**Autobody Refinishers Training and Technology Demonstration Pilot Project**
**Project Period:** January 1, 2008 – March 31, 2009

**Project Information**

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| **Project Name**: | Clean Air Minnesota<br>Autobody Refinishers Training and Technology Demonstration Pilot Project |
| **Applicant Information:** | Minnesota Environmental Initiative<br>211 First Street North, Suite 250<br>Minneapolis, MN 55401 |
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| **Funding Amount:** | $12,500 |
| Total Project Cost: | $21,650 |
| **Project Period:** | January 1, 2008 – March 31, 2009 |

1. Project Introduction

*Project Overview*

The Minnesota Environmental Initiative's (MEI's) Autobody Refinishers Training and Technology Demonstration Pilot Project was designed to reduce air toxics emissions from the auto body refinishing industry in the Twin Cities metropolitan area. The project was implemented within Clean Air Minnesota, a program of the Minnesota Environmental Initiative, and was conducted between January 2008 and March 2009. Funding for the project was provided by the U.S. Environmental Protection Agency (EPA) and Flint Hills Resources.

*Project Background*

Clean Air Minnesota (CAM) is a voluntary partnership of businesses, environmental groups, government agencies, and citizens working together to achieve significant, measurable reductions in air pollution. Clean Air Minnesota targets emission reductions in each major emission category (point sources, area sources, and mobile sources) with a goal of improving air quality and maintaining the region's status as a federal air quality attainment area.

Achieving emission reductions within an air quality attainment area presents unique conditions for Clean Air Minnesota. Because actions are strictly voluntary, emission reduction projects are designed to take into account not only potential emission reductions, but also opportunities for working through existing partnerships, and incentives to help address barriers to adoption. Clean Air Minnesota uses a collaborative process to select industry sectors and design emission reduction projects. The Clean Air Minnesota steering committee, comprised of over 20 representatives from the state's regulatory, business, nonprofit, and research communities, provides general oversight for the program's work, and helps to define focus areas. Working groups established by Clean Air Minnesota consider specific emission reduction opportunities within point source, mobile source, and area source sectors, and assist project staff in design, review, and implementation of resulting projects.

In 2004 MEI received an EPA grant for the Clean Air Minnesota Air Toxics Reduction Demonstration Project. The total budget for this project was $93,996 with a $75,000 grant from the EPA and a matching contribution of $18,996 provided by MEI. The goal of this printing industry pilot project was to achieve emission reductions through the introduction of low-VOC press/blanket wash solvents. All grant reporting requirements and project goals were exceeded. Project results showed that an average of 40 to 45 percent of volatile organic compounds (VOC) emissions could be eliminated with use of the low-VOC products tested in the pilot project.

In 2007 Clean Air Minnesota performed an analysis of air emissions and sources and evaluated strategies to reduce emissions in specific area source categories. The analysis considered emissions data from the Minnesota Pollution Control Agency (MPCA), as well as other industry-specific factors, in the selection and development of individual projects. Clean Air Minnesota then developed this project to address emissions from the auto body refinishing industry. The auto body refinishing category ranks among the top 15 area source categories for emissions of volatile organic compounds, and in the top 10 categories for air toxics emissions in the state.

The project design was based on a technology diffusion model developed by the Waste Management and Research Center in Illinois, implemented by the Minnesota Technical Assistance Program (MnTAP) in other industry sectors in Minnesota, and proven successful in the 2004-2006 Air Toxics Reduction Demonstration Project that targeted the printing industry. The technology diffusion process involves several steps to achieve widespread industry adoption of new technologies and innovations. At the beginning of the process, opportunities are identified through discussions with stakeholders, trade associations, and other avenues of input. Industry leaders who model best practices are identified and asked to mentor others in the industry. These leaders participate in demonstration events, where technology innovations are showcased to others in the industry. Pilot trials of the technology are arranged with industry members. These demonstrations and pilot trials are believed to be more successful in

accelerating adoption of innovative technologies than exposure through case studies or literature dissemination.

2. Project Description

The objective of the Autobody Refinishers Training and Technology Demonstration Pilot Project was to elicit voluntary action to achieve measurable reductions of air emissions within the auto body refinishing industry by coordinating with a variety of partners.

*Project Methods*

The project included four major elements:

- ***Demonstration of emission reduction technologies and/or practices and techniques in cooperation with an industry leader.*** Working with several partners, Clean Air Minnesota identified leaders within the auto body refinishing industry in the Twin Cities metropolitan area, and arranged for a combined demonstration and training event that highlighted industry-specific emission reduction technologies, practices and techniques, which were presented to other auto body refinishing shop owners, managers, and staff.

- ***Training using EPA or other training consultants and resources.*** During the combined demonstration and training event, Clean Air Minnesota hired an EPA-certified training consultant to overview emission reduction technologies, practices or techniques of interest to the local industry. Representatives from ten local auto body shops participated in the demonstration and training event, an agenda and description follows in Section 3: Project Activities and Results.

- ***Implementation of emission reduction technologies, practices or techniques on a pilot scale.*** Following the demonstration and training event, Clean Air Minnesota solicited participation of five shops in pilot trials of new or enhanced emission reduction technologies, techniques, or practices. Specific VOC and air toxics emission reductions achieved through these pilot trials, as well as through permanent adoption of new technologies, has been quantified by Clean Air Minnesota using guidance developed by Design for the Environment within the Office of Pollution Prevention and Toxics at U.S. EPA, and assistance from the Minnesota Pollution Control Agency.

- ***Development of a technical resource for emission reduction and best management practices for the local industry***. Clean Air Minnesota has developed an online technical resource for emission reduction and best management practices for the local auto body refinishing industry, and coordinated with the Minnesota Technical Assistance Program (MnTAP) to maintain the resource beyond the duration of the project.

*Project Goals and Performance Measures*

In accordance with the project proposal, Clean Air Minnesota has tracked performance and

measured success in achieving the project goals using a variety of factors. Project goals and associated outcomes are listed below.

- ***Support and participation from at least one industry leader*** – Two industry leaders were identified and both played significant roles in determining success throughout the project.
- ***At least six participants in the training activities*** – 25 individuals representing ten different body shops participated in the training and demonstration event.
- ***At least three training participants make changes in technology or practices based on training experience*** – Specific follow-up with training event participants was not conducted, however participants were connected with resources and key contacts to facilitate changes in technology or practices.
- ***At least two participants in the pilot trials*** – Five shops participated in the pilot trials, three of which adopted new technologies on a long-term basis.
- ***At least one shop or facility makes process changes as a result of the pilot trials*** – Three shops adopted new technologies on a long-term, if not permanent, basis.
- ***Participation from partners new to Clean Air Minnesota*** – Several new partners were introduced to Clean Air Minnesota through the course of the project including Park Nicollet Institute/NIOSH, Complete Health, Environmental & Safety Services, Inc. (CHESS), the Minnesota chapter of the Alliance of Automotive Service Providers (AASP-Mn), and Onsite Recycling Services.
- ***Technical resource and project concepts maintained by project partner beyond the duration of the project*** – MnTAP will maintain and update the online technical resource after the completion of the project period.

Clean Air Minnesota will continue to monitor adoption of the technologies and quantify associated emission reductions beyond the end date for this project as accommodated by general Clean Air Minnesota activities and with the cooperation of the project partners.

*Collaboration and Partnerships*

MEI and Clean Air Minnesota rely on the strength of partnerships and collaborative solutions to achieve environmental outcomes. Clean Air Minnesota worked with a diverse set of partners to plan and implement this project. The list includes: Minnesota Pollution Control Agency (MPCA), MPCA's Small Business Assistance Center, the Minnesota chapter of the Alliance of Automotive Service Providers (AASP-Mn), the Minnesota Technical Assistance Program (MnTAP), Minnesota Waste Wise, Hennepin County Environmental Services, Complete Health, Environmental & Safety Services, Inc. (CHESS), Onsite Recycling Services, Park Nicollet Institute, PPG Paints, Sterling Design, etc.

Clean Air Minnesota uses a number of methods to inform partners and other stakeholders of emission reduction activities, project achievements, upcoming events, and information related to air quality issues. These methods include blast emails, program-specific communications, and project updates provided to the CAM steering committee, which is made up of more than 20 partners from industry, nonprofit, and government sectors.

*Specific Project Objectives*

Because of the voluntary nature of Clean Air Minnesota's work, the project was designed to achieve several unique objectives. The following is a discussion of the objectives and strategies that CAM used to achieve these objectives.

***Elicits voluntary action.*** CAM first introduced the project to a variety of partners who helped to identify and recruit industry leaders. Mulroy's Body Shop (3920 Nicollet Avenue S., Minneapolis, MN 55409) and Latuff Brothers Auto Body (880 University Avenue, St. Paul, MN 55104) were both identified early in the project as spearheads for advanced technology and best practices for environmental performance and emission reductions. MEI met with both shop owners (Pat Mulroy and Peter Latuff) early on in the project and both individuals played critical roles in facilitating a successful project. The involvement of an industry leader helps to establish a peer-to-peer exchange of information, and encourages voluntary participation of others in the industry by building confidence and consensus around best practices and new technologies.

***Incorporates a variety of new and existing partners toward collaborative solution.*** CAM coordinated with MPCA, AASP-MN, MnTAP, suppliers and others to introduce industry representatives to the project, and to participate in project implementation. The partners' relationships with shop owners and managers can enhance commitment to the project, and strengthen the project outcomes. The project partners were asked to provide input on technology and training needs, training and demonstration event agenda, pilot trial implementation, and quantification of emission reductions.

***Achieves measurable emission reduction with potential for permanent reductions.*** The industry leaders identified at the beginning of the project were encouraged to operate as a mentor to other project participants. This encouraged participation in the pilot trials, and helped ease the transition to permanent adoption of new technologies or techniques. The demonstration and training opportunities provide shop owners and managers with direct experience with the emission reduction technologies or practices, which adds to the likelihood of successful pilot trials, and permanent adoption. CAM played an active role in monitoring the progress of the pilot trials, and followed up with participants regarding permanent adoption of new technologies or practices. CAM tracked materials and products used, and demonstrated emission reduction potential with each participant. Emission reductions achieved through pilot trials and permanent technology adoption have been quantified.

***Balances implementation costs with emission reduction potential.*** To the extent possible, CAM made use of training opportunities that were available at no cost, and designed training content and pilot trials around lower cost solutions. Suppliers were contacted for in-kind support, or equipment loans for trial applications.

***Has potential to realize co-benefits.*** Health exposure and other co-benefits have been recognized. In many cases, emission reduction activities will minimize cost, maintenance, energy usage, and waste, resulting in cost benefits. Some technologies also reduce the use

of other VOC and air toxics sources within the shops (i.e., solvents). These operational and cost advantages have been tracked and communicated back to the industry and the project partners.

***Project concept can be scaled up from pilot to large scale.*** CAM's area source emission reduction projects follow the concepts of a technology diffusion model developed by the Waste Management and Research Center in Illinois, and implemented by MnTAP in other industry sectors in Minnesota. The technology diffusion process involves several steps to achieve widespread industry adoption of new technologies and innovations. The demonstrations and pilot trials that are designed into the auto body refinishers project are believed to be more successful in accelerating adoption of innovative technologies than exposure through case studies or literature dissemination. This approach builds support among industry leaders. CAM has begun discussions with the project partners about continuing the project concept and maintaining the online technical resource beyond the duration of the project. CAM has tracked emission reductions, and has communicated successes back to the industry, regulatory agencies, and other partners.

*Desired Environmental Outcomes*

Clean Air Minnesota's area source work aims to reduce emissions of ozone precursors and air toxics in the Twin Cities metropolitan area. Industry-specific emission reduction projects like the auto body refinishers project are designed to reduce public exposure to air toxics among urban populations who are disproportionately exposed to air pollution. The technology diffusion methods incorporated into this and other projects will help raise awareness in the industry sector of air pollution issues, and provide an introduction to concepts and tools that can improve performance, reduce worker exposure to air toxics, and improve urban air quality. CAM is working to integrate industry-specific area source projects into additional Twin Cities metro initiatives that will involve both county and city governments.

Specific project outcomes achieved include:

- Quantifiable emission reductions, and assessment of co-benefits including waste reduction, and cost and energy savings
- Reduced worker exposure to air toxics
- Identification of barriers to adoption and implementation of technologies and practices in the auto body refinishing industry
- Increased awareness of urban air quality issues, potential solutions, and the role of small businesses in achieving air quality improvements
- An assessment of the cost-effectiveness of training and technologies in the auto body refinishing industry
- A model for implementing similar projects in other industry sectors

*Project Funding*

The total budget for this project was $21,620. This includes a grant of $12,500 from the U.S. EPA, leveraged against $9,120 from other funding sources (Flint Hills Resources). A project period extension was pursued and granted on January 16, 2009 but required no additional funds.

*Project Timeline*

| Task | 2008 | | | | Outputs | Target Date for Completion |
|---|---|---|---|---|---|---|
| | 1st Q | 2nd Q | 3rd Q | 4th Q | | |
| Meet with industry leaders to elicit support and participation and identify technology status and needs | | | | | List of potential demonstration site candidates, preliminary list of technology interests and training needs | March 30, 2008 |
| Contact autobody refinishers to assess interest in technology demonstration | | | | | List of potential demonstration and training event attendees | April 15, 2008 |
| Coordinate project objectives with partners | | | | | Project planning and progress meetings | Ongoing throughout project |
| Research technologies, techniques and practices | | | | | Summary of cost and emission reduction associated with each technology, technique or practice. | July 15, 2008 |
| Arrange demonstration event | | | | | Demonstration event, attendance list | May 30, 2008 |
| Follow up with participants and assess technology and training needs and interests | | | | | Summary of participant feedback, assessment of potential training needs and pilot technologies | August 31, 2008 |
| Coordinate training event | | | | | Training event, attendance list, and associated print materials | August 31, 2008 |
| Arrange technology pilot trials | | | | | Estimated emission reduction potential, feedback on barriers to adoption | January 31, 2009 |
| Track implementation and quantify emission reductions | | | | | Quantified emission reduction | March 31, 2009 |
| Develop best practices resource | | | | | Web-based resource for the industry | March 31, 2009 |
| Prepare final project report | | | | | Final report including summary of emission reduction | March 31, 2009 |

3. Project Activities and Results

*Research and Best Practices Compilation*

Beginning in April 2008, MEI staff researched technologies and trends impacting emissions of air toxics from the auto body refinishing industry. Comprehensive assessment of best practices for emission reductions was achieved through several independent and collaborative methods. Site visits to local body shops and interviews with shop owners and industry leaders provided insight into some of the opportunities and barriers that affect the industry. A Focus Group conducted in 2007 with industry representatives and affiliated professionals helped identify proven, developing, and emerging practices and technologies within the auto body refinishing industry. MEI staff conducted independent research of U.S. EPA's air toxics programs and collision repair assistance resources including Design for the Environment, Collision Repair Campaign, and the Environmental Results Program model, as well as MPCA, MnTAP, and the Iowa Waste Reduction Center's existing resources for environmental assistance to the collision repair industry.

Partnerships between MEI and several local entities were essential to the successful completion of the project scope. Key partner organizations and individuals included:

- MPCA's Small Business Assistance Program
  *Mike Nelson, Small Business Ombudsman*
- MPCA's Prevention and Assistance Division
  *Al Innes, Principle Planner*
- Park Nicollet Institute and the National Institute for Occupational Safety and Health (NIOSH) investigation of occupational risks in the auto body refinishing industry, MN Collision Auto Repair Safety Study (MN-CARSS)
  *Dr. David Parker, Principal Investigator*
  *Anca Bejan, Lead Researcher*
- OnSite Recycling Services
  *Barry Thomas, Owner*
- Minnesota Technical Assistance Program (MnTAP)
  *Cindy McComas, Executive Director*
  *Mick Jost, Senior Scientist*
- Minnesota Waste Wise
  *Mark Blaiser, Executive Director*
- Minnesota chapter of the Association of Automotive Service Providers (AASP-MN)
  *Judell Anderson, Executive Director*
- Complete Health, Environmental & Safety Services, Inc. (CHESS)
  *Carol Keys, Owner*
- Dunwoody College of Technology
  *Chuck Bowen, Director of Automotive, Auto Body, and Welding Programs*
  *Bruce Graffunder, Auto Collision Repair Principal Instructor*

*Training and Demonstration Event*

MEI hosted a combined training and demonstration event on Wednesday, August 27, 2008 at Dunwoody College of Technology in Minneapolis. With input from several partner contacts MEI staff completed the agenda development, speaker recruitment, facility selection, and event promotion that enabled this workshop to be a successful and well-attended event that achieved all of the core objectives as described in the project proposal.

During early August, MEI contacted Kevin Sikora with Eastern Research Group, who has contracted with EPA's Design for the Environment Collision Repair Campaign to provide training on best practices to shop owners and technical instructors across the U.S., to gauge his interest and availability in presenting at our demonstration and training event. Sikora had been previously identified as the leading expert in providing this training to shop owners and he proved to be an experienced and well-equipped presenter. MEI requested funds to be shifted between budget categories in our original budget to allow for a sub-contract to be executed between MEI and ERG to compensate Sikora for his travel and expenses. These necessary administrative changes were completed on a short timeline thanks to attentive responses and swift action taken by Jackie Nwia and Kathy Mullen.

Simultaneously, MEI staff developed and refined an agenda for the training and demonstration event that would showcase local industry leaders, highlight best practices for emission reduction, outline available technical assistance opportunities and resources, and enable close peer-to-peer interaction and information exchange. About 25 individuals, including ten representatives from local auto body shops, attended the training and demonstration event, entitled ***Speed up Cycle Times and Save Money: How Improving Environmental Performance Can Benefit the Bottom Line***. The event agenda appears below and a detailed description follows.

To recruit participation in the training and demonstration event, MEI worked with staff members in MPCA's Small Business Assistance division and with the Executive Director of the Minnesota chapter of the Association of Automotive Service Providers (MN-AASP) to inform them of our intent to host a training and demonstration event on August 27 and to request that these organizations help in promoting the event to their members and contacts. MEI created and circulated a promotional flyer via email to Minnesota chapter AASP members and local body shop contacts through MPCA and participants in a parallel study undertaken by Park Nicollet Institute and the National Institute for Occupational Safety and Health. MEI also direct-mailed a promotional postcard to approximately 500 Twin Cities metro area auto body shops, and "cold" called approximately 50 local shop owners.

The agenda that was distributed at the Training and Demonstration Event appears on the next page.

# *Speed Up Cycle Times and Save Money: How Improving Environmental Performance Can Benefit the Bottom Line*

**Free Training and Demonstration Event**

Wednesday, August 27, 2008
8:00 a.m. – 12:30 p.m.
Dunwoody College of Technology Automotive Center

## AGENDA

8:00 a.m. Breakfast – Classroom W-220

8:25 a.m. Welcome and Description of MEI Autobody Project
*Ellen Gibson, MEI*

8:30 a.m. Intro to HAPs and VOCs in Autobody Refinishing Sector
*Mike Nelson, MPCA Small Business Assistance Program*

8:40 a.m. Best Practices and Technologies that Reduce Exposures/Emissions
*Kevin Sikora, Certified Industrial Hygienist, Eastern Research Group*

10:00 a.m. Break

10:15 a.m. Panel Discussion: Motivating Factors and Benefits to Shop Owners
*Mark Blaiser, Executive Director, Minnesota Waste Wise*
*Kevin Carlson, President, Sterling Design*
*Pete Latuff, Latuff Brothers Auto Body, Saint Paul*
*Pat Mulroy, Mulroy's Body Shop, Minneapolis*

11:15 a.m. Break into smaller groups for Demonstration Stations

11:30 a.m. Demonstration Sessions – Refinish Lab

1. Mixing Room:
   Solvent recyclers/Gun washers – *Barry Thomas, OnSite Recycling*
2. Prep Station:
   PPS cups, HVLP guns compare & contrast – *Shawn Ryan, PPG*
3. Spray Booth:
   LaserPaint, IWRC – *Mick Jost, MnTAP*

12:30 p.m Closing Remarks, Follow-up Opportunities
*Ellen Gibson, MEI*

*Training and Demonstration Event Agenda Description*

After a brief welcome and description of MEI's project, Mike Nelson with the Small Business Assistance Program at the Minnesota Pollution Control Agency gave an overview of HAPs and VOCs in the auto body refinishing sector, discussed the new NESHAP rule for Paint Stripping and Miscellaneous Surface Coating Operations, and described assistance opportunities available through the Small Business office. Next, Kevin Sikora, Certified Industrial Hygienist with Eastern Research Group, presented an abbreviated version of the material he uses at Design for the Environment workshops nationwide, covering best practices and technologies for emission/exposure reduction. Lastly, a panel discussion featured industry leaders Pete Latuff (www.latuffbrothers.com) and Pat Mulroy (www.mulroysbodyshop.com), ventilation equipment supplier Kevin Carlson (http://www.sterling-design.net), and Mark Blaiser, the Executive Director of Minnesota Waste Wise, an affiliate program of the Minnesota Chamber of Commerce that assists businesses with waste reduction practices. Each panelist gave a brief testimonial of his experiences with implementing emission reduction practices and technologies and described lessons learned and opportunities for financial or technical assistance with equipment modifications or other practice changes. The panel then answered questions from attendees, and this proved to be extremely beneficial. Attendees actively engaged and asked a lot of questions of industry leaders Pete and Pat, who were very open to sharing their experiences.

We had planned three "demonstration sessions" in the college's refinish lab to take place during the final hour on the agenda, but given the unexpectedly high level of knowledge among our audience members, we condensed the demonstrations down to two stations and kept the group together as a unit rather than breaking into smaller groups. Barry Thomas with Onsite Recycling Services demonstrated the features of two different solvent recycling units, and Mick Jost of Minnesota Technical Assistance Program (MnTAP) gave a presentation about the training resources available through the Iowa Waste Reduction Center (LaserPaint, and Virtual Painting).

*Training and Demonstration Event Attendance and Outcomes*

Participants in the training and demonstration event included many of the project's key partners as well as a few new contacts.

In our opinion, one of the best indications of the event's success was the fact that, even though we finished the program ahead of schedule, all participants stayed at least a half hour longer and engaged in self-directed peer-to-peer learning and informal information exchange. It was gratifying to facilitate new connections, and we successfully forged new relationships upon which to build in the next phases of the project.

One challenge we encountered is that, as is often the case, those who could have benefited most from the content covered at this workshop proved the hardest people to get to pay attention or take time out of their day to attend. As a result, our event attracted a highly educated and well-informed audience of collision repair professionals with advanced awareness of emission reduction technologies and practices.

*Pilot Trial Implementation and Outcomes*

Building on the success of the training and demonstration event, MEI recruited shops to participate in pilot trial implementation of emission reduction technologies and practices. The first product we tested in pilot trials was a non-toxic, non-hazardous alternative solvent for use in paint cleaning operations (enclosed gun washing equipment or other clean-up applications).

Eco-Chem GW-1 Solvent is manufactured by ChemChamp, producer of solvent recycling and parts cleaning equipment, based out of Ottawa, Canada. Eco-Chem is non-toxic, free of hazardous air pollutants (HAPs), and has a low evaporation rate that enables it to last three times longer than traditional solvent in gun washing applications. With the help of Eco-Chem's local distributor, Barry Thomas, owner of Onsite Recycling Services, we tested the alternative solvent in four local body shops, and reactions to the product were mixed.

Two shops had success with the product and continue to use it on an ongoing and long-term basis. Jerry's Autobody in Stillwater, MN (http://jerrysautodetail.com/) was the first shop in Minnesota to test Eco-Chem. Jerry Schoenecker, owner of Jerry's Autobody, previously purchased Nason Select 481-16 paint thinner and Jerry's painter Lenny Ludowitz used the Nason Select in a Herkules enclosed gun washer to clean spray guns and parts. Lenny reported that Eco-Chem cleaned paint residue better than the previous solvent and was not bothered by Eco-Chem's orange citrus odor. After having successfully used the Eco-Chem for a number of months, MEI purchased a new 5-gallon quantity of Eco-Chem and donated it to Jerry's to facilitate continued use in place of the Nason Select product. Air emission reductions associated with the change of solvent product are documented below.

**Jerry's Auto Body**
Original solvent used: Nason Select 481-16
Density: 6.78 LB/GL at 75.0 F

| Chemical Name | CAS # | Percentage by weight of total solvent | Avg % by weight of total solvent | Emissions (lb) | Change in Emissions (lb) per 1.0 gal of solvent used | Change in Emissions (lb) per 5.0 gal of solvent used | % Change in Emissions |
|---|---|---|---|---|---|---|---|
| Xylene (mixed isomers) | 1330-20-7 | 3.00% | 3 | 1.02 | -0.23 | -1.02 | -100.00 |
| Methanol | 67-56-1 | 20.00% | 20 | 6.78 | -1.51 | -6.78 | -100.00 |
| Acetone[1] | 67-64-1 | 27.0 - 37.0% | 32 | 10.85 | -2.41 | -10.85 | -100.00 |
| Ethylbenzene | 100-41-4 | 0.80% | 0.8 | 0.27 | -0.06 | -0.27 | -100.00 |
| VM&P Napth[2] | 8032-32-4 | 5.0 - 15.0% | 10 | 3.39 | -0.75 | -3.39 | -100.00 |
| Toluene | 108-88-3 | 30.00% | 30 | 10.17 | -2.26 | -10.17 | -100.00 |
| VOC | | 100% | 100 | 33.90 | 0.00 | 0.00 | 0.00 |

Notes:
1. Acetone is not one of the 188 Hazardous Air Pollutants (HAPs) listed in the Clean Air Act, but it *is* included in the MN air toxics emission inventory.
2. VM&P Napth is not one of the 188 Hazardous Air Pollutants (HAPs) listed in the Clean Air Act, and it is *not* included in the MN air toxics emission inventory.

Bon Auto Body in Richfield, MN (http://www.bonautobody.com/), owned by Gary Wiberg, also uses a Herkules enclosed gun washer to clean spray guns and parts and previously used Klean-Strip CGC 111 paint thinner. The first batch of Eco-Chem that was used at Jerry's was drained from the gun washer and recycled in a solvent distillation unit to recover approximately 4.5 gallons of clean solvent. MEI donated this product, which had a dulled citrus odor to Bon Auto as a replacement for the Klean-Strip thinner. Bon Auto's painter also reported no problems with

the alternative solvent and air emission reductions associated with the change in solvent product are documented below.

**Bon Auto Body**
Original solvent used: Klean-Strip Gun Cleaner - CGC111
Density: 6.78 LB/GL at 75.0 F

| Chemical Name | CAS # | Percentage by weight of total VOC | Avg % by weight of total VOC | Emissions (lb) | Change in Emissions (lb) per 1.0 gal of solvent used | Change in Emissions (lb) per 4.5 gal of solvent used | % Change in Emissions |
|---|---|---|---|---|---|---|---|
| Xylene (mixed isomers) | 1330-20-7 | 20.0 -35.0 % | 27.5 | 8.39 | -1.86 | -8.39 | -100.00 |
| Methanol | 67-56-1 | 5.0 -15.0 % | 10 | 3.05 | -0.68 | -3.05 | -100.00 |
| Acetone[1] | 67-64-1 | 20.0 -40.0 % | 30 | 9.15 | -2.03 | -9.15 | -100.00 |
| Ethanol, 2-Butoxy- | 111-76-2 | 5.0 -10.0 % | 7.5 | 2.29 | -0.51 | -2.29 | -100.00 |
| Butyl acetate | 123-86-4 | 1.0 -5.0 % | 3 | 0.92 | -0.20 | -0.92 | -100.00 |
| Toluene | 108-88-3 | 5.0 -10.0 % | 7.5 | 2.29 | -0.51 | -2.29 | -100.00 |
| VOC | | 99% | 99 | 30.20 | 0.07 | 0.31 | 0.01 |

Notes:
1. Acetone is not one of the 188 Hazardous Air Pollutants (HAPs) listed in the Clean Air Act, but it is an air toxic.

Next we installed the Eco-Chem alternative solvent product at the Bloomington, MN location of Lehman's Garage, Inc. (http://www.lehmansgarage.com/), where owner Darrell Amberson also used the Nason Select 481-16 paint thinner in an enclosed gun washer. Unfortunately, we heard complaints that the orange citrus odor was bothering the painters so they took it out of their gun washer the same day the product was installed. As a result of this feedback, we contacted ChemChamp and asked them to reconfigure the product and to reduce or remove the citrus odor. Several weeks later, they delivered an "odor-free" version, named Eco-Solve PW-2, that had similar properties to the Eco-Chem, but no orange odor.

Crystal Lake Automotive in Lakeville, MN (http://www.crystallakeautomotive.com/) was also interested in participating in our pilot work, and we decided to test the Eco-Solve PW-2 product at their shop before potentially returning to Lehman's Garage. Crystal Lake Automotive did use the Eco-Solve in an enclosed gun washer for a one-week period, but owner Jim Sigfried's painters were also bothered by the smell of the alternative solvent and preferred to revert to their original paint thinner, Klean-Strip CGC 111.

As adoption of the non-toxic solvent was inconsistent, we decided to shift to a more proven technology for emission reduction and used the remaining funding we had available for pilot trial equipment to help cover the capital cost of a new solvent recycler unit, which was recently installed at a Maaco body shop in Little Canada, MN (http://www.maaco.com/LittleCanada). Solvent distillation units recycle used solvent to yield reusable clean solvent and offer two-fold benefits by reducing the amount of new solvent shops must purchase and by significantly reducing quantities of hazardous waste (paint-contaminated solvent) shops must dispose. The solvent recycler that was installed at Maaco - Little Canada was purchased through Onsite Recycling Services and is also manufactured by ChemChamp. The unit is a new product called the Always Clean 110, which uses patented continuous recycling technology to reduce solvent waste without requiring a change to existing clean-up procedures. The Always Clean 110 sits on top of a 55-gallon liquid hazardous waste drum, draws waste solvent into the distillation chamber automatically, and deposits clean solvent into a second clean drum. Many solvent recyclers require a plastic bag liner and waste solvent must be emptied into a separate piece of equipment

and manually programmed to run as needed. Alternatively, painters can pour dirty solvent directly into the funnel atop the Always Clean 110, and pump clean solvent as needed from the clean drum without adding a step to existing clean-up procedures.

Maaco Little Canada's shop manager, Dick Reeves, anticipates reducing solvent usage by half and cutting the shop's generation of hazardous waste solvent by up to 95%. The shop will save money by reducing waste disposal fees and purchasing new solvent half as often. Although the shop continues to use a toxic solvent product (Nason Select 481-16), significant reductions in air emissions will be realized over the life of the equipment. Air emission reductions associated with the installation of the Always Clean 110 recycling unit are documented below.

Maaco Little Canada
Solvent: **Nason Select 481-16**

| Chemical Name | CAS # | Percentage by weight of total solvent | Avg % by weight of total solvent | Annual Emissions (lb) w/o Recycler[1] | Annual Emissions (lb) w/Recycler[2] | Annual Change in Emissions (lb) |
|---|---|---|---|---|---|---|
| Xylene (mixed isomers) | 1330-20-7 | 3.00% | 3 | 22.37 | 11.19 | -11.19 |
| Methanol | 67-56-1 | 20.00% | 20 | 149.16 | 74.58 | -74.58 |
| Acetone | 67-64-1 | 27.0 - 37.0% | 32 | 238.66 | 119.33 | -119.33 |
| Ethylbenzene | 100-41-4 | 0.80% | 0.8 | 5.97 | 2.98 | -2.98 |
| VM&P Napth | 8032-32-4 | 5.0 - 15.0% | 10 | 74.58 | 37.29 | -37.29 |
| Toluene | 108-88-3 | 30.00% | 30 | 223.74 | 111.87 | -111.87 |
| VOC | | 100% | 100 | 745.80 | 372.90 | -372.90 |

Notes:
1. Based on use of two 55 gal drums of solvent in one year.
2. Based on use of one 55 gal drum of solvent in one year.

The demonstrated benefits that pilot shop participants have realized could easily be replicated in other auto body shops. Through the implementation of pilot trials we learned the challenges posed by changing traditional procedures, familiar products, and long-standing habits. Owner buy-in is essential to implementing and enforcing new practices, but without support from the shop's painters, new techniques will not become permanent or institutionalized.

## *Technical Resource Compilation*

In partnership with the Minnesota Technical Assistance Program (MnTAP), a technical assistance outreach program at the University of Minnesota, MEI has compiled an online list of resources for the collision repair industry to supplement existing references on the MnTAP website. MEI was able to expand on the resources based upon interviews with various industry experts and independent research regarding industry needs and opportunities. The revised MnTAP website incorporates:

- A Summary of MEI's Auto Body Project;
- Information on Best Practices for Emission Reduction;
- Training Opportunities and Industry Associations;
- Funding and Technical Assistance;
- Regulation and Compliance Assistance

MnTAP staff will take responsibility for ongoing updates and site maintenance. The resource can be accessed at http://mntap.umn.edu/vehicle/collision.htm.

4. Project Costs

This project was funded through a grant from the U.S. EPA totaling $12,500. Additional funding was provided by Flint Hills Resources in the amount of $9,120, for a total project cost of $21,620.

*Breakdown of Project Expenditures*

| | |
|---|---|
| Staff Time | $10,188.00 |
| Solvent purchases | $600.00 |
| Equipment purchases | $2,800.00 |
| Consulting fees (ERG) | $3,428.94 |
| Other expenses, including travel, communications, meeting supplies | $771.00 |
| Indirect Costs | $3,653.70 |
| **Total** | **$21,441.64** |

5. Project Results and Next Steps

*Technology Diffusion Model: Successes and Challenges*

This project further evidenced the effectiveness of the technology diffusion model for influencing behavioral change (voluntary emission reduction practices) in a given industry sector. While it is difficult to guarantee permanent adoption of new technologies or practices, our pilot work in the Twin Cities auto body refinishing industry has resulted in measurable and replicable reductions of air toxics emissions totaling approximately 960 lbs./year. In addition, our project forged new relationships and connected shop owners to resources and opportunities previously unknown to them.

The auto body refinishing industry in the Midwest region is on the eve of a transitional period, as states on the West coast have already adopted strict standards mandating a universal conversion to waterborne paints. Furthermore, EPA's new area source rule (which mandates compliance for new shops in 2008 and existing sources by 2011) could provide a stepping-stone for more rigid rules to come. While most metro area shops already operate in compliance with the new NESHAP requirements (spray booths have four walls and a roof, HVLP guns, training and certification requirements) outstate and smaller operations may not be otherwise equipped to adapt to waterborne paints. Spraying waterborne as opposed to solvent-based paints necessitates curing paints much faster at a much higher temperature, thus spray booths must be retrofitted with enhanced ventilation and heating equipment. Waterborne paints, however, produce no VOCs or air toxics, are odorless, require no solvent usage (paint thinner) for clean up, and provide an equally high-quality finish as do solvent-based paints.

Currently the biggest barriers to adoption of waterborne paints in Minnesota are the high costs of spray booth retrofit equipment (which typically runs at a minimum of around $60,000) and myths that persist around the performance of the paints. Current waterborne users such as

Mulroy's and Latuff Brothers attest that waterborne paints cure well (composition has improved) and match well (nearly all vehicle manufacturers use waterborne paints in OEM operations), and that their painters, once converted, have never regretted the transition. Due to the high capital cost of retrofitting spray booths for waterborne, our project focused on lower cost emission reduction technologies to reduce solvent usage through solvent recycling and investigated alternative solvent products. Nevertheless, we succeeded in heightening awareness of cutting-edge practices and technologies, such as waterborne paints, by providing a platform for industry leaders to share their experiences among peers.

*Lessons Learned*

Although we had a high level of interest, engagement, and participation throughout the project from a number of dedicated shop owners, the biggest overall challenge we faced with the technology diffusion model was reaching a broader audience of shop owners. The auto body refinishing industry is comprised of many small, independently owned shops that function on tight budgets with a heavily fluctuating workload. During the busy season (summer or anytime following a hail storm), efficiency (cycle time) is at a premium and neither shop owners nor their staff are likely to participate in professional development activities. The unpredictable nature of the shops' workload makes investing in expensive or high-risk technologies all the more difficult, and most shop owners want to be reassured that production will increase (faster turn-around times), thereby justifying the investment.

Because shop revenues are variable dependent on workflow, operational efficiency and resource conservation are inherently highly valued in the collision repair industry. Bottom line savings are, nevertheless, the primary motivator for shop owners, and financial incentives for improved practices certainly carry weight in the industry.

The success of our project was entirely contingent upon the strong partnerships formed with industry leaders, product suppliers, and the trade association. Early identification of and communication with local industry leaders Pat Mulroy and Pete Latuff, who serve as "champions" for best practices in the community, proved invaluable to MEI's project staff. In addition, technical support from Barry Thomas, owner of Onsite Recycling Services, made pilot trial implementation possible.

*Next Steps*

The online technical resource developed by MEI project staff will by maintained on an ongoing basis through MnTAP: http://mntap.umn.edu/vehicle/collision.htm.

Contingent upon available funding, follow-up with pilot trial participants will take place within Clean Air Minnesota as part of ongoing cumulative emission reduction tracking and quantification activities.

Name recognition within and outside of the collision repair industry is an important marketing strategy, especially for small, independently-owned shops. Project participants will benefit from recognition through CAM/MEI materials and the online technical resource.

Additionally, MEI is planning further area source emission reduction work in conjunction with a proposed targeted neighborhood initiative in 2010. Another sector-specific technology diffusion project could target industrial surface coating operations (27.4% of all area source air toxic emissions in 2002) or gasoline service stations (5.9% of all area source air toxic emissions in 2002).