



Center for Transportation Research and Education

**Maintenance Decision Support
System Stakeholders' Meeting**

June 17-18, 2003

Des Moines, IA

IOWA STATE
UNIVERSITY





Data Collection Process

- Paper Forms
- Driver Training
- Manual Collection
- Manual Completion
- Drivers & Supervisors



Data Collection

- Important to obtain timely info
- Quality of data collected generally good
- Both Operators and Supervisors provided need information.

Data Collected

- Date, Start & End Time of Event
- Road Condition-Before/After Treatment
- Amount of material applied
- Weather Conditions
- Traffic Conditions
- By driver

Ames Log

MDSS Supplemental Daily Log: AMES GARAGE

Driver Name:		Truck ID:	
Shift Start Date:		Shift Start Time: (24 Hr.)	
Shift End Date:		Shift End Time: (24 Hr.)	
Comments:			

Segment ID	Route	Start MP	End MP
1A	U.S. 65	98.38	112.09
1B	U.S. 30	164.93	172.30
2	U.S. 65	112.09	132.59
3	I-35	111.60	128.46
4	I-35	96.60	111.60
5	U.S. 30	142.88	164.93
6	IA 210	13.79	34.43

Directions: Use 1 Column per Run. Use a New Column if one of the following applies:

- 1). you are starting a new segment
- 2). you make a significant change on the same segment (such as a change of application rate)
- 3). you begin a second treatment on the same segment

Mark up the map on the reverse side with any additional details that makes the report of your treatment more complete.

	Run 1						Run 2						Run 3						Run 4									
Segment ID Covered (circle one)	1A	1B	2	3	4	5	6	1A	1B	2	3	4	5	6	1A	1B	2	3	4	5	6	1A	1B	2	3	4	5	6
Run Start Time (24 Hr.)																												
Run End Time (24 Hr.)																												
Did You Plow?	YES NO		YES NO		YES NO		YES NO		YES NO		YES NO		YES NO		YES NO		YES NO		YES NO		YES NO		YES NO		YES NO			
Lane Materials Applied On	Driving Passing		Driving Passing		Driving Passing		Driving Passing		Driving Passing		Driving Passing		Driving Passing		Driving Passing		Driving Passing		Driving Passing		Driving Passing		Driving Passing		Driving Passing			
Pre-Storm Chemical Application Note amount	YES NO		YES NO		YES NO		YES NO		YES NO		YES NO		YES NO		YES NO		YES NO		YES NO		YES NO		YES NO		YES NO			
During Storm Chemicals applied? (Circle type)	NONE		NONE		NONE		NONE		NONE		NONE		NONE		NONE		NONE		NONE		NONE		NONE		NONE			
Note amount	Salt Calcium Iceban Iceslicer brine		Salt Calcium Iceban Iceslicer brine		Salt Calcium Iceban Iceslicer brine		Salt Calcium Iceban Iceslicer brine		Salt Calcium Iceban Iceslicer brine		Salt Calcium Iceban Iceslicer brine		Salt Calcium Iceban Iceslicer brine		Salt Calcium Iceban Iceslicer brine		Salt Calcium Iceban Iceslicer brine		Salt Calcium Iceban Iceslicer brine		Salt Calcium Iceban Iceslicer brine		Salt Calcium Iceban Iceslicer brine		Salt Calcium Iceban Iceslicer brine			
Abrasives applied? (amount)	_____lb/lane-mile						_____lb/lane-mile						_____lb/lane-mile						_____lb/lane-mile									
Road condition before treatment (Circle all that apply)	dry wet slushy icy		dry wet slushy icy		dry wet slushy icy		dry wet slushy icy		dry wet slushy icy		dry wet slushy icy		dry wet slushy icy		dry wet slushy icy		dry wet slushy icy		dry wet slushy icy		dry wet slushy icy		dry wet slushy icy		dry wet slushy icy			
How effective was this treatment? (Circle # that applies 1=worst, 4=best)	1 2 3 4		1 2 3 4		1 2 3 4		1 2 3 4		1 2 3 4		1 2 3 4		1 2 3 4		1 2 3 4		1 2 3 4		1 2 3 4		1 2 3 4		1 2 3 4		1 2 3 4			
Estimate Traffic Volume (circle one)	low normal high		low normal high		low normal high		low normal high		low normal high		low normal high		low normal high		low normal high		low normal high		low normal high		low normal high		low normal high		low normal high			
Traffic speed (circle one) (approx. mph)	Stopped slow normal		Stopped slow normal		Stopped slow normal		Stopped slow normal		Stopped slow normal		Stopped slow normal		Stopped slow normal		Stopped slow normal		Stopped slow normal		Stopped slow normal		Stopped slow normal		Stopped slow normal		Stopped slow normal			
Run Specific Comments																												

Des Moines North Log

MDSS Supplemental Daily Log: DES MOINES NORTH GARAGE

Driver Name:	Truck ID:
Shift Start Date:	Shift Start Time: (AM/PM)
Shift End Date:	Shift End Time: (AM/PM)
Comments:	

Segment ID	Route	Start MP	End MP
1	I-35	93.20	96.60
2	I-35	86.94	93.20
3	I-80	137.82	142.10
4	I-35/I-80	131.50	137.82
5	I-235	8.80	14.26
6	IA 415	0.00	21.93

Directions: Use 1 Column per Treatment. Use a New Column if one of the following applies:

- 1). you are starting a new segment
- 2). you make a significant change on the same segment (such as a change of application rate)
- 3). you begin a second treatment on the same segment

Mark up the map on the reverse side with any additional details that makes the report of your treatment more complete.

	Treatment 1						Treatment 2						Treatment 3						Treatment 4					
	1	2	3	4	5	6	1	2	3	4	5	6	1	2	3	4	5	6	1	2	3	4	5	6
Segment ID Covered (circle one)																								
Treatment Start Time	AM/PM						AM/PM						AM/PM						AM/PM					
Treatment End Time	AM/PM						AM/PM						AM/PM						AM/PM					
Did You Plow?	YES		NO				YES		NO				YES		NO				YES		NO			
Lane Materials Applied On	Driving Center Passing						Driving Center Passing						Driving Center Passing						Driving Center Passing					
Pre-Storm Chemical Application	YES		NO				YES		NO				YES		NO				YES		NO			
Note amount	Brine _____gal/lane-mile						Brine _____gal/lane-mile						Brine _____gal/lane-mile						Brine _____gal/lane-mile					
During Storm Chemicals applied? (Circle type)	NONE		Salt		Brine		NONE		Salt		Brine		NONE		Salt		Brine		NONE		Salt		Brine	
Note amount	_____gal or lb/lane-mile						_____gal or lb/lane-mile						_____gal or lb/lane-mile						_____gal or lb/lane-mile					
Abrasives applied? (amount)	_____lb/lane-mile						_____lb/lane-mile						_____lb/lane-mile						_____lb/lane-mile					
Road condition before treatment (Circle all that apply)	dry		wet		slushy icy		dry		wet		slushy icy		dry		wet		slushy icy		dry		wet		slushy icy	
	snow-packed		road frost		drifting snow		snow-packed		road frost		drifting snow		snow-packed		road frost		drifting snow		snow-packed		road frost		drifting snow	
Road condition after treatment (Circle all that apply)	dry		wet		slushy icy		dry		wet		slushy icy		dry		wet		slushy icy		dry		wet		slushy icy	
	snow-packed		drifted snow		unknown		snow-packed		drifted snow		unknown		snow-packed		drifted snow		unknown		snow-packed		drifted snow		unknown	
Estimate Traffic Volume (circle one)	low		normal		high		low		normal		high		low		normal		high		low		normal		high	
Traffic speed (circle one)	stopped		slow		normal		stopped		slow		normal		stopped		slow		normal		stopped		slow		normal	
Treatment Specific Comments																								

Des Moines North Map



Des Moines West Log

MDSS Supplemental Daily Log: DES MOINES WEST GARAGE

Driver Name:		Truck ID:	
Shift Start Date:		Shift Start Time: (AM/PM)	
Shift End Date:		Shift End Time: (AM/PM)	
Comments:			

Segment ID	Route	Start MP	End MP
1	I-35/I-80	123.53	131.50
2	I-35	67.89	72.70
3	I-235	0.00	8.80

Directions: Use 1 Column per Treatment. Use a New Column if one of the following applies:

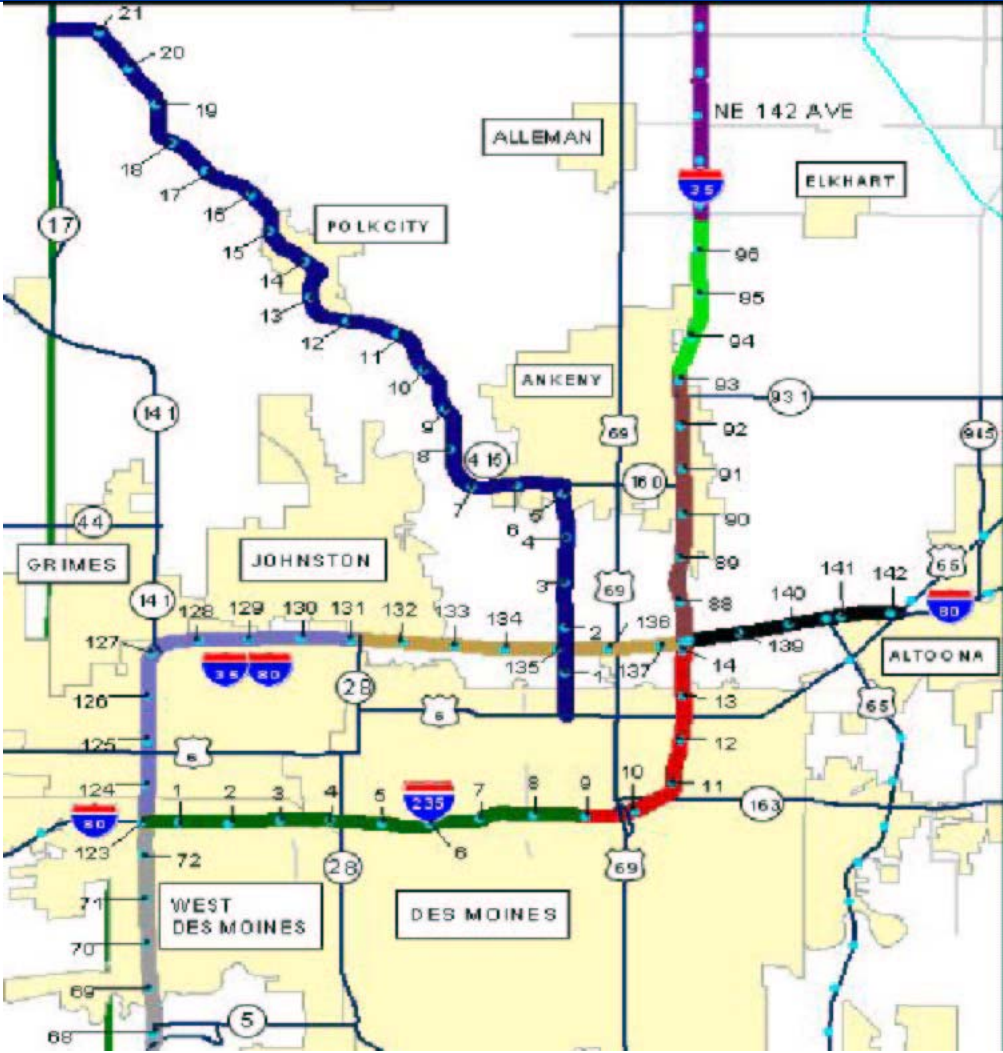
- 1). you are starting a new segment
- 2). you make a significant change on the same segment (such as a change of application rate)
- 3). you begin a second treatment on the same segment

Mark up the map on the reverse side with any additional details that makes the report of your treatment more complete.

Segment ID Covered (circle one)	Treatment 1			Treatment 2			Treatment 3			Treatment 4		
	1	2	3	1	2	3	1	2	3	1	2	3
Treatment Start Time	AM/PM			AM/PM			AM/PM			AM/PM		
Treatment End Time	AM/PM			AM/PM			AM/PM			AM/PM		
Did You Plow?	YES	NO		YES	NO		YES	NO		YES	NO	
Lane Materials Applied On	Driving Center Passing			Driving Cennter Passing			Driving Center Passing			Driving Center Passing		
Pre-Storm Chemical Application Note amount	YES NO Brine ____gal/lane-mile			YES NO Brine ____gal/lane-mile			YES NO Brine ____gal/lane-mile			YES NO Brine ____gal/lane-mile		
During Storm Chemicals applied? (Circle type) Note amount	NONE Salt Brine ____gal or lb/lane-mile			NONE Salt Brine ____gal or lb/lane-mile			NONE Salt Brine ____gal or lb/lane-mile			NONE Salt Brine ____gal or lb/lane-mile		
Abrasives applied? (amount)	____lb/lane-mile			____lb/lane-mile			____lb/lane-mile			____lb/lane-mile		
Road condition before treatment (Circle all that apply)	dry wet slushy icy snow-packed road frost drifting snow			dry wet slushy icy snow-packed road frost drifting snow			dry wet slushy icy snow-packed road frost drifting snow			dry wet slushy icy snow-packed road frost drifting snow		
Road condition after treatment (Circle all that apply)	dry wet slushy icy snow-packed drifted snow unknown			dry wet slushy icy snow-packed drifted snow unknown			dry wet slushy icy snow-packed drifted snow unknown			dry wet slushy icy snow-packed drifted snow unknown		
Estimate Traffic Volume (circle one)	low normal high			low normal high			low normal high			low normal high		
Traffic speed (circle one)	stopped slow normal			stopped slow normal			stopped slow normal			stopped slow normal		
Treatment Specific Comments												



Des Moines West Map



Database

ID	Driver Name	Date	Truck ID	Shift Start	Shift End	Run Num	Segment	Run Start	Run End	Did You I	Lane Mat	Pre Stom	Amount o	During St	Type	Amount (l	Abrasives	Road Cor	
268	Dan judge	4/8/2003	30457	0:01	11:45	1		1:30	2:15	TRUE	passing	FALSE		FALSE				snow-pack	
269	Dan Judge	4/8/2003	30457	0:01	11:45	2		4:30	5:15	TRUE	passing	FALSE		FALSE				snow-pack	
270	Dan Judge	4/8/2003	30457	0:01	11:45	3		8:20	9:30	FALSE	driving	FALSE		FALSE	salt		slushy		
271	Jeff R	4/8/2003	28488	0:01	11:30	1	2	0:01		TRUE	driving	TRUE	50	FALSE	salt		300	snow-pack	
272	Jeff R	4/8/2003	28488	0:01	11:30	2				TRUE	driving	TRUE	50	FALSE	salt		300	snow-pack	
273	Jeff R	4/8/2003	28488	0:01	11:30	3			11:30	TRUE	driving	TRUE	50	FALSE	salt		300	slushy	
274	Newton	4/8/2003	29007	0:01	13:00	1	1A	1:00	3:00	TRUE	driving	TRUE		FALSE	salt	400		dry, wet, icy	
275	Newton	4/8/2003	29007	0:01	13:00	2	1B	3:10	4:10	TRUE	driving	FALSE		FALSE	salt		400	dry, wet, sr	
276	Newton	4/8/2003	29007	0:01	13:00	3	1A	4:10	5:00	TRUE	driving	FALSE		FALSE	salt	400		dry, wet, sr	
277	Mike William	4/8/2003	30113	8:30	10:00	1	2	8:30	10:00	TRUE	driving	FALSE		FALSE	salt		400	dry, snow-p	
278	Darrell	4/7/2003	28474	5:15	17:00	1	1B			TRUE	driving	FALSE		FALSE	salt		300	slushy, drif	
279	Darrell	4/7/2003	28474	5:15	17:00	2	5			TRUE	driving	FALSE		FALSE	salt		300	slushy, drif	
280	Randy Reii	4/7/2003	28437	5:30	19:15	1	3	5:45	7:45	TRUE	passing	FALSE		FALSE	salt	200		snow-pack	
281	Randy Reii	4/7/2003	28437	5:30	19:15	2	3	8:15	9:45	TRUE	passing	FALSE		FALSE	salt			slushy, drif	
282	Randy Reii	4/7/2003	28437	5:30	19:15	3	3	10:00	11:00	TRUE	driving, pas	FALSE		FALSE	salt			slushy, drif	
283	Randy Reii	4/7/2003	28437	5:30	19:15	4	5	16:30	18:30	FALSE	driving	FALSE		FALSE	salt			wet	
284	Kimsey Am	4/7/2003	28470	5:00	16:00	1	6	11:30	12:30	TRUE	driving	FALSE		FALSE	salt			wet	
285	Kimsey Am	4/7/2003	28470	5:00	16:00	1	6	5:15	7:30	TRUE	driving	FALSE		FALSE	salt, brine	200		snow-pack	
286	Kimsey Am	4/7/2003	28470	5:00	16:00	2	6	7:30	9:00	TRUE	driving	FALSE		FALSE	salt	200		snow-pack	
287	Walker, Mil	4/7/2003	30457	0:01	13:00	1	5	1:30	4:00	TRUE	passing	FALSE		FALSE	iceban	10	300	drifting snc	
288	Walker, Mil	4/7/2003	30457	0:01	13:00	2	5	4:00	6:00	TRUE	passing	FALSE		FALSE	salt			snow-pack	
289	Walker, Mil	4/7/2003	30457	0:01	13:00	3	1B	6:00	8:00	TRUE	driving	FALSE		FALSE	salt, icebar	11	400	snow-pack	
290	Walker, Mil	4/7/2003	30457	0:01	13:00	4	1A	8:00	13:00	TRUE	driving	FALSE		FALSE	salt, icebar	11	400	snow-pack	
291	Dan Judge	4/7/2003	27179	19:00	8:30	1	4	19:30	20:20	FALSE	passing	FALSE		FALSE	salt 1/2 & 1/2		300	wet	
292	Dan Judge	4/7/2003	27179	19:00	8:30	2	4	22:00	23:30	TRUE	passing	FALSE		FALSE	salt		300	icy, snow-p	
293	Dan Judge	4/7/2003	27179	19:00	8:30	3	4	3:00	4:10	TRUE	passing	FALSE		FALSE	salt			slushy	
294	Jeff R	4/6/2003	28488	19:00	8:30	1		19:00	21:00	TRUE	driving	TRUE		FALSE	salt	300		300	wet
295	Jeff R	4/6/2003	28488	19:00	8:30	2		21:00	23:59	TRUE	driving	TRUE		FALSE	salt			300	slushy
296	Jeff R	4/6/2003	28488	19:00	8:30	3		0:01	3:00	TRUE	driving	TRUE		FALSE	salt			300	snow-pack
297	Jeff R	4/6/2003	28488	19:00	8:30	4		3:00	8:30	TRUE	driving	TRUE		FALSE	salt			300	snow-pack
298	Darrell	4/6/2003	28474	13:00	19:30	1	4			FALSE	driving	FALSE		FALSE	salt	300		300	dry, wet
299	Randy Reii	4/4/2003	28	7:30	18:30	1	1B 5	10:00	11:00	FALSE	driving	FALSE		FALSE	salt, brine, sand			900	wet
300	Randy Reii	4/4/2003	28	7:30	18:30	2		13:30	14:30	FALSE	driving	TRUE		FALSE	salt, brine, sand			400	wet, slushy
301	Bill Golden	4/4/2003	28058	7:30	17:45	1	5	13:00	15:30	TRUE	driving	TRUE		FALSE	salt			250	wet, slushy
302	Jeff R	4/4/2003	28488	7:30	17:45	1	2	10:00	11:45	FALSE	driving	TRUE	50	FALSE	salt			300	wet
303	Jeff R	4/4/2003	28488	7:30	17:45	2	4	1:30	2:30	FALSE	driving	FALSE	50	FALSE	brine				wet, slushy
304	Jeff R	4/4/2003	28488	7:30	17:45	3	4	2:30	4:00	FALSE	driving	TRUE	50	FALSE	salt	300		300	wet, slushy
305	VanCanno	4/4/2003	28082	7:30	17:45	1	1A	14:00		FALSE	driving	FALSE		FALSE	salt			2	slushy
306	Newton	4/7/2003	29007	0:01	8:30	1	1B	0:01	2:30	TRUE	driving	FALSE		FALSE	salt			200	wet, slushy
307	Newton	4/7/2003	29007	0:01	8:30	2	5	2:30	8:00	TRUE	driving	TRUE		FALSE	salt			200	wet, slushy
308	Newton	4/6/2003	29007	19:00	23:59	1	1B	19:00	23:59	FALSE	driving	FALSE		FALSE	salt				wet
309	Adams	3/8/2003	28474	10:15	19:30	1		10:45	14:45	TRUE	driving	FALSE		FALSE	salt, brine			500	dry, wet, sh
310	Adams	3/8/2003	28474	10:15	19:30	2		14:45	19:45	TRUE	driving	FALSE		FALSE	salt, brine			500	dry, wet, sh
311	Sean	3/8/2003	27627	10:00	19:30	1	2	12:00	7:00	TRUE	driving	FALSE		FALSE	salt				drifting snc
312	Sean	3/8/2003	27627	10:00	19:30	2	1A	10:00	12:00	TRUE	driving	FALSE		FALSE	salt				
313	Bill Golden	3/8/2003	28058	10:45	19:15	1	6	11:10	12:15	TRUE	driving	FALSE		FALSE	salt				dry, icy, drif
314	Bill Golden	3/8/2003	28058	10:45	19:15	2	6	12:15	1:55	TRUE	driving	FALSE		FALSE	salt			500	wet, icy, dri
315	Bill Golden	3/8/2003	28058	10:45	19:15	3	6	2:00	4:00	TRUE	driving	FALSE		FALSE	salt			50	dry, icy, dri
316	Bill Golden	3/8/2003	28058	10:45	19:15	4	6	5:00	6:30	TRUE	driving	FALSE		FALSE	salt				icy

Additional Data

CCNAME	EVENT	NORMAL	OF A	ROADS	C	ROADS	D	ROADS	FROST	F	FROST	F	SALT	US	BRINE	US	SAND	US	LIQ	CAL	CALC	FL	TRACE	(S	SNOW	A	COMMEN
AMES	1/15/2003	0							2	2												0				20:30 Temp	
AMES	1/16/2003	0							2	2			92.6		2578							0				00:01 3 out	
AMES	1/17/2003	-1							2	2																	
AMES	1/18/2003	0		4:00		6:00		7:30	2	2												0				light snow	
AMES	1/19/2003	-1							2	2																	
AMES	1/20/2003	-1							2	2																	
AMES	1/21/2003	-1							2	2																	
AMES	1/22/2003	0							2	2												0				6:00 very li	
AMES	1/23/2003	0							2	2																	
AMES	1/24/2003	0							2	2																light flurrie	
AMES	1/25/2003	0							2	2			56		950						1		0			15:00 light	
AMES	1/26/2003	0							2	2			1													5:00 one tr	
AMES	1/27/2003	0							2	2			60		1000						1					3:00 light s	
AMES	1/28/2003	0							2	2			121.5		14715						0.5					3:00 3 in to	
AMES	1/29/2003	0							2	2																6:00 12*wi	
AMES	1/30/2003	0							2	2			20		25594											21:00 Rain	
AMES	1/31/2003	0							2	2			63		1640											0.3 2:00 small	
AMES	2/1/2003	-1							2	2																	
AMES	2/2/2003	-1							2	2																	
AMES	2/3/2003	0							2	2			175		21790							3				04:30 very	
AMES	2/4/2003	0							2	2			162		7000							0				00:01 6 tru	
AMES	2/5/2003	-1							2	2			20		500												
AMES	2/6/2003	-1							2	2																	
AMES	2/7/2003	-1							2	2																	
AMES	2/8/2003	0		10:00		11:00		11:00	2	2			42		2850											0.3 7:00 Light	
AMES	2/9/2003	-1							2	2																9:30 temp	
AMES	2/10/2003	-1							2	2																chance of s	
AMES	2/11/2003	-1							2	2												0				00:01 temp	
AMES	2/12/2003	-1							1	2																	
AMES	2/13/2003	-1							2	2																9:00 startin	
AMES	2/14/2003	0							2	2			130		7165							3				10:00 temp	
AMES	2/15/2003	0							2	2			143		4735							0		6		00:01 7 tru	
AMES	2/16/2003	0							1	2			63		1860											00:30 11*2	
AMES	2/17/2003	-1							1	2																	
AMES	2/18/2003	-1							2	2																	
AMES	2/19/2003	-1							2	2																	
DES MOIN	1/15/2003	0							2	2			1		7300												11 ton of s
DES MOIN	1/16/2003	0		15:00		12:00		12:00	2	2			199		16495												6 tons salt
DES MOIN	1/17/2003	-1							2	2																	4 tons of
DES MOIN	1/18/2003	0		10:00		8:00		8:00	2	2			78														1A dry blv
DES MOIN	1/19/2003	-1							2	2																	
DES MOIN	1/20/2003	-1							2	2																	
DES MOIN	1/21/2003	-1							2	2																	
DES MOIN	1/22/2003	0							2	2																	A light flurr
DES MOIN	1/23/2003	-1							2	2																	
DES MOIN	1/24/2003	0							1	2																	
DES MOIN	1/25/2003	0							2	2			124		9725							0					Event sta
DES MOIN	1/26/2003	0							2	2			47														Light flurry
DES MOIN	1/27/2003	0		11:00		9:00		9:00	2	2			126		19800							3		0.5		0.3	Light flurr
DES MOIN	1/28/2003	0							2	2			230		20000							2		0.5			Used 15 to
DES MOIN	1/29/2003	0							2	2			9														3 tons of 5t
DES MOIN	1/30/2003	-1							2	2			9		21200												We pretre
DES MOIN	1/31/2003	0							2	2			36		2650												Very light p
DES MOIN	2/1/2003	-1							2	2																	
DES MOIN	2/2/2003	-1							2	2																	
DES MOIN	2/3/2003	0							2	2			270		11525												Used 6 ton
DES MOIN	2/4/2003	0							2	2			275		15652												Due to fre
DES MOIN	2/5/2003	0							2	2			11														Used 10 to
DES MOIN	2/6/2003	-1							2	2			10														Used 4 ton
DES MOIN	2/7/2003	-1							2	2			4														Used 4 ton
DES MOIN	2/8/2003	0							2	2			16.5		775												0.1 Just enoug
DES MOIN	2/9/2003	0							2	2																	Small amot
DES MOIN	2/10/2003	0							2	2			12		12620												A very light
DES MOIN	2/11/2003	0							2	2																	A very fast
DES MOIN	2/12/2003	-1							2	2			3														3 tons of
DES MOIN	2/13/2003	0							1	2			8		22150												
DES MOIN	2/14/2003	0							2	2			174		11300												
DES MOIN	2/15/2003	0							2	2			312		5000												Snow came
DES MOIN	2/16/2003	0							2	2			340		8900												A lot of ice
DES MOIN	2/17/2003	0							1	1			29														tons salt
DES MOIN	2/18																										

Data Collection Issues

- Operator training critical
 - Confusion at first to complete forms
 - Des Moines garages used radio and supervisors to complete entries
 - Ames garage operators completed
 - Accuracy and timeliness of information required for good model



Issues

- Manual collection
- Time delay retrieving information
 - Had to confirm some entries
 - Entries had to be re-entered to transmit
- Added pressure on operators during already stressful situation to complete forms
- Added issues for supervisors to complete forms
- Road condition based on observation

Challenges

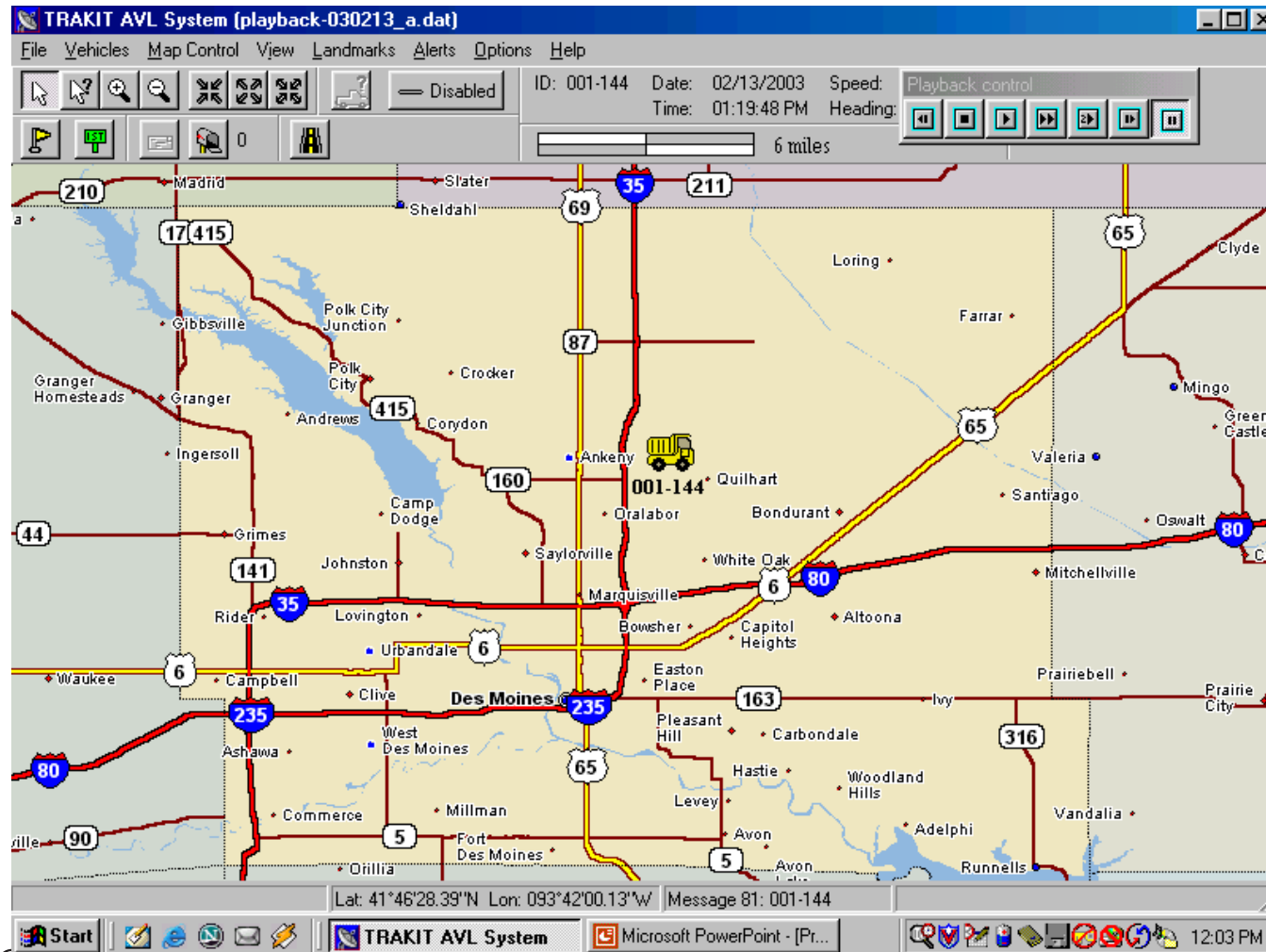
- Need for automatic data collection
 - Accuracy
 - Timeliness
 - Keep drivers on task
 - Less disruption for supervisors
 - Supervisors have stated “No more paper!”
 - KISS principle applies

Concept Vehicle Data

Daily Work Sheet - Snow Removal, Ice Control & Equipment

Equipment	Equipment usage time	Equipment usage distance (miles)								
			Date: 2/18/2003							
Plow	0:00:00	0								
Left Wing	0:00:00	0	Truck ID: 30144							
Right Wing	0:00:00	0								
Scraper	0:00:00	0	Console ID: DCS710C							
No equipment data collected in this pass			Operator ID:							
Start Time	Stop Time	Hours Master On	Average Speed (mph)	Spreading Distance (mi)	Sand (tons)	Salt (tons)	Prod1 (tons)	Prod2 (tons)	Prewet (gal)	Anti ice (gal)
10:32:13	12:03:32	1:31:19	31.21	47.50	0.00	8.00	0.00	0.00	0.00	19182.00
TOTALS		1:31:19	31.21	47.50	0.00	8.00	0.00	0.00	0.00	19182.00

Map Data from Concept Vehicle



Field Data



Field Data

