

# **Pollution Prevention Grant**

## **Final Report CFMS#A72150**

### **Road Salt Education and Training for those Maintaining Parking Lots and Sidewalks**

March, 2006

Connie Fortin, Carolyn Dindorf  
Fortin Consulting Inc  
215 Hamel Road, Hamel, MN 55340  
[fci@fortinconsulting.com](mailto:fci@fortinconsulting.com)  
763-478-3606



**Pollution Prevention Grant  
Final Report CFMS#A72150**

Road Salt Education and Training for those Maintaining Parking Lots and Sidewalks

TASK 6

March, 2006

Connie Fortin, Carolyn Dindorf  
Fortin Consulting Inc  
215 Hamel Road, Hamel, MN 55340  
763-478-3606 connie@fortinconsulting.com

This project has been completed. We have accomplished all of our tasks and additional tasks not required by the agreement. This report includes an update on our interim deliverables since our last report and a summary of the entire project. We feel the project has been a remarkable success. Thank you for this opportunity.

EXPENSE/BUDGET REPORT

**Road Salt P2 Grant**

**Report of Expenditures**

Final Report 1: July 1, 2004 to March 2006

*Prepared by Fortin Consulting, Inc.*

<b>Category</b>	<b>Task</b>	<b>Budget</b>	<b>Previous Expenditures</b>	<b>Expenditures this period</b>	<b>Expenditures to date</b>	<b>Remaining Funds</b>
Task 1	Finalize work plan	\$ 750.00	\$ 750.00	\$ -	\$ 750.00	\$ 0
Task 2	Background Research	\$ 4,750.00	\$ 4759.10	-	\$ 4,759.10	\$ 0
Task 3	Develop Training and Materials	\$ 7,500.00	\$ 2488.00	\$ 5,012.00	\$ 7,500.00	\$ 0
Task 4	Coordinate and Conduct Training	\$ 6,000.00	\$ 1125.00	\$ 4,875.00	\$ 6,000.00	\$ 0
Task 5	Analysis	\$ 3,000.00	\$ -	\$ 3,000.00	\$ 3,000.00	\$ 0
Task 6	Reporting & Evaluation	\$ 3,000.00	\$ 735.00	\$ 2,255.90	\$ 3,000.00	\$ 0
<b>Total</b>		\$25,000.00	\$ 9857.10	\$ 15,142.90	\$ 25,000.00	\$ 0

## INTERIM DELIVERABLES

- Background Research Summary. The Background Research report summarizes our winter 2004-2005 observations and interviews with parking lot maintainers and property owners and managers. This summary was e-mailed to MPCA on June 16<sup>th</sup>, 2005.
- Background Research Details. These details included the names, dates, and comments of those who were observed and interviewed. This report was e-mailed to MPCA June 16<sup>th</sup>, 2005.
- Training Sessions Scheduled and training sessions have taken place: October 10<sup>th</sup>, 2005 for the City of Minnetonka, October 14<sup>th</sup>, 2005 for the Ramsey Washington Watershed District, and November 15<sup>th</sup>, 2005 for the Capitol Region Watershed District. Additional classes were held in October, 2005 at the Fall Maintenance Expo for municipal maintenance workers, one in December 2005 for MPCA staff and one future class (not required by this grant) is scheduled to be held at the 5<sup>th</sup> annual Road Salt Symposium on April 5<sup>th</sup>, 2006.

## WORK PLAN PROGRESS INDICATORS AND DEVIATIONS

### Indicators

Eleven of the 12 progress indicators have been met. Step 12 is the approval of the final report by MPCA and the closing out of the grant agreement. 1) the grant agreement was executed. 2) training materials were reviewed by the project team, which included MnDOT representatives and a private company representative. 3) Evaluation forms were developed for use in the course. Information from these forms were used in this report. 4) Background literature and internet research and observations were conducted and used to develop the training materials. 5) Three pilot training sessions were scheduled in the metro area. 6) We continually evaluated the program as we conducted the training and collected the evaluations and comments. 7) All three training sessions were completed as required and two additional sessions 8) Load reduction analysis was completed and is included in this report. 9) One interim report was submitted and this final report. 10) This final report is being submitted. 11) Access to the final report and deliverables will be arranged with MPCA staff.

### Deviation

Several things have developed from this project. Many of these activities are not outlined or paid for in the grant. But they have happened because of the work accomplished through this P2 project.

- Snow and Ice Manager Magazine would like an article about how to reduce environmental impacts.
- SIMA (Snow and Ice Management Association has invited us to speak at their annual symposium in Connecticut this summer. See program [www.sima.org](http://www.sima.org)

- A condensed version of our trial training session was offered to maintenance workers across the state at the Fall Maintenance Expo in St. Cloud on April 5<sup>th</sup>, 2005. See newspaper article.
- A parking lot training session will be held at the 5<sup>th</sup> annual road salt symposium April 5<sup>th</sup>, 2006.
- A 319 grant application was submitted to take the training developed under this grant and improve it to bring it out across the state during the 2006-2008 time frame. That has been approved and will start in 2006.
- We have acquired additional funds to write a manual that can be distributed with the future parking lot training sessions.
- We are interested in starting an education campaign for citizens on use of de-icers. With this we hope to increase their knowledge and understanding of road maintenance and how their expectations for perfect roads come with a steep environmental price. We must all work together on this issue.

### HIGHLIGHTS

- We have made significant reductions in salt application in those that attended training. The potential for reductions in others during future training sessions is enormous.
- We learned a tremendous amount from our winter research which included literature search, interviews and observations. The environmental impacts are real, but there are many existing ways to reduce impacts.
- We found and scheduled three test training sites.
- We were very excited to be working with our training hosts.
- MnDOT and CTAP were excited to help teach the trial training sessions.
- We have developed a good PowerPoint training tool (see enclosed CD).
- We went out to a MnDOT facility and photographed various application rates as applied to their large parking lot. MnDOT made this experiment possible by being willing to outfit a truck in the summer with the winter equipment, calibrate it for our test purposes, run the various test patterns we were looking for, and use their staff to run the snowplow and the sweeper.
- We have proven to ourselves that education is needed for private operators, education is appreciated and change is possible.

### LESSONS LEARNED TO DATE

#### **Final Evaluation of the Pilot Program**

##### **Class attendance**

- Class 1 – City of Minnetonka – 20
- Class 2 – Ramsey Washington Watershed District - 6
- Class 3 – Capitol Region Watershed District - 21
- Class 4 – Maintenance Expo – 110
- Class 5 – MPCA – approx. 15
- Class 6 – Road Salt Symposium - Limited to 60

**Social Marketing** – It was required for all those testing for certification to sign this pledge “I pledge to incorporate the Best Management Practices I have learned about today into my very important work of winter parking lot and sidewalk maintenance. I will look for ways to reduce the environmental impacts of winter maintenance in order to protect Minnesota’s Lakes and Rivers”. This is one of the three requirements to be certified. The other requirements are to attend the training and to pass the test.

### **Evaluations from Training**

We handed out class evaluations in our three official training classes. The other classes we did had different evaluations that the host developed or had no evaluation component. The results of our evaluations are in appendix A. To summarize everyone said this class was useful to them. Everyone said they would recommend this class to their colleagues. They had a variety of suggestions and observations about training that are interesting. Curiously, some listed the class as easy, most as perfect but no one listed it as difficult. We can probably increase either the speed we cover the material or the amount of material for future training sessions. The evaluations are included in the appendix.

### **Suggestions for future expansion of this work**

- Create a manual for parking lot and sidewalk maintenance.
- Work with cities, counties or watersheds to require training to operate in their area. Especially in areas under chloride TMDLs.
- Start up a program for citizen education of de-icers similar to the phosphorus free fertilizer education program.
- Find a more permanent way to continue to offer this class beyond 2008 when the 319 grant expires.
- Look at holding training sessions at venues where private parking lot operators already attend, perhaps trade shows.

### **Analysis of the effectiveness/appropriateness of the training program and aids**

#### **Load reduction Analysis**

We had 3 training classes at which we did this load reduction worksheet during our training class (see appendix A). In the first class we had great results, the class was primarily private applicators, but we misplaced their worksheets. We have looked everywhere, we are still looking and we have tried with limited success to track down the attendees and recreate this information. In the second class we had very poor attendance due (we think) to a very nice weather late in the spring. Most of those who had confirmed attendance also do landscaping/turf maintenance in the growing season and were likely taking advantage of the weather for the late season clean up. For the third class we had a good turn out although some of the attendees were municipal, not private, perhaps skewing our rate reduction percentages on the lower end since they tend to be more educated on the subject. We were fortunate to have the maintenance staff from the University of Minnesota attend the class. They are already making changes in their program over a large campus area. Despite the unusual circumstances described above it is very clear to us from teaching the classes and talking to the attendees that huge rate

reductions are possible and likely. The amount of predicted reductions, the actual reductions and the behavior change potential are listed below.

**Source Reduction Potential** –The potential for reduction in the use of sand and salt is enormous. We asked applicators to fill out a worksheet stating how much salt they normally used on a one day event for a particular area. We then had them calculate how much they should use based on our application rate table. The estimated reduction in salt usage varied between 100% to 25% with most responses in the 90% range.

**Actual Reductions** - In our follow up survey, the achieved reduction rate ranged from 65% to 30% with the most common reduction of salt and sand use around 50%. These reductions were achieved within 2 months of training. In such a short period of time the applicators are still taking their first steps to learn and test the BMP's. One example of an actual reduction came from the Ridgedale parking lot in Minnetonka. Prior to training, they applied from 12-14 tons of salt per one day snow event. Immediately after training they reduced their salt use to 5-6 tons of salt per one day snow event. This reduced salt loading to Bassett Creek anywhere from 6 to 9 tons of salt per snow day. The contractor commented that they made a conservative adjustment and they felt there was plenty of room for future reductions but they wanted to do it one step at a time. Other actual reductions are listed in the appendix. Everyone who responded to our follow-up survey reported that they have lowered application rates since training.

**Behavior Change Potential** – The potential here is enormous. In the classroom survey only one person had been checking pavement temperatures, however everyone said in the future they might or they would check pavement temperatures. Pavement temperatures are a key step in understanding how much de-icer, and what type of de-icer to apply. Everyone in the follow-up group who responded to our survey said they implemented some of the BMP's taught during the training course. Interestingly some thought the BMP's were very difficult to implement while others thought the BMP's were very easy to implement. This probably can be linked to how advanced their practices were prior to training. When asked what their successes have been since trying the BMP's there was a variety of answers but everyone had successes to report. Successes covered many aspects of the training. Answers ranged from lower application rates, to better understanding of the de-icers. A complete listing can be found in the appendix. All of those responding said they would try the new practices again or in the future. . One good example is the U of M campus parking lot. Jim Weber (U of M) explained to me that they had tried anti-icing just a little but did not understand the enormous advantage it could provide. He said we just weren't educated enough about what it could do. Because of attending training, they now ordered a brine making system and will be fully operational next year to implement this. For this year they still tried anti-icing on the sidewalks and roads but had to do their own brine mixing without the tools that would make it easier. He also remarked that the contacts he made by attending training have proved very valuable to him already.

### **Recommendations for future training or other outreach strategies**

**Overcoming barriers** – Our biggest barrier is to get applicators to attend training so they understand the recommended practices. The model we have set up for 2006-2008 is to provide a free or reduced price training session if the host recruits attendees and pays for refreshments. The 319 grant will allow us to take the training across the state in the next few years and sew the seeds of education. We also hope to bring the training directly to the commercial winter maintenance companies by conducting a session at one of the conferences these contractors would normally attend. We believe the addition of the certification program may become a great way to get attendance. Cities or private companies could require applicators to be certified in order to work in their city or for their organization. Discussion on this in the Shingle Creek Watershed and for Hennepin County facilities has already occurred.

The applicators biggest barriers are still largely unknown. We have a glimpse into their worries about litigation, being profitable, making their customers happy, equipment upgrades and so on. Once applicators are trained they will be able to list task specific barriers that they will need to address. For many of these barriers we will have suggestions or resources to offer. For some of these problems, we will have to work together to find ways to bridge the barriers.

**Achieving estimated reduction goals** –In class we do an exercise to figure out the recommended application rates. These application rates are untested in parking lots. They were taken from the latest recommendations for roads. As we do this exercise in class we have noticed that it is very common to see a 90% rate reduction recommended. To implement this would be a drastic change in their business practices. If we said the recommended rate reductions were the reduction goals, we would not achieve the estimated reduction goals. However we have seen great results! We suggested they conduct some trials to see how it works in their specific situations.

It seems in our trials that a 90% reduction is possible on paper. So far a 65% reduction is the most we have seen implemented. In the case of the Ridgedale parking lot they used to use 12-14 tons of salt per typical one day snow event. After training they used 5-6 tons of salt per typical snow day. This 50-65% reduction saved Bassett Creek from receiving 5-6 tons of salt per day of snow. In one day this prevented up to almost 4,000,000 gallons of water from being contaminated at concentrations of 230 mg/l, the TMDL chronic standard for chlorides. In the winter of 2005-2006 (through February 28<sup>th</sup>) there were 26 snow events where MnDOT called out their plows, and as of February 28<sup>th</sup>, 2006 we had received 24 inches of snow. If the Ridgedale parking lot team had responded to even ½ of the MnDOT declared snow events, their new practices would have saved 51 million gallons of water from potentially being polluted.

### **Accomplishments**

- We have developed a training program
- We have developed a set of handouts

- We have developed a certification test
- We have worked with MPCA to develop a voluntary certification program
- We have developed a follow up survey
- We have conducted training
- We have conducted follow up interviews
- We have completed all program analysis
- We have made recommendations for future projects
- We have sought out and received future funding and partnerships to extend the life of this pilot program for 2 more years
- We have sought out funding to produce a parking lot manual to accompany this training. The manual will be completed in 2006.
- We have proven that our training program can see actual pollution prevention reduction rates of up to 65% within a few months after training.

### **Lessons Learned**

- We have spent much more time and energy than we anticipated working on this project. It is very exciting new territory. If Fortin Consulting had to do it again, we would have done the research and training development as one grant and conduct training, training evaluation and follow those trained to evaluate behavior change as another grant.
- The most difficult part of this education program is getting people to attend training. The model we used in 3 trainings was to have our hosts (City or Watershed Organization) recruit from within their jurisdiction. We figured they knew the potential problem areas and they could be more efficient at recruiting. We might be right, but they had a problem getting people to attend.
- What worked better in recruiting attendees were events like the maintenance expo, or road salt symposium where people are already at the all day event and chose to come to this session. However these are not typically private companies, they tend to be more government employees.
- We thought we could produce a visual aid tool that would help applicators recognize application rates without high tech equipment. After doing a variety of trials so we could photograph the application rates, we discovered that the amounts recommended are so small that it is very difficult to visually see a difference. Instead of coming up with a visual tool we showed these rates on the PowerPoint so they could see how difficult it is to judge with your eyes. Since this didn't work out we needed to find other methods to help them with the rates. We came up with a lbs/ sq foot table that would allow them to measure the size of their parking lot and, based on the temperature, would tell them how many pounds of material they needed. It would be up to them to spread it evenly across their lot. This seemed to work very well and instigated many comments during our training classes.

**Stewardship** – Most people want to protect our lakes and rivers. Most people have no idea winter maintenance is a threat to our lakes and rivers. Until this is understood they cannot be expected to be stewards of our waters. Once they attend training, their knowledge base changes dramatically as they see how salt and sand which seem quite

benign are actually a very real threat to our waters. They learn many BMP's that they can implement to improve their stewardship. Seventy five percent of the people surveyed answered yes to the question "Do you think you will be able to reduce the environmental impacts of your winter maintenance activities as a result of attending this class?". Seventeen percent of those asked did not respond. Eight percent said "not sure". Zero percent said "No".

**Fostering Sustainable Behavior** – This is very related to the stewardship topic. Most applicators do not understand that using salt is not a sustainable practice. They have no idea that the chlorides are in our water supply forever. After class they understand that the only way to reduce chloride contamination comes from applying less. They also leave with many ideas or tools that can help them reduce impacts. Once they try these practices and find that they work, they are likely to improve their practices from then on and reduce environmental impacts. One participant commented at the Minnetonka class, "This is going to change the way I do business".

**Partnerships** – We have formed a strong partnership with MnDOT and the Center for Transportation Studies at the U of M. Together with the environmental knowledge and outreach skills of the MPCA and Fortin Consulting we have built a core group to develop and deliver training. Partnerships must extend beyond this core group to the City, County and watershed level. These organizations can help us recruit attendees for our training classes. In the future Fortin Consulting would like to see alliances with some of the trade shows so we have an event which already exists where we can just deliver our training without the overhead.

**Leverage Resources** - In the future Fortin Consulting would like to see alliances with some of the trade shows so we have an event which already exists where we can just deliver our training without the overhead. In the development of this training program we took key concepts from the Minnesota Snow and Ice Control Field Manual. We were able to use some of these concepts directly and some we adapted to fit better with parking lot and sidewalk maintenance. We also worked with people experienced in winter maintenance to help us better understand the situations the applicators would typically be faced with. This gave us the advantage of developing a more practical training program. The materials created in this course will be used toward writing a manual for parking lot maintenance. The CTAP program staff and MnDOT winter maintenance staff have copies of the handouts and PowerPoint presentation that can be used for future training.

**Prevention Measures** – The training sessions emphasized prevention of water contamination through better use of materials. We taught them that chlorides cannot be easily removed from our water once introduced. One teaspoon of salt will contaminate 5 gallons of water, one ton of salt will contaminate over 650 thousand gallons of water to the 230 mg/l level. Therefore the best approach for reducing impacts of winter maintenance is to emphasize using less salt. This is done in many ways throughout the four hour training session. We developed a list of BMP's each of which will contribute to pollution prevention. See our training materials for the sheet that describes many of the BMP's we are recommending. Here are a few examples of pollution prevention

measures. If you get your salt wet you can apply 30% than dry salt. It sticks to the parking lot surface and starts working faster. Here is another example. Measure the size of your parking lot, measure the road temperature, calculate how much material is needed by using our application rate chart. This exercise which we did together several times in each training class pointed out rate reductions often in the 90% category. The only way to reduce chloride contamination is to apply less.

**Replication** –The training materials have been developed and tested. They should be refined as this process grows and improves. The MPCA 319 grant will allow us to have two more years to teach this class to private applicators. The CTAP program under the Center for Transportation Studies and MnDOT has been a very active partner in this process. It is likely they will take this training and modify for use in their municipal training programs. It is not clear at this time the best way to continue teaching the class outside of the 319 opportunities 2006-2008. Fortin Consulting expect we will get more requests for training than are built into the 319 grant and we will have to figure out a way to get everyone trained. The project partners will have copies of the materials and will go through training themselves so that they can in the future either conduct classes themselves or host additional sessions.

**Build Capacity** – From the parking lot training developed under the P2 grant we should continue to improve the training and develop new and better training tools. We will be developing a Parking lot manual in 2006 to accompany the training. It seems likely that parts of this training will be incorporated into municipal training by MnDOT or CTAP as they are both actively involved in this program.

The program will grow as the word spreads about the availability of training and the opportunity for certification. There is talk at least in the cities involved in chloride TMDLs that certification might be required to operate in those cities. That would make this program grow and would cause us to think about a re-certification process to keep current.

**Access** – Access to training in 2006-2008 will be through the MPCA 319 grant program. Fortin Consulting along with the 319 partners will be conducting over 25 training sessions. These are free sessions available to all. We are offering a training session at the annual statewide Road Salt Symposium on April 5, 2006. This will provide access to the training to people from around the state. The MPCA has a copy of our training PowerPoint. They can also use it to teach about parking lot maintenance or help advertise and promote the training. Information on training and certification should be somehow available from MPCA's website. This has not been resolved. We have had preliminary discussions with MPCA staff about this.

#### References

MnDOT Oct –Feb 2005-2006 Monthly Snow and Ice Report for Engineers. Per phone conversation with Wendy Frederickson. Winter Maintenance Coordinator.