MRI REPORT

OU3 Wind Tunnel Study

Volume II: Field Data Sheets

Prepared for
EG&G Rocky Flats, Inc.
Rocky Flats Plant, Building No. 131
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Attn: Grant Euler

DOE Prime Contract No. DE-AC04-90DP62349
Subcontract No. ASC218973GG
MRI Project No. 3155-M

January 24, 1994

SEP 2002
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PREFACE

This report was prepared by Midwest Research Institute (MRI) for EG&G Rocky Flats, Inc., under DOE Prime Contract No. DE-AC04-90DP62349 and Subcontract No. ASC218973GG. Mr. Grant Euler was the EG&G project manager.

The project was conducted in MRI's Engineering and Environmental Technologies Department. Dr. Chatten Cowherd served as MRI Project Leader. Other MRI technical staff who contributed to the project were Mary Ann Grelinger (data acquisition), Steve Cummins (wind tunnel operation and laboratory activities), and Alietia Caughron (calculations). Mr. Reed Hodgin of AlphaTRAC, Inc., contributed to the planning and site selection phases.

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Chatten Cowherd, Jr., Ph.D.
Principal Advisor

Approved:

for Charles F. Holt, Ph.D., Director
Engineering and Environmental
Technology Department

January 24, 1994

Note that a checkmark (✓) by a pitot tube reading indicates that the reading was duplicated in an additional measurement.

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Wind Erosion Testing

Run No. RF-16 Date 6/10/93
MRI Project No. 3155 Recorded by MAE

thick blades grass

TEST SITE CHARACTERISTICS

Location Site T-4: SW terrestrial area above Stanley Lake
Composition Soil with lots of small rocks; grass 2"-3" all but very thin
Surface Texture Undisturbed; somewhat rocky; sparse 2"-3" grass + tole
Tunnel Orientation: Inlet facing NW (Compass used; no correction)

Air Temperature Dry Bulb °F	Air Temperature Dry Bulb °C	Air Temperature Wet Bulb °F	Air Temperature Wet Bulb °C	Relative Humidity %	Ambient Pressure In Hg	Ambient Winds Speed mph	Ambient Winds Direction
76		56		26	24.4	0-5	E

15:42

THRESHOLD VELOCITY None observed; surface looked like it held tight thru $\Delta p = 0.39$ tunnel

Centerline Reference: ΔP = _____ in H_2O; U_C = _____ fpm _____ mph _____ m/s
Surface Reference: Z_o = _____ cm; U_* = _____ mph _____ m/s

TEST CONDITIONS 1.00" nozzle

Sampler Data

Expay 16:45

Sampler	Filter No.	Flow (acfm) Reading	Flow (acfm) Actual	Mass Tare	Mass Final	Mass Catch
Blank 8 x 10	9333038					
Cyclone						
Cyc 8 x 10 #3	9333015		40			
~~Blank Substrate~~						
~~Substrate (µm)~~						
~~Substrate (µm)~~						
~~Substrate (µm)~~	9333036					

Background

Test Velocity

nozzle 1.00"

		fpm	mph	m/s
Ambient	10m			
Working Section	℄			

2.0 in H_2O on Cyclone

Set flow to Δp = 3.27 in H_2O on manometer in Sampling Tube (S.T.)

~~3.27 in H_2O 0.54 in H_2O 0.53 on Pitot 0.530~~

Test Times (Hr : Min : Sec)

A. Start of Test 2466.6 16:18:40
B. End of Test 2520.7 16:38:45
C. Test Duration (B-A) 20 min

3.7 on backpressure

Comments: Check for leaks on manometer – both sides ok. Magnehelics checked + zeroed. After very high threshold test and before (d) start on RF-16, observed small amount of grains of dust in nozzle assembly as cyclone was attached for test.

16:38:40

93-17 SEV chat wksht 052893

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Run Nos RF-16 Wind Tunnel Testing Date 6/10/93

MRI Project No 3155 Background Air Sampling Recorded by MAK

FILTER DATA

Filter No	Final Wt.	Tare Wt.	Catch
9333036			
9333038 (blank)			

FLOW DATA

Magnehelic Range	0 - 4	in H_2O
Target Flow	45	ACFM
Target Magnehelic Reading	3.7	in H_2O

RUN TIME

		Clock Time	Elapsed Time Meter	Magnehelic Reading (in H_2O)
First Period RF-16	Start	15:44:42	01622.95	3.6 (later 3.7)
	Stop	16:39:10	01678.7	3.7
	Duration			
Second Period RF-17	Start	17:32:25	01678.7	3.7
	Stop	18:12:49	01720.0	3.7
	Duration	1		
Cumulative	Duration			

COMMENTS

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[illegible] RESEARCH INSTITUTE

Run No. RF-16 Wind Tunnel Testing Date 6/10/93 Time 2/6:1

MRI Project No. 3155 Subthreshold Velocity Profile Recorded by MAK

None seen up to $\Delta p = 0.39$ in Tested Magnet

THRESHOLD VELOCITY $P_{VEL\,\mathbb{C}}$ = None seen in H_2O ; $U_{\mathbb{C}}$ = _____ fpm _____ mph _____

→ SUBTHRESHOLD VELOCITY $P_{VEL\,\mathbb{C}}$ 0.162 in H_2O ; $U_{\mathbb{C}}$ = _____ fpm _____ mph _____

VELOCITY PROFILE

Height Above Gnd. (cm)	Pitot Tube Readings P_{VEL} (in H_2O) 1st	2nd	Avg	Velocity, U (fpm)	(mph)	(m/s)
0						
0.5	0.002	0.001				
0.7	0.005	0.003				
1.0	0.005	0.005				
1.4	0.010	0.011				
2.0	0.021	0.021				
0.050 2.8	0.000	0.014				
3.8	0.020	0.005				
5.0	0.044	0.041				
7.0	0.068	0.065				
10.0	0.100	0.100				
℄ = 15.2	0.162	0.153				
20.0		0.171				
25.0		0.152				
30.0						

0.160 1.00

$$U\,(mph) = 10.83 \sqrt{P_{VEL}\,(in\,H_2O)} \times \sqrt{\frac{T_{amb}(°F) + 459.3}{P_{amb}\,(in\,Hg)}} \times \sqrt{P_{VEL}\,(in\,H_2O)} = K'$$

76 24.4

Used in front of pitot tube inlet @ 2.8–3.8 cm height

℄ WIND SPEED RATIO

Location (℄)	P_{VEL} (in H_2O)	U (fpm)
Sampling Tube (S)	1.00	
Wind Tunnel (T)	0.155	
Ratio	$(\frac{S}{T})^{1/2} = 2.54$	$\frac{S}{T}$ =

1.00 / 0.16

2.5

Expect $\left(\frac{36.3}{50.7}\right)^2 = 0.51$ in H_2O Tunnel ℄

Use 2.52 $\frac{91.6}{2.52} = 36.3$ mph Expect

$83.3 \times 1.10 = 91.6$ mph S.T.

$\left(\frac{91.6}{50.7}\right)^2 = 3.27$ in H_2

$U\,(mph) =$

$U\,(mph) =$

$K' = 50.7$

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Run No. RF-16 Wind Tunnel Testing Date 6/10/93 Time 1162

MRI Project No. 3155 Subthreshold Velocity Profile Recorded by [illegible]

~~THRESHOLD VELOCITY $P_{VEL\,\mathbb{C}}$ = ____ in H_2O; $U_{\mathbb{C}}$ = ____ fpm ____ mph ____~~

ABOVE ~~SUB~~-THRESHOLD VELOCITY $P_{VEL\,\mathbb{C}}$ ____ in H_2O; $U_{\mathbb{C}}$ = ____ fpm ____ mph ____

During Test RF-16

VELOCITY PROFILE

Height Above Gnd. (cm)	Pitot Tube Readings P_{VEL} (in H_2O) 1st	2nd	Avg	Velocity, U (fpm)	(mph)	(m/s)
0						
0.5	0.005	0.005				
0.7	0.008	0.008				
1.0	0.010	0.011				
1.4	0.05	0.04				
2.0	0.06	0.064				
2.8	0.00	~~0.150~~ 0.015				
3.8	0.12	0.095				
5.0	0.16	0.16				
7.0	0.22	0.22				
10.0	0.34	0.30				
℄ = 15.2	0.52	0.52				
20.0		0.55				
25.0		0.48				
30.0						

adjusted from 3.1 back to 3.27

$$U\,(mph) = 10.83 \sqrt{\frac{T_{amb}\,(^\circ F) + 459.3}{P_{amb}\,(in\ Hg)}} \times \sqrt{P_{VEL}\,(in\ H_2O)}$$

$$U\,(mph) = K' \times \sqrt{P_{VEL}\,(in\ H_2O)}$$

$$K' =$$

℄ WIND SPEED RATIO

Location (℄)	P_{VEL} (in H_2O)	U (fpm)
Sampling Tube (S)	3.25	
Wind Tunnel (T)	0.55	
Ratio	$\left(\frac{S}{T}\right)^{1/2} = 2.43$	$\frac{S}{T} =$

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Run No. RF-15 Wind Tunnel Testing Date 6/10/93 Time 11:3

MRI Project No. 3155 Subthreshold Leaving Visible Recorded by MAG

~~THRESHOLD VELOCITY $P_{VEL\,\mathfrak{C}}$ ____ in H_2O; $U_{\mathfrak{C}}$ = ____ fpm ____ mph ____ m~~

→ ~~SUB~~ ABOVE THRESHOLD VELOCITY $P_{VEL\,\mathfrak{C}}$ ____ mH_2O; $U_{\mathfrak{C}}$ = ____ fpm ____ mph ____ m/

VELOCITY PROFILE

Height Above Gnd. (cm)	Pitot Tube Readings P_{VEL} (in H_2O) 1st	2nd	Avg	Velocity, U (fpm)	(mph)	(m/s)
0						
0.5	0.051	0.049				
0.7	0.068	0.069				
1.0	0.080	0.080				
1.4	0.098	0.098				
2.0	0.114	0.118				
2.8	0.129	0.138				
3.8	0.155	0.165				
5.0	0.1895	0.191				
7.0	0.250	0.262				
10.0	0.355	0.380				
$\mathfrak{C}$ = 15.2	0.460	0.460 0.458				
20.0	~~0.03~~ 0.390					
25.0	0.375					
30.0						

.460

No visible fission during profile

$$U(mph) = 10.83 \sqrt{\frac{T_{amb}(°F) + 459.3}{P_{amb}(in\ Hg)}} \times \sqrt{P_{VEL}(in\ H_2O)} \times \sqrt{P_{VEL}(in\ H_2O)}$$

K'

$U(mph) =$

$K' =$

$\mathfrak{C}$ WIND SPEED RATIO

Location ($\mathfrak{C}$)	P_{VEL} (in H_2O)	U (fpm)
Sampling Tube (S)	3.32	
Wind Tunnel (T)	0.458	
Ratio	$(\frac{S}{T})^{1/2} = 2.69$	$\frac{S}{T}$ =

$\frac{3.31}{0.460}$

11:50:40

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Wind Erosion Testing

Run No. RF-15 Date 6/10/93
MRI Project No. 3155 Recorded by MAG

TEST SITE CHARACTERISTICS

Location Site S-3 on North shore of Stradley Lake
Composition Mud flat shoreline very dry
Surface Texture Disturbed by rake, stomped by feet (twice), raked crosswise, several times then lengthwise (see picture of pre erosion surface)
Tunnel Orientation: Inlet facing W

Air Temperature Dry Bulb °F	Air Temperature Dry Bulb °C	Air Temperature Wet Bulb °F	Air Temperature Wet Bulb °C	Relative Humidity %	Ambient Pressure In Hg	Ambient Winds Speed mph	Ambient Winds Direction
72.5		53.5		26	24.55	<3	ESE
77		55		23	24.5	<3	L+V

11:44

MRI Sling psych 3155

THRESHOLD VELOCITY

Centerline Reference: ΔP = 0.24 in H_2O; $U_{\mathbb{C}}$ = _____ fpm _____ mph _____ m/s
Surface Reference: Z_o = _____ cm; U_* = _____ mph _____ m/s

TEST CONDITIONS

1.00" nozzle

Sampler Data

Sampler	Filter No.	Flow (acfm) Reading	Flow (acfm) Actual	Mass Tare	Mass Final	Mass Catch
Blank 8 x 10	9333053					
Cyclone						
Cyc 8 x 10	9333048		40			
Blank Substrate						
Substrate (µm)						
Substrate (µm)						
Substrate (µm)						

cyclone 3.0 in H_2O

Background 8x10 9333052

1.00" nozzle

Test Velocity

		fpm	mph	m/s
Ambient	10m			
Working Section	℄			

① 3.31 0.440
② 3.3 0.46
③ 3.3 0.46

Target Δp on S. manometer = 3.31 in H_2O

Test Times (Hr : Min : Sec)

A. Start of Test 1:30:40
B. End of Test 1:50:40
C. Test Duration (B-A) 20 min

Comments: Tunnel appears to be set up on old road track that leads into water. Disturbed area is not totally pulverized but has some rocks (some) on surface and unbroken clumps of dirt. drill.
mostly 1/8" - 3/8" + then smaller particles

No visible erosion @ 11:31:40

93-17 SEV chal wksht 052893

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Run Nos RF-14 RF15 Wind Tunnel Testing
MRI Project No 3155 Background Air Sampling

Date 6/10/93
Recorded by MAG

FILTER DATA

Filter No	Final Wt.	Tare Wt.	Catch
9333052			
9333053 (blank)			

FLOW DATA

Magnehelic Range	0 - 4	in H_2O
Target Flow	45	ACFM
Target Magnehelic Reading	3.7	in H_2O

RUN TIME

		Clock Time	Elapsed Time Meter	Magnehelic Reading (in H_2O)
RF-14 First Period	Start	9:34:20	1522.9	3.7
	Stop	10:23:45	1573.25	3.7
	Duration			
RF-15 Second Period	Start	11:02:45	1573.25	3.7
	Stop	11:51:30	1622.95	3.7
	Duration			
Cumulative	Duration			

1622.95 MAG 6/10/93

COMMENTS

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Run No. RF-15 Wind Tunnel Testing Date 6/10/93 Time ~11:2

MRI Project No. 3155 Subthreshold Velocity Profile Recorded by: K

THRESHOLD VELOCITY $P_{VEL\,℄}$ = 0.24 in H_2O ; $U_{℄}$ = _____ fpm 24.7 mph _____

→ SUBTHRESHOLD VELOCITY $P_{VEL\,℄}$ 0.158 in H_2O ; $U_{℄}$ = _____ fpm _____ mph _____

VELOCITY PROFILE

Height Above Gnd. (cm)	Pitot Tube Readings P_{VEL} (in H_2O) 1st	2nd	Avg	Velocity, U (fpm)	(mph)	(m/s)
0						
0.5	0.035	0.028				
0.7	0.040	0.029				
1.0	0.050	0.039				
1.4	0.052	0.041				
2.0	0.064	0.050				
2.8	0.079	0.0763				
3.8	0.095	0.080				
5.0	0.104	0.100				
7.0	0.135	0.128				
10.0	0.156	0.152				
℄ = 15.2	0.158	0.152				
20.0	0.143					
25.0	0.138					
30.0						

0.155

$$U(mph) = 10.83 \times \sqrt{P_{VEL}\,(in\,H_2O)} \times \left\{ \sqrt{\frac{T_{amb}(°F) + 459.3}{P_{amb}\,(in\,Hg)}} \right\} K'$$

$$U(mph) = \sqrt{P_{VEL}\,(in\,H_2O)} \times \left\{ \sqrt{\frac{72.5 + 459.3}{24.55}} \right\} K'$$

Test @ 83.3 mph × 1.10 = 91.63 mph / 50.4 ~~10.63~~ = ~~1.82~~ 1.91

℄ WIND SPEED RATIO S.T. Δp = 3.31

	Location (℄)	P_{VEL} (in H_2O)	U (fpm)
1.25	Sampling Tube (S)	1.258	
0.155	Wind Tunnel (T)	0.152	
2.84	Ratio	$(\frac{S}{T})^{1/2}$ = 2.90	$\frac{S}{T}$ =

91.63

use 2.87 $\frac{91.63}{2.87}$ = 31.9 mph $\Delta p = \left(\frac{31.9}{50.4}\right)^2$ = 0.401 tunnel

= 50.4

Run No. RF-14 Wind Tunnel Testing Date 6/10/93 Time 10:06

MRI Project No. 3155 Subthreshold Velocity Profile Recorded by MHE

ABOVE THRESHOLD VELOCITY $P_{VEL\,℄}$ = _____ in H_2O ; $U_{℄}$ = _____ fpm _____ mph _____ m

~~SUB-THRESHOLD VELOCITY $P_{VEL\,℄}$ _____ in H_2O ; $U_{℄}$ = _____ fpm _____ mph _____ m~~

VELOCITY PROFILE

No visible erosion at time of ~~thresh~~ profile test.

Height Above Gnd. (cm)	Pitot Tube Readings P_{VEL} (in H_2O) 1st	2nd	Avg	Velocity, U (fpm)	(mph)	(m/s)
0						
0.5	0.116	0.117				
0.7	0.125	0.125				
1.0	0.140	0.135				
1.4	0.150	0.150				
2.0	0.168	0.169				
2.8	0.184	0.190				
3.8	0.208	0.212				
5.0	0.225	0.224				
7.0	0.240	0.238				
10.0	0.300	0.295				
℄ = 15.2	0.410	0.405				
20.0	0.438					
25.0	0.330					
30.0						

+C4

$$U(mph) = 10.83 \sqrt{\frac{T_{amb}(°F) + 459.3}{P_{amb}(in\ Hg)}} \times \sqrt{P_{VEL}(in\ H_2O)}$$

$$U(mph) = K' \times \sqrt{P_{VEL}(in\ H_2O)}$$

$$\boxed{K' = 50.3}$$

℄ WIND SPEED RATIO

	Location (℄)	P_{VEL} (in H_2O)	U (fpm)
3.35	Sampling Tube (S)	3.25	
0.42	Wind Tunnel (T)	0.404	
2.82	Ratio	$(\frac{S}{T})^{1/2}$ = 2.84	$\frac{S}{T}$ =

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Wind Erosion Testing

Run No. RF-14 Date 6/10/93
MRI Project No. 5155 Recorded by MAC

TEST SITE CHARACTERISTICS
Location Site S-3 on North shore of Standley Lake
Composition Mud flat shoreline
Surface Texture Undisturbed silty looking soil, hard packed
Tunnel Orientation: Inlet facing W

Screening test

	Air Temperature Dry Bulb °F	Dry Bulb °C	Wet Bulb °F	Wet Bulb °C	Relative Humidity %	Ambient Pressure In Hg	Ambient Winds Speed mph	Direction
9:50	67		54		41	24.6	Calm	
10:19	71		58		45	24.6	LAV at end of test	

THRESHOLD VELOCITY for small particles on surface of chart
Centerline Reference: ΔP = 0.24 in H_2O; $U_{\mathbb{C}}$ = _____ fpm _____ mph _____ m/s
Surface Reference: Z_o = _____ cm; U_* = _____ mph _____ m/s

TEST CONDITIONS

Sampler Data

Sampler	Filter No.	Flow (acfm) Reading	Flow (acfm) Actual	Mass Tare	Mass Final	Mass Catch
Blank 8 x 10	9333053					
Cyclone #1						
Cyc 8 x 10	9333051					
Blank Substrate						
Substrate (µm)						
Substrate (µm)						
Substrate (µm)						

Exposed 9:04

Background 8x10 9333052

1.00" nozzle

2.0 in H_2O on cyclone manometer
5.35 on S.T. ℄ manometer
0.41 on Tunnel ℄ manometer
3.47 on background manometer

Test Velocity

		fpm	mph	m/s
Ambient	10m			
Working Section	℄			

Test Times (Hr : Min : Sec)
A. Start of Test 23953 10:02:45
B. End of Test 10:22:50
C. Test Duration (B-A) _____

Comments: Calm + clear @ 8:59 9:15 9:35
Small particles lying on top of crusted surface that is cracked
Some small plants on surface, but patchy ~~not~~ covering 5-7% of surface

10:22:45

93-17 SEV chat wksht 052893

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MIDWEST RESEARCH INSTITUTE
Wind Erosion Testing

Run No. RF-13d Date 6/9/93
MRI Project No. 3155 Recorded by MAB

TEST SITE CHARACTERISTICS

Location See Test RF-13a
Composition
Surface Texture
Tunnel Orientation: Inlet facing

Air Temperature Dry Bulb °F	Air Temperature Dry Bulb °C	Air Temperature Wet Bulb °F	Air Temperature Wet Bulb °C	Relative Humidity %	Ambient Pressure In Hg	Ambient Winds Speed mph	Ambient Winds Direction
67		~~52~~ 54			24.3	Calm	

MAB 6/9/93

THRESHOLD VELOCITY

Centerline Reference: ΔP = 0.19 in H_2O; $U_{\mathbb{C}}$ = _____ fpm _____ mph _____ m/s
Surface Reference: Z_o = _____ cm; U_* = _____ mph _____ m/s

TEST CONDITIONS

0.78" Nozzle dia

Sampler Data

Sampler	Filter No.	Flow (acfm) Reading	Flow (acfm) Actual	Mass Tare	Mass Final	Mass Catch
Blank 8 x 10						
X9243 Cyclone #4	MAB 6/9/93					
Cyc 8 x 10	93359059		20			
Blank Substrate						
X9254 S1 Substrate (µm)	9338045					
S2 Substrate (µm)	9338046					
S3 Substrate (µm)	9338047					

MAB 6/9/93 ~~2.6~~ 2.2" H_2O
K.T. Manometer
Pitot 3.7" H_2O
Cyclone 0.6" H_2O

Target Tunnel
ΔP = 0.305"

Test Velocity

		fpm	mph	m/s
Ambient	10m			
Working Section	℄			

Test Times (Hr : Min : Sec)

A. Start of Test ~~2373.6~~ 18:35:56
B. End of Test 18:43:56
C. Test Duration (B-A) _____

Comments: Target Test Time = 8 min Start of Test is when target ΔP of tunnel ℄ was been reached. Shut down 2 after

93-17 SEV chat wksht 052893

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MIDWEST RESEARCH INSTITUTE

Run No. KF-14 Wind Tunnel Testing Date 6/10/93 Time ____

MRI Project No. 3155 Subthreshold Testing Profile Recorded by 76

THRESHOLD VELOCITY of small particles on crusted surface $P_{VEL\,\mathbb{C}}$ = 0.22 in H_2O ; $U_{\mathbb{C}}$ = 3110 fpm ~~25.9~~ 24.0 mph ____

→ SUB-THRESHOLD VELOCITY $P_{VEL\,\mathbb{C}}$ 0.152 in H_2O ; $U_{\mathbb{C}}$ = ____ fpm ____ mph ____

VELOCITY PROFILE

Height Above Gnd. (cm)	Pitot Tube Readings P_{VEL} (in H_2O) 1st	2nd	Avg	Velocity, U (fpm)	(mph)	(m/s)
0						
0.5	0.045	0.048				
0.7	0.049	0.050				
1.0	0.051	0.052				
1.4	0.059	0.059				
2.0	0.064	0.064				
2.8	0.070	0.069				
3.8	0.077	0.074				
5.0	0.081	0.083				
7.0	0.094	0.091				
10.0	0.125	0.121				
℄ = 15.2	0.152	0.152				
20.0	0.129					
25.0	0.124					
30.0						

.152

$$U\,(mph) = 10.83 \times \sqrt{P_{VEL}\,(in\,H_2O)} \times \left\{ \sqrt{\frac{T_{amb}\,(^\circ F) + 459.3}{P_{amb}\,(in\,Hg)}} \right\} K'$$

67 24.6

$$U\,(mph) = \sqrt{P_{VEL}\,(in\,H_2O)} \times K' = 50.1$$

83.3 × 1.10 = 91.63 mph

℄ WIND SPEED RATIO S.T. $\Delta p = \left(\frac{91.63}{50.1}\right)^2 = 3.35$ in H_2O

Location (℄)	P_{VEL} (in H_2O)	U (fpm)
Sampling Tube (S)	1.35	
Wind Tunnel (T)	0.152	
Ratio	$\left(\frac{S}{T}\right)^{1/2}$ =	$\frac{S}{T}$ =

$$P_{vel} = \left(\frac{U}{50.1}\right)^2$$ 2750 ex ch

Est. Tunnel ℄ Vel (Tasks) = $\frac{83.3}{2.98}$ = 28.0 mph × 1.10 (+10%) = 30.7 mph

$$P_{vel} = \left(\frac{30.7}{50.1}\right)^2 = 0.377$$ in

5

MIDWEST RESEARCH INSTITUTE
Wind Erosion Testing

Run No. RF-13b Date 6/9/93
MRI Project No. 5155 Recorded by MAG

TEST SITE CHARACTERISTICS

Location _____
Composition _____
Surface Texture _____
Tunnel Orientation: Inlet facing _____

Air Temperature				Relative Humidity	Ambient Pressure	Ambient Winds	
Dry Bulb		Wet Bulb				Speed	Direction
°F	°C	°F	°C	%	In Hg	mph	
						Calm	

THRESHOLD VELOCITY

Centerline Reference: ΔP = 0.19 in H_2O; $U_{\mathcal{C}}$ = _____ fpm _____ mph _____ m/s
Surface Reference: Z_o = _____ cm; U_* = _____ mph _____ m/s

TEST CONDITIONS

Cyclone #1 See Test RF-13a 0.78" nozzle diam

Sampler Data

Sampler	Filter No.	Flow (acfm) Reading	Flow (acfm) Actual	Mass Tare	Mass Final	Mass Catch
Blank 8 x 10						
Cyclone	#1	MRB 6/30/93				
Cyc 8 x 10	~~9338038~~	9338041	20			
Blank Substrate	9338041					
Substrate (µm)	9338038					
Substrate (µm)	9338039					
Substrate (µm)	9338040					

Tro

x8128

Background Δp = 3.7 in H_2O [0-4.0 in H_2O]
Cyclone Δp = 0.6 inspirator
Stack Δp = 1.6
Tunnel ℄ Δp = 0.21

Test Velocity

		fpm	mph	m/s
Ambient	10m			
Working Section	℄			

Test Times (Hr : Min : Sec)

A. Start of Test 18:04:18
B. End of Test 18:11:20
C. Test Duration (B-A) 8 min

Comments: Target 8 min test. Great weather for today

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MIDWEST RESEARCH INSTITUTE
Wind Erosion Testing

Run No. RF-13c Date 6/9/93
MRI Project No. 3155 Recorded by MAE

TEST SITE CHARACTERISTICS

Location See Test RF-13a
Composition
Surface Texture
Tunnel Orientation: Inlet facing

See Test RF-13a

Air Temperature Dry Bulb °F	Air Temperature Dry Bulb °C	Air Temperature Wet Bulb °F	Air Temperature Wet Bulb °C	Relative Humidity %	Ambient Pressure in Hg	Ambient Winds Speed mph	Ambient Winds Direction
						Calm	

THRESHOLD VELOCITY

Centerline Reference: ΔP = 0.19 in H_2O; $U_{\mathcal{C}}$ = _____ fpm _____ mph _____ m/s
Surface Reference: Z_o = _____ cm; U_* = _____ mph _____ m/s

TEST CONDITIONS Cyclone #3 See Test RF-13a 0.78" Nozzle diam

Sampler Data

Sampler	Filter No.	Flow (acfm) Reading	Flow (acfm) Actual	Mass Tare	Mass Final	Mass Catch
Blank 8 x 10						
Cyclone #~~2~~3						
Cyc 8 x 10	9333040					
Blank Substrate						
S1 Substrate (µm)	9338042					
X 932 S2 Substrate (µm)	9338043					
S3 Substrate (µm)	9338044					

Background Δp = 3.7 in H_2O
Cyclone Δp = 0.6
Tunnel $\mathcal{C}$ = 0.305
Pressure (S. Tube) = 3.2

Target ΔP on tunnel $\mathcal{C}$ = 0.305 in H

Test Velocity

		fpm	mph	m/s
Ambient	10m			
Working Section	$\mathcal{C}$			

Test Times (Hr : Min : Sec)

A. Start of Test ~~23:65:3~~ 18:24:56
B. End of Test ~~23:73:6~~ 18:26:58
C. Test Duration (B-A) 2 min

Comments: Target test time = 2 min

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Run No. KF-13 Wind Tunnel Testing Date 6/9/93 Time 17:

MRI Project No. 3155 Subthreshold Velocity Profile Recorded by MHC

THRESHOLD VELOCITY MAC 6/9/93 P_{VEL} ℄ = ~~0.15~~ 0.19 in H_2O ; $U_{℄}$ = ~~22.2~~ fpm 22.2 mph ____

→ SUBTHRESHOLD VELOCITY P_{VEL} ℄ ____ mm H_2O ; $U_{℄}$ = ____ fpm ____ mph ____

VELOCITY PROFILE

test tunnel ℄ ΔP = 0.21 → ~~22.8~~ mph
Magnehelic MHC 6/9/93

Height Above Gnd. (cm)	Pitot Tube Readings P_{VEL} (in H_2O) 1st	2nd	Avg	Velocity, U (fpm)	(mph)	(m/s)
0						
0.5	0.005	0.006	.006			
0.7	0.009	0.0089	.009			
1.0	0.012	0.012	.012			
1.4	0.018	0.017 ~~0.024~~	.017			
2.0	0.027	0.035	.024			
2.8	0.035	0.038	.035	.038		
3.8	0.047	0.045 ~~0.044~~	.045			
5.0	0.050	0.049	.049			
7.0	0.068	0.060	.060			
10.0	0.082	0.078	.078			
℄ = 15.2	0.112	0.100	.100			
20.0	0.090					
25.0	0.087					
30.0						

$$U(mph) = 10.83 \sqrt{P_{VEL}(in\ H_2O)} \times \sqrt{\frac{T_{amb}(°F) + 459.3}{P_{amb}(in\ Hg)}} \times \sqrt{P_{VEL}(in\ H_2O)} = U(mph)$$

$$K' = 50.3$$

℄ WIND SPEED RATIO

Location (℄)	P_{VEL} (in H_2O)	U (fpm)
Sampling Tube (S)	0.185	
Wind Tunnel (T)	0.100	
Ratio	$(\frac{S}{T})^{1/2}$ = 2.80	$\frac{S}{T}$ =

Comprehensive Test

MIDWEST RESEARCH INSTITUTE
Wind Erosion Testing

Run No. RF-13a Date 6/9/93
MRI Project No. 3155 Recorded by MAC

TEST SITE CHARACTERISTICS 2 cmplt 6/7/93 by
Location Site T-3 - about 100 yd from Indiana Street
Composition Rocky soil originally covered with thin patches of 10-11" high g
Surface Texture Disturbed by cutting grass to surface + taking some rocks that cont to sup. all removed
Tunnel Orientation: Inlet facing SE

Air Temperature Dry Bulb °F	Dry Bulb °C	Wet Bulb °F	Wet Bulb °C	Relative Humidity %	Ambient Pressure In Hg	Ambient Winds Speed mph	Direction
65		53		44	24.3	<5	SW

16:58

THRESHOLD VELOCITY
Centerline Reference: ΔP = 0.19 in H_2O; $U_{\mathbb{C}}$ = _____ fpm _____ mph _____ m/s
Surface Reference: Z_o = _____ cm; U_* = _____ mph _____ m/s

TEST CONDITIONS 0.78" profile
Cyclone No 2

Sampler Data

Sampler	Filter No.	Flow (acfm) Reading	Flow (acfm) Actual	Mass Tare	Mass Final	Mass Catch
Blank 8 x 10	9333047					
Cyclone #2	9333042					
Cyc 8 x 10	~~9333049~~		20			
Blank Substrate	9338041					
Substrate (µm)	9338035					
Substrate (µm)	9338036					
Substrate (µm)	9338037					

Exposed 17:17
17:22
S1
x9320 S2
S3

Backgrnd 8x10 9333050
2nd Blank 8x10 9333049

Test Velocity

		fpm	mph	m/s
Ambient	10m			
Working Section	℄	2060	23.4	

Target ℄ = 2060
MAC
~~Target Sampling tube. ΔP = 2.45 in~~
~~Target Tunnel ℄ ΔP = 0.305~~

background ΔP = 3.7 in H_2O
ΔP = 0.21
Cyclone = 0.6" H_2O

Test Times (Hr : Min : Sec)
A. Start of Test ~~2306.8~~ 17:54:42 MAC 6/9/93
B. End of Test 17:56:45
C. Test Duration (B-A) 2 min

Comments: Lost 1hr due to rain, lost 2hr due to moist soil left to dry for disturbed tests.
on 6/9/93

ΔP 1.6 read on Siphon Tube

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Screening test

MIDWEST RESEARCH INSTITUTE
Wind Erosion Testing

Run No. RF-12 Date 6/9/93
MRI Project No. 3157 Recorded by MAG

TEST SITE CHARACTERISTICS

Location Site T-22 about 100 yd from Indiana Street
Composition Rocky soil originally covered with thin patches of 10-11" high grass
Surface Texture Disturbed by cutting grass to surface + raking Crossing the Even slight raking brings rocks to surface Arizona
Tunnel Orientation: Inlet facing SE

	Air Temperature Dry Bulb °F	Air Temperature Dry Bulb °C	Air Temperature Wet Bulb °F	Air Temperature Wet Bulb °C	Relative Humidity %	Ambient Pressure In Hg	Ambient Winds Speed mph	Ambient Winds Direction
11:11	74		56		30	24.5	5-10	NE

Thunderstorm building to SSW

THRESHOLD VELOCITY

Centerline Reference: ΔP = 0.26 in H_2O; $U_{\mathbb{C}}$ = _____ fpm _____ mph _____ m/s
Surface Reference: Z_o = _____ cm; U_* = _____ mph _____ m/s

TEST CONDITIONS

During Test, winds from S @ 2-4 mph and cooler, est ~ 68°F

Sampler Data

Sampler	Filter No.	Flow (acfm) Reading	Flow (acfm) Actual	Mass Tare	Mass Final	Mass Catch
Blank 8 x 10	9333022					
Cyclone						
Cyc 8 x 10	9333037		40			
Blank Substrate						
Substrate (µm)						
Substrate (µm)						
Substrate (µm)						

Same as for RF-11

Background Samples for RF-11 6/9/93
0 µRS
0.368 on tunnel magnehelic
2.72 on manometer for sampling tube
3.7 on background
2.0 on cyclone

Test Velocity

		fpm	mph	m/s
Ambient	10m			
Working Section	℄			

Target 2.72 in H2O on sampling tube

Test Times (Hr : Min : Sec)

A. Start of Test 2258.6 11:56:55
B. End of Test 12:17:00
C. Test Duration (B-A) _____

Comments: Large hole ~ 3" wide + 1½" above surface about 2' in front of

Steve believes surface is still too moist and not bone dry

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MIDWEST RESEARCH INSTITUTE

Run No: RE-13 Wind Tunnel Testing DATE: 6/19/93

MRI Project No: 3155 Background Air Sampling Recorded by: MAG

FILTER DATA

Filter No	Final Wt.	Tare Wt.	Catch
9333050			
9333047 (blank)			

FLOW DATA

Magnehelic Range	0 - 4.00	in H_2O
Target Flow	45	ACFM
Target Magnehelic Reading	3.7	in H_2O

RUN TIME

		Clock Time	Elapsed Time Meter	Magnehelic Reading (in H_2O)
First Period	Start	17:26:40	1443.0	
	Stop	18:44:35		
	Duration			
Second Period	Start			
	Stop			
	Duration			
Cumulative	Duration			

COMMENTS

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MIDWEST RESEARCH INSTITUTE

Run No. RF-12 Wind Tunnel Testing Date 6/9/93 Time 11:4

MRI Project No. 3155 Subthreshold Velocity Profile Recorded by MAG

THRESHOLD VELOCITY $P_{VEL\,\mathfrak{C}}$ = 0.260 in H_2O ; $U_{\mathfrak{C}}$ = 25.8 fpm ____ mph ____

→ SUB-THRESHOLD VELOCITY $P_{VEL\,\mathfrak{C}}$ 0.161 in H_2O ; $U_{\mathfrak{C}}$ = ____ fpm ____ mph ____

VELOCITY PROFILE

Height Above Gnd. (cm)	Pitot Tube Readings P_{VEL} (in H_2O) 1st	2nd	Avg	Velocity, U (fpm)	(mph)	(m/s)
0						
0.5	0.011	0.011				
0.7	0.014	0.013				
1.0	0.019	0.016				
1.4	0.021	0.020				
2.0	0.024	0.025				
2.8	0.030	0.030				
3.8	0.037	0.038				
5.0	0.047	0.048				
7.0	0.068	0.060				
10.0	0.105	0.102				
℄ = 15.2	0.161	0.157				
20.0		0.163				
25.0		0.136				
30.0						

$\frac{0.157}{1.26} = 2.03$

℄ WIND SPEED RATIO

Location (℄)	P_{VEL} (in H_2O)	U (fpm)
Sampling Tube (S)	2.1	
Wind Tunnel (T)	0.260	
Ratio	$(\frac{S}{T})^{1/2} = 2.84$	$\frac{S}{T}$ =

$\frac{1.28}{0.162}$ 2.51

Use: 2.83

$$U(mph) = 10.83 \sqrt{P_{VEL}(in\,H_2O)} \times \sqrt{\frac{T_{amb}(°F) + 459.3}{P_{amb}(in\,Hg)}} \times K'$$

$$U(mph) = \sqrt{P_{VEL}(in\,H_2O)} \times K'$$

$$\boxed{K' = 50.5}$$

$$\left(\frac{83.3}{50.5}\right)^2 = 2.72 \text{ in } H_2O$$

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MIDWEST RESEARCH INSTITUTE

Run No. RF-12 Wind Tunnel Testing Date 6/9/93 Time 12:

MRI Project No. 3155 Subthreshold testing in silt Recorded by A

12:02 — 12:08

THRESHOLD VELOCITY $P_{VEL\,℄}$ = ____ in H_2O ; $U_{℄}$ = ____ fpm ____ mph ____

→ SUBTHRESHOLD VELOCITY $P_{VEL\,℄}$ ____ in H_2O ; $U_{℄}$ = ____ fpm ____ mph ____

During Test RF-12

VELOCITY PROFILE — ABOVE THRESHOLD

(No erosion observed; yes, very slight)

Very light winds 2-4 mph

Height Above Gnd. (cm)	Pitot Tube Readings P_{VEL} (in H_2O) 1st	2nd	Avg	Velocity, U (fpm)	(mph)	(m/s)
0						
0.5	0.030	0.030				
0.7	0.038	0.038				
1.0	0.041	0.041				
1.4	0.050	0.049				
2.0	0.059	0.0560				
2.8	0.070	0.069				
3.8	0.088	0.088				
5.0	0.100	0.110				
7.0	0.139	0.1439				
10.0	0.215	0.2215				
℄ = 15.2	0.365	0.370				
20.0		0.360				
25.0		0.310				
30.0						

0.3 and 0.360

2.72 on manometer

Try threshold test after 20 and see erosion @ 4.5 on manometer

℄ WIND SPEED RATIO @ 0.60 on Magnehelic " 39.5 Sampler "

Location (℄)	P_{VEL} (in H_2O)	U (fpm)
Sampling Tube (S)	2.72	
Wind Tunnel (T)	0.37	
Ratio	$(\frac{S}{T})^{1/2}$ =	$\frac{S}{T}$ =

$$U = \sqrt{P_{VEL}\,(\text{in } H_2O)} \times \sqrt{\frac{T_{amb}\,(°F) + 459.3}{P_{amb}\,(\text{in Hg})}} \times 10.83 \quad K'$$

$$U\,(\text{mph}) = \sqrt{P_{VEL}\,(\text{in } H_2O)} \times K'$$

12:12 during test

Wetbulb 54°F

Drybulb 66.5°F

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MIDWEST RESEARCH INSTITUTE
Wind Erosion Testing

Screening test

Run No. RF-11 Date 6/9/93

MRI Project No. 3155 Recorded by MAG

TEST SITE CHARACTERISTICS

Location Site T-~~3~~2 (as on MRI map reduced from RFmap) ~~Grassy area~~ that 100 yd from Indian St.

Composition Thin grassy area with rocks, tall grass thistles, and rocks

Surface Texture Undisturbed - Grass to height of tunnel, but very thin stand.

Tunnel Orientation: Inlet facing SE

9:50

Blank Exposed 9:41

Air Temperature Dry Bulb °F	Air Temperature Dry Bulb °C	Air Temperature Wet Bulb °F	Air Temperature Wet Bulb °C	Relative Humidity %	Ambient Pressure in Hg	Ambient Winds Speed mph	Ambient Winds Direction
70		55		36	24.50	<5-8	N

THRESHOLD VELOCITY >0.38

Centerline Reference: ΔP = None seen in H_2O; $U_{\mathbb{C}}$ = _____ fpm _____ mph _____ m/s

Surface Reference: Z_o = _____ cm; U_* = _____ mph _____ m/s

TEST CONDITIONS

Sampler Data

Sampler	Filter No.	Flow (acfm) Reading	Flow (acfm) Actual	Mass Tare	Mass Final	Mass Catch
Blank 8 x 10	9333022					
Cyclone #1						
Cyc 8 x 10	9333032		40			
~~Blank Substrate~~						
~~Substrate (µm)~~						
~~Substrate (µm)~~						
~~Substrate (µm)~~						

Background 8x10 9333031

Test Velocity

		fpm	mph	m/s
Ambient	10m			
Working Section	℄			

Sampling tube = 2.74

ΔP = 0.235
2nd = 0.255
3rd = 0.260
0.265

avg 2.55

ΔP needed for sampling tube ℄ = 83.3 mph = 7330 fpm = 2.74 in H_2O

Test Times (Hr : Min : Sec)

A. Start of Test 2236.4 10:21:20

B. End of Test 2258.1 10:42:00

C. Test Duration (B-A) 20 min 40 sec

Comments: Air density from Dwyer is 0.060 lbs/ft³

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Run Nos RF-11 Wind Tunnel Testing Date 6/9/95

MRI Project No 3155 Background Air Sampling Recorded by MAG

FILTER DATA

Filter No	Final Wt.	Tare Wt.	Catch
9333031			
9333022 (blank)			

FLOW DATA

Magnehelic Range 0 - 4 in H_2O

Target Flow MAG 6/9/95 ~~3.745~~ ACFM

Target Magnehelic Reading 3.7 in H_2O

RUN TIME

		Clock Time	Elapsed Time Meter	Magnehelic Reading (in H_2O)
First Period	Start	9:49:30	1328.35	3.7
	Stop	10:52:40	1393.65	3.7
	Duration			
Second Period	Start	~~10 11:41:10~~ ~~10:31:10~~ *	~~1393.6~~ 1405.6	3.7
	Stop	12:17:25	1443.0	
	Duration			
Cumulative	Duration			

COMMENTS

* timer running but motor not started until 11:41:10

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MIDWEST RESEARCH INSTITUTE
Wind Erosion Testing

Run No. RF-10 Date 6/7/93
MRI Project No. 3155 Recorded by MHC

TEST SITE CHARACTERISTICS

Location On plateau area (T-3) S of GW Reservoir
Composition Vegetated area where "grasses" have been cut with scissors, disturbed with rake
Surface Texture Mostly dirt; small no of rocks (0.5-2.0")
Tunnel Orientation: Inlet facing ESE

This surface appears a little more disturbed than Test RF-8

Disturbed Screening Test

Air Temperature Dry Bulb °F	Air Temperature Dry Bulb °C	Air Temperature Wet Bulb °F	Air Temperature Wet Bulb °C	Relative Humidity %	Ambient Pressure In Hg	Ambient Winds Speed mph	Ambient Winds Direction
54		42		35	24.05	10	W

8:52

5-15 Small gusts to 17 during test, mostly <10 mph

THRESHOLD VELOCITY

Centerline Reference: ΔP = 0.205 in H_2O; U_C = 2030 fpm 23.1 mph _____ m/s
Surface Reference: Z_o = _____ cm; U_* = _____ mph _____ m/s

TEST CONDITIONS

Nozzle = 1.00"

Sampler Data

Sampler	Filter No.	Flow (acfm) Reading	Flow (acfm) Actual	Mass Tare	Mass Final	Mass Catch
Blank 8 x 10	9333033					
Cyclone #1						
Cyc 8 x 10	9333034					
Blank Substrate						
Substrate (µm)						
Substrate (µm)						
Substrate (µm)						

Exposed 8:55

Background 0.7 in H_2O
Tunnel ℄ ΔP = 0.42 in H_2O
Sampling tube = 2.9 in H_2O
Cyclone = 2.0 in H_2O

9333035

Test Velocity

		fpm	mph	m/s
Ambient	10m			
Working Section	℄	2910	33.1	

Test Times (Hr : Min : Sec)

	Elapsed time		
A. Start of Test	2213.6	9:31:30	C. Test Duration (B-A)
B. End of Test		9:51:30	

Raised considerably during night, but trip around area to be tested. Prepare disturbed site for testing + begin test. Rest of run quite hot.

20 min

Comments: Recheck of manometer due to testing in sun. Difficult to control blower water adjustment in first min of test, then stabilized to 0.42 in H_2O for rest of 20 min test. At 9:40 no erosion from sampled area seen. Outside tufts of cactus, rocks, grass roots, large clumps of dirt seem to serve as nonerodible elements protecting the soil from further erosion.

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MIDWEST RESEARCH INSTITUTE

Run No. RF-11 Wind Tunnel Testing Date 6/9/93 Time 10:

MRI Project No. 3155 Subthreshold Velocity Profile Recorded by TG

No threshold seen at 0.38 on tunnel for Vegetable

THRESHOLD VELOCITY $P_{VEL\,\mathbb{C}}$ = None in H_2O ; $U_{\mathbb{C}}$ = _____ fpm ~~21.0~~ mph _____

→ SUB-THRESHOLD VELOCITY $P_{VEL\,\mathbb{C}}$ 0.175 in H_2O ; $U_{\mathbb{C}}$ = 1850 fpm 21.0 mph _____

VELOCITY PROFILE

Computed

Area of ~ 3"x4" appears slightly dust wip

Did not look at for threshold te

Height Above Gnd. (cm)	Pitot Tube Readings P_{VEL} (in H_2O) 1st	2nd	Avg	Velocity, U (fpm)	(mph)	(m/s)
0						
0.5	0.002	0.002				
0.7	0.003	0.003				
1.0	0.004	0.009				
1.4	0.007	0.008				
2.0	0.010	0.011				
2.8	0.016	0.020				
3.8	0.027	0.025				
5.0	0.040	0.040				
7.0	0.059	0.060				
10.0	0.105	0.105				
$\mathbb{C}$ = 15.2	~~0.120~~ 0.185	0.175				
20.0	0.355	0.355				
25.0	0.350	0.345				
30.0						

$$U\,(mph) = 10.83 \sqrt{P_{VEL}\,(in\,H_2O)} \times \left\{ \sqrt{\frac{T_{amb}\,(°F) + 459.3}{P_{amb}\,(in\,Hg)}} \right\} \times K'$$

$$U\,(mph) = \sqrt{P_{VEL}\,(in\,H_2O)} \times K'$$

$\mathbb{C}$ WIND SPEED RATIO

Location ($\mathbb{C}$)	P_{VEL} (in H_2O)	U (fpm)
Sampling Tube (S)	1.95	
Wind Tunnel (T)	~~0.20~~ 0.185	
Ratio	$\left(\frac{S}{T}\right)^{1/2}$ =	$\frac{S}{T}$ =

$$\left(\frac{83.3}{50.3}\right)^2 = P_{vel}$$

Sampling Tube = 2.7 in

2.74 × 2.74 = 3.014 highest Pvel

Sampling tube for threshold velocity test

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Run Nos. B1-10 Wind Tunnel Testing
MRI Project No 3155 Background Air Sampling

Date 6/7/93
Recorded by MAG

FILTER DATA

Filter No	Final Wt.	Tare Wt.	Catch
9333035			
9333033 (blank)			

FLOW DATA

Magnehelic Range	0 - 4	in H_2O
Target Flow	MH ~~3.7~~ 45	ACFM
Target Magnehelic Reading	3.7	in H_2O

RUN TIME

		Clock Time	Elapsed Time Meter	Magnehelic Reading (in H_2O)
First Period	Start	9:07:40	1282.6	
	Stop	9:51:55	1328.3	
	Duration			
Second Period	Start			
	Stop			
	Duration			
Cumulative	Duration			

COMMENTS

MIDWEST RESEARCH INSTITUTE

Run No. Df-10 Wind Tunnel Testing Date 6/7/93 Time 0915

MRI Project No. 3155 Subthreshold Leering Profile Recorded by MMG

THRESHOLD VELOCITY $P_{VEL\,\mathfrak{C}}$ = 0.205 in H_2O ; $U_{\mathfrak{C}}$ = 2030 fpm 23.1 mph ____

→ SUB-THRESHOLD VELOCITY $P_{VEL\,\mathfrak{C}}$ 0.077 in H_2O ; $U_{\mathfrak{C}}$ = 1250 fpm 14.2 mph ____

Pitot tube is at ground level at position 0.5 cm

VELOCITY PROFILE

	Pitot Tube Readings					
Height Above Gnd. (cm)	P_{VEL} (in H_2O) 1st	2nd	Avg	Velocity, U (fpm)	(mph)	(m/s)
0						
0.5	0.011	0.010				
0.7	0.016	0.014				
1.0	0.018	0.019				
1.4	0.021	0.024				
2.0	0.026	0.027				
2.8	0.025	0.030				
3.8	0.034	0.035				
5.0	0.040	0.041				
7.0	0.051	0.048				
10.0	0.064	0.061				
$\mathfrak{C}$ = 15.2	0.077	0.069				
20.0	0.062					
25.0	0.058					
30.0						

$\mathfrak{C}$ 0.065

Ambient winds 7-15 mph; small gusts above that ~17 mph

$$U\,(mph) = 10.83 \sqrt{P_{VEL}\,(in\,H_2O)} \times \left\{ \sqrt{\frac{54}{\frac{T_{amb}\,(°F) + 459.3}{P_{amb}\,(in\,Hg)}}} \right\} \times \sqrt{P_{VEL}\,(in\,H_2O)}$$

24.05

K'

$$U\,(mph) = K' \sqrt{P_{VEL}\,(in\,H_2O)}$$

$$\boxed{K' = 50.0}$$

$\mathfrak{C}$ WIND SPEED RATIO

	Location ($\mathfrak{C}$)	P_{VEL} (in H_2O)	U (fpm)	
0.44	Sampling Tube (S)	0.45		0.83
0.069	Wind Tunnel (T)	0.077		0.130
2.52	Ratio	$(\frac{S}{T})^{1/2}$ = 2.42	$\frac{S}{T}$ =	

$\frac{83.3}{2.52}$ = 33.1 mph 2.53

2910 fpm last vel

= 0.42

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Run No. RF-9 Wind Tunnel Testing Date 6/6/93 Time ____

MRI Project No. 3155 Subthreshold Testing, Pickle Recorded by MAC

THRESHOLD VELOCITY P_{VEL} @ = ____ in H_2O ; $U_{@}$ = ____ fpm ____ mph ____

Noise observed up to 0.25 in H_2O ; 0.58 in H_2O post?

→ SUB-THRESHOLD VELOCITY P_{VEL} @ ____ in H_2O ; $U_{@}$ = ____ fpm ____ mph ____

Max Δp @ 15.2 is 0.215 for pre test. Will bump it higher after 30 min test to check for Cuscuscaspin
Decision by Chris

VELOCITY PROFILE

Height Above Gnd. (cm)	Pitot Tube Readings P_{VEL} (in H_2O) 1st	2nd	Avg	Velocity, U (fpm)	(mph)	(m/s)
0						
0.5	0.004	0.002				
0.7	0.005	0.005				
1.0	0.007	0.008				
1.4	0.010	0.010				
2.0	0.012	0.012				
2.8	0.017	0.017				
3.8	0.026	0.027				
5.0	0.029	0.032				
7.0	0.034	0.038				
10.0	0.040	0.049				
@ = 15.2	0.150	0.152				
20.0		0.315				
25.0		0.372				
30.0						
	1.50	1.5				

MRI 6/6/93

$$U(mph) = 10.83 \sqrt{\frac{T_{amb}(°F) + 459.3}{P_{amb}(in\ Hg)}} \times \sqrt{P_{VEL}(in\ H_2O)} = K' \times \sqrt{P_{VEL}(in\ H_2O)}$$

@ WIND SPEED RATIO @ 25 cm

Location (@)	P_{VEL} (in H_2O)	U (fpm)
Sampling Tube (S)	0.205	6600
Wind Tunnel (T)	2.15	2010
Ratio	$(\frac{S}{T})^{1/2}$ = 3.24	$\frac{S}{T}$ =

$$\frac{83.3}{3.24} = 25.7 = 2262 \text{ fpm}$$

Run test at Δp = 0.255

$$\boxed{K' = 50.7}$$

MIDWEST RESEARCH INSTITUTE
Wind Erosion Testing

Run No. RF-9 Date 6/6/93
MRI Project No. 3155 Recorded by MHE

Permit by SC 1A with assist from Grant Euler

TEST SITE CHARACTERISTICS

Location On platform area (T-3). S of GW Reservoir. Thin Grasses
Composition Mostly a "grass" with dry stems + "flowers" - See sample
Surface Texture Dirt areas between litter and grasses broken in general area but not in tunnel, o tunnel, some rock; one clumps of thin grass about 6" tall. Small amount of buffalo grass
Tunnel Orientation: Inlet facing SE

Most plants in tunnel look like little trees

Air Temperature Dry Bulb °F	Air Temperature Dry Bulb °C	Air Temperature Wet Bulb °F	Air Temperature Wet Bulb °C	Relative Humidity %	Ambient Pressure In Hg	Ambient Winds Speed mph	Ambient Winds Direction
66		59		63	24.00	<5	~~SE~~ NE

18:42

THRESHOLD VELOCITY >0.58 (post test)

Centerline Reference: ΔP = ~~0.25~~ in H_2O; $U_{\mathbb{C}}$ = _____ fpm _____ mph _____ m/s
Surface Reference: Z_o = _____ cm; U_* = _____ mph _____ m/s

TEST CONDITIONS 1.00" Nozzle

Sampler Data

Sampler	Filter No.	Flow (acfm) Reading	Flow (acfm) Actual	Mass Tare	Mass Final	Mass Catch
Blank 8 x 10	9333024					
Cyclone #4						
Cyc 8 x 10	9333016					
~~Blank Substrate~~						
~~Substrate (µm)~~						
~~Substrate (µm)~~						
~~Substrate (µm)~~						

Same as for RF-8

Background 9333017

Background 2.7 in H_2O
Ambient 0.25 in H_2O
Sampling side 2.5 in H_2O
Cyclone 2.0 in H_2O

Test Velocity

		fpm	mph	m/s
Ambient	10m			
Working Section	℄			

Test Times (Hr : Min : Sec)

A. Start of Test 2191.7 19:30:45
B. End of Test 19:50:50
C. Test Duration (B-A) 20 min

Comments: Grant Euler decided that because area looked like no threshold velocity could be achieved with potential isokinetic flow that test on threshold should stop and be redone after sampling test. Wind tunnel flow then made as high as possible

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MIDWEST RESEARCH INSTITUTE
Wind Erosion Testing

Run No. 93-8 Date 6/6/93
MRI Project No. 2150 Recorded by MHG

TEST SITE CHARACTERISTICS East side of Indiana Street T-1
Location At top of small plateau near east entrance to RF Plant
Composition
Surface Texture Disturbed; grass cut to surface level; surface raked until fully disturbed
Tunnel Orientation: Inlet facing SE
Test Type Screening

Time	Air Temperature Dry Bulb °F	Air Temperature Dry Bulb °C	Air Temperature Wet Bulb °F	Air Temperature Wet Bulb °C	Relative Humidity %	Ambient Pressure In Hg	Ambient Winds Speed mph	Ambient Winds Direction
16:00	70.2		59.7		52	24.05	<5	NNE

THRESHOLD VELOCITY
Centerline Reference: ΔP = 0.155 in H_2O; $U_{\mathbb{C}}$ = 1770 fpm 20.1 mph _____ m/s
Surface Reference: Z_o = _____ cm; U_* = _____ mph _____ m/s

TEST CONDITIONS Nozzle: 1.00"

Sampler Data

Time Exposed	Sampler	Filter No.	Flow (acfm) Reading	Flow (acfm) Actual	Mass Tare	Mass Final	Mass Catch
16:15	Blank 8 x 10	9333029					
	Cyclone	30					
	Cyc 8 x 10 # 3	9333028		40+			
	~~Blank Substrate~~						
	~~Substrate (µm)~~						
	~~Substrate (µm)~~						
	~~Substrate (µm)~~						
	Background	9333028					

Test Δp in H_2O
Background — 3.7
Sampling tube — 3.15
Tunnel ℄ — 0.425
Cyclone — 2.0

Test Velocity

		fpm	mph	m/s
Ambient	10m			
Working Section	℄	2926	33.25	

Test Times (Hr : Min : Sec)

	Elapsed Time	
A. Start of Test	2170.6	16:56:30
B. End of Test	2191.7	17:16:30

C. Test Duration (B-A) 20 min

Comments: Surface (disturbed) has lots of very short shrubs with roots still in soil. Erosion of threshold velocity was seen in circular eddys channeling thru vegetation. Most representative of rails, not construction.

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MIDWEST RESEARCH INSTITUTE

Run No. RF-9 Wind Tunnel Testing Date 6/6/93

MRI Project No. 3165 Background Air Sampling Recorded by MAG

FILTER DATA

Filter ID	Final Wt.	Tare Wt.	Catch
9333017			
9333029 (blank)			

FLOW DATA

Magnehelic Range	0 - 4	in H_2O
Target Flow	45	ACFM
Target Magnehelic Reading	3.7	in H_2O

initial by SC on Magnehelic

3.7

40 SCFM

2.9" manometer

= 3.45" Magnehelic

= 72.5 Volt

RUN TIME

		Clock Time	Elapsed Time Meter	Magnehelic Reading (in H_2O)
First Period	Start	1900:40	1230.9	3.7
	Stop	1961:30	1282.6	3.7
	Duration			
Second Period	Start			
	Stop			
	Duration			
Cumulative	Duration			

COMMENTS

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Wind Tunnel Testing

WRI Project No 3155 Backgrounds Air Sampling

Date 6/6/93

Recorded by [illegible]

FILTER DATA

Filter No	Final Wt.	Tare Wt.	Catch
9333028			
9333029 (blank)			

FLOW DATA

Magnehelic Range	0 - 4	in H_2O
Target Flow 6/6/93 45	~~3.7~~	ACFM
Target Magnehelic Reading	3.7	in H_2O

RUN TIME

		Clock Time	Elapsed Time Meter	Magnehelic Reading (in H_2O)
First Period	Start	16:20:30	1173.1	3.7
	Stop	17:17:00	1230.9	3.7
	Duration			
Second Period	Start			
	Stop			
	Duration			
Cumulative	Duration			

COMMENTS

Up to 4.0 (@ 16:55), readjusted to 3.7 in H_2O from running then. Recording to field logbook.

MIDWEST RESEARCH INSTITUTE

Run No. ~~RF-8~~ Wind Tunnel Testing Date ~~4/14/93~~ Time ____

MRI Project No. 3155 Subtitle: [illegible] Recorded by: KG

THRESHOLD VELOCITY $P_{VEL\,\mathbb{C}}$ = 0.155 in H_2O ; $U_{\mathbb{C}}$ = 1770 fpm 20.1 mph ____

→ SUB-THRESHOLD VELOCITY $P_{VEL\,\mathbb{C}}$ 0.125 in H_2O ; $U_{\mathbb{C}}$ = 1590 fpm 18.1 mph ____

Bottom of pitot tube (nozzle end) rested on ground; front part ~~about~~ right at ground surface, but in slight depression

VELOCITY PROFILE

Height Above Gnd. (cm)	Pitot Tube Readings P_{VEL} (in H_2O) 1st	2nd	Avg	Velocity, U (fpm)	(mph)	(m/s)
0						
0.5	0.000	0.001				
0.7	0.001	0.002				
1.0	0.002	0.003				
1.4	0.004	0.004				
2.0	0.007	0.009				
2.8	0.015	0.018				
3.8	0.022	0.024				
5.0	0.034	0.035				
7.0	0.052	0.057				
10.0	0.075	0.082				
℄ = 15.2	0.125	0.128				
20.0	0.127					
25.0	0.122					
30.0						

$$U(mph) = 10.83 \sqrt{\frac{\frac{T_{amb}(°F) + 459.3}{70.2}}{P_{amb}(in\ Hg)}} \times \sqrt{P_{VEL}(in\ H_2O)}$$

$$U(mph) = K' \times \sqrt{P_{VEL}(in\ H_2O)}$$

$$K' = 5.8$$

Reed Hodgson said he saw only surface creep at 0.155 in H_2O; MA Geologist saw significant movement of particles, but these could have been caught by downwind vegetation.

℄ WIND SPEED RATIO

	Location (℄)	P_{VEL} (in H_2O)	U (fpm)
0.128	Sampling Tube (S)	0.125	4360
0.095	Wind Tunnel (T)	0.95	1590
	Ratio	$(\frac{S}{T})^{1/2}$ = 2.16	$\frac{S}{T}$ = 2.74

$\frac{83.3\ mph}{2.76}$ = 30.2 mph = 2660 fpm

Test Conditions

Δp = ~~0.125~~ 0.125

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Run No. RF-7 Wind Tunnel Testing Date 6/5/93 Time 8:30

M.R.E. Project No. 3155 Subthreshold [illegible] Recorded by [illegible]

Engine operation hypothesis

No clean elevated up to 3500 fpm

THRESHOLD VELOCITY P_{VEL} ℄ = _____ in H_2O ; $U_{℄}$ = _____ fpm _____ mph _____ m

→ JET-THRESHOLD VELOCITY P_{VEL} ℄ ~~0.31~~ 0.071 in H_2O ; $U_{℄}$ = ~~3500~~ 1200 fpm _____ mph _____ m

VELOCITY PROFILE

Hot seen clearly on surface between grass @ ~ 3000 fpm

@ 3800 fpm (Δp = 0.12) still no clear

Height Above Gnd. (cm)	Pitot Tube Readings P_{VEL} (in H_2O) 1st	2nd	Avg	Velocity, U (fpm)	(mph)	(m/s)
0						
0.5	0.000	0.001				
0.7	0.000	0.001				
1.0	0.000	0.002				
1.4	0.000	0.002				
2.0	0.000	0.0025				
2.8	0.000	0.004				
3.8	0.005	0.005				
5.0	0.010	0.010				
7.0	0.015	0.019				
10.0	0.038	0.038				
℄ = 15.2	0.071	0.075				
20.0	0.085					
25.0						
30.0						

$\sqrt{P_{VEL}\ (in\ H_2O)}$ × $\sqrt{P_{VEL}\ (in\ H_2O)}$ ×

$\sqrt{\dfrac{T_{amb}\ (°F) + 459.3}{P_{amb}\ (in\ Hg)}}$ 24.0 K'

10.83

at [illegible] 0.250 above [illegible] 0.20

U (fpm) vs Δp from Dwyer air velocity calibration set at ~~0.06~~ 0.06 lbs/ft³ 6/5/93

℄ WIND SPEED RATIO

low subthreshold high subthreshold

Location (℄)	P_{VEL} (in H_2O)	U (fpm)
Sampling Tube (S)	~~0.4~~ 0.2	
Wind Tunnel (T)	0.12	
Ratio	$(\frac{S}{T})^{1/2}$ = 2.42	$\frac{S}{T}$ =

0.42

~~0.31~~ 0.071 →

2.43

$\frac{83.3}{2.42}$ = 34.42 mph 3000 fpm

Need Δp = 0.455

U (mph) = U (mph) = $\boxed{K' = 50.8}$

MIDWEST RESEARCH INSTITUTE
Wind Erosion Testing

Run No. RF-7 Date 6/5/93
MRI Project No. 3155 Recorded by MAC

T-1

TEST SITE CHARACTERISTICS

Location On top of plateau; RF Plant, optimum on lin ~360 yds; excluding 6 W Rose to ENE
Composition Vegetated area thin patches grasses with mostly 2-3" ht.
Surface Texture Rocky area, especially toward center of working section
Tunnel Orientation: Inlet facing E Some dirt between grass clumps and rocks; 1 small cactus

Air Temperature Dry Bulb °F	Air Temperature Dry Bulb °C	Air Temperature Wet Bulb °F	Air Temperature Wet Bulb °C	Relative Humidity %	Ambient Pressure In Hg	Ambient Winds Speed mph	Ambient Winds Direction
69		58		50	24.0	L+V	N

17:40

THRESHOLD VELOCITY no threshold reached @ 15:40 12 mph @ 18:44 10 mph

Centerline Reference: ΔP = ~~0.42~~ in H_2O; $U_{\mathcal{C}}$ = _____ fpm _____ mph _____ m/s
Surface Reference: Z_o = _____ cm; U_* = _____ mph _____ m/s
Background 9333027

TEST CONDITIONS

Sampler Data

Sampler	Filter No.	Flow (acfm) Reading	Flow (acfm) Actual	Mass Tare	Mass Final	Mass Catch
Blank 8 x 10	9333026					
Cyclone						
Cyc 8 x 10 #3	9333021		40			
Blank Substrate						
Substrate (µm)						
Substrate (µm)						
Substrate (µm)						

Exposed 16:05

Nozzle = 1.00"

Target Δp = 0.4

Test Velocity

		fpm	mph	m/s
Ambient	10m			
Working Section	℄	3000	34.4	

Run @ 2.0 on cyclone
@ 3.1 on Background
@ 2.55 in H_2O Sampling tube

Test Times (Hr : Min : Sec)

A. Start of Test 2149.1 1847:00 C. Test Duration (B-A) _____
B. End of Test 1907:00

1910

Comments: Bottom position of pitot tube in thin grass that is about 1½"-2" height at entrance to pitot tube. Height since surface of center of pitot tube is ½ - 3/4". Ran at highest speed expected for isokinetic even though threshold test @ 3500 fpm received no visible erosion. Winds cause Δp to vary below 0.42 - 0.48 in H_2O

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MIDWEST RESEARCH INSTITUTE
Wind Erosion Testing

Computerized

Run No. RF-6d
MRI Project No. 3155

Date 6/5/93
Recorded by MAG

Initials by
CL
SL
MAG

TEST SITE CHARACTERISTICS

Location Same as RF-6a, 6b, and 6c
Composition "
Surface Texture "
Tunnel Orientation: Inlet facing S

Air Temperature Dry Bulb °F	Air Temperature Dry Bulb °C	Air Temperature Wet Bulb °F	Air Temperature Wet Bulb °C	Relative Humidity %	Ambient Pressure In Hg	Ambient Winds Speed mph	Ambient Winds Direction
73							

12:45

THRESHOLD VELOCITY

Centerline Reference: ΔP = 0.043 in H_2O; $U_{\mathcal{C}}$ = 930 fpm 10.6 mph _____ m/s
Surface Reference: Z_o = _____ cm; U_* = _____ mph _____ m/s

TEST CONDITIONS

Nozzle 0.78"

Sampler Data

Sampler	Filter No.	Flow (acfm) Reading	Flow (acfm) Actual	Mass Tare	Mass Final	Mass Catch
Blank 8 x 10	9333020					
Cyclone						
Cyc 8 x 10 #4	9333025					
Blank Substrate						
Substrate (µm) 1	9338050					
Substrate (µm) 2	9338051					
Substrate (µm) 3	9338052					

tube exposed
1254

2.1 in H_2O on sampling tube
" 2.0 in H_2O on
3.7 in H_2O on Background sampler
2.6 in H_2O on cyclone sampling system

Test Velocity

		fpm	mph	m/s
Ambient	10m			
Working Section	℄			

Target
0.22 in H_2O on Tunnel ℄

Test Times (Hr : Min : Sec)

A. Start of Test 2140.9 12:51
B. End of Test 2149.9 12:59
C. Test Duration (B-A) 8:00 min

Comments: Ratio = 3.0 based on 2.0/0.22 Elapsed time indicator did stay longer than because of time of sampling did not start until target Δp of 0.22 was reached / cannot tap tube: accuracy +0 CC + 0SC after end of test

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MIDWEST RESEARCH INSTITUTE

Run No RE-7 Wind Tunnel Testing DATE 6/5/93

MRI Project No 3155 Background Air Sampling Recorded by MAC

FILTER DATA

Filter No	Final Wt.	Tare Wt	Catch
9333027			
9333026 (blank)			

FLOW DATA

Magnehelic Range	0 - 7	in H_2O
Target Flow	45	ACFM
Target Magnehelic Reading	3.7	in H_2O

RUN TIME

		Clock Time	Elapsed Time Meter	Magnehelic Reading (in H_2O)
First Period	Start	18:07:30	1111.3	3.7
	Stop	19:07:15	1173.0	
	Duration	1:59:45		
Second Period	Start			
	Stop			
	Duration			
Cumulative	Duration			

COMMENTS

Comprehensive

MIDWEST RESEARCH INSTITUTE
Wind Erosion Testing

Run No. RF-6b
MRI Project No. 3155

Date 6/5/93
Recorded by HAG

TEST SITE CHARACTERISTICS

Location Inlet to Great Western Reservoir
Composition Sediment at lake shore
Surface Texture Cracked surface pulverized with tools twice smoothed with 2
Tunnel Orientation: Inlet facing S

	Air Temperature Dry Bulb °F	Air Temperature Dry Bulb °C	Air Temperature Wet Bulb °F	Air Temperature Wet Bulb °C	Relative Humidity %	Ambient Pressure In Hg	Ambient Winds Speed mph	Ambient Winds Direction
12:07	72		59		45	24.4	E	<5

measured to C during test

THRESHOLD VELOCITY

Centerline Reference: ΔP = 0.043 in H_2O; U_C = 930 fpm 10.6 mph _____ m/s
Surface Reference: Z_o = _____ cm; U_* = _____ mph _____ m/s

TEST CONDITIONS

Nozzle 1.00"

Sampler Data

Sampler	Filter No.	Flow (acfm) Reading	Flow (acfm) Actual	Mass Tare	Mass Final	Mass Catch
Blank 8 x 10	9333020					
Cyclone						
Cyc 8 x 10	9333014					
Blank Substrate						
Substrate (µm)	9338059					
Substrate (µm)	9338060					
Substrate (µm)	9338029					

tube exposed at interlocks

.8128 { 1, 2, 3

0.115 in H_2O on tunnel centerline
1.0 in H_2O on sampling tube
3.7 in H_2O on background
1.6 in H_2O on sampling system

Test Velocity

		fpm	mph	m/s
Ambient	10m			
Working Section	℄			

C.

Test Times (Hr : Min : Sec)

A. Start of Test 2129.9 12:16:30
B. End of Test 2138.9 12:23:30
C. Test Duration (B-A) 7.00 min

Comments: Little erosion seen on second half of this test at 17 mph.

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MIDWEST RESEARCH INSTITUTE
Wind Erosion Testing

Comprehensive

Run No. RF-6c Date 6/5/93
MRI Project No. 3154 Recorded by MAG

TEST SITE CHARACTERISTICS

Location Inlet Area to Great Western Reservoir
Composition Same as run no RF-6a and RF-6b
Surface Texture "
Tunnel Orientation: Inlet facing S

Air Temperature Dry Bulb °F	Air Temperature Dry Bulb °C	Air Temperature Wet Bulb °F	Air Temperature Wet Bulb °C	Relative Humidity %	Ambient Pressure In Hg	Ambient Winds Speed mph	Ambient Winds Direction

THRESHOLD VELOCITY

Centerline Reference: ΔP = 0.043 in H_2O; $U_{\mathcal{C}}$ = 930 fpm 10.6 mph _____ m/s
Surface Reference: Z_o = _____ cm; U_* = _____ mph _____ m/s

TEST CONDITIONS

Nozzle 0.78"

Sampler Data

Sampler	Filter No.	Flow (acfm) Reading	Flow (acfm) Actual	Mass Tare	Mass Final	Mass Catch
Blank 8 x 10						
Cyclone						
Cyc 8 x 10	9333024					
Blank Substrate						
S1 Substrate (µm)	9338053					
S2 Substrate (µm)	9338054					
S3 Substrate (µm)	9338055					

3.7 in H_2O in background sampler
1.7 in H_2O in sampling tube
0.6 in H_2O in cyclone sampling system

Test Velocity

		fpm	mph	m/s
Ambient	10m			
Working Section	℄			

Target 0.22 in H on tunne

Test Times (Hr : Min : Sec)

A. Start of Test 2137.0 12:36:30 C. Test Duration (B-A) 2:00. 2 min
B. End of Test 2140.9 12:38:30

Comments: Plugging of particulate down center of tunnel. Test time reduced to 2 min to get less mass on collection substrates.

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For Test RF-6:

Threshold velocity = 12 mph (est from RF-5)

Capacity of tunnel = 32-35

$32 - 12 = 20/3 = 7$

Choose 18 mph and 24 mph for test speeds at tunnel centerline, based

3 min test: 1.0" nozzle ~~at~~ 17 mph at tunnel centerline

7 ~~min~~ Test: 1.0" nozzle ~~at~~ 17 mph at tunnel centerline

3 min test: 0.78" nozzle — 24 mph at "

7 min test: 0.78" nozzle 24 mph at "

$$P_{vel}(\text{in } H_2O) = \left(\frac{U(\text{mph})}{K'} \right)^2$$

if $K' = 50$, then

$$P_{vel} = \left(\frac{17}{50}\right)^2 = 0.12 \text{ in } H_2O \quad (57°)$$

(17 mph) $\quad 0.11 \text{ in } H_2O \quad (75°)$

$$P_{vel} = \left(\frac{24}{50}\right)^2 = 0.23 \text{ in } H_2O \quad (57°)$$

(24 mph) $\quad 0.22 \text{ in } H_2O \quad (75°)$

MIDWEST RESEARCH INSTITUTE
Wind Erosion Testing

Comprehensive

Run No. RF-6a Date 6/5/93

MRI Project No. 3155 Recorded by Mike

TEST SITE CHARACTERISTICS

Location Inlet to Great Western Reservoir

Composition Sediment of lake shore

Surface Texture Cracked surface pulverized with truck tires, smoothed with:

Tunnel Orientation: Inlet facing S

	Air Temperature Dry Bulb °F	Air Temperature Dry Bulb °C	Air Temperature Wet Bulb °F	Air Temperature Wet Bulb °C	Relative Humidity %	Ambient Pressure In Hg	Ambient Winds Speed mph	Ambient Winds Direction
11:10	65		55		52	24.3	<5	E

THRESHOLD VELOCITY

Centerline Reference: ΔP = 0.043 in H_2O; $U_{\mathbb{C}}$ = 930 fpm 10.6 mph _____ m/s

Surface Reference: Z_o = _____ cm; U_* = _____ mph _____ m/s

TEST CONDITIONS

Nozzle 1.00"

Sampler Data

	Sampler	Filter No.	Flow (acfm) Reading	Flow (acfm) Actual	Mass Tare	Mass Final	Mass Catch
Exposed @ 11:27	Blank 8 x 10	9333020					
	Cyclone	—					
	Cyc 8 x 10 #1	9333023					
To be exposed @ interlocken	Blank Substrate						
1	Substrate (10.2μm)	9338056					
2	Substrate (42μm)	9338057					
3	Substrate (2.1μm)	9338058					

3.7 in H_2O background

0.6 in H_2O in cyclone

0.99 in manometer tube in 3" tube

Test Velocity

		fpm	mph	m/s
Ambient	10m			
Working Section	℄			

Target Δp for sampling sys. from ℄ = 0.115 in H_2

Δp 0.115

Test Times (Hr : Min : Sec)

A. Start of Test 2126.7 11:59:

B. End of Test 2129.9 12:01

C. Test Duration (B-A) 3:00 min

Comments: Site RF-6 is immediately adjacent to Site RF-5 and similarly prepared. Lot of erosion seen 'soil' now cyclone and filter & on substrates prior to Run RF-6b

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Run Nos [illegible] Wind Tunnel Testing
MRI Project No 3155 Background Air Sampling

Date 6/5/93
Recorded by MAK

FILTER DATA

Filter No	Final Wt.	Tare Wt	Catch
9333018			
9333020 (blank)			

FLOW DATA

Magnehelic Range	0 - 4	in H_2O
Target Flow	45	ACFM
Target Magnehelic Reading	3.7	in H_2O

RUN TIME

		Clock Time	Elapsed Time Meter	Magnehelic Reading (in H_2O)
First Period	Start	11:33	1023.35	3.7
	Stop	12:59	1111.3	3.7
	Duration			
Second Period	Start			
	Stop			
	Duration			
Cumulative	Duration			

COMMENTS

MIDWEST RESEARCH INSTITUTE

Run No. RF-6 Wind Tunnel Testing Date 6/5/93 Time 11:4

MRI Project No. 3155 Substrate: [illegible] Recorded by [illegible]

THRESHOLD VELOCITY $P_{VEL\,\mathfrak{C}}$ = 0.043 in H_2O ; $U_{\mathfrak{C}}$ = 930 fpm 10.6 mph ____

→ SUB-THRESHOLD VELOCITY $P_{VEL\,\mathfrak{C}}$ 0.037 in H_2O ; $U_{\mathfrak{C}}$ = 840 fpm 9.5 mph ____

VELOCITY PROFILE — Very light lines

Height Above Gnd. (cm)	Pitot Tube Readings P_{VEL} (in H_2O) 1st	2nd	Avg	Velocity, U (fpm)	(mph)	(m/s)
0						
0.5	0.018	0.018				
0.7	0.019	0.020				
1.0	0.021	0.022				
1.4	0.023	0.024				
2.0	0.025	0.025				
2.8	0.030	0.026				
3.8	0.026	0.030				
5.0	0.029	0.029				
7.0	0.030	0.031				
10.0	0.032	0.033				
$\mathfrak{C}$ = 15.2	0.037	0.035				
20.0	0.033					
25.0	0.029					
30.0						

$$K' = 10.83 \sqrt{P_{VEL}\,(\text{in } H_2O)} \times \sqrt{\frac{T_{amb}\,(°F) + 459.3}{P_{amb}\,(\text{in Hg})}} \times \sqrt{P_{VEL}\,(\text{in } H_2O)}$$

T_{amb} = 65, P_{amb} = 24.3

$\mathfrak{C}$ WIND SPEED RATIO

	Location ($\mathfrak{C}$)	P_{VEL} (in H_2O)	U (fpm)
0.27	Jampima Tube (S)	0.38	
0.037	Wind Tunnel (T)	0.037	
2.18	Ratio	$\left(\frac{S}{T}\right)^{1/2}$ = 3.20	$\frac{S}{T}$ =

P_{vel} 0.29 U (mph) = 0.035

P_{vel} 0.30 U (mph) = 0.035

K' = 50.3

use MRI

ignore [illegible]

2.93 use [illegible]

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MINNESOTA RESEARCH INSTITUTE

Run No. RF-5 Wind Tunnel Testing Date ~~[illegible]~~ Time [illegible]

MIRI Project No. 3165 Subthreshold Testing [illegible] Recorded by MHG

THRESHOLD VELOCITY $P_{VEL\,\mathfrak{C}}$ = 0.05 in H_2O ; $U_{\mathfrak{C}}$ = ~~1005~~ ~~1100~~ ~~1060~~ fpm ~~12.5~~ 12.0 mph

→ SUB-THRESHOLD VELOCITY $P_{VEL\,\mathfrak{C}}$ 0.035 in H_2O ; $U_{\mathfrak{C}}$ = ~~870~~ 847 fpm 9.6 mph

VELOCITY PROFILE

Height Above Gnd. (cm)	Pitot Tube Readings P_{VEL} (in H_2O) 1st	2nd	Avg	Velocity, U (fpm)	(mph)	(m/s)
0						
0.5	0.017	0.017				
0.7	0.018	0.018				
1.0	0.019	0.019				
20 → 1.4	0.020	0.023				
2.0	0.023	0.023				
2.8	0.025	0.025				
3.8	0.026	0.027				
5.0	0.023	0.027				
7.0	0.030	0.029				
10.0	0.030	0.031				
$\mathfrak{C}$ = 15.2	0.035	0.034				
20.0	0.029					
25.0	0.025					
30.0						

$$U(mph) = 10.83 \sqrt{\frac{T_{amb}(°F) + 459.3}{P_{amb}(in\ Hg)}} \times \sqrt{P_{VEL}(in\ H_2O)} \times K'$$

$$U(mph) = \sqrt{P_{VEL}(in\ H_2O)} \times K'$$

$$K' = 49.9$$

$\mathfrak{C}$ WIND SPEED RATIO

repeat 0.27 0.033

Location ($\mathfrak{C}$)	P_{VEL} (in H_2O)	U (fpm)
Sampling Tube (S)	0.27	2350
Wind Tunnel (T)	0.034	835
Ratio	$(\frac{S}{T})^{1/2}$ = 2.82	$\frac{S}{T}$ = 2.81

MIDWEST RESEARCH INSTITUTE
Wind Erosion Testing

Run No. RF-5 Date 6/4/93
MRI Project No. 3155 Recorded by MHG

TEST SITE CHARACTERISTICS

Location Inlet to Great Western Reservoir
Composition Sediment of lake shore
Surface Texture Crusted silt dirt mix over with thick tracks! Smoothed using 2x
Tunnel Orientation: Inlet facing S

Air Temperature Dry Bulb °F	Dry Bulb °C	Wet Bulb °F	Wet Bulb °C	Relative Humidity %	Ambient Pressure In Hg	Ambient Winds Speed mph	Direction
57		50		61	24.3	0-5	N

THRESHOLD VELOCITY

Centerline Reference: ΔP = 0.05 in H_2O; $U_{\mathbb{C}}$ = 1060 fpm 12.0 mph _____ m/s
Surface Reference: Z_o = _____ cm; U_* = _____ mph _____ m/s

TEST CONDITIONS

Sampler Data

Sampler	Filter No.	Flow (acfm) Reading (in H_2O)	Flow (acfm) Actual	Mass Tare	Mass Final	Mass Catch
Blank 8 x 10	9333002					
Cyclone	—					
Cyc 8 x 10 #3	9333010	2.0	4.7			
Blank Substrate						
Substrate (µm)						
Substrate (µm)						
Substrate (µm)						

$\frac{83.3}{2.82}$ = 29.5 mph X 1.11 = 32.7 mph = 2885 fpm ΔP = 0.41 in H_2O

S.TG set at 3.25 in H_2O

Test Velocity

		fpm	mph	m/s
Ambient	10m			
Working Section	℄	2885	32.7	

Test Times (Hr : Min : Sec)

A. Start of Test 19:20 2106.7 elapsed C. Test Duration (B-A) 20 min.
B. End of Test 19:40 2126.7

Comments: Ended at 0.41 in H_2O and massive erosion until non erodible elements are exposed and erosion slowed down considerably by 19:25. Some slight infiltration over lip of inlet section. Appeared to evenly erode across surface during early part of test but after ~1 min. channels all erosion down the tunnel ⓐ

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MIDWEST RESEARCH INSTITUTE
Wind Erosion Testing

Run No. RF-4 Date 06/04/93
MRI Project No. 5155 Recorded by MHC

TEST SITE CHARACTERISTICS

Location Inlet area to Great Western Reservoir
Composition Sediment at lake shore
Surface Texture Cracked soft dirt – Disturbed (by feet and rake)
Tunnel Orientation: Inlet facing SE

Cloudy

	Air Temperature Dry Bulb °F	Dry Bulb °C	Wet Bulb °F	Wet Bulb °C	Relative Humidity %	Ambient Pressure In Hg	Ambient Winds Speed mph	Direction
14:33	68		53.6		36	24.5	N	0-8

THRESHOLD VELOCITY 3.076 mph 13.6 mph 1200 mph

Centerline Reference: ΔP = ~~0.33~~ in H_2O; $U_{\mathcal{C}}$ = ~~2540~~ fpm ~~29.4~~ mph _____ m/s
Surface Reference: Z_o = _____ cm; U_* = _____ mph _____ m/s

TEST CONDITIONS

Sampler Data

Sampler	Filter No.	Flow (acfm) Reading (in H_2O)	Flow (acfm) Actual	Mass Tare	Mass Final	Mass Catch
Blank 8 x 10						
Cyclone	—					
Cyc 8 x 10	9333011	2.0	40			
~~Blank Substrate~~						
~~Substrate (µm)~~						
~~Substrate (µm)~~						
~~Substrate (µm)~~						

Background 8x10 9333007

0.33 in H_2O band ℄
OST 2.65 in H_2O band ℄

Test Velocity

		fpm	mph	m/s	Δp
Ambient	10m				
Working Section	℄	2540	29.4		0.33

Test Times (Hr : Min : Sec)

	Reading	
A. Start of Test	2086.4	1525
B. End of Test	2106.7	1545

C. Test Duration (B-A) 20 min

Comments: Lifting detected by rake (after pulverizing surface with feet), larger clumps came to surface. Picture taken of surface before results. At reading (time elapsed) of 2093.0 put hand at end of blower and could feel only air

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Run No. RF-5 Wind Tunnel Testing Date 6/4/93

MRI Project No. 5155 Background Air Sampling Recorded by JHC

FILTER DATA

Filter No.	Final Wt.	Tare Wt.	Catch
93330006			
93330021 (blank)			

FLOW DATA

Magnehelic Range	0 - 4	in H_2O
Target Flow	45	ACFM
Target Magnehelic Reading	3.7	in H_2O

RUN TIME

		Clock Time	Elapsed Time Meter	Magnehelic Reading (in H_2O)
First Period	Start	18:52	974.15	3.7
	Stop			
	Duration			
Second Period	Start			
	Stop			
	Duration			
Cumulative	Duration			

COMMENTS

MIDWEST RESEARCH INSTITUTE
Wind Erosion Testing

Run No. RF-5 Date 6/4/93
MRI Project No. 3155 Recorded by MHG

TEST SITE CHARACTERISTICS

Location Inlet area to Great Western Reservoir - Walnut Cre
Composition Sediment of lake shore
Surface Texture Cracked soft clayish dirt - crusted undisturbed
Tunnel Orientation: Inlet facing SE

No; not a clay because wet test in glass showed almost all settling within few min.

Air Temperature Dry Bulb °F	Dry Bulb °C	Wet Bulb °F	Wet Bulb °C	Relative Humidity %	Ambient Pressure in Hg	Ambient Winds Speed mph	Direction
59.5	~~51.0~~ MHG	51.0		50.4 MHG	24.6	0-10	N-NE

mostly cloudy

THRESHOLD VELOCITY

Centerline Reference: ΔP = 0.47 in H_2O; $U_{\mathbb{C}}$ = 3100 fpm 35.2 mph _____ m/s
Surface Reference: Z_o = _____ cm; U_* = ~~2592~~ MHG mph _____ m/s

TEST CONDITIONS Δp on sampling system = 2.0 in H_2O

Sampler Data

Sampler	Filter No.	Flow (acfm) Reading	Flow (acfm) Actual	Mass Tare	Mass Final	Mass Catch
Blank 8 x 10	9333009	in H_2O				
Cyclone	—	14/12.0	40			
Cyc 8 x 10 #1	~~9333013~~ 9333013	2.0	40			
Blank Substrate						
Substrate (µm)						
Substrate (µm)						
Substrate (µm)						

exposed on 6/3/93

Background ~~Opened~~ sampler 9333007

0.47 in H_2O found @
3.0 in H_2O STQ

Test Velocity

		fpm	mph	m/s
Ambient	10m	3		
Working Section	℄	3100	35.2	

Test Times (Hr : Min : Sec)

A. Start of Test 2066.4 ~~13:57~~ 13:57
B. End of Test 2086.4 _____ 14:17
C. Test Duration (B-A) 20

Comments: Target Δp on sampling system = 3.02 in H_2O for 40 acfm. Target Δp on upwind hit-rod = 5.7 in H_2O. Filter 9333013 blew out during threshold test will run @ threshold for 20 min; approximately 15% beyond proposed speed

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Run No. RF-4 Wind Tunnel Testing Date 6/4/93 Time 14:[illegible]

MRI Project No. 3155 Subthreshold Testing [illegible] Recorded by MAB

THRESHOLD VELOCITY $P_{VEL\,\mathbb{C}}$ = 0.070 in H_2O ; $U_{\mathbb{C}}$ = 1200 fpm 13.6 mph

→ SUB-THRESHOLD VELOCITY $P_{VEL\,\mathbb{C}}$ 0.060 in H_2O ; $U_{\mathbb{C}}$ = 1110 fpm 12.6 mph

Sampling tube 0.48

VELOCITY PROFILE

Height Above Gnd. (cm)	Pitot Tube Readings P_{VEL} (in H_2O) 1st	2nd	Avg	Velocity, U (fpm)	(mph)	(m/s)
0						
0.5	0.015	0.016				
0.7	0.017	0.017				
1.0	0.019	0.020				
1.4	0.022	0.023				
2.0	0.025	0.024				
2.8	0.033	0.029				
3.8	0.037	0.035				
5.0	0.045	0.040				
7.0	0.050	0.050				
10.0	0.059	0.060				
℄ = 15.2	0.060	0.060				
20.0	0.059	0.060				
25.0	0.060	0.060				
30.0						

$$U(mph) = 10.83 \sqrt{\frac{T_{amb}(°F) + 459.3}{P_{amb}(in\ Hg)}} \times \sqrt{P_{VEL}(in\ H_2O)}$$

$$U(mph) = K' \times \sqrt{P_{VEL}(in\ H_2O)}$$

$$K' = 1.07$$

1" nozzle → $\frac{83.3}{2.83}$ = 29.4 mph = 2590 fpm

max Δp = ~~0.03~~ 0.3 in for run RF-4 MAB

℄ WIND SPEED RATIO

Location (℄)	P_{VEL} (in H_2O)	U (fpm)
Sampling Tube (S)	0.48	3150
Wind Tunnel (T)	0.06	~~2590~~ 1110 MAB
Ratio	$(\frac{S}{T})^{1/2}$ = 2.83	$\frac{S}{T}$ = 2.84

Run No. RE-3 Wind Tunnel Testing
WRI Project No. 5155 Background Air Sampling

Date 6/4/93
Recorded by MAC

FILTER DATA

Filter No	Final Wt.	Tare Wt.	Catch
9333007			
9333009 (blank)			

FLOW DATA

Magnehelic Range	0 - 4	in H_2O
Target Flow	~~3.45~~	ACFM
Target Magnehelic Reading	3.7	in H_2O

RUN TIME

		Clock Time	Elapsed Time Meter	Magnehelic Reading (in H_2O)
First Period	Start	12:56	833.65	3.7
	Stop	14:17	915.9	3.7
	Duration	81 min		
Second Period	Start	14:48	915.9	3.7
	Stop	15:45	974.1	
	Duration	57 min		
Cumulative	Duration			

COMMENTS

About 7 min into first period the
chosen flowrate (magnehelic)
reading had increased to 3.9;
reset to 3.7

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Run No. RF-3 Wind Tunnel Testing Date 8/4/93 Time 13:15

MRI Project No. 3155 Substrate: [illegible] Recorded by: [illegible]

→ THRESHOLD VELOCITY $P_{VEL\,\mathbb{C}}$ = 0.47 in H_2O ; $U_{\mathbb{C}}$ = 3100 fpm 35 mph ____

→ SUB-THRESHOLD VELOCITY $P_{VEL\,\mathbb{C}}$ 0.086 in H_2O ; $U_{\mathbb{C}}$ = 1330 fpm 15 mph ____

VELOCITY PROFILE

Height Above Gnd. (cm)	Pitot Tube Readings P_{VEL} (in H_2O) 1st	2nd	Avg	Velocity, U (fpm)	(mph)	(m/s)
0						
0.5	0.020	0.020	0.020		7.0	
0.7	0.021	0.024	0.0225		7.5	
1.0	0.023	0.024	0.0235		7.6	
1.4	0.026	0.029	0.0275		8.2	
2.0	0.030	0.033	0.0315		8.8	
2.8	0.034	0.035	0.0345		9.2	
3.8	0.041	0.043	0.042			
5.0	0.048	0.050	0.049			
7.0	0.060	0.065	0.0625			
10.0	0.075	0.075	0.075			
℄ = 15.2	0.087	0.082	0.0845			
20.0	0.080					
25.0	0.073					
30.0						

$U(mph) = 10.83 \sqrt{\frac{T_{amb}(°F) + 459.3}{P_{amb}(in\ Hg)}} \times \sqrt{P_{VEL}(in\ H_2O)}$

$U(mph) = K' \times \sqrt{P_{VEL}(in\ H_2O)}$

$K' = 4.97$

Distributed over tunnel cross-section with [illegible] ~ 0.22 in H_2O ~ 3100 fpm. Will run velocity profile at ~16 mph

℄ WIND SPEED RATIO

	Location (℄)	P_{VEL} (in H_2O)	U (fpm)
0.068	Sampling Tube (S)	2.95	7750
0.087	Wind Tunnel (T)	0.39	2850
[illegible]	Ratio	$(\frac{S}{T})^{1/2}$ = 2.75	$\frac{S}{T}$ = 2.72

Run EEG: Soil moisture was taken [illegible] 24.35 [illegible]

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Run No. RF-2

MRI Project No. 3122

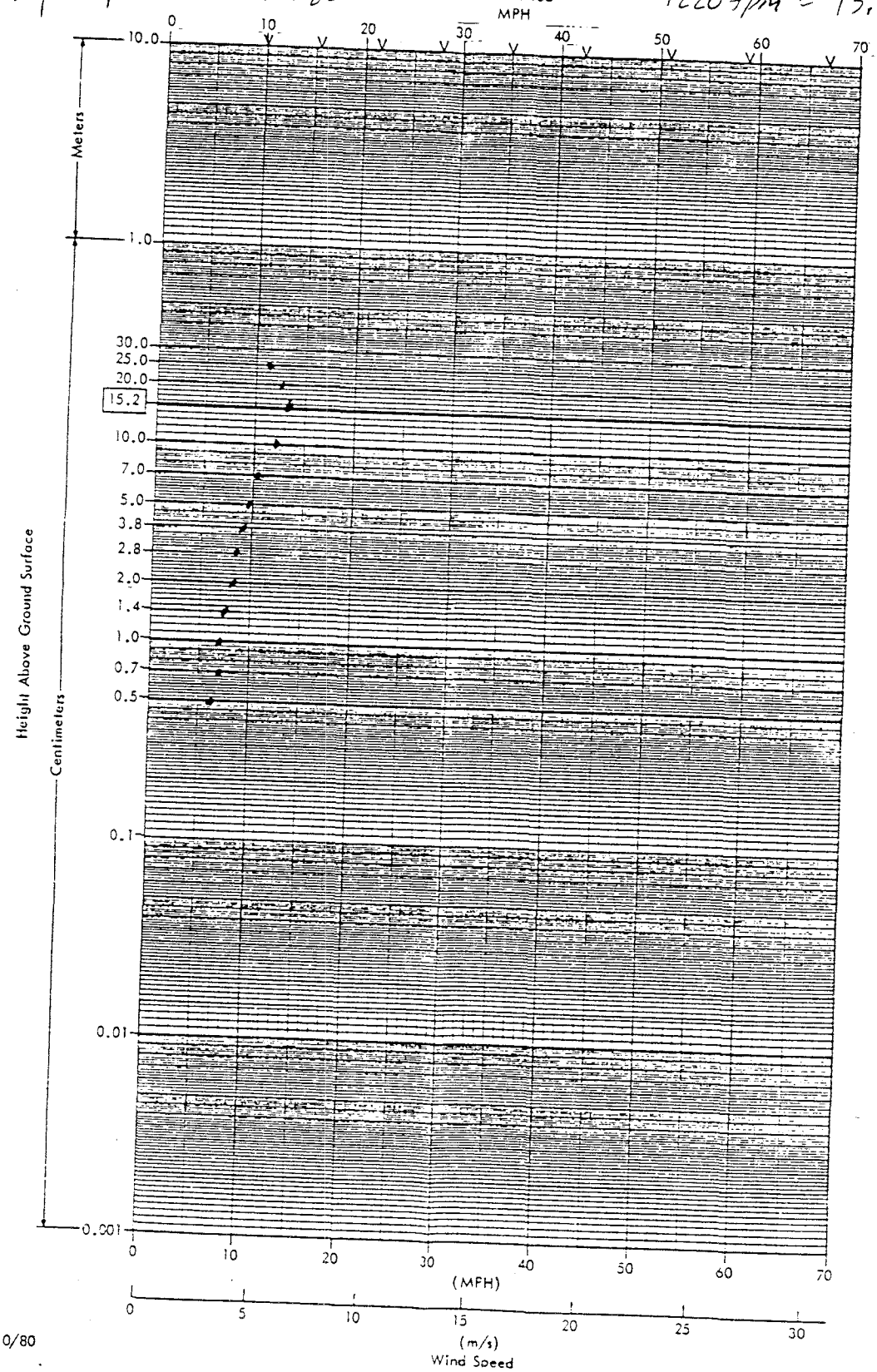
Wind Erosion Testing
Wind Speed Vertical Profile

Date 6/3/93

Recorded by MHB

Threshold velocity — $\Delta p = 0.075$ in H_2O

1220 fpm = 13.9 mph



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CANCELLED BECAUSE OF HIGH WINDS

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Wind Erosion Testing

Run No. RF-3 Cancelled Date 6/3/93
MRI Project No. 3155 Recorded by MAG

TEST SITE CHARACTERISTICS

Location Inlet area to Great Western Reservoir
Composition
Surface Texture
Tunnel Orientation: Inlet facing SE

Air Temperature				Relative Humidity %	Ambient Pressure In Hg	Ambient Winds	
Dry Bulb		Wet Bulb				Speed mph	Direction
°F	°C	°F	°C				
72					~24		

THRESHOLD VELOCITY

Centerline Reference: ΔP = _____ in H_2O; $U_{\mathbb{C}}$ = _____ fpm _____ mph _____ m/s
Surface Reference: Z_o = _____ cm; U_* = _____ mph _____ m/s

TEST CONDITIONS

Sampler Data

Sampler	Filter No.	Flow (acfm)		Mass		
		Reading	Actual	Tare	Final	Catch
Blank 8 x 10	9333009					
Cyclone	—					
Cyc 8 x 10 #1	9333013					
~~Blank Substrate~~						
~~Substrate (µm)~~						
~~Substrate (µm)~~						
~~Substrate (µm)~~						

not used

Upwind Sampler 9333007

Test Velocity

		fpm	mph	m/s
Ambient	10m			
Working Section	℄			

Test Times (Hr : Min : Sec)

A. Start of Test _____ C. Test Duration (B-A) _____
B. End of Test _____

Comments: Target Δp

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Wind Erosion Testing
Pitot Tube Readings and Meteorological Data

Test No. 22-2
MRI Project No. 3199

Date 6/2/93 / Time 12M
Recorded by MLG

No Wind Erosion _____ Wind Erosion Threshold _____ Wind Erosion in Progress _____

Pitot Tube Readings

Height Above Ground (cm)	Scale Reading (cm)	P_{VEL} (In. H_2O)	U (MPH)	U (m/s)
0				
0.5	0.017	0.019	6.8	
0.7	0.018	0.021	7.1	
1.0	0.019	0.020	7.1	
1.4	0.020	0.023	7.5	
2.0	0.024	0.025	8.0	
2.8	0.030	0.028	8.7	
3.8	0.032	0.031	9.0	
5.0	0.037	0.036	9.6	
7.0	0.042	0.044	10.4	
10.0	0.055	0.053	12.1	
15.2	0.068	0.070	13.3	1200 fpm
20.0	0.060		12.5	
25.0	0.054		11.8	
30.0				

Z_0 (cm) _____ U at 10 m _____ (MPH)
_____ (m/s)

Suggested Center-line Wind Speeds for Z_0 = _____ cm

Climatological Category	10 m Wind Speed (MPH)	15.2 cm Wind Speed (MPH)
3	10.0	
4	15.5	
5	21.5	
6	28.0	
7	35.0	
8	42.5	
9	51.0	
10	59.0	
11	67.0	

Meteorological Data

Air Temperature Dry Bulb °F	Dry Bulb °C	Wet Bulb °F	Wet Bulb °C	Relative Humidity %	Ambient Pressure In. Hg	Ambient Pressure kPa	Soil Temperature °F	Soil Temperature °C

0.52 in. on sampling pitot tube → 3270 fpm

Determination of U from P_{VEL}

$$U\ (MPH) = 10.83 \sqrt{\frac{P_{VEL}\ (In.\ H_2O) \times [T\ (°F) + 459.03]}{P_{AMB}\ (In.\ Hg)}}$$

$$U\ (MPH) = K \sqrt{P_{VEL}}$$

$$K = 10.83 \sqrt{\frac{T(°F) + 459.03}{P_{AMB}\ (In.\ Hg)}} \quad 10.83 \sqrt{\frac{70 + 459.3}{24}}$$

$$K = 50.86$$

$\frac{3270}{1200} = 2.7$

$\frac{833}{2.72} = 30$ mph clear

2700 ↓ 0.355 pitot on manual

Sampling Tube - Wind Tunnel ℄ Wind Speed Ratio at Wind Erosion Threshold

Location (℄)	P_{VEL} (in. H_2O)	U (fpm)
Sampling Tube (S)	0.52	3270
Wind Tunnel (T)	~~0.065~~ 0.070	1200
Ratio = $\sqrt{\frac{S}{T}}$ =	2.72	2.72

MIDWEST RESEARCH INSTITUTE
Wind Erosion Testing

Run No. RF-2 Date 6/3/93 & 6/3/93
MRI Project No. 3155 Recorded by [illegible]

TEST SITE CHARACTERISTICS

Location North Shore of Great Salton Sea
Composition Sediment
Surface Texture [illegible]
Tunnel Orientation: Inlet facing SE

Air Temperature Dry Bulb °F	Dry Bulb °C	Wet Bulb °F	Wet Bulb °C	Relative Humidity %	Ambient Pressure In Hg	Ambient Winds Speed mph	Direction
~70		—		~30	~24	~5-10	Light & Variable

Light Rain towards tunnel inlet

THRESHOLD VELOCITY

Centerline Reference: ΔP = [illegible] in H_2O; $U_{\mathcal{C}}$ = _____ fpm _____ mph _____ m/s
Surface Reference: Z_o = _____ cm; U_* = _____ mph _____ m/s

TEST CONDITIONS

Sampler Data

Sampler	Filter No.	Flow (acfm) Reading	Flow (acfm) Actual	Mass Tare	Mass Final	Mass Catch
Blank 8 x 10	9333008					
Cyclone #2	RF-2					6.7802g
Cyc 8 x 10	9333004					
Blank Substrate						
Substrate (µm)						
Substrate (µm)						
Substrate (µm)						

Cyclone Δp = 2.3 in H_2O

2.7 in H_2O S.T. Q

Upwind 8x10 9333001 40

(Δp = 3.7 in H_2O) Magnehelic

0.334 in H_2O Tunnel Q

Test Velocity

		fpm	mph	m/s
Ambient	10m			
Working Section	$\mathcal{C}$		30.5	

Test Times (Hr : Min : Sec)

A. Start of Test 2045.4 16:56
B. End of Test 2065.4 17:16
C. Test Duration (B-A) 20 min

Comments: Light Rain during test

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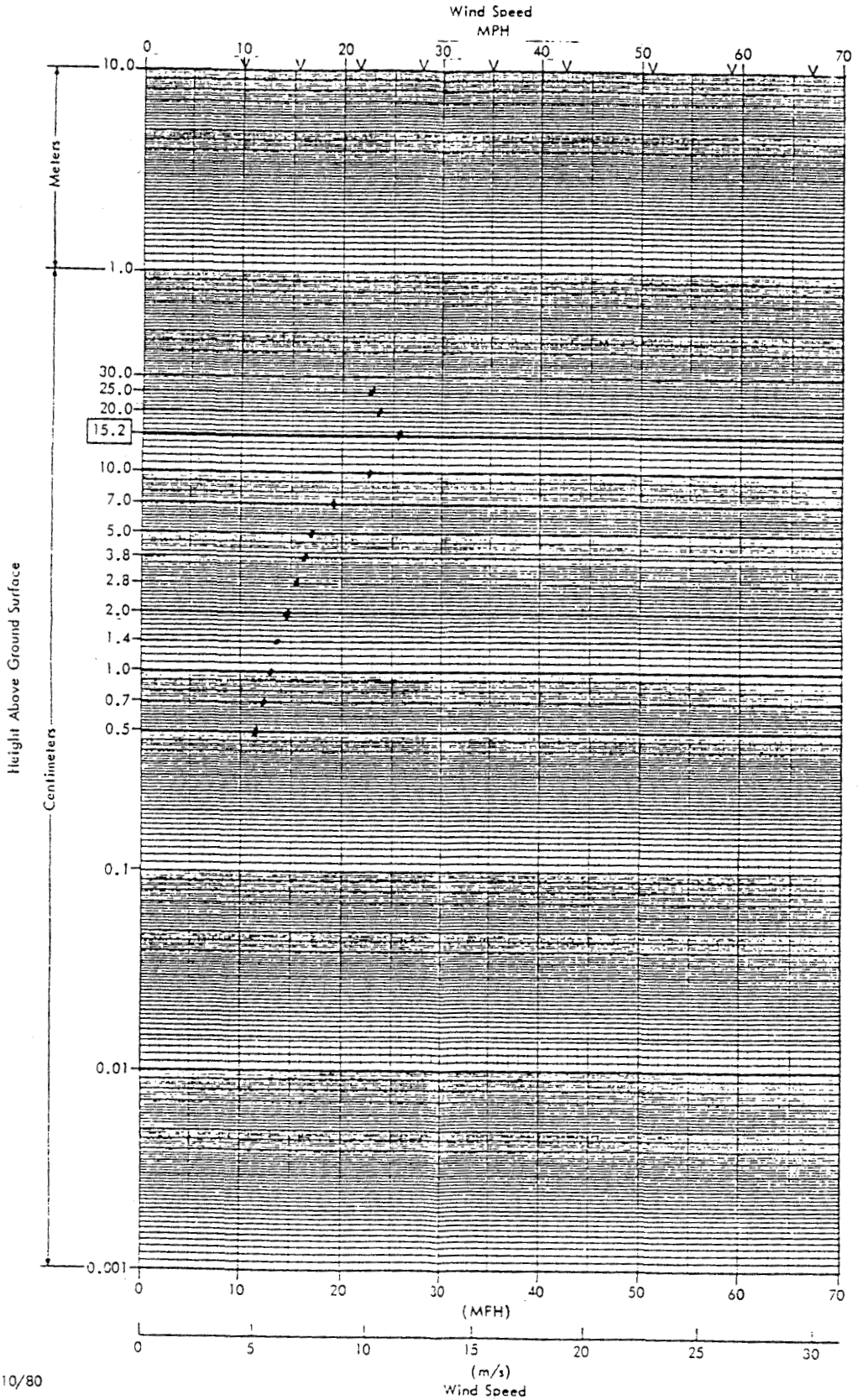
Run No. RF-1
MRI Project No. 3175

Wind Erosion Testing
Wind Speed Vertical Profile

Date 6/3/93
Recorded by MAG



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Test Shift [illegible]

Polarographic [illegible]

[illegible]

Magnesium in Cystine = [illegible] in H_2O

0.605 Normal Solution Air (in H_2O) consumed → [illegible] O_2

0.55 Sampling Solution Air (in H_2O) consumed → [illegible] O_2

$\frac{[illegible]}{[illegible]} = [illegible]$

Comparison [illegible] [illegible] and [illegible] Sample

Shift [illegible] [illegible]

[illegible]

MIDWEST RESEARCH INSTITUTE

Wind Erosion Testing

Pitot Tube Readings and Meteorological Data

n No. R-1

MRI Project No. 3155

Date 6/2/93 / Time 1

Recorded by MAG/CC

No Wind Erosion _____ Wind Erosion Threshold _____ Wind Erosion in Progress _____

2nd Pitot Tube Readings

Height Above Ground (cm)	Scale Reading (cm)	P_{VEL} (In. H_2O)	U (MPH)	U (m/s)
0				
0.5	0.055	0.052	11.8	
0.7	0.060	0.056	12.3	
1.0	0.065	0.065	13.0	
1.4	0.075	0.070	13.8	
2.0	0.085	0.080	14.7	
2.8	0.095	0.095	15.8	
3.8	0.105	0.103	16.5	
5.0	0.115	0.110	17.1	
7.0	0.140	0.145	19.3	
10.0	0.195	0.205	22.9	
15.2	0.245	0.325	25.4	
20.0	0.215		23.7	
25.0	0.195		22.6	
30.0				

Z_0 (cm) _____ U at 10 m _____ (MPH) _____ (m/s)

Suggested Center-line Wind Speeds for Z_0 = _____ cm

Climatological Category	10 m Wind Speed (MPH)	15.2 cm Wind Speed (MPH)
3	10.0	
4	15.5	
5	21.5	
6	28.0	
7	35.0	
8	42.5	
9	51.0	
10	59.0	
11	67.0	

Meteorological Data

Air Temperature Dry Bulb °F	Air Temperature Dry Bulb °C	Air Temperature Wet Bulb °F	Air Temperature Wet Bulb °C	Relative Humidity %	Ambient Pressure In. Hg	Ambient Pressure kPa	Soil Temperature °F	Soil Temperature °C
~75				~20	~24			

Observed soil moisture quality due Soil moisture readings of 0% are [illegible] near [illegible] level [illegible] Tree [illegible]

Time Domain Reflectometry: 15 cm probe, moisture observed as high as of 7.5 cm.

Determination of U from P_{VEL}

$$U\ (MPH) = 10.83 \sqrt{\frac{P_{VEL}\ (In.\ H_2O) \times [T\ (°F) + 459.03]}{P_{AMB}\ (In.\ Hg)}}$$

$$U\ (MPH) = K' \sqrt{P_{VEL}}$$

$$K' = 10.83 \sqrt{\frac{T(°F) + 459.03}{P_{AMB}\ (In.\ Hg)}} = 10.83 \sqrt{\frac{75 + 459.3}{24}}$$

$$K' = 51.1$$

Sampling Tube - Wind Tunnel ℄ Wind Speed Ratio at Wind Erosion Threshold

Location (℄)	P_{VEL} (in. H_2O)	U (fpm)
Sampling Tube (S)	1.7	5900
Wind Tunnel (T)	0.205	2050

$$Ratio = \sqrt{\frac{S}{T}} = 2.88$$

$S/T = 2.88$

6/6/93 $\frac{83.3}{2.88} = 28.9$ mph

30

60

MIDWEST RESEARCH INSTITUTE
Wind Erosion Testing

Run No. RF-1 Date [illegible] 6/3/93
MRI Project No. 3155 Recorded by [illegible]

TEST SITE CHARACTERISTICS

Location [illegible] Reservoir
Composition Sediment
Surface Texture [illegible]
Tunnel Orientation: Inlet facing SE

Air Temperature Dry Bulb °F	Air Temperature Dry Bulb °C	Air Temperature Wet Bulb °F	Air Temperature Wet Bulb °C	Relative Humidity %	Ambient Pressure In Hg	Ambient Winds Speed mph	Ambient Winds Direction
~75		—		~20	[illegible]	[illegible]	[illegible]

THRESHOLD VELOCITY

Centerline Reference: ΔP = [illegible] in H_2O; $U_{\mathbb{C}}$ = [illegible] fpm 27 mph _____ m/s
Surface Reference: Z_o = _____ cm; U_* = _____ mph _____ m/s

TEST CONDITIONS

Sampler Data

Sampler	Filter No.	Flow (acfm) Reading	Flow (acfm) Actual	Mass Tare	Mass Final	Mass Catch
Blank 8 x 10	9333008					
Cyclone #1	RF-1					.0465g
Cyc 8 x 10	9333003					
Blank Substrate	—					
Substrate (µm)	—					
Substrate (µm)	—					
Substrate (µm)	—					

Upwind 8x10 9333001 40
(ΔP = 3.7 in H_2O) Magnehelic

Test Velocity

		fpm	mph	m/s
Ambient	10m			
Working Section	℄			

Test Times (Hr : Min : Sec)

A. Start of Test 3:42
B. End of Test 4:01
C. Test Duration (B-A) 19 min on water, 20 min on counter

Comments: Magnehelic reading for tunnel threshold 0.205 [illegible] 1.7 [illegible] 5900 [illegible]

5900/6000 = 0.98

93-17 SEV chal wksht 052993

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[illegible] RESEARCH INSTITUTE

Run No. RF-17 Wind Tunnel Testing Date 6/10/93 Time 0141

MRI Project No. 3155 Subthreshold Velocity Profile Recorded by MAG

THRESHOLD VELOCITY $P_{VEL\,℄}$ = 0.21 in H_2O ; $U_{℄}$ = _____ fpm 23.2 mph _____ m

→SUBTHRESHOLD VELOCITY $P_{VEL\,℄}$ 0.162 in H_2O ; $U_{℄}$ = _____ fpm _____ mph _____ m

MAG believed threshold slightly lower ≈ 0.19

VELOCITY PROFILE

Height Above Gnd. (cm)	Pitot Tube Readings P_{VEL} (in H_2O) 1st	2nd	Avg	Velocity, U (fpm)	(mph)	(m/s)
0						
0.5	0.019	0.020				
0.7	0.030	0.030				
1.0	0.038	0.041				
1.4	0.051	0.048				
2.0	0.065	0.062				
2.8	0.078	0.075				
3.8	0.086	0.085				
5.0	0.095	0.098				
7.0	0.115	0.127				
10.0	0.149	0.163				
℄ = 15.2	0.162	0.170				
20.0	0.159	0.155				
25.0	0.150	0.151				
30.0						

0.164

0.167 After raking, removed rake tracks using hand to slightly tamp down and smoothed surface. This was not done at RF-15

℄ WIND SPEED RATIO

Location (℄)	P_{VEL} (in H_2O)	U (fpm)
Sampling Tube (S)	~~1.35~~ 1.36	
Wind Tunnel (T)	0.162	
Ratio	$(\frac{S}{T})^{1/2}$ = 2.90	$\frac{S}{T}$ =

1.35
0.167
2.84

$$U(mph) = 10.83 \sqrt{P_{VEL}(in\,H_2O)} \times \sqrt{\frac{T_{amb}(°F) + 459.3}{P_{amb}(in\,Hg)}}$$

$$U(mph) = K' \sqrt{P_{VEL}(in\,H_2O)}$$

$$\boxed{K' = 50.7}$$

Particulate seen in nozzle assembly after profile study and below [illegible]

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MIDWEST RESEARCH INSTITUTE

Run No. RE-17 Wind Tunnel Testing Date 6/10/93 Time 18:46

MRI Project No. 3164 Subthreshold Velocity Profile Recorded by

~~THRESHOLD VELOCITY $P_{VEL\,\mathcal{E}}$ = ____ in H_2O ; $V_{\mathcal{E}}$ = ____ fpm ____ mph~~

ABOVE

SUBTHRESHOLD VELOCITY $P_{VEL\,\mathcal{E}}$ 0.1 ____ in H_2O ; $V_{\mathcal{E}}$ = ____ fpm ____ mph ____

VELOCITY PROFILE

Height Above Gnd. (cm)	Pitot Tube Readings P_{VEL} (in H_2O) 1st	2nd	Avg	Velocity, V (fpm)	(mph)	(m/s)
0						
0.5	0.070	0.044				
0.7	0.050	0.069				
1.0	0.080	0.092				
1.4	0.100	0.124				
2.0	0.14	0.163				
2.8	0.165	0.179				
3.8	0.215	0.195				
5.0	0.235	0.229				
7.0	0.295	0.255				
10.0	0.37	0.345				
$\mathcal{E}$ = 15.2	0.44	0.455				
20.0	0.385					
25.0	0.360					
30.0						

3rd 0.449

Slight blown during profile

$$V\,(mph) = 10.83 \sqrt{\frac{T_{amb}\,(^\circ F) + 459.3}{P_{amb}\,(in\ Hg)}} \times \sqrt{P_{VEL}\,(in\ H_2O)} \times \sqrt{P_{VEL}\,(in\ H_2O)}$$

K'

$$V\,(mph) = K' = \boxed{}$$

$\mathcal{E}$ WIND SPEED RATIO

Location ($\mathcal{E}$)	P_{VEL} (in H_2O)	V (fpm)
Sampling Tube (S)	3.26	
Wind Tunnel (T)	0.449	
Ratio	$\left(\frac{S}{T}\right)^{1/2} = 2.69$	$\frac{S}{T}$ =

MIDWEST RESEARCH INSTITUTE
Wind Erosion Testing

Run No. RF17 Date 6/10/93
MRI Project No. 3155 Recorded by MAG

TEST SITE CHARACTERISTICS
Location Site T-4 on SW of Stradley Reservoir - Flat area overlooking lake
Composition Soil with lots of small rocks; some grass + 1 other type of plant
Surface Texture Disturbed: cut grass; raked crosswise
Tunnel Orientation: Inlet facing E NW
MAG 6/10/93

Air Temperature Dry Bulb °F	Air Temperature Dry Bulb °C	Air Temperature Wet Bulb °F	Air Temperature Wet Bulb °C	Relative Humidity %	Ambient Pressure In Hg	Ambient Winds Speed mph	Ambient Winds Direction
16:50 76		55		25	24.45	<5	E

5 mph E 17:36
<5 mph E 18:08

THRESHOLD VELOCITY
Centerline Reference: ΔP = _____ in H_2O; $U_{\mathcal{C}}$ = _____ fpm _____ mph _____ m/s
Surface Reference: Z_o = _____ cm; U_* = _____ mph _____ m/s

TEST CONDITIONS nozzle = 1.00"

Sampler Data

Sampler	Filter No.	Flow (acfm) Reading	Flow (acfm) Actual	Mass Tare	Mass Final	Mass Catch
Blank 8 x 10	9333038					
Cyclone #4						
Cyc 8 x 10	9333019		40			
Blank Substrate						
Substrate (µm)						
Substrate (µm)						
Substrate (µm)						

.7 in H_2O on Background 9333036
2.0" H_2O on Cyclone
3.26" H_2O on S.T.
0.44" H_2O on tunnel CL
-0.41"
MAG 6/10/93

Test Velocity

		fpm	mph	m/s
Ambient	10m			
Working Section	$\mathcal{C}$			

Test Times (Hr : Min : Sec)
A. Start of Test 2520.7 17:52:15
B. End of Test 18:12:22
C. Test Duration (B-A) _____

Comments: Some dust released during raking.
~~83.3~~ x 1.1 = 91.63 mph / 2.86 = 32.0 mph ← output

Target ΔP S.T. = $\left(\frac{91.6}{5.7}\right)^2$ = 3.26

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MIDWEST RESEARCH INSTITUTE
Wind Tunnel Testing
Background Air Sampling

Run No(s). RF-18 Date 7/8/93

MRI Project No. 3155 Recorded by MA Gerlinger

SAMPLER POSITION On top of inlet section to tunnel, facing same direction

FILTER DATA

Sampler	Filter No.
Hi-Vol (8 x 10)	9333061
Blank (8 x 10)	9333059

FLOW DATA

Magnehelic Range 0 - 40 in. H_2O

Target Flow 345 ACFM Actual Flow ~~3~~ ACFM

Target Magnehelic Reading 3.68 in. H_2O Avg. Actual Magnehelic Reading 3.69 in. H_2O

RUN TIME

		Clock Time	Elapsed Time Meter	Magnehelic Reading (in. H_2O)
Run No. RF-18 First Period	Start	9:53:30	1769.8	3.68
	Stop	11:15:20	1853.6	3.7
	Duration			
Run No. ____ Second Period	Start			
	Stop			
	Duration			
Cumulative	Duration			

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MIDWEST RESEARCH INSTITUTE
Wind Tunnel Testing
Subthreshold Velocity Profile

Run No. RF-18 Date 7/8/93 Time 10:00

MRI Project No. 3155 Recorded by MA Gallagher

THRESHOLD VELOCITY $P_{vel\,℄}$ 0.14 in. H_2O; $U_{℄}$ = _____ fpm 19.1 mph

SUBTHRESHOLD VELOCITY $P_{vel\,℄}$ 0.12 in. H_2O; $U_{℄}$ = _____ fpm 17.1 mph

VELOCITY PROFILE

	Height Above Gnd. (cm)	Pitot Tube Readings P_{vel} (in. H_2O) 1st	2nd	3rd	Avg	Velocity, U (fpm)	(mph)
	0						
	0.5	0.013	0.016				
	0.7	0.017	0.018				
	1.0	0.021	0.022				
	1.4	0.024	0.024				
	2.0	0.028	0.028				
	2.8	0.037	0.036				
	3.8	0.044	0.044				
	5.0	0.048	0.050				
	7.0	0.059	0.062				
	10.0	0.084	0.087				
℄	15.2	0.12	0.121	0.119			
	20.0	0.117					
	25.0	0.109					
	30.0						

$$U\,(mph) = 10.83 \sqrt{\frac{T_{amb}\,(°F) + 459.3}{P_{amb}\,(in.\,Hg)}} \times \sqrt{P_{vel}\,(in.\,H_2O)}$$

$$U\,(mph) = K' \times \sqrt{P_{vel}\,(in.\,H_2O)}$$

K' = 51.1

℄ WIND SPEED RATIO

Location (℄)	P_{vel} (in. H_2O)	1st	2nd	3rd	Avg	U (fpm)	1st	2nd	3rd	Avg
Sampling Tube (S)		0.825	0.80	0.79						
Wind Tunnel (T)		0.12	0.120	0.119						
Ratio	$(\frac{S}{T})^{\frac{1}{2}}$	2.62	2.58	2.58		$\frac{S}{T}$				

93-23 CHAT/CAUGH frm 4 062993

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MIDWEST RESEARCH INSTITUTE
Wind Erosion Testing

Run No. RF-18a Date 7/8/93
MRI Project No. 3155 Recorded by MAGrebogin

TEST SITE CHARACTERISTICS

Location Site T-1 Comprehensive test

Surface Description Disturbed: Buffalo grass cut with clippers; raked crosswise; cut again; raked crosswise; raked lengthwise front to back; back to front;

Tunnel Orientation: Inlet facing 70° magnetic ENE

Time of Observation	Air Temperature Dry Bulb °F	Air Temperature Wet Bulb °F	Relative Humidity %	Ambient Pressure in. Hg	Ambient Winds Speed mph	Ambient Winds Direction
8:55	73	65		24.1	Calm	
9:55	78				<5	L+ variable

THRESHOLD VELOCITY $P_{vel\,℄}$ 0.14 in H_2O; $U_{℄}$ = _____ fpm 19.1 mph

TEST CONDITIONS

Nozzle Diameter 0.78"

Cyclone No. 1

Impactor ID 9320
Runs a+b
Exposed

Sampler	Filter No.
Stage No. S1	9338018
Stage No. S2	9338019
Stage No. S3	9338020
Blank Substrate	9338004
Back-up (8 x 10)	9333062
Blank (8 x 10)	9333059

MAG 7/8/

Sampler Flow	Δp = 0.60 in. H_2O	Q = 20 ACFM

Test Velocity	Location	Δp (in. H_2O)	U = fpm	mph
Working Section	℄	0.22		24.0
Sampling Tube	℄	1.68		66.4

1.70 $\sqrt{R}$ = 2.77

RUN TIME

	Clock Time	Elapsed Time Meter
Start	10:25:10	2667.6
Stop	10:27:11	2673.6
Duration	2:01	

Comments: Very little erosion observed on this 2 min test

93-23 CHAT/CAUGH frm 5 062893

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MIDWEST RESEARCH INSTITUTE
Wind Erosion Testing

Run No. RF-18b
MRI Project No. 3155

Date 7/8/93
Recorded by MAGrelgin

TEST SITE CHARACTERISTICS

Location Same as RF-18a

Surface Description

Tunnel Orientation: Inlet facing

Time of Observation	Air Temperature Dry Bulb °F	Air Temperature Wet Bulb °F	Relative Humidity %	Ambient Pressure in. Hg	Ambient Winds Speed mph	Ambient Winds Direction

THRESHOLD VELOCITY $P_{vel\,℄}$ 0.14 in H_2O; $U_{℄}$ = _____ fpm 19.1 mph

TEST CONDITIONS

Nozzle Diameter 0.784

Cyclone No. 2

Impactor ID 9320

Sampler	Filter No.
Stage No. S1	9338018
Stage No. S2	9338019
Stage No. S3	9338020
Blank Substrate	9338004
Back-up (8 x 10)	9333062
Blank (8 x 10)	9333059

Sampler Flow	Δp = 0.60 in. H_2O	Q = 20 ACFM

Test Velocity	Location	Δp (in. H_2O)	U = fpm	mph
Working Section	℄	0.22		24.0
Sampling Tube	℄	1.69? 1.70	$\sqrt{R}$ = 2.77	66.4

RUN TIME

	Clock Time	Elapsed Time Meter
Start	10:34:25	2680.1
Stop	10:42:49	2689.3
Duration	8:24	

Comments: Again little wind

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MIDWEST RESEARCH INSTITUTE
Wind Tunnel Testing
Subthreshold Velocity Profile

Run No. RF-18 h Date 7/8/93 Time 10:37

MRI Project No. 3155 Recorded by MAGrelque

THRESHOLD VELOCITY $P_{vel\,℄}$ _____ in. H_2O; $U_{℄}$ = _____ fpm _____ mph

ABOVE **SUBTHRESHOLD VELOCITY** $P_{vel\,℄}$ 0.22 in. H_2O; $U_{℄}$ = _____ fpm 24.0 mph

VELOCITY PROFILE

Height Above Gnd. (cm)	Pitot Tube Readings P_{vel} (in. H_2O) 1st	2nd	3rd	Avg	Velocity, U (fpm)	(mph)
0						
0.5	0.026					
0.7	0.036					
1.0	0.040					
1.4	0.040					
2.0	0.049					
2.8	0.064					
3.8	0.074					
5.0	0.090					
7.0	0.115					
10.0	0.149					
℄ 15.2	0.22	0.22				
20.0	0.225					
25.0	0.185					
30.0						

$$U\,(mph) = 10.83 \sqrt{\frac{T_{amb}\,(^{o}F) + 459.3}{P_{amb}\,(in.\,Hg)}} \times \sqrt{P_{vel}\,(in.\,H_2O)}$$

78

24.1

K'

$$U\,(mph) = K' \times \sqrt{P_{vel}\,(in.\,H_2O)}$$

K' = 51.1

℄ WIND SPEED RATIO

Location (℄)	P_{vel} (in. H_2O)	1st	2nd	3rd	Avg	U (fpm)	1st	2nd	3rd	Avg
Sampling Tube (S)		1.72								
Wind Tunnel (T)		0.222								
Ratio	$(\frac{S}{T})^{\frac{1}{2}}$	2.78				$\frac{S}{T}$				

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No erosion seen during velocity profile

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MIDWEST RESEARCH INSTITUTE
Wind Erosion Testing

Run No. RF-18c
MRI Project No. 3155

Date 7/8/93
Recorded by M A Gregoire

TEST SITE CHARACTERISTICS

Location Same as RF-18a

Surface Description

Tunnel Orientation: Inlet facing

Time of Observation	Air Temperature Dry Bulb °F	Wet Bulb °F	Relative Humidity %	Ambient Pressure in. Hg	Ambient Winds Speed mph	Direction

THRESHOLD VELOCITY

$P_{vel\,℄}$ 0.14 in H_2O; $U_{℄}$ = _____ fpm 19.1 mph

TEST CONDITIONS

Nozzle Diameter 0.78"

Cyclone No. 3

Impactor ID 8128

Sampler	Filter No.
Stage No. S-1	9338015
Stage No. S-2	9338016
Stage No. S-3	9338017
Blank Substrate	9338005
Back-up (8 x 10)	9333063
Blank (8 x 10)	9333059

933801
MAG
7/8/9

Sampler Flow	Δp = 0.6 in. H_2O	Q = 20 ACFM

Test Velocity	Location	Δp (in. H_2O)	U = fpm	mph
Working Section	℄	0.30		28.0
Sampling Tube	℄	2.20		75.8

RUN TIME

	Clock Time	Elapsed Time Meter
Start	10:58:00	2704.1
Stop	11:00:02	2706.8
Duration	2:02	

Comments:

93-23 CHAT/CAUGH frm 5 062893

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MIDWEST RESEARCH INSTITUTE
Wind Erosion Testing

Run No. RF-18d Date 7/8/93
MRI Project No. 3155 Recorded by M H Gerlinger

TEST SITE CHARACTERISTICS

Location Same as RF-18a
Surface Description

Tunnel Orientation: Inlet facing

Time of Observation	Air Temperature Dry Bulb °F	Air Temperature Wet Bulb °F	Relative Humidity %	Ambient Pressure in. Hg	Ambient Winds Speed mph	Ambient Winds Direction
~~8~~ 11:17	82	67	45	24.1	<5	E

MRG ~~1:55~~

THRESHOLD VELOCITY $P_{vel\,℄}$ 0.14 in H_2O; $U_{℄}$ = _____ fpm 19.1 mph

TEST CONDITIONS

Nozzle Diameter 0.78"
Cyclone No. 4
Impactor ID 8128

Sampler	Filter No.
Stage No. S-1	9338015
Stage No. S-2	9338016
Stage No. S-3	9338017
Blank Substrate	9338005
Back-up (8 x 10)	9333063
Blank (8 x 10)	9333059

Sampler Flow	Δp = 0.60 in. H_2O	Q = 20 ACFM

Test Velocity	Location	Δp (in. H_2O)	U = fpm	mph
Working Section	℄	0.30		28.1
Sampling Tube	℄	2.25		77.0

RUN TIME

	Clock Time	Elapsed Time Meter
Start	11:06:47	2713.1
Stop	11:14:50	2721.8
Duration	8:03	

Comments:

93-23 CHAT/CAUGH frm 5 062893

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MIDWEST RESEARCH INSTITUTE
Wind Tunnel Testing
Subthreshold Velocity Profile

Run No. RF-18d Date 7/8/93 Time 11:09
MRI Project No. 3155 Recorded by M A Gallagher

THRESHOLD VELOCITY $P_{vel\,℄}$ _____ in. H_2O; $U_{℄}$ = _____ fpm _____ mph

Above
SUBTHRESHOLD VELOCITY $P_{vel\,℄}$ 0.30 in. H_2O; $U_{℄}$ = _____ fpm 28.1 mph

VELOCITY PROFILE

Height Above Gnd. (cm)	Pitot Tube Readings P_{vel} (in. H_2O) 1st	2nd	3rd	Avg	Velocity, U (fpm)	(mph)
0						
0.5	0.034					
0.7	0.039					
1.0	0.054					
1.4	0.055					
2.0	0.069					
2.8	0.085					
3.8	0.110					
5.0	0.120					
7.0	0.150					
10.0	0.20					
℄ 15.2	0.30	0.30				
20.0	0.289					
25.0	0.245					
30.0						

$$U\,(mph) = 10.83 \sqrt{\frac{T_{amb}\,(°F) + 459.3}{P_{amb}\,(in.\,Hg)}} \times \sqrt{P_{vel}\,(in.\,H_2O)}$$

$$U\,(mph) = K' \times \sqrt{P_{vel}\,(in.\,H_2O)}$$

$K' = 51.3$

℄ WIND SPEED RATIO

Location (℄)	P_{vel} (in. H_2O)	1st	2nd	3rd	Avg	U (fpm)	1st	2nd	3rd	Avg
Sampling Tube (S)		2.25								
Wind Tunnel (T)		0.30								
Ratio	$(\frac{S}{T})^{1/2}$	2.74				$\frac{S}{T}$				

93-23 CHAT/CAUGH frm 4 062893

Slight drain over during test

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MIDWEST RESEARCH INSTITUTE
Wind Tunnel Testing
Background Air Sampling

Run No(s). RF-19 Date 7/9/93

MRI Project No. 3155 Recorded by MA Gerlinger

SAMPLER POSITION on top of tunnel inlet facing in same direction

FILTER DATA

Sampler	Filter No.
Hi-Vol (8 x 10)	9333058
Blank (8 x 10)	9333060

FLOW DATA

Magnehelic Range 0 - 4 in. H_2O

Target Flow 45 ACFM Actual Flow ACFM

Target Magnehelic Reading 3.68 in. H_2O Avg. Actual Magnehelic Reading 3.7 in. H_2O

RUN TIME

			Clock Time	Elapsed Time Meter	Magnehelic Reading (in. H_2O)
Run No. 19	First Period	Start	8:10:30	1853.6	3.7
		Stop	9:32:16	1937.35	3.7
		Duration	1:21:~~31~~ 46		
Run No. ____	Second Period	Start	AC 8/4/93		
		Stop			
		Duration			
	Cumulative	Duration			

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MIDWEST RESEARCH INSTITUTE
Wind Tunnel Testing
Subthreshold Velocity Profile

Run No. 19a Date 7/9/93 Time 8:31

MRI Project No. 3155 Recorded by MA Gretinger

THRESHOLD VELOCITY P_{vel} ℄ 0.07 in. H_2O; $U_{℄}$ = _____ fpm 13.4 mph

SUBTHRESHOLD VELOCITY P_{vel} ℄ 0.05 in. H_2O; $U_{℄}$ = _____ fpm _____ mph

VELOCITY PROFILE

MAG said flushed seen at 0.0[illegible] in H_2

Height Above Gnd. (cm)	Pitot Tube Readings P_{vel} (in. H_2O) 1st	2nd	3rd	Avg	Velocity, U (fpm)	(mph)
0						
0.5	0.011	0.010				
0.7	0.013	0.012				
1.0	0.014	0.014				
1.4	0.016	0.017				
2.0	0.019	0.019				
2.8	0.024	0.024				
3.8	0.026	0.029				
5.0	0.030	0.034				
7.0	0.035	0.036				
10.0	0.042	0.042				
℄ 15.2	0.050	0.046	0.045			
20.0	0.043	0.043				
25.0	0.042	0.040				
30.0						

$$U\ (mph) = 10.83 \sqrt{\frac{70}{\frac{T_{amb}\ (°F) + 459.3}{P_{amb}\ (in.\ Hg)}}} \times \sqrt{P_{vel}\ (in.\ H_2O)}$$

$$U\ (mph) = K' \times \sqrt{P_{vel}\ (in.\ H_2O)}$$

$$\boxed{K' = 50.6}$$

℄ WIND SPEED RATIO

Location (℄)	P_{vel} (in. H_2O)	1st	2nd	3rd	Avg	U (fpm)	1st	2nd	3rd	Avg
Sampling Tube (S)		0.33	0.33	0.325						
Wind Tunnel (T)		0.050	0.046	0.045						
Ratio	$(\frac{S}{T})^{\frac{1}{2}}$					$\frac{S}{T}$				

93-23 CHAT/CAUGH frm 4 062893

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MIDWEST RESEARCH INSTITUTE
Wind Tunnel Testing
Subthreshold Velocity Profile

Run No. 19b Date 7/9/93 Time 9:00

MRI Project No. 3155 Recorded by MH Gilligan

THRESHOLD VELOCITY $P_{vel\,℄}$ _____ in. H_2O; $U_{℄}$ = _____ fpm _____ mph

~~SUB~~ABOVE THRESHOLD VELOCITY $P_{vel\,℄}$ _____ in. H_2O; $U_{℄}$ = _____ fpm _____ mph

VELOCITY PROFILE

Height Above Gnd. (cm)	Pitot Tube Readings: P_{vel} (in. H_2O) 1st	2nd	3rd	Avg	Velocity, U (fpm)	(mph)
0						
0.5	0.033					
0.7	0.040					
1.0	0.055					
1.4	0.060					
2.0	0.070					
2.8	0.075					
3.8	0.090					
5.0	0.130					
7.0	0.150					
10.0	0.185					
℄ 15.2	0.22	0.22				
20.0	0.20					
25.0	0.185					
30.0						

$$U\,(mph) = 10.83 \sqrt{\frac{T_{amb}\,(°F) + 459.3}{P_{amb}\,(in.\,Hg)}} \times \sqrt{P_{vel}\,(in.\,H_2O)}$$

$$U\,(mph) = K' \times \sqrt{P_{vel}\,(in.\,H_2O)}$$

$K' = 50.5$

℄ WIND SPEED RATIO

Location (℄)	P_{vel} (in. H_2O)	1st	2nd	3rd	Avg	U (fpm)	1st	2nd	3rd	Avg
Sampling Tube (S)										
Wind Tunnel (T)										
Ratio	$(\frac{S}{T})^{1/2}$					$\frac{S}{T}$				

93-23 CHAT/CAUGH frm 4 062893

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MIDWEST RESEARCH INSTITUTE
Wind Erosion Testing

Run No. 3RF-19a Date 7/8/93 9
MRI Project No. 3155 Recorded by MA Gillespie

TEST SITE CHARACTERISTICS

Location Site T-1 Comprehensive test

Surface Description Disturbed by cutting, raking thoroughly, and during van tires over surface of trucks & tires not smooth. Tunnel Orientation: Inlet facing ENE

Time of Observation	Air Temperature Dry Bulb °F	Wet Bulb °F	Relative Humidity %	Ambient Pressure in. Hg	Ambient Winds Speed mph	Direction

THRESHOLD VELOCITY $P_{vel\,℄}$ 0.07 in H_2O; $U_{℄}$ = _____ fpm 13 mph

TEST CONDITIONS

Nozzle Diameter 0.78

Cyclone No. 1

Impactor ID 9321

Sampler	Filter No.
Stage No. S-1	9338012
Stage No. S-2	9338013
Stage No. S-3	9338014
Blank Substrate	9338003
Back-up (8 x 10)	9333064
Blank (8 x 10)	9333060

Sampler Flow	Δp = 0.60 in. H_2O	Q = 20 ACFM

Test Velocity	Location	Δp (in. H_2O)	U = fpm	mph
Working Section	℄	0.22		23.7
Sampling Tube	℄	1.80		

RUN TIME

	Clock Time	Elapsed Time Meter
Start	8:46:25	2753.5
Stop	8:48:25	2761.4
Duration	2:00	

Comments: Time hand marks were about exceed during test. Quite a lot of erosion seen.

93-23 CHAT/CAUGH frm 5 062893

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MIDWEST RESEARCH INSTITUTE
Wind Erosion Testing

Run No. RF-19 b Date 7/~~8~~9/93
MRI Project No. 3155 Recorded by M H Cochran

TEST SITE CHARACTERISTICS

Location Site T-1 Comprehensive test
Surface Description Disturbed as for Run 18, except for adding deeper furrows to some, but roots and cornstalks brought to surface* Tunnel Orientation: Inlet facing _____

Time of Observation	Air Temperature Dry Bulb °F	Air Temperature Wet Bulb °F	Relative Humidity %	Ambient Pressure in. Hg	Ambient Winds Speed mph	Ambient Winds Direction
8:22	68	56	47	24.25	<5	S

THRESHOLD VELOCITY $P_{vel\,℄}$ 0.07 in H_2O; $U_{℄}$ = _____ fpm 13 mph

TEST CONDITIONS

Nozzle Diameter 0.78"
Cyclone No. 2
Impactor ID 9321

Sampler	Filter No.
Stage No. S1	9338012
Stage No. S2	9338013
Stage No. S3	9338014
Blank Substrate	9338003
Back-up (8 x 10)	9333064
Blank (8 x 10)	9333060

MAC 7/9/93

Sampler Flow	Δp = ~~0.22~~ 0.60 in. H_2O	Q = 20 ACFM

Test Velocity	Location	Δp (in. H_2O)	U = fpm	mph
Working Section	℄	~~0.22~~ 0.60		23.7
Sampling Tube	℄	1.80		

RUN TIME

	Clock Time	Elapsed Time Meter
Start	8:54:10	2766.4
Stop	9:02:10	2775.5
Duration	8:00	

Comments: * Surface also compressed ~6 times with tires of lawn. Surface to be tested has tire marks and is quite smooth with holes depressed into surface. During erosion period, weeds that had been depressed popped up

'93-23 CHAT/CAUGH frm 5 062893

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MIDWEST RESEARCH INSTITUTE
Wind Erosion Testing

Run No. RF-19c Date 7/9/93
MRI Project No. 3155 Recorded by MA Gerlinger

TEST SITE CHARACTERISTICS

Location Same as 19 a & b

Surface Description

Tunnel Orientation: Inlet facing ENE

Time of Observation	Air Temperature Dry Bulb °F	Air Temperature Wet Bulb °F	Relative Humidity %	Ambient Pressure in. Hg	Ambient Winds Speed mph	Ambient Winds Direction
9:10 9p	70.5	58.5	47	24.30	< 5 mph	SSE

THRESHOLD VELOCITY

$P_{vel\,℄}$ 0.07 in H_2O; $U_{℄}$ = _____ fpm 13 mph

TEST CONDITIONS

Nozzle Diameter 0.78"

Cyclone No. 3

Impactor ID 9254

Sampler	Filter No.
Stage No. 1	9338009
Stage No. 2	9338010
Stage No. 3	9338011
Blank Substrate	9338003
Back-up (8 x 10)	9333065
Blank (8 x 10)	9333060

Sampler Flow	Δp = 0.60 in. H_2O	Q = 45 ACFM

Test Velocity	Location	Δp (in. H_2O)	U = fpm	mph
Working Section	℄	0.30		28
Sampling Tube	℄	2.257 2.303		

RUN TIME

	Clock Time	Elapsed Time Meter
Start	9:14:03	2786.9
Stop	AMG 7/11/93 9:16:03	2789.7
Duration	2:00	

Comments:

93-23 CHAT/CAUGH frm 5 062893

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MIDWEST RESEARCH INSTITUTE
Wind Tunnel Testing
Subthreshold Velocity Profile

Run No. 19d Date 7/9/93 Time 9:27
MRI Project No. 3155 Recorded by MH Cauchy

THRESHOLD VELOCITY $P_{vel\,℄}$ _____ in. H_2O; $U_{℄}$ = _____ fpm _____ mph

ABOVE
SUBTHRESHOLD VELOCITY $P_{vel\,℄}$ 0.30 in. H_2O; $U_{℄}$ = _____ fpm _____ mph

VELOCITY PROFILE

Height Above Gnd. (cm)	Pitot Tube Readings P_{vel} (in. H_2O) 1st	2nd	3rd	Avg	Velocity, U (fpm)	(mph)
0						
0.5	0.049					
0.7	0.058					
1.0	0.065					
1.4	0.080					
2.0	0.095					
2.8	0.110					
3.8	0.115					
5.0	0.130					
7.0	0.165					
10.0	0.225					
℄ 15.2	0.30	0.30				
20.0	0.265					
25.0	0.240					
30.0						

$$U\,(mph) = 10.83 \sqrt{\frac{70.5}{\frac{T_{amb}\,(°F) + 459.3}{P_{amb}\,(in.\,Hg)}}} \times \sqrt{P_{vel}\,(in.\,H_2O)}$$

$$U\,(mph) = K' \times \sqrt{P_{vel}\,(in.\,H_2O)}$$

$K' = 50.6$

℄ WIND SPEED RATIO

Location (℄)	P_{vel} (in. H_2O)	1st	2nd	3rd	Avg	U (fpm)	1st	2nd	3rd	Avg
Sampling Tube (S)										
Wind Tunnel (T)										
Ratio	$(\frac{S}{T})^{\frac{1}{2}}$					$\frac{S}{T}$				

93-23 CHAT/CAUGH frm 4 062893

Crop only Avg

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MIDWEST RESEARCH INSTITUTE
Wind Erosion Testing

Run No. RF-19d Date 7/9/93
MRI Project No. 3155 Recorded by M A Gaughan

TEST SITE CHARACTERISTICS

Location Same as 19a + b

Surface Description

Tunnel Orientation: Inlet facing

Time of Observation	Air Temperature Dry Bulb °F	Air Temperature Wet Bulb °F	Relative Humidity %	Ambient Pressure in. Hg	Ambient Winds Speed mph	Ambient Winds Direction

THRESHOLD VELOCITY $P_{vel\,℄}$ 0.07 in H_2O; $U_{℄}$ = _____ fpm 13 mph

TEST CONDITIONS

Nozzle Diameter 0.78

Cyclone No. 4

Impactor ID 9254

Sampler	Filter No.
Stage No. 1	9338009
Stage No. 2	9338010
Stage No. 3	9338011
Blank Substrate	9338003
Back-up (8 x 10)	~~9338065~~ 9333065
Blank (8 x 10)	9333060

MC 7/30

Sampler Flow	Δp = 0.60 in. H_2O	Q = 20 ACFM

Test Velocity	Location	Δp (in. H_2O)	U = fpm	mph
Working Section	℄	0.30		28
Sampling Tube	℄	2.25		

RUN TIME

	Clock Time	Elapsed Time Meter
Start	9:23:41	2796.9
Stop	9:31:41	2805.7
Duration		

Comments:

93-23 CHAT/CAUGH frm 5 062893

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MIDWEST RESEARCH INSTITUTE
Wind Tunnel Testing
Background Air Sampling

Run No(s). RF-20 Date 7/9/93

MRI Project No. 3155 Recorded by MA Gretlaugh

SAMPLER POSITION On top of tunnel inlet section

FILTER DATA

Sampler	Filter No.
Hi-Vol (8 x 10)	9333057
Blank (8 x 10)	9333056

FLOW DATA

Magnehelic Range 0 - 4.0 in. H_2O

Target Flow 45 ACFM Actual Flow ACFM

Target Magnehelic Reading 3.68 in. H_2O Avg. Actual Magnehelic Reading in. H_2O

RUN TIME

		Clock Time	Elapsed Time Meter	Magnehelic Reading (in. H_2O)
Run No. RF-20 First Period	Start	13:45:18	1937.3	3.7
	Stop	15:20:51	2035.5	3.7
	Duration			
Run No. ____ Second Period	Start			
	Stop			
	Duration			
Cumulative	Duration			

93-23 CHAT/CAUGH frm 2 062893

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MIDWEST RESEARCH INSTITUTE
Wind Tunnel Testing
Subthreshold Velocity Profile

Run No. RF-20 Date 7/9/93 Time _____

MRI Project No. 3155 Recorded by MA Gallagher

THRESHOLD VELOCITY $P_{vel\,℄}$ 0.165 in. H_2O; $U_{℄}$ = _____ fpm 20.8 mph

SUBTHRESHOLD VELOCITY $P_{vel\,℄}$ 0.10 in. H_2O; $U_{℄}$ = _____ fpm _____ mph

VELOCITY PROFILE

	Height Above Gnd. (cm)	Pitot Tube Readings P_{vel} (in. H_2O) 1st	2nd	3rd	Avg	Velocity, U (fpm)	(mph)
	0						
	0.5	0.010	0.012				
	0.7	0.012	0.013				
	1.0	0.014	0.018				
	1.4	0.020	0.020				
	2.0	0.029	0.030				
	2.8	0.032	0.032				
	3.8	0.048	0.049				
	5.0	0.051	0.050				
	7.0	0.060	0.058				
	10.0	0.075	0.074				
℄	15.2	0.103	0.100	0.097			
	20.0	0.091					
	25.0	0.084					
	30.0						

$$U\,(mph) = 10.83 \sqrt{\frac{T_{amb}\,(°F) + 459.3}{P_{amb}\,(in.\,Hg)}} \times \sqrt{P_{vel}\,(in.\,H_2O)}$$

$$K' = 10.83 \sqrt{\frac{T_{amb}\,(°F) + 459.3}{P_{amb}\,(in.\,Hg)}}$$

$$U\,(mph) = K' \times \sqrt{P_{vel}\,(in.\,H_2O)}$$

83

24.35

$K' = 51.1$

℄ WIND SPEED RATIO

Location (℄)	P_{vel} (in. H_2O)	1st	2nd	3rd	Avg	U (fpm)	1st	2nd	3rd	Avg
Sampling Tube (S)		0.635	0.615	0.60	0.617					
Wind Tunnel (T)		0.103	0.100	0.097	0.100					
Ratio	$(\frac{S}{T})^{\frac{1}{2}}$				2.48	$\frac{S}{T}$				

93-23 CHAT/CAUGH frm 4 062893

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MIDWEST RESEARCH INSTITUTE
Wind Erosion Testing

Run No. 20a
MRI Project No. 3155

Date 7/9/93
Recorded by MA Gaughan

TEST SITE CHARACTERISTICS

Location Site T-2, above Moser Reservoir; about 100 yd from Indian Street
Surface Description Thin dry grass, weeds, thistles cut to surface raked sideways left to right; then raked lengthwise
Tunnel Orientation: Inlet facing 75° ENE

Time of Observation	Air Temperature Dry Bulb °F	Air Temperature Wet Bulb °F	Relative Humidity %	Ambient Pressure in. Hg	Ambient Winds Speed mph	Ambient Winds Direction
13:42	83	64	33	24.35	Calm	

THRESHOLD VELOCITY $P_{vel\,℄}$ 0.165 in H_2O; $U_{℄}$ = _____ fpm 21 mph

TEST CONDITIONS

Nozzle Diameter 0.78"
Cyclone No. 1
Impactor ID 9253

Sampler	Filter No.
Stage No. S1	9338021
Stage No. S2	9338022
Stage No. S3	9338023
Blank Substrate	9338006
Back-up (8 x 10)	9333046
Blank (8 x 10)	9333056

Sampler Flow	Δp = 0.60 in. H_2O	Q = 20 ACFM

Test Velocity	Location	Δp (in. H_2O)	U = fpm	mph
Working Section	℄	0.28 0.28		27
Sampling Tube	℄	1.85		69.4

$\sqrt{\text{Ratio}}$ = 2.57

RUN TIME

	Clock Time	Elapsed Time Meter
Start	14:19:53	2841.4
Stop	14:21:53	2843.7
Duration	2:00	

Comments: _____

93-23 CHAT/CAUGH frm 5 062893

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MIDWEST RESEARCH INSTITUTE
Wind Tunnel Testing
Subthreshold Velocity Profile

Run No. RF-20b Date 7/9/93 Time 14:41

MRI Project No. 3155 Recorded by MA Enlaugh

THRESHOLD VELOCITY $P_{vel\,℄}$ _____ in. H_2O; $U_{℄}$ = _____ fpm _____ mph

ABOVE **SUBTHRESHOLD VELOCITY** $P_{vel\,℄}$ _____ in. H_2O; $U_{℄}$ = _____ fpm _____ mph

VELOCITY PROFILE

	Height Above Gnd. (cm)	Pitot Tube Readings P_{vel} (in. H_2O) 1st	2nd	3rd	Avg	Velocity, U (fpm)	(mph)
	0						
	0.5	0.030					
	0.7	0.030					
	1.0	0.038					
	1.4	0.059					
	2.0	0.077					
	2.8	0.088					
	3.8	0.110					
	5.0	0.123					
	7.0	0.150					
	10.0	0.219					
℄	15.2	0.28	0.26				
	20.0	0.230					
	25.0	0.199					
	30.0						

$$U\,(mph) = 10.83 \sqrt{\frac{T_{amb}\,(°F) + 459.3}{P_{amb}\,(in.\,Hg)}} \times \sqrt{P_{vel}\,(in.\,H_2O)}$$

$$U\,(mph) = K' \times \sqrt{P_{vel}\,(in.\,H_2O)}$$

$$K' =$$

℄ WIND SPEED RATIO

Location (℄)		P_{vel} (in. H_2O) 1st	2nd	3rd	Avg		U (fpm) 1st	2nd	3rd	Avg
Sampling Tube (S)		1.70	1.85							
Wind Tunnel (T)		0.26	0.28							
Ratio	$(\frac{S}{T})^{\frac{1}{2}}$					$\frac{S}{T}$				

93-23 CHAT/CAUGH frm 4 062893

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MIDWEST RESEARCH INSTITUTE
Wind Erosion Testing

Run No. 20b
MRI Project No. 3155

Date 7/9/93
Recorded by MAGchaugh

TEST SITE CHARACTERISTICS

Location Site T-2, above Mount Reservoir, near Indiana Street

Surface Description Thin grass and thistles cut to ground level; raked sideways, then raked lengthwise. Rock of <1.5" diameter brought to surface. Tunnel Orientation: Inlet facing ENE

Time of Observation	Air Temperature Dry Bulb °F	Air Temperature Wet Bulb °F	Relative Humidity %	Ambient Pressure in. Hg	Ambient Winds Speed mph	Ambient Winds Direction
					Calm	

THRESHOLD VELOCITY $P_{vel\,℄}$ 0.165 in H_2O; $U_{℄}$ = _____ fpm 21 mph

TEST CONDITIONS

Nozzle Diameter 0.78"

Cyclone No. 2

Impactor ID 9253

Sampler	Filter No.
Stage No. S1	9338021
Stage No. S2	9338022
Stage No. S3	9338023
Blank Substrate	9338006
Back-up (8 x 10)	9333046
Blank (8 x 10)	9333056

Sampler Flow	Δp = 0.60 in. H_2O	Q = 20 ACFM

Test Velocity	Location	Δp (in. H_2O)	U = fpm	mph
Working Section	℄	0.28		27
Sampling Tube	℄	1.85		~~70~~ 69.5

MAG 7/9/93

$\sqrt{R}$ = 2.57

RUN TIME

	Clock Time	Elapsed Time Meter
Start	14:36:38	2858.4
Stop	14:44:38	2867.0
Duration		

Comments: _____

93-23 CHAT/CAUGH frm 5 062893

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MIDWEST RESEARCH INSTITUTE
Wind Erosion Testing

Run No. 20 c
MRI Project No. 3155

Date 7/9/93
Recorded by MAGerhinger

TEST SITE CHARACTERISTICS

Location Sarco 20a

Surface Description

Tunnel Orientation: Inlet facing

Time of Observation	Air Temperature Dry Bulb °F	Air Temperature Wet Bulb °F	Relative Humidity %	Ambient Pressure in. Hg	Ambient Winds Speed mph	Ambient Winds Direction

THRESHOLD VELOCITY $P_{vel\,℄}$ 0.165 in H_2O; $U_{℄}$ = _____ fpm 21 mph

TEST CONDITIONS

Nozzle Diameter 0.78"

Cyclone No. 3

Impactor ID 8473

Sampler	Filter No.
Stage No. 1	9338024
Stage No. 2	9338025
Stage No. 3	9338026
Blank Substrate	
Back-up (8 x 10)	9333045
Blank (8 x 10)	9333056

Sampler Flow	Δp = 0.60 in. H_2O	Q = 20 ACFM

Test Velocity	Location	Δp (in. H_2O)	U = fpm	mph
Working Section	℄	0.37		31
Sampling Tube	℄	2.350		77

MAG 7/9/93

RUN TIME

	Clock Time	Elapsed Time Meter
Start	1501:36	2883.9
Stop	1503:37	2886.5
Duration		

Comments: Soil movement much more apparent than on RF-20a + b.

93-23 CHAT/CAUGH frm 5 062893

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MIDWEST RESEARCH INSTITUTE
Wind Tunnel Testing
Subthreshold Velocity Profile

Run No. RF-20d Date 7/9/93 Time 15:13
MRI Project No. 3155 Recorded by MA Gallagher

THRESHOLD VELOCITY $P_{vel\,℄}$ _____ in. H_2O; $U_{℄}$ = _____ fpm _____ mph

~~SUBTHRESHOLD~~ ABOVE VELOCITY $P_{vel\,℄}$ _____ in. H_2O; $U_{℄}$ = _____ fpm _____ mph

VELOCITY PROFILE

	Height Above Gnd. (cm)	Pitot Tube Readings P_{vel} (in. H_2O) 1st	2nd	3rd	Avg	Velocity, U (fpm)	(mph)
	0						
	0.5	0.045					
	0.7	0.043					
	1.0	0.050					
	1.4	0.078					
	2.0	0.100					
	2.8	0.122					
	3.8	0.135					
	5.0	0.165					
	7.0	0.20					
	10.0	0.26					
℄	15.2	0.312	0.354				
	20.0	0.313					
	25.0	0.					
	30.0						

$$U\ (mph) = 10.83 \sqrt{\frac{T_{amb}\ (°F) + 459.3}{P_{amb}\ (in.\ Hg)}} \times \sqrt{P_{vel}\ (in.\ H_2O)}$$

82

24.35

K'

$$U\ (mph) = K' \times \sqrt{P_{vel}\ (in.\ H_2O)}$$

K' = 1.19

℄ WIND SPEED RATIO

Location (℄)	P_{vel} (in. H_2O)	1st	2nd	3rd	Avg	U (fpm)	1st	2nd	3rd	Avg
Sampling Tube (S)		2.3								
Wind Tunnel (T)		0.31								
Ratio	$(\frac{S}{T})^{1/2}$	2.49				$\frac{S}{T}$				

93-23 CHAT/CAUGH frm 4 062893

At 15:15:20 propeller out of gear
Add 10 sec to test period

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MIDWEST RESEARCH INSTITUTE
Wind Erosion Testing

Run No. 20d
MRI Project No. 3155

Date 7/9/93
Recorded by MAG

TEST SITE CHARACTERISTICS

Location Same as 20a

Surface Description

Tunnel Orientation: Inlet facing

Time of Observation	Air Temperature Dry Bulb °F	Air Temperature Wet Bulb °F	Relative Humidity %	Ambient Pressure in. Hg	Ambient Winds Speed mph	Ambient Winds Direction
15:08	82	62		24.35	Calm	

occasional breeze

THRESHOLD VELOCITY $P_{vel\,℄}$ 0.165 in H_2O; $U_{℄}$ = _____ fpm 21 mph

TEST CONDITIONS

Nozzle Diameter 0.78"

Cyclone No. 4

Impactor ID 8473

Sampler	Filter No.
Stage No.	9338024
Stage No.	9338025
Stage No.	9338026
Blank Substrate	9338027
Back-up (8 x 10)	9333045
Blank (8 x 10)	9333056

Sampler Flow	Δp = 0.60 in. H_2O	Q = 20 ACFM

Test Velocity	Location	Δp (in. H_2O)	U = fpm	mph
Working Section	℄	0.37		31
Sampling Tube	℄	2.3		77

TR = 2.49

RUN TIME

	Clock Time	Elapsed Time Meter
Start	15:11:49	2894.5
Stop	15:19:59	2903.3
Duration		

Comments: Blower popped out of gear. SC quickly restored but tunnel flow dropped to < 0.20. Decision to add 10 sec to test

93-23 CHAT/CAUGH frm 5 062893

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MIDWEST RESEARCH INSTITUTE
Wind Tunnel Testing
Background Air Sampling

Run No(s). RF-21 Date 7/10/93

MRI Project No. 3155 Recorded by MAGrelinger

SAMPLER POSITION _____

FILTER DATA

Sampler	Filter No.
Hi-Vol (8 x 10)	9333066
Blank (8 x 10)	9333067

FLOW DATA

Magnehelic Range 0 - 4.0 in. H_2O

MAG 7/10/93

Target Flow 45 ~~3.6~~ ACFM Actual Flow _____ ACFM

Target Magnehelic Reading 3.68 in. H_2O Avg. Actual Magnehelic Reading _____ in. H_2O

RUN TIME

			Clock Time	Elapsed Time Meter	Magnehelic Reading (in. H_2O)
Run No. 21	First Period	Start	7:56:16	2035.5	3.7
		Stop		2131.2	3.65
		Duration			
Run No. ____	Second Period	Start			
		Stop			
		Duration			
	Cumulative	Duration			

93-23 CHAT/CAUGH frm 2 062893

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MIDWEST RESEARCH INSTITUTE
Wind Tunnel Testing
Subthreshold Velocity Profile

Run No. RF-21 Date 7/10/93 Time 8:28

MRI Project No. 3155 Recorded by MA Gochenour

THRESHOLD VELOCITY $P_{vel\,℄}$ 0.12 in. H_2O; $U_{℄}$ = _____ fpm 17.5 mph

SUBTHRESHOLD VELOCITY $P_{vel\,℄}$ 0.070 in. H_2O; $U_{℄}$ = _____ fpm _____ mph

VELOCITY PROFILE

Height Above Gnd. (cm)	Pitot Tube Readings P_{vel} (in. H_2O) 1st	2nd	3rd	Avg	Velocity, U (fpm)	(mph)
0						
0.5	0.010	0.011				
0.7	0.014	0.014				
1.0	0.017	0.020	0.019			
1.4	0.024	0.021	0.019			
2.0	0.028	0.027				
2.8	0.030	0.028				
3.8	0.033	0.032				
5.0	0.037	0.038				
7.0	0.045	0.046				
10.0	0.060	0.058				
℄ 15.2	0.070	0.070	0.070			
20.0	0.064					
25.0	0.050					
30.0						

5th 4th
0.019 0.019

$$U\,(mph) = 10.83 \sqrt{\frac{T_{amb}\,(°F) + 459.3}{P_{amb}\,(in.\,Hg)}} \times \sqrt{P_{vel}\,(in.\,H_2O)}$$

72 24.3 K'

$$U\,(mph) = \times \sqrt{P_{vel}\,(in.\,H_2O)}$$

$K' = 50.6$

℄ WIND SPEED RATIO

Location (℄)	P_{vel} (in. H_2O)	1st	2nd	3rd	Avg	U (fpm)	1st	2nd	3rd	Avg
Sampling Tube (S)		0.51	0.51							
Wind Tunnel (T)		0.070	0.069							
Ratio	$(\frac{S}{T})^{1/2}$	2.85	2.87			$\frac{S}{T}$				

93-23 CHAT/CAUGH frm 4 062893

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MIDWEST RESEARCH INSTITUTE
Wind Erosion Testing

10 MAG 7/10/93

Run No. RF-2/a Date 7/9/93
MRI Project No. 3155 Recorded by MAGreliger

TEST SITE CHARACTERISTICS

Location Site T-2 (immediately adjacent to RF-20 site)
Surface Description Disturbed by cutting thin grasses (dry), weeds, thistles to ground level; then raking to depth of 2-2½". Running truck tires over area several times Tunnel Orientation: Inlet facing ENE

Time of Observation	Air Temperature Dry Bulb °F	Wet Bulb °F	Relative Humidity %	Ambient Pressure in. Hg	Ambient Winds Speed mph	Direction
8:05				24.3	Calm	

THRESHOLD VELOCITY $P_{vel\,℄}$ 0.12 in H_2O; $U_{℄}$ = _____ fpm 17.5 mph

TEST CONDITIONS

Nozzle Diameter 0.78"
Cyclone No. 1
Impactor ID 8493

Sampler	Filter No.
Stage No. 1	9338028
Stage No. 2	9338030
Stage No. 3	9338031
Blank Substrate	9338007
Back-up (8 x 10)	9333044
Blank (8 x 10)	9333067

Sampler Flow	Δp = 0.60 in. H_2O	Q = ~~25~~ ACFM

20 ACFM 9/24/93 AC.

Test Velocity	Location	Δp (in. H_2O)	U = fpm	mph
Working Section	℄	0.225		24
Sampling Tube	℄	0.180 1.80		68

$\sqrt{R}$ = 2.86

RUN TIME

	Clock Time	Elapsed Time Meter
Start	8:45:18	2954.6
Stop	8:47:18	2956.7
Duration		

Comments: Soil appears coarser than at site T-1 on similarly prepared area. Surface was covered overnight with tarpaulin and tarps.

93-23 CHAT/CAUGH frm 5 062893

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MIDWEST RESEARCH INSTITUTE

Wind Tunnel Testing
Subthreshold Velocity Profile

Run No. RF-21b Date 7/10/93 Time 8:55

MRI Project No. 3155 Recorded by MA Cadengue

THRESHOLD VELOCITY $P_{vel\,℄}$ _____ in. H_2O; $U_{℄}$ = _____ fpm _____ mph

ABOVE

SUBTHRESHOLD VELOCITY $P_{vel\,℄}$ _____ in. H_2O; $U_{℄}$ = _____ fpm _____ mph

VELOCITY PROFILE

	Height Above Gnd. (cm)	Pitot Tube Readings P_{vel} (in. H_2O) 1st	2nd	3rd	Avg	Velocity, U (fpm)	(mph)
	0						
	0.5	0.045					
	0.7	0.060					
	1.0	0.068					
	1.4	0.077					
	2.0	0.088					
	2.8	0.091					
	3.8	0.100					
	5.0	0.114					
	7.0	0.129					
	10.0	0.171					
℄	15.2	0.220	0.218				
	20.0	0.194					
	25.0	0.155					
	30.0						

$$U\,(mph) = 10.83 \sqrt{\frac{T_{amb}\,(°F) + 459.3}{P_{amb}\,(in.\,Hg)}} \times \sqrt{P_{vel}\,(in.\,H_2O)} \quad K'$$

$$U\,(mph) = \quad \times \sqrt{P_{vel}\,(in.\,H_2O)}$$

K' =

℄ WIND SPEED RATIO

Location (℄)	P_{vel} (in. H_2O)	1st	2nd	3rd	Avg	U (fpm)	1st	2nd	3rd	Avg
Sampling Tube (S)		1.80	1.80							
Wind Tunnel (T)		0.22	0.218							
Ratio	$(\frac{S}{T})^{\frac{1}{2}}$					$\frac{S}{T}$				

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MIDWEST RESEARCH INSTITUTE
Wind Erosion Testing

Run No. RF-21b Date 7/10/93
MRI Project No. 3155 Recorded by M Boehlinger

TEST SITE CHARACTERISTICS

Location Same as RF-21a
Surface Description

Tunnel Orientation: Inlet facing

Time of Observation	Air Temperature Dry Bulb °F	Air Temperature Wet Bulb °F	Relative Humidity %	Ambient Pressure in. Hg	Ambient Winds Speed mph	Ambient Winds Direction
8:05	72	55	32			

THRESHOLD VELOCITY $P_{vel\,℄}$ _____ in H_2O; $U_{℄}$ = _____ fpm _____ mph

TEST CONDITIONS

Nozzle Diameter 0.78
Cyclone No. 2
Impactor ID 8493

Sampler	Filter No.
Stage No. 1	9338028
Stage No. 2	9338030
Stage No. 3	9338031
Blank Substrate	9338007
Back-up (8 x 10)	9333044
Blank (8 x 10)	9333067

Sampler Flow	Δp = 0.60 in. H_2O	Q = 20 ACFM

Test Velocity	Location	Δp (in. H_2O)	U = fpm	mph
Working Section	℄	0.22		24
Sampling Tube	℄	1.80		

RUN TIME

	Clock Time	Elapsed Time Meter
Start	8:53:21	2962.6
Stop	9:01:22	2971.3
Duration		

Comments: Lots of erosion during test 21a; little seen on 21b. Only remnants of tire track marks seen at 5 min into test RF-21b

93-23 CHAT/CAUGH frm 5 062893

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MIDWEST RESEARCH INSTITUTE
Wind Erosion Testing

Run No. RF-21c Date 7/10/93
MRI Project No. 3155 Recorded by MAGreiger

TEST SITE CHARACTERISTICS

Location Same as RF-21a
Surface Description

Tunnel Orientation: Inlet facing

Time of Observation	Air Temperature Dry Bulb °F	Air Temperature Wet Bulb °F	Relative Humidity %	Ambient Pressure in. Hg	Ambient Winds Speed mph	Ambient Winds Direction
9:10	77.5			24.3		

K = 50.9

THRESHOLD VELOCITY $P_{vel\,℄}$ _____ in H_2O; $U_{℄}$ = _____ fpm _____ mph

TEST CONDITIONS

Nozzle Diameter 0.18
Cyclone No. 3
Impactor ID 8421

Sampler	Filter No.
Stage No. 1	9338032
Stage No. 2	9338033
Stage No. 3	9338034
Blank Substrate	9338008
Back-up (8 x 10)	9333043
Blank (8 x 10)	9333067

Sampler Flow	Δp = 0.60 in. H_2O	Q = 20 ACFM

7/10/93

Test Velocity	Location	Δp (in. H_2O) MAG	U = fpm	mph
Working Section	℄	~~0.38~~ 0.37		31
Sampling Tube	℄	2.85		86

$\sqrt{R}$ = 2.78

RUN TIME

	Clock Time	Elapsed Time Meter
Start	9:11:45	2981.4
Stop	9:13:50	2984.0
Duration		

Comments: Massive motion at start of test

93-23 CHAT/CAUGH rm 5 062893

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MIDWEST RESEARCH INSTITUTE
Wind Tunnel Testing
Subthreshold Velocity Profile

Run No. 21d Date 7/10/93 Time 9:23
MRI Project No. 3155 Recorded by MAG

THRESHOLD VELOCITY $P_{vel\,℄}$ _____ in. H_2O; $U_{℄}$ = _____ fpm _____ mph

SUBTHRESHOLD VELOCITY $P_{vel\,℄}$ _____ in. H_2O; $U_{℄}$ = _____ fpm _____ mph

VELOCITY PROFILE

Height Above Gnd. (cm)	Pitot Tube Readings P_{vel} (in. H_2O) 1st	2nd	3rd	Avg	Velocity, U (fpm)	(mph)
0						
0.5	0.059					
0.7	0.073					
1.0	0.100					
1.4	0.113					
2.0	0.131					
2.8	0.149					
3.8	0.169					
5.0	0.175					
7.0	0.225					
10.0	0.279					
℄ 15.2	0.37	0.355				
20.0	0.315					
25.0	0.262					
30.0						

$$U\,(mph) = 10.83 \sqrt{\frac{T_{amb}\,(°F) + 459.3}{P_{amb}\,(in.\,Hg)}} \times \sqrt{P_{vel}\,(in.\,H_2O)}$$

$$U\,(mph) = K' \times \sqrt{P_{vel}\,(in.\,H_2O)}$$

$K' = 10.9$

℄ WIND SPEED RATIO

Location (℄)	P_{vel} (in. H_2O)	1st	2nd	3rd	Avg	U (fpm)	1st	2nd	3rd	Avg
Sampling Tube (S)		2.80								
Wind Tunnel (T)		0.37								
Ratio	$(\frac{S}{T})^{1/2}$	2.75				$\frac{S}{T}$				

93-23 CHAT/CAUGH frm 4 062893

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MIDWEST RESEARCH INSTITUTE
Wind Erosion Testing

Run No. RF21d Date 7/10/93
MRI Project No. 3155 Recorded by MAGehrger

TEST SITE CHARACTERISTICS

Location Same as RF-21a

Surface Description

Tunnel Orientation: Inlet facing

Time of Observation	Air Temperature Dry Bulb °F	Air Temperature Wet Bulb °F	Relative Humidity %	Ambient Pressure in. Hg	Ambient Winds Speed mph	Ambient Winds Direction

THRESHOLD VELOCITY $P_{vel\,℄}$ _____ in H_2O; $U_{℄}$ = _____ fpm _____ mph

TEST CONDITIONS

Nozzle Diameter 0.78

Cyclone No. 4

Impactor ID 8421

Sampler	Filter No.
Stage No. 1	9338032
Stage No. 2	9338033
Stage No. 3	9338034
Blank Substrate	9338008
Back-up (8 x 10)	9333043
Blank (8 x 10)	9333067

Sampler Flow	Δp = 0.60 in. H_2O	Q = 20 ACFM

Test Velocity	Location	Δp (in. H_2O)	U = fpm	mph
Working Section	℄	0.37		
Sampling Tube	℄	2.85		

$\sqrt{R}$ = 2.78

RUN TIME

	Clock Time	Elapsed Time Meter
Start	9:20:41	2990.6
Stop	9:28:42	2999.3
Duration		

Comments:

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MIDWEST RESEARCH INSTITUTE
Wind Tunnel Testing
Subthreshold Velocity Profile

Run No. RF-22 Date 7/10/93 Time 1339

MRI Project No. 3155 Recorded by MA Eckenrode

THRESHOLD VELOCITY $P_{vel\,℄}$ 0.15 in. H_20; $U_{℄}$ = _____ fpm 20 mph

SUBTHRESHOLD VELOCITY $P_{vel\,℄}$ _____ in. H_20; $U_{℄}$ = _____ fpm _____ mph

VELOCITY PROFILE

Height Above Gnd. (cm)	Pitot Tube Readings P_{vel} (in. H_2O) 1st	2nd	3rd	Avg	Velocity, U (fpm)	(mph)
0						
0.5	0.011	0.011				
0.7	0.013	0.013				
1.0	0.015	0.015				
1.4	0.019	0.019				
2.0	0.022	0.023				
2.8	0.028	0.029				
3.8	0.032	0.037				
5.0	0.045	0.043				
7.0	0.055	0.054				
10.0	0.064	0.068				
℄ 15.2	0.10	0.10				
20.0	0.095					
25.0	0.078					
30.0						

$$U\,(mph) = 10.83 \sqrt{\frac{T_{amb}\,(°F) + 459.3}{P_{amb}\,(in.\,Hg)}} \times \sqrt{P_{vel}\,(in.\,H_2O)}$$

86

24.25

K'

$$U\,(mph) = K' \times \sqrt{P_{vel}\,(in.\,H_2O)}$$

K' = 51.4

℄ WIND SPEED RATIO

Location (℄)	P_{vel} (in. H_2O)	1st	2nd	3rd	Avg	U (fpm)	1st	2nd	3rd	Avg
Sampling Tube (S)		0.76	0.77							
Wind Tunnel (T)		0.10	0.105							
Ratio	$(\frac{S}{T})^{1/2}$	2.76	2.71			$\frac{S}{T}$				

93-23 CHAT/CAUGH frm 4 062893

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MIDWEST RESEARCH INSTITUTE
Wind Erosion Testing

Run No. RF-22a Date 7/10/93
MRI Project No. 3155 Recorded by MA Gretlinger

TEST SITE CHARACTERISTICS

Location Site T-3 - On mesa directly east of Site T-1 South of Great Western Reservoir

Surface Description Disturbed, first by cutting all the vegetation to surface, then raking crosswise, then lengthwise

Tunnel Orientation: Inlet facing S (magnetic)

Time of Observation	Air Temperature Dry Bulb °F	Air Temperature Wet Bulb °F	Relative Humidity %	Ambient Pressure in. Hg	Ambient Winds Speed mph	Ambient Winds Direction
13:53					8-10	SW

THRESHOLD VELOCITY $P_{vel\,℄}$ 0.15 in H_2O; $U_{℄}$ = _____ fpm 20 mph

TEST CONDITIONS

Nozzle Diameter 0.78"

Cyclone No. 1

Impactor ID 8473

Sampler	Filter No.
Stage No. 1	9338077
Stage No. 2	9338083
Stage No. 3	9338070
Blank Substrate	
Back-up (8 x 10)	9333077
Blank (8 x 10)	9333067

to be exposed

Sampler Flow	Δp = 0.60 in. H_2O	Q = 20 ACFM

Test Velocity	Location	Δp (in. H_2O)	U = fpm	mph
Working Section	℄	0.26		26
Sampling Tube	℄	1.958		72

$\sqrt{R}$ = 2.76

RUN TIME

	Clock Time	Elapsed Time Meter
Start	13:52:10	3023.3
Stop	13:54:10	3025.8
Duration		

Comments: _____

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MIDWEST RESEARCH INSTITUTE
Wind Tunnel Testing
Subthreshold Velocity Profile

Run No. RF-22b Date 7/10/93 Time _____

MRI Project No. 3155 Recorded by MA Gretzinger

THRESHOLD VELOCITY $P_{vel\,℄}$ _____ in. H_2O; $U_{℄}$ = _____ fpm _____ mph

ABOVE

SUBTHRESHOLD VELOCITY $P_{vel\,℄}$ _____ in. H_2O; $U_{℄}$ = _____ fpm _____ mph

VELOCITY PROFILE

Height Above Gnd. (cm)	Pitot Tube Readings P_{vel} (in. H_2O) 1st	2nd	3rd	Avg	Velocity, U (fpm)	(mph)
0						
0.5						
0.7						
1.0						
1.4						
2.0						
2.8						
3.8						
5.0						
7.0						
10.0						
℄ 15.2						
20.0						
25.0						
30.0						

No trace during 22b because the velocity was so low to be measurable because of ambient winds

$$U\,(mph) = 10.83 \sqrt{\frac{T_{amb}\,(°F) + 459.3}{P_{amb}\,(in.\,Hg)}} \times \sqrt{P_{vel}\,(in.\,H_2O)}$$

$$U\,(mph) = K' \times \sqrt{P_{vel}\,(in.\,H_2O)}$$

K' = 51.4

℄ WIND SPEED RATIO

Location (℄)	P_{vel} (in. H_2O)	1st	2nd	3rd	Avg	U (fpm)	1st	2nd	3rd	Avg
Sampling Tube (S)										
Wind Tunnel (T)										
Ratio	$(\frac{S}{T})^{\frac{1}{2}}$					$\frac{S}{T}$				

93-23 CHAT/CAUGH frm 4 062893

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MIDWEST RESEARCH INSTITUTE
Wind Erosion Testing

Run No. RF-22 b Date 7/10/93
MRI Project No. 3155 Recorded by MA Gretzinger

TEST SITE CHARACTERISTICS

Location Site T-3
Surface Description

1403 Tunnel Orientation: Inlet facing 15 W

Time of Observation	Air Temperature Dry Bulb °F	Wet Bulb °F	Relative Humidity %	Ambient Pressure in. Hg	Ambient Winds Speed mph	Direction
13:30	86	63	26	24.25	<5	
14:00					7	W

THRESHOLD VELOCITY $P_{vel\,℄}$ 0.15 in H_2O; $U_{℄}$ = _____ fpm 20 mph

TEST CONDITIONS

Nozzle Diameter 0.784
Cyclone No. 2
Impactor ID 8473

Sampler	Filter No.
Stage No.	9338077
Stage No.	9338083
Stage No.	9338070
Blank Substrate	
Back-up (8 x 10)	9333077
Blank (8 x 10)	9333067

to be exposed

Sampler Flow	Δp = 0.60 in. H_2O	Q = 20 ACFM

Test Velocity	Location	Δp (in. H_2O)	U = fpm	mph
Working Section	℄	0.26		26
Sampling Tube	℄	1.98		72

$\sqrt{R}$ = 2.76

RUN TIME

	Clock Time	Elapsed Time Meter
Start	13:59:15	3030.4
Stop	14:07:15	3039.2
Duration		

Comments: Winds picked up about 2 min into test

93-23 CHAT/CAUGH frm 5 062893

100

MIDWEST RESEARCH INSTITUTE
Wind Erosion Testing

Run No. RF-22-c Date 7/10/93
MRI Project No. 3155 Recorded by MAG

TEST SITE CHARACTERISTICS

Location See Test RF-22a

Surface Description

Tunnel Orientation: Inlet facing

Time of Observation	Air Temperature Dry Bulb °F	Wet Bulb °F	Relative Humidity %	Ambient Pressure in. Hg	Ambient Winds Speed mph	Direction

THRESHOLD VELOCITY $P_{vel\,℄}$ 0.16 in H_2O; $U_{℄}$ = _____ fpm 20 mph

TEST CONDITIONS

Nozzle Diameter 0.61"

Cyclone No. 3

Impactor ID 9254

Sampler	Filter No.
Stage No. 1	9338088
Stage No. 2	9338089
Stage No. 3	9338090
Blank Substrate	
Back-up (8 x 10)	9333076
Blank (8 x 10)	9333067

to be appr.

Sampler Flow	Δp = 0.60 in. H_2O	Q = 20 ACFM

Test Velocity	Location	Δp (in. H_2O)	U = fpm	mph
Working Section	℄	0.44		
Sampling Tube	℄	3.3		

RUN TIME

	Clock Time	Elapsed Time Meter
Start	14:19:50	3051.6
Stop	14:21:50	3054.2
Duration		

Comments: Still a fair amount of vegetation holding surface

93-23 CHAT/CAUGH frm 5 062893

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MIDWEST RESEARCH INSTITUTE
Wind Tunnel Testing
Subthreshold Velocity Profile

Run No. RF-22d Date 7/10/93 Time _____

MRI Project No. 3156 Recorded by MAG

THRESHOLD VELOCITY $P_{vel\,℄}$ _____ in. H_2O; $U_{℄}$ = _____ fpm _____ mph

SUBTHRESHOLD VELOCITY $P_{vel\,℄}$ _____ in. H_2O; $U_{℄}$ = _____ fpm _____ mph

VELOCITY PROFILE

Height Above Gnd. (cm)	Pitot Tube Readings: P_{vel} (in. H_2O) 1st	2nd	3rd	Avg	Velocity, U (fpm)	(mph)
0						
0.5						
0.7						
1.0						
1.4						
2.0						
2.8						
3.8						
5.0						
7.0						
10.0						
℄ 15.2						
20.0						
25.0						
30.0						

No profile due to winds

$$U\,(mph) = 10.83 \sqrt{\frac{T_{amb}\,(°F) + 459.3}{P_{amb}\,(in.\,Hg)}} \times \sqrt{P_{vel}\,(in.\,H_2O)}$$

$$U\,(mph) = K' \times \sqrt{P_{vel}\,(in.\,H_2O)}$$

$$K' =$$

℄ WIND SPEED RATIO

Location (℄)	P_{vel} (in. H_2O)	1st	2nd	3rd	Avg	U (fpm)	1st	2nd	3rd	Avg
Sampling Tube (S)										
Wind Tunnel (T)										
Ratio	$(\frac{S}{T})^{\frac{1}{2}}$					$\frac{S}{T}$				

93-23 CHAT/CAUGH frm 4 062893

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MIDWEST RESEARCH INSTITUTE
Wind Erosion Testing

Run No. RF-22d Date 7/10/93
MRI Project No. 3155 Recorded by MA Chatrugue

TEST SITE CHARACTERISTICS

Location See Test RF-22a

Surface Description

Tunnel Orientation: Inlet facing

Time of Observation	Air Temperature Dry Bulb °F	Air Temperature Wet Bulb °F	Relative Humidity %	Ambient Pressure in. Hg	Ambient Winds Speed mph	Ambient Winds Direction
1425				24.3	7-12	SW

THRESHOLD VELOCITY $P_{vel\,℄}$ 0.15 in H_2O; $U_{℄}$ = _____ fpm 6 TO 20 20 mph

TEST CONDITIONS

Nozzle Diameter 0.61"

Cyclone No. 4

Impactor ID 9254

Sampler	Filter No.
Stage No. 1	9338088
Stage No. 2	9338089
Stage No. 3	9338090
Blank Substrate	
Back-up (8 x 10)	9333076
Blank (8 x 10)	9333067

to be exp. ~~3 blanks~~

Sampler Flow	Δp = 0.60 in. H_2O	Q = 20 ACFM

Test Velocity	Location	Δp (in. H_2O)	U = fpm	mph
Working Section	℄	0.44		34
Sampling Tube	℄	3.35		

$\sqrt{R}$ = 2.76

RUN TIME

	Clock Time	Elapsed Time Meter
Start	14:29:50	3061.3
Stop	14:37:50	3070.6
Duration		

Comments: Very difficult to hold @ 0.44" because of ambient winds

30-23 CHAT/CAUGH frm 5 062890

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MIDWEST RESEARCH INSTITUTE
Wind Tunnel Testing
Background Air Sampling

Run No(s). RF-22 & 23 Date 7/10/93

MRI Project No. 3155 Recorded by MA Gretzinger

SAMPLER POSITION _____

FILTER DATA

Sampler	Filter No.
Hi-Vol (8 x 10)	9333073
Blank (8 x 10)	9333067

FLOW DATA

Magnehelic Range 0 - 4.0 in. H_2O

Target Flow 45 ACFM Actual Flow _____ ACFM

Target Magnehelic Reading 3.68 in. H_2O Avg. Actual Magnehelic Reading 3. in. H_2O

RUN TIME

			Clock Time	Elapsed Time Meter	Magnehelic Reading (in. H_2O)
Run No. 22	First Period	Start	13:29:00	\	3.7
		Stop	14:38:45	\	3.7
		Duration MAG	~~16:15~~		
Run No. 23	Second Period	Start	16:18:55	2202.5	
		Stop	17:24:20	2269.5	
		Duration			
	Cumulative	Duration			

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MIDWEST RESEARCH INSTITUTE

Wind Tunnel Testing
Subthreshold Velocity Profile

Run No. RF-23 Date 7/10/93 Time 1629

MRI Project No. 3155 Recorded by MAGreenfield

THRESHOLD VELOCITY $P_{vel\,℄}$ 0.070 in. H_2O; $U_{℄}$ = _____ fpm 13.7 mph

SUBTHRESHOLD VELOCITY $P_{vel\,℄}$ 0.040 in. H_2O; $U_{℄}$ = _____ fpm _____ mph

VELOCITY PROFILE

Height Above Gnd. (cm)	Pitot Tube Readings P_{vel} (in. H_2O) 1st	2nd	3rd	Avg	Velocity, U (fpm)	(mph)
0						
0.5	0.016	0.016				
0.7	0.017	0.017				
1.0	0.019	0.019				
1.4	0.020	0.020				
2.0	0.022	0.023				
2.8	0.025	0.024				
3.8	0.029	0.028				
5.0	0.032	0.030				
7.0	0.036	0.034				
10.0	0.040	0.038				
℄ 15.2	0.048	0.039	0.039			
20.0	0.037					
25.0	0.035					
30.0						

$$U\,(mph) = 10.83 \sqrt{\frac{90}{\frac{T_{amb}\,(°F) + 459.3}{P_{amb}\,(in.\,Hg)}}} \times \sqrt{P_{vel}\,(in.\,H_2O)}$$

$$U\,(mph) = K' \times \sqrt{P_{vel}\,(in.\,H_2O)}$$

$K' = 51.6$

℄ WIND SPEED RATIO

Location (℄)	P_{vel} (in. H_2O)	1st	2nd	3rd	Avg	U (fpm)	1st	2nd	3rd	Avg
Sampling Tube (S)		0.315	0.29							
Wind Tunnel (T)		0.048	0.039							
Ratio	$(\frac{S}{T})^{\frac{1}{2}}$	2.81				$\frac{S}{T}$				

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MIDWEST RESEARCH INSTITUTE
Wind Erosion Testing

Run No. RF-23a Date 7/10/93
MRI Project No. 3155 Recorded by MAGrelinger

TEST SITE CHARACTERISTICS

Location Site T-3

Surface Description Disturbed by cutting grass, taking crossmic, taking lengthwise, drawing over the surface 4 times

Tunnel Orientation: Inlet facing S

Time of Observation	Air Temperature Dry Bulb °F	Air Temperature Wet Bulb °F	Relative Humidity %	Ambient Pressure in. Hg	Ambient Winds Speed mph	Ambient Winds Direction
16:20	90	61	17	24.2	<3	

THRESHOLD VELOCITY $P_{vel\,℄}$ 0.07 in H_2O; $U_{℄}$ = _____ fpm 14 mph

TEST CONDITIONS

Nozzle Diameter 0.784

Cyclone No. 1

Impactor ID 9321

Sampler	Filter No.
Stage No. 1	9338091
Stage No. 2	9338092
Stage No. 3	9338093
Blank Substrate	
Back-up (8 x 10)	9333075
Blank (8 x 10)	9333072

3 blank Substrates 9338024 9338021 933802

Sampler Flow	Δp = 0.60 in. H_2O	Q = 70 ACFM

K= 51.6

Test Velocity	Location	Δp (in. H_2O)	U = fpm	mph
Working Section	℄	0.22		24
Sampling Tube	℄	~~1.85~~ 1.90 MRG 7/10/93		71

RUN TIME

	Clock Time	Elapsed Time Meter (min)
Start	15:40:59	3093.5
Stop	16:42:59	3096.1
Duration		

Comments: Ten seconds of tremendous erosion, then little erosion seen

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MIDWEST RESEARCH INSTITUTE

Wind Tunnel Testing
Subthreshold Velocity Profile

Run No. 23b Date 7/10/93 Time 16:55

MRI Project No. _____ Recorded by _____

THRESHOLD VELOCITY $P_{vel\,℄}$ _____ in. H_2O; $U_{℄}$ = _____ fpm _____ mph

ABOVE **~~SUBTHRESHOLD~~ VELOCITY** $P_{vel\,℄}$ _____ in. H_2O; $U_{℄}$ = _____ fpm _____ mph

VELOCITY PROFILE

Height Above Gnd. (cm)	Pitot Tube Readings P_{vel} (in. H_2O) 1st	2nd	3rd	Avg	Velocity, U (fpm)	(mph)
0						
0.5	0.040					
0.7	0.051					
1.0	0.059					
1.4	0.064					
2.0	0.073					
2.8	0.079					
3.8	0.095					
5.0	0.109					
7.0	0.140					
10.0	0.184					
℄ 15.2	0.220	0.215				
20.0	0.189					
25.0	0.170					
30.0						

$$U\,(mph) = 10.83 \sqrt{\frac{T_{amb}\,(°F) + 459.3}{P_{amb}\,(in.\,Hg)}} \times \sqrt{P_{vel}\,(in.\,H_2O)}$$

$$U\,(mph) = K' \times \sqrt{P_{vel}\,(in.\,H_2O)}$$

$K' =$ _____

℄ WIND SPEED RATIO

Location (℄)	P_{vel} (in. H_2O)	1st	2nd	3rd	Avg	U (fpm)	1st	2nd	3rd	Avg
Sampling Tube (S)		1.85								
Wind Tunnel (T)		0.215								
Ratio	$(\frac{S}{T})^{\frac{1}{2}}$					$\frac{S}{T}$				

93-23 CHAT/CAUGH frm 4 062893

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MIDWEST RESEARCH INSTITUTE
Wind Erosion Testing

Run No. RF-23b
MRI Project No. 3155

Date 7/10/93
Recorded by M A Coulinger

TEST SITE CHARACTERISTICS

Location Same as RF-23a

Surface Description Disturbed to depth of 2"; about 8 vehicle

Tunnel Orientation: Inlet facing S

Time of Observation	Air Temperature Dry Bulb °F	Air Temperature Wet Bulb °F	Relative Humidity %	Ambient Pressure in. Hg	Ambient Winds Speed mph	Ambient Winds Direction
					5-10	W

THRESHOLD VELOCITY

$P_{vel\,℄}$ 0.07 in H_2O; $U_{℄}$ = _____ fpm 14 mph

TEST CONDITIONS

Nozzle Diameter 0.78"

Cyclone No. 2

Impactor ID X 9321

Sampler	Filter No.
Stage No. 1	9338091
Stage No. 2	9338092
Stage No. 3	9338093
Blank Substrate	
Back-up (8 x 10)	9333075
Blank (8 x 10)	9333072

Three Blanks
9338024
933802
93380

Sampler Flow	Δp = 0.60 in. H_2O	Q = 20 ACFM

Test Velocity	Location	Δp (in. H_2O)	U = fpm	mph
Working Section	℄	0.22		24
Sampling Tube	℄	1.9		71

$\sqrt{R}$ = 2.94

RUN TIME

	Clock Time	Elapsed Time Meter
Start	16:49:25	3102.9
Stop	16:57:25	3110.9
Duration	8:00	8.0

?

Comments: Very little erosion; small puff seen at beginning of test

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Wind Erosion Testing

Run No. 23c Date 7/10/93
MRI Project No. 3155 Recorded by MAGreenfield

TEST SITE CHARACTERISTICS

Location Same as 23a + b

Surface Description

Tunnel Orientation: Inlet facing

Time of Observation	Air Temperature Dry Bulb °F	Air Temperature Wet Bulb °F	Relative Humidity %	Ambient Pressure in. Hg	Ambient Winds Speed mph	Ambient Winds Direction
					~10	SW

THRESHOLD VELOCITY $P_{vel\,℄}$ 0.07 in H_2O; $U_{℄}$ = _____ fpm 14 mph

TEST CONDITIONS

Nozzle Diameter 0.61"

Cyclone No. 3

Impactor ID 9253

Sampler	Filter No.
Stage No. 1	9338094
Stage No. 2	9338095
Stage No. 3	9338096
Blank Substrate	
Back-up (8 x 10)	9333074
Blank (8 x 10)	9333072

} 3 blank
9338c
9338c2
9338c2

Sampler Flow	Δp = 0.60 in. H_2O	Q = 20 ACFM

Test Velocity	Location	Δp (in. H_2O)	U = fpm	mph
Working Section	℄	0.44		34
Sampling Tube	℄	3.45		96
		2.80		

RUN TIME

	Clock Time	Elapsed Time Meter
Start	17:08:20	3121.7
Stop	17:10:20	3124.2
Duration	2:00	

Comments: Wind picked up just as test started ~15mph

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Wind Tunnel Testing

Subthreshold Velocity Profile

Run No. RF-23d Date 7/10/93 Time 17:18

MRI Project No. 3155 Recorded by MH Gochenour

THRESHOLD VELOCITY $P_{vel\,℄}$ _____ in. H_2O; $U_{℄}$ = _____ fpm _____ mph

ABOVE **SUBTHRESHOLD VELOCITY** $P_{vel\,℄}$ _____ in. H_2O; $U_{℄}$ = _____ fpm _____ mph

VELOCITY PROFILE

Height Above Gnd. (cm)	Pitot Tube Readings: P_{vel} (in. H_2O) 1st	2nd	3rd	Avg	Velocity, U (fpm)	(mph)
0						
0.5						
0.7						
1.0						
1.4						
2.0						
2.8						
3.8						
5.0						
7.0						
10.0						
℄ 15.2						
20.0						
25.0						
30.0						

Not required but useful to analyst

$$U\,(mph) = 10.83 \sqrt{\frac{T_{amb}\,(°F) + 459.3}{P_{amb}\,(in.\,Hg)}} \times \sqrt{P_{vel}\,(in.\,H_2O)}$$

$$U\,(mph) = K' \times \sqrt{P_{vel}\,(in.\,H_2O)}$$

K' =

℄ WIND SPEED RATIO

Location (℄)	P_{vel} (in. H_2O)	1st	2nd	3rd	Avg	U (fpm)	1st	2nd	3rd	Avg
Sampling Tube (S)										
Wind Tunnel (T)										
Ratio	$(\frac{S}{T})^{\frac{1}{2}}$					$\frac{S}{T}$				

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Wind Erosion Testing

Run No. RF-23d Date 7/10/93
MRI Project No. 3155 Recorded by MAG

TEST SITE CHARACTERISTICS

Location Same as RF 23a, b, + c

Surface Description

Tunnel Orientation: Inlet facing

Time of Observation	Air Temperature Dry Bulb °F	Air Temperature Wet Bulb °F	Relative Humidity %	Ambient Pressure in. Hg	Ambient Winds Speed mph	Ambient Winds Direction

THRESHOLD VELOCITY $P_{vel\,℄}$ _____ in H_2O; $U_{℄}$ = _____ fpm _____ mph

TEST CONDITIONS

Nozzle Diameter 0.61

Cyclone No. 4

Impactor ID 9253

Sampler	Filter No.
Stage No. 1	9338094
Stage No. 2	9338095
Stage No. 3	9338096
Blank Substrate	
Back-up (8 x 10)	9333074
Blank (8 x 10)	9333072

3 blanks
933802
933802
93380

Sampler Flow	Δp = 0.60 in. H_2O	Q = 20 ACFM

Test Velocity	Location	Δp (in. H_2O)	U = fpm	mph
Working Section	℄	0.44		
Sampling Tube	℄	3.35 (8 x 40)		95

$\sqrt{R} = 2.77$

RUN TIME

	Clock Time	Elapsed Time Meter
Start	17:15:33	3129.1
Stop	17:23:33	3130.8
Duration		

Comments: Tire tracks have almost disappeared. Winds decreased about 6 min into test

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