	**Field Direction (NS/EW):** NS	**Length/Width Ratio:** 4.0		**Wind Erodibility Group:** 4 (1-7)	
Location: Donnelly Training Area East	**Adjusted Soil "I":** 86	**Site "C" Value:** 32			

Average Annual Wind Erosion (t/ac): 0.1 | **Yrs in Rotation:** 1.0 | **Sum Period Erosion:** 0.1 (tons/ac)

Crop and Operation Management Records/Residue Calculations (green and dry)

Operation Date (date)	Crop (name)	Operation (name)	No. of Irr./Period (#)	Flat Res. (%)	Yield Adjustment (%)	Yield (units/ac)	Ridge Height (in)	Ridge Spacing (in)	Est. Res Retention (fact)	Est. Res. Dry Matter (lb/ac)	Est. Ground Cover (%)	SGe Dry Residue (lb/ac)	Green Dry Matter (lb/ac)	SGe Green Growth (lb/ac)	Random Roughness (in)
1/1/2013		Start Rotation			-	- -	1	6	-	2000	67	0	0	0	0.40
1/2/2013	Pasture/Hay, spring	Over winter loss F					1	6	0.60	1200	50	3339	0	0	0.30
5/1/2013	Pasture/Hay, spring 15	Seeder, corrugated packer F					1	6	0.95	1140	49	3173	50	87	0.40
5/15/2013	Pasture/Hay, spring 15	Grow					1	6	1.00	1140		3173	50	87	0.40
5/30/2013	Pasture/Hay, spring 30	Grow					1	6	1.00	1140		3169	100	175	0.40
6/15/2013	Pasture/Hay, spring 45	Grow					1	6	1.00	1140		3114	1000	1982	0.40
6/30/2013	Pasture/Hay, spring 60	Grow					1	6	1.00	1140		3059	2600	5836	0.40
7/15/2013	Pasture/Hay, spring 75	Grow					1	6	1.00	1140		3059	2600	5836	0.40
10/15/2013	Pasture/Hay, spring	Harvest			-50%	1 ton/ac	1	6	1.00	2000	67	5476	0	0	0.40
10/16/2013	Snow Cover	Grow					1	6	1.00	2000		5356	2000	2668	0.40
12/31/2013		End Rotation					1	6	1.00	2000	67				0.40

NRCS - WEQ CALCULATIONS

Version 9.00 1-12-2005

Producer:	Fort Wainwright Range Contr	Planner:	Steven R. Becker, CEP	Location:	Donnelly Training
Tract:		Field:	F		
Crop Rotation:	Bivouac Areas	Climate Data Station:	AK, BIG DELTA	Site "C" Value:	32
Tillage Direction (NS/EW):	EW	Length/width ratio:	4	Field Direction (NS/EW):	NS
Field Width (Ft.):	650				
Irrigation (Y or N):	N	Soil "I":	86	Wind Erodibility Group:	4 (1-7)
TWF:	3 (see instr.)				
Sum Period Erosion (t/ac):	0.1	No. Yrs in Rotation:	1.0	Av. Annual Wind Erosion:	0.1 (t/ac/yr)

Calculations and Output

Mgt Periods		Irr.	Soil	Ridge Roughness				Random Roughness	Unsheltered Distance				SGe	Erosion			
Dates		No. of	"I"	Dev.	Ht.	Sp.	"Krd"	"Krr"	Dev.	Prep.	WED	"L"	"V"	"E"	EWE	"IF"	Loss
Begin	End	(#)	(t/ac)	(deg)	(in.)	(in.)	(factor)	(factor)	(deg)	(factor)	(factor)	(ft)	(lbs/ac)	(t/ac)	(%)	(%)	(t/ac)
1/1	01/02/13	0	86	67.5	1	6	0.62	0.86	22.5	27.5	1.480	962	0	9.5	1.1	1.00	0.11
1/2	05/01/13	0	86	67.5	1	6	0.62	0.99	22.5	27.5	1.480	962	3339	0.0	64.9	1.00	0.00
5/1	05/15/13	0	86	0.0	1	6	0.62	0.86	90.0	12.2	4.000	2600	3260	0.0	1.9	1.00	0.00
5/15	05/30/13	0	86	0.0	1	6	0.62	0.86	90.0	12.2	4.000	2600	3260	0.0	2.0	1.00	0.00
5/30	06/15/13	0	86	0.0	1	6	0.62	0.99	90.0	12.2	4.000	2600	3344	0.0	0.5	1.00	0.00
6/15	06/30/13	0	86	0.0	1	6	0.61	0.86	90.0	13.3	4.000	2600	5096	0.0	0.3	1.00	0.00
6/30	07/15/13	0	86	0.0	1	6	0.61	0.86	90.0	13.3	4.000	2600	6999	0.0	0.1	1.00	0.00
7/15	10/15/13	0	86	0.0	1	6	0.60	0.99	90.0	34.1	4.000	2600	6999	0.0	7.6	1.00	0.00
10/15	10/16/13	0	86	67.5	1	6	0.70	0.86	22.5	6.4	1.110	722	5476	0.0	0.2	1.00	0.00
10/16	12/31/13	0	86	67.5	1	6	0.70	0.99	22.5	6.4	1.110	722	6999	0.0	21.5	1.00	0.00
		0			1	6											
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															

NRCS - WEQ INPUT WORKSHEET

Version 9.00 1-12-2005

Producer: Fort Wainwright Range Control	Climate Data Station: AK, BIG DELTA			Tract:	Field: F
Planner: Steven R. Becker, CEP	Field Width (Ft.): 650	Tillage Direct (NS/EW): NS		Irrigated? (y or n): N	
Crop Rot: Bivouac Areas	Field Direction (NS/EW): EW	Length/Width Ratio: 4.0		Wind Erodibility Group: 4 (1-7)	
Location: Donnelly Training Area East	Adjusted Soil "I": 86	Site "C" Value: 32			

Average Annual Wind Erosion (t/ac): 0.1 | Yrs in Rotation: 1.0 | Sum Period Erosion: 0.1 (tons/ac)

Crop and Operation Management Records/Residue Calculations (green and dry)

Operation Date (date)	Crop (name)	Operation (name)	No. of Irr./Period (#)	Flat Res. (%)	Yield Adjustment (%)	Yield (units/ac)	Ridge Height (in)	Ridge Spacing (in)	Est. Res Retention (fact)	Est. Res. Dry Matter (lb/ac)	Est. Ground Cover (%)	SGe Dry Residue (lb/ac)	Green Dry Matter (lb/ac)	SGe Green Growth (lb/ac)	Random Roughness (in)
1/1/2013		Start Rotation			-	- -	1	6	-	2000	67	0	0	0	0.40
1/2/2013	Pasture/Hay, spring	Over winter loss F					1	6	0.60	1200	50	3339	0	0	0.30
5/1/2013	Pasture/Hay, spring 15	Seeder, corrugated packer F					1	6	0.95	1140	49	3173	50	87	0.40
5/15/2013	Pasture/Hay, spring 15	Grow					1	6	1.00	1140		3173	50	87	0.40
5/30/2013	Pasture/Hay, spring 30	Grow					1	6	1.00	1140		3169	100	175	0.40
6/15/2013	Pasture/Hay, spring 45	Grow					1	6	1.00	1140		3114	1000	1982	0.40
6/30/2013	Pasture/Hay, spring 60	Grow					1	6	1.00	1140		3059	2600	5836	0.40
7/15/2013	Pasture/Hay, spring 75	Grow					1	6	1.00	1140		3059	2600	5836	0.40
10/15/2013	Pasture/Hay, spring	Harvest			-50%	1 ton/ac	1	6	1.00	2000	67	5476	0	0	0.40
10/16/2013	Snow Cover	Grow					1	6	1.00	2000		5356	2000	2668	0.40
12/31/2013		End Rotation					1	6	1.00	2000	67				0.40

NRCS - WEQ CALCULATIONS

Version 9.00 1-12-2005

Producer: Fort Wainwright Range Contr | Planner: Steven R. Becker, CEP | Location: Donnelly Trainin | Tract: | Field: F

Crop Rotation: Bivouac Areas | Climate Data Station: AK, BIG DELTA | Site "C" Value: 32

Tillage Direction (NS/EW): NS | Length/width ratio: 4 | Field Direction (NS/EW): EW | Field Width (Ft.): 650

Irrigation (Y or N): N | Soil "I": 86 | Wind Erodibility Group: 4 (1-7) | TWF: 3 (see instr.)

Sum Period Erosion (t/ac): 0.1 | No. Yrs in Rotation: 1.0 | Av. Annual Wind Erosion: 0.1 (t/ac/yr)

Calculations and Output

Mgt Periods		Irr.	Soil	Ridge Roughness				Random Roughness	Unsheltered Distance				SGe	Erosion			
Dates		No. of	"I"	Dev.	Ht.	Sp.	"Krd"	"Krr"	Dev.	Prep.	WED	"L"	"V"	"E"	EWE	"IF"	Loss
Begin	End	(#)	(t/ac)	(deg)	(in.)	(in.)	(factor)	(factor)	(deg)	(factor)	(factor)	(ft)	(lbs/ac)	(t/ac)	(%)	(%)	(t/ac)
1/1	01/02/13	0	86	22.5	1	6	0.60	0.86	67.5	27.5	4.000	2600	0	12.1	1.1	1.00	0.13
1/2	05/01/13	0	86	22.5	1	6	0.60	0.99	67.5	27.5	4.000	2600	3339	0.0	64.9	1.00	0.00
5/1	05/15/13	0	86	90.0	1	6	0.97	0.86	0.0	12.2	1.010	657	3260	0.0	1.9	1.00	0.00
5/15	05/30/13	0	86	90.0	1	6	0.97	0.86	0.0	12.2	1.010	657	3260	0.0	2.0	1.00	0.00
5/30	06/15/13	0	86	90.0	1	6	0.97	0.99	0.0	12.2	1.010	657	3344	0.0	0.5	1.00	0.00
6/15	06/30/13	0	86	90.0	1	6	0.97	0.86	0.0	13.3	1.010	657	5096	0.0	0.3	1.00	0.00
6/30	07/15/13	0	86	90.0	1	6	0.97	0.86	0.0	13.3	1.010	657	6999	0.0	0.1	1.00	0.00
7/15	10/15/13	0	86	90.0	1	6	0.99	0.99	0.0	34.1	1.110	722	6999	0.0	7.6	1.00	0.00
10/15	10/16/13	0	86	22.5	1	6	0.64	0.86	67.5	6.4	2.490	1619	5476	0.0	0.2	1.00	0.00
10/16	12/31/13	0	86	22.5	1	6	0.64	0.99	67.5	6.4	2.490	1619	6999	0.0	21.5	1.00	0.00
		0			1	6											
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															

NRCS - WEQ INPUT WORKSHEET

Version 9.00 1-12-2005

Producer: Fort Wainwright Range Control
Planner: Steven R. Becker, CEP
Crop Rot: Bivouac Areas
Location: Donnelly Training Area East

Climate Data Station: AK, BIG DELTA
Field Width (Ft.): 650
Field Direction (NS/EW): EW
Adjusted Soil "I": 86

Tillage Direct (NS/EW): EW
Length/Width Ratio: 4.0
Site "C" Value: 32

Tract:
Field: F
Irrigated? (y or n): N
Wind Erodibility Group: 4 (1-7)

Average Annual Wind Erosion (t/ac): 0.1
Yrs in Rotation: 1.0
Sum Period Erosion: 0.1 (tons/ac)

Crop and Operation Management Records/Residue Calculations (green and dry)

Operation Date (date)	Crop (name)	Operation (name)	No. of Irr./Period (#)	Flat Res. (%)	Yield Adjustment (%)	Yield (units/ac)	Ridge Height (in)	Ridge Spacing (in)	Est. Res Retention (fact)	Est. Res. Dry Matter (lb/ac)	Est. Ground Cover (%)	SGe Dry Residue (lb/ac)	Green Dry Matter (lb/ac)	SGe Green Growth (lb/ac)	Random Roughness (in)
1/1/2013		Start Rotation			-	- -	1	6	-	2000	67	0	0	0	0.40
1/2/2013	Pasture/Hay, spring	Over winter loss F					1	6	0.60	1200	50	3339	0	0	0.30
5/1/2013	Pasture/Hay, spring 15	Seeder, corrugated packer F					1	6	0.95	1140	49	3173	50	87	0.40
5/15/2013	Pasture/Hay, spring 15	Grow					1	6	1.00	1140		3173	50	87	0.40
5/30/2013	Pasture/Hay, spring 30	Grow					1	6	1.00	1140		3169	100	175	0.40
6/15/2013	Pasture/Hay, spring 45	Grow					1	6	1.00	1140		3114	1000	1982	0.40
6/30/2013	Pasture/Hay, spring 60	Grow					1	6	1.00	1140		3059	2600	5836	0.40
7/15/2013	Pasture/Hay, spring 75	Grow					1	6	1.00	1140		3059	2600	5836	0.40
10/15/2013	Pasture/Hay, spring	Harvest			-50%	1 ton/ac	1	6	1.00	2000	67	5476	0	0	0.40
10/16/2013	Snow Cover	Grow					1	6	1.00	2000		5356	2000	2668	0.40
12/31/2013		End Rotation					1	6	1.00	2000	67				0.40

NRCS - WEQ CALCULATIONS

Version 9.00 1-12-2005

Producer: Fort Wainwright Range Contr | Planner: Steven R. Becker, CEP | Location: Donnelly Training | Tract: | Field: F

Crop Rotation: Bivouac Areas | Climate Data Station: AK, BIG DELTA | Site "C" Value: 32

Tillage Direction (NS/EW): EW | Length/width ratio: 4 | Field Direction (NS/EW): EW | Field Width (Ft.): 650

Irrigation (Y or N): N | Soil "I": 86 | Wind Erodibility Group: 4 (1-7) | TWF: 3 (see instr.)

Sum Period Erosion (t/ac): 0.1 | No. Yrs in Rotation: 1.0 | Av. Annual Wind Erosion: 0.1 (t/ac/yr)

Calculations and Output

Mgt Periods		Irr.	Soil	Ridge Roughness				Random Roughness	Unsheltered Distance				SGe	Erosion			
Dates		No. of	"I"	Dev.	Ht.	Sp.	"Krd"	"Krr"	Dev.	Prep.	WED	"L"	"V"	"E"	EWE	"IF"	Loss
Begin	End	(#)	(t/ac)	(deg)	(in.)	(in.)	(factor)	(factor)	(deg)	(factor)	(factor)	(ft)	(lbs/ac)	(t/ac)	(%)	(%)	(t/ac)
1/1	01/02/13	0	86	67.5	1	6	0.62	0.86	67.5	27.5	4.000	2600	0	12.6	1.1	1.00	0.14
1/2	05/01/13	0	86	67.5	1	6	0.62	0.99	67.5	27.5	4.000	2600	3339	0.0	64.9	1.00	0.00
5/1	05/15/13	0	86	0.0	1	6	0.62	0.86	0.0	12.2	1.010	657	3260	0.0	1.9	1.00	0.00
5/15	05/30/13	0	86	0.0	1	6	0.62	0.86	0.0	12.2	1.010	657	3260	0.0	2.0	1.00	0.00
5/30	06/15/13	0	86	0.0	1	6	0.62	0.99	0.0	12.2	1.010	657	3344	0.0	0.5	1.00	0.00
6/15	06/30/13	0	86	0.0	1	6	0.61	0.86	0.0	13.3	1.010	657	5096	0.0	0.3	1.00	0.00
6/30	07/15/13	0	86	0.0	1	6	0.61	0.86	0.0	13.3	1.010	657	6999	0.0	0.1	1.00	0.00
7/15	10/15/13	0	86	0.0	1	6	0.60	0.99	0.0	34.1	1.110	722	6999	0.0	7.6	1.00	0.00
10/15	10/16/13	0	86	67.5	1	6	0.70	0.86	67.5	6.4	2.490	1619	5476	0.0	0.2	1.00	0.00
10/16	12/31/13	0	86	67.5	1	6	0.70	0.99	67.5	6.4	2.490	1619	6999	0.0	21.5	1.00	0.00
		0			1	6											
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															

NRCS - WEQ INPUT WORKSHEET

Version 9.00 1-12-2005

Producer:	Fort Wainwright Range Control	Climate Data Station:	AK, BIG DELTA			Tract:		Field: D
Planner:	Steven R. Becker, CEP	Field Width (Ft.):	35	Tillage Direct (NS/EW):	NS	Irrigated? (y or n):	N
Crop Rot:	Gravel Road	Field Direction (NS/EW):	EW	Length/Width Ratio:	6.0	Wind Erodibility Group:	4 (1-7)
Location:	Donnelly Training Area East	Adjusted Soil "I":	86	Site "C" Value:	32		

Average Annual Wind Erosion (t/ac): 8.2 | Yrs in Rotation: 1.0 | Sum Period Erosion: 8.2 (tons/ac)

Crop and Operation Management Records/Residue Calculations (green and dry)

Operation Date (date)	Crop (name)	Operation (name)	No. of Irr./Period (#)	Flat Res. (%)	Yield Adjustment (%)	Yield (units/ac)	Ridge Height (in)	Ridge Spacing (in)	Est. Res Retention (fact)	Est. Res. Dry Matter (lb/ac)	Est. Ground Cover (%)	SGe Dry Residue (lb/ac)	Green Dry Matter (lb/ac)	SGe Green Growth (lb/ac)	Random Roughness (in)
1/1/2013	Weeds, winter, <6 weeks	Start Rotation			-	- -	0	0	-	150	10	0	0	0	0.30
1/2/2013	Weeds, winter, <6 weeks	Over winter loss F	0	0%			0	0	0.60	90	6	22	0	0	0.30
1/3/2013	Weeds, winter, <6 weeks	Roller, smooth F	0	0%			0	0	0.95	86	6	21	0	0	0.40
5/1/2013	Weeds, winter, <6 weeks	Grow	0	0%			0	0	1.00	86		21	0	0	0.40
9/30/2013	Weeds, winter, <6 weeks	Harvest	0	0%	-50%	250 lbs/ac	0	0	1.00	250	16	54	0	0	0.40
10/1/2013	Weeds, winter, <6 weeks	Grow	0	0%			0	0	1.00	250		54	0	0	0.40
10/2/2013	Weeds, winter, <6 weeks	Over winter loss F	0	0%			0	0	0.60	150	10	34	0	0	0.30
12/31/2013		End Rotation					0	0	1.00	150	10				0.30

NRCS - WEQ CALCULATIONS

Version 9.00 1-12-2005

Producer: Fort Wainwright Range Contr(Planner: Steven R. Becker, CEP Location: Donnelly Training Tract: Field: D

Crop Rotation: Gravel Road Climate Data Station: AK, BIG DELTA Site "C" Value: 32

Tillage Direction (NS/EW): NS Length/width ratio: 6 Field Direction (NS/EW): EW Field Width (Ft.): 35

Irrigation (Y or N): N Soil "I": 86 Wind Erodibility Group: 4 (1-7) TWF: 3 (see instr.)

Sum Period Erosion (t/ac): 8.2 No. Yrs in Rotation: 1.0 Av. Annual Wind Erosion: 8.2 (t/ac/yr)

Calculations and Output

Mgt Periods Dates		Irr.	Soil	Ridge Roughness				Random Roughness	Unsheltered Distance				SGe	Erosion			
		No. of	"I"	Dev.	Ht.	Sp.	"Krd"	"Krr"	Dev.	Prep.	WED	"L"	"V"	"E"	EWE	"IF"	Loss
Begin	End	(#)	(t/ac)	(deg)	(in.)	(in.)	(factor)	(factor)	(deg)	(factor)	(factor)	(ft)	(lbs/ac)	(t/ac)	(%)	(%)	(t/ac)
1/1	01/02/13	0	86	22.5	0	0	1.00	0.94	67.5	27.5	4.000	140	0	8.8	1.1	1.00	0.10
1/2	01/03/13	0	86	22.5	0	0	1.00	0.94	67.5	27.5	4.000	140	22	8.6	1.1	1.00	0.10
1/3	05/01/13	0	86	22.5	0	0	1.00	0.99	67.5	27.5	4.000	140	21	9.4	63.8	1.00	5.99
5/1	09/30/13	0	86	90.0	0	0	1.00	0.99	0.0	12.2	1.010	35	21	2.7	9.3	1.00	0.25
9/30	10/01/13	0	86	90.0	0	0	1.00	0.86	0.0	7.2	1.010	35	54	1.8	0.1	1.00	0.00
10/1	10/02/13	0	86	22.5	0	0	1.00	0.86	67.5	6.4	2.490	87	54	5.2	0.2	1.00	0.01
10/2	12/31/13	0	86	22.5	0	0	1.00	0.99	67.5	6.4	2.490	87	34	7.0	24.4	1.00	1.71
		0			0	0											
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															

NRCS - WEQ INPUT WORKSHEET

Version 9.00 1-12-2005

Producer:	Fort Wainwright Range Control	Climate Data Station:	AK, BIG DELTA	Tract:	
				Field:	G
Planner:	Steven R. Becker, CEP	Field Width (Ft.):	30	Tillage Direct (NS/EW):	NS
				Irrigated? (y or n):	N
Crop Rot:	Gravel Road w/ Snow	Field Direction (NS/EW):	EW	Length/Width Ratio:	6.0
				Wind Erodibility Group:	4 (1-7)
Location:	Donnelly Training Area East	Adjusted Soil "I":	86	Site "C" Value:	32

Average Annual Wind Erosion (t/ac): 0.6	Yrs in Rotation: 1.0	Sum Period Erosion: 0.6	(tons/ac)

Crop and Operation Management Records/Residue Calculations (green and dry)

Operation Date (date)	Crop (name)	Operation (name)	No. of Irr./Period (#)	Flat Res. (%)	Yield Adjustment (%)	Yield (units/ac)	Ridge Height (in)	Ridge Spacing (in)	Est. Res Retention (fact)	Est. Res. Dry Matter (lb/ac)	Est. Ground Cover (%)	SGe Dry Residue (lb/ac)	Green Dry Matter (lb/ac)	SGe Green Growth (lb/ac)	Random Roughness (in)
1/1/2013	Weeds, winter, <6 weeks	Start Rotation			-	- -	0	0	-	150	10	0	0	0	0.30
1/2/2013	Weeds, winter, <6 weeks	Over winter loss F	0	0%			0	0	0.60	90	6	22	0	0	0.30
1/3/2013	Weeds, winter, <6 weeks	Roller, smooth F	0	0%			0	0	0.95	86	6	21	0	0	0.40
1/4/2013	Snow Cover	Grow	0	0%			0	0	1.00	86		15	2000	3057	0.40
5/1/2013	Weeds, winter, <6 weeks	Grow	0	0%			0	0	1.00	86		21	0	0	0.40
9/30/2013	Weeds, winter, <6 weeks	Harvest	0	0%	-50%	250 lbs/ac	0	0	1.00	250	16	54	0	0	0.40
10/1/2013	Weeds, winter, <6 weeks	Grow	0	0%			0	0	1.00	250		54	0	0	0.40
10/2/2013	Weeds, winter, <6 weeks	Over winter loss F	0	0%			0	0	0.60	150	10	34	0	0	0.30
10/15/2013	Snow Cover	Grow	0	0%			0	0	1.00	150		26	2000	3037	0.30
12/31/2013		End Rotation					0	0	1.00	150	10				0.30

NRCS - WEQ CALCULATIONS

Version 9.00 1-12-2005

Producer: Fort Wainwright Range Contr(
Planner: Steven R. Becker, CEP
Location: Donnelly Trainin(
Tract:
Field: G

Crop Rotation: Gravel Road w/ Snow
Climate Data Station: AK, BIG DELTA
Site "C" Value: 32

Tillage Direction (NS/EW): NS
Length/width ratio: 6
Field Direction (NS/EW): EW
Field Width (Ft.): 30

Irrigation (Y or N): N
Soil "I": 86
Wind Erodibility Group: 4 (1-7)
TWF: 3 (see instr.)

Sum Period Erosion (t/ac): 0.6
No. Yrs in Rotation: 1.0
Av. Annual Wind Erosion: 0.6 (t/ac/yr)

Calculations and Output

Mgt Periods Dates		Irr.	Soil	Ridge Roughness				Random Roughness	Unsheltered Distance				SGe	Erosion			
		No. of	"I"	Dev.	Ht.	Sp.	"Krd"	"Krr"	Dev.	Prep.	WED	"L"	"V"	"E"	EWE	"IF"	Loss
Begin	End	(#)	(t/ac)	(deg)	(in.)	(in.)	(factor)	(factor)	(deg)	(factor)	(factor)	(ft)	(lbs/ac)	(t/ac)	(%)	(%)	(t/ac)
1/1	01/02/13	0	86	22.5	0	0	1.00	0.94	67.5	27.5	4.000	120	0	8.0	1.1	1.00	0.09
1/2	01/03/13	0	86	22.5	0	0	1.00	0.94	67.5	27.5	4.000	120	22	7.9	1.1	1.00	0.09
1/3	01/04/13	0	86	22.5	0	0	1.00	0.86	67.5	27.5	4.000	120	21	6.7	1.1	1.00	0.07
1/4	05/01/13	0	86	22.5	0	0	1.00	0.99	67.5	27.5	4.000	120	3071	0.0	62.7	1.00	0.00
5/1	09/30/13	0	86	90.0	0	0	1.00	0.99	0.0	12.2	1.010	30	21	2.3	9.3	1.00	0.21
9/30	10/01/13	0	86	90.0	0	0	1.00	0.86	0.0	7.2	1.010	30	54	1.4	0.1	1.00	0.00
10/1	10/02/13	0	86	22.5	0	0	1.00	0.86	67.5	6.4	2.490	75	54	4.5	0.2	1.00	0.01
10/2	10/15/13	0	86	22.5	0	0	1.00	0.94	67.5	6.4	2.490	75	34	5.6	2.7	1.00	0.15
10/15	12/31/13	0	86	22.5	0	0	1.00	0.99	67.5	6.4	2.490	75	3063	0.0	21.7	1.00	0.00
		0			0	0											
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															

NRCS - WEQ INPUT WORKSHEET

Version 9.00 1-12-2005

Producer:	Fort Wainwright Range Control	Climate Data Station:	AK, BIG DELTA	Tract:	
				Field:	G
Planner:	Steven R. Becker, CEP	Field Width (Ft.):	30	Tillage Direct (NS/EW):	EW
				Irrigated? (y or n):	N
Crop Rot:	Gravel Road	Field Direction (NS/EW):	EW	Length/Width Ratio:	6.0
				Wind Erodibility Group:	4 (1-7)
Location:	Donnelly Training Area East	Adjusted Soil "I":	86	Site "C" Value:	32

Average Annual Wind Erosion (t/ac): 7.4 | Yrs in Rotation: 1.0 | Sum Period Erosion: 7.4 (tons/ac)

Crop and Operation Management Records/Residue Calculations (green and dry)

Operation Date (date)	Crop (name)	Operation (name)	No. of Irr./Period (#)	Flat Res. (%)	Yield Adjustment (%)	Yield (units/ac)	Ridge Height (in)	Ridge Spacing (in)	Est. Res Retention (fact)	Est. Res. Dry Matter (lb/ac)	Est. Ground Cover (%)	SGe Dry Residue (lb/ac)	Green Dry Matter (lb/ac)	SGe Green Growth (lb/ac)	Random Roughness (in)
1/1/2013	Weeds, winter, <6 weeks	Start Rotation			-	- -	0	0	-	150	10	0	0	0	0.30
1/2/2013	Weeds, winter, <6 weeks	Over winter loss F	0	0%			0	0	0.60	90	6	22	0	0	0.30
1/3/2013	Weeds, winter, <6 weeks	Roller, smooth F	0	0%			0	0	0.95	86	6	21	0	0	0.40
5/1/2013	Weeds, winter, <6 weeks	Grow	0	0%			0	0	1.00	86		21	0	0	0.40
9/30/2013	Weeds, winter, <6 weeks	Harvest	0	0%	-50%	250 lbs/ac	0	0	1.00	250	16	54	0	0	0.40
10/1/2013	Weeds, winter, <6 weeks	Grow	0	0%			0	0	1.00	250		54	0	0	0.40
10/2/2013	Weeds, winter, <6 weeks	Over winter loss F	0	0%			0	0	0.60	150	10	34	0	0	0.30
12/31/2013		End Rotation					0	0	1.00	150	10				0.30

NRCS - WEQ CALCULATIONS

Version 9.00 1-12-2005

Producer:	Fort Wainwright Range Contr	Planner:	Steven R. Becker, CEP	Location:	Donnelly Trainin	Tract:		Field:	G
Crop Rotation:	Gravel Road		Climate Data Station:	AK, BIG DELTA		Site "C" Value:	32
Tillage Direction (NS/EW):	EW	Length/width ratio:	6	Field Direction (NS/EW):	EW	Field Width (Ft.):	30
Irrigation (Y or N):	N	Soil "I":	86	Wind Erodibility Group:	4 (1-7)	TWF:	3 (see instr.)
Sum Period Erosion (t/ac):	7.4	No. Yrs in Rotation:	1.0			Av. Annual Wind Erosion:	7.4 (t/ac/yr)

Calculations and Output

Mgt Periods		Irr.	Soil	Ridge Roughness				Random Roughness	Unsheltered Distance				SGe	Erosion			
Dates		No. of	"I"	Dev.	Ht.	Sp.	"Krd"	"Krr"	Dev.	Prep.	WED	"L"	"V"	"E"	EWE	"IF"	Loss
Begin	End	(#)	(t/ac)	(deg)	(in.)	(in.)	(factor)	(factor)	(deg)	(factor)	(factor)	(ft)	(lbs/ac)	(t/ac)	(%)	(%)	(t/ac)
1/1	01/02/13	0	86	67.5	0	0	1.00	0.94	67.5	27.5	4.000	120	0	8.0	1.1	1.00	0.09
1/2	01/03/13	0	86	67.5	0	0	1.00	0.94	67.5	27.5	4.000	120	22	7.9	1.1	1.00	0.09
1/3	05/01/13	0	86	67.5	0	0	1.00	0.99	67.5	27.5	4.000	120	21	8.6	63.8	1.00	5.47
5/1	09/30/13	0	86	0.0	0	0	1.00	0.99	0.0	12.2	1.010	30	21	2.3	9.3	1.00	0.21
9/30	10/01/13	0	86	0.0	0	0	1.00	0.86	0.0	7.2	1.010	30	54	1.4	0.1	1.00	0.00
10/1	10/02/13	0	86	67.5	0	0	1.00	0.86	67.5	6.4	2.490	75	54	4.5	0.2	1.00	0.01
10/2	12/31/13	0	86	67.5	0	0	1.00	0.99	67.5	6.4	2.490	75	34	6.2	24.4	1.00	1.51
		0			0	0											
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															

NRCS - WEQ INPUT WORKSHEET

Version 9.00 1-12-2005

Producer:	Fort Wainwright Range Control	Climate Data Station:	AK, BIG DELTA			Tract:	
						Field:	G
Planner:	Steven R. Becker, CEP	Field Width (Ft.):	30	Tillage Direct (NS/EW):	EW	Irrigated? (y or n):	N
Crop Rot:	Gravel Road w/ Snow	Field Direction (NS/EW):	EW	Length/Width Ratio:	6.0	Wind Erodibility Group:	4 (1-7)
Location:	Donnelly Training Area East	Adjusted Soil "I":	86	Site "C" Value:	32		

Average Annual Wind Erosion (t/ac): **0.6** | Yrs in Rotation: **1.0** | Sum Period Erosion: **0.6** (tons/ac)

Crop and Operation Management Records/Residue Calculations (green and dry)

Operation Date (date)	Crop (name)	Operation (name)	No. of Irr./Period (#)	Flat Res. (%)	Yield Adjustment (%)	Yield (units/ac)	Ridge Height (in)	Ridge Spacing (in)	Est. Res Retention (fact)	Est. Res. Dry Matter (lb/ac)	Est. Ground Cover (%)	SGe Dry Residue (lb/ac)	Green Dry Matter (lb/ac)	SGe Green Growth (lb/ac)	Random Roughness (in)
1/1/2013	Weeds, winter, <6 weeks	Start Rotation			-	- -	0	0	-	150	10	0	0	0	0.30
1/2/2013	Weeds, winter, <6 weeks	Over winter loss F	0	0%			0	0	0.60	90	6	22	0	0	0.30
1/3/2013	Weeds, winter, <6 weeks	Roller, smooth F	0	0%			0	0	0.95	86	6	21	0	0	0.40
1/4/2013	Snow Cover	Grow	0	0%			0	0	1.00	86		15	2000	3057	0.40
5/1/2013	Weeds, winter, <6 weeks	Grow	0	0%			0	0	1.00	86		21	0	0	0.40
9/30/2013	Weeds, winter, <6 weeks	Harvest	0	0%	-50%	250 lbs/ac	0	0	1.00	250	16	54	0	0	0.40
10/1/2013	Weeds, winter, <6 weeks	Grow	0	0%			0	0	1.00	250		54	0	0	0.40
10/2/2013	Weeds, winter, <6 weeks	Over winter loss F	0	0%			0	0	0.60	150	10	34	0	0	0.30
10/15/2013	Snow Cover	Grow	0	0%			0	0	1.00	150		26	2000	3037	0.30
12/31/2013		End Rotation					0	0	1.00	150	10				0.30

NRCS - WEQ CALCULATIONS

Version 9.00 1-12-2005

Producer:	Fort Wainwright Range Contr	Planner:	Steven R. Becker, CEP	Location:	Donnelly Trainin	Tract:	
						Field:	G
Crop Rotation:	Gravel Road w/ Snow	Climate Data Station:	AK, BIG DELTA			Site "C" Value:	32
Tillage Direction (NS/EW):	EW	Length/width ratio:	6	Field Direction (NS/EW):	EW	Field Width (Ft.):	30
Irrigation (Y or N):	N	Soil "I":	86	Wind Erodibility Group:	4 (1-7)	TWF:	3 (see instr.)
Sum Period Erosion (t/ac):	0.6	No. Yrs in Rotation:	1.0	Av. Annual Wind Erosion:	0.6 (t/ac/yr)		

Calculations and Output

Mgt Periods		Irr.	Soil	Ridge Roughness				Random Roughness	Unsheltered Distance				SGe	Erosion			
Dates		No. of	"I"	Dev.	Ht.	Sp.	"Krd"	"Krr"	Dev.	Prep.	WED	"L"	"V"	"E"	EWE	"IF"	Loss
Begin	End	(#)	(t/ac)	(deg)	(in.)	(in.)	(factor)	(factor)	(deg)	(factor)	(factor)	(ft)	(lbs/ac)	(t/ac)	(%)	(%)	(t/ac)
1/1	01/02/13	0	86	67.5	0	0	1.00	0.94	67.5	27.5	4.000	120	0	8.0	1.1	1.00	0.09
1/2	01/03/13	0	86	67.5	0	0	1.00	0.94	67.5	27.5	4.000	120	22	7.9	1.1	1.00	0.09
1/3	01/04/13	0	86	67.5	0	0	1.00	0.86	67.5	27.5	4.000	120	21	6.7	1.1	1.00	0.07
1/4	05/01/13	0	86	67.5	0	0	1.00	0.99	67.5	27.5	4.000	120	3071	0.0	62.7	1.00	0.00
5/1	09/30/13	0	86	0.0	0	0	1.00	0.99	0.0	12.2	1.010	30	21	2.3	9.3	1.00	0.21
9/30	10/01/13	0	86	0.0	0	0	1.00	0.86	0.0	7.2	1.010	30	54	1.4	0.1	1.00	0.00
10/1	10/02/13	0	86	67.5	0	0	1.00	0.86	67.5	6.4	2.490	75	54	4.5	0.2	1.00	0.01
10/2	10/15/13	0	86	67.5	0	0	1.00	0.94	67.5	6.4	2.490	75	34	5.6	2.7	1.00	0.15
10/15	12/31/13	0	86	67.5	0	0	1.00	0.99	67.5	6.4	2.490	75	3063	0.0	21.7	1.00	0.00
		0			0	0											
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															
		0															