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MTBE CRISIS AND THE FUTURE OF BIOFUELS

HEARING

BEFORE THE

COMMITTEE ON AGRICULTURE, NUTRITION, AND FORESTRY UNITED STATES SENATE SUBCOMMITTEE ON RESEARCH, NUTRITION AND GENERAL LEGISLATION

ONE HUNDRED SIXTH CONGRESS

SECOND SESSION

ON

MTBE CRISIS AND THE FUTURE OF BIOFUELS

April 18, 2000

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MTBE CRISIS AND THE FUTURE OF BIOFUELS

TUESDAY, APRIL 18, 2000

U.S. SENATE,
SUBCOMMITTEE ON RESEARCH, NUTRITION, AND GENERAL LEGISLATION, OF THE COMMITTEE ON AGRICULTURE, NUTRITION, AND FORESTRY,
Washington, DC.

The Subcommittee met, pursuant to notice, at 10:10 a.m., in room 400, State Capitol Building, 2nd and Capital Street, Springfield, Illinois, Hon. Peter G. Fitzgerald, (Chairman of the Subcommittee,) presiding.

OPENING STATEMENT OF HON. PETER G. FITZGERALD, A U.S. SENATOR FROM ILLINOIS, CHAIRMAN, SUBCOMMITTEE ON RESEARCH, NUTRITION AND GENERAL LEGISLATION, COMMITTEE ON AGRICULTURE, NUTRITION, AND FORESTRY

The CHAIRMAN. I would like to call this meeting to order. Thank you all for being here. This marks the opening of the field hearing of the U.S. Senate Committee on Agriculture, Nutrition and Forestry and this is a subcommittee hearing of the Subcommittee on Research, Nutrition and General Legislation, and I am Chairman of that subcommittee. Thank you all for being here. I appreciate having so many people here from Illinois as well as those from Washington who have come here to testify.

In a few moments we will start with Congressman Ray LaHood and John Shimkus from the heart of Illinois. I would just like to open this meeting with a few comments.

We are now at a crossroads in the ethanol industry. Illinois is the largest ethanol producing state in the Nation and the second largest corn producing state in the Nation. I think, in terms of yields per acre, we are still number one in the Nation as I like to remind my good friends from Iowa, Chuck Grassley and Tom Harkin. But right now there are competing proposals on what to do with our Nation's air pollution situation. And how to deal with the gasoline additive methyl tertiary butyl ether [MTBE] . Going back to last summer, the Environmental Protection Agency in Washington had a blue ribbon panel that came out with a report suggesting that our Nation should phase out and ultimately ban the use of MTBE as an additive in our reformulated gasoline.

MTBE has been used for many years, probably going back to the 1970's. It was first used a gasoline additive after the use of lead was banned in gasoline. After lead was banned, oil producers needed something that would enhance the octane level of reformulated

gasoline; and thus the oxygenated, MTBE, came into popular production.

In 1990, Congress amended the Clean Air Act to require all fuel sold in the Nation's largest, and most polluted cities to contain an oxygenate additive that would help reformulated gasoline burn more cleanly. In order to comply with these regulations gasoline had to contain at least 2-percent oxygen by weight.

Since 1990, reformulated gasoline has been required by the Clean Air Act to be blended with an oxygenate, in all the large smog-filled cities, or ozone non-attainment areas. Most (roughly 85%) of the reformulated gasoline used in this country is blended with the oxygenate MTBE. Ethanol is used in about 8-percent of our nation's reformulated gasoline; primarily in the mid-west. But for all intents and purposes, only Chicago and Milwaukee are using ethanol as their oxygenate additive in their fuel. Most of the rest of the country is using MTBE.

It turns out, however, that Illinois has been very lucky that we have been using ethanol. It has recently come to light that many of those cities 2nd municipal lines where gasoline has been blended with are finding severe contamination in their drinking water.

According to the Environmental Protection Agency's blue ribbon panel, MTBE, in very small amounts, can yield water undrinkable. One cup of MTBE can contaminate, and make undrinkable, a 5-million gallon water tank. Additionally, MTBE has properties that make it resist degrading. If gasoline blended with MTBE leaks out of an underground storage tank, most of the gasoline will just leak out and ultimately be eaten by the microbes in the soil. But the MTBE will resist degradation and rapidly seep into the ground water, where even the smallest concentrations can make the ground water undrinkable.

Even though MTBE is not popularly used in Illinois, it has been found in many wells around the state. I believe 26 is the number. Twenty-six wells in Illinois that have detected some level of MTBE. In other parts of the country, California, for example, MTBE has been detected large amounts. There are numerous stories of cities that have almost shut down because of MTBE in their drinking water. Sixty-Minutes did a report about a small town in California that literally dried up when they started detecting MTBE in their water.

Many seem to agree that we should ban MTBE. The question now is, though, how do we go about doing that? Do we simply ban MTBE and keep the oxygenate requirement in our fuel? If that were to happen, would that mean that ethanol would simply immediately capture the entire MTBE market? That is one possible solution to this problem.

The other potential solution is to go in and amend the Clean Air Act and do as the administration has suggested, and repeal the oxygenate requirement in our fuel. The administration has suggested that we should repeal the oxygenate requirement, but replace it with a renewable fuels requirement. Specifically, their proposal is that, of all the gasoline sold in the United States, approximately 1.2-percent of that gasoline should be a renewable source of fuel, presumably ethanol. It looks to us that 1.2-percent of all the gasoline sold in the country would be roughly the market ethanol now

has, where it is being sold for our nation's reformulated fuels program.

Those are the issues we want to discuss. The other thing that we are going to discuss today is should the EPA, or will the EPA, grant the waiver request that the state of California has made. California has requested that it waive out of the Clean Air Act's requirement that their fuel be reformulated. My understanding is Missouri has also requested such a waiver.

What would be the affect of such waivers be if we start seeing those being granted by the EPA? With that, with those opening comments, I am going to ask for unanimous consent to submit a written statement to the record from myself. Since I am the only Senator here, I will grant myself unanimous consent. And I want to welcome my good friends and colleagues, Representatives Ray LaHood and John Shimkus. I know they have both been very active in Illinois agriculture for a number of years now and they have been leaders in the House of Representatives, fighting for Midwestern farmers. I welcome you here. And thank you for having me in your district because both of you represent different parts of the city of Springfield.

But thank you all for being here. And Congressman LaHood, would you like to start first? We appreciate all that you have done for agriculture. And thank you for showing your interest in being here today.

[The prepared statement of Senator Fitzgerald, can be found in the appendix on page 44.]

STATEMENT OF HON. RAY LAHOOD, A U.S. REPRESENTATIVE FROM ILLINOIS

Mr. LAHOOD. Mr. Chairman, thank you very much. Let me begin by saying that it is a treat for those of us on Agriculture Committee of the House to have you in the Senate, on the Agriculture Committee. For those people gathered here today who do not know it, you and I have worked very closely on file bill that you have passed in the Senate and we have now passed in the House and I think it is a bill that can be signed by the President that will really bring agriculture into the 21st Century by allowing farmers to electronically file all the paperwork with their FS offices and your leadership in the Senate is very much appreciated.

And then our work on the crop insurance bill, where we are trying to really make some sense out of a crop insurance program that has not worked very well, and I know you have spent some time on that, and we have now passed a bill that hopefully, in a conference committee, which is going on right now, we will get it back to both the House and the Senate. So I think we have a number of good things that we have accomplished for agriculture, and we could not have done it without your leadership. And I am grateful to you for your service on the agriculture committee, and the way that we have been able to work so closely together on a couple of real, real important bills that will have a tremendous impact on agriculture generally, but certainly on our state of Illinois and on the farmers that we represent. So thank you so much for your leadership that you have provided over there. It is great to have you there.

John and I represent, together between the two of us, 33 counties in Illinois, which is about a third of the state. And a good part of what we represent is agriculture and farmers, and I think I have more ethanol producing plants in my district than any district in the country. I have two plants in Pekin, Pekin Energy and Midwest Grain; the ADS facility in Peoria; and I also represent part of Macon County which had a dominance of ADM there, too. So when we talk about ethanol, it is something near and dear to my heart because of the jobs that are provided by the ethanol industry in the 18th District and then all of the jobs that are provided for the raw material that is provided through the corn that is used to make ethanol.

I would like to read in part my statement because I know that this hearing is so important. And the recent reports over MTBE, contamination of ground water wells, have provided us an opportunity to insure that ethanol will emerge as the primary oxygenate in the reformulated gasoline program. I am really encouraged by the meeting that we had with Administrator Browner and Secretary Glickman where it was really a meeting to address the problem with MTBE and I believe that we need to take the proposal a couple of steps further to insure that we protect our ground water from MTBE, while at the same time maintaining the clean air that we have achieved under the reformulated gasoline [RFG] program.

I believe the best approach would be to amend the Clean Air Act in order to allow oil manufacturers to address the volatility of ethanol during warm weather and maximize the blending formation of their gasoline. However, this approach would be very difficult to achieve in the near term, which is why I am supporting of efforts, I am very supportive of efforts in Congress to ban MTBE. I know Congressman Shimkus will talk about a bill that he and Congressman Ganske have introduced and I know there is similar legislation in the Senate. And I believe the administration.

And I have said this before, and I said it to Ms. Browner and Secretary Glickman. This administration has had a good record on ethanol, a very good record, for seven, 8-years. Vice President Gore made the tie-breaking vote in the Senate to extend the ethanol credit to 2007. Where it was a 50–50 tie, he did make the tie-breaking vote, and so I give them a great deal of credit.

But as I told Ms. Browner at the meeting that we had, Mr. Chairman, I think it would be a terrible mistake for them to allow California to opt out of this program. That will open the flood gates to a lot of other northeastern states to make application to opt out. California is a huge state. They have made a lot of progress, but they can make a lot more progress if they eliminate MTBE and begin to use alcohol, and to allow them to opt out, I think would send a very, very bad message all over this country, and I think it would destroy the good record that they have had and maintained over the last 8-years. So I am very much opposed to them doing that, and I made that very clear.

Banning MTBE and encouraging greater use of ethanol in the RFG program will benefit the environment. It will also help our beleaguered farm economy at a time when commodity prices are at a historic low. Increased use of ethanol will provide a valuable

market for corn. For every 100-million bushels of corn used in the production of ethanol, the price of corn increases by approximately five cents. This increase in price could mean the difference between solvency or bankruptcy for many corn producers in Illinois and throughout the country.

So again, I appreciate your bringing your hearing right here in the heartland, right smack dab in the middle of Illinois, where we produce so much corn. And say, again thanks for your leadership and allowing us to sound off for a few minutes on some aspects of ethanol. Thank you very much.

The CHAIRMAN. Well, thank you, Congressman LaHood, and thank you also for convening that meeting with Secretary Glickman and Administrator Browner last week. It was very productive. And you bring up an excellent point about the importance of the EPA denying California's waiver request. I share your concerns. If they grant that request, there are going to be a lot of states that may request waivers and that could be trouble for the ethanol program. Thank you much.

[The prepared statement of Representative LaHood, can be found in the appendix on page 48]

John Shimkus, thank you for being here. It is good to have you here.

STATEMENT OF HON. JOHN SHIMKUS, A U.S. REPRESENTATIVE FROM ILLINOIS

Mr. SHIMKUS. Thank you, Mr. Chairman, and thank you for calling the hearing, and your efforts. Thank you for allowing me to testify along with my colleague Ray LaHood about the phasing out of the MTBE and increasing our use of bio-fuels such as ethanol. And I say bio-fuels because, of course, our personal favorite in Illinois ethanol produced by corn. But there are other types of bio-fuels programs that can help meet the demand, rice grown in California is an example of issues that we deal with in the Congress committee as far as the bio-fuels program.

But in my tenure as a member of Congress I have never seen a better climate to increase the use of ethanol than we have here and now. We really need to strike while the iron is hot. With gas prices having reached almost two dollars a gallon and corn prices just over two dollars a bushel, we can produce a product that will help our energy supply, which is also a major focus I think that we need to keep in mind, while increasing the demand for our corn farmers.

With that in mind, I am here today to discuss recent proposals to phase out the use of MTBE, a hazardous fuel additive and an ethanol competitor. As you well know, the administration recently offered its legislative principles in response to the MTBE crisis. We talked about that at our meeting just last week.

The administration is asking for three legislative responses. They want to amend the Clean Air Act to provide the authority to significantly reduce or eliminate MTBE use. As MTBE use is reduced or eliminated, to insure that air quality gains are not diminished. They call that the anti-backsliding clause. They want to replace the existing oxygenate requirement contained in the Clean Air Act with a renewable fuel standard, as you mentioned, for all gasoline at a level that maintains the current level of renewable fuel, 1.2-

percent of the gasoline supply and allows for sustained growth over the next decade.

While I support the first two principles, I need to express my reservations about eliminating the oxygenate requirement in reformulated gasoline. And I agree with my colleague, Representative Greg Ganske from Iowa when he said in a hearing, we want to fix real problems like MTBE and water contamination and not abandon real solutions like oxygenated fuels. We need to understand that mathematically under the administration's proposal, not as much ethanol would be used per gallon as the current law, and that has a lot of us concerned.

And the debate in the Committee, as we have addressed this now 2-years in a row, was you can have clean air and you can have clean water. The solution is ethanol. Just to throw the baby out with the bath water, eliminating the oxygenate standard, it is an incredible debate, that what you are getting is dirtier air. And so we have got to focus on a couple of things. Clean air, clean water and also our energy security which we deal with a lot in the Energy and Power Subcommittee of the Committee.

As a result my colleague, which shares a large portion of the district and borders, Congressman LaHood, is helping co-sponsor the legislation that Greg Ganske of the chief original sponsor of the Clean Air and Water Preservation Act of 2000. Our bill currently has 37 other co-sponsors and is supported by the American Farm Bureau, the National Corn Growers Association and the Renewable Fuels Association.

This legislation bans MTBE within 3-years and urges refiners replace it with ethanol; requires labels be placed on all pumps dispensing MTBE-blended fuels, giving consumers knowledgeable choice. I think that is always critical in this debate. Directs the U.S. EPA to provide technical guidelines to help states remove MTBE from ground water. We have to help fix the program that MTBE has caused. Give refiners flexibility to blend oxygen with the 2-percent requirement, thus addressing some of the debate issues that we have with Chicago and the warmer air. If it is averaged out, we see that as a better solution.

Prohibits environmental backsliding by raising the standards on emissions reductions and prohibiting an increase in the use of the gasoline aromatics. In our debate about these new gasoline standards, if you take out the oxygen, they are talking about new mixes of fuels. And one issue that was brought up in our hearings countless times was an increase in aromatics which is toxic. So this anti-backsliding clause is a very critical part of this debate. And the clean air standards have to be maintained because they have been successful. Our air is cleaner. The reason why it is cleaner is because of the oxygen standard and the fact that it forced, it allows gasoline to burn hotter and it burns up all that nasty stuff. And it is a proven fact that the oxygen requirement cleans the air. We have now polluted water, and that polluted water because of MTBE and not ethanol.

Overall this bill will help clean up MTBE contaminated water supplies. It will preserve clean air accomplishments of the past decade and will provide a renewable energy source which will decrease

our dependence on foreign oil and improve our agricultural economy.

Last week, with the leadership of Ray LaHood we had that meeting that he mentioned with Secretary Glickman and the Administrator Browner and members of the Illinois, Missouri delegations, also we had colleagues from Nebraska and I think Minnesota, too. I hope that in the future we can continue to sit around the table and work on a solution to phase out MTBE and increase demand for ethanol. I applaud all my colleagues who attended the meeting. I think there was a consistent message given to the administration.

Again the time is now to make changes, and I appreciate the work that everyone has been doing. However, I must make special mention of the work that you have done, Mr. Chairman, since coming to Washington. For many of us from downstate, we were watching anxiously as you moved to Washington, to see, to help us fight for the interest of Illinois. We are all tickled pink that you chose to lobby to get on the Ag Committee, as Congressman LaHood has said, your work there has been courageous and we needed a voice on the Ag side, on the Ag Committee on the Senate, so much that I think Ray and I are going to try to propose that we make you an honorary member of the House Renewable Fuels Caucus. That is still up to debate, based upon our success of the pending legislation in front of us. But we do really appreciate your commitment to downstate and the agricultural interest.

And as we continue to move forward, you have our commitment to work with you to make sure that our agriculture sector, our family farms are not left behind and that we accomplish what was attempted to accomplish under the Clean Air Act. But we want clean air. We want clean water. And we want, we no longer want to be solely reliant on foreign oil by having renewable fuels program and a national energy policy that can meet all three needs, with working together, and pressuring the administration. I think we can get there. Thank you for the hearing. If you have any questions, I am sure Ray and I would be happy to answer them.

[The prepared statement of Representative Shimkus, can be found in the appendix on page 49.]

The CHAIRMAN. Well, Congressman Shimkus, thank you very much. I appreciate your testimony. I just have one or two questions for both of you. My understanding is that about 16-percent of the corn that is sold in Illinois goes for ethanol production. The figure nationwide is less. I think it more like, 6-percent or below of all the corn nationwide goes for ethanol.

In your districts and specifically Congressman LaHood, do you think even more of your corn than 16-percent goes to ethanol production with those ethanol plants you have?

Mr. LAHOOD. All I know is this. I know that ADM in Decatur uses about 350, excuse me, ADM in Decatur uses about 500,000 bushels of corn a day. In Peoria it is about 250,000 bushels of corn a day strictly for ethanol. And I have to believe that what the administrator said about Chicago for the summer, that will be very helpful for ethanol production. I do not know the figure for Pekin Energy which is now Williams Company or Midwest Grain, but I am sure it is significant and I think the use of corn in Central Illi-

nois I think would go up dramatically, given the opportunity to make the standard different.

The CHAIRMAN. Congressman Shimkus, do you have any ethanol plants in your district?

Mr. SHIMKUS. We are working diligently to get an ethanol pilot plant at SIU to help, you know, the industry have a location in research and development to help lower the cost. But of course, I border on all the other areas, and remember, distance does equal cost. We benefit greatly just by being close to the proximities of Peoria and Decatur.

And as far as the cost, I see your Agricultural Legislative Director here Terry Van Doren, and he probably could answer that question about my district better than I could. And it is good to see him here. You are well served by him.

The CHAIRMAN. Well, Congressmen, thank you both very much for being here and I look forward to working with you as we resolve these issues in Washington. Thank you, all, very much.

And now it is time for the second panel, and you can please come up there and take a seat. We will put your name tags up there.

On this second panel we have Joe Hampton who is the distinguished director of the Department of Agriculture. Joe, you have been doing a great job. I visited with you many times in Washington and here, and thank you so much for being here.

We have Tom Skinner who is doing an excellent job as director of the State's Environment Protection Agency. Just as I visited with Joe, I saw you in Washington just last week. You were at that meeting with Administrator Browner and Secretary Glickman. Thank you very much for being here.

And Merrylin Zaw-Mon from the Environmental Protection Agency in Washington. You are the director of the Transportation and Regional Programs Division of the U.S. EPA, and you traveled from Washington to be here. Thank you very much for making the trip. We appreciate it.

Merrylin, if you would like to begin first, we would appreciate hearing from you, then we will go to Tom Skinner and then Joe Hampton.

STATEMENT OF MERRYLIN ZAW-MON, DIRECTOR, TRANSPORTATION & REGIONAL PROGRAMS DIVISION, OFFICE OF TRANSPORTATION AND AIR QUALITY, U.S. ENVIRONMENTAL PROTECTION AGENCY, WASHINGTON, DC.

Ms. ZAW-MON. Thank you, Mr. Chairman, for the invitation to appear here today. I am pleased to have this opportunity to share information with the Committee on the Administration's recommendations and plans to reduce or eliminate MTBE and boost the use of alternatives.

The CHAIRMAN. Would you speak into that microphone? Use the other microphone and put that one right here. Thank you.

Ms. ZAW-MON. Is this better?

The CHAIRMAN. That is better.

Ms. ZAW-MON. OK. And also boost the use of alternatives like ethanol that pose less of a threat to ground water. The Administration's response includes taking regulatory action under the authorities that it currently has available, and working with Congress to

implement the legislative principles that we recently announced to protect ground water, maintain clean air benefits and promote greater production and use of renewable fuels.

Last month Administrator Browner and Secretary Glickman submitted to Congress legislative principles which have been discussed earlier, and I would like to reiterate that these three principles, taken together, will lead to an environmentally sound and cost effective approach.

The first principle is to ask Congress to amend the Clean Air Act to provide the authority to significantly reduce or eliminate MTBE. Second, as MTBE is eliminated we must preserve the clean air benefits. This was the anti-backsliding provision that Congressman Shimkus referred to earlier.

Third, the existing oxygenate requirement in the Clean Air Act should be replaced with a renewable fuel standard for all gasoline, not just the reformulated fuels. And we would expect that this renewable fuel standard would grow over the next decade. By preserving and promoting continued growth in renewable fuels, particularly ethanol, this action will increase farm income, create jobs in rural America, improve our energy security and protect the environment.

Allow me to present a brief history of the Federal Reformulated Fuels Program in order to put the issues surrounding the use of oxygenates, MTBE and ethanol, in perspective. As you know, the Clean Air Act amendments of 1990 put into place a number of programs to achieve cleaner air, and these included cleaner motor vehicles and cleaner fuels. These programs have been extremely successful in reducing air pollution.

Congress stuck the balance between vehicle and fuel emissions control programs after extensive deliberations, and in order to serve several Congressional goals, including air quality improvement, enhanced energy security by extending the gasoline supply through the use of oxygenates and encouraging the use of renewable energy sources.

The Federal Reformulated Gasoline Program introduced cleaner gasoline in 1995, primarily to reduce smog levels or ozone levels. Unhealthy ozone levels are still of concern in many areas of the country, with over 30 areas still in non-attainment of the current 1-hour ozone standard. Ozone has been linked to a number of health effects concerns. Repeatedly exposures may increase susceptibility to respiratory infection, cause lung inflammation and aggravate preexisting respiratory diseases such as asthma. Other effects attributed to ozone exposures include significant increases in lung function and increased respiratory symptoms such as chest pain and coughing. The young and the elderly are particularly susceptible to ozone.

The Reformulated Fuel Program is an effective way to reduce smog precursors such as volatile organic compounds and oxides of nitrogen. The Clean Air Act amendments of 1990 require that RFG contain 2-percent minimum oxygenate content by weight. The first phase of the Reformulated Fuels Program from 1995 to 1999 required average reduction of smog forming volatile organic compounds and toxics of 17-percent each, and a minimum oxide reduction of 1.5-percent. In practice, however, the clean air benefits of

this program have far exceeded the requirements, and these are the benefits that we are seeking to preserve.

This year the second phase of the Reformulated Fuel Program will achieve even greater air benefit, an average of 27-percent reduction in volatile organic compounds, 22-percent reduction in toxics and a 7-percent reduction in oxides of nitrogen emissions.

These reductions for the Reformulated Fuel Program are equivalent to taking 60-million cars off the roads. States rely on the air quality benefits of the Reformulated Program, to demonstrate in their state implementation plans that they can achieve the ozone standard. 17 states and the District of Columbia are relying on air quality benefits associated with the Reformulated Fuels Program.

The Reformulated Fuels Program is required in ten metropolitan areas that have the most serious ozone pollution levels; however, many other areas of the country, including the northeast, Texas, Kentucky and Missouri have elected to join or opt into Reformulated Fuel Program as a cost effective measure to combat the ozone air pollution they are experiencing in their jurisdictions.

At this time approximately 30-percent of the Nation's gasoline consumption is cleaning burning RFG. It should be noted that neither the Clean Air Act nor the EPA requires the use of specific oxygenates in the Reformulated Fuels Program. The statute and subsequently EPA's regulations only specify the oxygen content by weight. They do not specify which oxygenate to use. Both ethanol and MTBE are used in the current RFG program but as you pointed out, Mr. Chairman, many fuel providers are choosing to use MTBE in about 85- to 87-percent of the RFG, mainly because of cost and ease of transport reasons.

Despite the air quality benefits of oxygenates in RFG there is significant concern about contamination of drinking water in many areas of the country including California and Maine. And you are absolutely correct in that some areas of California have had to go to an alternative water supply because the water supply was contaminated by MTBE. EPA obviously is very concerned about the widespread detection of MTBE in drinking water. And current levels of MTBE in ground and surface waters are at low levels.

The United States Geological Survey has found that the occurrence of MTBE in ground water is strongly related to its use as a fuel additive in that area. Low levels of MTBE were detected in 21-percent of ground water in areas where MTBE is used under the Reformulated Fuels Program as compared to 2-percent detections in areas using conventional gasoline.

In response to concerns associated with the use of oxygenates in gasoline, the Administration established the blue ribbon panel that you referred to earlier. It included leading experts from public health and scientific communities, water utilities, environmental groups, industry and state and local government, to assess issues opposed by the use of oxygenates in gasoline.

The panel's recommendations have been used by the Administrator and the Administration to formulate the legislative principles that have been brought before Congress. EPA has also initiated a number of actions to deal with the panel's recommendations. These include developing a secondary drinking water standard under the Safe Drinking Water Act establishing a water quality

standard under the Clean Water Act, and enhancing underground storage tank program compliance to 90-percent level this year. The agency is funding a grant to evaluate the effectiveness of leak detection technologies and we are conducting a million dollar technology demonstration for the clean up of MTBE contaminated aquifers. EPA is committed to working with those cities and states that need help cleaning up ground water contaminated with MTBE.

In addition to the legislative principles that we have discussed here, EPA has initiated a regulatory action aimed at reducing or eliminating the use of MTBE in gasoline. Under Section 6 of the Toxic Substances Control Act [TSCA], we initiated an advance notice of proposed rule making which was signed last month. This is now under a 45-day comment period. This action is the best regulatory mechanism available to the Agency.

TSCA gives EPA the authority to ban, phase out, limit or control the manufacture of any chemical substance deemed to pose an unreasonable risk to the public health or the environment. However, the procedural burdens associated with this statute can be complex and time consuming. And we are not certain that we can prevail. Therefore, legislative action is out first priority and we want to work with Congress to address this issue.

Reducing or eliminating MTBE in no way diminishes the continued role for other oxygenates such as ethanol to control mobile source emissions. We recognize that a significant role for renewable fuels is important to our nation's energy supply. Thus, the Administration recommends that Congress replace the 2-percent oxygenate requirement in the Clean Air Act with a renewable fuel average content for all gasoline at a level that maintains the current use level of renewable fuel, and this was the 1.2-percent that you referred to earlier. But also allows for sustained growth over the next decade.

Mr. Chairman, in closing, we intend to move forward with the rule making under TSCA. This action, however, cannot substitute for Congressional action based on the legislative principles I have discussed here. If we are to continue to achieve the public health benefits of cleaner burning gasoline, while avoiding unacceptable risk to our nation's water supplies, it is essential that Congress acts. We remain committed to working with you to provide a targeted legislative solution. Americans deserve both clean air and clean water. One should never come at the expense of the other.

With regard to the California waiver, we are doing a thorough independent evaluation of the application that was submitted by the state of California. We intend to make a decision and propose our decision in early summer. After the decision is proposed there will be a 30-day public comment period. This concludes my prepared statement. I would be pleased to answer any questions once the other panels members have testified.

[The prepared statement of Ms. Zaw-Mon can be found in the appendix on page 56.]

The CHAIRMAN. Thank you very much for that.

Director Skinner, thank you for being here. If you feel comfortable summarizing your remarks, you can submit your prepared remarks for the record, and if you could try and keep it four or 5-

minutes so we can keep the hearing moving, we would appreciate it. Thank you very much for being here.

STATEMENT OF THOMAS V. SKINNER, DIRECTOR, ILLINOIS ENVIRONMENTAL PROTECTION AGENCY

Mr. SKINNER. Absolutely. I am glad to do that. Thank you for your kind introduction a little bit earlier. I can tell you, from my standpoint, your efforts on behalf of both the MTBE issue and ethanol in Illinois are greatly appreciated. No matter how capable Terry Van Doren is, and he is very capable, I am quite confident that he is not a ventriloquist, and your work and your understanding of these issues, issues that are not all intuitive, obviously have taken a great deal of effort on your part, but I think goes a very long way in dealing with the Administration.

The CHAIRMAN. I will at least take credit for hiring Terry.

Mr. SKINNER. It is a pleasure to see you again, Mr. Chairman. The meeting last week seemed to be very productive, although I think we have a ways to go. By the way, Governor Ryan fully intended to be here this morning. He sends his regrets. His schedule changed at the last minute and he asked Director Hampton and me to represent him and to convey his support for your proposed legislation phasing out MTBE as well.

To summarize my prepared remarks, the use of RFG in the Chicago area has been an unqualified success. We estimate that its use in 1999 reduced emissions of VOCs or volatile organic chemical compounds by about 65-tons per day. RFG also reduces air toxics such as benzine as compared to conventional gasoline. These benefits have resulted in very measurable improvements to the air quality in the Chicago area, as well as it does in other large urban areas throughout the country.

As we have discussed this morning, and as others have discussed, one of the two oxygenates in the RFG program, MTBE which is the primary alternative to ethanol, however, has proved to be problematic, particularly in recent years. Contamination of drinking water supplies from MTBE has been reported from New York to California, literally coast to coast. It comes from underground storage tanks, from marine engines that contain fuel with MTBE in it, and even at times auto accidents have been linked to detections of MTBE in ground water. As you have pointed out, it's highly soluble. It gets into the water very quickly and is pervasive and is very difficult to remove once it is there. Even here in Illinois where we are, I believe, 95-percent ethanol RFG, we have had detections of MTBE in, as you pointed out, 26 different water supplies across the state. In fact, in three of those communities, Island Lake, East Alton and Oakdale Acres, we have actually had to discontinue use of drinking water wells as a result of MTBE levels.

As Director Zaw-Mon pointed out, U.S. EPA appointed a blue ribbon panel a while back, a little over a year ago or so to examine the use of oxygenates in the RFG program. They did recommend that MTBE be phased out. Since that time the states of California and New York have banned its use or proposed banning its use. Here in Illinois, the city of Chicago adopted a resolution that state and Federal officials take action to prevent the use of MTBE in the Chicago area. And on the state level, a bill that will require that

MTBE containing gasoline be labeled is on its way to the Governor's desk, and the Governor is expected to sign it into law shortly. The Illinois General Assembly continues to discuss the possibility of passing legislation that would immediately ban MTBE from further use in Illinois.

Responding to these concerns and others, last month U.S. EPA proposed, as Director Zaw-Mon pointed out, a legislative frame work to encourage immediate Congressional action to reduce or eliminate the use of MTBE. Among other things, U.S. EPA recommended that Congress amend the Clean Air Act and provide the authority to phase out MTBE usage and also call for the removal of the oxygenate requirement from RFG.

We in Illinois believe that the most appropriate means to address the MTBE issue is on the national level rather than on a state by state piecemeal basis. We fully support a phase out of MTBE of the type that you have proposed in your legislation. We still disagree with the Clinton Administration's recommendation to remove the oxygenate requirement, at least as that proposal currently stands now.

The ground water contamination issue is an MTBE problem. It's not an oxygenate problem. Ethanol, because it has a higher oxygen content than MTBE, provides additional carbon monoxide and toxic air emissions reductions benefits over MTBE. By removing the oxygenate requirement we risk losing the current level of emissions reductions being achieved, and I think that is why U.S. EPA in fact has proposed their so-called anti-backsliding provisions which we believe would be critical if you were going to remove the oxygenate requirement.

We believe that implementation of your proposal, Mr. Chairman, will both remove a risk to our nation's drinking water supply and insure the continued air quality benefits of the Reformulated Gasoline Program as envisioned in the Clean Air Act. I would like to touch on at least one other issue in closing. And that is that we would urge Congress to continue to push U.S. EPA to adopt Illinois' proposal for an appropriate carbon monoxide offset or credit with regard to ethanol blended reformulated gasoline.

We estimate the use of ethanol in the Chicago area reduces carbon monoxide emissions from vehicles by 780 tons per day, compared to non-oxygenated gasoline. The scientific analysis that we have submitted concludes that a minimum of 0.5 per square inch Reid vapor pressure allowance is a reasonable gasoline volatility offset. This would provide a long term solution that more accurately recognizes the clean air contribution of ethanol while avoiding the increased expense to gasoline producers of a lower volatility based gasoline.

In summation, Mr. Chairman, we appreciate and applaud your effort to address the MTBE problem in an expedited yet reasonable time frame. We will continue to urge U.S. EPA and the Clinton Administration to support your bill as well. It strikes me that it would be strikingly inconsistent for the U.S. EPA to attempt to phase out MTBE through TSCA, the Toxic Substances Control Act, and complain about how lengthy, complex and uncertain the TSCA process and yet not support your effort to accomplish the same thing with-

out the uncertainty and without the delay. I will be glad to take questions.

[The prepared statement of Mr. Skinner can be found in the appendix on page 67.]

The CHAIRMAN. Thank you very much, Tom. We appreciate that. And Director Hampton, again thank you for being here. We appreciate all your efforts on behalf of agriculture. And after your testimony we will take questions from all the panelists.

STATEMENT OF JOSEPH L. HAMPTON, DIRECTOR OF AGRICULTURE, STATE OF ILLINOIS

Mr. HAMPTON. Thank you, Mr. Chairman. I have done some editorializing here, as Director Skinner gave his presentation, realizing not to be redundant but I think there are a couple of things we need to touch on.

First, we really appreciate you coming to Illinois. And on behalf of the Governor, thank you for coming. And as Director Skinner said, the Governor wanted to be here and I think you have his written testimony. And it was unavoidable, that he could not be here today. So with his apologies, we again thank you.

It is very important that we state to you on behalf of agriculture and more important on behalf of the citizens of Illinois that you exercise the kind of leadership and courage that you have as a member of the Senate, particularly as a member of the Agriculture Committee. And we think the vision that you have brought and your willingness to look at things with a clear and open eye is very important to us and very important to the future of the state and the country. We thank you very much for that.

I also, as you listened to the testimony of Director Skinner, I think that we in agriculture recognize the importance of having, first, his competency and the Governor's wisdom in using him and asking him to represent our interest in ethanol and our interest, and I think this is a precedent that other states have not had the luxury of having, and we truly appreciate that.

One of the unexpected side effects of the renewable fuels program has been that the ground water contamination caused by MTBE, because it is a colorless liquid and it has an odor, it contaminates our ground water and because it is non-biodegradable and soluble in water, we agree that it should be banned through a phase out program. It has entered ground water wells and drinking water supplies across the country and continues to cause future environmental problems and cost. I am glad that the Clinton Administration has proposed rectifying the MTBE problem. I am very concerned about their proposal in two areas.

The first one is rescinding the oxygenate requirement in gasoline and the second, a new renewable fuel program as it is proposed. While the Nation's air pollution has improved with the Clean Air Act oxygenate requirement, the increased negative Nation attention directed toward MTBE is allowing critics to question the oxygenate standard. Your bill, Mr. Chairman Fitzgerald, Senate 2233 not only recognizes the problems with MTBE in Illinois but also the importance of maintaining our air quality with an oxygenate requirement. I also want to commend Senator Durbin for his co-

sponsorship of this bill. We pledge our support to both of you for its passage.

As you know, Governor Ryan and other Illinois officials and organizations, some of which are here today, and the 23-member Governor's Ethanol Coalition have repeatedly asked the White House and U.S. EPA to maintain a role for ethanol and renewable fuels program. With Illinois farmers facing some of the lowest commodity prices in years, there needs to be an assurance for ethanol in the future. And second, a need to increase their market share. Ethanol, whether produced from corn or other bio-fuels should not be overlooked because it benefits the environment, the Ag economy and is a bio-renewable fuel for the future.

The ethanol blended gasoline has been projected to reduce carbon monoxide emissions by some 700-plus-tons in the Chicago air shed each day. This is the equivalent of over 30 semi loads of carbon monoxide. And as I heard Director Zaw-Mon talk about removing 15-million cars from the highway, and you think about the need to do that and then having an alternative that is falling off a log simple, like ethanol. That does not make for a very hard decision. And you know, we recognize people actually spend their own money to buy carbon monoxide detectors so this becomes pretty clear how significant this is to us.

I also might add there is almost three semi loads each day of organic compounds that are not introduced in the Chicago air shed because we currently use ethanol. Illinois corn growers, if ethanol or the oxygenate requirement is eliminated, would forfeit a market of at least 160-million gallons of ethanol and 70-million bushels of grain usage. As I said in here, as I heard Congressman LaHood about the usage, and 150 bushels, that is 5,000-acres a day. 5,000-acres a day, as I best remember, 365 in a year, we are talking about a fair amount of corn. That is important to all of us including the people who build grain bins.

That elimination could translate into investment losses by the ethanol industry in excess of a billion dollars, a loss of 800 jobs in ethanol plants, 4,000 jobs in industry related jobs and a decrease in the national market price of corn by 25 cents a bushel. Our Illinois legislators should also be complimented.

Their recent efforts to pass a consumer right to know about what is being purchased at the gasoline pump is a first step to addressing MTBE. The bill requires retail motor fuel gas pump dispersement that contains 2-percent MTBE to display a label identifying it. This piece of legislation now awaits the Governor's signature.

I think it is a mistake to allow states to opt out of any oxygenate. This discredits the entire clean air effort and all history of the clean air effort. We think that the oxygenate and the credit offset that Director Skinner talked about are reasonable and should certainly be given attention. Thank you again, Mr. Chairman, for your leadership here today.

In closing, I think it was Representative Greg Ganske who said, the solution is simple; if you want clean water, ban MTBE. If you want clean air; use oxygenated fuel. If you want both clean water and clean air; use ethanol. Thank you for your time today. I will try to answer any questions you may have. Thank you.

[The prepared statement of Mr. Hampton can be found in the appendix on page 63.]

The CHAIRMAN. Well, that's a great close, a quote from Representative Ganske. Thank you very much, Director Hampton.

I have a question that I have wondered about it a lot. And anybody on the panel who knows this can answer. I only see that MTBE has about 85-percent of the Nation's reformulated fuel market. Ethanol has about 8-percent. Who has the remaining percent of the oxygenate reformulate fuel? Is there another oxygenate additive out there?

Ms. ZAW-MON. Yes, Mr. Chairman, there are other oxygenates out there that can be used and they are used in very small quantities. There are other ethers. There is one called TAME, and I have to admit I cannot remember what it stands for, but there are other oxygenates that are used on much lesser volume than MTBE.

The CHAIRMAN. They are not cost competitive I take it; is that why they are not used as much? or are they not as effective? Do you know the answer?

Ms. ZAW-MON. Both. They are not as effective in that their oxygenate value, their octane value is not as good as MTBE and ethanol. And then also in terms of production costs, they are not produced in the amounts that MTBE is produced.

The CHAIRMAN. Well, thank you. That answers my question. That kind of leads to another one, though. Some people criticize the idea of just banning MTBE and retaining the oxygenate requirement, suggesting that will give ethanol the better market. But it turns out there are other competitive oxygenates out there that are used now, and potentially could compete with ethanol for the oxygenate market. So if you banned MTBE, you would be banning not one of two oxygenates but one of many oxygenates out there. And you wouldn't necessarily being giving the whole market to ethanol. Does that make sense?

Ms. ZAW-MON. It does, Mr. Chairman. But one of the concerns raised by the blue ribbon panel was to look at the environmental impacts of those other oxygenates. In fact, TAME is an ether like MTBE and probably possesses very similar qualities to MTBE. So there is a concern that you were to ramp up the usage of this ether we might see similar ground water contamination problems. So one of the blue ribbon panel's recommendation was to thoroughly address the health impacts and the environmental impacts of the other oxygenates and the Agency is in the process of looking at some of the other oxygenates.

The CHAIRMAN. Has there ever been a study that has found any problems with ethanol contaminating ground water, are there similar health problems that we are finding with MTBE?

Ms. ZAW-MON. No, there are not, because as you pointed out, ethanol does degrade. It is liked by the little organisms in the soils and they tend to consume ethanol over the other components of gasoline. Nonetheless, we have been asked to also address the environmental and health effects of ethanol and it is something that we do need to be looking into.

The CHAIRMAN. Director Skinner, you said in your testimony that 95-percent of your reformulated fuel used in Illinois is with ethanol, and yet you pointed out we have detected MTBE in the under-

ground water supplies in 26-communities, three of which have been forced to discontinue use of wells and switch to another source of water.

If 95-percent of the fuel we are using has ethanol, where is this MTBE that we are finding in Illinois, where we did not think we used it, where is this coming from? Is it coming from boats or lawnmowers or something else that we are not really thinking about; do you know?

Mr. SKINNER. It is both of those. MTBE was used as an octane enhancer historically. So it may be fuels that leaked out prior to the Reformulated Gasoline Program coming into effect and remaining in either the soils or migrating from the soils to the water supplies. As we discussed, MTBE degrades very slowly and has a relatively long life.

Representative Ganske I know has premised or suggested that MTBE in fact can come from automobiles traveling through a jurisdiction, going from one jurisdiction with MTBE RFG through Illinois to another jurisdiction. Now, he uses Iowa as an example. But Iowa has apparently no MTBE in their fuel supplies and yet they have found some levels of MTBE as well. So it probably comes from a number of sources. But it shows you how diligent we really need to be with regard to this particular contaminant.

The CHAIRMAN. To Merrylin Zaw-Mon, I am wondering, the California fuel refiners have argued that they can refine fuel that can burn as clean as an oxygenated fuel without an oxygenate additive. Do you know if that really is possible? And if so, at what kind of added cost? I presume it would add a substantial cost to the price of a gallon of gasoline.

Ms. ZAW-MON. We are reviewing all that information right now. It is my understanding that with cleaner cars, California has adopted a cleaner car program, very similar to the tier two cleaner car program that the Agency recently adopted. But with cleaner cars the use of oxygenates is less effective because the emissions from the vehicles are reduced considerably. But California refiners believe they can still meet the VOC, the volatile organic compounds reduction as well as the toxics reductions by reformulating fuel without all of the oxygenates that were required under the Clean Air Act. That is the 2-percent oxygenate.

But in any event, a study that California required showed that even with the repeal of the 2-percent requirement we would expect that 60-percent of the fuels used in California would contain oxygenates to some extent.

The CHAIRMAN. Is it not true that the gasoline refiners need something like an oxygenate in order to enhance the octane? Even if we did not have the oxygenate requirement, they would be using an MTBE or an ethanol to give it more octane. Is that correct?

Ms. ZAW-MON. You are absolutely correct. But you use it at much lower volumes, and lower weight percentages. But you are absolutely right, it is used as an octane enhancer, especially in premium fuels.

The CHAIRMAN. Director Skinner, maybe you can comment on the issue of the phase two of the Reformulated Fuels regulations taking effect in Chicago. I know you have been talking to the oil refiners who deliver in Chicago. We are currently awaiting to find

out whether the carbon monoxide credit that the EPA has proposed to the administration will be granted for ethanol. If it is not granted, that would pose a potential problem for ethanol. Has a decision been made by the petroleum producers who supply the Chicago market? Are they going to use MTBE even in the face of lawsuits that have been filed asking them to clean up the pollution that has been caused by it? Or do you think they will just go ahead and use ethanol in summer and do whatever they have to do to make sure it complies with the phase two regulations?

Mr. SKINNER. We have had discussions with the refiners in Illinois, and actually the answer I am going to give you goes to the last question you asked, as well as in a sense how does MTBE get into a state which does not have much MTBE. Literally yesterday I was driving down 294, the tollway outside of Chicago on the way to a speech to a bunch of chemical manufacturers. And at one point I looked over and I was passing a tanker truck, and on the tanker truck was, it was like a billboard. Huge letters that said, this tanker contains high quality MTBE, blah, blah, blah. And two thoughts occurred to me at the time.

One was, who designed the marketing scheme for this trucking company? Why would you put that on your trucks, given the controversy lately? Second, where was the truck going? Was it just passing through Illinois? Was it in fact heading toward an Illinois refinery? We have been assured by the main producers in Illinois that at least for this summer season they intend to continue to use ethanol. I believe in part it is because of this potential for litigation that is out there. There have been a couple of class action lawsuits filed in Long Island. There was one, as I understand it, that was filed in Madison County very recently. I think it is in part because of the regulatory uncertainty. They are hopeful that there will be some sort of CO offset that is coming out of Washington at some point in the next 6-months or so and it is difficult to switch ethanol to MTBE and back to ethanol.

So for reasons that may be related to wanting to do the right thing environmentally, but may be related to economics, for this summer we are hopeful that ethanol will continue to be used. There is no assurance that after this summer, that in subsequent years, that situation will continue unless we get some sort of CO offset that equalizes the economic disparity between MTBE and ethanol. It is cheaper to use MTBE now. If you are a for profit company, ultimately that is something that you are going to have to take into account. I would think the Nation as a whole, and certainly Illinois, wants to avoid an economic incentive to switch to a contaminant that greatly concerns everybody, that we find almost impossible to get rid of.

The CHAIRMAN. Director Hampton, I think you touched upon this in your opening remarks. You talked about the effects on farm income and rural employment if we were to ban MTBE and replace some of that market with ethanol. I know that Secretary Glickman's office has done studies at the USDA that suggested that the annual increase in farm income nationwide could be as much as a billion dollars if you banned MTBE and replaced it with ethanol. Do you have any idea what the specific effects on farm income

might be in Illinois if we were to ban MTBE and phase it out over 3-years and replace it with ethanol?

Mr. HAMPTON. Mr. Chairman, my response would be that the estimate along with the million dollars is some 13, 000 jobs nationwide. The only thing I can think here in Illinois that 15-percent of the market will kill the market. It is having the last 10-percent or so of the crop or not having that last ten percent that makes the value on the other 90-percent. So that truly it is significant.

One other thought I had, I would like to, this is not going to shed a lot of light on this, but I think it is probably right to the point. A gallon of the MTBE contaminated 25-million-gallons of water contracted to maybe a gallon of Everclear making 25 people pretty happy. To really tell this whole story, and that sometimes, you know, I think as we look at the real answers for this, as Director Skinner pointed out, looking at something that is a contaminant and trying to find economic incentives to make this program work I think is the real challenge for us. We would try to be more patient and more effective, and as far as meeting the demand, you know, I since I was a small child, I have heard that we would never raise enough food to feed the world, and we are selling corn and beans even less than I was a small child. So I think we would really like to accept the challenge to be able to do this as an industry and as a state.

The CHAIRMAN. Thank you very much, Director Hampton. One final question for Merrylin. I am wondering, I am sure you saw that 60-Minutes report on MTBE that aired a couple months back. In that report, they claim that there was an EPA memo that went as far back as 1987 that stated that, quote, "known cases of drinking water contamination have been reported in four states affecting 20,000 people. It is possible that this problem could rapidly mushroom due to leaking underground storage tanks. The problem of ground water contamination will increase as the proportion of MTBE in gasoline increases."

Now, that was an internal EPA memo circulated in 1987, according to that 60-Minutes report. Certainly that was before you or the current administration were there. But I am wondering, how could it be that the EPA could have overlooked that kind of memo and have allowed the problem to mushroom, just as that memo predicted, and it is only now really that the EPA is suggesting that we initial action under the Toxic Substances Control Act?

Ms. ZAW-MON. That memo was written as part of a health effects and environmental effects, a study that is required for fuel additives. And in 1988 I think this memo laid out some of the concerns and the need for additional studies.

Subsequent to that, the fuel additive MTBE was approved because there is a provision in the Clean Air Act that allows for substantially similar components of gasoline to be approved at certain levels. And MTBE actually is a by-product of gasoline. And given the fact that it is substantially similar to gasoline it was approved as an additive. And in the meantime, you know, the studies were ongoing and we really only had inhalation studies as opposed to ingestion studies. And that is one of the reasons, and we are doing the ingestion studies now, close to completing them.

I know that is no excuse for the fact that there is this widespread contamination of ground water. But these studies do take a long period of time because you have to look at all the available data. They have to be peer reviewed and we based our decision to move forward on the inhalation studies.

The CHAIRMAN. Well, that is a pretty good answer and that clears that issue up for me. I appreciate so much all of you being here. And Director Zaw-Mon, for traveling all the way from Washington to be here.

Ms. ZAW-MON. Thank you, Mr. Chairman, it was my pleasure.

The CHAIRMAN. You are welcome any time on Capitol Hill.

Ms. ZAW-MON. Thank you.

The CHAIRMAN. And Director Skinner, Director Hampton, you were wonderful, as always. And thank you very much for your hard work on behalf of the state, and I give Governor Ryan credit for hiring you two gentlemen, too. Thank you very much.

We will take a quick break. Then we will come back to the final panel. My hope would be that we could try and wrap up by noon, so that everybody has time to get lunch. But let us just take a quick, no more than 5-minute break. Thank you.

[Recess.]

We are going to get going with the third panel. We do have one panel after this third panel. So we are just going to keep moving forward. I want to thank all of the panelists for being here. We have Leon Corzine, the President of the Illinois Corn Growers Association. Leon, thank you very much for being here.

We have Ron Warfield, who is the President of the Illinois Farm Bureau. Eric Vaughn, who is the President of the Renewable Fuels Association. Eric, thank you for being here. And Larry Quandt, who is the President of the Illinois Farmers Union. Larry, it is good to see you, and thank you for being here.

Why don't we start from my left to right. Leon, why don't you go ahead. Corn growers are the ones who make it, ethanol, and make it possible. So why don't we start with you, and thank you again for being here.

STATEMENT OF LEON CORZINE, PRESIDENT, ILLINOIS CORN GROWERS ASSOCIATION

Mr. CORZINE. Thank you, Mr. Chairman. I would like to start with thanking you for providing us this forum to talk about this very important product ethanol. My name is Leon Corzine and I am a corn and soybean grower from Assumption, Illinois, which is in Christian and Shelby County. I am testifying today on behalf of the Illinois Corn Growers Association.

Let me start off by addressing ICGA's concerns about the recent recommendations made by the U.S. EPA with the blessing of the Clinton Administration in regard to ethanol and MTBE. It is our sentiment that this plan to fix the Nation's clear air program is offered with good intent but it is really lacking in substance.

EPA's plan will phase out MTBE. This is a positive step considering it does contaminate water and damages the environment. But it also eliminates the oxygenate requirement which is key to the continued use of ethanol and the market growth that we need. ICGA opposes this strategy because eliminating the oxygenate re-

quirement due to the failure of MTBE also constitutes backsliding in our efforts to address air quality. We can document the clean air success of this program and ethanol's ability to keep it viable.

As was stated earlier, Chicago offers a perfect example. We have used ethanol almost exclusively in Chicago to meet the clean air standards and the results really have been remarkable. ICGA concurs with you, Mr. Chairman, that Illinois citizens should not have to choose between clean air and clean water. Ethanol is proven to reduce emissions, especially carbon monoxide which is the number one contributor to air pollution, and it can do so without water contamination associated with MTBE.

MTBE, as it was stated, has contaminated water resources from Maine to California, including the 25 known sites in Illinois. So it must be addressed as soon as possible. That is why we are supporting your bill wholeheartedly.

Ethanol provides the means to reach our environmental goals quickly and painlessly, by also providing jobs to boost our economy. Ethanol provides these clean air benefits in a cost competitive manner, compared to highly refined gasoline and other additives which might be used in lieu of MTBE. Petroleum companies continue to tell the EPA, the Administration and Congress that they can meet the Federal clean air guidelines without using oxygenates; however, no one is asking at what cost to consumers and the environment.

The volume of gasoline increase without oxygenates has not been talked about. They have to replace it with something by sheer volume and what that means if more foreign oil. The bottom line is that consumers will pay more for gasoline without ethanol, probably a lot more. Even before the recent price spike of gasoline, I am running an E–85 pick up truck and my E–85 gasoline at the pump is ten cents a gallon cheaper, even before this price spike, cheaper than conventional gasoline.

Environmental benefits of oxygenates is clear long term environmental and public health benefits, resulting from the use of these oxygenates and reformulated gasoline when compared to non-oxygenated gasoline that meet the RFG include the fewer aromatics in the gasoline, the lower potency weighted toxic emissions and thus lowering long term cancer risk, the reduced emissions of carbon monoxide that we have talked about, and this also reduces the ozone pollution due to the carbon monoxide reductions and fewer fine particles in the exhaust emissions. This is what oxygenates do for us all.

The oxygenate standard must not be compromised in any way. ICGA is asking the Senate and U.S. Congress as a whole to make a real statement about our government's commitment to clean air, fighting high fuel prices and energy self-sufficiency. The administration proposal also encourages establishment of a renewable fuel standard and this proposal sounds good at first. It is similar to a bill offered by Senator Tom Daschle of South Dakota and it would require gasoline sold in the U.S. to contain a small amount, estimated at one to 2-percent, of renewable fuels.

There is nothing wrong with the concept except the projected market potential for ethanol would be little improved in its early

years and would be far less than leaving the oxygenated requirement in place.

I could not believe that Tom Daschle made the comments that he did last week in the public. His comments questioning the ability to supply enough corn or ethanol are unexcusable and in my opinion we cannot ignore that kind of verbiage. The USDA has done a study. The Governor's Ethanol Coalition had a study done. California has done several studies. They have all said the same thing, the supply of ethanol will be there.

What we need now is a Federal Government commitment to phase in ethanol, replacing all the MTBE in our Nation. All these studies have said we will supply, we can supply the ethanol within a three to 4-year time frame. And what about the corn supply?

Senator Daschle mentioned that also and I would challenge, no, maybe better, I would dare him to come to Illinois and talk about corn supply to me as an Illinois corn farmer. I would like to bring him to my farm and have a talk about that.

Today ethanol also means $20,000 to every 500-acre corn farmer in the U.S. We can double ethanol usage in the next 4-years or less. And that would also help our rural development.

Corn growers also question why the U.S. EPA's proposal did not address the concept of a carbon monoxide credit for ethanol. EPA director Tom Skinner presented this concept to the U.S. EPA, as he mentioned earlier, and a way to use science to resolve ethanol's role in the U.S. energy policy. And we agree with Mr. Skinner, that ethanol should receive the carbon monoxide credit which will allow its use year round in the Chicago market. The carbon monoxide credit is not some kind favor or special concession to the growers that we are asking for but it is a natural response to the National Academy of Science's study on RFG. They concluded about 20-percent of the ozone or smog produced in non-attainment areas is caused by carbon monoxide. Ethanol cuts carbon monoxide pollution by up to 20-percent, 25-percent, excuse me.

We are at a watershed moment for ethanol. Years of research, building of infrastructure and expanding corn supply, high gas prices and growing public support leave us well positioned to finally make a national commitment to our only domestically produced renewable fuel supply. Expanded ethanol product would give agriculture, which is in the economic doldrums, a much needed lift, provide jobs in processing and transportation and help us reach our environmental goals responsibly.

ICGA applauds you, Mr. Chairman, Congressman Shimkus, Congressman LaHood, Governor Ryan's administration and others for their efforts to provide clean air and clean water for all of us, and at the same time providing a sound rural development policy that will work for agriculture. Thank you very much.

[The prepared statement of Mr. Corzine can be found in the appendix on page 70.]

The CHAIRMAN. Leon, thank you very much. I have enjoyed working with you and the corn growers in Washington. And I look forward to working with you in the months and years to come on this issue and others.

Mr. CORZINE. My pleasure.

The CHAIRMAN. Ron, thank you for being here. Feel free to go ahead with your testimony and we will wait on all the questions until all of you have had an opportunity to provide your testimony. Thank you very much.

STATEMENT OF RONALD R. WARFIELD, PRESIDENT, ILLINOIS FARM BUREAU

Mr. WARFIELD. Thank you very much, Mr. Chairman. Thank you for coming here and having this hearing and the leadership that you have shown on this and other agricultural issues that we have had an opportunity to visit about. I am Ron Warfield, president of the Illinois Farm Bureau, the state's largest general farm organization.

I believe right now we in agriculture are facing two of the most important pocketbook issues that we will face that are going to impact us in the next 5-years. Number one is what we do with PNTR and increase our markets through expanding trade; and number two, how we expand our market through the use of ethanol which is a renewable fuel that provides environmental qualities that many people have already attested to today.

I am going to have many of the same notes in my written testimony that have already been presented. So I am just going to summarize and give an overall view on some points that I think are very important because many of the points I would make have already been made.

It was interesting to me that the U.S. EPA comes in and makes a presentation talking about the fact that we have actually exceeded the requirements under the reformulated gas program through the oxygenate requirements that we have put forward. We have exceeded the requirements. Now, that just says oxygenates work. The fact is, first of all, don't question whether whatever oxygenates work, they worked, they cleaned up the air and the fact that has been extremely significant, we have exceeded what we have set out to do.

Second now, because of the health and the environmental aspects of the water contamination, it has prompted the EPA and others to talk about eliminating MTBE. Now, this action has or will prompt several states to ask the Government to grant them a waiver from the oxygen requirements of the Clean Air Act. EPA has responded by seeking Congressional action to eliminate the oxygen requirement and replace it with renewable fuels standard.

Now, I sit as a farmer here kind of scratching my head because I'm saying, on the one hand we are saying oxygenates work. They have cleaned up the air. We have on the other hand, a product that has contaminated the water, so we are going to eliminate the oxygenate requirement, when actually all we are trying to do is clean up the water. Quite frankly farmers sit here scratching their head and say let us use a little common sense, the approach I want to use.

As Leon has already indicated, the further scientific studies show that clean air rules do not take into account our ability to cut the carbon monoxide emissions which reduce pollution. And he quoted the statistics that show the effect that, that has in cleaning up the emissions and the situation here in Chicago. As you met with the

EPA Carol Browner last week, she told the Illinois Congressional delegation that legislation granting an ethanol carbon monoxide credit and thus allowing ethanol use in the Chicago market would be finalized by Memorial Day. Well, again farmers say we believe the administration could solve this not only now, but could have done it in January, granting the carbon monoxide credit, clearing up any uncertainty, any uncertainty about ethanol's role in the Chicago market.

All of these actions are particularly puzzling to farmers, especially again in the light of the proven track record that we have with ethanol. While MTBE has very significant human health and environmental impact, as you have questioned the panelists here this morning, in the last 10-years none, I repeat, none have surfaced with the use of ethanol. Ethanol has a proven track record of reducing air pollution without any negative environmental or health effects.

The Farm Bureau along with the Farmers Union, the Renewable Fuels and National Corn Growers and other organizations have been meeting in a summit, to come together with common legislative strategy, that we have all put together a national solution to the ethanol issue. It is Farm Bureau's belief that any legislation addressing MTBE, one, must be national in scope. We know about states individually banning MTBE. It does not make an industry that can operate effectively or efficiently. All action should be taken on a national level.

In addition, we ought to have legislation or ruling that would not allow any state or regional waivers from the reformulated gasoline oxygenate standard. We believe that national standards, we should not reduce the progress we made and certainly has been well documented in terms of what we have accomplished in clean air.

Three, we must retain the oxygen standard, not allow any reduction in air quality standards and not allow any backsliding to occur. Four, we must protect the real world environmental and public health benefits of Phase 2 of the RFG program nationwide.

As a group we support H.R. 4011 with an amendment to prohibit state or regional waivers of the RFG oxygen requirement based on current law, and protects the environment and public health. We would also support a companion bill in the Senate that does the same thing.

These legislative principles reflect a united strategy that expands ethanol use while preserving and enhancing the environmental and public health benefits. It is a win-win-win. It is win for the environment, for energy and for the economics. Cleaner healthier air while no water quality problems would exist. For energy policy it would increase domestically produced renewable fuel, relying less on imported fuel. And economics, it increases the market and market prices for agriculture, increases jobs and improves the trade deficit.

We unapologetically believe that we will expand the use of ethanol by two times and the use of corn by two times in the production of ethanol in the next 5-years. And that is good for the farm economy and creating jobs in the process and we urge your support in making that happen. Thank you.

[The prepared statement of Mr. Warfield can be found in the appendix on page 72.]

The CHAIRMAN. Mr. Warfield, thank you very much for that testimony. Good to have you here.

Eric Vaughn, thank you for being here, and we look forward to hearing what the Renewable Fuels Association has to say. Thank you.

STATEMENT OF ERIC VAUGHN, PRESIDENT, CHIEF EXECUTIVE OFFICER, RENEWABLE FUELS ASSOCIATION.

Mr. VAUGHN. Mr. Chairman, thank you very much. It is indeed an honor to be here. Thank you for the invitation to appear before you, Mr. Chairman, and your committee here in Illinois. The Senate Agriculture Committee over the last 14, 15-years has played a prominent role in the development of renewable and alternative energy sources. Your current chairman, Senator Lugar, in neighboring Indiana has been a stalwart defender and promoter and expander of the notion of ethanol from corn and arange of other the bio mass feed stocks.

I represent the Renewable Fuels Association, the national trade association for the domestic ethanol industry. There are 58 ethanol production facilities in operation today, and within about 2-days there will be another one in neighboring Missouri, a farmer owned co-operative.

In 1990, when the Clean Air Act amendments were being debated and discussed, a great Illinois legislator by the name of Ed Madigan teamed up with another legislator from the great state of California. I probably should say great legislator as well, Mr. Henry Waxman, to promote, produce and develop a new standard, a reformulated gasoline standard that would require for the first time the oil companies would produce cleaner burning fuels. It was historic. I was there for many, if not all, of those hearings. I watched Mr. Madigan work tirelessly as he promoted the ethanol and oxygenate content requirement of reformulated gasoline.

Now, it didn't come out of the air. It came out of Colorado. It came out of the Rocky Mountain West, where it was tried and succeeded by adding oxygen, the simple addition of oxygen greatly reducing toxic emissions, and reduced carbon monoxide emissions. And it was included in that program as a compromise, a 2-percent weight oxygen requirement, in order to encourage competition. If Representative Madigan were alive today, I think he would be spinning on the floor in front of us, the thought that 85-percent of that program turned into an MTBE program. That is not what was anticipated.

It was farm leaders, people at this very table, certainly those in this room who worked tirelessly for the adoption of that initiative in the Clean Air Act amendments of 1990. It worked then and it works today. Chicago, and Northern Illinois is the envy of the Nation in terms of reformulated gasoline. The leadership of your Governor, the Mayor of the great city of Chicago Mr. Daley, Mr. Chairman you, Mr. Durbin and your entire Congressional delegation have worked to provide a very solid political base. The oil industry in the state has worked very aggressively to produce clean burning reformulated fuel with ethanol. The ethanol industry and the corn farmers have worked to promote and produce the cleanest burning renewable alternative fuel supply in the country. The program

works. It exceeds all toxic emissions standards required under Phase 1 and will do so under Phase 2. But most importantly, it is done without any harm or degradation to the rest of the environment, namely the water.

You have already recounted and many of the witnesses have already told you all the terrors and woes of MTBE. I cannot tell you it is going to cause cancer. I cannot tell you it is going to cause an increase in the instances of leukemia. I can tell you MTBE stinks. It just flat out stinks and people are tired of it, and they do not want to trade off some air toxic reduction for water contamination.

The Chairman of the powerful Environment of Public Works Committee, where by the way, a hearing has not been held on the ethanol issue in 7-years, has stated recently that 3,865 wells in his state of New Hampshire are contaminated with MTBE and he wants it out of their gasoline. We join with him in that. We want it out as well. It was never intended, it was never thought of as the Nation's primary oxygenate choice, but it was a mistake and we need to reverse that mistake.

The two major questions before us today are confronted by your legislative initiative, S. 2233. I like Ron Warfield's point, a common sense approach. It is about time we had some leadership in Washington like yours, Mr. Chairman, that is just flat out common sense. We have an MTBE contamination problem, so deal with it, address it and your bill does. I also note with a great deal of pride, because I was there the day it was on the Senate floor. 15-days later the Federal EPA issued a notice of intent to accomplish your legislative objective under TSCA. The Federal EPA has it within their authority to act and act aggressively and they should do so. Your legislative initiative will help move them along just that much more quickly. And I congratulate you, Sir, on your initiative.

In addition, the Federal EPA has the authority, in fact, they have made the promise to the Illinois delegation for three and a half years to provide a carbon monoxide credit for ethanol blends in reformulated gasoline. There will be no carbon monoxide credit on Memorial Day or any other day because what the EPA is currently working on is not a carbon monoxide credit. I know they say it is, but when you see it, it will surprise you, hopefully shock you. They are not considering what Illinois EPA Administrator Tom Skinner proposed. If they would simply adopt the Skinner plan, in fact, allow it to be used in experimental purposes, your air will be cleaner, the product will be a much more powerful one and the economic implications would be tremendously powerful.

In addition, the California waiver has now become a major hot topic of debate. The Federal EPA has it within their authority to deny that waiver for one very specific reason. The California waiver request fails to prove its stated concern which is that the use of ethanol will prevent or interfere with the attainment of another national ambient air quality standard. That is not the case. A politically motivated waiver can be granted. A technical and environmentally focused one cannot be, and should not be.

Lastly, the Federal EPA has the authority today to adopt oxygen averaging in the Federal reformulated gasoline program which provides tremendous flexibility assistance to the oil industry as it

phases out of MTBE and begins the marketing and production and use of ethanol.

Mr. Chairman you asked earlier and I would like to submit for the record a study that was done for the Federal EPA by one of the most experienced and professional organizations in the country on air toxic and toxic emissions in the environment, Cambridge Environmental. We submitted this study to the Federal EPA at the hearing on ethanol last week in Washington and I would like to submit it for the record, because it identifies extensively, in an exhaustive fashion the environmental, health and fate of ethanol entering the environment, the ground water and the soil.

What it says is ethanol is a benign, efficient, effective, very consumer friendly and health friendly additive with approximately a 6-hour half life. In other words, it will break down completely in 6-hours. And I would ask that the report be entered into the record.

The CHAIRMAN. We will introduce that into the record. Thank you.

Mr. VAUGHN. Thank you, Sir. And I would like to just close with this. In traveling here today from Washington, and on my way to California, the stark contrast is almost beyond belief. That while there is concern here in the Midwest about MTBE contamination, one of the greatest concerns is that should this administration deliver to California a waiver, I would believe and tell you today, a politically motivated waiver, that would allow California to be out of the oxygenate program and in their case, that is a MTBE program. There are 1.5-billion gallons of MTBE sold in the state of California. Providing one state, with a resolution to their MTBE problem presents an unacceptable risk to the rest of the country. Where will those MTBE barrels go? And how will they be dealt with when they end up in Kansas City or St. Louis or Chicago if trucks are moving along your highways? We need a national solution to this problem, not a regional one. And we believe ethanol ought to be part of, in fact, we are confident it will be part of a national solution to the MTBE contamination crises.

Again Mr. Chairman, I want to congratulate you for S. 2233 and pledge our strong support and commitment to you as you pursue a success of that legislative action back in Washington. Thanks for the opportunity to be here.

[The prepared statement of Mr. Vaughn, can be found in the appendix on page 76.]

The CHAIRMAN. Mr. Vaughn, thank you very much. I appreciate your testimony. It was very enlightening. And we will have some questions for you after Larry Quandt, the President of the Illinois Farmers Union, testifies.

Larry, thank you very much for being here. It is good to see you again.

STATEMENT OF LARRY QUANDT, PRESIDENT ILLINOIS FARMERS UNION

Mr. QUANDT. Good morning, Mr. Chairman. Thank you for the opportunity to testify here this morning. As you said, my name is Larry Quandt and I am president of the Illinois Farmers Union. And I would particularly like to thank you, Mr. Chairman, and

your co-sponsors, especially Senator Durbin for introducing Senate Bill 2233. I think it shows vision and leadership that we need in Illinois, and it continues the ongoing debate on ethanol and MTBE and I think we now have learned enough about MTBE that we have to get it out of our fuel market and out of the ground.

The Illinois Farmers Union would support any legislation to insure expansion of the ethanol industry because out here, all over the United States, not just in rural Illinois, but there is a price crisis. It is an income price we will see, commodity prices that are at a decade long low period. The increase in ethanol would have a dramatic effect on it.

It is also an environmental issue. We know now that MTBE is bad for the ground water and it contaminates it. We don't know what the other health effects might be and they are just now being studied, and I think it is safe to assume that they are probably not good. Agriculture plays a big role in protecting the environment, not just in the clean air by helping produce clean burning ethanol, but our conservation practices and the chemical reduction and what the different practices will put in place on the farm to preserve all the water, not just ground water.

I think this debate centers around another thing, too, as well that has just been brought to our attention in the last few months, is energy security. We are spending too much of our money on foreign oil and it puts us in the dictates of governments and people that really do not have our best interest at heart anymore. So if we would increase the use of ethanol we reduce our dependence on foreign oil. I know we cannot eliminate it, but we can reduce it and if we reduce it 1-percent, that has an effect in the market.

Everyone I believe in this room anyway is supporting the expansion of the ethanol industry, whether it be the corn growers or the people that grow the corn, the ADMs, the environmental people. I think part of why we are here is what is the best way to do that.

We have heard some discussion about replacing the oxygenate mandate with a national renewable fuel standard. I know that this debate is just now breaking out. I know that virtually all the proposals say we start at the base level. What I have not been able to discover yet is what kind of growth factor anybody wants to put into it, whether we take 10-years to double which I think that is the projection we get, in three or four if we maintain the oxygenate standard.

I would assume that it would have some increase in growth over a 10-year period, it would more than double it. Which is the best way to go? I do not think we have enough information to answer that question. There would be some advantages to both. We would have larger growth I think versus any renewable standard. We could have larger quicker growth maintaining an oxygen standard. But with renewable standard it might be slower but it might wind up larger at the end of 10-years and with the slower growth, might offer the opportunity for farmer owned value added co-opts to pick up part of this demand.

I think along with that we should study the possibility of including a renewable energy security reserve. I think everybody can probably remember back in 1996 some of us farming, there was a pretty good price, but it also shut down the ethanol plants. So a

renewable energy security reserve would do two things. Increased ethanol production would raise prices. Creating this reserve would also raise prices. Seeing a reserve of any kind is very cost effective, reduced not only in the Treasury and would also guarantee a supply of seed stock for this extra ethanol demand. This also has to be coupled with strict, and this has been covered by some of the experts, a backsliding for the air quality standards we have had.

I know you want to get done, so I am going to close. I would like to thank you for this opportunity again, Mr. Chairman. And the question you asked earlier about any knowing intentions of ethanol contaminated water, I think if you ask some people in this room they might confirm that occasionally I have deliberately consumed water contaminated with ethanol.

[The prepared statement of Mr. Quandt can be found in the appendix on page 85.]

The CHAIRMAN. Well, Larry, thank you very much for your testimony, and all of you. It is good to have you all here and on the same panel. Seeing you all together, all saying pretty much the same thing, brings to light one issue we have in Washington. I am a little bit worried that the different associations might get divided and go in different directions supporting different bills. Senator Daschle and I have worked very well in the last year and a half. We have always agreed on farm issues. I am concerned that there seem to be two main competing ways of going about this, one banning MTBE and keeping the Clean Air Act unchanged with the oxygenate requirement. And the other replacing the Clean Air Act requirement of an oxygenate with the renewable fuels. I think it is really important that we all unite on this, or we are going to lose out all together. We may not get anything because the forces against us will be united.

Last year when Senator Boxer proposed a resolution to ban MTBE and replace it with ethanol, we passed it by just two votes in the U.S. Senate. So the Senators from farm states cannot afford to be divided on this issue, And we appreciate all of you working together.

I think it was Leon, mentioned that MTBE really started being used in Denver. Was that right? or was it you, Eric?

Mr. VAUGHN. Actually I said MTBE was first used in Denver.

The CHAIRMAN. It is oxygenate.

Mr. VAUGHN. But that is actually true. It was the National Corn Growers Association and others that went to the front range of Denver and established in 1988, the first in the Nation oxygenate content requirement in the winter months for carbon monoxide. And after about 8-months of debate, over the strong opposition of the oil industry at the time, the content requirement was established. It was a huge victory, and ethanol got completely shut out of that market. For the first 3-years it was all MTBE.

Since that time it has become virtually an entire ethanol market. In fact, just last week I believe the Senate in Colorado approved a bill to ban MTBE. So it has come around completely full circle to where ethanol, I believe, is the only oxygenate today used in the front range of Colorado.

The CHAIRMAN. OK. But they started experimenting with MTBE in Denver as an oxygenate. And that is how that was. You men-

tioned, Eric, in your testimony that you do not believe that the EPA is proposing a carbon monoxide credit. You think that it is going to be something else. Have you seen what the EPA has proposed? My understanding is they have sent something to the Office of Management and Budget that is winding its way through the process. Administrator Browner described it to me, Ray LaHood and Senator Durbin. She described what they had proposed as a carbon monoxide credit. What do you think their proposal really is?

Mr. VAUGHN. Well, as you know in Washington, all you have to do is say that something is sensitive or secret or confidential and then everybody gets a copy of it. We have been reviewing this informally with administration officials now for months. I do not think, I am absolutely certain it is not a carbon monoxide credit. Essentially they have come up with a, the only word I can use is convoluted, but it is a scheme that allows those in the state of Illinois, in Chicago, Illinois, in the RFG covered areas, reasonable further progress credits will essentially be allowed in a 1-percent VOC credit to an oil company using ethanol. It may have carbon monoxide as its underpinnings, but the reality is Tom Skinner, one the brightest State EPA Administrators in the country, and I am not just saying that because I am here, but he has just really dug into this issue.

If you simply read his plan, you will understand the technical and scientific approach he brings to this debate. And the five-tenths VOC offset is fully documented by the air shed models that you incorporated in that plan. I would tell you, I do not think the Federal EPA even read his proposal, because they certainly did not act on it and they did not incorporate his suggestions into their proposed. And Sir, again it is not going to be a carbon monoxide credit once it comes back out of the OMB. It just is not going to happen that way.

The CHAIRMAN. It is going to be something else. A question for all the panelists. It has occurred to me that with the lawsuits being filed in Long Island, recently in Madison County, and I guess a class action suit was filed against oil companies all over the country by plaintiffs from all over the country who are alleging that their water supply was contaminated by MTBE.

Is it possible that if Washington did nothing the oil industry would be thinking twice about continuing their use of MTBE based on now the studies coming out showing that it is a problem in the water, the lawsuits, and the mounting legal challenges that they face? Do you think there is any possibility that they might just of their own accord stop using MTBE and start gradually shifting over to ethanol?

Would anybody care to comment on that?

Mr. WARFIELD. I guess speculating with you in terms of the direction they might go. Although we know that when it comes to this issue and certainly the opposition we faced over the last decade that they seem to have nine lives when it comes to this issue. But certainly is going to put a great deal of pressure upon them. There is a very broad based understanding, common understanding that the fact is there is a problem with that.

I guess the concern I have, even if that is true, even if that is true, that will we have allowance by EPA for certain states to opt

out and say well, we can do it without the oxygenate requirement, and we start moving down that path. So even if that scenario does follow, it seems to me I still have the concern about the direction and the policy we pursue because of that. And again I say that in mind of the fact that every time, it seems like this one has nine lives. I hesitate to say that, but it seems like it is common understanding by everyone that there is a water quality problem here that needs to be dealt with and so it is broad based enough that it seems to me that is a possibility.

The CHAIRMAN. Larry.

Mr. QUANDT. I am not sure these are right, but that way we can get them in the record and somebody maybe can help verify them, if I cannot. I think in this discussion, like what do they call the fuels in California that they are trying to meet both designer fuels that contain no oxygen, additive. The nearest I can tell from what I have read, the cost of that product is like 12 to 14, 15-cents a gallon more. And that would be RFG, too.

If you upgrade the blend stock to use ethanol without any waiver it is a couple cents. So there is an economic incentive. But I do not know, based on history, whether you want to assume that would drive it, because there seems to be a great hesitancy for the oil companies to relinquish any share of the market for ethanol.

Mr. VAUGHN. Let us take this hypothetical. Let us say you lived in a progressive state with a progressive governor and a greatly advanced and progressive state legislature that adopted an MTBE label and let us say you put that label on the pump. Apparently there is hardly any MTBE blending going on here so there won't be many labels up. We will find out. But let us say you identify where the stuff is and you give the consuming public some information about the oxygenate that is out there. We have had to have an ethanol label on the pump for years. It does not seem to have any serious negative effects. My guess is an MTBE label will.

Second, if the Federal Government were to be as progressive as the state of Illinois and provide the oil companies with a carbon monoxide benefit in the terms of the oil that they are producing, the gas that they are selling, you are getting the credit, you are getting the benefits for air quality, so provide that to the oil industry to make the blending of ethanol that much more economic and efficient. Then Mr. Chairman, with those two caveats, I would say there is no question that the oil companies are responsible. They do not want to be in MTBE blending, and when you think about how the MTBE might get here, you are crossing the Great Lakes with shipments of MTBE. Nobody wants to take on that responsibility. So I think you are right, almost doing nothing, those being the two caveats, I think you have a very powerful incentive to move out of MTBE and back into cleaning burning renewable ethanol.

Mr. CORZINE. Mr. Chairman, the only other thing that I could add would be that one thing that is not talked about very much is that if we were to eliminate the oxygenate or eliminate MTBE without replacing it with ethanol, we are talking about a large volume of more gasoline that we would need. Also if the gasoline could be further refined without oxygenates it would also mean less gasoline per barrel of oil. So all that boils down to, more barrels of oil.

And what that means to me is more foreign oil and increases our dependency on foreign oil.

What we really need in conjunction with what you might say is a real initiative for a renewable initiative by the Federal Government to help us reduce our dependency on foreign oil and keep all those dollars on our shores.

The CHAIRMAN. Well, thank you. It just occurs to me, being a lawyer, that the legal liability the oil industry may face now, makes it very clear that MTBE is a problem, and it may enhance their liability for any future contamination. They may have a defense to any cases of past contamination, they may say that they did not know that it caused ground water contamination. They may say the EPA required the use of it. But going forward, now they are on notice and continuing to use MTBE with it continuing to leak into the soil and into the ground water would potentially enhance their likelihood of being found guilty in the future. I just throw that out there as something to think about.

Now, on this waiver issue, this is a very serious matter. Most of you alluded to it in your testimony. If the California waiver is granted I think we can expect to see more states applying for waivers. My understanding was the Governor of Missouri Mel Carnahan said that he was going to apply for a waiver, but now he is saying he was misinterpreted. Does anybody know if any other states are thinking about applying for a waiver from the oxygenate requirement?

Mr. VAUGHN. Mr. Chairman, I will do it from memory, but the states of Maine, New Hampshire, New York, Connecticut, New Jersey, Alaska did some time ago, getting out of MTBE, California.

The CHAIRMAN. They applied for a waiver?

Mr. VAUGHN. Actually at the time Governor Hickle simply banned MTBE and the Federal Government decided not to take him on, and the MTBE was in there for about a week.

The CHAIRMAN. This is what state?

Mr. VAUGHN. The state of Alaska.

The CHAIRMAN. The state of Alaska. The previous Governor?

Mr. VAUGHN. It is also the CEO program in Alaska. Yes, Sir, back in about 1991, 1992 time frame. I can get the specifics.

The CHAIRMAN. They banned MTBE?

Mr. VAUGHN. They banned MTBE. Ethanol now has the entire Alaskan market.

The CHAIRMAN. Wow.

Mr. VAUGHN. We satisfied that relatively easily. I think it is 14 states currently have applied for relief from either the Federal RFG oxygen standard and also considering MTBE ban bills in their state legislatures. Governor Carnahan has asked the Federal Government for relief on the Federal standard and would like to replace the Federal program with the state RFG program that would require the use of ethanol. That was his change of position that was announced about a day later or so.

Mr. CHAIRMAN. OK. Well, that is something we are going to watch. If any of these waivers are granted, it could have a domino effect and we will have to watch that issue very closely.

Thank you all, for your testimony. I do have another panel that will be testifying. One final question. I guess the Petroleum Insti-

tute has argued that states do not have the authority to ban MTBE. You just pointed out, Eric, that Alaska has banned it. Other states have also banned it.

Do you have any comments on the authority of states?

Mr. VAUGHN. Mr. Chairman, that is a very good question. The former, the previous 2 counsels of the EPA that are now in private practice in Washington, DC. are working with several senators, one in fact your colleague from Iowa, Senator Grassley and others, to make it clear what authority the governors have. When a governor was either placed in a program, as Chicago was placed in the gasoline program because of air quality concerns, or opts into that program because of the objective of achieving air toxic reductions, they did not obviate or eliminate their responsibility to their citizens to protect the environment. There is nothing that prevents a governor acting against any chemical in any program if it is affecting water quality.

I realize there is a tight legal definition, and since you have got something that is covered under the Clean Air Act, some have contended that the governors do not have the authority to remove that chemical of that product under the Clean Air Act. I would agree with that. However, if other environmental contamination, in this case water contamination results, the governors absolutely not only have the right, they have the responsibility to move on that product and my guess, my comment would be that the Federal EPA ought to provide that guidance to the state that they can move out of that product to protect their water resources in their states.

The CHAIRMAN. Thank you. That answers that question. All of you have been very helpful and I appreciate your testimony. I look forward to working with you on this issue and others. Thank you all very much.

While that panel is coming up I am going to ask unanimous consent that the following letters and written statements be included in the record as if read. The National Corn Growers Association letter of support for S. 2233; the National Association of Conservation District's letter of support for S. 2233; letter of support from Mayor Daley and Governor Ryan; statement of United States Senator Durbin; statement of Illinois Attorney General Jim Ryan; statement by Al Nathis, long time ethanol supporter.

[The information referred to can be found in the appendix on page 97.]

The CHAIRMAN. The Committee record shall remain open for five business days after the conclusion of this hearing for additional written testimony. And with that I want to welcome the fourth panel. We have here Donald Holt, the Senior Associate Dean of the College of Agriculture, Consumer Environmental Sciences at the University of Illinois at Urbana-Champaign. Mr. Holt, thank you for being here.

Brian Donnelly. Brian is the Executive Director of Southern Illinois University at Edwardsville ethanol pilot plant, which we have been working very hard to get funding to construct that plant, from Edwardsville, Illinois.

Darryl Brinkmann. Darryl is the Illinois representative in the American Soybean Association. Darryl, you are from Carlisle, Illinois. Thank you all for being here.

Don Holt, if you would like to begin, we would appreciate your testimony.

STATEMENT OF DONALD A. HOLT, SENIOR ASSOCIATE DEAN, COLLEGE OF AGRICULTURAL, CONSUMER AND ENVIRONMENTAL SCIENCES, UNIVERSITY OF ILLINOIS

Mr. HOLT. Thank you, Mr. Chairman. I bring greetings to you from our Dean and also to Terry.

The CHAIRMAN. Did you have Terry as a student there?

Mr. HOLT. Yes, we did.

The CHAIRMAN. You did, okay.

Mr. HOLT. He was a good student.

The CHAIRMAN. Thank you.

Mr. HOLT. As you indicated, I am Don Holt, Senior Associate Dean of the College of Agricultural Consumer and Environmental Sciences. I hope you will pardon my scratchy voice today. We do greatly appreciate this opportunity to provide testimony on issues facing ethanol and the bio-fuels industry.

You specifically requested to hear our views on the Clinton Administration's recently released proposal to ban the use of methyl tertiary butyl ether, MTBE, rescind the oxygenate requirement of the Clean Air Act and replace the oxygenate standard with a renewable fuels requirement. Likewise, you requested our views on your bill S. 2233, described as the MTBE Elimination Act, and other relevant legislation.

Needless to say, measures that encourage use of ethanol as a fuel, fuel additive and for other purposes stand to benefit Illinois, which is a major producer of both ethanol and the most important raw material for ethanol production, namely corn. Likewise, measures that would reduce and eventually eliminate the use of MTBE as a fuel additive would have several benefits for Illinois and the other speakers have outlined outline the reasons for that.

The logical substitute for MTBE in gasoline is ethanol. Ethanol is the Nation's head start in the bio-based economy of the future. I want to repeat that statement. Ethanol is the Nation's head start into the bio-based economy of the future. Ethanol provides oxygen to insure complete oxidation of gasoline components in internal combustion engines, and the benefits of that have been outlined by other speakers today.

Further, ethanol enhances octane levels thus improving engine performance and fuel efficiency. We do not see a benefit for eliminating the oxygenate requirement, as some propose. Ethanol can provide the environmental benefits of oxygenate without the drawbacks and dangers of MTBE. And according to USDA, by 2004 ethanol could successfully replace MTBE in meeting oxygenate demands with negligible effects on gasoline prices and supplies.

I am going to talk mostly about the science involved in ethanol production. The major steps in ethanol production include corn production, corn harvest and drying, corn milling, ethanol production and sidestream processing. Thanks to research, ethanol production is now an energy efficient process, yielding net energy benefits and a number of other benefits to the U.S. economy. This development was the result of improvements at all stages in the overall ethanol production process.

The University of Illinois has a long history of interest and contributions in all facets of producing and utilizing corn-based ethanol. The Illinois Corn Marketing Board, which administers the check-off funds, has been a key partner in ethanol related research, along with other Illinois universities, neighboring state universities, state and Federal Government and several private firms.

Decades of corn breeding and genetics research have increased the yield of corn and consequently of starch, contributing greatly to the efficiency of the overall process. In the mid-1980's the energy required to produce corn was sharply reduced by introduction of no-till technology that was pioneered by Professor George McKibben of the University's Dixon Springs Agricultural Center. Recently, University of Illinois scientists, including Professor Marvin Paulsen and colleagues developed a rapid accurate test for extractable starch, the key variable for ethanol production.

Research facilitated by the quick test is focused on genetic improvements, harvest protocols and artificial drying equipment and procedures leading to higher levels of extractable starch. University of Illinois scientist Steve Eckhoff and colleagues improved the milling step by pioneering the so called "quick germ" and "quick fiber" processes in which relatively inexpensive dry milling equipment is used to separate the corn germ, starch and fiber for further processing.

With this equipment corn processors can gain many of the benefits of wet milling while using the simpler, less expensive dry milling process. An especially exciting recent development is the finding that there are important cholesterol-lowering agents, known as stanol esters, in an oil fraction associated with corn fiber produced by the quick fiber process. These ingredients alone are worth about three dollars a bushel, even though they make up a small fraction of each bushel of corn.

University of Illinois scientists pioneered important changes in the ethanol fermentation process. Through the 1980's and 1990's Professor Munir Cheryan and colleagues developed and perfected continuous membrane bioreactors, that is CMBs, for ethanol production. This continuous fermentation approach offers many advantages over the traditional batch processes.

Successful large scale CMBs were first operated in Illinois at the world's second largest ethanol producer Pekin Energy, now William's Energy. Continuous membrane bioreactors were also developed by University of Illinois scientists for production of improved dextrose, that is, glucose, which is key to almost all fermentation processes, as well as corn oil, zein, which is corn protein, and zanthophylls. CMBs will be key components of corn processing in the future and will be used to produce many diverse corn based products safety and efficiently and profitably. Brian Donnelly will address some of the interesting scale-up problems associated with this kind of research.

University of Illinois research on aspirating ethanol into both gasoline and diesel engines continues to yield engine design criteria and specifications. In addition, literally hundreds of studies were conducted on the use of various co-products as food, feed, fiber, fuel and chemical feedstocks. This work will continue and increase in the future.

Functional genomics, which is part of the bio-technology revolution, will continue to make corn a better raw material for manufacturing ethanol and many other products. Bio-technology will create totally new products, including pharmaceuticals and neutraceuticals, that can be produced in and manufactured from corn and soybeans. Functional genomics will also improve the microorganisms and enzymes used in production and processing of the various fractions of the corn kernel, leading to even more diverse and useful products that can be obtained from corn in profitable commercial operations.

In my written testimony I reported on our research on all of the major stages of ethanol production and use. Because the overall viability of the ethanol industry is improved by advances in each of these dimensions, no one factor makes or breaks the strong case for ethanol. Ethanol is one part of a very complex bio-based production and utilization system. Analyses of its strengths and weaknesses must reflect all of these dimensions.

Legislation that encourages public and private investment in research and development in support of a bio-based economy, including your MTBE Elimination Act and Senator Lugar's National Sustainable Fuels and Chemicals Act, S. 935, will benefit the ethanol and bio-fuels industries and their customers. We applaud your efforts in that direction. Thanks for this opportunity to provide information for the Committee.

[The prepared statement of Mr. Holt can be found in the appendix on page 87.]

The CHAIRMAN. Dean Holt, thank you very much.

Brian Donnelly from SIUE and the Executive Director of the ethanol pilot plant there. Thank you for being here and I look forward to your testimony.

STATEMENT OF BRIAN E. DONNELLY, EXECUTIVE DIRECTOR, UNIVERSITY PARK, SOUTHERN ILLINOIS UNIVERSITY, EDWARDSVILLE

Mr. DONNELLY. Thank you, Mr. Chairman. Good afternoon. I am Brian Donnelly, Executive Director of University Park, Southern Illinois University, Edwardsville. I am here to represent the site that has been chosen for the National Ethanol Research Pilot Plant. I would like to begin by complimenting you, Mr. Chairman, and the Senate Committee on Agriculture for holding this hearing and for the commitment to the development of the safe dependable cost effective fuel to meet the clean air needs of our Nation. Particularly I would like to compliment the Committee and the entire Senate for the passage of S. 935, to promote the conversion of bio-mass into bio-based industrial products. This legislation, thanks to an amendment offered by you, Mr. Chairman, includes a Federal authorization for the construction of the National Ethanol Research Pilot Plant at SIUE.

The pilot plant holds the potential to provide a bright future for ethanol and the environmental and energy security that it provides.

University Park is a 330 acre research and technology park located on the campus of Southern Illinois University-Edwardsville. The state of Illinois has invested $3.1 million in University Park,

building concrete roads and installing utilities to support more than one million square feet of building space. The park exists to foster regional, state and national economic development by making tracts of land available to corporations, nonprofit organizations and government agencies that could benefit from its strategic location. This site is at mid-continent, next to a comprehensive university, just 30-minutes away from Lambert-St. Louis International Airport.

Scores of researchers are engaged in discovering new ways to produce ethanol more efficiently. Some are examining processes for grinding corn, hydrolyzing starch, fermenting glucose, distilling and dehydrating alcohol or converting corn fiber to ethanol. Others are interested in engineering the corn kernel, altering enzymes, breeding or genetically engineering new strains of bacteria, yeast and fungi or in producing or recovering valuable co-products of the ethanol production process.

However, these research efforts share a common problem. Encouraging results have not been tested on a commercial scale because of the prohibitive costs and risks of injecting an exploratory technology into an existing facility. These costs and risks have created a log jam of research projects waiting to go forward to commercialization. In 1995 SIUE received a $500,000 grant from USDA to study the feasibility of constructing the pilot ethanol plant. As part of this study, engineers from the Fluor Daniel Company succeeded in producing a preliminary design for a pilot plant that would emulate full scale corn wet mill and corn dry mill production facilities and be a very flexible platform for testing of many different types of technology.

The benefits of the facility were clearly demonstrated. Representatives of the fuel ethanol industry were asked to select several research projects from a list of 102 that hold the greatest potential for reducing the cost of manufacturing ethanol from corn. Ten projects were selected. Stanley Consultants, Inc. conducted an economic analysis of these projects and reached a dramatic conclusion. If just five of these technologies are sped to commercialization through the ethanol pilot plant, the cost of converting corn to ethanol could be reduced by approximately ten cents a gallon. In 1999, 1.56 billion gallons of ethanol were produced in the United States.

In 1996 Congress appropriated $1.5 million for final design of the pilot plant. Using these funds, Raytheon Engineers and Constructors was employed to finish designing the plant and produce bid packages. These bid packages are prepared and ready to mail. Construction can begin within a few months. The State of Illinois believes so strongly in this $20 million project that it has already appropriated $6 million. If the additional $14 million Federal share becomes available within a year or so, this major national asset will be on line.

In closing I would like to thank you, Mr. Chairman, for the opportunity to appear today, and would be pleased to answer any questions you might have. Thank you.

[The prepared statement of Mr. Donnelly can be found in the appendix on page 92.]

The CHAIRMAN. Mr. Donnelly, thank you very much.

Next is Mr. Brinkmann from the American Soybean Association, thank you for being here and we look forward to your testimony.

STATEMENT OF DARRYL BRINKMANN, ILLINOIS SOYBEAN ASSOCIATION

Mr. BRINKMANN. Thank you, Mr. Chairman. It is indeed an honor to be here today to share some comments of what the soybean industry can contribute toward our bio-fuels effort.

Good morning. My name is Darryl Brinkmann. I am a corn and soybean farmer from Carlisle, Illinois. I am past president of the Illinois Soybean Association. I currently serve on the Board of Directors of the American Soybean Association. I also serve on the Board of Directors of the National Bio-Diesel Board. I am pleased to be here today to commend you, Mr. Chairman, for holding this hearing on bio-fuels. I am going to shift the focus a bit from the earlier panels and use this opportunity to discuss bio-diesel and some of the issues our industry our industry is working on.

Mr. Chairman, I know you understand bio-diesel, but for the record bio-diesel is a cleaning burning fuel for diesel engines. It is produced from renewable resources such as soybean oil. Bio-diesel is an ideal alternative fuel because it operates in diesel engines just like petroleum diesel and requires little or no modifications while maintaining the payload capacity and range of petroleum. Because its chemical characteristics are very similar to petroleum diesel, bio-diesel blends well at any level. The most commonly used blend is 20-percent bio-diesel and 80-percent diesel blend, B20. One of the reasons this is the most commonly used blend is due in large part to legislation sponsored and shepherded through Congress in 1998 by my Congressman John Shimkus.

Congressman Shimkus' bill amended the Energy Policy Act, EPACT of 1982 to allow Federal and state fleets to earn credit under this program by using B20. The major change in this law has resulted in record growth of bio-diesel use and I believe we are just beginning to take advantage of the potential of that market. So I thank you, Mr. Shimkus, and other members of Congress in the room for your strong support of this effort and of our industry.

Bio-diesel is simple to use, renewable, domestically produced and readily available. Other advantages of bio-diesel include superior lubricity for smoother operation and reduced engine wear and a high flash point, making it safer to store and handle.

The use of bio-diesel in a conventional diesel engine results in substantial reductions of unburned hydrocarbons, carbon monoxide and particulate matter compared to emissions from diesel fuel. Pure bio-diesel does not contain any sulfur and therefore reduces sulfur dioxide result from diesel engines virtually to zero.

Of course, there are other reasons to use bio-diesel fuel right now. With agriculture prices at record lows and petroleum prices approaching record highs, it is clear that more can be done to utilize domestic surpluses of renewable oils such as soybean oil while enhancing our energy's security. Because bio-diesel can be used with existing petroleum infrastructure it provides immediate opportunity for addressing our dependence on imported petroleum and helping our farm economy.

There are many reasons for our transportation sectors to use more renewable fuels like bio-diesel, but there are still hurdles and obstacles to making this a reality. Congressman Shimkus has introduced legislation in the House to amend the Congestion Mitigation Air Quality or CMAQ program to allow funds in this program to be used to buy down the cost of bio-diesel. The Shimkus bill does not create a new program for bio-diesel nor does it earmark funds in the current program for bio-diesel. It just levels the playing field for bio-diesel by making the funds eligible in the CMAQ program. Senator Bond of Missouri and Senator Johnson of South Dakota have sponsored similar legislation in the Senate, and I am sure we can count on your support, Mr. Chairman of that bill.

For long term support of bio-diesel the industry is considering a number of options including a national renewable standard. In other words, all diesel transportation fuel would contain a very small percentage of bio-diesel. Some petroleum distributors are already offering premium diesel that includes a low blend of bio-diesel as an additive. For example, Koch Industries is offering a product, U.S. Soy Field Diesel in bulk at over 20 terminal locations across the midwest. A similar product, Soy Master is being marketed by Country Energy, a joint venture between Farmland and Cenex/Harvest States co-operatives. We think this concept has merit and will work with industry to further develop expansion and use of low level blends bio-diesel. An upcoming rule making process by EPA which will lower sulfur content in diesel fuel and consequently necessitate inclusion of a lubricity additive makes this all the more attractive. Because bio-diesel contains no sulfur it can serve as a domestically produced renewable oxygenated lubricity additive in the ultra-low sulfur diesel fuel.

Mr. Chairman, we think the future looks bright for bio-diesel and with the help of members of Congress like you and Representative Shimkus we know that many of the current obstacles will soon be opportunities. Again, I appreciate the chance to talk about several key issues facing the bio-diesel industry and look forward to working with you on these matters and others of importance to Illinois soybean farmers. Thank you.

[The prepared statement of Mr. Brinkmann can be found in the appendix on page 94.]

The CHAIRMAN. Thank you very much, Mr. Brinkmann. If I could just stay with you for a couple of questions and then I will go back to Dean Holt and Brian Donnelly.

You mention in your testimony the use of bio-diesel is enhanced by the Energy Policy Act of 1992, EPACT. Can you explain how this program fosters the market for bio-diesel?

Mr. BRINKMANN. Well, it is like ethanol, making the exhaust of the diesel, the diesel exhaust cleaner. It lowers hydrocarbons and particulate matter emissions. And you know, gives us cleaner burning air. Actually soy diesel contains about 11-percent oxygen by weight, and that is the big point that we are trying to do.

The CHAIRMAN. It helps the oxygen content. So it is very similar to ethanol in that context.

I know many transit authority buses, state government trucks and mowers, as well as other municipal vehicles are powered by diesel. What kind of success has bio-diesel had in these markets?

Mr. BRINKMANN. Well, in these kind of markets you can come in with bio-diesel and there is absolutely no modifications that need to be made as far as fueling facilities or engine changes or anything. It can be burned in an engine just like diesel fuel. That is one advantage we have over some of the infrastructure changes that natural gas would have to make or something like that.

The CHAIRMAN. Now, the CTA in Chicago, the Chicago Transit Authority, they were using some bio-diesel buses, weren't they, for a while?

Mr. BRINKMANN. Yes, they were. They tried those along with the Chicago police department on their water boats on the riverfront. And they were very happy with the results. Again, people could notice the difference in the exhaust. It was no black as straight diesel and it smells a little bit like french fries.

The CHAIRMAN. What happened? They are not using those anymore?

Mr. BRINKMANN. There is some going on, but until the EPACT was amended these transit authorities did not get credit for using bio-diesel as if they were converting vehicles to natural gas or something. So that was why we really had Congressman Shimkus' bill.

The CHAIRMAN. Well, I look forward to working with you. And let us know what we can do to assist you on that. I think it is a very promising area and we have got to continue to promote it.

Back to Mr. Holt and Mr. Donnelly. The need for research on improving the efficiency of producing ethanol is only going to increase, even though we have made great strides already. And as Dean Holt pointed out, we have made strides in every step of the production of corn all the way to ethanol. But if we ban MTBE and part of that MTBE market is replaced with ethanol and market for ethanol doubles, we are going to need even more research to improve the efficiency and effectiveness of the ethanol production.

I am wondering what steps will your universities take to fill this role? Obviously SIUE is committed to managing the corn to ethanol pilot research plant and we are trying to get funds for that. But beyond the research plant itself and specifically at the Champaign-Urbana campus of U of I, what steps will the U of I be taking to help fill this important research role?

Mr. HOLT. Incidently I should point out that we have worked closely with Brian and others at SIU and see ourselves as cooperators in that effort. We will need to make the best use of all of our research facilities.

There are many initiatives underway that I think bear on this, probably the biggest one, the one that has the most potential for the future, is what has come to be known as I-bio or the bio technology initiative in Illinois. Of course, there are similar initiatives at the Federal level.

In the future, biological research, and most of the research that is going to be done relative to ethanol is biological research, will essentially be done under this umbrella of genomics, comparative genomics and functional genomics. It is a relatively recent development that grew out of the progress that was made in structural genomics that is, the mapping and sequencing of enzymes. The success in that is building on itself. I think your imagination is just

above the limit on how that is relevant to ethanol. It is relevant to increasing the yield of ethanol from a bushel of corn, which is very important for us, and it is relevant to increasing the yield of corn overall. It is relevant to being able to tailor corn and soybeans and other crops to be ideal raw materials for manufacturing a number of different products. In the past, of course, one of our problems has been that corn and soybeans were essentially commodities and they were not differentiated for various uses. Genomics will make it possible to differentiate corn and soybean for all the uses, including ethanol, and to tailor that raw material so that you start out with something that has great value and that value can be there as ethanol and some of the co-products and by-products.

I wish we could somehow emulate the bio-medical and pharmaceutical industries. I recently attended the Bio meetings in Boston and I was impressed that the various participants were unanimously enthusiastic in their support for the National Institutes of Health. They are supporting an effort to double the research budget in the National Institutes of Health. They see that effort pouring new disclosures and patents into the private sector and into the medical and pharmaceutical industries. It will do that. It is going to be the biggest game in town in terms of biological research. We need to get the same degree of energy and focus among stakeholders in agriculture.

The CHAIRMAN. We will continue to work on that. Now, ethanol can be made, not just from corn, but from any plant that has starch. Is the research just not that very advanced on making ethanol out of potatoes or out of rice stalks or out of meat? What is the state of all that research and do you do any of that research in your universities?

Mr. HOLT. Well, we focus primarily on corn. I think the reason is that corn has such a tremendous advantage in terms of the yield of starch per unit of input, I think the only plant that comes close in that regard is casava. It grows tubers and does produce a tremendous weight of starch, but is hard to harvest. To make comparisons you have to look at all the dimensions of the process.

The CHAIRMAN. The bottom line is that nothing is likely to threaten a dominance of corn in producing ethanol.

Mr. HOLT. I do not think so because it is very hard to find any biological system that is as productive as growing corn in Central Illinois.

The CHAIRMAN. That is right. Well, that is good. One final question and then we will conclude this hearing. I am just wondering how the public research universities such as SIUE and University of Illinois, are doing on interfacing with the ethanol industry and with the corn growers to insure that your research is well targeted?

Mr. DONNELLY. One of the things we did as part of evaluating the feasibility of the ethanol plant, the pilot ethanol plant, is we did an inventory of the, inventoried all the current ethanol research projects underway in the United States. We managed to identify 102 active research projects at that time, incidently more than half of which were coming out of the big public research universities in the midwest, institutions like University of Illinois, Purdue and Iowa State University. We then, through the Renew-

able Fuels Association, ordered a study in which the major ethanol companies were asked which of those research projects held the greatest promise for increasing the cost effectiveness of producing ethanol from corn. And they identified through that process ten research projects which were particularly high yield projects.

The pilot plant was then designed to make sure that it accommodated those ten research projects as an example of the mechanism we have used to try and stay in touch with industry and its needs.

The CHAIRMAN. Well, all of you, thank you very much for being here. I appreciate your testimony. I appreciate your traveling to Springfield. And to everybody who has been here in the audience, thank you for your attendance and your interest in this issue. And with that, I am going to conclude this meeting of the Senate's Agriculture Committee, and thank you all for being here. This meeting is adjourned.

[Whereupon, at 12:45 p.m., the Subcommittee adjourned.]

A P P E N D I X

APRIL 18, 2000

Statement of Senator Peter G. Fitzgerald
Hearing of the Subcommittee on Research, Nutrition and General Legislation
Agriculture, Nutrition and Forestry Committee
MTBE Crisis and the Future of Biofuels
Tuesday, April 18, 2000

Good morning. As Chairman of the Research, Nutrition and General Legislation Subcommittee, I am privileged to initiate this field hearing and bring the ethanol debate to the heart of ethanol country.

I have become deeply concerned by the use and ultimate misuse of the gasoline additive methyl tertiary butyl ether (MTBE), a nonrenewable fuel derivative, and its potential adverse health effects on those who come in contact with it.

As many of you know, on March 9th, I introduced the "MTBE Elimination Act" with my Colleagues Senators Bayh, Abraham, Kohl, Grassley, Durbin, Brownback and Grams to address this issue. Specifically, this bill will phase out MTBE use across the United States over the next three years, ensure proper labeling of all fuel dispensaries containing MTBE enriched reformulated gasoline, provide grant awards for MTBE research, and express the sense of the Senate that the Administrator of the Environmental Protection Agency should provide assistance to municipalities to test for MTBE in drinking water sources, as well as provide remediation where appropriate. This bill represents an important first step toward nationwide safe and healthy drinking water.

Despite the potential damaging effects of MTBE, research of this chemical is still in its preliminary stages. In February of 1996, the Health Effects Institute reported that MTBE could be classified as a neurotoxicant for its acute impairment effects on humans. Further, the Alaska Department of Health and Social Services and the Centers for Disease Control from December 1992 through February 1993 monitored concentrations of MTBE in the air and in the blood of humans. These studies showed that people with a higher concentration of MTBE in their bloodstream have a much greater tendency toward headaches, eye irritation, nausea, disorientation, and vomiting. Finally, the January 16, 2000 broadcast of the "60 Minutes" show noted, "the EPA's position is that MTBE is a possible human carcinogen." It is imperative that our nation remove MTBE from our Nation's drinking water supply.

MTBE pollution has been perpetuated by a lack of knowledge, as well as indifference, to a potentially hazardous substance. MTBE does not readily attach to soil particles, nor does it naturally biodegrade, making its movement from gasoline to water extremely rapid. The physical properties of MTBE, coupled with its potential adverse health effects, make the use of this specific oxygenate potentially dangerous to the American people.

Some have suggested that this dilemma could be solved by eliminating the oxygenate requirement of the Clean Air Act. Our current problem is NOT the oxygenate standard, the problem is clearly MTBE. The elimination of the use of MTBE in reformulated gasoline should not mean the removal of the oxygenate requirement set forth under the Clean Air Act of 1990 – which requires reformulated gasoline to contain two percent oxygen by weight. I believe it to be reasonable for our

nation to have both clean air and clean water, without eliminating the reformulated gasoline market or sacrificing our national health.

According to the United States Department of Agriculture study entitled, "Economic Analysis of Replacing MTBE with Ethanol in the United States," replacing MTBE with the oxygenate additive ethanol would create approximately 13,000 new jobs in rural America, increase farm income by more than $1 billion annually over the next ten years, and reduce farm program costs and loan deficiency payments through an expanded value-added market for grain. Furthermore, the U.S. Department of Agriculture has concluded that within three years, ethanol can be used as a substitute oxygenate for MTBE in nationwide markets without price increases or supply disruptions.

Ethanol has proven to be a viable, environmentally-friendlier alternative to MTBE. The Chicago reformulated gas program (RFG) has used ethanol for years, and according to the American Lung Association, Chicago has established one of the most successful RFG programs in the country. Ethanol is vitally important to our home state since Illinois is the number one producer of ethanol in the nation. Each year, 274 million bushels of Illinois corn are used to produce about 678 million gallons of ethanol. At a time when agricultural prices are at depression-era lows, this increased demand is sorely needed.

The MTBE Elimination Act will send a signal that the Senate strongly supports bio-based fuels research and recognizes the need to find viable ways to reduce our dependency on fossil fuels. Through research programs, localized testing, and proper labeling we can help assure that MTBE is properly identified in gasoline, extracted from groundwater, and phased out of use– thereby reducing the risk of future MTBE contamination.

The Clinton Administration recently announced they would seek to significantly reduce the use of methyl tertiary butyl ether (MTBE). I applaud their decision to join me and others in this worthwhile goal.

I am, however, very concerned with the Administration's proposal to eliminate the oxygenate requirement of the reformulated fuels program. Deleting this requirement—as the Clinton Administration proposes—without fully considering its implications may be ill-advised.

The Administration's plan would cap the ethanol market at a bureaucratically-determined limit, doing nothing to enhance farm income. As I mentioned earlier, the Department of Agriculture's own analysis affirms that banning MTBE, in the method that the legislation I introduced requires, would increase farm income by $1 billion per year. This could lower federal farm program costs and help farmers who are experiencing extraordinarily low prices. Unfortunately, the Administration has chosen an approach that will allow and even encourage this important market to stagnate.

By phasing out MTBE over a three year period and replacing it with ethanol, as the MTBE Elimination Act requires, we can help secure an ample supply of reformulated gasoline, clean water, and clean air for future generations. My legislation enjoys bipartisan support and is important to the well being of the environment as well as our nation's farmers.

I look forward to discussing our panelists' concerns about the MTBE situation and hearing their opinions on alternative approaches and remedies.

Testimony of Governor George H. Ryan

Senate Agriculture Subcommittee on

Research, Nutrition, and Legislation Field Hearing

April 18, 2000

Good morning.

First, let me thank Sen. Peter Fitzgerald for calling this hearing and providing a forum for us to once again weigh-in on this important public policy issue.

We are here today to stand with Sen. Fitzgerald in support of his efforts on the federal level to promote and protect the ethanol industry.

I want to begin by expressing my wholehearted and enthusiastic support of Sen. Fitzgerald's bill, S. 2233, the MTBE Elimination Act.

Co-sponsored by Sen. Durbin, this legislation would phase out the use of the fuel oxygenate MTBE over three years.

It also calls for pump labeling to ensure that consumers know when they are subjected to MTBE.

As you know, MTBE has proven harmful to the environment and to our public water supplies.

Here in Illinois, even though MTBE has not been widely used as compared with some other states, we have detected MTBE in 26 public water supplies.

Already, the Illinois General Assembly has approved similar pump labeling legislation, and I intend to sign that into law soon.

In Illinois, we have done and will continue to do everything in our power to encourage President Clinton and his Administration and the members of Congress to fully recognize the many benefits of ethanol.

On the state level, we have pledged planning and construction funds that will be used to supplement any federal dollars the state would receive for a proposed ethanol research pilot plant.

Also, we have budgeted funds to encourage construction of a new ethanol processing plant.

All in this upcoming fiscal year.

The bottom line is that ethanol is of critical importance as an environmentally-friendly alternative energy source and as a viable market for American farmers.

Recently, the US EPA and the US Department of Agriculture outlined a plan to significantly reduce the use of MTBE in gasoline.

That's a good first step.

And I want to recognize US EPA Administrator Browner and US Department of Agriculture Secretary Glickman for acknowledging the harmful effects of MTBE.

I also applaud their commitment to renewable fuels such as ethanol.

But I must also express my concerns regarding the possible elimination of the oxygenate requirement from the Clean Air Act Amendments of 1990.

The oxygenate requirement has helped clean the air in our urban areas, both in Chicago and the Metro-East area.

Eliminating the oxygenate requirement will adversely impact the use of ethanol and potentially increase the amount of toxins released into the air we breathe.

Sen. Fitzgerald's proposed legislation properly addresses these concerns.

In a recent letter to President Clinton, I voiced concerns about any effort to eliminate the oxygenate requirement and encouraged the President to support Senator Fitzgerald's legislation.

Mr. Chairman, I would ask that a copy of that letter be placed in the record.

There are also substantial economic concerns surrounding this issue.

The use of ethanol is crucial to the economic vitality of Illinois farmers.

Currently, approximately 600 million bushels of corn are used in the production of ethanol throughout the United States.

In Illinois, we produce more than 600 million gallons of ethanol, making us the nation's leading producer of ethanol.

In fact, approximately 17% of Illinois' total corn crop is used to make ethanol.

That demand increases the price of corn between 30 and 48 cents per bushel.

If that demand is lost, Illinois farmers and producers will suffer severe economic hardships.

With today's commodity prices, our farmers simply cannot afford further setbacks.

This legislation would protect and perhaps increase that demand.

Obviously, ethanol is an issue of particular importance here in Illinois and in other agriculture-based states.

But the fact of the matter is that clean air, clean water, and a healthy agriculture economy are important to everyone.

I am one of 23 governors on the Governors' Ethanol Coalition.

In fact, I chair the Environmental Committee of that coalition, and I know that the entire Coalition strongly believes that America needs to say no to MTBE and yes to ethanol.

And I think implementing the MTBE Elimination Act is the best way to do that.

Written Testimony by Congressman Ray LaHood (IL-18)
Senate Agriculture Subcommittee on Research, Nutrition, and General Legislation
Hearing: Issues Facing Ethanol and the Biofuels Industry
Tuesday, April 18, 2000

Senator Fitzgerald, thank you for holding this hearing to discuss Ethanol and the Biofuels Industry.

This issue is very important to the people of the 18th District of Illinois, and I am honored to have the opportunity to express my concerns.

With the recent reports over MTBE contamination of ground water wells, we have the opportunity to ensure that ethanol will emerge as the primary oxygenate in the Reformulated Gasoline Program. I am encouraged by the Administration's recent proposal to address the problems with MTBE, but I believe that we need to take the proposal a couple of steps further to ensure the we protect our ground water from MTBE, while at the same time maintaining the clean air that we have achieved under the RFG program.

I believe the best approach would be to amend the Clean Air Act, in order to allow oil manufacturers to address the volatility of ethanol during warm weather and maximize the blending formulations of their gasoline. However, this approach would be very difficult to achieve in the near term, which is why I am supportive of the efforts in Congress to ban MTBE outright.

As I have stated in the past, I believe that the Administration has a proven record of supporting the biofuels industry, especially ethanol. That is why I hope the Administration will stay the course and not allow the state of California to opt out of the oxygenate requirement in the RFG program.

Granting the waiver to California would not only severely impact the use of ethanol in the RFG program, it would also provide a precedent for other states to try to remove themselves from the oxygenate requirement. That precedent could ultimately lead to an unfortunate patchwork of Clean Air regulations throughout the country, instead of having one RFG national standard.

I believe that we can have a win-win situation.

Banning MTBE and encouraging greater use of ethanol in the RFG program will benefit the environment, and it will also help our beleaguered farm economy.

At a time when commodity prices are at an historic low, increased use of ethanol will provide a valuable market for corn. For every 100 million bushels of corn used in the production of ethanol, the price of corn increases by approximately 5 cents. This increase in price could mean the difference between solvency or bankruptcy for many corn producers in Illinois, and throughout the country.

Thank you again, Senator, for holding this hearing.

Statement of
Congressman John Shimkus
20th District, Illinois

TO THE
SENATE AGRICULTURE, NUTRITION AND FORESTRY
SUBCOMMITTEE ON RESEARCH, NUTRITION, AND
GENERAL LEGISLATION
REGARDING
RECENT PROPOSALS TO PHASE OUT THE USE OF MTBE

April 18, 2000

Mr. Chairman and Members of the Subcommittee, I first want to commend Chairman Fitzgerald on his efforts and for calling today's hearing. Thank you for allowing me to testify to you today on the importance of phasing out MTBE and increasing the use of biofuels, such as ethanol.

In my tenure as a Member of Congress I have never seen a better climate to increase the use of ethanol than here and now. With gas prices at almost two dollars per gallon and corn prices just over two dollars per bushel, we can produce a product that will help our energy supply while increasing the demand for corn for farmers.

With that in mind, I am here today to discuss recent proposals to phase out the use of MTBE, a hazardous fuel additive and an ethanol competitor. As you well know, the Clinton Administration recently offered its legislative principles in response to our MTBE crisis. The Administration is asking for three legislative responses.

1) To amend the Clean Air Act to provide the authority to significantly reduce or eliminate MTBE use.
2) As MTBE use is reduced or eliminated, ensure that air quality gains are not diminished.
3) Replace the existing oxygen requirement contained in the Clean Air Act with a renewable fuel standard for all gasoline at a level that maintains the current level of renewable fuel (1.2% of the gasoline supply) and allows for sustained growth over the next decade.

While I support the first two principles, I need to express my reservations about eliminating the oxygenate requirement in reformulated gasoline. I agreed with my colleague, Representative Greg Ganske (IA-4), when he said "We want to fix real problems, like MTBE water contamination, not abandon real solutions, like oxygenated fuels." We need to understand that, mathematically,

under the Administration's proposal, not as much ethanol would be used per gallon as the current law.

As a result, Congressmen Ganske, LanHood and I have introduced H.R. 4011, the "Clean Air and Water Preservation Act of 2000." Our bill currently has 37 other cosponsors and is supported by the American Farm Bureau Federation, the National Corn Growers Association and the Renewable Fuels Association. This legislation:

1) Bans MTBE within three years and urges refiners to replace it with ethanol.
2) Requires labels be placed on all pumps dispensing MTBE-blended fuel.
3) Directs US EPA to provide technical guidelines to help states remove MTBE from water.
4) Gives refiners flexibility to blend oxygen within the two percent requirement.

5) Prohibits environmental backsliding by raising the standards on emissions reductions and prohibiting an increase in the use of gasoline aromatics (which can lead to cancer forming particulate emissions).
6) Directs DOE and EPA to look for alternative sources of gasoline oxygenates.

Overall, this bill will help cleanup MTBE contaminated water supplies. It will preserve the clean air accomplishments of the past decade, and it will provide a renewable energy source which will decrease our dependence on foreign oil and improve our agricultural economy.

Last week, with the leadership of our two Senators, Durbin and you, Mr. Chairman, we had a very profitable meeting with Secretary of Agriculture Dan Glickman, EPA Administrator Carol Browner, and Members of the Illinois and Missouri delegations. I

hope that in the future we can continue to sit around the table and work on a solution to phase out MTBE and increase the demand for ethanol. Again, the time is now to make changes, and I appreciate the work that everyone has been doing. However, I must make special mention of the work that Senator Fitzgerald has done since coming to Washington. For many of our constituents in downstate, they were waiting to see how involved you might be in ag related issues, particularly ethanol. I am here to testify to them that not only have you been involved, but you have taken the lead in fighting for ethanol, in fact, you have done so much on this issue, that I think Ray and I are going to propose that we make you an honorary member of the House Renewable Fuels Caucus.

In all seriousness, though, I appreciate, and we all appreciate the work that you continue to do for us. You promised that the ag community would have another strong voice in the Senate and you haven't let us down.

Working with you, Ray and our ag community, I am confident that we will build on our efforts and ensure ethanol and biofuels will be a part of our nation's energy future.

Thank you for allowing me to testify today; and thank you, Chairman Fitzgerald, for holding this hearing.

TESTIMONY OF
MERRYLIN ZAW-MON
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BEFORE THE
SUBCOMMITTEE ON RESEARCH, NUTRITION
AND GENERAL LEGISLATION
OF THE
COMMITTEE ON AGRICULTURE, NUTRITION
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UNITED STATES SENATE

STATE CAPITOL BUILDING
SPRINGFIELD, ILLINOIS

April 18, 2000

Thank you, Mr. Chairman and Members of the Subcommittee, for the invitation to appear here today. I am pleased to have this opportunity to share information with the Committee on the Administration's recommendations and plans to reduce or eliminate the use of methyl tertiary butyl ether (MTBE) and boost the use of alternatives like ethanol that pose less of a threat to groundwater. The Administration's response includes taking regulatory action to protect drinking water and working with you to implement the legislative principles we recently announced to protect drinking water, preserve clean air benefits, and promote greater production and use of renewable fuels.

My testimony today will focus on the Clean Air Act's Reformulated Gasoline (RFG) program which has provided significant air quality improvements, the growing concerns about MTBE contamination of water

supplies and replacement of the existing oxygenate requirement in the Clean Air Act with a renewable fuel standard for all gasoline.

Last month, Administrator Browner and Secretary Glickman submitted to Congress legislative principles which, when taken together, will provide an environmentally sound and cost-effective approach:

- First, Congress should amend the Clean Air Act to provide the authority to significantly reduce or eliminate the use of MTBE. This action is necessary to protect America's drinking water supplies.
- Second, as MTBE use is reduced or eliminated, Congress must ensure that air quality gains are not diminished.
- Third, Congress should replace the existing oxygenate requirement in the Clean Air Act with a renewable fuel standard for all gasoline. By preserving and promoting continued growth in renewable fuels, particularly ethanol, this action will increase farm income, create jobs in rural America, improve our energy security, and protect the environment.

Cleaner Burning Reformulated Gasoline

An understanding of the history of the federal RFG program is important in order to put the issues surrounding the use of the oxygenates methyl tertiary butyl ether and ethanol in perspective. As you know, the Clean Air Act Amendments of 1990 put in place a number of programs to achieve cleaner motor vehicles and cleaner fuels. These programs have been highly successful in reducing air pollution. Congress struck the balance between vehicle and fuel emissions control programs after extensive deliberation. The RFG requirements also emerged as a program designed to serve several Congressional goals, including air quality improvement, enhanced

energy security by extending the gasoline supply through the use of oxygenates, and encouraging the use of renewable energy sources.

The federal reformulated gasoline program introduced cleaner gasoline in January 1995 primarily to help reduce ozone or smog levels. Unhealthy smog levels are still of significant concern in this country, with over 30 areas still in nonattainment of the current 1-hour ozone standard. More areas are expected to exceed the new, 8-hour ozone standard, should it take effect.

Ozone has been linked to a number of health effects concerns. Repeated exposures may increase susceptibility to respiratory infection, cause lung inflammation, and aggravate pre-existing respiratory diseases such as asthma. Other health effects attributed to smog exposures include significant decreases in lung function and increased respiratory symptoms such as chest pain and coughing.

RFG is an effective way to reduce smog precursors such as volatile organic compounds (VOCs) and oxides of nitrogen (NOx). The Clean Air Act Amendments of 1990 required that RFG contain 2.0 percent minimum oxygen content by weight. The first phase of the RFG program, from 1995 through 1999, required average reductions of smog-forming volatile organic compounds and toxics of 17% each, and NOx by 1.5%. In practice, phase I RFG, on average, exceeded these requirements for VOC, NOx and toxics reductions. This year, the second phase of the RFG program will achieve even greater average benefits: a 27% reduction in VOCs, a 22% reduction in toxics and a 7% reduction in oxides of nitrogen emissions. These reductions for RFG are equivalent to taking more than 16 million vehicles off the road. States rely on the air quality benefits of the

RFG program to demonstrate in their State Implementation Plans (SIPs) that they can achieve the ozone standard. In fact, seventeen states and the District of Columbia currently rely on air quality benefits from the RFG program in their attainment SIPs.

The federal RFG program is required in ten metropolitan areas which have the most serious smog pollution levels. Although not required to participate, some areas in the Northeast, in Kentucky, Texas and Missouri have elected to join, or "opt-in" to the RFG program as a cost-effective measure to help combat their air pollution problems. At this time, approximately 30% of this country's gasoline consumption is cleaner-burning reformulated gasoline.

Neither the Clean Air Act nor EPA requires the use of specific oxygenates in RFG. The statute and, subsequently, EPA's regulations only specify the oxygen content by weight; they do not specify which oxygenate to use. Both ethanol and MTBE are used in the current RFG program, with fuel providers choosing to use MTBE in about 87 percent of the RFG mainly because of cost and ease of transport reasons.

Water Supply Concerns

Despite the air quality aspects of oxygenates in RFG, there is significant concern about contamination of drinking water by MTBE in many areas of the country including California, and Maine. EPA is very concerned about the widespread detection of MTBE in drinking water. Current data on MTBE levels in ground and surface waters indicate widespread and numerous detections of MTBE at low levels. The United States Geological Survey has found that the occurrence of

MTBE in groundwater is strongly related to its use as a fuel additive in an area. Low levels of MTBE were detected in 21% of ambient groundwater tested in areas where MTBE is used in RFG compared to 2% of ambient groundwater in areas using conventional gasoline.

The Administration's Response

In response to concerns associated with the use of oxygenates in gasoline, the Administrator established a Blue Ribbon Panel of leading experts from public health and scientific communities, water utilities, environmental groups, industry, and local and state government, to assess issues posed by the use of oxygenates in gasoline. The Blue Ribbon Panel grappled with a number of complex issues, including an assessment of alternatives to the use of MTBE to ensure that current air quality benefits of RFG are continued and the additional benefits of the second phase of the program are not endangered. The Panel's recommendations to the Administrator fall under the following broad categories:

- Reduce the use of MTBE;
- Maintain current air quality benefits (no environmental backsliding);
- Prevent leaks through improvement of existing programs;
- Remediate existing contamination;
- Accelerate research on MTBE and its substitutes; and
- Amend the Clean Air Act to remove the requirement that federal reformulated gas contain 2% oxygen (by weight).

The Panel recognized that Congress, when adopting the oxygen requirement in 1990, sought to advance several national policy goals -- energy security and diversity, agriculture policy, among others --

that must be taken into consideration when addressing this complex issue.

EPA's has initiated a number of actions in response to the Blue Ribbon Panel's recommendations. This includes developing a secondary drinking water standard under the Safe Drinking Water Act, establishing a water quality standard under the Clean Water Act, and enhancing underground storage tank program compliance to a 90% level in 2000. The Agency is currently funding a grant with the University of California-Davis to evaluate the effectiveness of leak detection technologies. EPA is also conducting a $1 million technology demonstration project for the clean up of MTBE contaminated aquifers. EPA continues to work with those cities and states that need help cleaning up existing problems. Remediation will be challenging, but essential. And we are working to develop and promote new cleanup technologies. We are also strengthening our efforts to make storage tanks more secure. In addition, where possible, we will work to provide more flexibility to states and refiners as they move to decrease the use of MTBE in gasoline.

The Administration's MTBE announcement and legislative principles are based on many of the Panel's recommendations. In addition to the legislative principles mentioned above, EPA has initiated a regulatory action aimed at reducing or eliminating the use of MTBE in gasoline. Under Section 6 of the Toxic Substances Control Act (TSCA), an Advance Notice of Proposed Rulemaking to ban or phase down MTBE from gasoline was signed last month. This action is the best regulatory mechanism available for limiting or eliminating the use of MTBE. TSCA gives EPA authority to ban, phase out, limit or

control the manufacture of any chemical substance deemed to pose an unreasonable risk to the public health or the environment. The procedural burdens required by this statute, however, can be complex and time consuming. Therefore, legislative action is our first priority and we want to work with Congress to address the issue.

Reducing or eliminating MTBE in no way diminishes the continued role for other oxygenates, such as ethanol, to control mobile source emissions. In addition, a significant role for renewable fuels is important to our nation's energy supply. Thus, the Administration recommends that Congress replace the two percent oxygenate requirement in the Clean Air Act with a renewable fuel annual average content for all gasoline at a level that maintains the current use level of renewable fuel (1.2 percent of the gasoline supply) and allows for sustained growth over the next decade.

Mr. Chairman, in closing, we intend to move forward with rulemaking under TSCA to significantly reduce or eliminate the use of MTBE. Congressional action, however, on the legislative principles I have discussed here is essential if we are to continue to achieve the public health benefits of cleaner burning gasoline while avoiding unacceptable risks to our nation's water supplies. We remain committed to working with Congress to provide a targeted legislative solution to this matter. Americans deserve both clean air and clean water and never one at the expense of the other.

This concludes my prepared statement. I would be pleased to answer any questions that you may have.

Testimony of
Joseph L. Hampton
Director of Agriculture
State of Illinois

Senate Agriculture Subcommittee on Research, Nutrition, and Legislation

Springfield, Illinois
April 18, 2000

Senate Agriculture Subcommittee on
Research, Nutrition, and Legislation Field Hearing
April 18, 2000
Springfield, Illinois

Good Morning. I am Joe Hampton, Director of the Illinois Department of Agriculture. I am pleased to be here today along with Director Skinner of the Illinois Environmental Protection Agency. His leadership efforts have helped in moving the Clinton Administration to propose a ban on methyl tertiary butyl ether (MTBE). This is a step in the right direction to help protect our families, and communities, and our environment.

An unexpected side effect of the Federal Reformulated Gasoline Program (RFG) has been groundwater contamination caused by leakage of MTBE-blended gasoline. It is a colorless liquid, that smells like turpentine, contaminates our groundwater, and because it is non-biodegradable and soluble in water, it should be banned.

MTBE has entered underground wells and drinking water supplies across the country and continues to cause future environmental problems and costs. I am glad the Clinton Administration has proposed rectifying the MTBE problem, but I am very concerned about their proposal in two areas. The first one is the rescinding of the oxygenate requirement in gasoline, and my second concern is the new renewable fuel program as it is proposed.

While the nation's air pollution has improved with the Clean Air Act oxygenate requirement, increased negative national attention directed toward MTBE is allowing critics to question the oxygenate standard. Your bill Senator Fitzgerald, S. 2233, not only recognizes the problems with MTBE in Illinois, but also the importance in maintaining our air quality with an oxygenate requirement. I want to also commend Senator Durbin for his co-sponsorship of this bill and pledge our support to both of you for its passage.

As you know, Governor Ryan, other Illinois officials, organizations, some of which are here today, and the 23-member Governor's Ethanol Coalition have repeatedly asked the White House and the US EPA to maintain a role for ethanol in the RFG program. With Illinois farmers facing some of the lowest commodity prices in years, there needs to be an assurance for ethanol in the future and second, a need to increase that market share. Ethanol, whether produced from corn or other bio-fuels should not be overlooked, because it benefits the environment, the agricultural economy, and is a bio-based renewable fuel of the future.

Ethanol-blended gasoline has been projected to reduce carbon monoxide emissions by 780 tons and volatile organic compounds by 112 tons each day in the Chicago region. More than 95% of the gasoline sold in the Chicago area contains 10% ethanol. This is a substantial market for us here in Illinois and for the farmers of this state.

Illinois Corn Growers, if ethanol or the oxygenate requirement is eliminated, would forfeit a market of at least 160 million gallons of ethanol and 70 million bushels of grain usage. That elimination could translate into investment losses by the ethanol industry in excess of one billion dollars, the loss of 800 jobs in ethanol plants operations, 4,000 jobs in industry-related jobs, and a decrease in the national market price of corn by 25 cents per bushel.

Our Illinois legislators should also be complimented. Their recent efforts to pass a "consumer right to know bill" on what is being purchased at the gasoline pumps is the right first step to address MTBE. This Bill will require a retail motor fuel gas pump dispensing fuel containing 2% MTBE to display a label identifying the MTBE. This piece of legislation now awaits Governor Ryan's signature.

I want to again thank Director Skinner for his tireless efforts in this endeavor and you, Senator Fitzgerald, for your leadership here today. In closing, Iowa's Representative Greg Gankse best said, "The solution is simple: If you want clean water ban MTBE. If you want clean air, use oxygenated fuel. If you want both clean water and clean air, use ethanol."

Thank you for your time today. I will try and answer any questions you might have.

Testimony of Thomas V. Skinner, Director
Illinois Environmental Protection Agency
Before the Senate Subcommittee on Research, Nutrition and General Legislation
April 18, 2000

I am honored to appear before you today to discuss two very important issues to the environment of Illinois and the nation -- the use of clean-burning reformulated gasoline ("RFG") and the threat of MTBE to our drinking water supplies.

The use of RFG in the Chicago area has been an unqualified success. We estimate that it's use in 1999 reduced emissions of ozone-forming volatile organic compounds by about 65 tons per day in 1999. Additionally, the use of RFG reduces emissions of toxic air pollutants, such as benzene, as compared to conventional gasoline. These benefits have resulted in improved air quality in the Chicago area and a dozen other large urban areas throughout the country.

However, one of the compounds that is assisting in providing us these air quality benefits is now threatening our nation's drinking water supplies. In order to provide more complete fuel combustion, the Clean Air Act requires that RFG contain a minimum of 2.0 weight percent oxygen. The two primary compounds used to provide oxygen to a fuel are ethanol and methyl tertiary butyl ether, or MTBE. Ethanol has been blended in the overwhelming majority of Chicago area RFG since the beginning of the program in 1995 with no adverse effects. But, gasoline producers have largely chosen to use MTBE as the RFG oxygenate in the remainder of the country. As we are now learning, this choice has brought an unwelcome side effect.

Contamination of drinking water supplied from MTBE is being reported from New York to California. Leaks from underground storage tanks, the use of MTBE containing fuel in marine engines, and even auto accidents have been linked to detections of MTBE in

groundwater. MTBE is an organic chemical which is highly soluble in water and travels faster and further in soil than other gasoline constituents. MTBE is also persistent in that it degrades very slowly by natural chemical or biological processes within the soil or groundwater environment. Public water supplies in Santa Monica and South Lake Tahoe, California have been forced to close their wells due to MTBE contamination. MTBE has been detected in more than 100 public water supplies in New York. In Illinois, where MTBE is not significantly blended into RFG, detections of MTBE have been found in 26 public water supplies. Three of our community water supplies, East Alton, Island Lake, and Oakdale Acres, had to discontinue use of wells as a result of MTBE contamination.

Concerns regarding the growing number of reports of MTBE contamination prompted the U. S. Environmental Protection Agency ("USEPA") to appoint a Blue Ribbon Panel to study the use of oxygenates in RFG. In July 1999, this panel recommended that the use of MTBE should be substantially reduced. Since then, the States of California, and New York have banned its use. In Illinois, the City of Chicago adopted a resolution demanding that state and federal officials take action to prevent the use of MTBE in gasoline in the Chicago area.

Responding to these concerns, last month the USEPA issued a legislative framework to encourage immediate Congressional action to reduce or eliminate the use of MTBE. USEPA recommended that Congress amend the Clean Air Act to provide the authority to phase-out MTBE usage. USEPA also called for the removal of the RFG oxygenate requirement. While I believe that the most appropriate means to address the MTBE issue is on the national level, and support its removal, I disagree with the recommendation to remove the oxygenate requirement. The groundwater contamination issue is an MTBE problem, not an oxygenate problem.

The ethanol-based RFG program in Chicago has experienced none of the problems being reported in MTBE-focused areas throughout the country. Ethanol, due the higher oxygen content than MTBE, provides additional carbon monoxide and toxic air emissions

reduction benefits. By removing the oxygenate requirement we risk losing the current level of emissions reductions currently being achieved. Ethanol also readily and harmlessly biodegrades in the environment proving no risk to drinking water supplies. The California Environmental Policy Council recently unanimously approved reports which found no air quality, water quality, or health concerns associated with the use of ethanol as an oxygenate in California's cleaner burning gasoline program.

I support Senator Fitzgerald's proposal to as expeditiously as possible phase out the use of MTBE in our nation's gasoline. His proposal also maintains the RFG oxygenate requirement. Implementation of this proposal will both remove a risk to our nation's drinking water supply and ensure the continued air quality benefits of the reformulated gasoline program envisioned in the Clean Air Act.

I also urge USEPA to adopt Illinois' proposal for appropriate additional offset credits for carbon monoxide emissions from ethanol-blended RFG. We estimate the use of ethanol in the Chicago area reduces CO emissions from vehicles by 780 tons per day, compared to non-oxygenated gasoline. Scientific analyses have concluded that a minimum of a 0.5 per square inch Reid vapor pressure allowance is a reasonable gasoline volatility offset. This would provide a long-term solution that more accurately recognizes the clean air contribution of ethanol while avoiding the increased expense to gasoline producers of a lower volatility base.

Thank you.

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Senate Committee on Agriculture Nutrition & Forestry
Field Hearing - April 18, 2000
Springfield, IL

Testimony by: Leon Corzine, President
Illinois Corn Growers Association

Mr. Chairman, Senator Fitzgerald, and members of the Committee, I am Leon Corzine, a corn and soybean grower from Assumption in Shelby County. I am testifying, today, on behalf of the Illinois Corn Growers Association. Thank you for the opportunity to offer formal comments on the issues facing the ethanol industry today.

Let me start off by addressing ICGA's concerns about the recent recommendations made by the U.S. Environmental Protection Agency, with the blessing of the Clinton Administration, in regard to ethanol and MTBE. It is our sentiment that this plan to fix the nation's clean air program is offered with good intent, but it is lacking in real substance. It fails to address the immediacy of the MTBE issue and the current window of opportunity for ethanol.

EPA's plan will phase out the use of MTBE. This is a positive step considering it contaminates water and damages the environment, but it also eliminates the oxygenate requirement which is key to continued ethanol use and market growth. ICGA opposes this strategy because eliminating the oxygenate requirement due to the failure of MTBE constitutes backsliding in our efforts to address air quality. We can document the clean air success of this program and ethanol's ability to keep it viable. Chicago offers a perfect example. We have used ethanol almost exclusively in Chicago to meet clean air standards and the results have been remarkable.

ICGA concurs with Senator Fitzgerald that Illinois citizens should not have to choose between clean air and clean water. Ethanol has proven to reduce emissions, especially carbon monoxide which is the number one contributor to air pollution. And it can do so without the water contamination associated with MTBE. MTBE has contaminated water resources from Maine to California including 25 known sites in Illinois, so it must be addressed as soon as possible. That's why we are supporting Senator Fitzgerald's bill.

Ethanol provides the means to reach our environmental goals quickly and painlessly, while also providing jobs and a boost to our economy. Ethanol provides these clean air benefits in a cost competitive manner compared to highly refined gasoline and other additives which might be used in lieu of MTBE. Petroleum companies continue to tell EPA, the Administration, and Congress

they can meet federal clean air guidelines without using oxygenates. However, no one is asking at what cost to consumers and the environment? The bottom line is a consumers will pay more for gasoline without ethanol, probably a lot more, according to the institutional research firm BioScience Securities, Inc. of Orinda, California.

Environmental benefits from oxygenates are clear. Long term environmental and public health benefits resulting from the use of oxygenates in reformulated gasoline, when compared to non-oxygenated gasoline that meet RFG standards include:

- Fewer aromatics in gasoline
- Lower potency weighted toxic emissions and thus lower long term cancer risk
- Reduced emissions of carbon monoxide
- Reduced ozone due to carbon monoxide
- Fewer fine particles in exhaust emissions

EPA has asked Congress to address this issue with a proposal that looks good on the surface. ICGA is asking the Senate and the U.S. Congress as a whole to make a real statement about our government's commitment to clean air, fighting high fuel prices, and energy self sufficiency.

The Administration proposal also encourages establishment of a "renewable fuel standard" for all gasoline. This proposal, similar to a bill offered by Senator Tom Daschle of South Dakota, would require gasoline sold in the U.S. to contain a small amount (estimated at 1-2%) of renewable fuel.

There is nothing wrong with this concept, except the projected market potential for ethanol would be little improved in its early years and would be far less than leaving the oxygen requirement in place.

Corn Growers also question why US EPA's proposal did not address the concept of a carbon monoxide credit for ethanol. Illinois EPA Director Tom Skinner presented this concept to U.S. EPA as a way to use science to resolve ethanol's role in U.S. energy policy. ICGA agrees with Mr. Skinner that ethanol should receive a carbon monoxide credit which will allow its use year round in markets like Chicago where summer time heat makes evaporative emissions an issue. A carbon monoxide credit is not some kind of favor or special concession to the growers and the ethanol industry, but a natural response to the National Academy of Sciences' study on RFG. They concluded about 20% of the ozone (smog) produced in non-attainment areas is caused by carbon monoxide. Ethanol cuts carbon monoxide pollution by up to 25%. So the bottom line is, if we remove oxygen and replace it with aromatics, the potential for ground-level ozone or smog is notably higher.

We are at a watershed moment for ethanol. Years of research, building of infrastructure, expanding corn supply, high gas prices and growing public support leave us well positioned to finally make a national commitment to our only domestically produced, renewable fuel supply. Expanded ethanol product would give agriculture, which is in the economic doldrums, a much needed lift; provide jobs in processing and transportation; and help us reach our environmental goals responsibly.

Thank you for the opportunity to testify.

Testimony
Of
Ronald R. Warfield, President
Illinois Farm Bureau
Before the Senate Agriculture Committee
April 18, 2000
Springfield, Illinois

Good morning Senator Fitzgerald and members of the Senate Agriculture Committee. I'm Ron Warfield, president of the Illinois Farm Bureau, the state's largest general farm organization.

We are here today to talk about the ethanol and biofuels industry and what we can do together to ensure that ethanol maintains its place in the nation's clean air regulations. We appreciate the opportunity to make comments in this regard.

We have seen ethanol grow from a little-known alternative fuel in the 1970s to a powerhouse today. The ethanol market has grown from just over 10 million gallons of production in 1979 to more than 1.8 billion gallons today.

As you know, the federal Clean Air Act requires gasoline in some areas of the U.S. to be blended with oxygen, like ethanol or MTBE, to help reduce air pollution. In fact, the U.S. Environmental Protection Agency credits these cleaner burning fuels with significant clean air improvements in many of America's cities.

Now, EPA is moving to eliminate MTBE because of health and environmental concerns. This action has, or will, prompt several states to ask the government to grant them a waiver from oxygen requirements of the clean air

rules, saying they can meet clean air standards without MTBE. EPA has responded by seeking congressional action to eliminate the oxygen requirement and replace it with a national renewable fuels standard.

Farmers are scratching their heads at EPA's proposal to eliminate the Clean Air Act requirement that fuels contain oxygen to help reduce pollution.

We recognize the urgency of ending MTBE use to protect drinking water supplies. However, by eliminating the oxygen requirement – the cornerstone of clean air programs -- it seems as if EPA is trying to mitigate the problem of MTBE water contamination by eliminating the logical solution to clean air -- ethanol or other oxygenates.

Farmers have endured decades of controversy over ethanol's role in the Clean Air Act. Opponents have raised questions about ethanol's ability to reduce air pollution. Scientific studies show that clean air rules don't take into account ethanol's ability to cut carbon monoxide emissions which reduces pollution.

Scientific studies, including one by the National Academy of Sciences, have concluded that about 20 percent of the ozone, or smog, produced in highly-polluted areas is caused by carbon monoxide. Renewable ethanol has been shown to cut carbon monoxide emissions by up to 25 percent.

One of the markets at risk right now is the Chicago market. This area uses one third of the ethanol produced in Illinois. Chicago and Milwaukee combined utilize one third of the ethanol sold in the US.

EPA's Carol Browner last week told members of the Illinois congressional delegation that legislation granting a ethanol carbon monoxide credit – and thus

allowing ethanol use in the Chicago market -- would be finalized by Memorial Day.

Farmers believe the administration could solve this problem **right now** by granting the carbon monoxide credit, clearing up any uncertainty about ethanol's role in the Chicago market.

All of these actions are particularly puzzling especially in light of the proven track record we have with ethanol. While MTBE has adverse human health and environmental impacts, there are **none** with ethanol.

Ethanol has a proven track record of reducing air pollution without any negative environmental or health effects.

Farm groups have spent a considerable amount of time with lawmakers to develop a legislative solution to many of these issues. Let me say here that we **sincerely** appreciate your efforts, Senator Fitzgerald, along with the efforts of other lawmakers here today to help us resolve the ethanol issue. We have worked closely with many in Congress to ensure ethanol will maintain its role in the Clean Air Act. We look forward to continuing that working relationship.

Farm Bureau, along with the National Farmers Union, the National Corn Growers Association, and the Renewable Fuels Association – the ethanol summit – are trying to agree on a common legislative strategy that offers a national solution to the ethanol issue that would prevent states from opting out of the federal oxygen requirements.

It's Farm Bureau's belief that any legislation addressing MTBE:

- Must be **national** in scope. All action should be on a **national** level. Allowing states to have different programs will not achieve our national energy goals.
- Must resist any state or regional waivers from the Reformulated Gasoline program's oxygen standard based on current law. Allowing states to opt out of this program will reverse the progress we have made in cutting air pollution.
- Must retain the oxygen standard. We cannot allow any reduction in air quality standards achieved under the Reformulated Fuels program.
- Must protect the real world environmental and public health benefits of Phase 2 of the Reformulated Gasoline program nationwide.

As a group, we support HR 4011, with an amendment that prohibits state or regional waivers of the RFG oxygen requirement based on current law, and protects the environment and public health. We will also support a companion bill in the Senate.

These legislative principles reflect a united strategy that expands ethanol use while preserving and enhancing the environmental and public health benefits of the Reformulated Gasoline Program – it is a win-win for agriculture, ethanol, and the environment.

Thank you.

Testimony of

Eric Vaughn
President/Chief Executive Officer
Renewable Fuels Association

before the

Senate Subcommittee on Research, Nutrition, and General Legislation of the Committee on Agriculture, Nutrition and Forestry

Springfield, Illinois
April 18, 2000

Good morning Mr. Chairman and Members of the Committee. I am very pleased to be here to discuss ethanol's continued participation in the federal reformulated gasoline program (RFG) generally, and the RFG oxygen content requirement specifically. These are important issues with far-reaching consequences for both consumers and air quality, and I appreciate the opportunity to provide comments on behalf of the domestic ethanol industry.

The Renewable Fuels Association (RFA) is the national trade association for the domestic ethanol industry. Our membership includes a broad cross-section of ethanol producers, marketers, agricultural organizations and state agencies interested in the increased development and use of fuel ethanol. There are more than 50 ethanol producing facilities in 21 states in operation today, including a growing number of farmer-owned cooperatives that have begun production in just the past five years. The industry currently produces approximately 100,000 barrels of ethanol per day (1.5 billion gallons annually), and utilizes more than 600 million bushels of grain per year.

Background:

Before turning to the RFG program, I would like to provide some perspective as to why ethanol is so critically important to the nation's economic, energy and environmental policies. One need only look at today's headlines to appreciate the need for increased production and use of fuel ethanol. With overall conditions in the farm economy in 2000 expected to be similar to last year and the nation facing record oil prices due to OPEC production cutbacks, ethanol production and use will play a pivotal role in providing value-added processing for grain while helping to constrain gasoline prices and promote competition.

At a recent USDA Agricultural Outlook Forum, USDA Chief Economist Keith Collins stated that the price for corn this year is "expected to average only $1.90 a bushel, slightly below the 1998 crop." With total supplies predicted to be near 1999 levels and little change in ending stocks, Collins noted that "corn prices are expected to show only modest improvement next season." Collins also predicted that in light of

weak markets, substantial government payments will be made under current programs in 2000. The use of corn for ethanol production not only adds to the price of a bushel of corn, it also helps to reduce government payments.

At the same time, the Energy Department reports oil prices are at the highest levels since the Gulf War, and gasoline prices are expected to top $1.60/gallon this summer. Blending ethanol with gasoline provides an economically competitive source of octane, helping to constrain gasoline prices. As the Congress considers policies to moderate gasoline prices and assure fuel supplies, providing increased market opportunities for domestically-produced renewable energy, such as ethanol, should be a top priority. In fact, the farm income and energy security benefits of ethanol were principle factors leading to congressional approval of the RFG program and the oxygen content requirement in the Clean Air Act Amendments of 1990. Today's headlines merely reinforce the efficacy of that decision.

The Reformulated Gasoline Program:

First, I think it is important to underscore that the RFG program, *with* its oxygen content requirement, has worked quite effectively. Air quality has improved. Indeed, about 75 million people are breathing cleaner air because of RFG. EPA reports that RFG is reducing ozone-forming hydrocarbon emissions by 41,000 tons and toxic pollutants such as benzene by 24,000 tons annually. That's the equivalent of taking 16 million vehicles off the road each year. A study by the Northeast States for Coordinated Air Use Management (NESCAUM) shows that today's RFG reduces the cancer risk from gasoline by about 20 percent. It is critically important to recognize that these benefits are significantly greater than required by the Clean Air Act's performance standards for hydrocarbons and toxics, at least in part because of the federal oxygen requirement.

At the same time, the decision by refiners to use MTBE in most RFG has had a devastating impact on water quality. The U.S. Geological Survey reports that MTBE has been detected in 27 percent of urban wells nationwide. In RFG areas, where MTBE is more commonly used, the problem is more severe. MTBE is four to six times more likely to be detected in RFG areas than in conventional gasoline areas. USGS reports that 79% of the wells tested in Denver and 37% of the wells tested in New England had detectable levels of MTBE. Indeed, MTBE is now the second most commonly found chemical in groundwater, behind only chloroform.

Leaking underground storage tanks and spills at the land surface are important point sources for MTBE in the environment. But there are many other sources of MTBE water contamination. Potential non-point sources of MTBE include precipitation, urban runoff, and motor water craft. Once MTBE is in water it is expected to move between surface and ground water with the natural movement of water. Indeed, MTBE is very water soluble compared to the BTEX compounds and other components in gasoline; the solubility of MTBE is about 50,000 mg/L (milligrams per liter) whereas the next most soluble component of gasoline is benzene, which has a solubility of 1,780 mg/L. Therein lies the problem; if MTBE is in gasoline it will find its way to water where it is extremely soluble and will eventually contaminate drinking water supplies.

As a consequence of the growing concerns regarding MTBE water contamination, there is interest in amending the Clean Air Act and the RFG program to allow refiners to reduce or eliminate their MTBE use. Refiners claim they cannot eliminate their use of MTBE without the "flexibility" of producing non-oxygenated fuel and have sought the elimination of the oxygen requirement. The domestic ethanol industry has steadfastly opposed efforts which seek only to eliminate the federal RFG oxygen requirement or address the issue for particular states or regions. However, we do not want to hinder legislative efforts to address this serious public health and environmental issue. We want to be part of the solution, not part

of the problem. Toward that end, we have developed the following principles which we believe should guide congressional action on this issue.

- Develop a national solution;
- Address the cause of the problem;
- Protect the environment; and,
- Provide the necessary time and "flexibility" to allow refiners to make a rational transition to increased ethanol utilization.

Develop a national solution.
Regional or state-specific actions will create a patchwork of fuel regulations resulting in increased consumer costs and will encourage MTBE use in areas not using MTBE today – expanding potential MTBE water contamination.

Approximately 4 billion gallons of MTBE are consumed in the United States today, with the vast majority of it used in RFG markets. Approximately one-third of the MTBE used is imported, either as a fuel blendstock or in finished gasoline. In the absence of a national MTBE control program, states will continue to take action phasing out MTBE. Already, California, Iowa and South Dakota have enacted MTBE controls. Missouri, Colorado, Wisconsin and several northeast states have MTBE ban bills pending. In the Congress, H.R. 11 and various other legislative proposals attempt to address this issue regionally. But unless a national control is imposed, MTBE will flow unfettered into areas where MTBE is currently not being used. Saudi Arabia is not going to take its MTBE back. MTBE producers will find other markets. The first place MTBE will flow is Midwest oxygenate markets where MTBE is currently not used. It is logical to assume that MTBE will also flow into conventional gasoline octane markets. In addition to displacing ethanol from these critical markets, this will merely expand potential MTBE water contamination and jeopardize precious water supplies. Only a national control of MTBE will protect *everyone's* water supplies and not disrupt existing oxygen and octane markets for ethanol.

Address the cause of the problem – MTBE.
The use of MTBE in the nation's motor fuel should be reduced or eliminated as expeditiously as possible.

The domestic ethanol industry should not be advising the Congress on how to control the use of its competition in the marketplace. However, we can state with conviction that if the problems associated with the use of MTBE are so serious as to warrant legislative action, Congress ought to be sure to fix them. The problem is not oxygen in gasoline, it is MTBE in water. Congress should determine what controls on MTBE are necessary to protect water supplies and take them. But simply eliminating the RFG oxygen requirement will NOT assure that MTBE use is reduced and WILL undermine the "real world" environmental benefits of the current RFG program with oxygen.

EPA's Blue Ribbon Panel concluded that MTBE use should be "reduced or eliminated." EPA staff recently went further, stating that MTBE should be removed from gasoline as quickly as possible. The Department of Energy has stated a 3% volume cap on MTBE is appropriate. Because MTBE is bio-accumulative and persistent in the environment, many believe the only sure means of protecting drinking water supplies is to prevent MTBE from getting into gasoline in the first place. In any case, Congress needs to take whatever action it deems appropriate to protect public health and water resources.

We would only suggest that as Congress debates this issue, and if an MTBE phase-out or other control is imposed, that consumers be made aware whether MTBE is being used in the gasoline they purchase. Pump labeling of MTBE is something that can be done quickly and effectively. We would strongly encourage EPA to act expeditiously so that consumers are aware when MTBE is being used. Consumers have a right to know.

Protect the Environment.
The air quality gains provided by RFG with oxygenates should not be sacrificed as MTBE use is reduced, i.e., the toxic and carbon monoxide emissions benefits of oxygen should be preserved.

The RFG program assures air quality benefits through the combined application of emissions performance standards *and* an oxygen requirement. As a result, the RFG program has provided toxic reductions in excess of those required by the performance standards alone. The oxygen standard has also provided reductions in carbon monoxide for which there is no performance standard at all. Congress should not reward the disastrous decision of the oil industry to utilize MTBE as the oxygenate of choice in RFG by allowing them to increase pollution.

Industry analysts have concluded that given the opportunity to produce non-oxygenated RFG, refiners will dramatically increase their use of aromatics and other petroleum-derived octane such as alkylate. The environmental consequences of alkylates is not known. The environmental impacts of aromatics certainly is known, and it is troubling. Increased aromatics will lead to higher toxic emissions and increased ozone pollution.

It is ironic that the RFG program was initiated largely in response to environmental concerns about the rising levels of aromatics in gasoline. Increased aromatics, including benzene, toluene and xylene (BTEX), resulted from the congressionally-mandated lead phase-down of the late 70's. To replace the lost octane associated with lead, refiners dramatically increased aromatic levels. By the mid-80's, some premium gasolines had BTEX levels as high as 50 percent. Seeing this, Congress created the RFG program in the Clean Air Act Amendments of 1990, including a specific cap on aromatic levels. That cap was forfeited by EPA in the regulations implementing the RFG program in favor of a complex model, with the understanding that the use of oxygenates in RFG would supply the octane and volume provided by aromatics. Congress should assure that as MTBE use is reduced, the cap on aromatics originally included as an RFG specification is re-established.

In addition, EPA should conduct a rigorous analysis of the "real world" emissions benefits of oxygen, including the impact on higher emitting vehicles, off-road and off-cycle driving (areas where the impact of oxygen is more critical) to assure there is no backsliding from these effects. EPA should also compare the potency-weighted toxic affects of oxygenated and non-oxygenated RFG.

Finally, it is critical that the carbon monoxide (CO) benefits of oxygenates not be ignored. The oxyfuel program worked and CO has been dramatically reduced nationwide. Several CO non-attainment areas have been reclassified into attainment based in part on maintenance plans which include the oxygen content benefits of RFG. If the RFG oxygen requirement is repealed, the CO attainment status of these areas will be jeopardized. In addition, the National Academy of Sciences concluded last year that as much as 20% of the ozone coming from automobiles was attributable to carbon monoxide. EPA should assess this beneficial impact and either 1) incorporate a CO performance standard into the program or 2) promulgate a CO offset so that refiners can balance CO reductions with VOC increases.

Provide Flexibility to Refiners.
The expeditious removal of MTBE should not result in dramatically increased gasoline prices or supply shortages. Refiners and gasoline marketers should be given some flexibility in meeting this challenge.

Refiners claim the only way to eliminate MTBE without increasing consumer gasoline costs is to eliminate the oxygen standard itself. Indeed, some see the two as synonymous. At a time when gasoline prices across the country are soaring, Congress must consider the economic implications of reducing MTBE use. MTBE currently represents about 3% of the nation's transportation fuel supply. If it is

precipitously eliminated without providing for a replacement of that supply, gasoline prices will clearly rise. Indeed, this fact has been established by both the Department of Energy and the California Energy Commission, which concluded a non-oxygenated fuel scenario in California (with no ethanol used) was the most expensive option available to the state in addressing MTBE. It is therefore critical that if MTBE volume is to be reduced, it is replaced with safe alternatives such as ethanol. Following the oil companies' "flexibility" agenda of no oxygen requirement and an all-hydrocarbon fuel supply will increase consumer gasoline costs.

But we believe there are ways to provide increased flexibility in meeting the oxygenate standard such that replacing MTBE with ethanol will not result in price spikes or supply shortages. Certainly, a gradual phase-out is the best way to protect against potential consumer impacts.

The U.S. Department of Agriculture has completed a comprehensive analysis demonstrating that ethanol can effectively replace MTBE by 2004 without price spikes or supply shortages. The Department's analysis shows that total ethanol production capacity will have to increase roughly 50%, to approximately 3 billion gallons by 2004, in order to supply the oxygenate demands of RFG while maintaining the existing ethanol octane markets in conventional gasoline.
USDA also analyzed the transportation affects of increased ethanol RFG.
The Department concluded that ethanol would be shipped by barge or rail cost-competitively, and that there would be "no transportation impediment to the use of ethanol as a replacement for MTBE."

S. 2233, The MTBE Elimination Act

On March 9, Senator Peter Fitzgerald, along with seven of his colleagues, introduced S. 2233, the MTBE Elimination Act. This bill clearly meets the principles we have established for addressing the MTBE crisis and the domestic ethanol industry is pleased to announce its support. By amending the Toxic Substances Control Act, the bill addresses MTBE water contamination directly and on a national basis. By phasing down the use of MTBE, the bill provides refiners with the flexibility and time necessary for an orderly transition. And by retaining the federal RFG oxygen requirement, the bill assures that the air quality benefits of RFG will be preserved. We applaud Senator Fitzgerald's effort to provide a solution to the growing MTBE water contamination crisis while retaining the federal oxygen content requirement. This provision has been tremendously important to the growth of the domestic ethanol industry and to air quality. While some are clamoring to abandon the oxygen requirement, we continue to believe it provides unique environmental benefits, including emissions reductions in exhaust hydrocarbon, carbon monoxide and fine particulates that could not be achieved without oxygenates. The oxygen requirement also assures emissions reductions in off-road engines that are critical to maintaining air quality.

Source: U.S. Department of Agriculture

The Ethanol Solution

The primary concern with maintaining the oxygen standard appears to be the industry's ability to supply the increased demand for ethanol. But such concerns are unfounded. It is important to understand that because ethanol has twice the oxygen content of MTBE, it will only take half as much ethanol to satisfy the oxygen

requirements of RFG. Current MTBE use in RFG is approximately 257 bb/d (thousand barrels per day). That level of oxygen can be met by only 128 bb/d of ethanol. Current ethanol production is 100 bb/d.

A recent report prepared by AUS Consultants, Inc. for the Governors' Ethanol Coalition demonstrates that the ethanol industry can double production within two years, quicker than the proposed three year MTBE phase out. According to the report, "*Ability of the U.S. Ethanol Industry to Replace MTBE*":

- Replacing MTBE with ethanol would increase the demand for ethanol to nearly 3.2 billion gallons per year by 2004;
- The ethanol industry can increase production capacity from 1.5 billion gallons to 3.5 billion gallons per year by 2004 - more than exceeding the greater demand;
- The increased capacity would come from increased utilization of existing plants, expansion of existing facilities, new plants currently under construction, and proposed facilities currently in various stages of development;
- Using ethanol to replace MTBE will prevent an oxygenate supply shortage that could result in increased gasoline prices;
- Expanding ethanol capacity will result in $1.9 billion in new investment;
- Construction activity and increased commodity demand will add $11.7 billion to real GDP by 2004 and increase household income by $2.5 billion; and
- Switching to ethanol will create more than 47,800 new jobs throughout the country.

Ability of the Ethanol Industry to Replace MTBE
(Million Gallons per Year)

	2000	2001	2002	2003	2004
Ethanol Demand	**1,343**	**1,781**	**2,231**	**2,693**	**3,168**
Current Production	1,5330	1,5331	1,5331	1,5331	1,533
Increased Use	0	80	80	80	180
Expanded Plants	0	420	839	1,049	1,049
Cap'y Under Construction	0	60	121	121	121
Cap'y Under Development		0	0	333	598
Total Supply	**1,533**	**2,193**	**2,673**	**3,216**	**3,481**
Surplus	**190**	**412**	**444**	**523**	**313**

It is important to understand that ethanol production facilities are largely modular. Expansions can be done very quickly by simply adding new equipment to existing production streams. New production from green fields is also now done quite efficiently. Since 1990, most new ethanol production has been by farmer-owned cooperatives. These highly efficient dry mill plants typically go from drawing board to production within two years, at an approximate cost of $1.00 - $1.50 per gallon of capacity.

The next generation of ethanol production facilities will also include production from cellulose and biomass feedstocks. Recently, a new ethanol production plant in Jennings, Louisiana was awarded a $120 billion bond and is expected to begin construction this spring. When completed, this plant will produce ethanol from rice hulls and bagasse. Three other plants are currently planned in California that will produce ethanol from rice straw. Another facility is planned in upstate New York producing ethanol from municipal waste. Already, ethanol is being produced from wood and paper waste by Georgia Pacific in

Washington state, and production from forest residue is not far behind. None of this will happen, however, without the assurance of increased market opportunities for ethanol in RFG. If the oxygenate requirement itself is repealed, there will be little increased ethanol production in the coming years. On the other hand, maintaining the oxygen requirement as MTBE use is phased out will stimulate tremendous new economic development across the country.

Ethanol Production Capacity
March 2000

Company	City	State	Primary Feedstock	Capacity (MGY)
A.E. Staley	Louden	TN	Corn	45.0
Ag Power, Inc	Commerce City	CA		2.0
AGP	Hastings	NE	Corn	45.0
Agri-Energy	Luverne	MN	Corn	18.0
Al-Corn	Claremont	MN	Corn	18.0
Alchem	Grafton	ND	Wheat	12.0
Archer Daniels Midland	Decatur	IL	Corn	750.0
	Cedar Rapids	IA	Corn	
	Peoria	IL	Corn	
	Clinton	IA	Corn	
Broin Assoc	Scotland	SD	Corn	8.0
Company	**City**	**State**	**Primary Feedstock**	**Production Capacity (MGY)**
Cargill	EddyVille	IA	Corn	70.0
	Blair	NE	Corn	35.0
Cent MN Ethanol Coop	Little Falls	MN	Corn	18.0
Chief Ethanol	Hastings	NE	Corn	62.0
Chippawa Valley	Benson	MN	Corn	20.0
Corn Plus	Winnebago	MN	Corn	17.5
DENCO	Morris	MN	Corn	15.0
Eco Products of Plover	Plover	WI		4.0
ESE Alcohol	Leoti	KS	Corn	1.1
Ethanol 2000	Bingham Lake	MN	Corn	15.0
Exol	Albert Lea	MN	Corn	18.0
Farm Tech USA	Spring Green	WI	Corn	0.5
Georgia Pacific	Bellingham	WA	Waste	3.5
Golden Cheese of CA	Corona	CA	Cheese/Whey	2.8
Grain Processing Corp	Muscatine	IA	Corn	10.0
Heartland Corn Prods	Winthrop	MN	Corn	17.0
Heartland Grain Fuels	Aberdeen	SD	Corn	8.0
	Huron	SD	Other	12.0
High Plains	Portales	NM	Corn	14.0
	Colwich	KS	Corn	20.0
	York	NE	Corn	40.0
J.R. Simplot	Heyburn	ID	Potato Waste	3.0
	Caldwell	ID	Potato Waste	4.0
Jonton Alcohol	Edinburg	TX		1.2
Kraft	Melrose	MN	Cheese/Whey	3.0
Manildra Energy	Hamburg	IA	Corn	7.0
Midwest Grain	Atchinson	KS	Corn	8.0
	Pekin	IL	Corn	100.0

Minnesota Clean Fuels	Dundas	MN		1.5
MMI/ETOH	Golden	CO		1.5
MN Corn Processors	Marshall	MN	Corn	32.0
	Columbus	NE	Corn	90.0
MN Energy	Buffalo Lake	MN	Corn	12.0
New Energy Co of IN	South Bend	IN	Corn	88.0
Pabst Brewing	Olympia	WA	Bev Waste	0.7
Parallel Products	Rancho Cucamonga	CA	Food Waste	2.0
	Louisville	KY	Corn	10.0
Permeate Prods	Hopkinton	IA		1.5
Pro-Corn	Preston	MN	Corn	19.0
Reeve Agri-Energy	Garden City	KS	Corn	10.5
Stroh's Brewery	Winston Salem	NC	Bev Waste	1.0
Sunrise Energy	Blairstown	IA	Corn	5.0
Vienna Correctional	Vienna	IL	Corn	0.5
Williams Energy	Aurora	NE	Corn	30.0
	Pekin	IL	Corn	100.0
Wyoming Ethanol	Torrington	WY	Corn	5.0
Total				1,837.8

Source: Bryan and Bryan, Inc.

Ethanol Production Under Construction, March 2000

Company	City	State	Capacity MGY	Feedstock
Golden Triangle	Craig	MO	14.0	Corn
Adkins Energy	Lena	IL	30.0	Corn
BC International	Jennings	LA	20.0	Bagasse/rice hulls
Nebraska Nutrients	Sutherland	NE	15.0	Corn
Dakota Ethanol	Wentworth	SD	40.0	Corn
NE Missouri Grain Proc	Macon	MO	15.0	Corn
Total			**134.0**	

Source: Bryan and Bryan, Inc.

Ethanol Plants Under Development, March 2000

City	State	Capacity (MGY)	Feedstock
Grain			
Undisclosed	CO	20.0	Corn
Central Iowa	IA	15.0	Corn
NW Iowa	IA	40.0	Corn
L. Cascade	IL	100.0	Corn
Pratte	KS	15.0	Corn/milo
Undisclosed	KS	40.0	Corn
Undisclosed	KY	20.0	Corn
Central State	MI	40.0	Corn
St. Paul	MN	30.0	Corn
SE Missouri	MO	30.0	Corn
Great Falls	MT	75.0	Wheat/Barley
Neely	NE	15.0	Corn
Central State	NJ	10.0	Corn
Clatskanie, OR	OR	80.0	Corn/wheat
Milbank	SD	40.0	Corn

Platte	SD	15.0	Corn
Rosholt	SD	15.0	Corn
Undisclosed	TX	30.0	Corn
Moses Lake	WA	40.0	Corn/Barley
Lacrosse	WI	20.0	Corn
Subtotal		**690.0**	
Biomass Conversion			
SE Region	AK	8.0	Wood Waste
NE Region	CA	15.0	Forest Residues
Gridley	CA	20.0	Rice Straw
Mission Viejo	CA	8.0	Rice straw
Chester	CA	20.0	Forest Residues
Onslow County	NC	60.0	Sweet potatoes
Greene County	NC	60.0	Sweet potatoes
Martin County	NC	60.0	Sweet potatoes
Middletown	NY	10.0	MSW
Central Region	OR	30.0	Wood Waste
Philadelphia	PA	15.0	MSW
Black Hills	WY	12.0	Forest Residues
Subtotal		**318.0**	
TOTAL NEW CAPACITY		**1,008.0**	

Ethanol RFG will provide a tremendous economic stimulus to rural America by creating value-added demand for 500 million bushels of grain. According to USDA, replacing MTBE with ethanol in RFG nationwide would:

- increase net farm income $1 billion annually;
- create 13,000 new jobs;
- enhance our balance of trade $12 billion by 2010; and,
- reduce farm program costs more than $1 billion for each $0.10 increase in corn price.

Thus, replacing MTBE with domestically-produced renewable ethanol will provide a tremendous economic stimulus to rural America while protecting air quality, preserving water resources and maintaining stable consumer gasoline prices and supply.

Conclusion:

The domestic ethanol industry understands that the Congress is faced with a daunting challenge, i.e, how to protect water supplies by reducing the use of MTBE without sacrificing air quality or increasing fuel prices. We see ethanol as a solution. Increasing ethanol use in this program will allow MTBE to be phased out cost-effectively while protecting precious water resources and air quality. Stimulating rural economies by increasing the demand for grain used in ethanol production will help farmers left behind by our booming economy. Encouraging new ethanol production from biomass feedstocks will provide additional environmental benefits and take a positive step toward a sustainable energy future and global climate change. The bottom line is that we need to protect both air quality and water quality. With ethanol, we can.

Thank you.

Testimony of
Mr. Larry Quandt
President, Illinois Farmers Union
Before the
Senate Agriculture Subcommittee on Research,
Nutrition, and General Legislation
Tuesday, April 18, 2000
Springfield, Illinois

Good morning, and thank you for the opportunity to testify before the Subcommittee today. My name is Larry Quandt, and I am President of the Illinois Farmers Union.

Senator Fitzgerald, the members of the Illinois Farmers Union, and the 300,000 family farmers and ranchers which make up the National Farmers Union are grateful for your leadership by introducing S. 2233 in the Senate Committee on Environment and Public Works, a bill that would prohibit the use of, and provide for remediation of water contaminated by MTBE, and provide for grants to study the effects on humans of MTBE.

In our opinion, the ongoing MTBE/Ethanol debate concerns the relative benefits of reformulated gasoline (RFG) and its minimum oxygen requirement, the water contamination problems posed by MTBE in certain areas, and the proper role for renewable ethanol.

The Illinois Farmers Union supports legislation that would ensure the expansion of the ethanol industry, improve farm income, protect the environment, and provide energy security to American consumers. Let me mention the concerns of our producers here in Illinois and across the nation that surround the issue of ethanol use in our nation's fuel supply.

First:

- ***Farm Income*** – the three biggest problems in farming today are price, price and price. The devastatingly low price era must be reversed. Supplies of farm commodities exceed demand. Expansion of the ethanol industry will reduce the oversupply by utilizing a greater amount of our domestic corn production.

Secondly:

- ***Environment*** – Farmers and ranchers play a key role in improving our environment – from protecting our soil, wildlife, and water through conservation programs to helping provide cleaner burning fuel. Ethanol has and will be a key component in ensuring a better environment. However, the confusion created by MTBE must be addressed first.

Third:

- ***Energy Security*** – We have recently been reminded again why the United States must become more self-sufficient in energy production. We rely far too much on imported oil from countries that do not necessarily have our best interests at heart.

Almost everyone in the ethanol industry from the farmers who grow the corn to the companies that process it into ethanol, have the same goal, to ***expand the industry***. The real question is what is the best strategy to achieve that goal.

We support efforts to create a ***national renewable fuels standard*** to ensure that whatever happens to the clean air act, there is still a viable, sizable role for ethanol in the future. Relying just on an oxygenate standard seems too risky for an industry that is so vital to our nation's farmers.

We support the creation of a ***renewable energy security reserve***. This strategic reserve should be equal to one year's use of feedstock stored ***on the farm*** and used when supplies are tight or prices are too high for ethanol to remain competitive. It would immediately boost corn prices to farmers; remove any doubts about ethanol's reliability during times of short supply; and ensure that the industry can continue to operate even when prices are high.

We support strict anti-backsliding requirements on refiners so that the air quality gains from the RFG program are preserved. Tight limits on aromatics levels in all gasoline must be adopted by Congress to prevent dumping in non-RFG areas.

Expanding the industry is important, but we must make sure that the expansion is sustainable, and that it is accomplished to maximize benefits to farmers in the near and long-term. A renewable fuels standard coupled with a renewable energy security reserve, and strict requirements on backsliding will help us accomplish our goals of improving farm income, protecting the environment, and providing energy self sufficiency to the nation.

TESTIMONY PRESENTED TO

SENATE SUBCOMMITTEE ON

RESEARCH, NUTRITION, AND GENERAL LEGISLATION

(subcommittee of Committee on Agriculture, Nutrition, and Forestry)

THE HONORABLE PETER G. FITZGERALD, CHAIR

AT

SPRINGFIELD, IL

April 18, 2000

BY

DONALD A. HOLT, SENIOR ASSOCIATE DEAN

COLLEGE OF
AGRICULTURAL, CONSUMER AND ENVIRONMENTAL SCIENCES

UNIVERSITY OF ILLINOIS

Chairman Fitzgerald and distinguished members of the subcommittee: I am Don Holt, Senior Associate Dean, College of Agricultural, Consumer and Environmental Sciences, University of Illinois. We greatly appreciate your invitation to provide testimony on issues facing ethanol and the biofuels industry.

You specifically requested to hear our views on the Clinton administration's recently released proposal to ban the use of methyl tertiary butyl ether (MTBE), rescind the oxygenate requirement of the Clean Air Act, and replace this oxygenate standard with a renewable fuels requirement. Likewise, you requested our views on your bill, S. 2233, described as "the MTBE elimination act" and other relevant legislation.

Needless to say, measures that encourage use of ethanol as a fuel, fuel additive, and for other purposes stand to benefit Illinois, which is a major producer of both ethanol and the most important raw material for ethanol production, namely corn. Likewise, measures that would reduce and eventually eliminate the use of MTBE as a fuel additive would have several benefits for Illinois.

MTBE and its metabolic byproducts are toxic and probably carcinogenic. Because MTBE is water-soluble and neither attaches to soil particles nor biodegrades, it finds its way into water supplies, where a very small amount causes water to be virtually undrinkable and dangerous. So far, no economically viable method of removing MTBE from water supplies has been devised. If MTBE use continues, the national cost of remediating MTBE contamination of water is likely to run into the billions of dollars. In addition, MTBE reduces the efficiency of efforts to remediate water contaminated by other petroleum hydrocarbons.

The logical substitute for MTBE in gasoline is ethanol. Ethanol is the nation's head start into the bio-based economy of the future. Ethanol provides oxygen to ensure complete oxidation of gasoline components in internal combustion engines, thus reducing emissions of toxic pollutants, including carbon monoxide. By reducing carbon monoxide, ethanol also reduces ozone pollution. Further, ethanol enhances octane levels, thus improving engine performance and fuel efficiency. We do not see a benefit to eliminating the oxygenate requirement, as some propose. Ethanol can provide the environmental benefits of oxygenate without the drawbacks and dangers of MTBE.

According to USDA, by 2004 ethanol could successfully replace MTBE in meeting oxygenate demands with negligible effects on gasoline prices or supplies. This would double the demand for ethanol, improve corn demand and price, and increase profits of corn producers. This situation looks particularly attractive to Illinois corn producers, who have endured a lengthy period of low corn prices.

The University of Illinois has a long history of interest and contributions in all facets of producing and utilizing corn-based ethanol. The Illinois Corn Marketing Board, which administers the checkoff funds, has been a key partner in ethanol-related

research, along with other Illinois universities, neighboring state universities, the state and federal governments, and several private firms.

Major steps in ethanol production include corn production, corn harvest and drying, corn milling, ethanol production, and sidestream processing. In 1980, taking into account the energy used to produce corn, it required more energy to produce ethanol than was provided by the ethanol produced. Now ethanol production is an energy-efficient process, yielding net energy benefits and a number of other benefits to the US economy. The change was the result of improvements at all stages in the overall ethanol production process.

Decades of corn breeding and genetics research have increased the yield of corn and, consequently, of starch, contributing greatly to the efficiency of the overall process. In the mid-1980s, the energy required to produce corn was sharply reduced by introduction of no-till technology, originally pioneered by Professor George McKibben of the University's Dixon Springs Agricultural Center and later perfected by other crop and soil scientists.

Since the cost of corn is a large proportion of the cost of producing ethanol, it is important to increase the yield of ethanol per bushel of corn. This requires increasing the yield of starch in each bushel of corn and increasing the efficiency with which fermentation microorganisms convert starch to ethanol. Public and private advances in biotechnology have greatly improved the efficiency of fermentation microorganisms.

Recently, University of Illinois scientists, including Professor Marvin Paulsen and colleagues, developed a rapid, accurate test for extractable starch. They found that genetics, as well as natural and artificial drying conditions, influence the proportion of total starch that can be extracted from corn kernels. This, in turn, influences the yield of ethanol and other products for which starch is a feedstock. Further research, which is greatly facilitated by the quick test, is focused on genetic improvements, harvest protocols, and artificial drying equipment and procedures leading to higher levels of extractable starch.

University of Illinois scientists also made important contributions to the milling step in ethanol production. Until recently, relatively complex and expensive wet milling equipment was required for separating the germ, starch, fiber, and other valuable components of corn for further processing. This expensive separation process was necessary if valuable co-products and by-products were to be produced. Generating useful co-products and by-products is key to economically sound ethanol production and use.

Less expensive milling is practiced by so-called "dry-grind" ethanol producers. In that process, only ethanol and the fermentation residues, relatively low-value products known as distillers dried grains with solubles (DDGS), are produced.

Recently, University of Illinois scientists Steve Eckhoff and colleagues pioneered the so-called "quick-germ" and "quick fiber" processes in which relatively inexpensive dry-milling equipment is used to separate the corn germ, starch, and fiber for further processing.

With this milling approach, which is very economical, relatively pure starch is available for fermentation, the germ is available for oil and protein extraction, and the fiber can be used make animal feeds, fiber supplements, gums, etc. Thus, corn processors can gain many of the benefits of wet milling while using a simpler, less expensive dry-milling process.

An especially exciting recent development is the finding that there are important cholesterol-lowering agents, known as stanol esters, in an oil fraction associated with the corn fiber produced by the quick fiber process. These are the same ingredients that give the special new spreads, e.g., benecol, their cholesterol-lowering capabilities. Currently one of these ingredients in the special margarine products comes from soy and the other from wood pulp. Both exist in corn fiber oil in about equal proportions. The effects of these two appear to be additive, so it is an advantage to have both ingredients in the same product. These ingredients are worth about $10 per pound and each bushel of corn has about 0.3 pounds. Thus these ingredients alone are worth about $3 per bushel, even though they make up a small fraction of each bushel of corn.

University of Illinois scientists pioneered important changes in the ethanol fermentation process. Through the 1980s and 1990s, Professor Munir Cheryan and colleagues developed and perfected continuous membrane bioreactors (CMB) for ethanol production. This continuous fermentation approach offers many advantages over batch processes. Throughput is much faster, ethanol yields are higher, down time is greatly reduced, purification and concentration are simplified, equipment is much smaller for a given output, less floorspace is required, capital costs are reduced, yeast costs are reduced, systems are modular for greater flexibility, and by-product and waste management are greatly simplified.

Successful, commercial-scale CMBs were first operated in Illinois, at the world's second largest ethanol producer, Pekin Energy (now Williams Energy). Continuous membrane bioreactors were also developed by University of Illinois scientists for production of dextrose (glucose), corn oil, zein (corn protein), and zanthophylls. Dextrose is made from corn starch and is the final feedstock for most industrial fermentation processes, including ethanol production.

The latter three components are not currently being separated in dry-grind ethanol production. Corn oil, of course, has many food and non-food uses. Zein likewise is the basis for several products, including high-quality, biodegradable plastic films now being perfected for commercial use at the University of Illinois. Xanthophylls are pigments known to reduce or prevent age-related eye problems.

CMBs will be key components of corn processing in the future, and will be used to produce many diverse corn-based products safely, efficiently, and profitably.

University of Illinois scientists are also conducting research on the performance of ethanol as a fuel and fuel additive. Detailed work on aspirating ethanol into both gasoline and diesel engines continues to yield engine design criteria and specifications. In addition, literally hundreds of studies were conducted on the use of various co-products as food, feed, fiber, fuel, and chemical feedstocks. This work will continue and increase in the future.

Biotechnology has been and will continue to be a key tool in improving the ethanol industry and the biofuels industry in general. Functional genomics will continue to make corn a better raw material for manufacturing ethanol and many other products. Biotechnology will create totally new products, including pharmaceuticals and neutraceuticals, that can be produced in and manufactured from corn. Functional genomics will also improve the microorganisms and enzymes used in production and processing of the various fractions of the corn kernel, leading to even more diverse and useful products that can obtained from corn in profitable commercial operations.

I deliberately reported on all the major stages of ethanol production and use, because the overall viability of the ethanol industry is improved by advances in each of these dimensions. No one factor makes or breaks the strong case for ethanol. Ethanol is just part of a very complex bio-based production and utilization system. Anaylses of its strengths and weaknesses must reflect all of these dimensions.

Legislation that encourages public and private investment in research and development in support of a bio-based economy, including your MTBE Elimination Act (S2233) and Senator Lugar's National Sustainable Fuels and Chemicals Act (S935), will benefit the ethanol and biofuels industries and their customers. We applaud your efforts in that direction.

Thank you for this opportunity to provide information for the committee.

UNIVERSITY PARK

University Park
Southern Illinois University at Edwardsville, Inc.
One North Research Drive
Edwardsville, Illinois 62025-3604

Testimony by Dr. Brian E. Donnelly
Executive Director, University Park, Southern Illinois University Edwardsville,
Before the Field Hearing of the U.S. Senate Subcommittee on Research, Nutrition, and General Legislation of the Committee on Agriculture, Nutrition, and Forestry
Tuesday, April 18, 2000

Good morning, I am Dr. Brian Donnelly, Executive Director of University Park, Southern Illinois University Edwardsville. I am here in my role as the representative of the site that has been chosen for the National Ethanol Research Pilot Plant.

I would like to begin this morning by complimenting Senator Fitzgerald and the Senate Committee on Agriculture for holding this hearing and for the commitment to the development of a safe, dependable, cost-efficient fuel to meet the clean air needs of our nation.

Particularly, I would like to compliment the Committee and the entire Senate for passage of S. 935 to "promote the conversion of biomass into biobased industrial products." This legislation, thanks to an amendment offered by Senator Fitzgerald, includes a federal authorization for the construction of the National Ethanol Research Pilot Plant at SIUE. As my statement will explain, the NERPP holds the potential to provide a bright future for ethanol and the environmental and energy security that it provides. Senator Fitzgerald has been a leader in getting the U.S. Senate to recognize the benefits of ethanol and the NERPP. It is an honor, Senator, to appear before you today.

University Park is a 330-acre research and technology park located on the 2,660-acre campus of Southern Illinois University Edwardsville (SIUE). The State of Illinois has invested $3.1 million in University Park, building concrete roads and installing utilities capable of supporting more than 1,000,000 square feet of building space. Approximately 155 acres are fully improved, with street lighting, entry signage, landscaping and buried utilities. The site includes massive telecommunications infrastructure.

University Park exists to foster regional, state, and national economic development by leasing, or otherwise making available, tracts of land to corporations, non-profit organizations, and government agencies that could benefit from University Park's strategic location. This site is at mid-continent, next to a comprehensive University, in the Illinois suburbs of St. Louis and just thirty minutes away from Lambert-St. Louis International Airport. University Park already includes six privately owned buildings that house eight companies, four non-profit organizations, and specialized facilities operated by two public universities.

The very laudable efforts of Senator Fitzgerald and other leaders to replace MTBE as an oxygenate will be complemented by the construction of the ethanol pilot plant, a facility that will enhance the cost effectiveness of ethanol - a renewable fuel. University Park and SIUE have been working since 1995 to help create the National Ethanol Research Pilot Plant because we believe that increasing the use of ethanol as a motor fuel is an important local, state and federal priority. I will not recite all of ethanol's well-known environmental, economic, and national security benefits, but allow me to provide the following overview.

The National Ethanol Research Pilot Plant is designed to improve the efficiency of ethanol production. Increased operational efficiency will help in two ways. First, it will increase market penetration by this efficient and environmentally friendly fuel. Second, it will reduce the role of government incentives.

There are scores of researchers, throughout the United States and in several other nations, actively engaged in research designed to improve the efficiencies of ethanol production. Their approaches vary widely. Some are examining processes for grinding corn, hydrolyzing starch, fermenting glucose, distilling and dehydrating alcohol, or converting corn fiber to ethanol. Others are interested in engineering the corn kernel, altering enzymes, breeding or genetically

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engineering new strains of bacteria, yeast and fungi, or in producing or recovering valuable co-products of the ethanol production process.

Many of these research efforts are very promising. However, they share a common problem. Encouraging results, obtained at the laboratory level, have not been tested on a commercial scale because of the prohibitive costs and risks of injecting an exploratory technology into an existing facility. These costs and risks have, in effect, created a logjam of research projects waiting to go forward to commercialization. For this reason, a 1994 USDA report indicated that a pilot scale ethanol production facility that would evaluate ethanol process research "could be a major factor in the future utilization of corn."

In 1995, SIUE received a $500,000 grant from the United States Department of Agriculture to study the feasibility of constructing a pilot ethanol plant in Illinois. The study looked at several things. First, it examined what would be needed in a designated site to accommodate the pilot plant. Second, it reviewed whether it was possible to build a pilot plant that would emulate a full-scale wet and dry facility. Third, it tried to understand the economic implications of commercializing some of the ethanol production techniques currently being developed by laboratory researchers.

Engineers from the Fluor Daniel Company succeeded in producing a preliminary design for a pilot ethanol plant that would emulate full scale corn wet mill and corn dry mill production facilities and be a very flexible platform for the testing of many different types of technology.

In addition, the benefits of such a facility were clearly demonstrated. Representatives of the fuel ethanol industry, as well as related engineering firms, were asked to select several research projects from a list of 102 that hold the greatest potential for reducing the cost of manufacturing ethanol from corn. Ten projects were selected. Stanley Consultants, Inc. conducted an economic analysis of these ten projects and reached a dramatic conclusion. If just five of these technologies are sped to commercialization through the ethanol pilot plant, the cost of converting corn to ethanol could be reduced by approximately 10 cents a gallon. In 1999, 1.56 billion gallons of ethanol were produced in the United States, which would have resulted in production cost reductions of $156 million per year.

Late in 1996, Congress appropriated $1.5 million for final design of the pilot plant. Using these funds, Raytheon Engineers and Constructors were employed to finish designing the plant and produce bid packages. These bid packages are prepared and ready to mail. If construction funds for this project were appropriated today, construction of the facility would begin within a few months. The State of Illinois believes so strongly in this $20 million project that it has already appropriated $6 million. If the additional $14 million federal share becomes available, within a year or so, this major national asset will be on line, with all of the positive ramifications for the environment, the economy, national security and ethanol subsidy reduction.

In closing, I would like to thank Senator Fitzgerald for the opportunity to appear today and would be pleased to answer any questions that you may have.

Illinois Soybean Association

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STATEMENT BY THE
ILLINOIS SOYBEAN ASSOCIATION
By Darryl Brinkmann
For SENATOR PETER FITZGERALD
HEARING ON BIOFUELS
April 18, 2000

Good morning. I am Darryl Brinkmann, a soybean and corn producer from Carlyle, Illinois. I am past President of the Illinois Soybean Association and currently represent the state on the American Soybean Association (ASA) Board of Directors. I also serve on the Board of Directors of the National Biodiesel Board (NBB).

I am pleased to be here today and commend you, Senator Fitzgerald, for holding this hearing on biofuels. I am going to shift the focus a bit from our earlier panel and use this opportunity to discuss biodiesel and some of the issues our industry is working on.

Senator Fitzgerald, I know you understand biodiesel, but for the record, biodiesel is a cleaner burning fuel for diesel engines. It is produced from renewable resources, such as soybean oil. Biodiesel is an ideal alternative fuel because it operates in diesel engines just like petroleum diesel and requires little or no modifications, while maintaining the payload capacity and range of petroleum. Because its chemical characteristics are very similar to petroleum diesel, biodiesel blends well at any level. The most commonly used blend is a 20% biodiesel, 80% diesel blend - B20. One of the reasons it is the most commonly used blend is due in large part to legislation sponsored and shepherded through Congress in 1998 by my Congressman, John Shimkus.

Congressman Shimkus' bill amended the Energy Policy Act (EPACT) of 1992 to allow federal and state fleets to earn credit under this program by using B20. This major change in law has resulted in record growth of biodiesel use and I believe we are just beginning to take advantage of the potential of this market. So, thank you Mr. Shimkus and other Members of Congress in the room for your strong support of this effort and of our industry.

Biodiesel is simple to use, renewable, domestically produced and readily available. Other advantages of biodiesel include superior lubricity for smoother operation and reduced engine wear and a high flash point, making it safer to store and handle.

The use of biodiesel in a conventional diesel engine results in substantial reduction of unburned hydrocarbons, carbon monoxide, and particulate matter compared to emissions from diesel fuel. Pure biodiesel does not contain sulfur and therefore reduces sulfur dioxide exhaust from diesel engines virtually to zero.

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Of course, there are other reasons to use more biodiesel right now. With agriculture prices at record lows and petroleum prices approaching record highs, it is clear that more can be done to utilize domestic surpluses of renewable oils, such as soybean oil, while enhancing our energy security. Because biodiesel can be used with existing petroleum infrastructure, it provides an immediate opportunity for addressing our dependence on imported petroleum and helping our farm economy.

There are many reasons for our transportation sectors to use more renewable fuels like biodiesel, but there are still hurdles and obstacles to making this a reality. Congressman Shimkus has introduced legislation in the House to amend the Congestion Mitigation Air Quality (CMAQ) program to allow funds in this federal grant program to be used to buy down the cost of biodiesel. The Shimkus bill does not create a new program for biodiesel nor does it earmark funds in the current program for biodiesel. It just levels the playing field for biodiesel to be eligible for funds in the CMAQ program. Senator Bond of Missouri and Senator Johnson of South Dakota have sponsored similar legislation in the Senate, and I know we can count on your support, Senator Fitzgerald, of that bill.

For long-term support of biodiesel, the industry is considering a number of options including a national renewable standard. In other words, all diesel transportation fuels would contain a very small percentage of biodiesel. Some petroleum distributors are already offering a premium diesel that includes a low blend biodiesel additive. For example, Koch Industries is offering a product, U.S. Soy Field Diesel in bulk at over twenty terminal locations across the Midwest. A similar product, Soy Master, is being marketed by Country Energy, a joint venture between Farmland and Cenex/Harvest States. We think this concept has merit and will work with industry to further develop the expansion and use of low blends of biodiesel. An upcoming rulemaking process by EPA which will lower sulphur content in diesel fuel, will necessitate inclusion of a lubricity additive. Because biodiesel contains no sulphur, it could serve as a domestically produced renewable, oxygenated lubricity additive in ultra-low sulphur diesel fuel.

Senator Fitzgerald, we think the future looks bright for biodiesel and with the help of Members of Congress like you and Representative Shimkus we know that many of the current obstacles will soon be opportunities.

Again, I appreciate the chance to talk about several key issues facing the biodiesel industry and look forward to working with you on these matters and others of importance to Illinois soybean producers.

Thank you.

DOCUMENTS SUBMITTED FOR THE RECORD

APRIL 18, 2000

National Corn Growers Association
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Washington, DC 20001-2109
202/628-7001 FAX 202/628-1933

April 14, 2000

The Honorable Peter Fitzgerald
US Senate
SD-555 Dirksen Senate Office Bldg.
Washington, DC 0510-1305

Dear Senator Fitzgerald:

I am writing on behalf of the 31,000 members of the National Corn Growers Association (NCGA) in support of your bill, S. 2233, the *MTBE Elimination Act*. NCGA recognizes the need for the Congress to act in order to protect the nation's water supplies from MTBE contamination. Your bill, by eliminating the use of MTBE as a fuel additive within 3 years and requiring the labeling of gasoline containing MTBE, will achieve that goal.

We also believe the provisions in your bill to mitigate ground water contamination by MTBE will go a long way toward cleaning up a problem that has been in the making for more than 20 years. Establishing a research and competitive grant program at the Environmental Protection Agency will ensure that cost effective mitigation technologies are developed and that the Federal Government pays a fair share of the costs of developing these technologies.

We look forward to working with you and the cosponsors of your legislation on a speedy enactment of the bill.

Sincerely,

Lynn D Jensen

Lynn Jensen
President

STATEMENT OF U.S. SENATOR RICHARD J. DURBIN

SENATE AGRICULTURE COMMITTEE

RESEARCH, NUTRITION, AND GENERAL LEGISLATION SUBCOMMITTEE

ETHANOL FIELD HEARING

APRIL 18, 2000

Mr. Chairman, I appreciate the opportunity this morning to share my thoughts with the Subcommittee on ethanol. I commend you for organizing this important hearing and for holding it in my hometown of Springfield, Illinois. Throughout my 20 years of public service I have been an advocated for the use of ethanol. I look forward to working with you and our colleagues in the Senate to promote the continued use of ethanol and to expand its role in our nation's clean air strategy.

This year, we have several ethanol-related issues before us. Never before has the future of the industry and the ethanol program been so clearly on the legislative front-burner on Capitol Hill and at the White House.

A year ago, we were celebrating an ethanol tax incentive extension and talking about the Chicago-Milwaukee reformulated gasoline program (RFG) and how to ensure the continued year-round use of ethanol. Unfortunately, the Chicago RFG issue is still unresolved. We must redouble our efforts to get a final rule that gives ethanol the carbon monoxide credit it deserves so it can continue to play a vital role in the Chicagoland area's clean air strategy.

Illinois EPA Director Tom Skinner has developed a scientifically sound approach for accomplishing this task. I pledge to work with you and the Illinois Delegation to convince U.S. EPA to adopt the Illinois EPA proposal. The first step was accomplished last week when we met with U.S. EPA Administrator Browner and USDA Secretary Glickman on this important issue.

First, let me say that this Administration led by President Clinton and Vice President Gore deserves high marks for their continuing commitment to ethanol. They have proven time and again that their support of ethanol is more than convenient political posturing.

With that said, we need this Administration to do more. Last month's announcement that U.S. EPA will seek legislative changes to the Clean Air Act to phase out and eventually ban MTBE is good news. We all know the dangers of MTBE to our environment, our water supply, and our communities. You needn't travel beyond the confines of many Illinois communities to realize the public health concerns associated with MTBE.

I do take issue, however, with the proposal to lift the oxygenate requirement. I think the Administration needs to examine ways to promote renewal fuels and ethanol, in particular. I read with interest Senator Tom Daschle's suggestion that the oxygenate requirement should not be lifted entirely. Rather, the Senate Democratic Leader has suggested that states be allowed to decide. In Illinois' case, I'm confident that the state would retain the important oxygenate requirement. Clearly, it has worked well for Illinois.

We should continue working with our allies in Congress to address a renewable fuels approach while encouraging the Administration to reexamine their oxygenate requirement proposal. I'm committed to pursuing a continuing, expanded role for ethanol.

I'm proud to say that Illinois is the nation's largest ethanol producer and that one in every six rows of Illinois corn -- 280 million bushels -- goes to ethanol production. But, an expanded role for this renewable fuel is more than a boost to industry, it's jobs to rural America, and it's energy security. As we look for solutions to rising oil prices, we must remember that ethanol is a viable alternative fuel -- domestically produced and environmentally friendly. In fact, every 23 gallons of ethanol displaces a barrel of foreign oil.

Let me mention one more issue -- research. Ethanol proponents need to seize this opportunity to further promote ethanol research and to develop public-private partnerships that will expand the use of ethanol into the 21st Century. One research proposal that is very important to me is the National Corn-to-Ethanol Research Pilot Plant in Edwardsville, Illinois.

The Pilot Plant would test new and potentially more competitive processes for converting corn into ethanol. This project is designed to enhance ongoing industry efforts that will improve the environment, reduce our dependence on foreign oil, and expand economic growth in both rural and urban America. A USDA feasibility study suggests that this Pilot Plant could reduce production costs by as much as 10 percent. The Illinois Congressional Delegation continues to look for ways to fund this important project.

Mr. Chairman, thank you again for the invitation to share my thoughts on ethanol this morning. I look forward to working with you and the Illinois Delegation to continue to promote and expand the use of ethanol in our nation's clean air strategy.

STATE OF ILLINOIS

OFFICE OF THE ATTORNEY GENERAL

SPRINGFIELD 62706

JIM RYAN
ATTORNEY GENERAL

April 17, 2000

The Honorable Peter Fitzgerald
United States Senator
Henson Robinson House
520 South Eighth Street
Springfield, IL 62703

Dear Senator Fitzgerald:

I join you and Director Hampton in expressing concern over the use of methyl tertiary butyl ether and supporting the increased use of ethanol fuels and fuel additives to fight urban pollution. The use of ethanol reduces pollution, is biologically renewable, reduces dependence on imported oil and creates value-added markets for corn growers.

The use of ethanol as a part of our nation's reformulated gasoline program reduces the release of carbon monoxide and hydrocarbons in the air. It is safe and does not pose the health and environmental hazards associated with MTBE-blended RFG.

According to the Argonne National Laboratory, corn based ethanol results in a 50 - 60 percent reduction in fossil energy use and a 35 - 46 percent reduction in greenhouse gas emissions. Ethanol is made from growing crops as opposed to fossil energy sources.

Over 55 percent of our oil is imported from foreign countries. Ethanol use reduces United States dependency on foreign sources of oil and the foreign market's ability to control U.S. gas prices. Domestically produced ethanol displaces foreign oil and keeps energy dollars in the United States.

Ethanol uses one in every six rows of corn planted in Illinois. More than 280 million bushels of corn are used to provide this domestic renewable fuel source. Ethanol creates new markets for Illinois corn and stimulates rural economics by increasing jobs and rural income.

Ethanol is a clean and safe renewable energy source and an excellent fuel source to replace MTBE.

Very truly yours,

Jim Ryan
ATTORNEY GENERAL

RUDY K. RICE
President

April 10, 2000

The Honorable Peter G. Fitzgerald
United State Senate
Washington, DC 20510

Dear Senator Fitzgerald:

I would like to commend you for your introduction of S. 2233, "A bill to prohibit the use of, and provide for remediation of water contaminated by, methyl tertiary butyl ether (MTBE). I am the current President of the National Association of Conservation Districts and an Illinois farmer. I am heartened by the introduction of a bill that would provide stewardship of our natural resources, specifically our water and air quality with the removal of this overly invasive fuel additive. The Sense of the Senate expressed within S. 2233 also points to the valuable use of ethanol, which provides significant air quality benefits, an increased market for the depressed agricultural economy and significant national security benefits.

The bill forthrightly addresses the growing national crisis of MTBE water contamination by phasing out completely the use of MTBE over the next three years and paving the way for the use of ethanol. By phasing out the use of MTBE nationwide, the bill seeks to protect the water supplies of every citizen, while allowing time for ethanol production to grow to meet the supply needs of the reformulated gasoline oxygenate standard.

With ethanol we can protect both air quality and precious water supplies while increasing the marketplace for ethanol feedstocks. With the current crisis in our Agriculture economy and with gasoline prices reaching record highs it only seems sensible to utilize products that will enhance our national security while also providing a boost for our nations farmers.

The nation's nearly 3,000 conservation districts work to provide stewardship for our nation's land, water and other natural resources. We are firmly rooted in the ideal of voluntary, locally led solutions. Our nearly 17,000 elected or appointed conservation district board members, along with some 7,000 district employees take on many of the nation's natural resource stewardship issues. As such, the current problems surrounding MTBE have our members concerned. Proper stewardship of our natural resources is of paramount concern to our members as we strive to build a healthy environment for future generations while ensuring economic prosperity for all of America.

We look forward to working with you and your staff to see the MTBE Elimination Act of 2000 become law.

Sincerely Yours,

Rudy Rice

Rudy Rice
President

National Association of Conservation Districts
509 Capitol Ct., NE - Washington, DC 20002
Phone (202) 547-6223 - Fax (202) 547-6450

April 18, 2000

Illinois State Capitol

U.S. Senator Peter G. Fitzgerald
Chairman of Senate Agriculture Subcommittee
On
Research, Nutrition and General Legislation

Field Hearing on

Ethanol and MTBE (Methyl Tertiary Butyl Ether)

Testimony of

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CLEAN AIR OXYGENATE REQUIREMENTS SHOULD REMAIN LAW!
MTBE IS A SERIOUS HEALTH AND ENVIRONMENTAL PROBLEM AND SHOULD BE BANNED NOW!

Let me begin by thanking Senator Fitzgerald for scheduling this hearing. But, let me go on to ask why over these past many months letters on MTBE and Ethanol to Director Joe Hampton, Lt. Gov. Corinne Wood, Illinois Governors, our elected senators and district representative, yet only Director Hampton and Lt. Gov. Wood responded?

It took more than 70 years for past leadership to put in place rules that banned lead. Yet once the developer was aware of what lead in gasoline would do to the health of Americans he arranged for his wealth to be used to establish cancer clinics known as Sloan-Kettering.

When the oil companies announced they would use MTBE as their source of oxygenates technically-qualified people informed me it was even more hazardous to Americans health than lead. In 1990 our government published public law 101-549 which listed "hazardous air pollutants". Both Methanol and MTBE are on the list. Not ethanol or ETBE. (See attachment #1)

At that time it probably wasn't known of the hazard MTBE would become to American's water supply and health of Americans.

The current nation wide news is making this an Ethanol vs. MTBE matter. Nothing is further from the truth. This is an obvious situation where both the federal and state leaders of the EPA and Energy Departments lack the back bone necessary to demand that the oil companies include America's only domestic, clean burning, renewable oxygenate Ag ethanol in all areas were required.

Rather for these many years MTBE may have allowed the oil companies to clean up the air but until recently MTBE was never criticized or published as a hazardous pollutant both to air and water.

In the late 1970's it was the strong leadership in Illinois that commercialized the blend of 10% Ag ethanol and 90% gasoline. Many of the organizations now talking ethanol were strong opponents to Ag ethanol production and use. Books were written and published against Ag ethanol, Ag ethanol parallels the railroad rail situation that faced President Abe Lincoln. Rails could be purchased cheaper from a foreign supplier. Abe Lincoln came to the conclusion that the rails may cost more if made in America but it would use American Ore, American factories, employ Americans and even better all the monies would still be in America.

Ag ethanol was introduced during a time when oil imports were at 37% but it still created an energy crisis. MTBE, primarily imported has polluted American air and water at a time when it's reported we are importing 57% of our oil needs. Ag ethanol should play an important role in phase II of the Clean Air Act. When used like in Brazil it can be used year around and nation wide.

Currently the largest percentage of Ag ethanol is used in producing the 10% blend formerly known as gasohol. When the Illinois program was started we contacted Brazil, who was the leader in ethanol for fuel. They reported all the advantages of a 10% blend but also told of the 1% increase in vapor pressure but this was no problem if 22% ethanol was used in the blend. (See attachment #2).

In the fall of 1977 there wasn't enough ethanol for a 22% blend nor was there any Anhydrous Ag ethanol available. Illinois chose to move ahead with the 10% blend and its benefits using ethanol from cheese whey. Further the waiver for vapor pressure was requested and granted.

Illinois successfully started the commercialization of ethanol with wet ethanol produced from cheese whey by Milbrew of Wisconsin. It wasn't until the spring of 1978 that Archer Daniel's Midland of Decatur produced and marketed anhydrous ethanol. What this should tell you that if there were a need American ingenuity would rise to the occasion. Therefore if the oil companies will stop their media campaigns that there won't be enough Ag ethanol and it will cost too much, the United States will and can meet their needs.

The U.S. Government took one of Americas largest grain processor to trial on a price fixing charge yet our local gas outlets have rapidly changing, yet quite similar prices, and the U.S. Government doesn't call them to task about price collusion. Prices in Springfield were as follows: February 8, 143.9; 28th 138.9; March 2 152.9; April 2 147.9; 9th 145.9; 13th 143.9; 17th 132.9. (See attachment #3).

Of the enclosed pictures please note that even though a credit goes to the blender of ethanol fuel only the Phillips 143.9 Vs 148.9 and Marathon 145.9 Vs 150.9 are passing this savings on to their customers.

In spite of all the media stories on the health problems of MTBE the petroleum industry takes the position that MTBE was required. (See attachement #4).

If the petroleum council talks only of MTBE and not of oxygenate requirements it is easy to see how the public can be misled as to what Congress wanted and the leaders of EPA and Energy didn't have the guts to implement.

As with the tobacco industry there will be many major lawsuits. Please note that after the court's decision against them the price of tobacco items has risen sharply with lawyer's fees being significant and the states using some of their settlements as general revenue.

The same, but more, will occur with MTBE lawsuits in that it involves everyone. The volume is greater and the environmental stakes higher.

It would come as no surprise to some that if and when such MTBE lawsuit was filed in Illinois it would also cite the 9 democrat house members that Rep. Phil Novak, (D) Bradley asked to vote present on Rep. Bill Mitchell
(R) Forsyth, amendment to Senate Bill 1046 which proposed to ban MTBE by January 1, 2001.

Farm organizations like the Illinois Corn Growers need to stop talking about raising the price of corn and permanent normal trade relations with China from which they expect to increase corn sales. How do they expect this to occur when China is a corn exporter? If it were a barter deal it would make sense since our current trade deficit with China is in excess of 60 billion dollars ($60,000,000,000). I've been told some of Chinas corn is going to Japan whose trade deficit with the U.S. is in excess of 70 billion ($70,000,000,000).

The Illinois Corn Growers had best spend their time and money on expanding the domestic market for fuel.

Even the carbon dioxide problem is eased since the next corn crop will take the co2 from ethanol fuel and use it back in the production of the next crop.

With respect to the soybean industry and its place in fuels one has but to look to Assumption Cooperative Grain Company, 104 W North St, Assumption, IL 62510, 217-226-3212, Tom Bressner Manager. After research and documentation of soy-diesel blends ability to meet the lubrication problems, that elimination of sulfur brought in they held a press conference and announced the diesel fuel they would sell would be a soy blend and it would be their only diesel available. It has been a local success.

I recently visited with Tim Bressner and, as I expected, their fuel concept has not been picked up and used by other coops. This continues to point out that change only occurs when someone takes the lead and does it.

I want to continue my testimony by including what my long time Washington D.C. friend Bill Holmberg put together. In the late 70's Bill was one of the first U.S. Department of Energy people to work with Illinois as they established the 10% ethanol blend "Gasohol".

The following is a quote from Bill:

"As I said earlier, I have been deeply involved in the ethanol industry from its inception and continue to do so today – a quarter century later. The big lesson learned is that when times are right we have to hit hard and fast. This was true with the first energy crisis in 1974; the second crisis in 78-79; the phase out of lead in gasoline (which should have been replaced with ethanol, but the oil industries turned to toxic aromatics); and the passage of the Alternative Transportation Fuels Act of 1988, the Clean Air Act in 1990,

with its attack on carbon monoxide and ozone, and the Energy Policy Act of 1992, with new opportunities for alternative fuels like ethanol.

These actions forged a foundation and now, finally, conditions are set for the ethanol industry to take a big leap forward. With this, there should be a focus on strengthening the lot of farmers, ranchers, dairyman, foresters and farm communities. Those conditions are:

- A well established ethanol industry with an in-place infrastructure and a solid track record in reducing CO and ozone (when the oil companies provide the right blendstocks) and downward pressures on gas prices to the customer;
- National recognition that MTBE is causing serious problems with the ground water in many parts of the country;
- Growing and dangerous dependence of the United States and the world on OPEC oil and our rising trade deficit;
- The high price of gasoline, diesel and heating oil causing economic problems for many and a sudden rise in inflation;
- The obvious need to further reduce CO and ozone levels through high octane, non-toxic oxygenates like ethanol without boosting aromatics (toxic and carcinogenic) and olefins in gasoline, and without negatively impacting the driveability index;
- The urgent need for the U.S. to fully engage in the reduction of greenhouse gases with American farmers taking the lead in the transition from a hydrocarbon to a carbohydrate economy;
- The equally urgent need to democratize the production of energy supplies in the U.S. so that value-added benefits remain in farm and rural communities;
- The President's Biomass Initiative and increasingly cooperative efforts within the Departments of Energy and Agriculture and the Environmental Protection Agency, as well supportive legislation with several states; and
- Vital national legislation sponsored by Senators Lugar and Daschle.

These powerful forces have set the stage for major advances in the biofuels industry. But there are commanding forces aligned against these advances:

- First and foremost is the major oil companies that have undermined the ethanol industry for well over a hundred years. Even though they can incorporate ethanol into gasoline to the benefit of farmers, consumers, the environment and indeed, their own bottom line, they remain determined in their struggle against any non-hydrocarbon fuels in the transportation sector - ensuring the future for the oil barrel is of primary importance. Of course, at a propitious time, they can use their vast capital resources and human talents to launch their own biorefineries, taking advantage of government investments and pioneering achievements of entrepreneurs. But, that would dampen the benefits to farmers, ranchers, foresters, rural communities and the opportunity to advance the democratization of energy supplies by keeping value-added benefits in rural communities.
- Second is the lack of aggressive action on the part of some government bureaucracies, at both the federal and state levels, and their failure to seize upon the opportunities offered up by legislation and circumstances like those outlined above. These bureaucrats are joined by organizations like the American Farm Bureau Federation

that are more interested in gaining favor from major corporations and industry than honoring their obligations to farmers and rural communities.

- Then there are the major, multinational corporations in the ethanol industry, which in concert, directly or indirectly, control the industry. They simply do not want to see the industry expand beyond their control, or to the extent that the increased volume of production would: 1) Threaten ethanol's tax incentives; 2) Raise the price of corn to a level that weakens profits in the corn grinding and exporting businesses; or 3) Flood the market with more ethanol, corn sweeteners, oil, gluten meal and feed, and other animal feeds like distillers grains and solubles. I report this with trepidation because I have clearly seen the absolutely essential contributions to the birth and health of the industry made by ADM. But, we have reached the point where the industry must expand beyond the control of the majors to the benefit of the nation, the farmers and the environment. It is my fervent wish that they will join in this next big adventure in the biofuels industry as partners rather than controllers.

To take advantage of the opportunities and to overcome the obstacles we must:

- Move now and move aggressively;
- Support Senator Daschel's legislation as it pertains to the accelerated phase out of MTBE, protection of Clean Air Act oxygenates standard, and the establishment of an aggressive Renewable Fuel Standard (RFS). The RFS must include a trading component so that areas of the country, remote from existing supplies of ethanol (until their own local production comes on line), will have the option of purchasing either ethanol or credits to meet the balance between the RFS requirement, clean air, and economic needs.
- Support Senator Lugar's and Congressman's Ewing's legislation that will contribute, in a major way, to expansion of the ethanol industry.
- Expand existing and open new markets for ethanol. This should include major increases in E-85 refueling stations to eliminate the dichotomy between the number of FFVs using just gasoline and those using E-85. It should also include governmental action to ensure an expanding market for ethanol in hybrid electric vehicles, fuel cells and in aircraft (there is an increasing number of aircraft certified to use ethanol, but cooperative action on the part of DOE, EPA and the FAA is needed to more fully capture this market).

I suggest that the Senate Agriculture Committee, because of Senator Lugar's leadership in these areas, take the lead in gaining support within the government and helpful constituencies, and in building needed coalitions. There are several steps that can be taken:

- Work with those supporting the stabilization of greenhouse gases to make better known the fact that agriculture and forestry are even now contributing in a major way to emissions reduction through sustainable agriculture and forestry practices. It is equally important to inform the public that biofuels, bioenergy and biochemical industries will add important dimensions to the reduction of greenhouse gas emissions through replacing fossil-based products with carbon-neutral, plant-based products, and, in doing so, stimulate rural economies;

- Encourage the major oil and ethanol industries to work cooperatively with the Congress to find solutions that truly serve the nation, particularly rural communities and the environment;
- Turn to the smaller organizations representing farmers and rural communities as well as to environmental and public interest groups to establish positions of primary importance to these organizations and groups – position that will also advance the ethanol industry; and
- Include the auto industry in the process of finding solutions so that this important industry will be more supportive of the use of ethanol. This would include:
  1. National gasoline standards that include oxygenates and biofuels while leading to improved engine performance and reduced emissions – this would include reductions in aromatics, olefins and sulfur as well as optimized driveability index.
  2. Continue the alternative fuel vehicle credits under CAFÉ standards.
  3. Flexibility in on-board canister standards to accommodate the periodic higher Rvp of ethanol blends under limited circumstances. Promoting ethanol gasoline blends where the ethanol content is always above 22% would solve that problem.
  4. Ensure that the oil companies do not offer inferior gasolines as blendstocks for ethanol, even though the blendstocks are sub-Rvp to accommodate ethanol.

Thank you for the opportunity to express my vision for the ethanol industry based on a through understanding of the past.

Times are right for a major expansion of the industry. It is time to move hard and fast, not delaying progress by trying to harness favorable conditions for political gain. The overall political process and the confidence of the public will benefit from the rapid implementation of the above recommendations."

Respectfully submitted,

Al Mavis

ATTACHMENT #1

under this section establishing an emission standard applicable to such source.

"(5) MODIFICATION.—The term 'modification' means any physical change in, or change in the method of operation of, a major source which increases the actual emissions of any hazardous air pollutant emitted by such source by more than a de minimis amount or which results in the emission of any hazardous air pollutant not previously emitted by more than a de minimis amount.

"(6) HAZARDOUS AIR POLLUTANT.—The term 'hazardous air pollutant' means any air pollutant listed pursuant to subsection (b).

"(7) ADVERSE ENVIRONMENTAL EFFECT.—The term 'adverse environmental effect' means any significant and widespread adverse effect, which may reasonably be anticipated, to wildlife, aquatic life, or other natural resources, including adverse impacts on populations of endangered or threatened species or significant degradation of environmental quality over broad areas.

"(8) ELECTRIC UTILITY STEAM GENERATING UNIT.—The term 'electric utility steam generating unit' means any fossil fuel fired combustion unit of more than 25 megawatts that serves a generator that produces electricity for sale. A unit that cogenerates steam and electricity and supplies more than one-third of its potential electric output capacity and more than 25 megawatts electrical output to any utility power distribution system for sale shall be considered an electric utility steam generating unit.

"(9) OWNER OR OPERATOR.—The term 'owner or operator' means any person who owns, leases, operates, controls, or supervises a stationary source.

"(10) EXISTING SOURCE.—The term 'existing source' means any stationary source other than a new source.

"(11) CARCINOGENIC EFFECT.—Unless revised, the term 'carcinogenic effect' shall have the meaning provided by the Administrator under Guidelines for Carcinogenic Risk Assessment as of the date of enactment. Any revisions in the existing Guidelines shall be subject to notice and opportunity for comment.

"(b) LIST OF POLLUTANTS.—

"(1) INITIAL LIST.—The Congress establishes for purposes of this section a list of hazardous air pollutants as follows:

CAS number	Chemical name
75070	Acetaldehyde
60355	Acetamide
75058	Acetonitrile
98862	Acetophenone
53963	2-Acetylaminofluorene
107028	Acrolein
79061	Acrylamide
79107	Acrylic acid
107131	Acrylonitrile
107051	Allyl chloride
92671	4-Aminobiphenyl
62533	Aniline
90040	o-Anisidine
1332214	Asbestos

CAS number	
71432	Benzene
92875	Benzidi
98077	Benzotr
100447	Benzyl c
92524	Biphenyl
117817	Bis(2-eth
542881	Bis(chlo
75252	Bromofo
106990	1,3-Buta
156627	Calcium
105602	Caprola
133062	Captan
63252	Carbara
75150	Carbon
56235	Carbon
463581	Carbony
120809	Catechol
133904	Chlorna
57749	Chlorde
7782505	Chlorin
79118	Chloro
532274	2-Chlo
108907	Chloro
510156	Chloro
67663	Chlorof
107302	Chloro
126998	Chlorop
1319773	Cresols
95487	o-Cresol
108394	m-Cresol
106445	p-Cresol
98828	Cumene
94757	2,4-D, s
3547044	DDE
334883	Diazom
132649	Dibenz
96128	1,2-Dib
84742	Dibutyl
106467	1,4-Dich
91941	3,3-Dich
111444	Dichlor
542756	1,3-Dich
62737	Dichlor
111422	Diethan
121697	N,N-Di
64675	Diethyl
119904	3,3-Dim
60117	Dimeth
119937	3,3'-Dim
79447	Dimeth
68122	Dimeth
57147	1,1-Dim
131113	Dimeth
77781	Dimeth
534521	4,6-Din
51285	2,4-Din
121142	2,4-Din
123911	1,4-Dio
122667	1,2-Diph
106898	Epichl
106887	1,2-Ep
140885	Ethyl
100414	Ethyl
51796	Ethyl
75003	Ethyl
106934	Ethyle
107062	Ethyle
107211	Ethyle

CAS number	Chemical name
151564	Ethylene imine (Aziridine)
75218	Ethylene oxide
96457	Ethylene thiourea
75343	Ethylidene dichloride (1,1-Dichloroethane)
50000	Formaldehyde
76448	Heptachlor
118741	Hexachlorobenzene
87683	Hexachlorobutadiene
77474	Hexachlorocyclopentadiene
67721	Hexachloroethane
822060	Hexamethylene-1,6-diisocyanate
680319	Hexamethylphosphoramide
110543	Hexane
302012	Hydrazine
7647010	Hydrochloric acid
7664393	Hydrogen fluoride (Hydrofluoric acid)
7783064	Hydrogen sulfide
123319	Hydroquinone
78591	Isophorone
58899	Lindane (all isomers)
108316	Maleic anhydride
67561	Methanol
72435	Methoxychlor
74839	Methyl bromide (Bromomethane)
74873	Methyl chloride (Chloromethane)
71556	Methyl chloroform (1,1,1-Trichloroethane)
78933	Methyl ethyl ketone (2-Butanone)
60344	Methyl hydrazine
74884	Methyl iodide (Iodomethane)
108101	Methyl isobutyl ketone (Hexone)
624839	Methyl isocyanate
80626	Methyl methacrylate
1634044	Methyl tert butyl ether
101144	4,4-Methylene bis(2-chloroaniline)
75092	Methylene chloride (Dichloromethane)
101688	Methylene diphenyl diisocyanate (MDI)
101779	4,4'-Methylenedianiline
91203	Naphthalene
98953	Nitrobenzene
92933	4-Nitrobiphenyl
100027	4-Nitrophenol
79469	2-Nitropropane
684933	N-Nitroso-N-methylurea
62759	N-Nitrosodimethylamine
59892	N-Nitrosomorpholine
56382	Parathion
82688	Pentachloronitrobenzene (Quintobenzene)
87865	Pentachlorophenol
108952	Phenol
106503	p-Phenylenediamine
75445	Phosgene
7803512	Phosphine
7723140	Phosphorus
85449	Phthalic anhydride
1336363	Polychlorinated biphenyls (Aroclors)
1120714	1,3-Propane sultone
57578	beta-Propiolactone
123386	Propionaldehyde
114261	Propoxur (Baygon)
78875	Propylene dichloride (1,2-Dichloropropane)
75569	Propylene oxide
75558	1,2-Propylenimine (2-Methyl aziridine)
91225	Quinoline
106514	Quinone
100425	Styrene
96093	Styrene oxide
1746016	2,3,7,8-Tetrachlorodibenzo-p-dioxin
79345	1,1,2,2-Tetrachloroethane

CAS number	
127184	Tetrac
7550450	Titaniu
108883	Toluen
95807	2,4-Tol
584849	2,4-Tol
95534	o-Tolu
8001352	Toxaph
120821	1,2,4-T
79005	1,1,2-T
79016	Trichl
95954	2,4,5-T
88062	2,4,6-T
121448	Triethy
1582098	Triflur
540841	2,2,4-T
108054	Vinyl
593602	Vinyl
75014	Vinyl
75354	Vinyli
1330207	Xylene
95476	o-Xyle
108383	m-Xyle
106423	p-Xyle
0	Antim
0	Arsen
0	Beryll
0	Cadm
0	Chrom
0	Cobal
0	Coke
0	Cyani
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ATTACHMENT #2

Private "restructuring" readies America for a surge of growth

We're optimistic on rising U.S. food demand and other elements of economic growth starting in the 1990s. One signal: The chart at left in effect plots the U.S. economic growth rate per person by subtracting a long-term 3.4% trend. It's due to bottom in the next two or three years. That clears the way for 25 years of *generally rising rates of growth.* Details at our SuperStrategy seminars this week in Kearny and Des Moines!

Former Soviet Union's market potential staggered under another financial punch this week: Ukraine is willing to accept its share of former Soviet debt but only if other republics hand over more assets. Rivalry among republics makes it tougher for USDA to grant Ukraine credits. It also erodes the paying power of Russia, which carries most of the FSU's debt and remains in arrears.

Russians have now delayed debt restructuring talks with the powerful "Paris Club" of international bankers until "possibly February." Iowa State University economist Stanley Johnson believes Russia will be in no real hurry to get its creditworthiness back in order because they don't need U.S. grains. "Meat consumption is way down; herds are smaller," explains the ISU expert on Russia. Formerly, subsidies encouraged FSU meat and milk consumption. Now, those subsidies are fading.

Pay IOUs, say Chinese farmers. China's government is waffling on promised subsidy payments to farmers who've helped fuel an economic boom in China with rapid rises in output. Now, farmers are losing patience for growing rice and other grains based on IOUs, not hard yuan on the barrelhead. Chinese officials will try to make at least part of the back payments by mid-January.

Final '92 rice deficiency payment will be around $2.45 per cwt. And, given current outlook, USDA will probably set the estimated '93 crop deficiency payment at $4.21.

Final word on '93 cotton ARP. OMB pushed a 10% ARP, but USDA prevailed to keep it at 7.5%.

Mostly cloudy '93 summer, expects USDA's top weathercaster, Norton Strommen. He reports Mt. Pinatubo's persistent volcanic veil will dim the sun. His similar prediction about this time last year nailed '92 weather.

Strommen acknowledges other cycles at work, too, but says, "Without pinpointing the year, we could have a couple of years of drought in the next 4 or 5 years. But for 1993, El Niño is totally overridden by Mt. Pinatubo. Better soil moisture also guards against drought."

Other climatologists warn of the two-year cycle: A wet-weather season is often followed by a dry one. This year, weather-wary traders will want to see a drought before they buy it.

Ethanol from corn, cobs & stalks?!

BioEnergy International, a firm in Gainesville, Fla., foresees ethanol plants worldwide pumping out cheap, clean fuel — and digesting huge volumes of cellulose-containing wastes.

The new "superbug" technology, based on a genetically altered, patented bacteria, could eventually:

- Enhance today's ethanol-from-corn economics by squeezing fuel from the corn fraction now sold as gluten feed. ADM won't talk, but they've studied the technique. It's a market alternative if EC slaps high duty on gluten.
- Open up new opportunities for farmers to raise biomass for ethanol.

First chore for the superbug, which can convert hard-to-digest sugars into ethanol, will focus on disposal problems such as paper mill waste and leftover bagasse from sugar plants.

BioEnergy spokesman D. B. Jameson tells *Pro Farmer* that costs of the new process, other than raw material feedstocks, total less than 50¢ per gallon of 95% pure ethanol. Since millions of tons of this kind of waste biomass are essentially free, ethanol from superbug plants could compete directly against gasoline.

BioEnergy's first commercial licensing of the new technology is to Bionol Corp. of Massachusetts, which is building a plant in upstate New York to convert paper mill sludge into 10 million gallons of ethanol per year. Bionol plans facilities to produce 100 million gallons. A superbug ethanol plant is slated for Brazil, where 4.5 million vehicles run on straight ethanol and 7.5 million run on a blend of 22% ethanol, 78% gasoline.

Brazilians find that raising the ethanol content to 22% (not the 10% commonly used here) reduces vapor pressure in the blend below that of straight gasoline. They're bemused about opposition to ethanol here on the grounds that it makes gasoline more volatile and polluting.

BioEnergy International intends to license the technology to other manufacturers worldwide, "including agricultural co-ops and agribusiness corporations," says Jameson.

Two new processes make conversion of high-cellulose biomass work.

First, a non-polluting *enzyme* breakdown of cellulose into sugars.

Second breakthrough is a genetically altered *e coli* microbe which thrives on longer-chain sugars from enzyme-hydrolyzed cellulose. Normal fermentation yeasts need less complex sugars.

The superbug was engineered by University of Florida microbiologist Lonnie Ingram. He extracted two genes from a bacteria called *z mobilis* (which is used to brew tequila) and implanted the genes in the DNA strands of an ordinary *e coli* bacteria (found in digestive systems of people).

Distillation is still needed to extract ethanol from the digested mash, but new efficiencies of doing this have cut energy needs to around 30,000 BTU per gallon produced, half that of several years ago. The superbug leaves behind only lignin, which can be used as fuel to drive the distillation plant. But, as we all know, what works in the lab may not work on the farm.

ATTACHMENT #3

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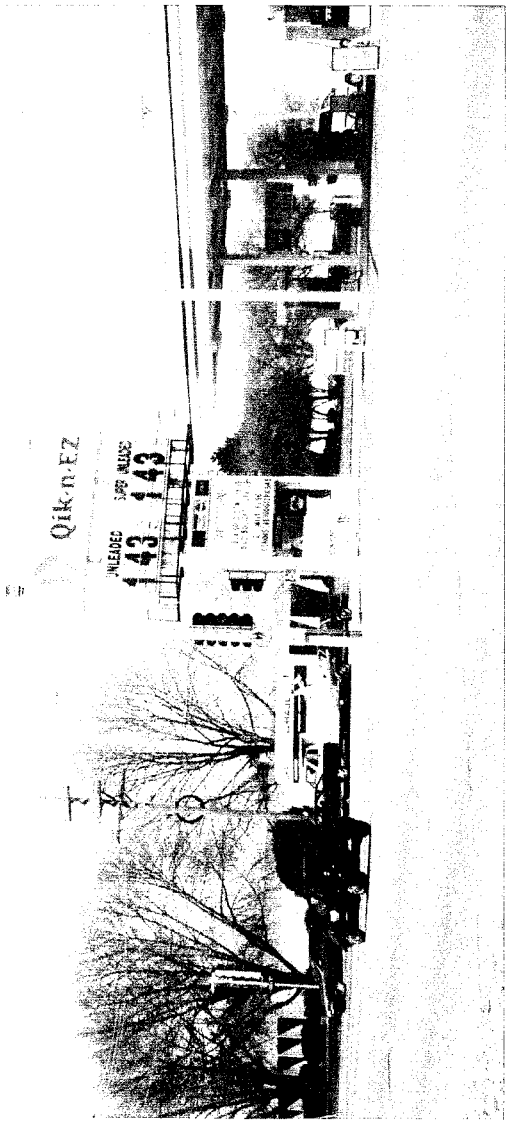
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ATTACHMENT #4

Thinks MTBE cartoon went over the line

Dear Editor,

I consider Chris Britt's MTBE editorial cartoon of March 23 to be a willful and vicious slander on Illinois' 5,600 service station dealers. The SJ-R editorial and reporting staff are fully away of the massive complexity of the Clean Air Act and are also fully aware that the Clean Air Act specifically requires gasoline refiners to blend MTBE in our motor fuel in certain parts of the country.

For the record, we opposed these regulations when proposed by U.S. EPA Administrator Carol Browner, and in spite of our opposition, we're required to obey the law.

I'm proud to have represented Illinois' oil industry for over 24 years. I'm also a parent with growing children, and I really resent Britt's implications that I support a position that could be harmful to my own kids.

Chris Britt is a talented editorial cartoonist. I know it's his job to come up with pithy and controversial editorial images. But allowing him to suggest the oil industry is poisoning little kids is reprehensible and way over the line.

Ill State Journal
3-29-00

David A. Sykuta
Executive director
Illinois Petroleum Council

Wells Scholarship Fund

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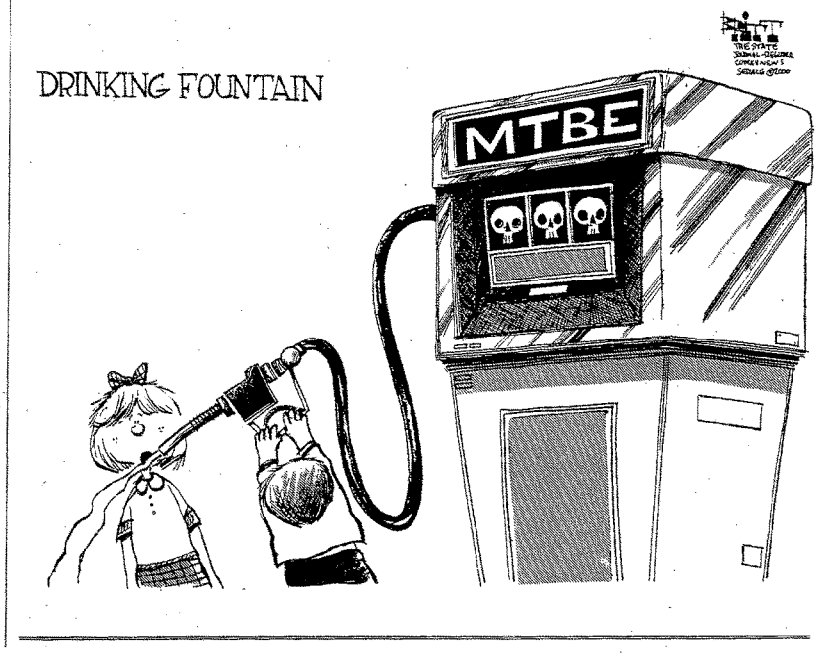
OPINION

THE STATE JOURNAL-REGISTER

CHRIS BRITT



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ETHANOL

Brief Report on
its Use in Gasoline:
Expected Impacts and
Comments of
Expert Reviewers

Sarah R. Armstrong, M.S., M.S.
Cambridge Environmental Inc.
58 Charles St.
Cambridge, MA 02141
April 5, 2000

Sponsored by the Renewable Fuels Association

Executive Summary

This paper summarizes information about ethanol's health and environmental effects, in the context of ethanol's use as a fuel oxygenate. The conclusions are:

- ethanol is readily degraded in the environment;
- anticipated human exposures to ethanol are very low; and
- voluminous information on metabolism of ethanol by humans, and on the health effects of ingested ethanol, strongly suggests that environmental exposures to ethanol will have no adverse health impact.

Also summarized are some findings of a recent, extensive report by the State of California regarding ethanol's potential impact on air and water quality. Appended to the report is a compilation of comments by various expert bodies regarding the same issues discussed in this paper.

Health effects of inhaled ethanol

The data strongly suggest that exposure of the general public to ethanol vapors coming from ethanol-blended gasoline is very unlikely to have any adverse consequences. The reasons for this are:

- the tiny doses that might be received, which might not be observable in light of naturally-occurring levels of ethanol in blood;
- the body's rapid elimination of ethanol; and
- the relatively large doses of ethanol and high blood levels of ethanol associated with toxic effects in people.

No data in the scientific literature support the hypothesis that chronic exposure to non-irritating levels of ethanol in air could cause significant elevation of blood ethanol levels (unless exposed individuals are exercising at the time), or that a risk of cancer or birth defects would be created.

A review by the Health Effects Institute of the potential health effects of ethanol inhaled from ethanol-blended fuels reached similar conclusions. HEI states, "It is unlikely that these [adverse health] effects would result from the very low exposure levels (by inhalation) in refueling situations, because the preexisting levels of ethanol in the blood from normal metabolic processes would not be significantly affected." A recent survey of the literature regarding the inhalation toxicity of ethanol by the Swedish Institute for Environmental Medicine concluded that "a high blood concentration of ethanol is needed for the development of adverse effects" and "ethanol at low air concentrations should not constitute a risk for the general population."

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Environmental persistence

Ethanol is not persistent in the environment. Virtually any environment supporting bacterial populations is believed capable of biodegrading ethanol. Ethanol in water is expected to undergo rapid biodegradation, as long as it is not present in concentrations directly toxic to microorganisms. The half-life of ethanol in surface water is reported to range from 6.5 to 26 hours. Atmospheric degradation is also predicted to be rapid.

Air pollution

Detailed modeling of atmospheric pollution in southern California suggests that using ethanol will not increase the risk of adverse health effects due to emissions or formation of ethanol, acetaldehyde, or peroxyacetyl nitrate (PAN). In fact, the predicted concentrations of ethanol in air were at least 500-fold less than the identified health-protective concentration of 53 ppm.

Water pollution

California also assessed the potential for ethanol to increase pollution of water wells by gasoline components following underground leaks of ethanol-blended fuel. Screening modeling suggests that ethanol might increase the probability of well pollution during the first five to 10 years after a leak occurs, but that the probability would decrease beyond that period.

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ETHANOL

Introduction

The purpose of this short paper is to summarize information about ethanol's health and environmental effects, given ethanol's use as a fuel oxygenate. The conclusions are: (1) ethanol is readily degraded in the environment; (2) anticipated human exposures to ethanol are very low; and (3) voluminous information on metabolism of ethanol by humans, and on the health effects of ingested ethanol, strongly suggests that environmental exposures to ethanol will have no adverse health impact. Also summarized are some findings of a recent, extensive report by the State of California regarding ethanol's potential impact on air and water quality. Appended to this report is a compilation of comments by various expert bodies regarding the same issues discussed in this paper. Those comments largely support the material given here.

Health effects of inhaled ethanol

Ethanol, the active ingredient of alcoholic beverages, has been part of the human diet — and the human environment — for thousands of years. It is produced by fermentation by fungi and other microorganisms, and is found at low levels in the blood and breath of persons who do not drink alcohol. Biological exposures and responses to ethanol are typically evaluated in terms of the blood concentrations, where the units of concentration are milligrams of ethanol per deciliter of blood, or mg/dl. Some blood ethanol concentrations (BEC) and associated effects are shown in Table 1. Endogenous blood levels of ethanol range from non-detectable to 0.02 mg/dl to 0.15 mg/dl (Jones, 1985; Lester, 1962). A typical alcoholic beverage contains 12 g of alcohol, which corresponds to a dose of about 170 mg/kg for a 70-kg adult, and produces a peak blood ethanol concentration on the order of 25 mg/dl. Legal limits on blood alcohol for drivers of vehicles are typically 80-100 mg/dl.

Ethanol is widely ingested in alcoholic beverages, usually with only mild effects. However, at sufficiently high doses, ethanol can cause toxic effects in humans, both short-term (such as inebriation) and long-term (such as cirrhosis of the liver). If ethanol becomes a common fuel additive, there may be opportunities for exposure by inhalation: ethanol vapors might be inhaled at gasoline stations or in automobiles, for example. Thus, concern has been raised about the possible health consequences of using ethanol for this purpose.

The scientific literature contains virtually no reports of injury to humans from inhaled ethanol. The apparent lack of harm may be attributable to rapid metabolism of ethanol and the difficulty in significantly raising blood ethanol concentrations by inhalation exposure, which keep internal doses extremely low except in unusual situations, such as heavy exercise in the presence of concentrated vapors. The occupational standard for ethanol in air is 1000 ppm (1900 mg/m^3) on an eight-hour basis. The occupational experience with ethanol in air appears to be favorable: no symptoms at levels below 1000 ppm are reported: at this or higher concentrations, ethanol vapor causes eye and upper respiratory tract irritation, fatigue, headache, and sleepiness (ACGIH, 1991;

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Clayton and Clayton, 1994). No reports regarding chronic exposure of humans to ethanol vapors have been located.

Laboratory animals, chiefly rats, have been subjected to inhalation exposure in a variety of experiments, most investigating aspects of central nervous system or developmental toxicity. The majority of exposures have been short-term, of less than two weeks, but many of these were continuous. The study of longest duration, 90 days, also used the lowest concentration of ethanol, 86 mg/m^3 (45 ppm); otherwise, experimental designs typically produced atmospheres of thousands of mg/m^3 (or ppm), frequently in order to develop ethanol dependence. Blood ethanol concentrations were often, but not always, determined. The great majority of BEC measurements were above 100 mg/dl. The 90-day study, in which male and female Sprague-Dawley and Long-Evans rats, male and female guinea pigs, male New Zealand rabbits, male squirrel monkeys, and male beagle dogs were exposed, examined only hematologic endpoints and some tissues, but observed no exposure-related changes or clinical signs of toxicity (Coon *et al.*, 1970).

Scientists at the Swedish Institute for Environmental Medicine published a literature review of the inhalation toxicology of ethanol, prompted by the use of alcohols in vehicle fuels (Andersson and Victorin, 1996). They identified three studies in which rodents were exposed to ethanol concentrations of 1,800 mg/m^3 (1,000 ppm) or less (and far more studies with much higher exposures). These lower-dose studies examined bronchoconstriction, sleeping patterns, reinforced behavior, and serum hormones. A two-hour exposure to 190 mg/m^3 ethanol (100 ppm; the lowest exposure examined in any study) caused an increase in the waking stage and a decrease in REM sleep of male rats, but no change in EEG power spectra. Exposure to higher concentrations (1,500 mg/m^3 [790 ppm] or more) did not cause these changes (Ghosh *et al.*, 1991a). Two- or five-hour exposures to 140 ppm ethanol, or 80 minutes of exposure to 100 ppm, had no effect on measures of reinforced behavior (Ghosh *et al.*, 1991b). Cannulated guinea pigs did not develop bronchoconstriction when exposed to up to 11,520 mg/m^3 (6,060 ppm) of ethanol. Male rats exposed to 1,880 mg/m^3 (1,000 ppm) for six hours per day showed decreased serum testosterone after one day, but not after seven days of exposure.

The paucity of direct evidence regarding the possible effects of inhaled ethanol does not mean that the possible consequences are entirely unpredictable. In fact, the data strongly suggest that exposure of the general public to ethanol vapors coming from ethanol-blended gasoline is very unlikely to have any adverse consequences. While there are little, if any, data on the toxicity of ingested ethanol itself in humans, it is generally accepted that the vast literature on the effects of alcoholic beverages is highly relevant. Alcohol abuse is a significant medical and social problem, and is the impetus for most research into ethanol toxicology, both in humans and experimental animals. A consequence of this is that little experimental data address the levels of internal exposure that can be reasonably anticipated to result from using ethanol as an oxygenate. A second motivation for experimental work in ethanol is fetal alcohol syndrome (or fetal alcohol effects) which, in theory at least, could be caused by relatively brief maternal exposures to ethanol during pregnancy.

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Since ethanol's important toxic effects require that the material first enter the bloodstream, one can evaluate inhalation exposures in terms of the blood alcohol concentrations they would produce. Prediction of BEC following exposure to ethanol vapors must consider several factors: (a) the concentration of ethanol in air, (b) the duration of exposure, (c) breathing rate, (d) absorption of ethanol across the lungs, and (e) the body's elimination rate of ethanol. Two of these factors are more or less constant in every situation. Experiments in humans have shown that from 55% to 60% of inhaled vapors are absorbed into the bloodstream (Kruhoffer, 1983; Lester and Greenberg, 1951). The rate of clearance of ethanol from the blood (V_{max}) is about 15 mg/dl/hr (Pohorecky and Brick, 1987) but may be as high as 23 mg/dl/hr (Holford, 1987); these rates correspond to elimination of 83 mg/kg/hr to 127 mg/kg/hr, or about 6 to 9 g of ethanol per hour for an adult. For comparison's sake, it should be noted that a single alcoholic drink contains about 12 g of ethanol (IARC, 1988).

As long as a person's intake of ethanol does not exceed V_{max}, blood alcohol levels will stay low. In Table 2 are shown the intake rates for ethanol inhaled under a variety of conditions, assuming absorption across the lungs of 55% and a standard body weight of 70 kg. In bold type are intakes above 83 mg/kg/hr, the lower estimate of alcohol clearance: exposure under these conditions could lead to an accumulation of ethanol in the blood and a rising BEC. Under the other conditions given, the body's ability to eliminate ethanol is not exceeded, and BEC levels would remain below toxic levels.

The calculations suggest that exposure to ethanol vapors that are irritating to the eyes and mucous membranes, while uncomfortable, would not cause a significant rise in BEC in persons at rest. As activity increases, ethanol intake increases, but vapor concentrations would need to exceed the occupational limit by a substantial margin in order to cause a rise in BEC. Some experimental work demonstrates that significant uptake of ethanol through the air is unusual, or difficult, as shown in Table 3. Moderate activity in the presence of irritating vapors is required.

Environmental behavior

Recent reviews of the environmental behavior of gasoline oxygenates generally note that ethanol is not likely to accumulate or persist for long in the environment. For example, the Interagency Assessment of Oxygenated Fuels (NSTC, 1997) observes that ethanol is expected to be rapidly degraded in groundwater and is not expected to persist beyond source areas. Virtually any environment supporting bacterial populations is believed capable of biodegrading ethanol (Ulrich, 1999). Ethanol in surface water is also expected to undergo rapid biodegradation, as long as it is not present in concentrations directly toxic to microorganisms (NSTC, 1997; Malcolm Pirnie, Inc., 1998). The half-life of ethanol in surface water is reported to range from 6.5 to 26 hours (Howard *et al.*, 1991). Atmospheric degradation is also predicted to be rapid (Malcolm Pirnie, Inc., 1998).

In part, expectations of ethanol's degradability rely on experiments that use microcosms of groundwater and soil mixtures to demonstrate that ethanol is rapidly degraded both aerobically (100 mg/l in 7 days, Corseuil *et al.*, 1998) and anaerobically (100 mg/l in 3 to 25 days, depending

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on conditions Corseuil *et al.*, 1998; 96 mg/l within 30 days, Suflita and Mormile, 1993; 100 mg/l within 14 days, Yeh and Novak, 1994). In these experiments, ethanol generally delays degradation of benzene, toluene, and xylenes, but not always, and some investigators (Corseuil *et al.*, 1998) caution against generalizations about ethanol's effect.

Possible inhalation exposures to ethanol due to use in gasoline

Opportunities for inhalation exposure of the general public to ethanol used as a gasoline oxygenate include vapors inhaled while fueling vehicles and ambient air. The first sort of exposure would be relatively brief, no more than five minutes, perhaps, while the second could last for many hours. These scenarios are considered in more detail below.

Very limited investigations of personal exposures during refueling have so far failed to detect ethanol, where detection limits were 50 ppm or less (HEI, 1996). If refueling involved five-minute exposures at the occupational limit of 1,000 ppm, an adult might receive an ethanol dose of 0.13 g (about 2 mg/kg). Such an exposure might increase BEC by about 0.3 mg/dl, at most. Exposure to such a high level of ethanol is unlikely. The Health Effects Institute evaluated hypothetical exposures of 1 ppm for three minutes and 10 ppm for 15 minutes, and determined that incremental changes in BEC would be insignificant (HEI, 1996).

Data on ambient air concentrations of ethanol are few. The average ambient level in air in the city of Porto Alegre, Brazil, where 17% of vehicles run entirely on ethanol, is 12 ppb (0.023 mg/m^3) (Grosjean *et al.*, 1998). The lowest concentration of ethanol tested for toxicity in animals was almost 4,000-times greater than this (86 mg/m^3, 45 ppm). A person might receive half a milligram of ethanol per day from ambient air containing 12 ppb of ethanol, a negligible dose.

Several agencies in the State of California recently completed a large investigation into the possible impacts of using ethanol more extensively as a fuel oxygenate (State of California, 1999). To estimate the effects of oxygenates on air quality, modelers predicted airborne concentrations of various pollutants in the southern California air shed (a particularly polluted region) resulting from five fuel scenarios. Total concentrations of airborne pollutants, that is the contributions from vehicles plus all other sources, were estimated, both maximum one-hour-averages and maximum daily averages. Two ethanol scenarios were assessed, in which the oxygenate is used to give fuel oxygen content of 2 or 3.5%. Predicted concentrations of ethanol in air over any averaging period were at least 500-fold less than the identified health-protective concentration of 53 ppm.

Atmospheric byproducts of ethanol use

Not only ethanol itself, but byproducts of ethanol's use as an oxygenate are of concern, particularly contributions of acetaldehyde and peroxyacetyl nitrate (PAN) to the atmosphere. The State of California included these chemicals in its air contaminant modeling and inhalation risk assessment. For acetaldehyde, no acute or chronic non-cancer impacts were predicted, and while the increased level of acetaldehyde poses a small additional cancer risk (under standard low-dose

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potency assumptions), the increase is small compared to the risks posed by other gasoline components, and is offset by reductions in formaldehyde. PAN was predicted to occur at levels that might present a health risk, but these levels did not differ by future-use oxygenate scenario (*i.e.*, MTBE, ethanol at 2 or 3.5%, or otherwise compliant fuel), and were in all cases lower than past PAN exposures during MTBE use.

Effect of ethanol on sub-surface benzene plumes

Although ethanol-blended gasoline contains less benzene (or any gasoline component) per gallon than does non-oxygenated gasoline, there is concern that ethanol might affect the sub-surface behavior of leaked gasoline components, and perhaps worsen sub-surface contamination. Since ethanol biodegradation is likely favored over benzene biodegradation, the presence of ethanol may allow larger amounts of benzene to remain in the ground for dispersal. As there are no observational (*i.e.*, field) data on this subject, the State of California and others have addressed the potential effect of ethanol on sub-surface benzene plume lengths created by leaking underground fuel tanks by conducting mathematical modeling of an idealized physical situation. All three models necessarily make assumptions in order to simplify the complex physical situation and to fill data gaps, but these assumptions, according to California, tend to exaggerate the possible influence of ethanol. California's assessment is that the models are in good agreement, and that ethanol present in ethanol-blended gasoline has a "modest potential" for extending benzene (represented by benzene) plumes by less than 100%.

California extended its analysis to address the question, would elongation of sub-surface benzene plumes in the presence of ethanol cause an increase of contamination of drinking water? The screening analysis compared the likelihood of drinking water contamination by MTBE (MTBE being the dominant oxygenate in California at the present) and the likelihood of contamination by benzene if ethanol replaced MTBE as the oxygenate, with contamination by benzene in the absence of ethanol as the base case. Contamination of drinking water by ethanol itself was not examined because such contamination is expected to be much less significant than contamination by benzene or MTBE. The analysis thus had to consider the distribution of leaking underground fuel tanks (LUFTs) in the state, the distribution of drinking water wells, and benzene and MTBE contamination data. In California, 32% of LUFTs are within about 2,000 feet of a drinking water well, and about 38% of wells are within about 2,000 feet of a LUFT.

The analysis derived plume lengths for each leaking fuel scenario, and then, given the distances from LUFTs to nearby wells, calculated how many wells might become contaminated. Because plumes grow (and shrink) over time, numbers of wells affected were also estimated over time, up to 100 years. Because of the many simplifying assumptions used, the analysis could not calculate the true probabilities that wells would be affected; however, relative probabilities could be calculated by comparing the probability under one scenario (*e.g.*, contamination by benzene in the presence of ethanol) to the probability under another (*e.g.*, contamination by benzene in the absence of ethanol).

The likelihood of well contamination by MTBE increased over the entire 100-year period analyzed, due to lack of biodegradation of this compound. In the case of benzene, likelihood of well contamination reaches a maximum five to 10 years after the fuel release, whether or not ethanol is present, but then declines. This pattern is due to eventual attenuation of the source and biodegradation of benzene. In comparing the two benzene scenarios, it was found that ethanol increased the chance of benzene contamination of wells by about 10% overall within the first five years, although for a small fraction of sites, the probability increased by about 20%. However, starting about five years after fuel release, the probability of well contamination by benzene was thereafter *decreased* for almost all sites by the presence of ethanol.

Other health effects issues

Some of ethanol's known or suspected toxic effects have not been, or can not be, quantified in terms of BEC. Fetal alcohol syndrome (FAS), for example, is a constellation of physical and mental deficiencies in children linked to maternal alcohol ingestion. Risk of FAS is a function of alcohol intake during pregnancy: the frequency of this syndrome is twice as great for children of heavy drinkers as for children of moderate or non-drinkers (Schardein, 1993). While it may be prudent to abstain from alcohol during pregnancy, a risk from daily consumption of less than 30 g of alcohol has not been proved (Schardein, 1993). Cancer of certain organs has been observed to occur at elevated rates in some groups of drinkers — the World Health Organization, for example, has linked alcohol consumption to cancers of the oral cavity, pharynx, esophagus, larynx, and liver (IARC, 1988). In almost all of the studies, risks were observed among alcoholics or were seen to increase with consumption.

In addition, if we look to human experience with alcohol consumption for information regarding toxic effects of ethanol, it is fair also to look at the evidence for possible health benefits. Numerous epidemiologic studies have observed that light-to-moderate drinkers of alcohol have lower mortality rates than either alcohol abstainers or heavy drinkers. Reduced mortality is due to decreased rates of fatal coronary heart disease and cardiovascular disease. To be sure, the picture is complicated, varying by sex, age, and disease risk factors, and competing causes of death. We are not suggesting that low-level exposures to ethanol due to its use as an oxygenate is desirable. At the least, however, the apparent beneficial effects of alcohol (or ethanol) for some cohorts should be recognized.

Conclusion

It is highly unlikely that exposure to airborne ethanol associated with gasoline use could produce toxic effects. The reasons for this are (a) the tiny doses that might be received, which might not be observable in light of endogenous levels of ethanol in blood, (b) the body's rapid elimination of ethanol, and (c) the relatively large doses of ethanol and high blood levels of ethanol associated with toxic effects in people. No data in the scientific literature support the hypothesis that chronic exposure to non-irritating levels of ethanol in air could cause significant elevation of BEC (unless exposed individuals are exercising at the time), or that a risk of cancer or birth defects would be created. A recent survey of the literature regarding the inhalation toxicity of

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ethanol by the Swedish Institute for Environmental Medicine reached similar conclusions, namely that "a high blood concentration of ethanol is needed for the development of adverse effects" and "ethanol at low air concentrations should not constitute a risk for the general population" (Andersson and Victorin, 1996). Detailed modeling of atmospheric pollution in southern California indicates that using ethanol will not increase the risk of adverse health effects due to exposure to ethanol, acetaldehyde, or PAN. Screening modeling of impacts of sub-surface gasoline contamination on drinking water wells suggests that ethanol might increase the probability of water pollution during the first five to 10 years after a leak occurs, but that the probability would decrease beyond that period.

Potential health and environmental impacts of ethanol used as a fuel oxygenate: Compilation of comments by expert reviewers[1]

1. Air

a. Toxicity of inhaled ethanol

The rapid metabolism is the reason why very high air concentrations of ethanol combined with a prolonged exposure or a very fast ventilation rate is necessary in order to produce substantial blood concentrations from inhalation. Inhalation of ethanol vapor at the concentration representing the short term Occupational Exposure Limit of Sweden and many other countries (1900 mg/m^3, the 8 h average is 1000 mg/m^3 [sic]) seem to result in a blood concentration of only 2 mg/l. [Sweden[2] pages 14-15]

Inhalation of ethanol vapors at normal concentrations [occupational, one infers] will thus not result in any significant blood concentration. The metabolic elimination of ethanol from the blood will in most cases exceed the uptake. The only exception is when the air concentration is well above the exposure limit combined with a high ventilation rate. [Sweden page 15]

Inhalation of ethanol vapor does not seem to cause any severe acute effects [in humans] at ethanol concentrations below 10,000 mg/m^3. However, headache and cough have been reported after about 30 minutes of inhaling ethanol vapor at concentrations of 2600 and 3400 mg/m^3 respectively. [Sweden page 19]

[effects on respiratory system:] Ethanol vapor does not seem to induce oxidative stress in the lungs of rats and no bronchoconstriction was seen in guinea pigs studied, but acetaldehyde vapor did induce bronchoconstriction. However, human asthmatic subjects did show decreased airway calibre after inhalation of ethanol at concentrations from 3400 to 3800 mg/m^3. [Sweden page 22]

[effects on CNS:] Animal inhalation studies have revealed an effect on CNS at relatively low ethanol concentrations. Disturbances in the REM-phase of sleeping rats and a decrease in self-adjusted reinforcement rate were seen at concentrations between 190 and 746 mg/m^3 (REM-sleep) and between 302 and 748 mg/m^3 (reinforcement). Ethanol also inhibits or potentiates the neurotransmitter-gated ion channels in the CNS. Alterations of receptors and their affinities, as well as altered gene expression has also been seen in animals after inhalation of ethanol vapors.

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[1] Except for outline headings and bracketed text, information is directly quoted from the cited sources. In-text references are omitted.

[2] Andersson, P. and Victorin, K. (1996). *Inhalation of Ethanol: Literature Survey and Risk Assessment.* Karolinska Institute for Environmental Medicine: Stockholm, Sweden.

However, these animals were exposed to very high concentrations (25,000 mg/m^3). [Sweden page 24]

[effects on liver:] Chronic inhalation of high concentrations of ethanol may lead to the elevation of liver triglycerides, fatty infiltration and eventually liver cirrhosis. Rats exposed to high concentrations (22,000 mg/m^3) showed increased lipid peroxidation and rats exposed to 20,000 mg/m^3 showed elevated levels of liver triglycerides. [Sweden page 26]

Some of the most serious effects of alcohol abuse is damage to the fetus and reduced fertility. However, inhalation does not seem to produce such effects. [Sweden page 31]

Experiments where both male and female rats were exposed to ethanol vapor of relatively high and high concentrations (19,000 and 30,240 mg/m^3) before mating and during gestation, did not result in any effects on fertility nor behavioral changes in the pups. [Sweden page 31]

The reported effects on humans after inhaling ethanol vapors have been reversible and mostly of an irritating nature. The decreased airway calibre seen at 3400-3800 mg/m^3 was not of great magnitude and has not been supported by animal experiments. There seems to be an effect on the CNS at low concentrations, but it is difficult to evaluate the biological importance of these studies. The effects seen in animal experiments have mostly been seen at high blood concentrations, obtained only at high air concentrations . . . [Sweden page 36]

b. Incremental exposure to and health risk of inhaled ethanol

i. U.S. EPA[3]

The health effects of ingested ethanol have been extensively investigated. Given that ethanol is formed naturally in the body at low levels, inhalation exposure to ethanol at the low levels that humans are likely to be exposed are generally not expected to result in adverse health effects. [EPA page 16105]

[3] U.S. EPA. (2000). "Methyl tertiary butyl ether (MTBE); Advance notice of intent to initiate rulemaking under the Toxic Substances Control Act to eliminate or limit the use of MTBE as a fuel additive in gasoline." *Federal Register 65(58)*:16093-16109.

ii. National Science and Technology Council[4]

It is not likely that the health effects associated with ingestion of moderate to large quantities of ethanol would occur from inhalation of ethanol at ambient levels to which most people may be exposed from use of ethanol as a fuel oxygenate. [NSTC page vii]

iii. University of California[5]

Ethanol's detection threshold in air is 49 ppm. . . its recognition threshold in air is approximately 100 ppm. [95 and 190 mg/m^3, respectively; UC page 25]

iv. State of California[6]

The atmospheric lifetime for ethanol is similar to MTBE- about two to three days under polluted conditions and longer during periods of good air quality. [California, page 1-5]

. . . the maximum, estimated outdoor air-quality levels of ethanol and alkylates are at least a factor of 10 below any level of concern identified by OEHHA . . . [California, page 1-5]

Health effects due to ethanol exposure under any of the five fuel scenarios are not expected to occur at modeled ambient levels. There is no evidence that ethanol is carcinogenic via the inhalation route. Exposure to high concentrations of ethanol vapor may result in transient irritation to eyes and the respiratory system under either acute or chronic conditions. However, the acute and chronic noncancer HQs [hazard quotients] generated for ethanol by each of the five fuel scenarios are 0.002 or less, indicating that modeled concentrations are at least 500-fold below the HPCs. [health-protective concentrations; California, page 5-16]

. . . even if ethanol were regarded as a human carcinogen by the inhalation route, with linear low-dose response, the cancer risks predicted on this basis from ethanol are negligible. [California, page 5-16]

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[4] National Science and Technology Council. (1997). *Interagency Assessment of Oxygenated Fuels.*

[5] University of California (1998). *Health and Environmental Assessment of MTBE: Report to the Governor and Legislature of the State of California as Sponsored by SB 521.*

[6] State of California. (1999). *Health and Environmental Assessment of the Use of Ethanol as a Fuel Oxygenate.* California State Water Resources Control Board, California Air Resources Control Board, and California EPA Office of Environmental Health Hazard Assessment.

Under these exposure scenarios, the concentrations of irritants (including both air toxics and criteria pollutants) may achieve levels at which the margins of safety for short-term and long-term exposures are reduced. Adverse health effects are not necessarily expected at these levels, but more sensitive individuals may be affected. There were no substantial differences between the different fuel types with regard to the resulting levels of irritant air pollutants. [California, page 1-21]

There were no substantial differences between the different fuel types with regard to the cumulative cancer risks from air pollutants. Principal contributors to this risk are the fuel-related pollutants, benzene and 1,3-butadiene. Other pollutants (including formaldehyde and acetaldehyde, which may be partly related to oxygenate use in fuels, and MTBE) make a smaller contribution. [California, page 1-21]

v. NESCAUM[7]

Anticipated health effects of potential exposures from inhalation of low levels of ethanol and ethanol by products should not be inferred from the high dose studies in humans or animals. [NESCAUM Att. 1 page 25]

Generally reviews of the literature have concluded that ethanol inhalation from RFG has little public health significance. The highest inhalation exposure occurs during refueling, levels of 1 to 49 ppm have been determined. . . 50 ppm appears to be the most severe exposure anticipated with the use of RFG containing ethanol. The corresponding blood ethanol level increase under this exposure scenario would be 1.1 mg/l, given the endogenous levels of 1.5 mg/l reported in unexposed individuals, this would result in a total blood ethanol content of 2.6 mg/l. [NESCAUM Att. 1 page 25]

The lowest demonstrated blood level peak associated with a concurrent adverse health effect is the demonstrated threshold for reproductive injury in a human fetus at a maternal blood ethanol level of 350 mg/l . . . These data would suggest a greater than two orders of magnitude safety factor between the worst case exposure in humans from inhalation of ambient ethanol with RFG use and the lowest threshold for a toxic effect in humans. [NESCAUM Att. 1 page 25]

vi. HEI[8]

The blood level that would be expected from a possible exposure scenario can be estimated from the ethanol concentration, the duration of exposure, and the ventilation rate. For a typical

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[7] Northeast States for Coordinated Air Use Management (NESCAUM) (1999). *RFG/MTBE: Findings & Recommendations.* Boston, MA.

[8] Health Effects Institute (HEI). (1996). *The Potential Health Effects of Oxygenates Added to Gasoline: A Review of the Current Literature.* Cambridge, MA.

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refueling exposure scenario of 1 ppm (1.9 mg/m^3) for 3 minutes, and assuming that 60% of inhaled ethanol is taken up by the body, the resulting dose is equal to . . . 0.05 mg.

Assuming an average body weight of 70 kg, the dose per kilogram is . . . 0.7 μg/kg . . . the corresponding incremental blood level would be . . . 1 μg/l. . . For an extreme exposure scenario of 10 ppm for 15 minutes, the estimated incremental blood level is 40 μg/l. The resulting incremental blood levels are below the range of endogenous blood levels (0.3 to 27 mg/l), so ethanol would not significantly increase in blood under either of these exposure scenarios. [HEI page 40]

Because exposure to ethanol from its use in gasoline is not expected to cause an increase in maternal blood ethanol levels above the endogenous level, no increase in exposure to the fetus is expected. [HEI page 42]

[with regard to acute effects:] there is a large difference between the lowest blood levels of ethanol at which neurotoxic effects have been reported in humans (10 mg%) and the predicted blood levels arising from inhalation of gasoline containing ethanol. In exposure scenarios encountered by the general public, it is unlikely that an increase in ethanol blood levels will be measurable. On the basis of one community survey of symptoms conducted in Alaska, it does not appear that ethanol-containing fuel causes an increase in prevalence of symptoms. [HEI page 61]

Existing evidence demonstrates unequivocally that ingestion of ethanol can increase the risks of certain forms of human cancer, depending on the conditions of exposure. Ethanol itself has not proved to be carcinogenic to laboratory animals, but it has been found to enhance the carcinogenicity of other agents under appropriate experimental conditions. The carcinogenic effects of ethanol remain to be elucidated in full . . . the carcinogenic effects of ethanol have been observed only after ingestion of the substance in relatively large quantities. It is doubtful that comparable effects could result from inhaling ethanol at the low concentrations found when using ethanol in fuels. [HEI page 97]

Ethanol has been shown to be neurotoxic at high levels in both animal and human studies. The most sensitive functional outcome of acute exposure is impaired performance. [HEI, page 105]

It is well documented that embryonic exposure to ethanol by maternal drinking can result in serious developmental effects. The Fetal Alcohol Syndrome, which includes characteristic malformations and functional deficits, results from alcohol abuse during pregnancy, particularly binge drinking. Lower levels of maternal ethanol consumption result in Fetal Alcohol Effects, characterized by functional deficits that result from brain damage. Although a statistically definable threshold is elusive, some investigators have proposed an apparent threshold of about one drink (one-half ounce alcohol) per day, corresponding to a peak blood level of about 350 mg/l. Periodic exposures to ethanol in refueling stations or other exposures to fuel containing ethanol are predicted to produce ethanol levels at least 4 orders of magnitude lower than this proposed threshold and thus should not contribute to developmental effects. [HEI page 105]

vii. Sweden

Several experimental data support that [a high] blood concentration of ethanol is needed for the development of adverse effects. The metabolism of ethanol follows zero-order kinetics, which means that the rate of elimination is independent of the ethanol concentration. The elimination will occur at the same rate as long as the enzyme systems are not saturated. Ethanol will probably only accumulate and give a significant blood concentration when the metabolic systems are saturated, which happens only at high concentrations. Therefore, ethanol at low air concentrations should not constitute a risk for the general population. [Sweden page 36]

c. Incremental exposure to and health risk of inhaled acetaldehyde

i. State of California

The major products of concern for ethanol are acetaldehyde (a toxic-air contaminant) and peroxyacetyl nitrate (PAN, an eye irritant and cause of plant damage). These compounds are offset by reductions in formaldehyde (a toxic-air contaminant) due to the elimination of MTBE. [California, page 1-5]

There are increased ambient concentrations of acetaldehyde from the ethanol-based fuel containing 3.5% oxygen, compared to the other formulations evaluated for the year 2003. This results in an increase of up to two in a million excess lifetime cancer cases in the upper bound estimate. However, in view of the uncertainties both in the emission and exposure predictions, and in the acetaldehyde lifetime cancer risk estimate, this predicted increase in risk may be regarded as of marginal significance when comparing the other consequences of the different fuel formulations. [California, page 5-14]

In the case of acetaldehyde, the extensive metabolism of the compound in vivo (and its occurrence as a normal intermediary metabolite) is an additional source of uncertainty with respect to the standard assumption in risk assessment that the dose-response curve is linear down to the low ambient levels of this compound. [California, page 5-14]

The acute (one-hour maximal average) and chronic (maximum annual exposure) noncancer Hazard Quotients (HQs) for acetaldehyde generated by each of the fuel scenarios are will below one. . . Toxicological endpoints considered include eye, skin, and respiratory tract irritation with acute exposure, and inflammation of the respiratory tract and degeneration of the olfactory epithelium with chronic exposure. [California, page 5-14]

ii. NESCAUM

Use of ethanol, as a gasoline supplement will increase the combustion by-product emission rate of acetaldehyde, a probable human carcinogen, in the Northeast by between 50-70%. Ambient levels currently exceed health-protective thresholds [10^{-6} risk levels in air] at a majority of monitoring locations in the northeast. [NESCAUM Att. 1 page 6]

d. Incremental exposure to and health risk of inhaled PAN

The acute noncancer HQs for PAN based on the results of air modeling are above the threshold at which toxic effects may occur . . . The most sensitive acute toxic endpoint is eye irritation. The one-hour maximum predicted average HQ is 5.5 or less under all fuel scenarios. It appears than none of the scenarios for the year 2003 involves an exacerbation of the adverse health impact of PAN compared to the 1997 data. [California, page 5-18]

e. Incremental exposure to and health risk of formaldehyde

There is no apparent difference between year 2003 fuel formulations regarding cancer risk from formaldehyde. [California, page 5-17]

The 2003 fuel scenarios have lower [chronic] HQs [for formaldehyde, compared to 1997], but indicate that the concentrations of formaldehyde are almost two-fold above the REL. There is no apparent difference between fuel formulations for year 2003 of possible chronic health effects of formaldehyde. Toxicological endpoints include eye and respiratory system irritation. . . The acute health effects from formaldehyde, primarily due to eye irritation, are not anticipated to occur at the predicted maximal ambient levels. The upper bound maximum one-hour average concentrations for all five fuel scenarios were two-fold below the acute REL. [California, page 5-17]

2. Surface water and groundwater

a. Persistence

By comparison [to MTBE], in a December 1999 report to the California Environmental Policy Council the authors report that under aerobic conditions, the reported half-lives of ethanol in surface waters are short. Half-lives span 6.5 to 26 hours for ethanol. Anaerobic biodegradation in oxygen-limited environments is also expected to proceed at rapid rates. Reported half-lives for ethanol biodegradation under anaerobic conditions range from 1 to 4.3 days. [EPA, page 16096]

Ethanol is not expected to persist in groundwater . . . because it biodegrades easily. Thus, ethanol itself does not appear to pose as great a danger to groundwater supplies as MTBE. [EPA, page 16105]

Ethanol is a naturally-occurring intermediate produced during the fermentation of organic matter in anoxic environments and is expected to rapidly biodegrade in essentially all environments with conditions . . . that support microbial activity. Microorganisms capable of metabolizing ethanol are ubiquitously distributed in the environment and relatively rapid rats of ethanol biodegradation have been measured under aerobic and anaerobic conditions. Thus, ethanol is a short-lived compound in surface waters and subsurface aquifers. [Ulrich, page 1]

b. Incremental exposure to and health risk of ingested ethanol

Though pure ethanol is poisonous, it is less toxic than the benzene, toluene, ethyl benzene, and xylenes (BTEX) that are components of gasoline. Ethanol is present in pharmaceuticals, mouthwash products, alcoholic beverages, cleaning products, solvents, dyes, and explosives. Humans frequently ingest fermented beverages that contain about 12% ethanol by volume. [California, page 1-3]

Due to the ubiquitous occurrence of microorganisms capable of ethanolic fermentation, virtually all sugar-containing foodstuffs are liable to contain a low level of ethanol. This is generally at the ppm level, or less than 1% by weight . . . Ethanol is also a minor product of general metabolism in plants and animals, so a certain amount of endogenous exposure occurs even in the absence of external exposure. [California, page 5-A-13]

Taste thresholds [for ethanol] range from approximately 6 ppm to 42 ppm. [UC page 25]

The draft health-protective concentration for oral exposures to drinking water for ethanol is 1,100,000 μg/l . . . [California, page 1-16]

Ingestion of ethanol in relatively large quantities, increases the risks for several forms of human cancer. However, it is highly unlikely that the public will be exposed to large quantities of ethanol from drinking water contamination. [EPA, page 16105]

Predictions of ethanol dispersion and degradation in the environment indicate that ethanol is unlikely to occur in drinking water at levels having any toxicological significance. [California, page 5-A-16]

Ethanol and its oxidation products such as acetaldehyde are toxic only at very high levels and are also very rapidly biodegraded, so in general these are not expected to present major long-term [drinking water] contamination problems. [California, page 5-28]

Overall, these findings indicate that ethanol contamination of the water due to use of ethanol in gasoline should present very minimal toxic and carcinogenic risk and no objectionable taste or smell problems for public drinking water. [California, page 5-29]

Screening-level calculations for a scenario that simulates a discrete, seven-day period of watercraft discharges of fuel-borne ethanol to Donner Lake in northern California showed that the peak concentration of ethanol was only 2 μg/l . . . For accidental tank-car releases of ethanol to a river or stream, toxic levels of ethanol could occur in the immediate downstream area of a spill. [California, page 1-16]

c. Incremental exposure to and health risk of ingested acetaldehyde and/or acetic acid

Acetic acid is the intermediate [of ethanol biodegradation] that is most likely to accumulate to a significant extent, but it is commonly used as a food supplement. [Ulrich, page 2]

3. Effect of subsurface ethanol on BTEX plumes

Ethanol's ability to biodegrade does present another potential issue of concern. Laboratory data and hypothetical modeling indicate that based on physical, chemical, and biological properties, ethanol will likely preferentially biodegrade in groundwater compared with other gasoline components. As a result, the levels of BTEX in water may decline more slowly, and BTEX plumes may extend further than they would without ethanol present. However, BTEX does not migrate as quickly as MTBE. Thus, even with the presence of ethanol, BTEX plumes would not be expected to travel as far as MTBE plumes. [page EPA, 16105]

Because ethanol is a metabolic byproduct, many organisms tolerate concentrations that may be encountered during accidental releases into the environment. A variety of indigenous microorganisms within the environment are capable of using ethanol as an energy source and will preferentially utilize ethanol over gasoline hydrocarbons, such as benzene. [California, page 1-3]

Although the dissolved equilibrium concentrations of gasoline components- benzene, toluene, ethylbenzene, and xylenes- increase in the presence of high concentrations of ethanol, the 10% ethanol expected to be added to gasoline in California should have only a minor effect on the dissolution of these gasoline components. [California, page 1-22]

. . . EtOH would be expected to degrade much more rapidly than BTEX hydrocarbons, therefore, EtOH is not expected to persist much beyond the source area and the immediate contaminant plume at a gasoline spill site. [NSTC page 2-9]

In general the investigations have demonstrated that the alkyl ether oxygenates (MTBE, TAME, ETBE, DIPE) are difficult to biodegrade. In contrast, BTEX, EtOH and MeOH are readily biodegraded. [NSTC page 2-60]

4. Aquatic toxicity

For accidental tank-car releases of ethanol to a river or stream, toxic levels of ethanol could occur in the immediate downstream area of a spill. [California, page 1-16]

Aside from the acute toxicity for aquatic species that might be affected by a spill and their associated recovery, it is unlikely that there would be any long-term toxic effects, because the ethanol will not persist in water due to its rapid degradation. [California, page 1-6]

Table 1: Ethanol Dose-Response Data

BEC (mg/dl)	Observation	Reference
0.02-0.15	Endogenous (*i.e.* natural) level	Jones, 1985; Lester, 1962
50	central nervous system stimulant; talkativeness; relaxation	Pohorecky and Brick, 1987
100	legal limit for automobile drivers in many states	
>100	central nervous system depressant; decreased sensory and motor function; decreased mental and cognitive ability	Pohorecky and Brick, 1987
110	no effect on heart function	Pohorecky and Brick, 1987
140	no effect on cerebral blood flow; effects occur above this level	Pohorecky and Brick, 1987
300	stupefaction	Pohorecky and Brick, 1987
400	possible lethal level	Pohorecky and Brick, 1987

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Table 2: Intake Rate of Ethanol Under Various Exposure Conditions

Ventilation rate (l/min)	Intake rate of ethanol (mg/kg/hr) when the concentration in air is (mg/l)				
	1.9 (occupational standard)	5	10 (causes coughing and eye irritation; adaptation occurs)	20	30 (causes continuous lacrimation)
6 (rest)	5	14	28	57	**85**[9]
25 (moderate activity)	22	59	**118**	**236**	**354**
40 (heavy activity)	36	**94**	**189**	**377**	**566**
50 (very heavy activity)	45	**118**	**236**	**471**	**707**

[9] Bold type indicates intake rates that might be larger than the clearance rate for ethanol.

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Table 3: Experimental studies of vapor uptake by humans

Ventilation rate (l/min)	Concentration of ethanol in air (mg/l)	Duration of exposure (hr)	BEC (mg/dl)	Symptoms	Reference
rest (approx. 6)	1.9	3	<0.2	none reported	Campbell and Wilson (1986)
15	15		steady at 7-8	vapors irritating but adaptation occurred; no intoxication	Lester and Greenberg (1951)
22	16	6	47 and rising	vapors irritating but adaptation occurred; no intoxication	Lester and Greenberg (1951)
rest (approx. 6)	maximum of 17 average approx. 9	2.5	<5	vapors irritating but adaptation occurred; no intoxication	Mason and Blackmore (1972)

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