Rural Crime & Justice Center
A University Center of Excellence

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Presented by:
Rural Methamphetamine Education Project
Rural Crime & Justice Center
Minot State University
Minot, North Dakota
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Executive Summary

- Through analysis of methamphetamine-related data, RMEP identified that the prevalence of methamphetamine in North Dakota is decreasing in areas such as clandestine lab seizures and adolescent use, but trafficking continues to rise.

- The RMEP strives to provide the most recent statistical informational, as well as information that details the human cost of methamphetamine abuse in North Dakota.

- During the reporting dates March 11, 2009 – March 12, 2012, RMEP provided 405 presentations attended by 16,145 people, and 59 booth displays attended by 10,849 people.

- When surveyed, 95.9% of event facilitators indicated that the presentation/booth display increased the awareness of the intended audience.

- When surveyed, 95.9% of event facilitators agreed or strongly agreed that they would recommend RMEP services to others.

- During the reporting dates March 11, 2009 – March 12, 2012, RMEP attended 204 meetings with community coalitions and safety organizations.

- The RMEP will make presentations available online. Children’s presentations will be accompanied by a teacher’s guide. Adult presentation will be accompanied by a narrative or discussion points.

- The RMEP will continue to serve as a resource through the formation of a research library containing literature and data collected throughout the duration of the project.

- The RMEP will continue to stay abreast of methamphetamine research conducted by chemistry students and staff through communication with the Minot State University (MSU) Chemistry Department.

- The RMEP will continue to evaluate its education and awareness program by encouraging audience members to complete an evaluation after attending a presentation.

- The RMEP remains committed to providing its services, expanding services to areas in need, and evaluating the threat of methamphetamine in North Dakota.
Introduction

A variety of resources have been allocated to address the significant threat of methamphetamine facing North Dakota. The Department of Justice (DOJ), the Drug Enforcement Administration (DEA), the High Intensity Drug Trafficking Area (HIDTA) program, the Federal Law Enforcement Training Center (FLETC), the North Dakota Bureau of Criminal Investigation (BCI), North Dakota Department of Health (DOH), North Dakota Department of Human Services (DHS), North Dakota Department of Corrections and Rehabilitation (DOCR), and the Rural Crime & Justice Center (RCJC) have each contributed resources to help address the problem. Continued evaluation of the threat posed by methamphetamine to North Dakota and the efforts to reduce its presence show that we have seen success in some areas and must continue to evaluate and adjust strategies in others.

The Rural Methamphetamine Education Project’s (RMEP) initial goal was to develop and deliver a public awareness campaign to North Dakota communities. Through the evaluation of the project’s efforts, RMEP has expanded its role of public awareness to include many different strategies for information dissemination. This report details the efforts of RMEP.
Section 1: Methamphetamine in North Dakota

1.1 Transportation and Distribution

North Dakota is a part of the Midwest High Intensity Drug Trafficking Areas (HIDTA), which is an area connected by an extensive transportation infrastructure, making it easier for traffickers to ship wholesale quantities of methamphetamine and other drugs into the region (National Drug Intelligence Center, 2010).

Methamphetamine is readily available throughout Midwest HIDTA region, in large part because of well-established Mexican traffickers who provide a steady supply of the drug to the region. They are able to do so because of rising methamphetamine production in Mexico. Increased Mexican methamphetamine production is indicated by increased laboratory seizures in Mexico (217 in 2009 compared with 47 in 2008), as well as increased seizures of the drug along the Southwest Border. The wide availability of Mexican methamphetamine in the HIDTA region is evidenced by law enforcement reporting seizure data. Law enforcement officials identified increasing Mexican methamphetamine availability in the Midwest HIDTA region in 2009 and by mid-2010 most law enforcement agencies reported that Mexican methamphetamine was readily available in their areas. Survey data also indicate wide availability of the drug – 130 of 182 law enforcement agency respondents to the National Drug Intelligence Threat Survey (NDTS) 2011 in the Midwest HIDTA region categorize ice methamphetamine availability as moderate or high in their jurisdictions. Additionally, law enforcement officials in the region seized 137 kilograms of ice methamphetamine in 2010 compared to 64 kilograms in 2009 – a 115 percent increase and an indicator of the drug’s wide availability (National Drug Intelligence Center, 2011).

According to the 2010 Drug Market Analysis, the Midwest HIDTA region has experienced exploitation from various Mexican drug trafficking organizations (DTOs). As a result of the legislative control of pseudoephedrine in 2005, these DTOs have significantly increased distribution of ice methamphetamine in the region. The Midwest HIDTA region is also vulnerable to drug trafficking through the Northern border. North Dakota alone shares more than 300 miles of border and 18 land ports of entry with Canada, much of which is isolated and rural (National Drug Intelligence Center, 2010).
The trafficking and use of methamphetamine is a primary concern for law enforcement and public health officials in North Dakota. BCI reported seizing 6.9 kilograms of methamphetamine during the 2010 calendar year (North Dakota Bureau of Criminal Investigation, 2011). North Dakota Highway Patrol officers saw a significant increase in trafficking during the eight month period of August 2009 to March 2010, seizing seven pounds of methamphetamine and over $50,000 in drug money (North Dakota Highway Patrol, 2010).

Table 1.1 North Dakota Highway Patrol Methamphetamine-Related Arrests

<table>
<thead>
<tr>
<th></th>
<th>2009</th>
<th>2010</th>
<th>2011</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amount seized (grams)</td>
<td>30</td>
<td>3452</td>
<td>50</td>
</tr>
<tr>
<td>Possession Arrests</td>
<td>8</td>
<td>18</td>
<td>49</td>
</tr>
<tr>
<td>Trafficking Arrests</td>
<td>2</td>
<td>5</td>
<td>1</td>
</tr>
</tbody>
</table>

(North Dakota Highway Patrol, 2012)

In an effort to keep law enforcement officers aware of the current illegal street drug prices in North Dakota, BCI provided the following information. As of February 7, 2011, this information may be used in calculating the illegal market value of methamphetamine throughout the state (North Dakota Bureau of Criminal Investigation, 2011).

Table 1.2 Methamphetamine Street Cost

<table>
<thead>
<tr>
<th>Type</th>
<th>Quantity</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Powder</td>
<td>1 gram</td>
<td>$100-150</td>
</tr>
<tr>
<td></td>
<td>1 ounce</td>
<td>$2,000-2,500</td>
</tr>
<tr>
<td></td>
<td>1 pound</td>
<td>$10,000-20,000</td>
</tr>
<tr>
<td>Crystal</td>
<td>1 gram</td>
<td>$200-300</td>
</tr>
<tr>
<td></td>
<td>1 ounce</td>
<td>$2,500-4,000</td>
</tr>
<tr>
<td></td>
<td>1 pound</td>
<td>$24,000-35,000</td>
</tr>
</tbody>
</table>

(North Dakota Bureau of Criminal Investigation, 2011)
1.2 Seizures and Arrests

Figure 1.1 Clandestine Methamphetamine Lab Seizures*

* includes operational labs, non-operational labs, chemical equipment/glassware seizures, and dumpsites
(North Dakota Bureau of Criminal Investigation, 2012)

Figure 1.2 Methamphetamine/Amphetamine Samples Processed by ND Crime Lab

(Office of Attorney General, Crime Lab Division, 2012)
Figure 1.3 ND Drug Offense Arrests by Drug Type

(North Dakota Bureau of Criminal Investigation, 2011)

Figure 1.4 Federal Drug Sentencing: Methamphetamine as Primary Offense

(United States Sentencing Commission, 2010)
1.3 Associated Activity

High levels of criminal activity in the Midwest region are often linked to the distribution and frequent use of illicit drugs in the area. Methamphetamine abuse is often associated with violent criminal activity such as domestic violence and child abuse, as well as the commission of property crimes such as burglary, forgery, fraud, and identity theft, which provide a means to support an offender’s drug habit (National Drug Intelligence Center, 2010). According to the 2011 Drug Market Analysis, 54.3% of law enforcement respondents identified methamphetamine as the drug that “most contributes to violent crime in their jurisdictions,” and 54.9% identified methamphetamine as the drug that “most contributes to property crime” (National Drug Intelligence Center, 2011).

1.4 Youth at Risk

To gauge the use of methamphetamine by students in grades 7-12, RMEP refers to the results of the North Dakota Youth Risk Behavior Survey (YRBS). This self-report study is voluntary for all public schools and is administered in the spring of odd years. The compiled data is randomly selected from all participating schools. It focuses on youth and young adult behaviors that may lead to death or disability, including alcohol and other drug use. The information is reported by both state and region. The survey indicates how youth risk behaviors change over time and is important because, “these behaviors are often established during youth and extend into adulthood.” The YRBS indicates a steady decrease in methamphetamine use by North Dakota students in grades 9-12 from 1999-2009, while it indicates fluctuation in use by students in grades 7 and 8. The 2011 YRBS did not ask students about methamphetamine usage (North Dakota Department of Public Instruction, 2011).
**Figure 1.5 ND YRBS Data:**
Used Methamphetamine One or More Times during Lifetime

![Graph showing the percentage of students using methamphetamine one or more times during their lifetime from 1999 to 2009.](image)

*No data available for 1999, Grades 7-8*  
(North Dakota Department of Public Instruction, 2011)

**Figure 1.6 Grades 9-12 by Region:**
Used Methamphetamine One or More Times during Lifetime

![Graph showing the percentage of students using methamphetamine one or more times during their lifetime by region from 2001 to 2009.](image)

(North Dakota Department of Public Instruction, 2011)
1.5 Department of Corrections and Rehabilitation

According to the North Dakota Department of Corrections and Rehabilitation (DOCR), 3,341 individuals were admitted to a state prison facility during the time period of October 1, 2007 to December 6, 2010. Of those admitted during this time period, 522 (15.6%) were due to a methamphetamine-related crime, which is defined as possession, paraphernalia, distribution, or manufacturing, and 640 (19.2%) were admitted due to a methamphetamine-related crime or probation violation (North Dakota Department of Corrections and Rehabilitation, 2010).

Since 2009 the total number of inmates under DOCR responsibility averages 1,467 per month. On average 349 of those inmates are incarcerated on drug charges each month. Meaning nearly one quarter (23.8%) of North Dakota’s prison population is incarcerated on drug charges (North Dakota Department of Corrections and Rehabilitation, 2012).

1.6 Treatment Episode Data Set

Each year in the United States, there are approximately two-million substance abuse admissions to treatment facilities that report to individual state administrative data systems. The Treatment Episode Data Set (TEDS) is a part of the Substance Abuse and Mental Health Services Administration’s (SAMHSA) Drug and Alcohol Services Information System. TEDS is a collection of both demographic and substance abuse data, which can be broken down by state and calendar year (Substance Abuse and Mental Health Services Administration, 2010).

TEDS is an admissions-based system; however, each admission reported does not necessarily represent an individual. For example, a single individual admitted to a reporting facility twice in one calendar year will count as two admissions. TEDS only includes the data from admissions to facilities that are licensed or certified by a state substance abuse agency.
which are generally those that receive state alcohol or drug funding (Substance Abuse and Mental Health Services Administration, 2010).

**Figure 1.7 ND Substance Abuse Treatment Admissions: Methamphetamine as Primary Substance of Abuse**

![Bar chart showing the percent of admissions for methamphetamine as the primary substance of abuse from 2000 to 2010.](image)

(Substance Abuse and Mental Health Services Administration, 2010)

The North Dakota TEDS shows a steady prevalence of females entering treatment for methamphetamine as their primary substance of abuse. From 2000 to 2010, the average rate of females reporting methamphetamine as their primary substance of abuse was 49.1 percent. In 2010 alone, 57.4 percent of women reported methamphetamine as their primary substance of abuse (Substance Abuse and Mental Health Services Administration, 2010). The 2011 TEDS data was not yet available for inclusion in this report.

**1.7 Initiatives/Programs**

Aside from RMEP, North Dakota has developed and implemented several other drug related initiatives. This list is not exhaustive, but some of the major initiatives include:
1.7.1 Retail Meth Watch Program

The North Dakota Retailers Meth Watch Program is a partnership involving the BCI and a number of concerned North Dakota retailers. The program’s goals are to:

- Raise the level of awareness across the state of the methamphetamine lab problem;
- Educate and train retail employees to recognize the tell-tale signs of individuals that are obtaining the necessary precursors for the illegal production of methamphetamine;
- Limit the accessibility of precursors (North Dakota Office of the Attorney General, 2010).

1.7.2 Prevention Resource and Media Center

The North Dakota Prevention Resource and Media Center is located in Bismarck and maintains a library of written and video materials covering a wide range of topics including substance abuse. Resources are available to any North Dakota resident free-of-charge (North Dakota Department of Human Services, 2011).

1.7.3 Drug Courts

“Drug Court is a court supervised, treatment oriented program that targets non-violent participants whose major problems stem from substance abuse. The Drug Court Program is a voluntary program, which includes regular court appearances before the Drug Court Judge. Treatment includes drug testing, individual and group counseling, and regular attendance at 12-Step meetings. . . . Candidates must have multiple prior Misdemeanor or Felony drug offenses, or in DUI cases must have three or more DUIs” (North Dakota Association of Drug Court Professionals, 2012).

According to the North Dakota Association of Drug Court Professionals, North Dakota has thirteen courts operating: five adult, six juvenile, one tribal, and one college. The drug courts are located in Bismarck, Fargo, Grand Forks, Minot, North Dakota State University, Belcourt,
Williston, and Devils Lake. North Dakota has held two conferences to educate Drug Court Professionals in October 2009 and October 2011.

1.7.4 Targeted Communities

In the past, the Department of Human Services (DHS) had a Regional Substance Abuse Prevention Coordinator in each of the eight regions in North Dakota. In the fall of 2010, DHS restructured its prevention efforts. All North Dakota communities were invited to apply to be a “Targeted Community.” Selected communities were to receive substance abuse prevention assistance through DHS’s Mental Health and Substance Abuse Services Division. The RMEP was an integral part of the application process for the Minot community. Initially, Bottineau, Carrington, Minot, Watford City, and the Mohall-Lansford-Sherwood school district were selected as targeted communities and these communities will have access to one of two Community Prevention Specialists. There are also Prevention Specialists in the following areas: Substance Abuse, Education, and Media. Funding for various prevention efforts will be available through this program, and DHS is continuing to accept applications from other interested communities (North Dakota Department of Human Services, 2012).

1.8 Clandestine Lab Cleanup

Contamination related to methamphetamine production is extremely harmful to health and the environment. As a result, both the State of North Dakota and the Environmental Protection Agency (EPA) have established Best Practices for cleanup of a methamphetamine lab site. The guidelines for cleanup are designed to protect public health and the environment, and enable safe re-occupation of a former lab site. Neither the EPA nor the State of North Dakota requires compliance with these guidelines, and neither agency will certify that the cleanup has been performed accordingly. However, it is advised by both agencies that all property owners of
a confirmed or suspected methamphetamine lab site closely adhere to the published guidelines because they are based on the lessons learned and practical experience of experts in the field. The guidelines provide property owners with a series of remediation tactics, as well as the best practices for cleaning specific items and materials that might be found on the property. Both the state and EPA Best Practices indicate that these cleanup and remediation guidelines are in no way to be deemed all inclusive and therefore, individuals using them are also advised to consult local authorities (United States Environmental Protection Agency, 2012) (North Dakota Department of Health, 2012).

1.9 Native American Issues

The lack of readily available data regarding methamphetamine on North Dakota Native American reservations makes assessing its impact challenging. Difficulty finding tribal specific data is occurring at both the state and national level. When reporting data regarding abuse of illicit substances on reservations, the 2008 Indian Country Drug Threat Assessment makes a notation which explains that existing data does provide a general perspective, however due to issues such as substandard reporting and non-reporting, assessing reservation specific data is difficult (National Drug Intelligence Center, 2008). The National Institute of Justice also cites the lack of available data as a challenge researchers will face when conducting studies of American Indians and Alaska Native communities (National Institute of Justice, 2011).
Section 2: Rural Methamphetamine Education Project

The primary goal of RMEP is to provide a statewide methamphetamine education and awareness campaign. This is achieved by conducting presentations to educate professionals, community members, and students of all ages on the most current issues regarding methamphetamine and other drugs.

2.1 Presentations

The primary focus of RMEP continues to be providing educational presentations to any group making the request. Presentations are delivered using Microsoft PowerPoint and can be adapted to meet the needs of the audience. Over the years, RMEP has received many requests to expand the information in the presentations to include topics other than methamphetamine. In October 2011, RMEP received approval from Toni Morgan-Wheeler, Grant Advisor with the U.S. Department of Justice Office of Community Oriented Policing, to incorporate information on other drugs as long as the presentation still addressed methamphetamine. There are now sections on Synthetic Drugs and Prescription Drugs.

The RMEP also created new presentations to accommodate requests for age-appropriate information. One such presentation was based on the children’s book *No Way Slippery Slick! A Child’s First Book About Drugs* published by Bank Street Books. This presentation is designed for students in kindergarten through second grade. An interactive presentation, based on the popular game show *Jeopardy!* geared towards middle school students was also developed. The contestants select questions from the following categories: Who, What, Why, and How?; Wild Card; Refusal Skills; Illegal Drug FX; Role Play; and Identify It! Another presentation was developed to discuss the History of Drugs. This presentation identifies the origins of several drugs and illustrates how drug use has progressed throughout United States history.
An extensive slide bank library exists for both high school students and adults, allowing for brief or detailed presentations. Topics that can be currently covered within the adult or high school presentation include:

- Synthetic Drugs: synthetic cannabinoids like K2 and Spice, synthetic cathinones like bath salts, and ecstasy
- Prescription Drugs: Opiates/Narcotics/Pain Relievers, Depressants, Stimulants, and Diversion
- History: History of methamphetamine and how the drug problem has evolved
- Identification: Identification of the various forms of methamphetamine, street names, cost, who is using, and why
- Signs & Effects of Use: Routes of administration, how methamphetamine works in the brain, immediate effects, short-term effects, long-term effects, and additional damage to the body
- Cycle of Use: Types of users and the stages of abuse a user may go through
- Production & Trafficking: Ingredients used in local production, environmental impact of waste disposal, and transition from production to trafficking
- Concealment Techniques: Innovative methods used to conceal drugs and/or paraphernalia
- Tips for First-On-Scene: Personal and public safety measures and recommended secondary actions
- Penalties: Associated criminal activity and consequences and penalties for methamphetamine-related activity
- Children at Risk: Prenatal exposure, lab exposure, and drug-focused lifestyle of parent/caregiver
- Intervention: Strategies used with drug exposed children
- Treatment: Myths vs. facts
- Prevention: Options at the individual and community levels
The presentation is updated as new research becomes available. The RMEP strives to provide the most recent statistical informational, as well as information that details the human cost of methamphetamine abuse in North Dakota.

The RMEP currently offers Peace Officer Standards and Training (P.O.S.T.) board hours for law enforcement. Continuing Education Units (CEUs) are also available for social workers (LSW/LCSW/LICSW), licensed addiction counselors (LAC), licensed professional and clinical counselors (LPC/LPCC), and first responders (EMS). The RMEP also provided CEUs to nurses through December 2011. *This continuing nursing education activity was approved by CNE-Net, the education division of the North Dakota Nurses Association, an accredited approver by the American Nurses Credentialing Center’s Commission on Accreditation.*

In November 2008 and October 2010, Basin Electric Power Cooperative, one of the largest electric generation and transmission cooperatives in the United States, integrated RMEP presentations into its mandatory annual staff trainings. Training sessions were provided for seven facilities in three states and reached more than 1,300 employees both years. From December 2009 through April 2011, RMEP provided 27 presentations to companies throughout North Dakota as part of Mine Safety and Health Administration (MSHA) certification or recertification training. The RMEP also presented a block of instruction in 2008 and 2009, and provided an informational exhibit in 2008-2012 at the North Dakota Safety and Health Conference. This annual event is hosted by the North Dakota Safety Council.
Table 2.1 Attendance Totals

Reporting dates: March 11, 2009 – March 12, 2012

<table>
<thead>
<tr>
<th>Year</th>
<th>Presentations</th>
<th>Adult Attendance*</th>
<th>Youth Attendance</th>
<th>Booth Displays</th>
<th>Booth Attendance</th>
<th>Total Attendance</th>
</tr>
</thead>
<tbody>
<tr>
<td>2009</td>
<td>101</td>
<td>1,029</td>
<td>3,250</td>
<td>15</td>
<td>1,498</td>
<td>5,777</td>
</tr>
<tr>
<td>2010</td>
<td>167</td>
<td>2,766</td>
<td>3,321</td>
<td>18</td>
<td>4,566</td>
<td>10,653</td>
</tr>
<tr>
<td>2011</td>
<td>126</td>
<td>1,114</td>
<td>4,007</td>
<td>23</td>
<td>4,065</td>
<td>9,186</td>
</tr>
<tr>
<td>2012</td>
<td>11</td>
<td>232</td>
<td>426</td>
<td>3</td>
<td>720</td>
<td>1,378</td>
</tr>
</tbody>
</table>

*Includes both general awareness presentations and training seminars

2.2 Presentation Evaluations

2.2.1 Evaluation of Services

To determine the effectiveness of RMEP, an evaluation of the RMEP services was conducted during the summer of 2010. The evaluation focused on surveying individuals who contacted RMEP to set up a presentation, booth display, or both. These individuals will be referred to as facilitators in this report. Facilitators were asked to evaluate RMEP services using a survey which was developed and distributed via email providing a link to the survey online. A total of 186 surveys were distributed. Sixty-seven surveys were collected between June 2010 and September 2010 resulting in a 36% return rate.

The main purpose of the evaluation was to determine if RMEP met the needs of the facilitator, and if the service provided raised awareness of the intended audience. Facilitators answered questions related to demographics, evaluation of the scheduled event, and the overall value of the program.

2.2.2 Demographics

Facilitators reported working for a variety of organizations such as education, health, law enforcement, and private industry and business. Fifty-two percent reported that they worked in education, while 19.2% worked in community based or non-profit organizations. The majority of
facilitators served Region II (39.7%) and VII (23.3%) with 55% indicating they worked in a rural setting.

**Figure 2.1. Facilitator’s Organization/Agency**

![Facilitator’s Organization/Agency](image)

**Figure 2.2. Region Served**

![Region Served](image)

2.2.3 Evaluation of the Scheduled Event

Facilitators were asked to identify the type of services provided (i.e. presentation or booth display), and if the services were a standalone event or part of a larger event. Presentations were reported as the most common service utilized with just over half of all services provided as a standalone event.

**Figure 2.3. Standalone or Combined Event**

![Standalone or Combined Event](image)

**Figure 2.4. Service Provided**

![Service Provided](image)

In addition, facilitators classified the purpose of the event in one of the following categories: K-12 awareness, adult awareness, community awareness, or to fulfill a training
requirement for professionals. The RMEP services were utilized most often as K-12 awareness; while the other categories were fairly evenly distributed. The age of the intended audience ranged from elementary school students to adults.

**Figure 2.5. Age Group of Intended Audience**

**Figure 2.6. Purpose of Event**

To determine the effectiveness of the presentations, facilitators were asked to indicate: 1) if RMEP was effective in fulfilling the purpose of the event, 2) if the presentation increased awareness of the intended audience, 3) if they would consider RMEP services for future events, and 4) if they would recommend RMEP services to others. The majority (91.9%) of facilitators agreed or strongly agreed that RMEP was effective in fulfilling the purpose of the event with 95.9% indicating that the presentation/booth display increased the awareness of the intended audience. Ninety-seven percent would consider a presentation/booth display for a future event and 95.9% would recommend RMEP services to others.
2.2.4 Overall value of the program

All of the facilitators agreed or strongly agreed that awareness and education programs like RMEP are effective strategies for addressing issues related to substance use/abuse. Eighty-six percent agreed or strongly agreed that RMEP is a contributing factor to the decrease of use, abuse and overall presence of methamphetamine in North Dakota, and 89% agreed or strongly agreed that RMEP enhanced their professional capacity to address issues related to methamphetamine.
2.4 Involvement on Native American Reservations

From March 2009 through March 2012, RMEP has met or presented to 837 Native Americans from three of the four reservations of North Dakota – Fort Berthold, Spirit Lake, and Turtle Mountain. In addition to providing presentations to individual groups, RMEP has attended the North Dakota Indian Child Welfare Act conference in the years 2008-2011. This allows a wide variety of professionals working from all tribal lands the opportunity to learn about RMEP and the services available through the project. In January 2012, the RMEP had the opportunity to participate in the Mandan Hidatsa Arikara (MHA) Nation Law Enforcement Summit at Four Bears Casino near New Town, ND.

In 2007, Standing Rock Sioux Tribe, Three Affiliated Tribes, and Turtle Mountain Band of Chippewa Indians received federal funding under the Methamphetamine Initiative. Three Affiliated Tribes and Turtle Mountain Band of Chippewa Indians also received funding in 2010. Due to this funding, RMEP’s involvement with these tribes has been minimal, however, services are provided upon request.

2.5 Additional Strategies

The RMEP utilizes various means of information dissemination including booth displays, brochures, and publications. The RMEP provides booth displays at health fairs, conferences, schools, and community events across the state. This display allows RMEP to distribute materials, answer questions, and network within the community which provides for a greater reach of the services offered. All printed resources are available online at www.minotstateu.edu/rcjc.

The RMEP team has been active in several coalitions and safety organizations across the state. The RMEP regularly attends the Safe Communities of North Central Dakota, the Minot
Area Safety Association meetings in Minot, the Southwest Coalition of Safe Communities and Project Ace in Dickinson, and the Community Health Task Force in Hazen, ND and Beulah, ND. In addition, RMEP is involved in the Alcohol, Tobacco, and Other Drugs (ATOD) Task Force at Minot State University. This is a multi-disciplinary group that addresses substance abuse issues within the university system. The RMEP has also been instrumental in planning and coordinating various conferences, speakers, and health and safety fairs throughout the state. Some examples are the Summer Safety Fair and Law Day in Minot and the Teen Maze in Dickinson.

**Table 2.2 Meetings Attended by RMEP**

Reporting Dates: March 11, 2009 – March 12, 2012

<table>
<thead>
<tr>
<th>Year</th>
<th>Number of Meetings Attended</th>
</tr>
</thead>
<tbody>
<tr>
<td>2009</td>
<td>58</td>
</tr>
<tr>
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Section 3: Minot State University Chemistry Collaboration

The RMEP, in conjunction with MSU, purchased a Gas Chromatograph Mass Spectrometer (GC/MS) for use in the detection of methamphetamine and other materials used in methamphetamine production. The equipment is not currently being utilized for on-site detection and training, however other research opportunities are being explored. Studies regarding the detection of lithium and the degradation of methamphetamine over time were conducted using the equipment. The following sub-sections describe the studies conducted by the MSU Chemistry Department.

3.1 Methamphetamine Degradation

During the 2011-2012 academic year, Mitchell Falkenberg, MSU Chemistry student, under the supervision of Dr. Robert Crackel, conducted the study “Temperature Degradation of Methamphetamine as a Function of Time.” This study explored how methamphetamine breaks down over time at both room temperature and elevated temperatures (See Appendix A).

3.2 Effective Solvent for Remediation

In the fall of 2011, Kerri Berg, MSU Chemistry student, under the supervision of Dr. Robert Crackle, conducted the study “Determining an Effective Solvent for the Remediation of Methamphetamine.” In this study, three solvents: (1) reagent-grade methanol, (2) Sparkleen™ (manual washing) solution, and (3) distilled water were tested following attempted removal of methamphetamine from glass, finished wood, and unfinished wood surfaces.

It was found that all three solvents removed methamphetamine from the glass and finished wood surfaces well enough that no relative abundance of methamphetamine could be detected by the GC/MS. It was also determined that no relative abundance of methamphetamine could be detected on the surface or at one centimeter of depth into the unfinished wood using
methanol or dichloromethane as a soaking solvent. Since results suggest that methamphetamine travels into the grain of wood, further research is needed to establish the depth to which methamphetamine may be expected to penetrate and how it might be extracted for detection (See Appendix B).
Section 4: Project Recommendations

As the issues related to methamphetamine in North Dakota evolve, so do the efforts of RMEP. The RMEP remains committed to providing its services, expanding services to areas in need, and evaluating the threat of methamphetamine in North Dakota. The RMEP is actively working on several projects that include the following:

4.1 Expand the Use of Digital Medium

The RMEP has explored the possibility of developing a methamphetamine “toolkit” for public use. After further research on existing “toolkits,” the RMEP has changed its focus. Since there are many well-designed “toolkits” available, RMEP will make existing PowerPoint presentations available online. Presentations will be broken into sections and will be accompanied by a resource guide.

The RMEP contacted the Department of Public Instruction (DPI) to gather information regarding current drug prevention requirements for the state of North Dakota. While no requirements for drug prevention exist, instruction regarding substance abuse is recommended. Based on these findings, RMEP researched the North Dakota state curriculum standards for Health, Science and School Guidance for grades K-12 to determine what additions and modifications could be made to the current presentations for students. The RMEP’s goal is to incorporate more grade specific, relevant information. Once the presentations are edited, RMEP will explore the possibility of narrating them and posting the presentations on the Web site for anyone to view. In addition to the PowerPoint’s, teacher’s guides and resources will be made available for teachers to utilize.
4.2 Methamphetamine Research Library

The RMEP has been in existence since 2001 and has compiled a great deal of data and literature. The organization of this literature into a research library will allow RMEP to continue serving as a resource after funding for the project has been exhausted. This library will make literature readily available to human service professionals, law enforcement, and the general public. Currently this information is available on the “Links” tab of the RMEP Web site. It is organized by local, state, and federal agencies that provide reliable information to the public.

4.3 Minot State University Chemistry Collaboration

The RMEP staff is not currently participating in chemistry research; however, the Chemistry Department, along with enrolled chemistry students, is using RMEP equipment for further research pertaining to methamphetamine detection and removal. Current research includes the testing of a variety of solvents to determine their effectiveness in removing methamphetamine from surfaces. Chemistry students are investigating the influence of the type of surface in relation to methamphetamine removal. While not directly involved in this research, RMEP will continue to stay abreast of the findings through regular communication with Dr. Crackel.

4.4 Continued Evaluation

Continued evaluation is a useful tool to determine the effectiveness of a program. The RMEP will continue to evaluate its education and awareness program. Audience members will have the opportunity to complete a presentation evaluation after events and return them directly to RMEP staff or return them as a self-addressed, pre-paid post card to RMEP. The RMEP will continue to track events, including the attendance, purpose and location. Results of all evaluations will be made available on the RMEP website.
Conclusion

This report represents an analysis of the impact of methamphetamine in North Dakota and the response by RMEP. Statistics suggest that the prevalence of methamphetamine has decreased in areas such as clandestine lab seizures and adolescent use, but trafficking continues to rise. The RMEP will continue to provide resources and services throughout the state of North Dakota. In order to meet the needs of those requesting services, RMEP will continue to evaluate its efforts and modify its strategies when necessary.
References


North Dakota Department of Corrections and Rehabilitation. (2012). *The Insider.*
http://www.nd.gov/docr/media/stats.html.


North Dakota Department of Human Services. (2011, January 24). *Prevention and Media Resource Center.* Retrieved from North Dakota Department of Human Services Division of Mental Health and Substance Abuse Services:
http://www.nd.gov/dhs/services/mentalhealth/prevention/prmc.html

North Dakota Department of Human Services. (2012, April 20). *Community Prevention.* Retrieved from North Dakota Department of Human Services Division of Mental Health and Substance Abuse Services:
http://www.nd.gov/dhs/services/mentalhealth/prevention/community-services.html

North Dakota Department of Public Instruction. (2011). *Youth Risk Behavior Survey.* Retrieved from North Dakota Department of Public Instruction:
http://www.dpi.state.nd.us/health/YRBS/index.shtm


http://www.ag.nd.gov/MethWatch/MethWatch.htm


Substance Abuse and Mental Health Services Administration. (2010). *Quick Statistics from the Drug and Alcohol Services Information System.*


http://www.epa.gov/osweroe1/methlab.htm


Appendix A

Temperature Degradation of Methamphetamine Over Time
The goal of the work completed during the 2011-2012 school year at Minot State University on the project: Temperature Degradation of Methamphetamine as a Function of Time; was to see how the methamphetamine in solution signal changed when subjected to higher than normal temperatures. A stock solution of 1000ng/mL of methamphetamine was prepared; it was used both as a control reference and for the purpose of making samples. The stock solution was kept in a refrigerator to help preserve it. Every sample was analyzed by a gas chromatograph (GC) and a mass spectrometer (MS) was used as the detector for determining the methamphetamine signal from each sample.

Fall semester 2011 (August through December), samples were prepared by placing the stock solution into an oven that was regulated at 40°C, in increments of one hour. Samples were heated for one hour up to a total of eight hours. After heating, the samples were run on the GC/MS. For each run, the sample was analyzed, and then a pure solvent was run though to cleanse the system. The stock solution and another solvent injection followed this for each run. The sample signal was compared to the signal from the cold stock solution. Initially we saw a decrease in area and height on the GC/MS at retention time (RT) of approximately 5.5. Also we saw an increase in the area and height on the GC/MS at RT of approximately 6.1-6.2. When investigated both peaks showed the highest probability of being the methamphetamine. An interesting in the change in the ratios of peaks, seeing as they both came out as methamphetamine. There have been observable changes to the signal from the sample; however, it is hard to determine at this time what is causing the ratio of peaks at RT 5.5 and RT 6.2 to change. It does not appear that the methamphetamine has been degraded or destroyed at this temperature or time range.

In January we started to test samples heated at 50°C for 4-9 hours, in one hour increments, as well as 24 hours and at 30 hours. As during the first semester it was observed that the ratios of peaks on the GC/MS was changing at RT 5.5 minutes and RT 6.1-6.2 minutes. A decrease in the signal at RT 5.5 minutes and an increase at RT 6.1-6.2 minutes was observed. However, when investigated both peaks showed up as being methamphetamine.

It was decided to switch from testing the solutions heated in the oven to surfaces coated with methamphetamine and then heated. We began testing the methamphetamine on glass surfaces heated in the oven starting at 50°C for one hour increments. At this point only one, two and three hours have been completed and it is hard to say at this time if we are seeing a different trend than we saw in the solutions. However, so far the data appears to be similar to that from heated solutions. The technique for extracting the methamphetamine off of the glass surface needs to be perfected in order to have an accurate amount to compare with the control stock solution.
Appendix B

Determining an Effective Solvent for the Remediation of Methamphetamine
Determining an Effective Solvent for the Remediation of Methamphetamine

Kerri Berg
Department of Chemistry
Fall 2011

Approved: ____________________________
ABSTRACT

Methamphetamine is a controlled substance under the Drug Abuse Act of 1965. Since legal drug manufacturers removed it from the market and the FDA restricted its use to medical treatments in the 1970s, methamphetamine has been produced illegally in a variety of settings from household kitchens to sheds. Persons exposed to harmful chemicals at methamphetamine production sites may suffer adverse health effects including throat irritation and respiratory difficulties. Effective remediation of methamphetamine has thus become a concern. In this study, three solvents: (1) reagent-grade methanol, (2) Sparkleen™ (manual washing) solution, and (3) distilled water were tested following attempted removal of methamphetamine from glass, finished wood, and unfinished wood surfaces. It was found that all three solvents removed methamphetamine from the glass and finished wood surfaces well enough that no relative abundance of methamphetamine could be detected by GC/MS. It was also determined that no relative abundance of methamphetamine could be detected on the surface or at one centimeter of depth into the unfinished wood using methanol or dichloromethane as a soaking solvent. Since results suggest that methamphetamine travels into the grain of wood, further research is needed to establish the depth to which methamphetamine may be expected to penetrate and how it might be extracted for detection.
INTRODUCTION

Methamphetamine, a structural analog to amphetamine, is an illegal, powerfully addictive, central nervous system stimulant that is easily manufactured with relatively inexpensive over-the-counter ingredients. It is causing a nationwide epidemic (Chesley 1999). It can be smoked, inhaled, injected, or ingested, resulting in increased heart rate, blood pressure, body temperature, and rate of breathing (Hughart 2011). Ephedrine, derived from plants in the genus Ephedra, is used in manufacturing amphetamines, which at one time were used medicinally as the “cure all” for such conditions as multiple sclerosis, narcolepsy, Parkinson’s Disease, depression, and asthma (Chesley 1999). Due to a shortage of naturally occurring ephedrine, Ogata (in 1919) attempted to synthesize it. In his attempt, he discovered d-phenylisopropylamine HCL, known today as methamphetamine, or “meth” in colloquial usage (Chesley 1999).

Abuse of the amphetamine drug was first noted in Japan amongst factory workers and soldiers. Because of this, amphetamines and methamphetamine were controlled under the Drug Abuse Act of 1965. Legal drug manufacturers removed these products from the market, spawning illicit manufacture due to a vacuum in the market (Chesley 1999). In the 1970s, the FDA restricted use of amphetamines to treatments for narcolepsy, attention deficit disorder (ADD) in children, and weight reduction for the morbidly obese (Chesley 1999). Though it is available today by prescription, much methamphetamine is produced and acquired illegally.

Methamphetamine laboratories have been found in a variety of locations, including household kitchens and garages, apartments, motel rooms, recreational vehicles, and sheds. The production of methamphetamine requires no chemistry
knowledge or background. Many different recipes exist, and usually they are learned from observation, by trial and error, by passage from person to person, or even through the Internet. Although manufacturing technique and ingredients may vary, no method that presently exists can be deemed safe.

Chemical precursors are required to manufacture illicit drugs (Hughart 2011). The Drug Enforcement Administration (DEA) estimates that 5-6 pounds of hazardous waste are generated for each pound of methamphetamine produced (Chesley 1999). Commonly encountered chemicals include red phosphorous, sodium hydroxide, freon, toluene, hydrochloric acid, phosphine gas, and ammonia (NDDH 2009). These materials often are poured down the drains of apartments and homes where the laboratories are located, potentially resulting in serious chemical and thermal burn hazards for law enforcement officers, maintenance and cleanup personnel, and future residents (Hughart 2011). Operating laboratories present the greatest exposure hazard from release of reagent chemicals and their byproducts and potential for fire or explosion (WADPH 2011).

Adverse health effects have been reported in subsequent occupants of laboratories that had not been adequately cleaned up. Such effects have included throat irritation, respiratory difficulties, and headaches when families unknowingly have moved into houses that previously contained methamphetamine laboratories (WADPH 2011). Children exposed to chemicals in clandestine drug laboratories may suffer kidney, spleen, or liver damage. Frequently they exhibit emotional and behavioral problems, lack proper nutrition and health care, and may be burned by corrosive and flammable precursor chemicals (Hughart 2011).
Testing for the presence of methamphetamine itself can determine whether or not a location has been used as a clandestine laboratory. Although agreement has not yet been reached as to which solvent should be used, the three most common lifting agents used in sampling for methamphetamine are deionized water, isopropyl alcohol, and methanol (USEPA 2009). This project was designed to determine which solvent — 99.8+% American Chemical Society (ACS) reagent-grade methanol, Fisherbrand® Sparkleen™ (manual washing) solution, or distilled water — should be considered most effective in removing methamphetamine from glass surfaces, either for sampling or as a part of remediation.

METHODS

Three solvents were tested: (1) 99.8+% ACS reagent-grade methanol, (2) a solution of Fisherbrand® Sparkleen™ manual washing detergent (2.5 mL powder detergent mixed with 500 mL warm water), and (3) distilled water. Four 125 mm watch glasses were used for testing each solvent on a glass surface, with one watch glass serving as the control and the other three as the experimental group. Prior to experimentation, each watch glass was gently scrubbed with a sponge in a solution of Sparkleen™ detergent which routinely is used to clean glassware in chemistry laboratories (approximately five milliliters detergent powder per liter of warm water). Watch glasses were then rinsed three times in distilled water, given a final rinse in isopropyl alcohol (ACS reagent grade), and left to dry.

Prior to methamphetamine application, each watch glass was labeled with the solvent to be tested (methanol, Sparkleen™, or distilled water) and either as the control, or by number as part of the experimental group (Exp #1, Exp #2, or Exp #3). Nitrile
powder-free gloves were worn for application of methamphetamine to each watch glass, and in subsequent solvent application and extraction procedures. To minimize cross-contamination, new gloves were worn for each watch glass sample.

**Methamphetamine Application Procedure**

Approximately two milliliters of a refrigerated stock solution of methamphetamine (5.0 µg/mL methamphetamine dissolved in methanol) were applied to the outer edge of each of the watch glasses in each set using a Pasteur pipette. The solution was allowed to run to the center of the watch glass and left to dry for two days.

**Solvent Application Procedure**

To test methanol, 99.8±% ACS reagent grade methanol was poured into a beaker, a Kimwipe® folded to approximately the same size as an alcohol wipe was submerged in it, and pressed slightly so that it would not drip. Three experimental watch glasses were then wiped using the technique of “wipe sampling,” in which a wipe wetted with solvent is used to cover a glass surface in an overlapping “Z” and “N” motion (DTSC 2009). A new Kimwipe® was used for each watch glass and then discarded.

To test the Sparkleen™ detergent, a solution was made according to product guidelines (2.5 mL detergent powder with 500 mL warm water). A Kimwipe® was then soaked in the detergent, pressed slightly to remove excess liquid. Each of three experimental watch glasses was wiped, again using the “Z” and “N” technique and a new Kimwipe® for each watch glass. The Kimwipes® were again discarded. The same process was repeated for distilled water.
Alcohol Wipe Sampling

After solvent application, all watch glasses were wiped with an alcohol wipe (with 70% isopropyl alcohol) using the same wipe sampling technique and a new alcohol wipe for each watch glass. Each wipe was then inserted into a labeled, ten-milliliter disposable plastic syringe by removing the plunger, inserting the alcohol wipe, and reinserting the plunger until the alcohol wipe was at the tip of the syringe with no liquid yet pressed out of it. This process was repeated with each watch glass, using a new alcohol wipe and syringe.

Extraction

Once the alcohol wipes were in their appropriately labeled syringes, extraction began. Approximately two milliliters of methanol (CHROMASOLV®, for HPLC, gradient grade, ≥99.9%) were pipetted with a disposable, one-milliliter plastic pipette into a small plastic weigh boat, and the syringe was held over the weigh boat. Depressing the plunger over the weigh boat, liquid from the alcohol wipe was expressed into the weigh boat. All of the liquid in the weigh boat was then drawn up into the syringe and the tip was covered with a gloved finger. With the tip covered, the syringe was shaken gently for approximately 15 seconds in order to allow the liquid to flow through the alcohol wipe. The liquid was then expressed back into the weigh boat and drawn up again into the syringe. The tip was again covered and the apparatus was again shaken for 15 seconds and the liquid was expressed. This process was repeated until the syringe had been shaken three times and all liquid had been delivered a final time into the weigh boat. The liquid was then drawn up using a Pasteur pipette and transferred to a labeled, two-milliliter glass sample vial for GC testing. This procedure was repeated for each sample.
GC/MS Testing

The GC/MS used in this study was a Thermo Scientific Trace GC Ultra with a Thermo Scientific PolarisQ MS and an AS 3000 auto-sampler, in conjunction with an Xcalibur Mass Spectrometry data system. This study used the GC data only.

In GC, a syringe is used to inject the sample through a septum into the inlet. This is where the sample is first introduced into the GC. The temperature is then raised high enough to volatilize the least volatile compound, but not so high that the sample starts to decompose. The sample volatilizes in the inlet and is then pushed through the column by an inert carrier gas, which typically is helium. (Helium is most widely used because of its availability, low cost, and the fact that it works well for most applications.)

Separation of the sample components occurs in the column (in this case, a capillary column), which is heated. When a sample enters the column, attraction may occur between the sample components and the lining in the column. If there is no attraction between a component and the lining, it is carried with the carrier gas and is detected in less time. If a component is attracted to the lining, it spends more time in the column and takes longer to reach the detector. Once components have passed through the column, the detector sends a signal to the computer. The computer then integrates the signal from the detector. Integration determines the area under a peak (compound) and thus displays the retention time.

Methanol (CHROMASOLV®, for HPLC, gradient grade, ≥99.9%) was run twice before any sample vial was run to minimize cross-contamination during GC testing. In order to assess methamphetamine presence from samples, a vial of the original methamphetamine stock solution was first run as a basis for comparison.
Wood Surface Testing

When it was discovered that 99.8+% ACS reagent grade methanol, Fisherbrand® Sparkleen™ manual washing detergent, and distilled water all worked sufficiently well to remove methamphetamine from a glass surface, it was determined that a different type of surface should be tested. A section of wood (finished on one side, unfinished on the other) measuring approximately 28 cm by 29 cm was acquired and cut into four separate squares to minimize cross contamination. One square served as the control while the other three served as the experimental group.

The finished side of each square was subjected to an initial wipe with an alcohol wipe to ensure a clean surface prior to methamphetamine application. In an effort to prevent methamphetamine from running off the edge, each square was rested on a flat surface while methamphetamine was applied. Approximately two milliliters of a refrigerated stock solution of methamphetamine (5.0 µg/mL methamphetamine dissolved in methanol) were applied to each finished surface using a Pasteur pipette in a spiral motion, and the squares were left to dry for two days. Each experimental square was then subjected to solvent application and left to dry for approximately five minutes to ensure the surface was no longer moist. Alcohol wipe sampling, extraction, and GC/MS testing processes were conducted on all four squares.

There was no initial cleaning of the unfinished wood prior to methamphetamine application due to the porosity of the wood surface. With each unfinished square resting on a flat surface, approximately two milliliters of a refrigerated stock solution of methamphetamine (5.0 µg/mL methamphetamine dissolved in methanol) were applied to each surface using a Pasteur pipette in a spiral motion. The squares were then left to dry for
two days. Each experimental square was then subjected to solvent application. Due to the porosity of the surface, it was deemed unnecessary to allow time for the surface to dry. Alcohol wipe sampling, extraction, and GC/MS testing processes were then repeated for each of the wood squares.

When it was discovered that the chromatograms showed no relative abundance of methamphetamine present in any of the unfinished wood square samples, it was determined that another technique should be applied in order to extract the methamphetamine from the wood. Using the tip of a knife, a conical portion of the control wood square measuring approximately 2.5 cm in diameter and 1.0 cm in depth was chipped out and placed in a 150 mm glass test tube. Five milliliters of methanol (CHROMASOLV®, for HPLC, gradient grade, ≥99.9%) were added to the test tube. The wood was allowed to soak for 10 minutes with light agitation from flicking the bottom of the test tube. The contents of the test tube were then poured into a glass funnel with size 5 filter paper and the liquid was allowed to drip into a glass sample vial for GC testing.

When the chromatogram showed no relative abundance of methamphetamine present, another conical portion of wood was chipped out from the control wood square and allowed to soak in methanol (CHROMASOLV®, for HPLC, gradient grade, ≥99.9%) for 20 minutes with light agitation (flicking of the bottom of the test tube). The same process was used to filter the contents of the test tube into a glass sample vial. It was determined that a soaking time of 20 minutes was excessive after the chromatogram showed a relative abundance of an unidentified compound present in the sample.

When it was discovered that a soaking time of 20 minutes was excessive and 10 minutes was inadequate, it was determined that a different soaking solvent should be
used. A conical portion of wood was again chipped out from the control wood square and allowed to soak in five milliliters of dichloromethane (CHROMASOLV® for HPLC, ≥99.8%, contains amylene as stabilizer). Using a clean apparatus, the contents were again filtered into a glass sample vial. Due to time constraints, no further experimentation was completed.

RESULTS

A chromatogram of the methamphetamine stock solution is shown in Figure 1, indicating a retention time (RT) of 5.49 minutes, with the area under the peak (AA) equal to 4470658 (intensity versus time).

![Figure 1](chart1.png)

**Figure 1** Chromatogram of the methamphetamine stock solution (concentration of 5.0 μg/mL methamphetamine dissolved in methanol).

Figures 2, 3, 4, and 5 show chromatograms for the methanol wipe set. The chromatogram for the control in Figure 2 shows a retention time of 5.52 minutes, with the area under the peak at 903907 (intensity versus time). Chromatograms for the experimental set (Figures 3, 4, and 5) show no relative abundance of methamphetamine present after using methanol (99.8+% ACS reagent grade) as a solvent.

![Figure 2](chart2.png)

**Figure 2** Chromatogram of the control for the methanol wipe set. No methanol was used on this sample.
Figures 3, 4, and 5 show chromatograms for the methanol wipe set.

Figures 6, 7, 8, and 9 show chromatograms for the Sparkleen™ detergent set.

The chromatogram for the control (Figure 6) shows a retention time of 5.52 minutes and the area under the peak as 232496 (intensity versus time). Chromatograms for the experimental set (Figures 7, 8, and 9) show no relative abundance of methamphetamine present after using Sparkleen™ as a solvent.

Figure 6 Chromatogram of the control for the Sparkleen™ detergent set. No Sparkleen™ was used on this sample.
Figures 7, 8, and 9 show chromatograms for the Sparkleen™ detergent set. Figures 10, 11, 12, and 13 show chromatograms for the distilled water set. The chromatogram for the control (Figure 10) shows a retention time of 5.51 minutes, with the area under the peak at 614709 (intensity versus time). Chromatograms for the experimental set (Figures 11, 12, and 13) show no relative abundance of methamphetamine present after using distilled water as a solvent.

Figure 10 Chromatogram of the control for the distilled water set. No distilled water was used on this sample.
Figures 11, 12, and 13 show chromatograms of experimental samples #1, #2, and #3, respectively, in the distilled water set.

Figures 14, 15, 16, and 17 show chromatograms for the finished wood squares. The chromatogram for the control (Figure 14) shows a retention time of 5.52 minutes, with the area under the peak at 255755 (intensity versus time). Chromatograms for the experimental set (Figures 15, 16, and 17) using methanol (99.8±% ACS reagent grade), Sparkleen® detergent, and distilled water indicate no relative abundance of methamphetamine present after solvent application.
Figures 15, 16, 17 show chromatograms for the wood squares. There is no relative abundance of methamphetamine present that can be seen in the chromatograms of the control (Figure 18) or the experimental group (Figures 19, 20, and 21).
Figures 19, 20, and 21 show chromatograms of the methanol sample in the wood square set. Figures 22, 23, and 24 show chromatograms of the chipped wood samples from the control wood square. The chromatogram of the sample soaked in methanol (CHROMASOLV®, for HPLC, gradient grade, ≥99.9%) for 10 minutes (Figure 22) shows no relative abundance of methamphetamine present. The chromatogram of the sample soaked in methanol (CHROMASOLV®, for HPLC, gradient grade, ≥99.9%) for 20 minutes (Figure 23) shows a retention time of 5.01 minutes from an unidentified compound. The chromatogram of the sample soaked in dichloromethane for 10 minutes (Figure 24) shows no relative abundance of methamphetamine present.
DISCUSSION

Remediation of Methamphetamine from Glass Surface and Finished Wood Surfaces

Three solvents, methanol (99.8+% ACS reagent grade), a solution of Sparkleen™ detergent, and distilled water, were found to be effective in removing methamphetamine (at a concentration of 5.0 μg/mL methamphetamine dissolved in methanol), so that no relative abundance could be detected using GC/MS testing.

All three solvents were again found to be effective in removing methamphetamine (at a concentration of 5.0 μg/mL methamphetamine dissolved in methanol), so that no relative abundance could be detected using GC/MS testing.
Discussion of Methamphetamine on an Unfinished Wood Surface

The alcohol wipe sampling and extraction processes were found to be ineffective for the detection of methamphetamine by GC/MS. Surface alcohol wipe sampling was found to be ineffective in extracting methamphetamine from an unfinished wood surface so that a relative abundance could not be detected by GC/MS.

It was also found that methanol (CHROMASOLV®, for HPLC, gradient grade, ≥99.9%) was ineffective as a soaking solvent (for 10 minutes and 20 minutes) to extract methamphetamine from chips of wood taken from a conical section measuring approximately 2.5 cm in diameter and 1.0 cm deep. The same was found for dichloromethane (CHROMASOLV®, for HPLC, ≥99.8%, contains amylene as stabilizer) after a 10-minute soak.

Solubility of Methamphetamine

Due to its apparent solubility in polar solvents, this research suggests that a number of solvents can successfully remove methamphetamine from non-porous surfaces so that no amount can be detected by GC/MS.

Discussion of Further Studies

Further research should be considered regarding the testing of other chromatograph-grade solvents to determine if there is a more effective solvent to extract methamphetamine from porous, unfinished wood as a continuation of remediation study. It may also be beneficial to experiment with various size sections of wood chipped from unfinished wood to determine the depths to which methamphetamine can soak.
REFERENCES


