CHEMISTS
ENGINEERS

BADGER LABORATORIES & ENGINEERING CO. INC.

1110 S. ONEIDA STREET • APPLETON, WISCONSIN 54915-1392 • EST. 1966

(414) 739-9213 • FAX (414) 739-5399 • 1-800-776-7196

October 16, 1995

Project 95-02470A

Mr. Dale Hanke
RED ARROW PRODUCTS CO., INC.
1226 S. Water Street
P.O. Box 1537
Manitowoc, WI 54221-1537

Dear Mr. Hanke:

Mr. Jeff Jennerjohn from Badger Labs. & Eng. performed visible emission readings on the wood dryer stack at the plant on October 4, 1995. The visible emission readings were taken concurrent with the particulate emission tests. Mr. Jennerjohn was certified on April 11, 1995 by the WDNR for Opacity determination. EPA Method 9 was followed for the Opacity determination. The readings were taken at 15 second intervals for one hour time periods. The results of the tests are shown below.

OPACITY RESULTS

Time Period	Highest 6' Ave.	Hourly Ave.
9:33-10:33	19.8%	13.9%
10:55-11:55	18.3%	15.6%
12:15-13:15	22.3%	18.1%
13:38-11:59	17.3%	-----

Please call if there are any questions. Thank you for having BL&E take care of this project for you.

Very truly yours,

BADGER LABORATORIES & ENGINEERING
WDNR Certification No. 445023150

Bruce F. Lamers

Bruce F. Lamers
Project Manager

Attachments

Department of Natural Resources

SMOKE FORM
Form 4500-29 Rev. 6-85

Run #1

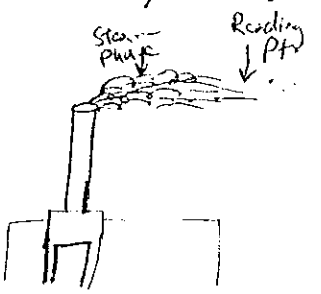
Name of Company: Red Arrow	Date: 10-4-95
Location: wood dryer	FID Number:
City, State, Zip Code: Manitowoc	Observer Certification Date: 4-11-95
Discharge Location:	Control Device: cyclone
Height of Discharge Above Ground: 200 ft.	Steam Plume? (Yes) No — Attached X 30-40 ft. Detached

	Initial		Final
Time of Observation	9:33:00		10:32:45
Observer Location: Distance to Discharge	300 ft.		300 ft.
Direction from Discharge	SE		SE
Height of Observation Point in Relation to Discharge	200 ft.		200 ft.
Plume Description (Color, Length, etc.)	white 30-40 ft.		white 30-40 ft.
Plume Background Description	Blue Sky white clouds		Blue Sky
Weather Conditions: Wind Direction	NW		NW
Wind Speed	0-5 mph		0-5 mph
Ambient Temperature	60°F		60°F
Sky Conditions (clear, overcast, % clouds, etc.)	clear clouds 50%/50%		clear, blue sky, no clouds

Describe Point in Plume at Which Opacity was Determined

steam plume extended approx 30-40 ft past stack

Remarks: opt. readings taken when steam dissipated.



SEC MIN	0	15	30	45	SEC MIN	0	15	30	45
0	5	5	10	10	30	15	15	20	10
1	15	10	10	15	31	10	10	10	10
2	10	5	5	10	32	15	15	10	15
3	10	5	10	5	33	10	20	15	15
4	5	5	10	5	34	15	15	20	15
5	5	10	10	10	35	20	15	15	15
6	10	10	15	15	36	15	20	20	20
7	10	10	5	5	37	15	20	20	20
8	5	10	10	10	38	20	15	20	15
9	5	5	5	10	39	20	15	15	15
10	10	10	10	5	40	10	15	20	20
11	5	10	10	10	41	25	20	20	30
12	15	15	10	10	42	30	20	20	20
13	15	5	10	10	43	20	20	20	15
14	15	10	10	5	44	15	15	20	20
15	5	10	5	5	45	20	20	20	10
16	10	10	10	15	46	15	15	20	25
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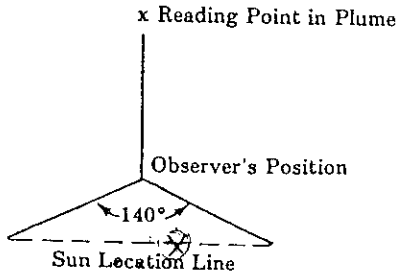
22	10	10	10	15	52	15	10	10	10
23	15	20	15	15	53	15	15	10	10
24	10	15	10	15	54	10	10	15	10
25	10	15	15	20	55	15	15	15	15
26	15	20	15	15	56	15	10	10	20
27	10	10	10	15	57	20	10	10	10
28	20	15	10	15	58	10	15	15	15
29	15	15	20	15	59	10	15	15	15

Summary of Average Opacity
(From Computer Program)

Set Number	Time Start — End	Opacity Sum	Opacity Average
1	41-46	475	19.8
2	34-39	415	17.3
3	47-52	370	15.4
4	16-21	355	14.8

Signature of Observer: Jeff Jernigan	Name of Observer (Please print): Jeff Jernigan

Sketch of Observer, Discharge, and Sun Location.



Allowable Source Opacity 20%

hourly ave 13.9%

Department of Natural Resources

SMOKE FORM
Form 4500-29 Rev. 6-85

Run #2

Name of Company: Red Arrow	Date: 10-4-95
Location: wood dryer	FID Number:
City, State, Zip Code: Manitowoc, WI	Observer Certification Date: 4-11-95
Discharge Location:	Control Device: cyclone
Height of Discharge Above Ground: 200 ft.	Steam Plume? (Yes) No — Attached X Detached

	Initial		Final
Time of Observation	10:55:00		11:54:45
Observer Location — Distance to Discharge	300 ft.		300 ft.
Direction from Discharge	SE		SE
Height of Observation Point in Relation to Discharge	200 ft.		200 ft.
Plume Description (Color, Length, etc.)	white 30-40 ft.		white 30-40
Plume Background Description	Blue Sky		
Weather Conditions — Wind Direction	NW		NW
Wind Speed	0-5		0-5
Ambient Temperature	60°F		60°F
Sky Conditions (clear, overcast, % clouds, etc.)	Blue Sky Clear		Blue Sky Clear

Describe Point in Plume at Which Opacity was Determined

steam plume extends past stack exit. Readings

Remarks:

taken were steam dissipated.

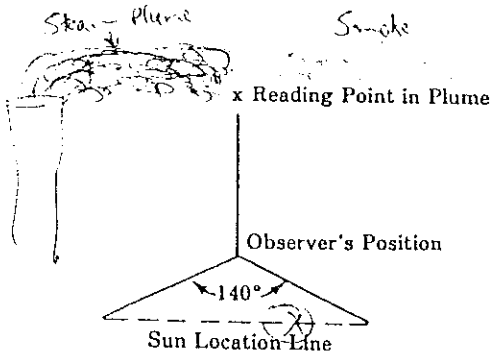
SEC MIN	0	15	30	45	SEC MIN	0	15	30	45
0	20	15	20	15	30	10	10	15	15
1	15	15	10	10	31	20	10	15	15
2	15	20	15	15	32	10	15	15	15
3	15	20	20	20	33	15	20	10	15
4	15	15	15	10	34	15	15	20	15
5	10	15	15	20	35	15	15	15	2[illegible]
6	20	15	15	10	36	15	15	15	10
7	10	10	15	20	37	10	15	15	20
8	20	15	15	15	38	15	15	15	2[illegible]
9	15	15	20	20	39	15	15	15	15
10	15	20	20	20	40	15	15	15	15
11	15	15	20	10	41	20	20	20	15
12	20	20	20	20	42	15	15	10	10
13	20	15	20	15	43	15	15	20	15
14	15	15	20	20	44	15	15	20	15
15	15	20	20	20	45	20	15	15	15
16	15	15	15	20	46	15	20	20	10
17	15	15	15	10	47	15	15	10	10
18	15	15	20	15	48	10	10	10	15
19	10	15	15	15	49	15	10	15	10
20	10	15	15	15	50	15	15	20	20
21	15	15	15	20	51	15	15	10	15
22	15	20	20	15	52	15	10	15	15
23	15	15	20	20	53	15	20	20	20
24	15	10	10	10	54	15	20	15	2[illegible]
25	10	15	10	15	55	20	20	20	2[illegible]
26	10	15	20	10	56	20	20	20	15
27	15	15	20	20	57	15	15	15	20
28	20	20	20	10	58	15	20	20	2[illegible]
29	15	15	10	10	59	20	20	15	20

Summary of Average Opacity
(From Computer Program)

Set Number	Time Start — End	Opacity Sum	Opacity Average
1	53-58	440	18.3
2	10-15	430	17.9
3	41-46	385	16.0
4	18-23	380	15.8

Signature of Observer: Jeff Jennerjohn	Name of Observer (Please print): Jeff Jennerjohn

Sketch of Observer, Discharge, and Sun Location.



Allowable Source Opacity 20%

hourly ave 15.6%

Department of Natural Resources

SM[illegible]E FORM
Form 4500-29 Rev. 6-85

Run # 3

Name of Company: Red Arrow	Date: 10-4-95
Location: wood dryer	FID Number:
City, State, Zip Code: Manitowoc, WI	Observer Certification Date: 4-11-95
Discharge Location:	Control Device: cyclone
Height of Discharge Above Ground: 200 ft	Steam Plume? (Yes) No Attached X 15-20 ft Detached

	Initial		Final
Time of Observation	12:15:00		1:14:45
Observer Location			
Distance to Discharge	300 ft		300 ft.
Direction from Discharge	SE		SE
Height of Observation Point in Relation to Discharge	200 ft		200 ft.
Plume Description (Color, Length, etc.)	white 40 ft		white 40 ft.
Plume Background Description	Blue Sky		Blue Sky
Weather Conditions			
Wind Direction	NW		NW
Wind Speed	0-5 mph		0-5 mph
Ambient Temperature	60°F		63°F
Sky Conditions (clear, overcast, % clouds, etc.)	Blue Sky Clear		

Describe Point in Plume at Which Opacity was Determined

~~Steam plume extends 15-20 ft past stack exit.~~

Remarks:

Readings taken at this point.

SEC MIN	0	15	30	45	SEC MIN	0	15	30	45
0	15	15	15	20	30	15	15	20	15
1	20	20	20	20	31	15	20	20	20
2	20	20	15	20	32	20	20	20	20
3	20	20	20	15	33	20	20	20	25
4	20	20	20	20	34	25	25	30	20
5	15	15	15	20	35	20	20	20	20
6	20	20	15	20	36	30	30	20	20
7	20	15	15	15	37	20	20	25	20
8	20	20	15	20	38	15	15	15	20
9	20	15	20	15	39	20	20	20	20
10	25	20	20	15	40	15	15	15	15
11	15	15	20	15	41	15	10	10	10
12	20	20	20	20	42	15	15	15	15
13	15	25	20	15	43	15	20	20	20
14	20	15	20	20	44	20	20	20	20
15	20	20	20	20	45	25	25	30	20
16	15	15	20	15	46	20	20	20	20
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18	25	20	20	20	48	15	15	15	15
19	20	20	25	15	49	20	20	20	15
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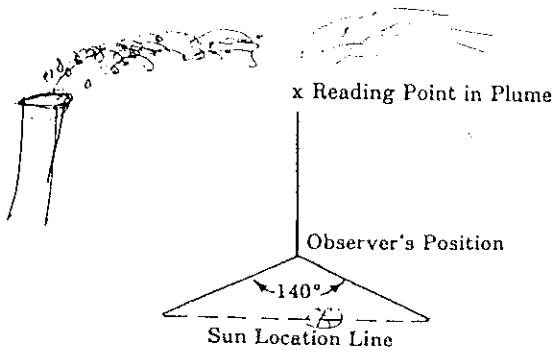
23	15	15	15	20	53	10	15	10	15
24	20	20	20	15	54	15	20	20	20
25	15	20	20	20	55	15	15	15	15
26	15	20	15	15	56	15	15	15	20
27	15	15	15	20	57	15	15	20	20
28	20	20	20	20	58	20	15	20	20
29	20	20	15	20	59	20	20	15	20

Summary of Average Opacity
(From Computer Program)

Set Number	Time Start — End	Opacity Sum	Opacity Average
1	32-37	535	22.3
2	42-47	475	19.8
3	14-19	470	19.6
4	1-6	450	18.8

Signature of Observer: Jeff Tenneighin	Name of Observer (Please print): Jeff Tenneighin

Sketch of Observer, Discharge, and Sun Location.



Allowable Source Opacity 20%

hourly ave 18.1%

Department of Natural Resources

SMOKE FORM
Form 4500-29 Rev. 6-85

Run #24

Name of Company: Red Arrow	Date: 10-4-95
Location: wood dryer	FID Number:
City, State, Zip Code: Manitowoc, WI	Observer Certification Date: 4-11-95
Discharge Location:	Control Device: cyclone
Height of Discharge Above Ground: 200 ft	Steam Plume? Attached x 10 ft (Yes) Detached No

	Initial		Final
Time of Observation	1:38:00		
Observer Location			
Distance to Discharge	300 ft.		200 ft.
Direction from Discharge	SE		E
Height of Observation Point in Relation to Discharge	200 ft.		200 ft.
Plume Description (Color, Length, etc.)	Blue Sky white Clouds white 30 ft.		white 30 ft.
Plume Background Description			Blue Sky white Clouds
Weather Conditions			
Wind Direction	W-SW		
Wind Speed	5-10 mph.		
Ambient Temperature	64°F		1:54 stop
Sky Conditions (clear, overcast, % clouds, etc.)	50/50 Clouds Blue Sky		

Describe Point in Plume at Which Opacity was Determined

Small steam plume exiting stack. Reading taken as steam dissipates.

Remarks:

winds shifted. Coming out of the south, east

Minute 20 - plant plugged - shutdown

SEC MIN	0	15	30	45	SEC MIN	0	15	30	45
0	20	15	15	15	30				
1	20	20	20	20	31				
2	15	15	15	15	32				
3	15	20	15	15	33				
4	20	20	20	20	34				
5	10	15	20	20	35				
6	15	15	15	15	36				
7	15	15	10	15	37				
8	20	25	20	20	38				
9	20	20	15	15	39				
10	15	15	15	15	40				
11	15	15	15	15	41			–	
12	15	15	15	15	42				
13	10	15	15	15	43				
14	15	10	15	10	44				
15	10	10	10	10	45				
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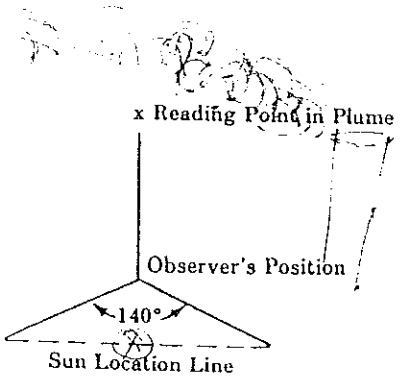
17	10	10	5	10	47				
18	5	10	5	5	48				
19	5	5	5	5	49				
20	5	5	5	5	50				
21					51				
22					52				
23					53				
24					54				
25					55				
26					56				
27					57				
28					58				
29					59				

Summary of Average Opacity
(From Computer Program)

Set Number	Time Start – End	Opacity Sum	Opacity Average
1	0-5	415	17.3
2	6-11	390	16.3
3	12-17	280	11.7

Signature of Observer: [signature]	Name of Observer (Please print): Jeff Jennerjohn

Sketch of Observer, Discharge, and Sun Location.



Allowable Source Opacity 20%