HEADLINE SPONSORS

U.S. Department of Energy
General Motors Corporation
Natural Resources Canada

MAJOR COMPETITION SPONSORS

Illinois Department of Commerce and Community Affairs
State of Nebraska
The Council of Great Lakes Governors

ASSOCIATE COMPETITION SUPPORTERS

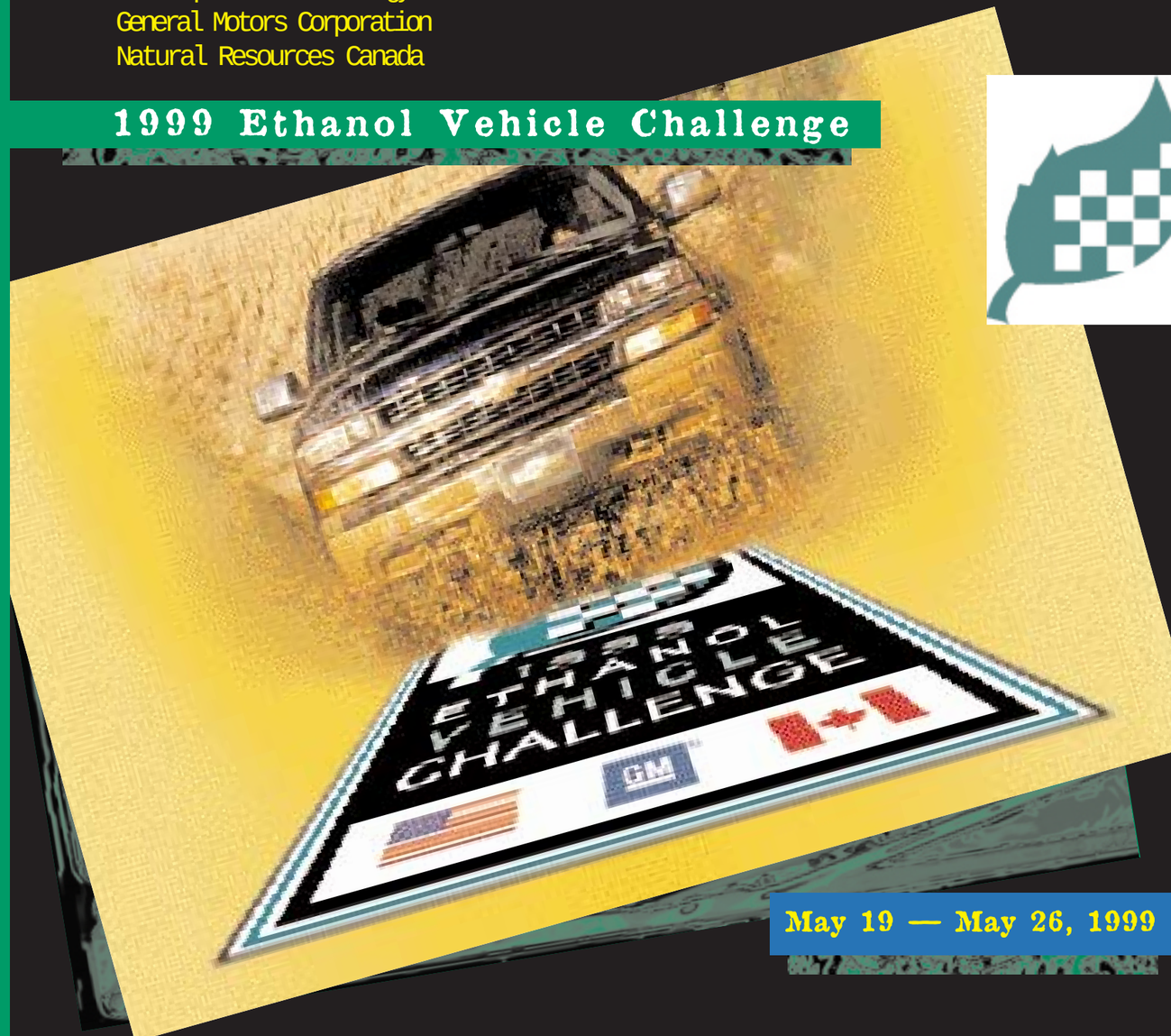
Delphi Automotive Systems
The Governors' Ethanol Coalition
The Illinois Corn Marketing Board
National Corn Growers Association
Renewable Fuels Association

COMPETITION SUPPORTERS

Canadian Renewable Fuels Association
Growmark
Williams Ethanol Services

U.S. Department of Energy
General Motors Corporation
Natural Resources Canada

1999 Ethanol Vehicle Challenge



May 19 — May 26, 1999

Cedarville College, Ohio
Crowder College, Missouri
Idaho State University
Illinois Institute of Technology
Kettering University, Michigan
Minnesota State University — Mankato
University of California, Riverside
University of Illinois at Chicago
University of Kansas
University of Nebraska — Lincoln
University of Texas at Austin
University of Texas at El Paso
University of Waterloo, Ontario
Wayne State University, Michigan

Managed by Argonne National Laboratory

CHEVROLET SILVERADO

The all-new Silverado is the first major redesign of Chevrolet's full-size pickups in a decade and, with over half a million sales last year, represents the division's single largest-selling vehicle line, car or truck. A new line of Vortec V-8 engines, ranging from a 4.8-liter/255-horsepower to a 6.0-liter/300-horsepower, provide plenty of power for towing or hauling. In addition, the half-ton Silverado has the roomiest cab in its class.

Dear Ethanol Vehicle Challenge Team Members,

On behalf of General Motors Corporation, welcome to the 1999 Ethanol Vehicle Challenge. We are proud to be a sponsor of this event as it represents the culmination of many months of effort, teamwork, and dedication. We are also very happy to have been able to provide one of GM's most exciting new vehicles for use by the teams in this year's competition — the 1999 Chevrolet Silverado Full-Size Pickup, winner of this year's Motor Trend Truck of the Year Award.

Participating as a team member in the Ethanol Vehicle Challenge provides each student the opportunity to learn how to balance their time and energy between competition activities, the rigors of strong engineering curriculums, and in many cases part-time jobs. This is not unlike the balance that the cross-functional teams at GM had to strike between safety, performance, function, styling, costs, and regulatory requirements on the Silverado.

The General Motors Truck Group is also particularly pleased to have the opportunity to explore alternative fuel technologies with the United States Department of Energy, Natural Resources Canada, and ethanol producers. General Motors is committed to reducing the impact of motor vehicles on our environment. Ethanol and mixes of ethanol with gasoline are clearly practical alternative fuel options that consumers need the opportunity to choose in the marketplace.

We at General Motors, along with other sponsors of the competition, look forward to learning about the unique design approaches you have developed in converting your team's Silverado from gasoline to ethanol (E85) fuel. We also hope that you have learned and that the competition will bring out some of the challenges unique to light truck vehicle engineering in contrast to solutions appropriate in the passenger car realm. However, our greatest gain is in the opportunity to meet students who want to be innovative members of tomorrow's engineering teams in the automotive industry. We applaud the dedication that brought you as students and faculty to our Milford Proving Ground.

Let the competition begin and may the best Silverado win!

Michael A. Grimaldi
Vice President and Vehicle Line Executive
Full-Size Truck Products

Thomas G. Stephens
Vice President, Engineering
General Motors Truck Group

GM®

ETHANOL VEHICLE CHALLENGE SCHEDULE

Wednesday, May 19

Registration	8:00 a.m. — Noon	Lundstrom House
Safety Inspections	8:00 a.m. — 5:30 p.m.	Building 73
Fuel Drain/Refueling	8:30 a.m. — 5:30 p.m.	Military Facility (Building 12)
Noise Testing	Noon — 5:30 p.m.	Noise Pass-By (Building 56)
Lunch	Noon — 1:00 p.m.	Military Facility (Building 12)
Registration	1:00 p.m. — 5:00 p.m.	Lundstrom House
Safety Meeting/Skit Night	7:00 p.m. — 8:30 p.m.	Baker's

Thursday, May 20

Safety Inspections	7:00 a.m. — 4:00 p.m.	Building 73
Appearance Judging	7:30 a.m. — 1:00 p.m.	Military Facility (Building 12)
Design Judging	7:30 a.m. — 1:00 p.m.	Building 73
Fuel Drain/Refueling	7:30 a.m. — 4:00 p.m.	Military Facility (Building 12)
Opening Ceremony/Lunch	1:00 p.m. — 3:00 p.m.	Military Facility (Building 12)
Design Judging	3:00 p.m. — 5:00 p.m.	Building 73
Teams Move Vehicles to Pits*	5:00 p.m. — 5:30 p.m.	Military Facility (Building 12)
Team Leader's Meeting	5:00 p.m. — 5:30 p.m.	Military Facility (Building 12)
Soak Cold Start/ Emissions Testing	5:30 p.m. — 8:00 p.m.	Vehicle Emissions Lab (Building 31)

Friday, May 21

Emissions Testing (odd #s)	7:00 a.m. — 5:00 p.m.	Vehicle Emissions Lab (Building 31)
Cold Start/Driveability Testing (even #s)	7:00 a.m. — 4:00 p.m.	Vehicle Emissions Lab (Building 31)
Noise Testing	8:00 a.m. — 5:00 p.m.	Noise Pass-By (Building 56)
Oral Presentations	9:00 a.m. — Noon	West Lobby Conference Room
Career Fair	9:00 a.m. — 4:00 p.m.	Military Facility (Building 12)
Lunch	Noon — 1:00 p.m.	Military Facility (Building 12)
Oral Presentations	1:00 p.m. — 5:00 p.m.	West Lobby Conference Room
Soak Cold Start/ Emissions Testing	5:00 p.m. — 7:00 p.m.	Vehicle Emissions Lab (Building 31)
Powertrain Reception	5:30 p.m. — 8:30 p.m.	Pontiac, MI

Saturday, May 22

Emissions Testing (even #s)	7:00 a.m. — 5:00 p.m.	Vehicle Emissions Lab (Building 31)
Cold Start/Driveability Testing (odd #s)	7:00 a.m. — 4:00 p.m.	Vehicle Emissions Lab (Building 31)
Noise Testing	8:00 a.m. — 5:00 p.m.	Noise Pass-By (Building 56)
Prop Shaft Re-Installation/ Tire Pressure Setting	7:00 a.m. — 4:00 p.m.	Vehicle Emissions Lab (Building 31)
Lunch	Noon — 1:00 p.m.	Military Facility (Building 12)
Team Leader's Meeting	4:00 p.m. — 5:00 p.m.	Military Facility (Building 12)
Acceleration Event	6:00 p.m. — 8:00 p.m.	Black Lake
Refueling and Ballasting	7:00 p.m. — 9:30 p.m.	Black Lake

Sunday, May 23

Breakfast	6:00 a.m. — 7:00 a.m.	Black Lake
On-Road Fuel Economy Testing	6:30 a.m. — 11:00 a.m.	Black Lake
Unballasting and Refueling	8:00 a.m. — 9:00 a.m.	Black Lake
Lunch	11:00 a.m. — Noon	Black Lake
Refueling	11:00 a.m. — Noon	Black Lake
Off-Road Event	Noon — 3:30 p.m.	Military Hill Course
Hill Climb Event	3:30 p.m. — 7:00 p.m.	7.2% Grade Hill

Monday, May 24

Driver's Meeting	6:00 a.m. — 6:30 a.m.	Holiday Inn Express, Brighton, MI
Road Trip Begins	6:30 a.m. — 8:30 a.m.	Brighton, MI to Lansing, MI
Press Event	8:30 a.m. — 11:00 a.m.	Capitol Building in Lansing, MI
Road Trip Continues	11:00 a.m. — 2:30 p.m.	Lansing, MI to Ft. Wayne, IN
Pit Stop/Box Lunch	1:00 p.m. — 2:00 p.m.	Pokegon State Park, IN
Press Event/Tour	2:30 p.m. — 6:30 p.m.	Ft. Wayne Assembly Plant

Tuesday, May 25

Driver's Meeting	7:00 a.m. — 7:30 a.m.	Best Western Luxbury Inn, Ft. Wayne, IN
Road Trip Continues	7:30 a.m. — 9:30 a.m.	Ft. Wayne, IN to Indianapolis, IN
Press Event/Lunch/ Refueling	9:30 a.m. — 12:30 p.m.	Indianapolis, IN
Road Trip Continues	12:30 p.m. — 4:30 p.m.	Indianapolis, IN to Peoria, IL
Press Event/Dinner/Refueling	4:30 p.m. — 8:00 p.m.	Williams Ethanol, Peoria, IL

Wednesday, May 26

Driver's Meeting	8:30 a.m. — 9:00 a.m.	Mark Twain Hotel, East Peoria, IL
Road Trip Continues	9:00 a.m. — 11:00 a.m.	Peoria, IL to Springfield, IL
Press Event	11:00 a.m. — Noon	Illinois Building, State Fair Grounds, Springfield, IL
Awards Ceremony	Noon — 2:30 p.m.	Illinois Building, State Fair Grounds, Springfield, IL

** Pit Hours*

Day 1	*May 19*	*7:00 a.m. — 6:00 p.m.*
Days 2-4	*May 20-22*	*6:00 a.m. — 8:00 p.m.*
Day 5	*May 23*	*5:30 a.m. — 8:00 p.m.*

Table of Contents

General Motors Welcome	1
Schedule	2
Introduction	5
Competition Events	6
Everyone Wins with Ethanol	8
Team Profiles	8
Organizers	15
Event Sites	16
Headline Sponsors	17
Major Competition Sponsors	18
Associate Competition Sponsors	19
Competition Supporters	20

The 1999 Ethanol Vehicle Challenge is the second year of an Advanced Technology Vehicle Competition sponsored by the U.S. Department of Energy (DOE) to investigate the potential for dedicated ethanol vehicles. Partnering with DOE in major sponsorship of the 1999 Challenge are Natural Resources Canada and General Motors Corporation (GM).

The Ethanol Vehicle Challenge is an engineering competition designed to provide student engineers with hands-on experience in solving real-world automotive design problems. Fourteen teams from colleges and universities across the United States and Canada are participating in the 1999 Challenge. These teams are made up of students from all academic ranks — freshman undergraduates to Ph.D. candidates — and from many disciplines — including engineering, computer science, business, and communications. The Challenge provides all of these students the unique opportunity to work together to design and implement the conversion of a gasoline-powered Chevrolet Silverado to operate on E85 (a blend of 85% denatured ethanol and 15% gasoline-like hydrocarbon primer).

The 1999 Challenge is being held at the GM Proving Ground in Milford, Michigan. During the competition, teams put the performance of their ethanol Silverados to the test in more than 10 technical events, including engineering design, emissions testing, cold start and driveability, acceleration, off-road, and noise testing. Team members also showcase their communication skills when they are judged on the quality and content of their written design reports and oral presentations.

Immediately following the competition, the teams will embark on a two and a half-day, 600-mile road rally through the Midwest — which the participants have affectionately nicknamed the “Pride Ride.” Stops on the route include:

- Michigan State Capitol (Lansing, Michigan);
- GM Fort Wayne Assembly Plant (Ft. Wayne, Indiana) — where the Silverados come off the line;
- Indiana State Capitol (Indianapolis, Indiana); and
- Williams Ethanol (Pekin, Illinois) — the ethanol provider for the Challenge.

The 1999 Challenge culminates in Springfield, Illinois, where the competition will conclude with an awards ceremony at which plaques, trophies, and more than $21,000 in cash prizes will be awarded to top-finishing schools for their efforts.

1999 Ethanol Vehicle Challenge Competition Events

Design Report — 100 Points

Prior to the start of the competition, all teams are required to submit a written report describing their approaches for emissions control, vehicle operation, ethanol conversion, cold start, driveability, improved performance, and fuel economy. Reports are to be formatted according to current Society of Automotive Engineers standards and are judged on content and quality.

Safety Inspection — Pass/Fail

Before any vehicle is allowed to compete, it must pass a thorough safety inspection. A panel of judges will decide if the ethanol conversion materials and parts used in the vehicle comply with the 1999 Ethanol Vehicle Challenge rules and other applicable standards. Vehicles may be inspected as many times as necessary in order to participate in the competition.

Oral Presentations — 100 Points

Two members of each team will make a 15-minute oral presentation to a group of industry experts, then answer questions for 5 minutes. Presentations will highlight the teams' conversion, fuel economy, emissions, cold start, driveability, and performance enhancement strategies and will be judged on content, format, and delivery. These sessions, held in the GM Milford Proving Ground West Lobby Conference Room, are open only to members of the presenting team.

Design Judging — 75 Points
Appearance Judging — Award

Teams will display their Silverados at the GM Military Facility and answer questions from judges concerning the execution of their conversion plan. Judges look for innovative designs, production feasibility, and quality craftsmanship. Up to three members per team are allowed to participate.

In conjunction with the Design Judging event, a panel of judges will be evaluating the vehicles' appearance. Appearance judges will be looking for innovative styling, quality of design implementation, and overall effectiveness of the vehicles' appearance.

Emissions Testing — 200 Points
EPA Fuel Economy — 150 Points

Each competition vehicle must undergo a Federal Test Procedure (FTP) for exhaust emissions. Specifications for this procedure originate from the Code of Federal Regulations, Title 40, Parts 86 and 600. Total hydrocarbons, methane, carbon monoxide, oxides of nitrogen, carbon dioxide, and aldehydes/ketones are measured. The GM Vehicle Emissions Laboratory (VEL) will conduct the test using a state-of-the-art 48-inch, single-roll, electric chassis dynamometer. After the FTP, competition vehicles will complete a Highway Fuel Economy Test (HWFET). Fuel economy will be calculated from the FTP (city fuel economy) and from the HWFET by a carbon balance from the exhaust emission results. The EPA fuel economy is calculated as 45% highway and 55% city.

On-Road Fuel Economy — 50 Points

The on-road fuel economy of the Silverados will be measured at a maximum speed of 88.5 km/h (55 mph) under controlled conditions (closed course and speed). Vehicles will be refueled to capacity and driven for approximately 240 km (150 miles). Vehicles will be refueled again and the amount of fuel consumed during the test will be recorded. The on-road fuel economy testing will take place at Black Lake, GM's dynamic test area at the Milford Proving Ground.

Cold Start/Driveability — 175 Points

The cold starting ability (20+ degrees F) of the vehicles will be tested at the VEL. After some preparation, vehicles will soak for a minimum of 8 hours before being tested. The amount of time before the vehicle starts, as measured by a stopwatch, will be recorded and used to calculate the team's cold start *time* score (25 points). The emissions produced during the cold start will also be measured and used to calculate the team's cold start *emissions* score (75 points).

In conjunction with the cold start test, vehicles will undergo a driveability test. A "CRC Cold Start and Warm-Up Driveability Cycle," modified to include the cold start event, will be used for this test. Driveability will be conducted on a chassis dynamometer at the VEL. The rating obtained by the team in this event will be used to calculate the team's cold start *driveability* score (75 points).

Acceleration — 50 Points

Each vehicle will make a 1/4-mile straight-line acceleration run from a standing start at Black Lake. The best time of a total of four attempts will be used to calculate the team's score. The maximum speed will be recorded using a radar gun.

Hill Climb — 50 Points

The hill climb event evaluates the vehicle acceleration, trailer and grade capability of the Silverado powertrain at vehicle Gross Combined Weight on a constant 7.2% grade. Each vehicle will make two runs up the hill, with either one or two drivers, accelerating for 2,000 feet while pulling a 7,000-lb trailer.

Off-Road — 50 Points

The off-road event evaluates the truck's maneuverability and handling qualities on a gravel road course without the hindrance of competing trucks. Each vehicle will be driven through a portion of the Military Hill Course at Milford Proving Ground. This course, which includes a 31% downgrade, will have variable posted speeds. Teams will be aiming to complete the course in a predetermined target time. Each team is allowed two runs, with either one or two drivers; the faster of the two runs will be used to calculate the team's score.

Noise — Penalty Points

Noise will be measured using the World Vehicle Procedure SAE J1470/ISO 362. Vehicles will approach the test area at 60 km/h (37 mph) or more to prevent downshift. Noise will be measured by four microphones located in different parts of the test area. The highest of the four readings will be used as the team's score. The test will be held at the GM Noise Pass-By.

Everyone Wins with Ethanol

Whether you want to enhance your car's performance, safeguard the environment, reduce U.S. dependence on foreign oil, or strengthen the economy, ethanol may be your answer. Americans already use more than 15 billion gallons of ethanol-blended gasoline each year to improve vehicle performance and reduce emissions. But many proponents of ethanol think its greatest potential is in fuels with high ethanol content, such as E85 (85% ethanol, 15% gasoline primer).

As automotive engineering advances (like those the students will demonstrate in this competition) enhance the performance and fuel efficiencies of vehicles designed specifically for E85, it becomes increasingly competitive with gasoline. In fact, results have shown that many of the cars that competed in the 1998 Ethanol Vehicle Challenge achieved better fuel efficiencies than comparable gasoline-powered models, even though ethanol contains less energy than conventional gasoline (about 2/3 as much).

- *Ethanol is the only liquid transportation fuel that reduces greenhouse gas emissions from cars. Fossil fuels release carbon into the air, where it reacts with oxygen to form carbon dioxide, a greenhouse gas that contributes to global warming. Ethanol, made from plant materials that "breathe" carbon dioxide and release oxygen, helps maintain our atmosphere's carbon dioxide balance. Because it burns cleaner than conventional fuels, ethanol also significantly reduces tailpipe emissions like CO, VOCs, NO_X, benzene, and toluene.*

- *Ethanol is made from renewable sources — agricultural crops grown right here in North America. It can also be produced from agricultural waste (biomass) that would otherwise be thrown away.*

- *Domestic ethanol production reduces our demand for imported oil and MTBE, which now represent almost 80% of the U.S. trade deficit.*

- *The ethanol industry has become a strong player in the domestic energy market, producing more than 1.8 billion gallons of ethanol, responsible for more than 40,000 jobs, and directly and indirectly adding more than $6 billion to the American economy each year.*

- *Ethanol vehicles have received high marks in performance, driveability, and reliability. Power, acceleration, payload, and cruise speed are all comparable to those for equivalent gasoline-fueled vehicles. The outlook for ethanol-fueled vehicles is bright — virtually all of the U.S. automakers will be releasing production vehicles in upcoming model years.*

Sources: American Coalition for Ethanol, 1999, "Ethanol Information" [http://www.ethanol.org/ethanol_info.html (as of April 6, 1999)].

Bryan and Bryan, Inc., 1999, "Ethanol — Clean Fuel for America."

School Name: **Cedarville College**
Faculty Advisor: Chuck Allport
Team Captain: Seth Valentine

The 1999 Cedarville Ethanol Vehicle Challenge team consists of 29 students who major in both Electrical and Mechanical Engineering. This year, there are 9 freshmen, 6 sophomores, 8 juniors, and 6 seniors. All work completed on the 1999 Chevrolet Silverado is voluntary and completely extracurricular. Because of the diverse team composition, a continuation of knowledge and experience is passed on from year to year.

Front row: *Ben Kaminsky, Adam Yingling, Chris Smith, Brian Sampsel, Mark Robertson, Stephen Mattick, Jay Talladay, Matt Buehler, Jai Mantravadi, Greg Flory.* ***Back row:*** *Seth Valentine, Brandon Luke, Lindy Anderlini, Tim Staufer, Lora Treichler, Nathan Lewis, Steve Parker, Debbie Pittman, Jon Fuge, Jeff Barrons, Ben Carpenter, Paul DeHart, Micah Thirey, Ed VanderBush, Nelson Lewis, Chuck Allport (Advisor).* ***Not pictured:*** *Derek Chandler, Aaron Shaw, Brock Weston.*

The Cedarville team has enjoyed the challenge of working on the 1999 Silverado — we have gotten a great deal of support and enthusiasm for the project from both GM and other corporate sponsors. We appreciate GM's willingness to supply technical details, and we're looking forward to an exciting competition at the Milford Proving Ground.

The overall team goal for the year was to provide an educational forum for students to have hands-on, real-world engineering experience through a structured vehicle development process. To achieve this, the team decided on an aggressive and innovative approach to this year's competition. The goal was to maximize the educational experience by producing a production prototype vehicle, instead of a simple baseline ethanol conversion. Throughout the development process, we made aggressive modifications, stretching our engineering understanding and design experiences.

Gary Hurst, Deanna Dozier, Chuck Triplett, Nate Harvey, Carmon Alger, Robert (Jason) Williams, Mary Hoffman, Eli Bryant (Advisor), James Thurman, Clark Patrick, Sherry McCormack (Advisor), Chris James. ***Not pictured:*** *Daniel Rockwell, Johnathan Foster, Sarah Leiby, and Art Boyt (Advisor).*

School Name: **Crowder College**
Team Name: Rough Rider Racing Team
Vehicle Name: Teddy
Faculty Advisors: Eli W. Bryant, Sherry McCormack, and Art Boyt
Team Captain: Mary Hoffman

The Crowder College team is made up of 13 students — 5 graduating sophomores and 8 freshmen. Six of the thirteen are Automotive Technology majors; the others major in Agriculture, General Studies, Pre-Engineering, Pre-Pharmacy, Liberal Arts, Small Business Management, and Industrial Maintenance. Participation is on a volunteer basis, but credit opportunity is available.

The Rough Riders focused on cold start and overall emissions performance for this year's Challenge. Our most innovative components are our heat exchange device and our spark arrestor.

Everyone on the Crowder College team is enthusiastic about working with the Silverado (nicknamed "Teddy"). It's been a challenge working with the newest generation of the Chevy small block, but a good experience. We're looking to do well in the competition, but also to gain valuable learning experience and to create a more environmentally conscious community.

School Name: **Idaho State University**
Team Name: ISU Team Ethanol
Faculty Advisors: Dr. Jonathan Blotter, Todd Gansauge, Kenyon Hart, and Miles Whiting
Team Captain: Steve Metzger

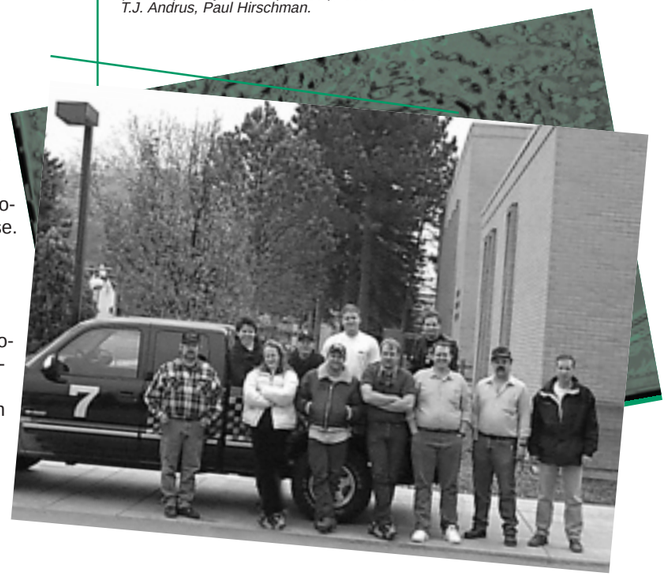
ISU Team Ethanol is made up of 10 undergraduate engineering students (1 freshmen, 3 sophomores, 4 juniors, 2 seniors) and 2 students in ISU's Automotive Technology program. Five of the undergraduates major in Electrical and five in Mechanical Engineering. This project was offered as a 3-credit elective engineering course. The Automotive Technology students are volunteers.

Our goals in converting the vehicle to ethanol were to effectively lower emissions, increase thermodynamic efficiency, and improve performance. Our design incorporates electrically heated catalytic converters, an ethanol-compatible fuel system, and a supercharger. By adding the supercharger, we were able to vary the compression ratio and improve the truck's performance for E85.

ISU Team Ethanol appreciated the opportunity to work on a top-of-the-line truck. The Silverado is well designed, with ample working space. The lack of after-market parts for the engine presented several design opportunities — we had to modify existing parts and design and build new parts.

Participating in the Challenge is a great opportunity for us to apply our varied engineering knowledge and experience to a "hands-on" project. This competition allows a smaller engineering college to participate on a national level and bring recognition to our program. Through this project, we also have the opportunity to develop leadership skills, expand our knowledge of the engineering process, and test our designs and strategies against national competition.

Front row: *Miles Whiting (Advisor), Stacey Evans, Sam Walton, Steve Metzger (Team Captain), Joseph Erickson, Todd Gansauge (Advisor), Justin Winter.* ***Back row:*** *Gwen Gerkey, Adam Ashley, Doug Harmon, Nicholas Hofeldt.* ***Not pictured:*** *Dr. Jonathan Blotter (Advisor), Kenyon Hart (Advisor), Gabriel Tschikot, T.J. Andrus, Paul Hirschman.*



School Name: **Illinois Institute of Technology**
Team Name: Scarlet Hawks
Vehicle Name: Superhawk 2
Faculty Advisor: Dr. Francisco "Paco" Ruiz
Team Captains: Dave Wyack and Jesse Richard

The 15 members of the Scarlet Hawks include 7 seniors, 4 juniors, 2 sophomores, and 2 freshman. Our team consists of students who participate for credit in the Interprofessional Program (IPRO) at IIT and student members of the Society of Automotive Engineers, for whom participation is an extra-curricular activity.

This year, we are taking a bold, new approach to the Challenge. We have designed the Superhawk 2 to take advantage of the power benefits of ethanol. We used engineered designs to convert the fuel rail and the other fuel components to safely use ethanol. We also installed a custom supercharger and inter-cooler, used extrude honing in the engine for more efficient flow, and increased engine displacement by using stronger internal engine parts. We strengthened driveline components to safely accept higher power levels and employed experimental catalysts, an auxiliary transmission, and computer recalibration (using an exhaust gas recirculation strategy) to improve emissions and fuel economy. Other special systems include coolant heat batteries for quicker engine warm-up and a completely engineered cold-start system.

Our team really enjoyed working with the full-size truck platform. We only wish we'd had more time to bring the Silverado together!!! Because the truck is so well built, we found it difficult to improve. The Scarlet Hawks feel honored to show GM what a group of college students with wild imaginations can do! We hope that GM and others continue to sponsor competitions like this one.

The Challenge will benefit the students and the school by raising awareness of projects like these. Also, the event will help inform the public about alternative fuels and the work being done at the college level to support their use. This competition lifts morale by giving IIT students something they can be proud of and something for future students to research and build upon. The Challenge is also an exciting event that will spice up life around campus.

Front row: *Loren McDaniel, Gilberto Cavada, Dave Finch, Jim Moran, Christine Pagcatipunan, Matt Siniawski, Wei-Choy Yap.* ***Back row:*** *Desiree Hendricks, Dave Wyack, Amy Lytle, Rachel Mills, Joseph Gheith, Mark Mika.* ***Not pictured:*** *Scott Burgauer, Greg Gruen, Gabriel Martin, Jesse Richard, Francisco "Paco" Ruiz (Advisor), Helen Trayer.*

School Name: **Kettering University**
Faculty Advisor: Dr. Greg Davis
Team Captains: Jeff Snyder — Team Captain
Joe Bouboulis — Asst. Captain

Our team is made up entirely of volunteers, from freshmen to second-year seniors. Our approach to the ethanol conversion centers on four primary customer-driven goals: maintaining or exceeding the performance of the current gasoline-fueled vehicle, reducing emissions, constructing a system that can be easily and economically integrated for production, and making this system invisible to the operator.

Team captain Jeff Snyder has this to say about working with the full-size Silverado, "If I were in the market to buy a truck right now, it would definitely be a Silverado."

We believe that each one of us has benefited and will continue to benefit from our participation in the Challenge. The skills we have acquired range from leadership to working together as a team to just plain turning a wrench.

Front row: *Jeff Snyder, Markus Maninger, Jimi Hendricks, Matt Tilchen, Nick Paresi, Paul Bahna.* ***In the truck:*** *Brian Spohn.* ***Not pictured:*** *Dr. Greg Davis (Advisor), Joe Bouboulis, John Calabrese, Brian Craig, Andrew DeBoer, Albert Esparza, Chad Fitterer, Thom Godward, Bob Hart, Ed Heil, Jason Macauliffe, Jim Matasic, Gabe Mesanza, Mary Palbykin, Dave Palm, Michelle Pomery, Zach Reifsnyder, Matt Skinbrink, Jeremy Taylor.*

School Name: **Minnesota State University—Mankato**
Team Name: Ethanol Challenge Team
Faculty Advisors: Kirk Ready and Dr. Bruce Jones
Team Captain: Brent Chamberlain

The MSU-M Ethanol Challenge Team is made up of nine seniors. We are using a supercharger for this year's Challenge that was not available for use in the Malibu last year. In addition to achieving a higher compression ratio, we hope to improve power as well as throttle fuel economy. Our team is also focusing on reducing emissions; we're using converters similar to those used in last year's Malibu. The converters will be electrically heated.

Reactions to working with the full-size Chevy truck? The Silverado is well laid out and easy to work on. The truck seems very solid. GM's assistance in providing access to the PCM and supplying high-flow injectors has made the actual conversion much easier. It has also allowed us to make some mistakes that we could correct simply by sending the PCM in again.

The competition will help to enhance MSU-M's reputation as the premier ethanol conversion specialists in Minnesota. It will also help to raise awareness of the power and emissions levels that are possible using ethanol as a fuel.

Dr. Bruce Jones (Advisor), Travis Howe, Steve Mathison, Eric Martinez, Dan Strauman, Chad Henrich, Jeremy Winkelman, Brent Chamberlain, Jesse Boyle.

School Name: **University of California, Riverside**
Team Name: Team CE-CERT
Vehicle Name: Forrest
Faculty Advisor: Kent Johnson
Team Captains: Mark Betty and Shaun McClure

Our team is made up of 12 undergraduates who participate on a 100% volunteer basis.

In converting "Forrest" to run on ethanol, we replaced the fuel pump, fuel regulator, and injectors. We are still waiting on the word about the fuel lines, but we are hoping we can just get them anodized. Last year, we built a distillation column, which we have perfected for this year's competition. We also incorporated an EGR cooler to help reduce NO_X and improve fuel economy. With GM's help, we worked on modifying the PCM and fine tuning the truck.

Working with the Silverado has been a dream come true. Our vehicle — "Forrest" we call her — is spectacular. We want to thank GM for going the extra mile to get us the 4x4 Z-71 package, 5.3-L V-8, and third door, the extra motor, and for all the help and knowledge we have gained and will gain. Working with this vehicle compares to working with the Corvette.

Participating in the Challenge gives us an opportunity to use what we have learned in the classroom. Converting the truck to run on ethanol required us to work as a team to solve a real-world problem. Our work on the Silverado makes school exciting — we look forward to every hour we spend on the project.

Shaun McClure (Team Leader 2), Scott Payne, Mark Betty (Team Leader 1), Marisa Wilson, Sanny, Ryan McCarthy, Max, Thang Dam. ***In the background:*** *"Forrest."*

School Name: University of Illinois at Chicago
Vehicle Name: Ethyl
Faculty Advisor: Dr. Brianno Coller
Team Captain: Michael Svestka

Front row: *Giuseppe Sammartino, Dr. Brianno Coller (Advisor).* ***Back row:*** *Phil Baranek, Pat Barasa, Mirko Barbir, Justin O'Connor, Pete Probst, Robert Ruda, Brian Gorman, Michael Svestka, Chris Gano.* ***Not pictured:*** *Andrew Chow, Sergio Filice, Bruno Porro, Jed Wilson.*

The UIC team is made up mostly of Mechanical and Electrical Engineering undergraduate students; we have one Mechanical Engineering graduate student. Our approach to the ethanol conversion is to keep it simple, ensure that it works, and test, test, TEST.

Our team has enjoyed working with the Silverado. We think that it's great to have the extra room to work with under the hood, but it's been difficult finding components for the new powertrain and suspension.

The Ethanol Vehicle Challenge gives us an opportunity to work on a real-world engineering problem in a team atmosphere with a real set of deadlines.

School Name: University of Kansas
Faculty Advisor: Dr. Robert Sorem
Team Captain: Timothy Martin

This year, nine seniors have combined to form the core of our team. We also had some participation by underclassman. All of the students involved in our project are undergraduate Mechanical Engineering majors who receive course credit for their work.

Our team strategy was to convert the Silverado into a high-performance, environmentally friendly pickup truck. Our design emphasizes simplicity and dependability. To maximize the horsepower produced by the engine and maintain ease of E85 combustion at low temperatures, we had to raise the compression ratio from its original value. We considered two main strategies: using a supercharger to supply high-density air to the engine and using high-compression pistons. We also looked at using custom-ground cams to increase the horsepower of the engine. Other engine modifications focused on ensuring that the components (e.g., rings, gaskets, and wrist pins) were compatible with the E85 fuel. We also modified the air induction, fuel management, emissions control, vehicle suspension, and cold-start systems to boost performance and lower emissions.

The Silverado proved to be an ideal vehicle for this competition. There is ample space in the engine compartment to add modified components or relocate existing parts. The horsepower capabilities of the engine and the 4WD aspect also generated significant interest during public relations events.

By participating in the 1999 Ethanol Vehicle Challenge, our team hopes to gain more technical knowledge while learning to work in a project group setting. This project will be the first chance for many team members to test the knowledge they have gained through coursework on an actual engineering application. The Ethanol Vehicle Challenge will also allow team members to get a brief introduction into the design side of automotive engineering.

School Name: University of Nebraska — Lincoln
Team Name: Redemption Squad
Vehicle Name: Redemption
Faculty Advisors: Dr. William Weins and Dr. Alexander Peters
Team Captain: Scott Peterson

The Redemption Squad is made up of 4 graduate students and 25 undergraduate students (mostly freshman and sophomores). The team members are all Mechanical Engineering majors; some are volunteers and some are receiving credit for their participation.

Nebraska approached this year's competition with the goal of developing power while maintaining emissions through an arsenal of innovative and "trick" components. Oh yes, and we're hoping for a complete redemption over the catastrophe that was last year's competition! All in all, we are coming to play and playing to win.

The team's reaction to working with the Silverado? "We LOVE this Truck!"

Nebraska's involvement in this competition has opened many doors into the automotive job market and given us an excellent opportunity to learn how to function as a team in a real-life engineering situation. The students involved also had an opportunity to learn about all aspects of vehicle technology beyond mechanical repair work — an opportunity that will inspire and carry us through the rest of our engineering careers.

Front row: *Michael Molesworth, Navid Attarzadeh, Greg McFarland, Kevin Countryman, Clark Otte, Arthur Hieronymus, Chet Dawes, Marc Meyer, Todd Cerny, Jason Detweiler, Luke VanCamp, Jason Armintrout, Rob Watts.* ***Back row****: Andrew Ragatz, John Becker, Ryan Harrington, Jeff Nelson, Scott Peterson (in truck), Tim Andre, Jacob Miller, Wilson, Scott Lohmann, Brad Belina, Scott Magner, Dr. Alexander Peters (Advisor).* ***Not pictured:*** *Dr. William Weins (Advisor), John MacKichan, Matt Duncan, Jason Brown.*

School Name: University of Texas at Austin
Team Name: Longhorn Racing Team
Vehicle Name: The Longhorn
Faculty Advisors: Dr. Ron Matthews and Dr. Matt Hall
Team Captain: Yiqun Huang

The Longhorn Racing Team is made up 10 students: seven undergraduates (three in a credit program) and three graduate students. Nine of the students are Mechanical Engineering majors and one is a Chemical Engineering major.

Our team's primary approach to the ethanol conversion was to use our improved onboard fuel distillation system to improve the truck's cold-start capability. We really enjoyed working with the Silverado; it's a nice platform with a very impressive engine.

Our goals in participating in the Challenge series are to enhance our engineering education through involvement in a complex, real-world engineering design problem; expand our engineering experience in the areas of air quality, energy, alternative fuels, automotive engineering, and control systems; increase our career opportunities; and enhance the reputation of the University of Texas as a center of automotive learning through fun projects.

Back row: *Chieh-sheng Ku, Brian Hollowell, Shengli Wu, Mario Bravo* ***Front row:*** *Dr. Matt Hall, (Advisor), Dr. Ron Matthews (Advisor), Yiqun Huang, Jake Sternberg* ***Not pictured:*** *Henry Yu, Kevin Schaber, Kevin Witt, Sam Shannon, Stephen Belle*

School Name: University of Texas at El Paso
Team Name: UTEP
Vehicle Name Head Hunter
Faculty Advisor: Dr. Ryan Wicker
Team Captain: Fernando Jasso

The UTEP team is made up of 14 students: 12 undergraduate and 2 graduate students, all majoring in Mechanical Engineering. About half of the team members are receiving senior project credit for their participation; the remainder are research assistants who work in UTEP's Engines and Alternative Fuels Research Laboratory and volunteer their time to the project.

Front row: *Jesus Carrillo, Javier Perez, Aaron Medina, Oscar Moguel, Miguel Perez, Frank Medina.* ***Back row:*** *Fernando Jasso, Oscar Rodriguez, Guillermo Villa, Laura Martinez, Aaron Hutchison, Jay Guerra, Oscar Acosta, Dr. Ryan Wicker (Advisor), Jose Bustamante.*

The UTEP team's conversion of the 1999 Chevrolet Silverado pickup addresses four primary issues: vehicle performance, emissions control, fuel economy, and cold starting. Our dedicated E85-fueled pickup has superior emissions, cold starting, and performance compared to the original gasoline vehicle. All fuel system components that were not E85 compatible were replaced or modified. We used ethanol-specific light-off and main catalysts to reduce emissions, and an experimentally optimized air injection system that rapidly heats the catalysts to reduce cold-start emissions. We improved cold-starting characteristics by incorporating a high-energy, multiple-spark ignition system. Although we made no internal engine modifications to maintain fuel flexibility, we used a novel strategy — a centrifugal supercharger — to improve performance at high loads.

Our experience in working with the Silverado has been both challenging and enlightening. Because of the limited availability of after-market products for the 1999 Silverado and the GM Gen III engine, we needed to work with various manufacturers to develop prototype equipment for this new engine.

We believe that participating in the Ethanol Vehicle Challenge provides students with the vision and experience to become successful. The qualities we develop during these competitions — creativity, teamwork, the ability to work under tight deadlines — will be very important in our future professional lives. The competition also provides an opportunity to meet other students and professional engineers and bring recognition to the UTEP department, which exemplifies the UTEP standard of excellence.

School Name: Wayne State University
Team Name: Team Ethanol
Faculty Advisors: Dr. Dinu Taraza and Dr. Frank Westervelt
Team Captains: Denise Rizzo and Kimberly Duda

Front row: *Brian Hillawi, Stephanie Corker, Heather O'Neill, Denise Rizzo, Linda Camaj, Paul Nahra, Jarret Zablocki, Jeff Jarvis, Greg Shroeder, Rojan Panicker.* ***Back row:*** *Kim Duda, Paul Siciliano, Derek Compton, Jeff Wuttke, Senan Karmo, Chris Jent, Addison Foster, Greg Maciasz, Tony Corsetti, Dan Simon, Tom Kakareka, Hani Badawi, Brian Thompson.* ***Not pictured:*** *Dr. Dinu Taraza (Advisor), Nishant Niroola, Dawn Isabel, Eric Dau, Noy Guerra.*

Team Ethanol comprises 27 students (3 graduate and 24 undergraduate students); each student receives four credits for a technical elective. The three graduate students are pursuing Masters degrees in Mechanical Engineering. The undergraduate students include 8 Electrical Engineering and 16 Mechanical Engineering majors.

This year's team is using an approach similar to last year's in converting the truck. We're changing lines and rails to stainless steel and increasing the compression ratio. The big difference this year is that we have 8 more electrical engineering students who are working on control modules to aid in cold starting the truck. Our team has enjoyed working with the Silverado; we particularly liked the fact that the truck has a new engine design. We believe the Ethanol Vehicle Challenge benefits us by providing an opportunity to acquire hands-on experience in real-world engineering situations. We also hope the competition will benefit Wayne State by bringing recognition to our work and to the college.

School Name: University of Waterloo
Team Name: University of Waterloo Alternative Fuels Team (UWAFT)
Vehicle Name: Bob & Doug
Faculty Advisor: Dr. Roydon Fraser
Team Captain: Nicole Dufour

Front row: *John Gaudet, Chris Wilk, Natacha Clark, Nicole Dufour, Dave Mather, Justin Julian (in truck), Roydon Fraser (Advisor).* ***Back row:*** *Richard Sykes, Jill Vickers, Martin Lewis, Hanif Premji, Mike Basden.* ***Not pictured:*** *Tammer Gaber, Bruce Nguyen, Milos Djordjevic, Bruno Barbulovic-Nad, Marc LeBlanc, Ritcha Gupta, Doug Suerich.*

UWAFT is dedicated to exploring the use of alternative fuels in the automotive industry. The team consists of students from across the Faculty of Engineering and, for 1999, draws the majority of its membership from among fourth-year Mechanical and Electrical Engineering students. The team is divided into four technical divisions: controls systems, fuel delivery, engine, and exhaust. UWAFT is proud to represent the University of Waterloo and Canada in the 1999 Ethanol Vehicle Challenge.

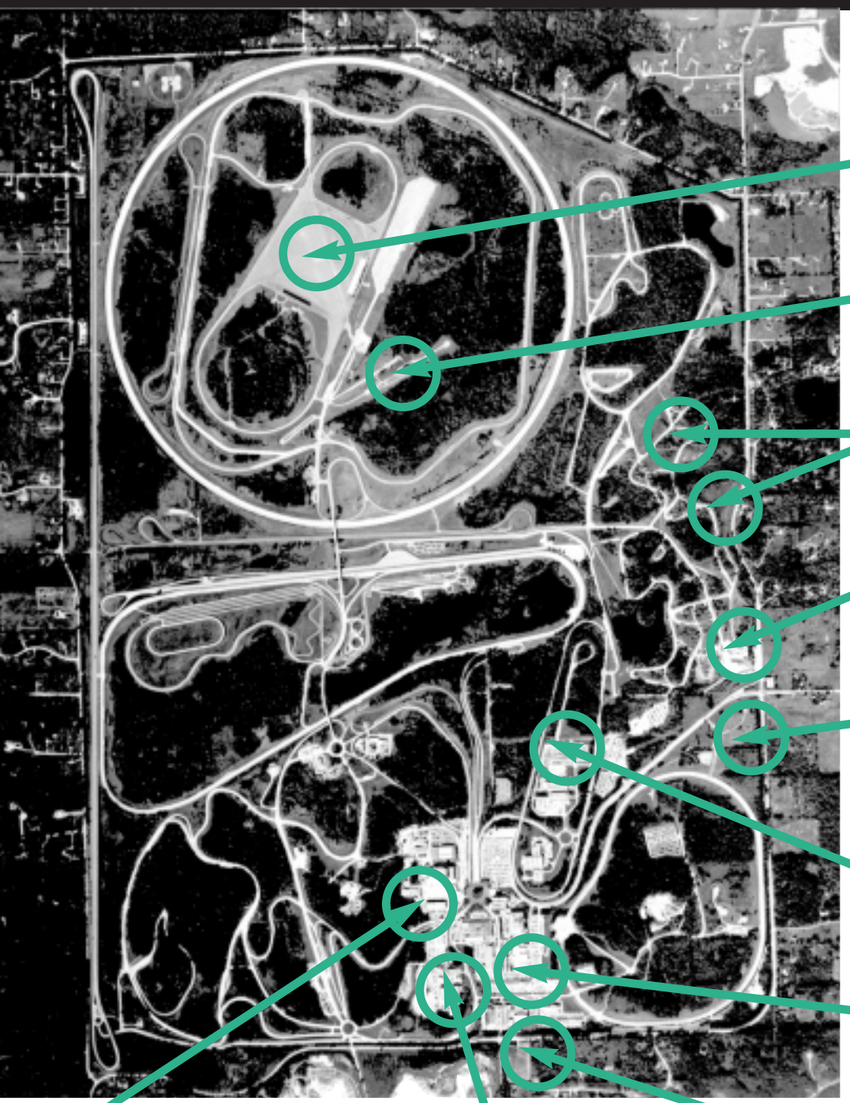
Our design strategy for converting and optimizing our Chevrolet Silverado for dedicated E85 operation emphasized simplicity and testing. Our fuel delivery team addressed all material compatibility, fuel delivery, and associated safety issues, including the use of additional fuel enrichment at cold start. We reduced engine flow losses and slightly increased the compression ratio for improved efficiency and power. A heated coolant storage system and EGR cooler were added to decrease engine-out emissions. We also completely modified the exhaust system, which now includes close-coupled pre-catalysts and ethanol-specific main catalysts. The controls team integrated all systems so that they would be transparent to the user and optimized PCM values for E85. UWAFT's reaction to working with the Silverado has been very positive. It's a great truck, a pleasure to drive, and we've enjoyed showing it off to sponsors and the community. Our only complaint is that there is little room left in the garage to move around!

Participating in the Challenge is very beneficial for the students and our school. UWAFT is a multi-disciplinary engineering team working on engineering and environmental solutions for the automotive industry and the public. In our short (3-year) history, we have become recognized as one of the major projects within the Faculty of Engineering. For the University, our involvement with the Challenge means recognition by the Canadian renewable energy sector.

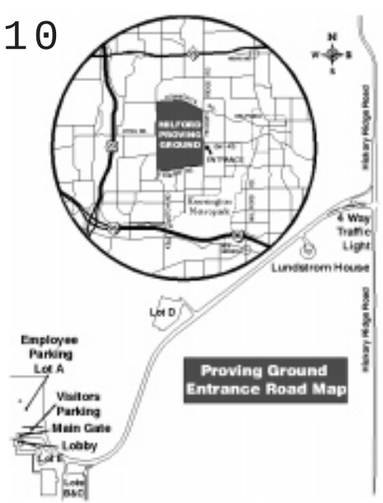
1999 Ethanol Vehicle Challenge Organizers

Laurie Ambrose	Argonne National Laboratory
Jerry Barnes	GM — Retired
Heidi Bayley	GM Proving Grounds — Communications
Kip Beasley	Reynolds Communications
Norm Brinkman	GM Research
Mike Bryan	Bryan & Bryan
Kathi Bryan	Bryan & Bryan
Carlos Buitrago	Argonne National Laboratory
Wendy Clark	GM Automotive Test Laboratories
Cathy Cole	GM Truck Group
Adam Crosley	Reel Impact
Jim Davies	GM
Kristen De La Rosa	Argonne National Laboratory
Kevin Dinger	GM Truck Group
Brain Ernst	GM Truck Group
John Firment	GM Powertrain
Mark Farone	GM Truck Group
Angela Graf	Bryan & Bryan
Joe Jacuzzi	GM Truck Group — Communications
P.T. Jones	GM Truck Group
Scott Jorgensen	GM Research
Jennifer Kissel	GM Proving Grounds — Communications
Mark Lambert	IL Corn Marketing Board
Bill Langhorst	GM Vehicle Emissions Laboratory
Bob Larsen	Argonne National Laboratory
Shelley Launey	Department of Energy
Dave Loos	Illinois Department of Commerce and Community Affairs
Mark Maher	GM Truck Group
Ian MacIntyre	Natural Resources Canada
Cynthia McFadden	Argonne National Laboratory
Christine McGhee	Argonne National Laboratory
Renee Nault	Argonne National Laboratory
Niles Parker	IN Department of Commerce
Vince Parris	MI Department of Agriculture
Guy Penard	Natural Resources Canada
Toni Pennman	GM PPC
TG Powell	Department of Energy
Greg Krissek	KS Department of Agriculture
Jim Redding	Williams Ethanol
Charlie Roehm	GM Truck Group
Dick Schumacher	GM Noise and Vibration Center
Jim Schell	GM Truck Group — Communications
Tom Smyth	Natural Resources Canada
Bill Watson	GM Vehicle Emissions and Fuel Efficiency
Mary Wertschnig	Renewable Fuels Association
Jerry Wilson	GM Proving Grounds — Communications

Ethanol Vehicle Challenge Event Sites



1. Black Lake Dynamic Events
2. Noise Pass-By (Building 56)
3. Lundstrom House (Registration)
4. Military Facility (Building 12)
5. Military Hill Course
6. Vehicle Emissions Laboratory (Building 31)
7. 7.2% Grade Hill
8. Building 73
9. West Lobby Conference Room
10. Building 26



Headline Sponsors

GENERAL MOTORS CORPORATION

General Motors Corporation, founded in 1908, is the world's largest full-line vehicle manufacturer. GM manufactures and markets cars, trucks, automotive systems, heavy-duty automatic transmissions, and locomotives worldwide. Our vision is to be the world leader in transportation products and related services. We will earn our customers' enthusiasm through continuous improvements driven by the integrity, teamwork, and innovation of GM people.

GM and its people understand the need to balance economic, environmental, and social issues. We understand that, as a global leader, we must hold ourselves to the highest principles of responsibility for our environmental and health and safety activities and that the world will judge us by our actions. Our shared beliefs have led us to sustainable development initiatives that hold great potential for benefiting both GM and the world in which we work.

The GM Truck Group develops a variety of light- and medium-duty trucks, vans, and cab-chassis for markets around the world. Truck team members design, engineer, and validate these products and the related manufacturing processes in Pontiac, Michigan. Further testing takes place at the GM Proving Grounds in Milford, Michigan, and Mesa, Arizona. More than 48,000 team members, whether salaried or represented by the UAW, CAW, IUE, or other unions, build our truck products in 14 plants in North America. These team members use the most advanced processes, tools, and technologies to develop and produce outstanding vehicles.

U.S. DEPARTMENT OF ENERGY

The Department of Energy has an aggressive R&D program in advanced vehicle technologies. DOE and its network of national laboratories supports work in fuel cells, energy storage, hybrid systems, advanced materials, alternative fuels, and heat engines. As a corollary, DOE has been sponsoring student vehicle competitions since 1989. These competitions are an effective way to demonstrate and test the technologies developed in the laboratory. Over 15,000 students have received hands-on engineering experience in these competitions. Many of them move on to take jobs in the automotive industry, bringing with them an understanding of and enthusiasm for these technologies.

NATURAL RESOURCES CANADA

Natural Resources Canada, through its research and technology development arm, CANMET Energy Technology Centre, is a proud sponsor of the 1999 Ethanol Vehicle Challenge. Natural Resources Canada, in partnership with the U.S. Department of Energy, has been a sponsor of these student vehicle challenges since they first began in 1989.

By combining the next generation of technical innovators with some of North America's emerging alternative transportation technologies, the Ethanol Vehicle Challenge is helping to ensure a sustainable, environmentally responsible transportation future.

Major Competition Sponsors

Illinois Department of Commerce and Community Affairs
The Bureau of Energy and Recycling of the Illinois Department of Commerce and Community Affairs (DCCA) provides Illinois citizens and businesses with technical information, financial assistance, and research support to develop and demonstrate promising technologies in energy conservation, alternative energy, recycling, and waste reduction. The division works with Illinois' industrial and agricultural organizations to actively promote and expand the use of ethanol as a clean-burning, renewable fuel and manages numerous ethanol fuel tests and demonstration projects that are designed to stimulate economic growth in both industrial and rural communities. DCCA also sponsors new and innovative research and development projects that will reduce ethanol production costs.

State of Nebraska
Three long-time Nebraska supporters of 85% ethanol blended fuels — the Corn Board, the Ethanol Board, and the Grain Sorghum Board — are pleased to sponsor the 1999 Ethanol Vehicle Challenge.

Nebraska Corn Board has been a strong supporter of ethanol for more than two decades, financing ethanol research and promotion projects. The Board helped introduce E85 technology to the nation in 1989 by converting a Chevrolet Corsica to run on E85.

Nebraska Ethanol Board is the state agency responsible for establishing and promoting a grain alcohol fuels industry in the state. This state-level entity assists companies with ethanol plant development and sponsor research and development of ethanol-related products.

Nebraska Grain Sorghum Board uses checkoff funds to finance market development, research, promotion, and education programs and to address federal legislative issues. The board is also responsible for maintaining and expanding overseas markets.

Council of Great Lakes Governors
The Council of Great Lakes Governors is a private, non-profit organization devoted to working cooperatively on public policy issues common to its eight member states: Illinois, Indiana, Michigan, Minnesota, New York, Ohio, Pennsylvania, and Wisconsin. Since its establishment in 1983, the Council has served as a vehicle for actively addressing the many issues that arise as a result of the Great Lakes Governors collective responsibility for both the world's largest source of fresh water and the industrial heartland of North America.

The Council of Great Lakes Governors has administered the Great Lakes Regional Biomass Energy Program (GLRBEP) under contract with DOE since 1983. This is one of five regional programs established by DOE and designed to encourage greater production and use of biomass for energy generation. The biomass program focuses on development and demonstration projects that increase the awareness of ethanol as a locally produced, environmentally friendly renewable fuel.

Associate Competition Sponsors

Delphi Automotive Systems, the world's most diversified supplier of automotive components and systems, is dedicated to the protection of human health, natural resources, and the global environment. Delphi Energy & Engine Management Systems is the Delphi division responsible for the generation, conversion, and storage of electrical energy, the flow of air and fuel into an engine, the combustion process, and cleaning of exhaust emissions. Delphi's advanced engine management systems offer affordable, economically justifiable solutions to fuel economy, emissions control, and performance demands. With the recent integration of Delphi Delco Electronics Systems, Delphi operates 208 manufacturing facilities, 46 ventures, and 27 technical centers in 36 countries. Delphi has world headquarters in Troy, Michigan, USA, and regional headquarters in Paris, Tokyo, and Sao Paulo. Delphi can be found on the Internet at http://www.delphiauto.com.

The Governors' Ethanol Coalition is a bipartisan organization representing 22 governors interested in expanding the market for ethanol. The Coalition also includes representatives from Brazil, Canada, Mexico, and Sweden. The goals of the Coalition are to increase the use of ethanol-based fuels, decrease the nation's dependence on imported energy resources, improve the environment, and stimulate the national economy. These goals are accomplished by educating the public about the benefits of ethanol use, encouraging ethanol fuel production and use through research and market development efforts, and investing in infrastructure that supports expansion of the ethanol market. The Coalition supports the production of ethanol from corn or other domestic, renewable resources using sustainable agricultural methods and encourages its use in environmentally acceptable applications.

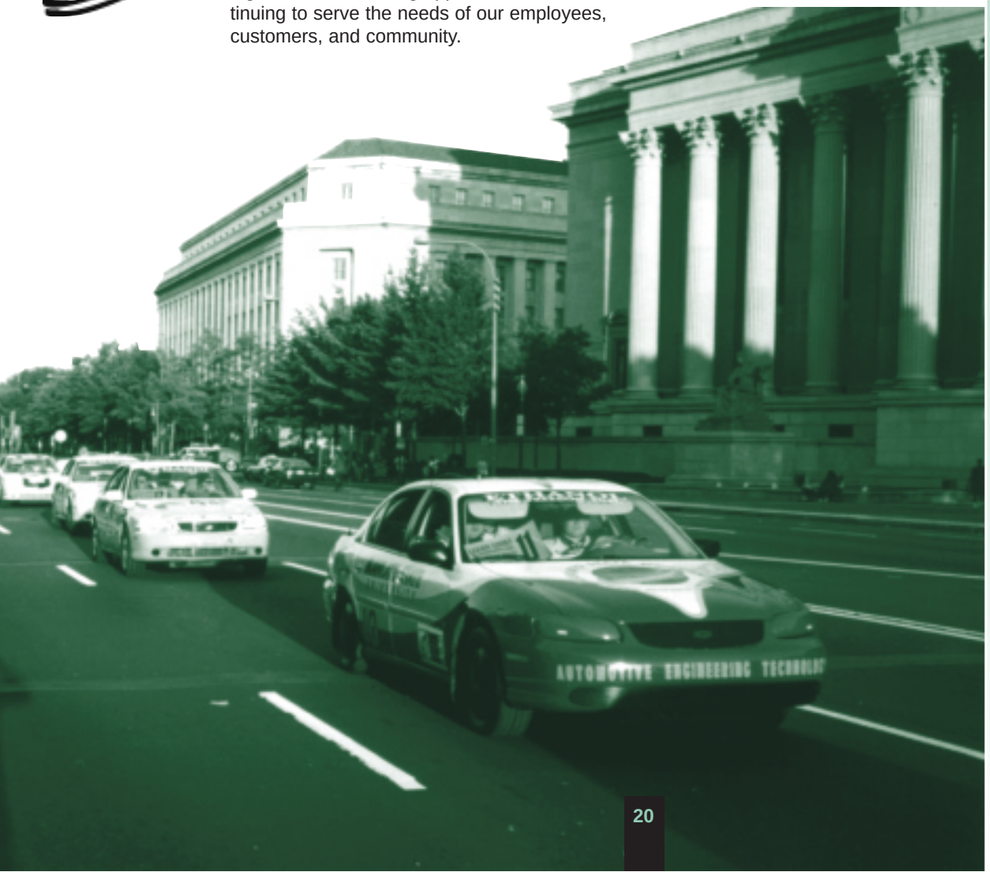
The Illinois Corn Marketing Board (ICMB) seeks to increase the profitability of corn production through a variety of research projects, domestic market development, and export expansion programs, as well as conducting consumer education and corn promotional programs. ICMB research and promotion programs focusing on ethanol fuel made from corn date back to 1982, and have played a major role in opening and advancing the market for ethanol. Fifteen farmer volunteers administer the activities of ICMB, and each is elected to represent different geographic areas in the state. The organization is not-for-profit and is funded by corn farmers who contribute 1/4 cent for every bushel they sell to a statewide corn checkoff program. This checkoff is voluntary and provides an annual budget in excess of $2.7 million. ICMB works closely with other agricultural organizations, university and private researchers, business, industry, and governmental entities to find new uses for corn, increase corn's contribution to the economy, and increase public awareness of how the thousands of corn-based products on the market today improve our quality of life.

National Corn Growers Association
The National Corn Growers Association (NCGA) represents the interests of producers of the nation's top crop. Membership includes more than 30,000 farmers in 48 states. NCGA's mission is to create and increase opportunities for corn growers in a changing world and to enhance corn utilization and profitability. Three corn farmers make up the officer team, and fifteen farmers represent corn growers on the NCGA board of directors.

Renewable Fuels Association
Established in 1981, RFA is the national trade association for the domestic ethanol industry. The RFA works to expand production and consumer use of renewable ethanol fuels in the U.S. fuels market, including blends, ETBE, and E85. Objectives include promoting policies, programs, and initiatives advantageous to the development and use of ethanol fuels to the U.S. Congress and other federal, state, and local government entities; providing technically accurate and up-to-date information on ethanol fuels to industry, media, and the public; and participating in educational activities to increase public awareness concerning the production, distribution, and use of renewable fuels. Members include ethanol producers, fuel retailers, ethanol fuel blenders, equipment manufacturers, agribusiness organizations, energy and engineering companies, environmentalists, and consumer organizations.

Competition Supporters

Canadian Renewable Fuels Association (CRFA) is dedicated to the expanded use of liquid fuels made from renewable biomass as a source of transportation energy. Because of near-term market prospects and association resources, the primary focus is on ethanol. The association provides public awareness and education; maintains relations with similar interests in other countries; and represents the renewable fuels industries in a variety of activities including media, public, and government relations.

Growmark is a farmer-owned cooperative based in Bloomington, Illinois. Growmark's primary mission is to improve the long-term profitability of the business of farming for its farmer owners. Growmark is the major supplier of E85 fuel throughout the Midwest.

Williams Ethanol Services is the second largest ethanol producer in the United States, with plants in Pekin, Illinois, and Aurora, Nebraska. Our vision is to develop new marketing and manufacturing opportunities while continuing to serve the needs of our employees, customers, and community.