MR REPORT

OU3 Wind Tunnel Study

Volume II: Field Data Sheets

Prepared for
EG&G Rocky Flats, Inc.
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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

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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 MAK

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" tall but very thin
Surface Texture Undisturbed, somewhat rocky; sparse 2"-3" grass + forbs
Tunnel Orientation: Inlet facing NW (Compass used; no correction)

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
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; $U_{\mathbb{C}}$ = _____ 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	9333038					
Cyclone						
Cyc 8 x 10 #3	9333015		40			
~~Blank Substrate~~						
~~Substrate (µm)~~						
~~Substrate (µm)~~						
~~Substrate (µm)~~	9333036					

Expires 16:45

Background

Test Velocity

		fpm	mph	m/s
Ambient	10m			
Working Section	℄			

nozzle 1.00"

2.0 in H_2O on Cyclone

Set flow to $\Delta p = 3.27$ in H_2O on manometer in Sampling Tube (S.T.)

3.27 in H_2O 0.53-0.54 in H_2O on Pitot ℄ 0.53-0.53

Test Times (Hr : Min : Sec)

A. Start of Test 2466.6 16:18:40
B. End of Test 2520.1 16:38:45
C. Test Duration (B-A) 20 min

3.7 on backpressure

16:38:40

Comments: Check for leaks on manometer – both sides ok. Magnehelics checked + zeroed. After very high threshold test and before (1) start on RF-16, observed small amount of grains of dust in nozzle assembly as cyclone was attached for test.

93-17 SEV chel wright 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 $\Delta p = 0.39$ on Thermal & Magnet

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

→ SUBTHRESHOLD VELOCITY $P_{VEL\,\mathfrak{C}}$ 0.162 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	0.002	0.001				
0.7	0.005	0.003				
1.0	0.005	0.006				
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		0.071				
25.0		0.152				
30.0						

0.160 1.00

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

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

76 24.4

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

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

℄ WIND SPEED RATIO

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

1.00 / 0.16

2 in.

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 × 1.10 = 91.6 mph S.T.

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

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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} ℄ = ____ in H_2O; $U_{℄}$ = ____ fpm ____ mph ____~~

ABOVE

→ ~~SUB~~-THRESHOLD VELOCITY P_{VEL} ℄ ____ mH_2O; $U_{℄}$ = ____ 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	~~0.160~~ 0.016				
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						

adapted from 3.1 back to 3.27

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

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

$K' =$

℄ WIND SPEED RATIO

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

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

MRI Project No. 3155 Subthreshold Testing Tunnel Recorded by MAG

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

ABOVE

→ ~~SUB~~-THRESHOLD VELOCITY P_{VEL} ____ 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	0.1~~8~~95	0.191				
7.0	0.250	0.262				
10.0	0.355	0.380				
℄ = 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

℄ WIND SPEED RATIO

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

3.31
0.460
11:20:40

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

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

$$K' = \boxed{}$$

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MIDWEST RESEARCH INSTITUTE
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
Surface Texture Disturbed by rake, stomped by feet (twice), raked crosswise, then lengthwise (see picture of pre erosion surface) very dry several times
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
11:44 77		55		23	24.5	<3	L+V

MRI Sling psych 3155

THRESHOLD VELOCITY

Centerline Reference: ΔP = 0.24 in H_2O; $U_{\mathcal{C}}$ = _____ 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 2.0 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 small rocks (some) on surface and underneath clumps of dirt dried. mostly 1/8" - 3/8" ~~+ than smaller particles~~

No visible erosion @ 11:31:40

93-17 SEV chal wksht 052893

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Run Nos KF-14 KF15 Wind Tunnel Testing
MRI Project No 3155 Background Air Sampling

Date 6/10/93
Recorded by PAG

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)
KF-14 First Period	Start	9:34:20	1522.9	3.7
	Stop	10:23:45	1573.25	3.7
	Duration			
KF-15 Second Period	Start	11:02:45	1573.25	3.7
	Stop	11:51:30	1622.95	3.7
	Duration			
Cumulative	Duration			

1622.95 PAG 6/10/93

COMMENTS

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

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

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

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

72.5 24.55

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

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

℄ WIND SPEED RATIO S.T. Δp = 3.31

	Location (℄)	P_{VEL} (in H_2O)	U (fpm)
1.25	Sampling Tube (S)	1.28	
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 Δp = $\left(\frac{31.9}{50.4}\right)^2$ = 0.401 tunnel

11

Run No. RF-14 Wind Tunnel Testing Date 6/10/93 Time 10:00

MRS Project No. 3155 Subthreshold Velocity Profile Recorded by MHC

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

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

VELOCITY PROFILE

No visible erosion at time of threshold 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						

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

$$U(mph) = K'$$

$$K' = 50.3$$

℄ 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	$(\frac{S}{T})^{1/2} = 2.84$	$\frac{S}{T}$ =

MIDWEST RESEARCH INSTITUTE
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 [illegible] small particles on surface of crust
Centerline Reference: ΔP = 0.25 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	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
3.35 on S.T. ℄ manometer
0.41 on Tunnel ℄ manometer
3.47 on background manometer
[illegible]

Test Velocity

		fpm	mph	m/s
Ambient	10m			
Working Section	℄			

Test Times (Hr : Min : Sec)
A. Start of Test 2385.3 10:02:45
B. End of Test 10:22:50
C. Test Duration (B-A) _____

Comments: Calm + clear @ 8:59 9:15 9:35
Soil particles lying on top of crusted surface that is cracked.
Some small plants on surface, that probably ~~[illegible]~~ moving 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
MRI Project No. 3155

Date 6/9/93
Recorded by MRB

TEST SITE CHARACTERISTICS

Location See Test RF-13d
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		~~50~~ 57			24.3	calm	

MRB 6/9/93

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

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	MRB 6/9/93					
Cyc 8 x 10	93389059		20			
Blank Substrate						
X9254 S1 Substrate (µm)	9338045					
S2 Substrate (µm)	9338046					
S3 Substrate (µm)	9338047					

MRB 6/9/93 ~~2.6~~ 2.2" = 2.6 " H_2O
D.T. Plenum
Pitot grid 3.7" H_2O
Cyclone 0.6" H_2O

Test Velocity

		fpm	mph	m/s
Ambient	10m			
Working Section	℄			

Target Tunnel ℄ ΔP = 0.305"

Test Times (Hr : Min : Sec)

A. Start of Test ~~23:13:16~~ 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 at 8 min

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 [illegible]

THRESHOLD VELOCITY of small particles on crusted surface P_{VEL} ℄ = 0.22 in H_2O ; $U_{℄}$ = 3110 fpm ~~23.9~~ 24.0 mph ___

→ SUB-THRESHOLD VELOCITY P_{VEL} ℄ 0.152 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	0.045	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

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

67 24.6

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	$\left(\frac{S}{T}\right)^{1/2}$ =	$\frac{S}{T}$ =

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

$$P_{VEL} = \left(\frac{U}{50.1}\right)^2$$

2750 ex ch

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

$P_{VEL} = \left(\frac{30.7}{50.1}\right)^2 = 0.37$ "

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MIDWEST RESEARCH INSTITUTE
Wind Erosion Testing

Run No. RF-13b
MRI Project No. 3155

Date 6/9/93
Recorded by MAG

TEST SITE CHARACTERISTICS

Location
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
						Calm	

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

Cyclone #1 — See Test RF-13a — 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						
Cyclone	#1	MRB 6/30/93				
Cyc 8 x 10	~~9338038~~	9333041	20			
Blank Substrate	9338041					
Substrate (µm)	9338038					
Substrate (µm)	9338039					
Substrate (µm)	9338040					

Two

x8128

Background Δp = 3.7 in H_2O
Cyclone Δp = 0.6 impeller [0-4.0 in H_2O]
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. Overcast 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 MAC

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

See Test RF-13a

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
						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 9321 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~~ 18:24:50
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:

MIRE Project No. 3155 Subthreshold Velocity Profile Recorded by Mike

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

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

VELOCITY PROFILE

tentatively ℄ ΔP = 0.2 → ~~22.8~~ 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	0.005	0.006	.006			
0.7	0.009	0.0089	.009			
1.0	0.012	0.012	.012			
1.4	0.018	0.024	.017			
2.0	0.027	0.035	.024			
2.8	0.035	0.038	.035	.038		
3.8	0.047	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	.105			
20.0	0.090					
25.0	0.087					
30.0						

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

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

℄ 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	$\frac{S}{T}$ =

Compressive Test

MIDWEST RESEARCH INSTITUTE
Wind Erosion Testing

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

TEST SITE CHARACTERISTICS 2 cleaned 6/7/93 by
Location SITE T-3 - about 100 yd from Indiana Street
Composition Rocky soil originally covered with thin patches of 10-4" high g
Surface Texture Disturbed by cutting grass to surface & taking crown some blades that cut to surf. are 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; $U_{\mathcal{C}}$ = _____ fpm _____ mph _____ m/s
Surface Reference: Z_o = _____ cm; U_* = _____ mph _____ m/s

TEST CONDITIONS 0.78" propyl
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	~~9333045~~		20			
Blank Substrate	9338041					
Substrate (µm) S1	9338035					
Substrate (µm) S2	9338036					
Substrate (µm) S3	9338037					

Exposed 17:17
17:22
x9320

Target =
Target T = 2060
MAG

Background 8x10 9333050
2nd Blank 8x10 9333049

Test Velocity

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

Δp = 0.21

Target Sampling time. Δp = 2.45 in
Target Tunnel ℄ Δp = 0.305

background Δp = 3.7 in H_2O
cyclone = 0.16" H_2O

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

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

Δp 1.6 read in Sampling Tube

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Screening test

MIDWEST RESEARCH INSTITUTE
Wind Erosion Testing

Run No. RF-12 Date 6/9/93
MRI Project No. 3155 Recorded by MAG

TEST SITE CHARACTERISTICS

Location SITE T-32 about 100 yd from Indiana Street
Composition Rocky soil usually covered with thin patches of 10-11" high grass
Surface Texture Disturbed by cutting grass to surface + raking Crossing the
Tunnel Orientation: Inlet facing SE Even slight raking brings rocks to surface Longitudinal

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
74		56		30	24.5	5-10	NE

11:11

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 MAY 6/9/93
0.368 on turned magnetic for sampling tube
2.72 on inverter
3.7 on background
2.0 on cyclone

Test Velocity

		fpm	mph	m/s
Ambient	10m			
Working Section	℄			

Target 2.72 in HC 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: 6/9/93

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

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 $P_{VEL\,℄} = 0.260$ in H_2O ; $U_{℄} = 25.8$ fpm ____ mph ____

→ SUB-THRESHOLD VELOCITY $P_{VEL\,℄}$ 0.161 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	0.011	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						

$$U(mph) = 10.83 \sqrt{P_{VEL}(in\,H_2O)} \times \sqrt[4]{\frac{T_{amb}(°F) + 459.3}{P_{amb}(in\,Hg)}} \quad K'$$

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

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

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

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

℄ WIND SPEED RATIO

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

$$\frac{1.28}{0.162} = 2.81$$

Use: 2.83

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MIDWEST RESEARCH INSTITUTE 12

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

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

12:02 — 12:08

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

→ SUBTHRESHOLD VELOCITY $P_{VEL\,\mathbb{C}}$ ____ in H_2O ; $U_{\mathbb{C}}$ = ____ 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				
$\mathbb{C}$ = 15.2	0.365	0.370				
20.0		0.360				
25.0		0.310				
30.0						

0.360 ↓

2.72 on manometer

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

@ 0.60 on Magnehelic ‖ 39.5 mph ‖

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

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

$\mathbb{C}$ WIND SPEED RATIO

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

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 (as on MRI map reduced from RFmap) — Grassy area about 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

Sampling tube = 2.74

Δp = 0.235
2nd = 0.255
3rd = 0.265
Avg 2.55

Test Velocity

		fpm	mph	m/s
Ambient	10m			
Working Section	℄			

Δp needed for sampling tube ℄ = 85.3 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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MIDWEST RESEARCH INSTITUTE

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

MRI Project No 3155 Background Air Sampling Recorded by MAS

FILTER DATA

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

FLOW DATA

Magnehelic Range: 0 - 4 in H_2O

Target Flow: MAS 6/9/93 ~~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	~~10:31:10~~ 11:41:10 *	~~1373.6~~ 1405.6	3.7
	Stop	12:17:25	1443.0	
	Duration			
Cumulative	Duration			

COMMENTS

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

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MIDWEST RESEARCH INSTITUTE
Wind Erosion Testing

Run No. RF-10
MRI Project No. 3155

Date 6/7/93
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

8:52

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

THRESHOLD VELOCITY

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

Centerline Reference: ΔP = 3.205 in H_2O; $U_{\mathbb{C}}$ = 2030 fpm 23.1 mph ____ m/s
Surface Reference: Z_o = ____ cm; U_* = ____ mph ____ m/s

TEST CONDITIONS

Nozzle = 1.00"

Exposed 8:55

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)						

Background 9333035
3.7 in H_2O
Tunnel ℄ ΔP = 0.42 in H_2O
Sampling tube = 2.9 in H_2O
Cyclone = 2.0 in H_2O

Test Velocity

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

Rained considerably during night, but trip covered area to be tested. Prepared disturbed site for testing + began test. Rest of area quite wet.

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	20 min

Comments: Recheck of manometer due to leaking in sun. Difficult to control blower motor adjusted in first min of test, then stabilized to 0.42 in H_2O for rest of 20 min test. At 9:40 no dirt from sampler was seen. Certain amounts of rocks, grass roots, and 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 JG

No threshold seen at 0.38 on tunnel fan regulator

THRESHOLD VELOCITY $P_{VEL\,\mathbb{C}}$ = none in H_2O ; $U_{\mathbb{C}}$ = ____ fpm ~~210~~ 1850 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 ridge. Did not look at for threshold 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	0.002	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	~~0.20~~ 0.185	0.1875				
20.0	0.355	0.365				
25.0	0.350	0.345				
30.0						

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

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

$$K' = \sqrt{\frac{70}{24.5}}$$

$\mathbb{C}$ WIND SPEED RATIO

Location ($\mathbb{C}$)	P_{VEL} (in H_2O)	U (fpm)
Sampling Tube (S)	1.95	
Wind Tunnel (T)	6/9/93 ~~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 / 3.014 highest P_{vel} Sampling tube for threshold velocity test

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Run Nos. MT-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 MAG ~~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. NT-10 Wind Tunnel Testing Date 6/7/93 Time [illegible]

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

THRESHOLD VELOCITY $P_{VEL\,\mathbb{C}}$ = 0.200 in H_2O ; $U_{\mathbb{C}}$ = 2030 fpm 23.1 mph ____

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

Pitot tube is at ground level at position 0.5 cm

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	0.010				
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				
℄ = 15.2	0.077	0.069				
20.0	0.062					
25.0	0.058					
30.0						

.1 ℄ 0.065

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

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

54

2% US

℄ WIND SPEED RATIO

	Location (℄)	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	$\frac{S}{T}$ =	

$U\,(mph) = 10.83$ $\quad U\,(mph) =$ $\quad K' = 50.0$

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

2910 fpm - last vel

= 0.42

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Run No. RF-9 Wind Tunnel Testing Date 4/6/93 Time ___

MRI Project No. 3155 Subthreshold Testing, Profile Recorded by MAK

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

Noise observed up to 0.245 in H_2O ; 0.58 in H_2O post?

→ SUB-THRESHOLD VELOCITY P_{VEL} @ _____ in H_2O ; $U_{@}$ = _____ fpm _____ mph _____ m/s

Max Δp @ 15.2 is 0.215 for pre test. Will bump it higher after 30 min test to check for overcompression

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 4/6/93

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

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

$$K' = 50.7$$

@ WIND SPEED RATIO

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

0.440 @ 25 cm

2.15

0.215

3.16

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

Run test at Δp = 0.255

MIDWEST RESEARCH INSTITUTE
Wind Erosion Testing

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

TEST SITE CHARACTERISTICS

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

Most clumps in tunnel look like little trees

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
66		59		63	24.00	<5	~~SE~~ NE

18:42

THRESHOLD VELOCITY > 0.58 (post test)

Centerline Reference: ΔP = ~~0.25~~ in H_2O; $U_{\mathcal{C}}$ = _____ 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	9333029					
Cyclone #4						
Cyc 8 x 10	9333016					
~~Blank Substrate~~						
~~Substrate (µm)~~						
~~Substrate (µm)~~						
~~Substrate (µm)~~						

Same as for RF-8

Background 9333017

Test Velocity

		fpm	mph	m/s
Ambient	10m			
Working Section	℄			

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

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. 96-8 Date 6/6/93
MRI Project No. 3150 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 16:15	Sampler	Filter No.	Flow (acfm) Reading	Flow (acfm) Actual	Mass Tare	Mass Final	Mass Catch
	Blank 8 x 10	9333029					
	Cyclone	30					
	Cyc 8 x 10 # 3	9333088		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 shoots with roots still in soil. Erosion of threshold velocity was seen in circular areas clearing thru vegetation. Most representative of rails, not conformance.

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

MRI Project No. 3165 Background Air Sampling Recorded by MAG

FILTER DATA

Filter No	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

Wind Tunnel Testing

WRI Project No 3155 Background 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 (6/16:55: readjusted to 3.7 in H_2O Front Coming 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: [illegible]

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 pitot tube (reversed) broke on ground; front part ~~about~~ right at ground spec, 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	0.036				
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						

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

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

$$K' = 0.5$$

Reed Hodges said he saw only surface creep at 0.155 in H_2O; HH Engineers saw significant movement of particles, but these could have been caught by dominant vegetation.

℄ WIND SPEED RATIO

	Location (℄)	P_{VEL} (in H_2O)	U (fpm)
0.128	Sampling Tube (S)	0.125	4360
0.95	Wind Tunnel (T)	0.95	1590
	Ratio	$(\frac{S}{T})^{1/2}$ = 2.76	$\frac{S}{T}$ = 2.74

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

Test Conditions

~~ΔP = 0.15~~

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Run No. RF-7 Wind Tunnel Testing Date 6/5/93 Time 1:20

MRI Project No. 3155 Subtherm [illegible] Recorded by [illegible]

Engine operating hypothesis

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

→ JET-THRESHOLD VELOCITY $P_{VEL\,\mathbb{C}}$ ~~0.31~~ 0.071 in H_2O ; $U_{\mathbb{C}}$ = ~~2500~~ 1200 fpm _____ mph _____ m

No clouds observed up to 2500 fpm

Hot seen circulating on surface between grates (@ ~ 3000 fpm)

(@ 3800 fpm (Δp = 0.72) still no clouds

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	0.000	0.001				
1.0	0.000	0.002				
1.4	0.000	0.002				
2.0	0.000	0.004				
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				
$\mathbb{C}$ = 15.2	0.071	0.075				
20.0	0.085					
25.0						
30.0						

at [illegible] 0.250 | non-[illegible] 0.20

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

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

$\sqrt{\frac{T_{amb}\,(°F) + 459.3}{P_{amb}\,(in\,Hg)}}$ = 10.83 (24.0)

U (mph) = _____ U (mph) = _____ K' = 50.8

$\mathbb{C}$ WIND SPEED RATIO

new Subtherm

high Subtherm

Location ($\mathbb{C}$)	P_{VEL} (in H_2O)	U (fpm)
Sampling Tube (S)	~~0.4~~ 0.42	
Wind Tunnel (T)	0.72	
Ratio	$(\frac{S}{T})^{1/2}$ = 2.42	$\frac{S}{T}$ =

0.42

~~0.31~~ →

0.43

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

Need Δp = 0.455

MIDWEST RESEARCH INSTITUTE
Wind Erosion Testing

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

TEST SITE CHARACTERISTICS T-1

Location On top of plateau; RF Plant, cyclone on lin 550 yds; circulating 6 kt Rose to ENE
Composition Vegetated area thin patches grasses with mostly 2-3" ht.
Surface Texture Rocky area, especially toward center of working section. Some dirt between grass clumps and rocks; 1 small cactus
Tunnel Orientation: Inlet facing E

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
69		58		50	24.0	L+V	N

17:40

THRESHOLD VELOCITY no threshold sensor

@ 18:40 12 mph
@ 18:44 10 mph

Centerline Reference: ΔP = ~~0.42~~ in H_2O; U_{ς} = _____ 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

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

Test Velocity

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

Test Times (Hr : Min : Sec)

A. Start of Test 2149.7 1847:00
B. End of Test 1907:00 C. Test Duration (B-A) _____

19:07

Comments: Bottom position of pitot tube in thin grass that is about 1½"-2" height at entrance to pitot tube. Height above surface of center of pitot tube is ½ - 3/4". Ran at highest speed expected for isokinetic sampling through threshold test @ 3500 fpm. Received slight visible erosion. Winds cause Δp to vary below threshold. 93-17 SEV chal wksht 052893
Δp 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 6/3/93
Recorded by MAG

Initials by
CC
SC
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
12:45	73							

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 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					
Tube exposed	Blank Substrate						
1	Substrate (µm)	9338050					
12:54 2	Substrate (µm)	9338051					
3	Substrate (µm)	9338052					

2.1 in H_2O on sampling tube
2.0 in H_2O on "
3.7 in H_2O on background sampler
0.16 in H_2O on cyclone sampling system

Test Velocity

		fpm	mph	m/s
Ambient	10m			
Working Section	℄			

Target
0.22 in H_2O on Thomas ℄

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 stop from time begins (10) time of sampling did not start until target ΔP of 0.22 was reached / cannot tip cyclone accurately to CC + SC 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 MAC

TEST SITE CHARACTERISTICS

Location Inlet to Great Western Reservoir
Composition Sediment at lake shore
Surface Texture Cracked surface pulverized with tracks twice smoothed with 2
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
12:07	72		59		45	24.4	E	<5

THRESHOLD VELOCITY

assumed to be during test

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 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 Interlocker
.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 backpanel
1.6 in H_2O on sampling system

Test Velocity

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

Test Times (Hr : Min : Sec)

A: Start of Test 2129.9 12:16:30
B. End of Test 3138 12:23:30
7.0
C. Test Duration (B-A) 7:00 min

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

93-17 SEV chal wksht 052993

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MIDWEST RESEARCH INSTITUTE
Wind Erosion Testing

Comprehensive

Run No. RF-6c Date 6/5/93
MRI Project No. 3155 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; $U_{\mathbb{C}}$ = 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 on backgrnd sampler
1.7 in H_2O on sampling tube
0.6 in H_2O on cyclone sampling system

Test Velocity

		fpm	mph	m/s
Ambient	10m			
Working Section	℄			

Target 0.22 in H on tunnel

Test Times (Hr : Min : Sec)

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

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

93-17 SEV chal wksht 052893

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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 MAC

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	Dry Bulb °C	Wet Bulb °F	Wet Bulb °C	Relative Humidity %	Ambient Pressure In Hg	Ambient Winds Speed mph	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	—					
to be exposed @ Interlocken	Cyc 8 x 10 #1	9333023					
	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 30" tube

Test Velocity

		fpm	mph	m/s
Ambient	10m			
Working Section	℄			

ΔP 0.115

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

Test Times (Hr : Min : Sec)

A. Start of Test 2126.7 11:58

B. End of Test 2129.9 12:01

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

Comments: Site RF-6 is immediately adjacent to Site RF-5 and similarly prepared. Lot of erosion seen. Set up new cyclone and filter substrates prep'd for Run RF-6b

93-17 SEV chal wksht 052893

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Run No. [illegible] Wind Tunnel Testing Date 6/5/93
MRI Project No. 3155 Background Air Sampling 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 Subtitle: [illegible] Recorded by [illegible]

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

→ JUST-RESTOLD VELOCITY $P_{VEL\,\mathbb{C}}$ 0.037 in H_2O ; $U_{\mathbb{C}}$ = 840 fpm 9.5 mph

VELOCITY PROFILE — Very light winds

Height Above Ground (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				
℄ = 15.2	0.0375	0.035				
20.0	0.033					
25.0	0.029					
30.0						

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

$$\frac{243}{}$$

℄ WIND SPEED RATIO

	Location (℄)	P_{VEL} (in H_2O)	U (fpm)
0.27	Sampling Tube (S)	0.38	
0.035	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

$K' = 50.3$

2.93

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MIDWEST RESEARCH INSTITUTE

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

MRI Project No. 3165 Subthreshold Velocity Profile Recorded by MHG

THRESHOLD VELOCITY $P_{VEL\,℄} = 0.05$ in H_2O ; $U_{℄} = \cancel{1005}$ fpm $\cancel{12.5}$ mph

→ SUBTHRESHOLD VELOCITY $P_{VEL\,℄}$ 0.035 in H_2O ; $U_{℄} = \cancel{870}$ 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				
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	0.028	0.027				
7.0	0.030	0.029				
10.0	0.030	0.031				
℄ = 15.2	0.035	0.034				
20.0	0.029					
25.0	0.025					
30.0						

$$U(mph) = 10.83 \sqrt{P_{VEL}\,(in\,H_2O)} \times \sqrt{\frac{\frac{T_{amb}(°F) + 459.3}{67}}{\frac{P_{amb}(in\,Hg)}{24.3}}} \times \sqrt{P_{VEL}\,(in\,H_2O)}$$

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

$$K' = 49.9$$

℄ WIND SPEED RATIO

Location (℄)	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 [illegible]

TEST SITE CHARACTERISTICS

Location Inlet to Great Western Reservoir [illegible] the
Composition Sediment at lake shore [illegible]
Surface Texture Crusted silt dirt run over with truck tires; smoothed using 2 x [illegible]
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
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	4.0			
Blank Substrate						
Substrate (µm)						
Substrate (µm)						
Substrate (µm)						

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

S.T.G. opt. 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 noncohesive 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. [illegible]

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MIDWEST RESEARCH INSTITUTE
Wind Erosion Testing

Run No. RF-4
MRI Project No. 5155

Date 06/04/93
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

	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 (Cloudy)
14:33	68		53.6		36	24.5	N	0-8

THRESHOLD VELOCITY

Centerline Reference: ΔP = ~~0.30~~ 0.078 in H_2O; U_C = ~~2590~~ 1200 fpm ~~29.4~~ 13.6 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

Test Velocity

		fpm	mph	m/s
Ambient	10m			
Working Section	℄	2590	29.4	

0.33 in H_2O Cent ℄
0.5T 1.65 in H_2O Cent ℄

Δp
0.33

Test Times (Hr : Min : Sec)

A. Start of Test 2086.4 (Reading) 1525
B. End of Test 2106.7 1545
C. Test Duration (B-A) 20 min

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

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MIDWEST RESEARCH INSTITUTE

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

MRI Project No 5155 Background Air Sampling Recorded by [illegible]

FILTER DATA

Filter No	Final Wt.	Tare Wt.	Catch
93330006			
93330022 (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-3
MRI Project No. 3155

Date 6/4/93
Recorded by MAC

TEST SITE CHARACTERISTICS

Location Inlet area to Great Western Reservoir - Walnut Cre
Composition Sediment of lake shore
Surface Texture Crusted 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	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
59.5	~~51.0~~ MAC	51.0		50.4 MAC	24.6	0-10	N-NE

mostly cloudy

THRESHOLD VELOCITY

Centerline Reference: ΔP = 0.47 in H_2O; U_C = 3100 fpm 35.2 mph _____ m/s
Surface Reference: Z_o = _____ cm; U_* = ~~2592~~ MAC 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 ~~upwind~~ sampler 9333007

0.47 in H_2O tunnel ℄
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-vol = 3.7 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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MIDWEST RESEARCH INSTITUTE

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

MRI Project No. 3155 Subthreshold Loading Vehicle Recorded by MAG

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				
$\mathbb{C}$ = 15.2	0.060	0.060				
20.0	0.059	0.060				
25.0	0.060	0.060				
30.0						

1" nozzle ⇒ $\frac{53.3}{2.83}$ = 29.4 mph = 2590 fpm

$\mathbb{C}$ WIND SPEED RATIO

max Δp = ~~0.05~~ 0.3 in
from run 4 MAG

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

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

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

$$K' = 1.0$$

Run ilos [illegible] Wind Tunnel Testing
URI Project No 3155 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 MAC ~~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 RF-[illegible] blank
Checked flow rate (magnehelic)
reading had increased to 3.9;
reset to 3.7

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Run No. RF-3 Wind Tunnel Testing Date 5/4/93 Time 13:15

MRI Project No. 5155 Substrate: dirt loamy sand Recorded by: JC

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

→ JUST-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		8.5	
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	0.077					
30.0						

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

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

$K' = 4.97$

Disturbed area: 0.22 in H_2O ~ 2100 fpm. Will run velocity profile at ~15 mph.

℄ WIND SPEED RATIO

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

Pull EEG: Soil samples were taken 24.35 to 2" from the [illegible]

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Run No. RF-2

MRI Project No. 3125

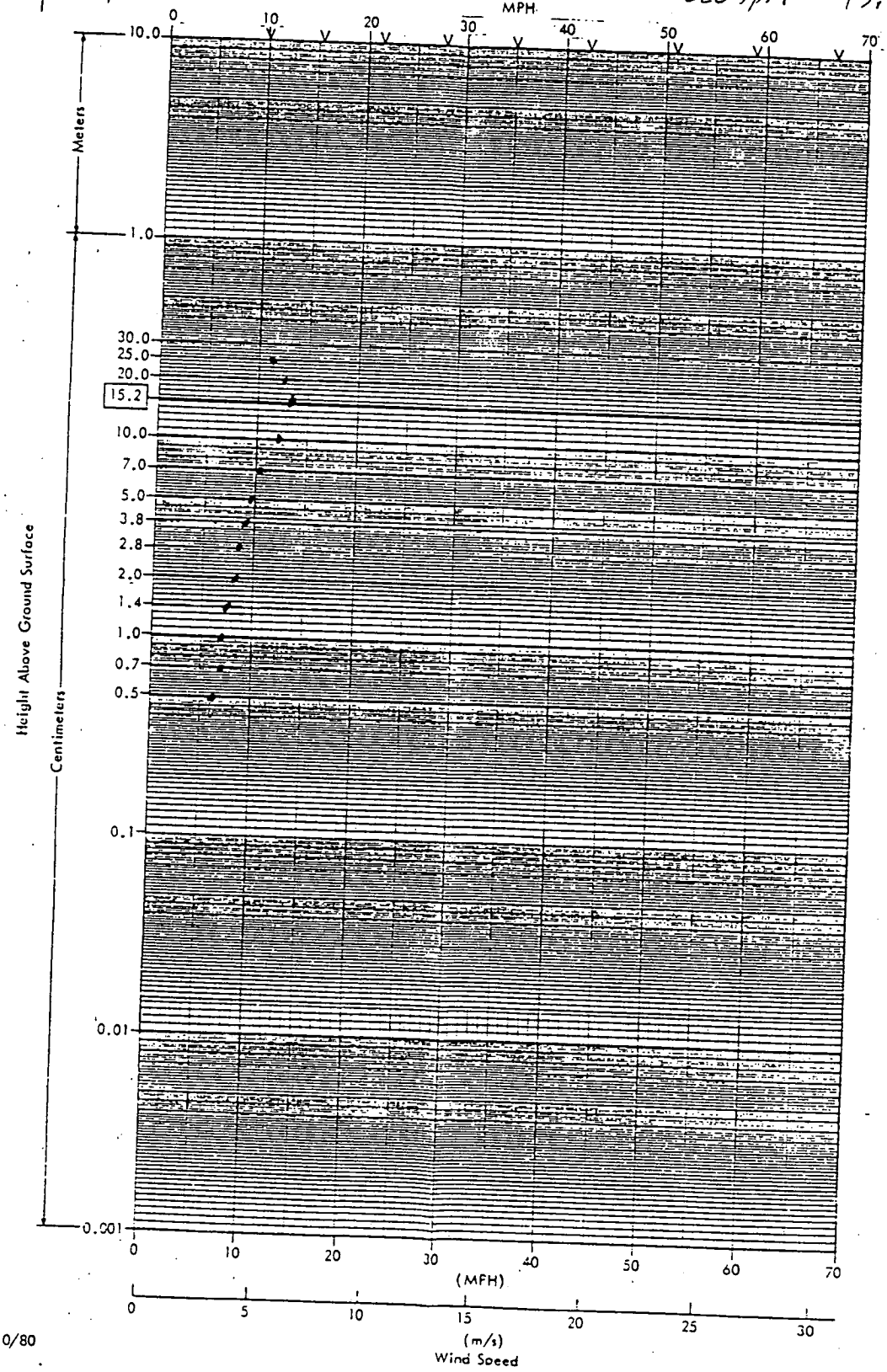
Wind Erosion Testing
Wind Speed Vertical Profile

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

MIDWEST RESEARCH INSTITUTE
Wind Erosion Testing

Run No. RF-3 Cancelled
MRI Project No. 3175

Date 6/3/93
Recorded by MAG

TEST SITE CHARACTERISTICS

Location Inlet area to Great Western Reservoir
Composition
Surface Texture
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
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) Reading	Flow (acfm) Actual	Mass Tare	Mass Final	Mass 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 _____
B. End of Test _____
C. Test Duration (B-A) _____

Comments: Target Δp

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Wind Erosion Testing
Pitot Tube Readings and Meteorological Data

Test No. 25-2
MRI Project No. 3129

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

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	0.017	6.8	
0.7	0.018	0.021	7.1	
1.0	0.017	0.020	7.1	
1.4	0.020	0.023	7.5	
2.0	0.024	0.027	8.0	
2.8	0.030	0.028	8.7	
3.8	0.032	0.031	9.0	
5.0	0.037	0.032	9.6	
7.0	0.043	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	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

Pitot tube 3.0 [illegible] = 3270 fpm

0.52 [illegible]

Determination of U from P_{VEL}

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

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

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

$$K = 50.86$$

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

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

[illegible] 2700 ↓ 0.355 [illegible]

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

30

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MIDWEST RESEARCH INSTITUTE
Wind Erosion Testing

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

TEST SITE CHARACTERISTICS

Location North Shore of Great Salt Lake
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
~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

Upwind 8x10 9333001 40

2.7 in H_2O S.T. ℄

0.334 in H_2O Tunnel ℄

(Δp = 3.7 in H_2O) Magnehelic

Test Velocity

		fpm	mph	m/s
Ambient	10m			
Working Section	℄		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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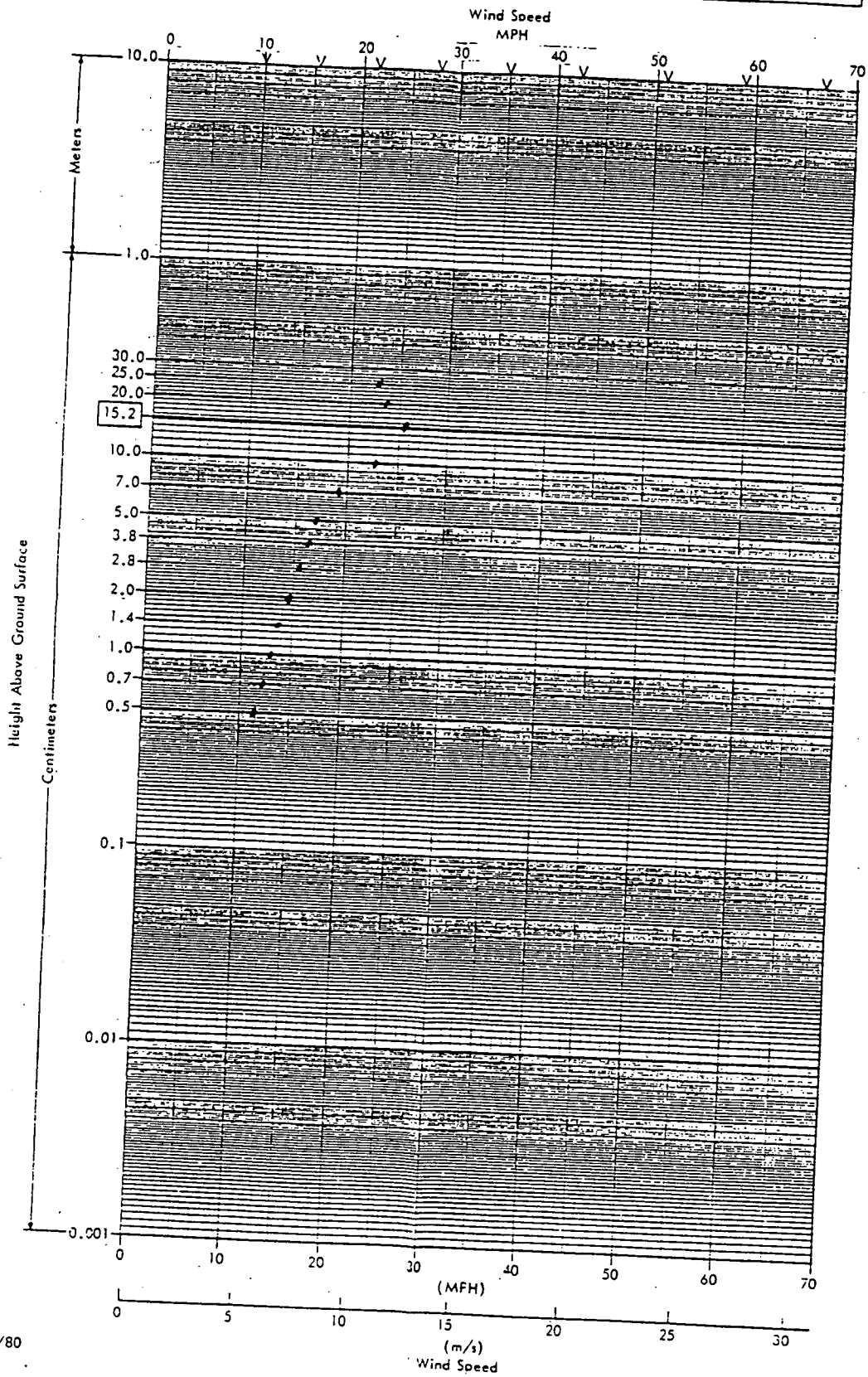
Run No. RF-1

MRI Project No. 3175

Wind Erosion Testing
Wind Speed Vertical Profile

Date 6/3/93

Recorded by MAC



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[illegible]

[illegible]

[illegible]

Magnetic in Cyclohexane = 3.0 in H_2O

0.605 [illegible] Δf (in H_2O) corresponds to 3350 cps

1.515 [illegible] Δf (in H_2O) corresponds to 10,000 cps

$\frac{10,000}{3350} = 2.98$

Compound [illegible] 8.0 [illegible] and 1.0 [illegible]

Shift [illegible] [illegible]

4.7 – 4.5 [illegible] [illegible] [illegible]

n No. R-1

MRI Project No. 3155

MIDWEST RESEARCH INSTITUTE

Wind Erosion Testing

Pitot Tube Readings and Meteorological Data

Date 6/2/93 / Time 1

Recorded by MRG/CC

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	0.055	0.052	11.8	
0.7	0.060	0.055	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 visibly dry. Soil moisture readings of 0% avg. Moisture meter [illegible] [illegible] [illegible] [illegible] Time Domain Reflectometry, 15 cm probe; moisture observed to [illegible] 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

60

60

MIDWEST RESEARCH INSTITUTE
Wind Erosion Testing

Run No. RF-1
MRI Project No. 3155

Date [illegible] 6/3/93
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
~76		—		~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 3:47
B. End of Test 4:01
C. Test Duration (B-A) 10 min on water, 20 min on counter

Comments: Magnehelic reading for tunnel threshold 0.205 [illegible] 1.7 [illegible] 0.205 [illegible] 5400

5400/1000 = 5.4

93-17 SEV chal wksht 052993

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MINERAL RESEARCH INSTITUTE

Run No. RF-17 Wind Tunnel Testing Date 6/10/93 Time 11:41

MRI Project No. 3155 Subthreshold Leaving Profile Recorded by MAG

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

→ SUBTHRESHOLD VELOCITY $P_{VEL\,\mathcal{C}}$ 0.162 in H_2O ; $U_{\mathcal{C}}$ = _____ 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				
$\mathcal{C}$ = 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 trowel to slightly tamp down and smoothed surface. This was not done at RF-15

$\mathcal{C}$ WIND SPEED RATIO

Location ($\mathcal{C}$)	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

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

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

$$K' = 50.7$$

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

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MIDWEST RESEARCH INSTITUTE

Run No. RF-17 Wind Tunnel Testing Date 6/10/93 Time 18:16

MRI Project No. 3164 Subthreshold Velocity Profile Recorded by

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

ABOVE

SUBTHRESHOLD VELOCITY $P_{VEL\,\mathcal{C}}$ 0.1 ____ mm H_2O ; $U_{\mathcal{C}}$ = ____ 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	0.070	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				
$\mathcal{C}$ = 15.2	0.44	0.455				
20.0	0.385					
25.0	0.360					
30.0						

3rd 0.449

Slight blown during profile

$\mathcal{C}$ WIND SPEED RATIO

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

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

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

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~~2520.~~ 8:12:15

MIDWEST RESEARCH INSTITUTE
Wind Erosion Testing

Run No. RF-17 Date 6/10/93
MRI Project No. 3155 Recorded by MAG

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

	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
16:50	76		55		25	24.45	<5	E

THRESHOLD VELOCITY
5 mph E 17:36
<5 mph E 18:08
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)						

.17 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
~~0.45"~~
MAG 6/10/93

Test Velocity

		fpm	mph	m/s
Ambient	10m			
Working Section	℄			

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 × 1.1 = 91.63 mph / 2.88 = 32.0 mph ← output~~

Target ΔP S.T. = $\left(\frac{91.6}{60.1}\right)^2 = 3.26$

93-17 SEV chat wksht 052893

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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 Gklinger

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			

93-23 CHAT/CAUGH frm 2 062893

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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 Gerlaugh

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 062893

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MIDWEST RESEARCH INSTITUTE
Wind Erosion Testing

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

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 10° 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 MAGreb

TEST SITE CHARACTERISTICS

Location Seneca 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. 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		66.4
		1.70	$\sqrt{R}$ = 2.77	

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

93-23 CHAT/CAUGH frm 5 062893

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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 MAGrebyn

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						

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

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				$\frac{S}{T}$				

93-23 CHAT/CAUGH frm 4 062893

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 Grelinger

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
MRI Project No. 3155

Date 7/8/93
Recorded by M H Gretlinger

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 ~~11:15~~

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 Gallinger

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						

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

82 24.1

K'

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

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 sun 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 HA Gallagher

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:~~24~~ 46		
Run No. ____	Second Period	Start	AC 8/4/93		
		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. 19a
MRI Project No. 3155

Date 7/9/93 Time 8:31
Recorded by M A Oehlinger

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 thought seen at 0.01 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						

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

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

$K' = 50.6$

℄ WIND SPEED RATIO

Location (℄)	P_{vel} (in. H_2O)	1st	2nd	3rd	Avg	U (fpm)	1st	2nd	3rd	Avg
Sampling Tube (S)		0.33	0.33	0.335						
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. 196 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~~THRESHOLD VELOCITY (ABOVE) $P_{vel\,℄}$ _____ 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						

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

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

$K' = 56.5$

℄ 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. 7RF-19a
MRI Project No. 3155

Date 7/8/93
Recorded by MH Gonzalez

TEST SITE CHARACTERISTICS

Location Site T-1 Comprehensive test

Surface Description Disturbed by cutting, raking thoroughly and driving van tires over surface - tracks of tires not smoothed. 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: Tire track ruts were about 1 inch deep 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 Gerhiger

TEST SITE CHARACTERISTICS

Location Site T-1 Comprehensive test
Surface Description Disturbed as for Run 18, except for adding deeper raking to remove most roots and compacted bright 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 = ~~0.82~~ 0.60 in. H_2O	Q = 20 ACFM

Test Velocity	Location	Δp (in. H_2O)	U = fpm	mph
Working Section	℄	~~0.22~~ 0.16		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 van, surface to be tested was the most and is quite smooth with holes depressed into surface. During erosion phase, holes 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
MRI Project No. 3155

Date 7/9/93
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 2.30		

RUN TIME

	Clock Time	Elapsed Time Meter
Start	9:14:03	2786.9
Stop	MAG 7/21/93 9:16:03	2789.1
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 [illegible]

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 Pair

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MIDWEST RESEARCH INSTITUTE
Wind Erosion Testing

Run No. RF-19d
MRI Project No. 3155

Date 7/9/93
Recorded by M A Gerlaugh

TEST SITE CHARACTERISTICS

Location Same as 19a + b

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

$P_{vel\,℄}$ 0.07 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 = 30 ACFM

Test Velocity	Location	Δp (in. H_2O)	U = fpm	mph
Working Section	℄	0.30		38
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

80

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						

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

83

24.35

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)		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 Mower Reservoir; about 100 yd from Indiana Street

Surface Description Thin dry grass, weeds, thistles cut to surface raked sideways left to right; then raked lightness

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		69.6

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
MRI Project No. 3155

Date 7/9/93 Time 14:41
Recorded by MA Gerlinger

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						

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

K'

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

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. 206 Date 7/9/93
MRI Project No. 3155 Recorded by MAGrichage

TEST SITE CHARACTERISTICS

Location Site T-2, above Mower 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 E/W

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

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

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' = 51.1

℄ 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)		0.37								
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 gas. SC quickly restored but tunnel flow dropped to < 0.26. 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 M A Gerlinger

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

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 Gochnour

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'

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

$K' = 50.6$

℄ WIND SPEED RATIO

Location (℄)	P_{vel} (in. H_2O)	1st	2nd	3rd	Avg	U (fpm)	1st	2nd	3rd	Avg
Sampling Tube (S)		0.51	0.51							
Wind Tunnel (T)		0.070	0.069							
Ratio	$(\frac{S}{T})^{\frac{1}{2}}$	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
MRI Project No. 3155

Date 7/9/93
Recorded by MAGreiner

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 in. Running truck tires over area several times. 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
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 tunnel and tarp.

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 Gallagher

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						

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

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

K' =

℄ WIND SPEED RATIO

Location (℄)	P_{vel} (in. H_2O)	1st	2nd	3rd	Avg	U (fpm)	1st	2nd	3rd	Avg
Sampling Tube (S)		1.80	1.80							
Wind Tunnel (T)		0.22	0.218							
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-21b
MRI Project No. 3155

Date 7/10/93
Recorded by M Hardinger

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 tread marks seen at 5 min interval test RF-21b

93-23 CHAT/CAUGH frm 5 062893

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MIDWEST RESEARCH INSTITUTE
Wind Erosion Testing

Run No. RF-21c
MRI Project No. 3155

Date 7/10/93
Recorded by M A Gregory

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 0.78
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 erosion at start of test

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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 MHG

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
MRI Project No. 3155

Date 7/10/93
Recorded by MAGaughan

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		

AR = 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 Erlinger

THRESHOLD VELOCITY $P_{vel\,℄}$ 0.15 in. H_2O; $U_{℄}$ = _____ fpm 20 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	0.011	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						

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

86

24.25

K'

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

K' = 41.4

℄ 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
MRI Project No. 3155

Date 7/10/93
Recorded by MA Gretlinger

TEST SITE CHARACTERISTICS

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

Surface Description Disturbed, first by cutting all the vegetation to surface, then raking excessive, then disk harrow

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: _____

93-23 CHAT/CAUGH rm 5 062093

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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 MAGreenfeld

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 travel during 22b because SC had to be adjusted because of current winds

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

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

$K' = 5.4$

℄ 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	$(\frac{S}{T})^2$					$\frac{S}{T}$				

93-23 CHAT/CAUGH frm 4 062893

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MIDWEST RESEARCH INSTITUTE
Wind Erosion Testing

Run No. RF-22 b
MRI Project No. 3155

Date 7/10/93
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	Air Temperature Wet Bulb °F	Relative Humidity %	Ambient Pressure in. Hg	Ambient Winds Speed mph	Ambient Winds 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 $P_{vel\,℄}$ 0.15 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

30-23 CHAT/CAUGH frm 5 062893

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MIDWEST RESEARCH INSTITUTE
Wind Tunnel Testing
Subthreshold Velocity Profile

Run No. RF-22d
MRI Project No. 3156

Date 7/10/93 Time _____
Recorded by MAK

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 wind

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

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

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	$(\frac{S}{T})^{1/2}$					$\frac{S}{T}$				

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	14:31:50	3070.6
Duration		

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

30-23 CHAT/CAUGH frm 5 062590

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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 Gelinger

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	~~76.4~~ 1148		
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 16:29

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						

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

90

K'

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

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	$(\frac{S}{T})^{1/2}$	2.81				$\frac{S}{T}$				

93-23 CHAT/CAUGH frm 4 062893

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MIDWEST RESEARCH INSTITUTE
Wind Erosion Testing

Run No. RF-23a
MRI Project No. 3155

Date 7/10/93
Recorded by MAGerhart

TEST SITE CHARACTERISTICS

Location Site T-3

Surface Description Disturbed by cutting grass, raking crosswise, raking lengthwise, driving 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 = 20 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

93-23 CHAT/CAUGH rm 5 062893

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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

~~**SUBTHRESHOLD VELOCITY**~~ ABOVE $P_{vel\,℄}$ _____ 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. Gochnauer

TEST SITE CHARACTERISTICS

Location Same as RF-23a
Surface Description Disturbed to depth of 24"; 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

93-23 CHAT/CAUGH frm 5 062893

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MIDWEST RESEARCH INSTITUTE
Wind Erosion Testing

Run No. 23c
MRI Project No. 3155

Date 7/10/93
Recorded by MAGrchmic

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
933802
933802

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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MIDWEST RESEARCH INSTITUTE
Wind Tunnel Testing
Subthreshold Velocity Profile

Run No. RF-23d
MRI Project No. 3155

Date 7/10/93 Time 17:18
Recorded by [illegible]

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 performed due to [illegible] winds

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

K'

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

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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MIDWEST RESEARCH INSTITUTE
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
933802

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	℄	~~3.840~~ 3.35		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 treads have almost disappeared. Winds decreased dust came into test

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