PAUL FARROW
STATE SENATOR

Date: October 31, 2013

To: Members of the Senate Committee on Natural Resources

From: Senator Paul Farrow

Subject: Testimony on Senate Bill (SB) 371; Relating to: nitrogen oxide emission standards for certain simple cycle combustion turbines.

Good morning Chairman Kedzie and members of the committee, and thank you for holding a Public Hearing on Senate Bill 371 which will allow the Wisconsin Department of Natural Resources (DNR) to request the federal Environmental Protection Agency's (EPA) permission to change Wisconsin's State Implementation Plan (SIP) to properly utilize the Paris Power Plant in Kenosha County.

I have worked with Representative Kerkman and WE Energies over the course of the last few months, and as you will learn throughout today's testimony on SB 371, WE Energies has collaborated closely with the DNR and the EPA to craft this piece of legislation.

The problem this bill aims to solve stems from an emission limit in a state rule that cannot be currently met by the Paris Generating Station. Both the DNR and the EPA understand this restraint and believe that the rate should be changed to a realistic limit that is both technologically and economically reasonable.

Senate Bill 371 creates an alternative NR 428 emission limit for plants that have been modified since 2001. In order for the Paris plant to be eligible, the DNR and the EPA need to subsequently make a determination that adding emission control technology is not technically or economically feasible.

What is important to understand is that even if we vote to pass SB 371, the DNR will still be required to seek EPA approval to incorporate the alternative limits into the State Implementation Plan (SIP) for ozone before WE Energies can operate Units 1 and 4 of the Paris Power Plant.

It has come to my attention that the EPA has indicated that this type of SIP revision is attainable. Once they have received a request for a SIP revision from the DNR, the EPA must process the request in accordance with federal regulations and requirements.

Having the Paris Power Plant closed removes what could be vital natural gas generating capacity on the days the utility and subsequently us as consumers need it the most.

As we have officials from WE Energies and the DNR with us today, I want to give them ample time to explain the process they have gone through to craft this legislation and to provide the committee more information on how we move forward once this legislation is implemented.

Thank you for your time and consideration.

SERVING WISCONSIN'S 33RD SENATE DISTRICT

Capitol Office: Post Office Box 7882 • Madison, WI 53707-7882 • (608) 266-9174 • Sen.Farrow@legis.wi.gov

STATE REPRESENTATIVE
SAMANTHA KERKMAN

Testimony on Senate Bill 371

Senate Committee on Natural Resources

October 31, 2013

Thank you, Chairman Kedzie and members of the committee for your consideration and the opportunity to speak in support of Senate Bill 371.

The bill creates alternative NR 428 emission limits for plants that have been modified since 2001. It is needed to correct an emission limit that cannot be met by the Paris Generating Station which is located in my district.

Both the DNR and the EPA understand this and believe that the rate should be changed to a realistic number that is technologically and economically reasonable.

For the Paris plant to be eligible, DNR and EPA need to subsequently make a determination that adding emission control technology is not technically or economically feasible.

I've worked with We Energies and they have collaborated closely with the DNR and the EPA to help craft this bill.

What's important to point out is that even if we all agree and pass SB 371, the DNR will need to seek EPA approval to incorporate the alternative limits into the state implementation plant for ozone before We Energies can operate Units 1 and 4 at the Paris power plant.

It is my understanding that EPA has indicated that this type of SIP revision is approvable. Once they receive a request for a SIP revision from DNR, EPA must process the request according to the necessary federal requirements.

Having this plant closed removes what could be vital generating capacity on the days the utility and subsequently – we, as customers – need it the most.

I'm going to stop there and let the folks from We Energies and the DNR provide you with more information.

PO Box 8952 • Madison, WI 53708-8952
Phone (608) 266-2530 • Toll Free (888) 529-0061 • Fax (608) 282-3661 • E-mail Rep.Kerkman@legis.wi.gov

State of Wisconsin
DEPARTMENT OF NATURAL RESOURCES
101 S. Webster Street
Box 7921
Madison WI 53707-7921

Scott Walker, Governor
Cathy Stepp, Secretary
Telephone 608-266-2621
FAX 608-267-3579
TTY Access via relay - 711

October 31, 2013

Testimony to the Wisconsin Senate
Natural Resources Committee
On Senate Bill (SB) 371

By Bart Sponseller – Director
Wisconsin Department of Natural Resources, Bureau of Air Management

Thank you, Chair and Committee members for the opportunity to provide testimony today. My name is Bart Sponseller. I am the Director of the Bureau of Air Management for the Department of Natural Resources and I am testifying for informational purposes only.

Senate Bill 371 ensures that certain combustion turbines may continue to operate in ozone nonattainment and maintenance areas, while at the same time minimizing emissions of nitrogen oxides, otherwise referred to as NO_x.

Existing combustion turbines operating in the southeast Wisconsin ozone nonattainment and maintenance areas must comply with NO_x emission limitations under our current state rule, NR 428. This requirement became effective on February 1, 2001. In addition, under this NO_x control program, when an existing combustion turbine is modified in a manner that increases capacity, the turbine must meet a more stringent emission limit for NO_x. The NO_x limit for modified combustion turbines is typically achieved using a widely available technology known as Dry Low NOx combustion or DLN.

However, the Department recently learned that the DLN technology is not available for certain, older models of combustion turbines that are currently subject to the state NO_x control program. DLN is a combustion technique that must be tailored for each specific model of combustion turbine. In this case, where the manufacturer has not already made this technology available, the cost to engineer, manufacture, and install DLN for only a few combustion turbines is prohibitive. In addition, DLN is simply difficult and technically challenging to adapt to an older combustion turbine that was not originally designed to accept DLN technology. Senate Bill 371 seeks to correct this rule condition and replaces the DLN based requirement for those combustion turbines where DLN is not commercially available with the next best level of NO_x control requirement.

I would like to underscore that these NO_x control requirements for combustion turbines are part of our federally approved state implementation plan or SIP. Therefore, the changes proposed in the Bill must also be approved by the U.S. EPA. EPA has reviewed the information and has agreed that the proposed statutory language, as written, will meet our ozone nonattainment requirements and can be approved in the SIP[1]. A major reason for EPA's approval is that the proposed requirement under SB 371 is not less stringent than the NO_x requirement for an existing, non-modified combustion turbine. Simply put, SB 371 will not increase allowable NO_x emission levels in the ozone nonattainment and maintenance areas above current levels that meet SIP requirements.

Thank you for the opportunity to provide information on SB 371. I am happy to answer any questions for you at this time.

[1] Mooney, October 22, 2013, Letter to Bart Sponseller regarding potential change to Wisconsin's SIP concerning NO_x emission limitations for modified combustion turbines, John Mooney, Chief Air Programs Branch, USEPA Region V.

Senate

PUBLIC HEARING

Natural Resources

Thursday, October 31, 2013
10:00 AM, 300 Southeast
State Capitol, Madison, WI

Senate Bill 371

Relating to: nitrogen oxide emission standards for certain simple cycle combustion turbines. By Senator Farrow; cosponsored by Representative Kerkman.

Testimony on behalf of We Energies

We Energies, is a subsidiary of the Wisconsin Energy Corporation. The company serves more than 1.1 million electric customers in Wisconsin and Michigan's Upper Peninsula and more than 1.1 million natural gas customers in Wisconsin and Michigan's Upper Peninsula.

Mr. Chairman, members of the committee, my name is Joel Haubrich and I am here on behalf of We Energies and would like to provide some further context for SB 371.

We Energies owns and operates the gas fired power plant located in western Kenosha County—the Paris Generating Station. It consists of four 100 MW units and has been in operation since 1995. The plant is designed to be a peaking plant, which means it can start and stop quickly. Because of this, peaking units are used when the electrical load spikes up – like on a very hot day. The units operate on average less than ten percent each year.

In 2000 and 2002 We Energies replaced the turbine blades at the plant. Two sets of blades were replaced in 2000 and two in 2002. The new blades were more efficient and lowered the plant's hourly air emissions. At the time, the company considered the turbine blade replacement work to be routine and did not obtain a construction permit.

In 2006, the DNR questioned the conclusion that the work was routine. The matter was considered by EPA, which eventually referred the question back to DNR. In 2012, the DNR determined that the blade replacements were major modifications and requested that We Energies obtain an after-the-fact construction permit for them.

The DNR issued We Energies a *Notice of Violation* earlier this year relating to the project and the case has been referred to the WI DOJ.

Per Natural Resources rule 428, units modified after 2001 must meet a more stringent NOx emission limit. Since the blades on units 1 and 4 were replaced in 2002, this new lower limit applied to only those units.

Since we are not able to meet this limit, we removed these units from service. We have notified the grid operator in the Midwest that 200 MW of peaking capacity has been placed on outage status until further notification.

The technology does not exist to retrofit these machines with dry low NOx combustors, which is the basis for the lower NOx limit. The DNR fully understands the equipment limitations with the Paris turbines. They also believe that changing NR 428 to an emission rate that is consistent with a technically and economically achievable emission rate applicable to those units is appropriate.

Over the past year, we have worked with the DNR and the EPA and determined that the limit in the state rule was never intended to apply to or force extensive technology investments in a gas fired peaker plant such as Paris.

Working together with Senator Farrow, Representative Kerkman, the DNR and the EPA, We Energies is asking the legislature to approve a statutory change to NR 428.04 (2)(g) 1 a. and 2.a. that will allow the plant to resume operations at Units 1 and 4.

The bill creates alternative NR 428.04 emission limits. For Paris to be eligible, DNR and EPA need to subsequently make a finding that adding emission control technology is not technically or economically feasible.

The EPA has indicated that this type of SIP revision is approvable.

Since the emission limitations in NR 428 are a component of the State Implementation Plan – or as we say SIP – for federal air quality **the EPA must approve any changes to Wisconsin's SIP.**

Once they receive a request for a SIP revision from DNR, EPA will process this request according to the necessary federal requirements.

Thank you for your time and we hope you all will support SB 371 when it is available for a vote.

I'm happy to answer any questions and I have two colleagues here today with a lot more technical understanding of the issue than me.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5
77 WEST JACKSON BOULEVARD
CHICAGO, IL 60604-3590

OCT 2 2 2013

REPLY TO THE ATTENTION OF:

Bart Sponseller, Director
Bureau of Air Management
Wisconsin Department of Natural Resources
101 S. Webster Street
Madison, WI 53707-7921

Dear Mr. Sponseller:

This letter is in response to your June 20, 2013 letter regarding a potential change to Wisconsin's State Implementation Plan (SIP). This potential change relates to nitrogen oxide (NOx) emission limits applicable to combustion turbines after they undergo a major modification. Based upon information provided by WDNR, we agree that the emission limits in NR 428.04(2)(g)1.a and 2.a., which establish NOx emission limits for combustion turbines with a maximum design power output of 85 megawatt-electric or greater that undergo a major modification after February 1, 2001, is not feasible at this time for some existing combustion turbines. EPA has reviewed the attached September 30, 2013, draft legislative language, and agrees that this language addresses the SIP issue.

Sincerely,

John Mooney, Chief
Air Programs Branch

Attachment: Draft Regulatory Language

State of Wisconsin
DEPARTMENT OF NATURAL RESOURCES
101 S. Webster Street
Box 7921
Madison WI 53707-7921

Scott Walker, Governor
Cathy Stepp, Secretary
Telephone 608-266-2621
Toll Free 1-888-936-7463
TTY Access via relay - 711

June 20, 2013

Mr. John Mooney
U.S. Environmental Protection Agency (EPA) - Region 5
77 West Jackson Boulevard
Mail Code: AR-18J
Chicago, IL 60604-3507

Subject: Potential Emission Limit Change to Wisconsin's Ozone State Implementation Plan

Dear Mr. Mooney:

The Wisconsin Department of Natural Resources (WDNR) and U.S. Environmental Protection Agency (EPA) Region V staff have recently had discussions concerning a potential change to Wisconsin's State Implementation Plan (SIP) for ozone control purposes. The potential change relates to nitrogen oxide (NO_x) emission limits applicable to combustion turbines after they undergo a major modification. The purpose of this letter is to confirm our common understanding regarding the approvability of this potential change in NO_x emission limits. The WDNR intends to formally submit a SIP revision if and when the emission limits are modified in state law.

Potential rule change

Currently, s. NR 428.04(2)(g)1.a. and 2.a., *Wis. Adm. Code*, establishes NO_x emission limits for combustion turbines with a maximum design power output of 85 megawatt-electric (MWe) or greater that undergo a major modification after February 1, 2001. The emission limits are 12 and 25 parts per million dry volume (ppmdv), corrected to 15% oxygen (O_2), for gaseous and distillate oil-fired simple cycle combustion turbines, respectively.

The emission limits in s. NR 428.04(2)(g)1.a. and 2.a., *Wis. Adm. Code*, were established based on the availability and use of dry low NO_x (DLN) combustion technology, which is commercially available for new combustion turbines. During the rule development process, the WDNR did not anticipate DLN combustion technology not being available for some existing combustion turbines. Lacking DLN technology, the only alternative to meet the current applicable modified combustion turbine emission limits is to apply selective catalytic reduction (SCR) equipment. However, the WDNR originally determined for purposes of s. NR 428.04(2)(g)1.a. and 2.a., *Wis. Adm. Code*, that SCR is not warranted for new or modified simple cycle combustion turbines. Further, the WDNR determined that SCR was not appropriate in setting Reasonably Available Control Technology (RACT)[1] or Best Available Control Technology (BACT)[2] standards for similar simple cycle combustion turbines that do not have DLN technology as part of other recent analyses. The RACT and BACT emission limits are 25 and 65 ppmdv, corrected to 15% O_2, while burning natural gas and distillate oil, respectively.

The WDNR has become aware of two modified combustion turbines in southeast Wisconsin that cannot be retrofitted to operate DLN combustion technology. Typically, DLN technology is integral to the combustion chamber and firing system and must be designed specifically by the manufacturer for each model of combustion

[1] Wisconsin NO_x RACT program – SIP approved, NR 428.22(1)(g)1.a. and b., *Wis. Adm. Code*.
[2] WDNR 2008, NO_x BACT Determination for ABB combustion turbines at the Concord Facility, Permit Condition A.3.1, Permit No. 128065080-P30.

turbine. For the combustion turbines in question, Model 11N, the manufacturer ASEA Brown-Boveri (ABB) has not developed the necessary DLN technology. We have discussed with U.S. EPA staff potentially establishing emission limits of 25 and 65 ppmdv, corrected to 15% O_2, for gaseous and distillate oil-fired simple cycle combustion turbines, respectively, based on the application of water injection control technology. This technology and the discussed emission limits are the same as applied under the earlier referenced RACT and BACT requirements for this type of combustion turbines. In addition to meeting the emission limits, the discussed proposal will also require operation of water injection NO_x control technology according to manufacturer specifications. The potential revised rule language is provided in Attachment A for your reference. Note, the current emission limits of 12 and 25 ppmdv, corrected to 15% O_2, will remain effective for all new combustion turbines and any modified combustion turbines for which DLN technology is available.

Affected Source Population

The population of emission sources that could be affected by this potential rule change is limited to four combustion turbines residing at one facility in southeast Wisconsin, the Paris Generating Facility operated by Wisconsin Electric Power Company (We Energies). All four of the Paris combustion turbines are ABB Model 11N combustion turbines for which DLN technology is unavailable. Two of these turbines have been modified after February 1, 2001 and therefore triggered applicability of the emission limits under s. NR 428.04(2)(g)1.a. and 2.a, *Wis. Adm. Code*. This modification was triggered by a replacement of turbine blades, which is periodically required in maintaining all combustion turbines. Therefore, future blade replacements at the two remaining combustion turbines may also trigger applicability of the modified combustion turbine NO_x emission limits.

Demonstrating Noninterference Under Section 110(l) of the Clean Air Act (CAA)

According to U.S. EPA guidance addressing Section 110(l) of the CAA [3], a SIP revision that removes or modifies a SIP-approved control measure can only be approved after the state has demonstrated that such removal or modification will not interfere with attainment or maintenance of the related National Ambient Air Quality Standards (NAAQS), Rate of Progress (ROP), Reasonable Further Progress (RFP) or any other applicable requirements of the CAA. This issue is commonly referred to as "backsliding" or "noninterference".

According to U.S. EPA guidance, backsliding does not occur if a proposed SIP change does not increase actual emission levels. This is the case under the potential change in NO_x emission limits. Prior to modification, the affected combustion turbines were subject to emission limits for existing sources under s. NR 428.05(3)(d), *Wis. Adm. Code*, of 75 and 110 ppmdv, corrected to 15% O_2, while burning natural gas and distillate fuel, respectively. Since that time, the combustion turbines have become subject to NO_x RACT requirements under s. NR 428.22(1)(g)1.a. and b., *Wis. Adm. Code*, of 25 and 65 ppmdv, corrected to 15% O_2, while burning natural gas and distillate fuel, respectively. Under the potential rule change being discussed, a modified combustion turbine would still be subject to emission limits of 25 and 65 ppmdv, corrected to 15% O_2, for natural gas and distillate oil, respectively. Thus, the potential emission limit change is no less stringent than the current applicable existing source and RACT requirements and backsliding therefore does not occur.

The s. NR 428.04, *Wis. Adm. Code*, new and modified source emission limits and s. NR 428.05, *Wis. Adm. Code*, existing source emission limits were created to fulfill federal 1-hour ozone NAAQS ROP requirements. Therefore, compliance with the ROP requirements must be maintained in accordance with the U.S. EPA noninterference guidance. Wisconsin's approved ROP plan is maintained under the proposed change. The approved ROP plan included emission reductions that result from existing sources meeting the limits under s. NR

[3] U.S. EPA, *Demonstrating Noninterference Under Section 110(l) of the Clean Air Act When Revising a State Implementation Plan*, Draft Guidance.

428.05, *Wis. Adm. Code*. However, the approved ROP plan did not count additional emission reductions that could result from existing sources undergoing major modifications and triggering applicability of s. NR 428.04, *Wis. Adm. Code*, new and modified source emission limits. Therefore, any further emission reduction that may result from the applicability of a modified source emission limit is in excess of the ROP requirements. This is the case with the potential NO_x emission limit change where the approved ROP plan requires existing combustion turbines to meet 75 and 110 ppmdv, corrected to 15% O_2, while burning natural gas and distillate fuel, respectively, as required under s. NR 428.05(3)(d), *Wis. Adm. Code*. In comparison the potential change will limit NO_x emissions to 25 and 65 ppmdv, corrected to 15% O_2. Therefore, the potential rule change does not interfere with Wisconsin's approved ozone ROP plan.

We respectfully request your response concerning our conclusion that the potential emission limitation changes meet SIP approvability criteria by satisfying the ozone ROP plan and CAA Section 110(l) requirements. If you or your staff have further questions please contact Tom Karman of my staff at thomas.karman@wisconsin.gov or (608) 264-8856. Thank you for your attention to this matter.

Sincerely,

Andrew M Stewart

for Bart Sponseller, Director
Bureau of Air Management

cc: Patrick Stevens - AD/8
Joseph Hoch - AM/7
Douglas Aburano – U.S. EPA Region V (AR-18J)
Steven Rosenthal – U.S. EPA Revion V (AR-18J)

Attach: Potential Regulatory Language

Attachment A: Potential Regulatory Language

Nitrogen oxide emission limits for certain existing combustion turbines undergoing major modification. (1) This provision applies to a simple cycle combustion turbine that undergoes a major modification, as defined in s. NR 428.04(1), after February 1, 2001 and for which dry low nitrogen oxide combustor technology is not technically feasible or commercially available from the combustion turbine manufacturer. The combustion turbine is exempt from performance standards under ss. NR 428.04(2)(g)1.a. and 2.a., *Wis. Adm. Code*, if the owner or operator meets all of the following conditions: 1) Water injection is operated according to manufacturer specifications for purposes of controlling nitrogen oxide emissions during operation of the combustion turbine, and 2) the concentration of nitrogen oxide emitted from the combustion turbine does not exceed 25 parts per million dry volume (ppmdv), corrected to 15% oxygen, on a 30 day rolling average basis while combusting gaseous fuels and does not exceed 65 parts per million dry volume (ppmdv), corrected to 15% oxygen, on a 30 day rolling average basis while combusting distillate fuels. The demonstration of compliance and reporting requirements for combustion turbines affected under this paragraph are those applicable under ch. NR 428, *Wis. Adm. Code*.

State of Wisconsin
DEPARTMENT OF NATURAL RESOURCES
101 S. Webster Street
Box 7921
Madison WI 53707-7921

Scott Walker, Governor
Cathy Stepp, Secretary
Telephone 608-266-2621
Toll Free 1-888-936-7463
TTY Access via relay - 711

Via Email

January 5, 2013

Mr. Bruce Ramme, Vice President, Environmental
Wisconsin Electric Power Company
333 W. Everrett Street, A231
Milwaukee, WI 53290-0002

Casetrack# 2012-SEEE-049
Kenosha County

Dear Mr. Ramme:

Enclosed is the fully executed Order between the Department of Natural Resources and Wisconsin Electric Power Company for the Paris Facility.

The Order is now in effect and enforceable. The Department looks forward to working with you to meet the commitments established in the Order.

If you have questions about the Order, please contact Kendra Fisher (608) 264-8527.

Sincerely,

Steven L. Sisbach, Section Chief
Environmental Enforcement and Emergency Management
Bureau of Law Enforcement

cc: Bart Sponseller – AM/7
Kendra Fisher – LS/8
Judy Polczinski – EE Supervisor
Debby Roszak – SER
Ted Cauwels – SER
Dan Schramm - SER
Bob Greco – We Energies
Pete Tomasi – Quarles & Brady

BEFORE THE
STATE OF WISCONSIN
DEPARTMENT OF NATURAL RESOURCES

In the matter of modification of air emission sources without a permit, at We Energies – Paris Generation Station, located at 335N 172nd Ave., Town of Paris, Kenosha County

Administrative Order # 2012-SEEE-049 FID # 230094810

FINDINGS OF FACT, CONCLUSIONS OF LAW AND ADMINISTRATIVE ORDER

The following is a summary of the Findings of Fact and Conclusions of Law upon which the Department of Natural Resources (Department) bases this administrative order.

FINDINGS OF FACT

The Department finds that:

We Energies – Paris Generation Station

1. Wisconsin Electric Power Company, doing business as We Energies operates an electric generation station located at 335N 172nd Avenue, in the town of Paris, Kenosha County (hereafter, We Energies - Paris).

2. The We Energies – Paris facility consists of four ASEA Brown-Boveri Model 11N natural gas fired, simple-cycle combustion turbines, each with an original maximum design power output of 100 MWe.

3. We Energies – Paris is a peaking station, generally used during periods of high demand or when other We Energies facilities are out of service.

4. Initial construction and operation of the four combustion turbines was permitted under air construction permit 91-RV-043 issued on October 29, 1992. 91-RV-043 established Best Available Control Technology ("BACT") requirements for particulate matter, nitrogen oxide, sulfur dioxide, carbon monoxide, and volatile organic compound emissions from the turbines under the Prevention of Significant Deterioration ("PSD") program in ch. NR 405, Wis. Adm. Code.

5. Construction Permit 91-RV-043 also established, among other requirements, emission limits and new source performance standards ("NSPS") applicable to the facility under chs. NR 400 – 499, Wis. Adm. Code.

6. Construction Permit 95-RV-096 was issued on February 27, 1996. Permit 95-RV-096 established hourly limitations on natural gas and fuel oil inputs to the Paris combustion turbines.

7. On January 6, 1992, Kenosha County was designated as a severe nonattainment area under the 1-hour ozone standard. 56 Fed. Reg. 56694 (Nov. 6, 1991).

8. On January 26, 1996, Wisconsin received a NOx RACT waiver under section 182(f) of the Clean Air Act (CAA) under the 1-hour ozone standard. Due to this waiver, the Department was not required to adopt NOx RACT regulations in areas designated moderate ozone nonattainment or above, including Kenosha County. In addition, for New Source Review considerations, waived areas are considered to be covered by Prevention of Significant Deterioration requirements under ch. NR 405, Wis. Adm. Code, for NOx rather than by nonattainment area new source requirements under ch. NR 408, Wis. Adm. Code.

9. Operating Permit 230094810-P01 was issued on August 22, 2001. Condition I.C.2.(b) of that permit and 40 C.F.R. § 75.12(d) required the Paris combustion turbines to operate at a capacity factor of less than 20 % in any calendar year and a capacity factor of less than 10% averaged over three years, or to install a continuous emissions monitoring system within 1 year of exceeding that capacity factor.

The 2000 and 2002 Turbine Parts Replacement Project

10. In accordance with the schedule provided by the original equipment manufacturer, the valves, blades, and other equipment on each ASEA Brown-Boveri Model 11N combustion turbine are inspected every 24,000 equivalent operating hours, and components are replaced as necessary..

11. On January 24, 2000, We Energies obtained a Certificate of Authority from the Wisconsin Public Service Commission ("PSC") in Docket 6630-CE-268 to replace the valves, blades, and other equipment on combustion turbine units P02 and P03.

12. On June 26, 2001, We Energies obtained a Certificate of Authority from the PSC in Docket 6630-CE-283 to replace the valves, blades, and other equipment on combustion turbine units P01 and P04.

13. The January 24, 2000 and June 26, 2001 PSC authorizations allowed We Energies – Paris to replace the original valves, blades, and equipment ("N1 design") with valves, blades, and equipment of an updated design ("NM design").

14. The NM design parts were more expensive than the N1 design parts and allowed the turbines to operate at a higher efficiency. Prior to installation of the new blades, We

Energies anticipated that the new blades would make the turbines more efficient and increase electrical output capacity from each turbine.

15. We Energies restricted the generation rate so that there would be no increase in hourly fuel consumption above the permitted limit. This restriction was accomplished by programming a "hard limit" into the computerized controls of the turbines.

16. We Energies – Paris completed replacement of the original N1 design blades with the replacement NM design blades on units P02 and P03 in May of 2000.

17. We Energies – Paris completed replacement of the original N1 design blades with the replacement NM design blades on units P01 and P04 in June of 2002.

18. We Energies - Paris did not apply for a permit or a permit exemption determination from the Department prior to undertaking either the May 2000 changes or June 2002 changes. We Energies concluded that the project: would not increase fuel consumption, hourly emissions, or annual emissions; would not change the plant's dispatch order or increase the facility's hours of operation; would not change the method of operation of the facility turbines; and would result in capital expenditures less than 50% of the fixed capital cost of the facility.

19. After completion of the 2000 and 2002 replacement parts project, utilization and dispatch of the Paris Generating Station turbines was less than during the 1998-1999 emission baseline period. As set forth in Attachment A to this Order, maximum annual emissions for any year since this project are less than emissions during the 1998-1999 baseline period.

Discussions of PSD and NR 428.04 Applicability for the 2000 and 2002 Project

20. The Department first noted the 2000 and 2002 turbine parts replacement project in its August 30, 2006 Full Compliance Inspection at We Energies – Paris. As a result of this inspection, Department staff met with We Energies personnel to discuss the potential applicability of PSD and Nonattainment Area New Source Review to the project.

21. On November 30, 2006, We Energies submitted a request for an applicability determination to US EPA Headquarters and Department. We Energies also requested at this time that the Department not respond to this applicability determination request pending a response from USEPA.

22. On March 16, 2010, We Energies personnel met with US EPA representatives from the Office of Enforcement and Compliance Assessment, the Office of Air Quality

Planning and Standards, and the Office of the General Counsel to discuss the November 30 2006 applicability determination request.

23. On August 4, 2010, US EPA requested that the Department make a determination of whether the 2000 and 2002 project required the issuance of an air construction permit.

24. Between August 2010 and August 2012, the Department and We Energies personnel met on several occasions to discuss the 2000 and 2002 project at We Energies – Paris.

25. The Department has also requested information regarding whether Paris Generating Station Units 1 and 4 can meet the applicable emission limit in NR 428.04, Wis. Admin. Code, which would apply if those units were modified after February 1, 2001.

26. We Energies – Paris performed stack testing for NOx emissions on Units 1 and 4, when operating using natural gas, and obtained the following results:
    a. On June 20th – 21st, 2012, Unit 4 NOx emissions ranged from 19-21 ppmdv, corrected to 15% O_2 at various operating loads.
    b. On June 18th -19th, 2012, Unit 1 NOx emissions ranged from 24-25 ppmdv, corrected to 15% O_2 at various operating loads.

CONCLUSIONS OF LAW

The Department concludes that:

Order and Rule Authority

1. Under s. 285.13(2), Wis. Stats., the Department has the authority to issue orders to effectuate the purposes of ch. 285, Wis. Stats. and chs. NR 400 - 499, Wis. Adm. Code.

2. This Order is necessary to accomplish the purposes of s. 285.13, Wis. Stats, and chs. NR 400 to NR 499, Wis. Adm. Code, and is enforceable by the Attorney General under ss. 299.95 and 299.97, Stats.

3. The Department has authority under s. 285.11, Wis. Stats. to promulgate rules contained in chs. NR 400 to 499, Wis. Adm. Code, including, but not limited to establishing applicable emissions limits and issuing air construction and operation permits.

4. Pursuant to the December 1, 2011 Air Compliance and Enforcement Memorandum of Understanding between the Department and U.S. EPA Region 5, the Department may resolve, under certain circumstances, an alleged High Priority Violation (HPV) through an Administrative Order.

Wisconsin's Prevention of Significant Deterioration Program

5. The Prevention of Significant Deterioration (PSD) provisions found in ch. NR 405, Wis. Adm. Code apply to construction of any new major stationary source or any project at an existing major stationary source located in an area designated as attainment or unclassifiable. NOx emissions from the waived areas under section 182(f) of the CAA are also covered by PSD requirements under ch. NR 405, Wis. Adm. Code.

6. Wisconsin's PSD Program in ch. NR 405, Wis. Adm. Code, that was applicable between 1999 and 2002, was approved by EPA as part of the federally enforceable Wisconsin SIP on May 27, 1999 in 64 Fed. Reg. 28745. The approved PSD SIP became effective on June 28, 1999.

7. After the time that the project was completed, Wisconsin revised the PSD program in ch. NR 405, Wis. Adm. Code on July 1, 2007. That revision was approved by EPA as a part of the enforceable Wisconsin SIP on April 20, 2007. *See* 72 Fed. Reg. 19,829; *see also* 73 Fed. Reg. 76,560 (Dec. 17, 2008); 75 Fed. Reg. 10,415 (Mar. 8, 2010) (denying reconsideration).

8. Pursuant to s. NR 405.02(21), Wis. Adm. Code, a "major modification" is defined as "any physical change in or change in the method of operation of a major stationary source that would result in a significant emissions increase of a regulated NSR air contaminant and a significant net emissions increase of that air contaminant from the major stationary source."

9. Pursuant to s. NR 405.02(25i)(a), Wis. Adm. Code, a "regulated NSR air contaminant" includes "[a]ny air contaminant for which a national ambient air quality standard has been promulgated ...".

10. Pursuant to s. NR 405.02(24), Wis. Adm. Code, a "net emissions increase" means the sum of the emission increases from a proposed project, less the net of other increases and decreases in emissions that may have occurred at a facility during the 5 years prior to the proposed project being undertaken.

11. In order to trigger major NSR, the net emissions increase must exceed specified significance levels when compared to a pre-modification baseline. A significant net emissions increase for a regulated NSR contaminant under s. NR 405.02(27), Wis. Adm. Code means an increase in the rate of emissions that would equal or exceed the rates specified in s. NR 405.02(27), Wis. Adm. Code, Table A.

12. Pursuant to s. NR 405.02(21)(b)1., Wis. Adm. Code, a "major modification" does not include any physical change in or change in the method of operation that is "routine maintenance, repair and replacement."

13. The Department follows state statute, state administrative code and federal administrative code in operating the New Source Review program in Wisconsin. The Department also considers state guidance, U.S. EPA guidance, and federal and state court decisions when interpreting these statutes and administrative code.

PSD Applicability Considerations

14. EPA and the Department use the "four factor test" for determining whether a project should be considered "routine maintenance, repair, and replacement" (RMRR). This test was developed by EPA to assist regulatory agencies in making these kinds of determinations and its use has been upheld in numerous federal court decisions.

15. Whether a project qualifies under the RMRR exemption is based on a case by case analysis of four central factors (1) the nature and extent (2) purpose (3) frequency and (4) cost of the project.

16. Under ch. NR 405, Wis. Adm. Code that was in effect between 1999 and 2002, if a project did not qualify under the RMRR exemption, then a facility shall evaluate the "net emissions increases", if any, that will result from the physical or operational change. For all existing emissions units, the emissions increase for any project undertaken on such units is determined by subtracting the past actual emissions from the future actual emissions.

17. As stated under ch. NR 405, Wis. Adm. Code that was in effect between 1999 and 2002, for emissions units which had not commenced normal operation, that future actual emissions are equal to the potential emissions from the emissions unit. This methodology is commonly identified as the actual-to-potential test for determining an emissions increase.

The 2000 and 2002 Turbine Parts Replacement Project

18. The Department alleges and concludes as follows:

    a. the turbine parts replacement project undertaken by We Energies – Paris was a physical change to the turbine units as that term is used in ch. NR 405, Wis. Adm. Code; and

    b. replacement of turbine parts in 2000 and 2002 was not excluded as "routine maintenance repair and replacement" because they didn't weigh in favor of being routine under the four factor test; and

    c. the changes that We Energies undertook at the Paris Generation facility were sufficiently extensive for the Department to conclude that the turbines had not commenced normal operation; and

d. the net emissions increase from the 2000 and 2002 replacement parts project is calculated using an "actual to potential" analysis. The values computed by this method lead to a significant net emissions increase for all of the following pollutants: carbon monoxide (CO), nitrogen oxides (NO_X), particulate matter (PM), particulate matter less than 10 µm (PM_{10}), sulfur dioxide (SO_2), volatile organic compounds (VOC), sulfuric acid mist and beryllium; and

e. the replacement of turbine parts in 2000 and 2002 constituted a major modification as that term is defined under ch. NR 405, Wis. Adm. Code.

19. We Energies does not admit the allegations or agree to the conclusions of Paragraph 18.

20. Ch. NR 405, Wis. Adm. Code, requires that any emissions unit which undergoes a significant net emissions increase for a pollutant or pollutants has those emission controlled to a level which represents Best Available Control Technology (BACT) emission rate for that pollutant or pollutants.

21. Section NR 428.04, Wis. Adm. Code requires that any combustion turbine with a maximum design power output of 85 MWe or greater that undergoes a major modification, as that term is defined in ch. NR 405, Wis. Adm. Code after February 1, 2001, achieve an emission rate of 12 parts per million dry volume (ppmdv), corrected to 15% oxygen, as measured over a 30 day rolling average basis.

BACT Applicability Considerations

22. Pursuant to s. NR 405.07(1), Wis. Adm. Code, no major stationary source or major modification may begin actual construction unless the requirements of ss. NR 405.08 – 405.16, Wis. Adm. Code have been met. Requirements in ss. NR 405.08 – 405.16, Wis. Adm. Code include, but are not limited to, the requirement to apply BACT for each air contaminant that it would have the potential to emit in significant amounts.

23. Pursuant to s. NR 405.02(7), Wis. Adm. Code BACT means "an emissions limitation, including a visible emissions standard, based on the maximum degree of reduction for each air contaminant subject to regulation under the Act which would be emitted from any proposed major stationary source or major modification which the department, on a case-by-case basis, taking into account energy, environmental, and economic impacts, and other costs, determines is achievable for such source or modification through application of production processes or available methods, systems, and techniques, including clean fuels, fuel cleaning or treatment or innovative fuel combination techniques for control of the air contaminant."

24. Pursuant to s. 285.63(3), Wis. Stats., the Department may approve a construction permit for a new or modified major source if the department finds that the source meets all requirements under ss. 285.63(3)(a) –(d), Wis. Stats., including BACT.

25. U.S. EPA discusses its expectations for enforcement of new source review violations under its November 17, 1998 "Guidance on the Appropriate Injunctive Relief for Violations of Major New Source Review Requirements" (Schaeffer Memorandum).

26. For failure to obtain either a major new source review permit or synthetic minor permit, the Schaeffer Memorandum differentiates between situations where the source's actual emissions exceeded the major source threshold and where the source's actual emissions never exceeded the major source threshold.

27. The Schaeffer Memorandum allows for the consideration of economic waste if a source's actual emissions are so low that imposing add-on controls would be cost prohibitive.

28. The turbines at We Energies – Paris have each only operated a maximum of 735 hours per year since calendar year 2002, and have, on average, operated 500 hours per year or less.

29. We Energies also operates the Concord Generating Station. The Concord Generating Station is similar to the We Energies - Paris facility and underwent similar changes to the turbines at that facility in 2008.

30. After discussing the Paris blade replacements with the Department in 2006, We Energies applied for a permit prior to undertaking blade replacements at the Concord Generating Station and underwent PSD review as part of the construction permit issued for that facility in 2008. (Permit 08-SDD-104)

31. BACT for all emissions at the Concord Generating Station were determined to be diluent injection, restrictions on the types of fuel that may be combusted, limitations on turbine loading, and limitations on the hours of operation for the turbines.

32. Consistent with the Schaeffer Memorandum, based upon a consideration of the post-project utilization of the We Energies-Paris Turbines and the cost data provided with the construction permit application, the Department concludes that requiring installation of a traditional SCR or an oxidation catalyst for the We Energies – Paris turbines may constitute economic waste.

33. Based on the determination of economic waste, the Department will determine a "BACT equivalent" emissions rate for all pollutants which are subject to a BACT control requirement, taking "economic impacts" into account consistent with the definition of BACT in NR 405.02 and considering "economic waste," consistent with the guidance provided by the Schaeffer Memorandum.

34. The "BACT equivalent" determination will be made based on the same number of hours of operation and other operating restrictions that were required as BACT allowed for the Concord Generating Station in permit 08-SDD-104. This BACT determination will be done consistent with the policies and procedures used to make BACT determinations under s. NR 405.08, Wis. Adm. Code, with the proviso that the hours of operation and fuel restrictions identified as BACT for the Concord station will be assumed to be existing emission limitations for the Paris facility.

35. Without a determination of economic waste and this Consent Order, the BACT determination for We Energies - Paris would not take into account economic impacts in this fashion, and would be based on the number of hours of operation allowed under the permit(s) in effect prior to undertaking the 2000 and 2002 replacement parts project.

ADMINISTRATIVE ORDER

Based on the Findings of Fact and Conclusions of Law, the Department orders, and in order to resolve this, We Energies agrees that it shall do the following:

1. We Energies shall assist in facilitating the Department's review of the permit application received by the Department on July 6, 2012 (Construction permit 12-SDD-143), consistent with the schedule of compliance in operating permit 230094810-P02.

2. We Energies shall install and begin operation of any control equipment or emission monitoring equipment required under the applied for construction permit, if applicable, in accordance with the schedule established in the construction permit. The construction permit notwithstanding, We Energies - Paris shall not operate without installation and operation of any required control equipment or emission monitoring equipment longer than one year after issuance of the construction permit unless the permittee requests, and the Department approves in writing, an additional twelve month extension. The schedules required under this condition do not apply in the event that a relevant term of the construction permit is challenged under s. 285.81, Wis. Stats.

3. Any schedule for installation and operation of control equipment or emission monitoring equipment contained in construction permit 12-SDD-143 shall also be reflected in the We Energies – Paris Title V operation permit schedule for compliance at the time the construction permit is issued.

4. We Energies agrees not to contest, or seek for others to contest, the BACT determination in construction permit 12-SDD-143 for the We Energies - Paris facility to the extent that such BACT determination is consistent with the BACT determination included in the application for construction permit 12-SDD-143 and any supplements to that application, or to the extent that the BACT determination is mutually agreed to by the parties. The Parties agree that the

BACT determination will require that no distillate fuel other than ultra-low sulfur distillate fuel may be burned on or after the date of issuance of construction permit 12-SDD-143.

5. We Energies shall not operate Paris Generating Station Units 1 and 4 until one of the following occurs:

   a. Units 1 and 4 can achieve the applicable emissions rate in NR 428.04(2)(g)1.a., Wis. Adm. Code; or

   b. The Department revises the applicable requirements in ch. NR 428, Wis. Adm. Code such that Units 1 and 4 can achieve the applicable limit or are no longer subject to limits under this chapter. As required under section 182(c)(2) – (d) of the Clean Air Act, any changes to chapter NR 428, Wis. Adm. Code contemplated above are not applicable until approved by the U.S. EPA as part of Wisconsin's State Implementation Plan (SIP); or

   c. Any alleged modification of Units 1 and 4 are resolved through entry of a Consent Decree; or

   d. Wisconsin Circuit Court, Federal District Court, or another court of competent jurisdiction determines that the blade replacement project at the Paris Generating Station did not make the emissions limits in s. NR 428.04(2)(g)1.a., Wis. Adm. Code applicable to Units 1 and 4.

STIPULATION

By agreeing to the terms of this Administrative Order, the Department does not waive its right to refer these alleged violations to the Attorney General for possible prosecution under ss. 285.83 and 299.95, Wis. Stats.

By agreeing to undertake the actions specified in this Administrative Order, We Energies does not admit to any of the Findings of Fact or Conclusion of Law set forth above, nor does it waive any rights it has except: (1) We Energies hereby waives further notice and all statutory and regulatory rights to demand a hearing before the Department of Natural Resources and to commence any judicial action regarding Construction Permit 12-SDD-143, as long the BACT determination in that permit is consistent with the terms of Paragraph 4 of this Administrative Order, and (2) We Energies hereby waives further notice and all statutory and regulatory rights to demand a hearing before the Department of Natural Resources and to commence any judicial action regarding this Administrative Order. This reservation of rights does not affect We Energies' obligation to fully comply with its obligations as set forth in the Administrative Order.

We Energies further stipulates and agrees that this Administrative Order is effective and enforceable upon being signed by both parties and may be enforced in accordance with ss. 285.83 and 285.87, Wis. Statutes, and ch. NR 494, Wisconsin Administrative Code. The undersigned certifies that he is authorized by We Energies to execute such Administrative Order and Stipulation.

WISCONSIN ELECTRIC POWER COMPANY

BY:

Bruce W. Ramme
Vice President Environmental
Wisconsin Electric Power Company

Date: January 4, 2013

STATE OF WISCONSIN
DEPARTMENT OF NATURAL RESOURCES

BY:

Steven L. Sisbach, Section Chief
Environmental Enforcement & Emergency Management
Bureau of Law Enforcement

Date: 1-5-13

WISCONSIN

American Lung Association in Wisconsin
13100 West Lisbon Road, Suite 700
Brookfield, WI 53005-2508
(262) 703-4200
www.lung.org/wisconsin

HIGH OZONE DAYS 2009–2011

County	Orange	Red	Purple	Wgt. Avg	Grade
Ashland	0	0	0	0.0	A
Brown	2	0	0	0.7	B
Columbia	0	0	0	0.0	A
Dane	0	0	0	0.0	A
Dodge	0	0	0	0.0	A
Door	11	0	0	3.7	F
Eau Claire	INC	INC	INC	INC	INC
Florence	INC	INC	INC	INC	INC
Fond du Lac	2	0	0	0.7	B
Forest	0	0	0	0.0	A
Grant	DNC	DNC	DNC	DNC	DNC
Jefferson	0	0	0	0.0	A
Kenosha	15	1	0	5.5	F
Kewaunee	5	1	0	2.2	D
La Crosse	0	0	0	0.0	A
Manitowoc	11	1	0	4.2	F
Marathon	0	0	0	0.0	A
Milwaukee	10	1	0	3.8	F
Oneida	0	0	0	0.0	A
Outagamie	1	0	0	0.3	B
Ozaukee	10	1	0	3.8	F
Racine	12	1	0	4.5	F
Rock	0	0	0	0.0	A
St. Croix	INC	INC	INC	INC	INC
Sauk	0	0	0	0.0	A
Sheboygan	17	2	0	6.7	F

HIGH PARTICLE POLLUTION DAYS 2009–2011

24 Hour					Annual	
Orange	Red	Purple	Wgt. Avg	Grade	Design Value	Pass/ Fail
0	0	0	0.0	A	5.5	PASS
18	0	0	6.0	F	10.4	PASS
DNC	DNC	DNC	DNC	DNC	DNC	DNC
10	0	0	3.3	F	10.6	PASS
3	0	0	1.0	C	INC	INC
DNC	DNC	DNC	DNC	DNC	DNC	DNC
0	0	0	0.0	A	INC	INC
DNC	DNC	DNC	DNC	DNC	DNC	DNC
DNC	DNC	DNC	DNC	DNC	DNC	DNC
0	0	0	0.0	A	6.0	PASS
3	0	0	1.0	C	10.7	PASS
DNC	DNC	DNC	DNC	DNC	DNC	DNC
3	0	0	1.0	C	9.7	PASS
DNC	DNC	DNC	DNC	DNC	DNC	DNC
3	0	0	1.0	C	9.6	PASS
INC	INC	INC	INC	INC	INC	INC
DNC	DNC	DNC	DNC	DNC	DNC	DNC
7	0	0	2.3	D	11.1	PASS
DNC	DNC	DNC	DNC	DNC	DNC	DNC
9	0	0	3.0	D	9.8	PASS
1	0	0	0.3	B	9.5	PASS
DNC	DNC	DNC	DNC	DNC	DNC	DNC
DNC	DNC	DNC	DNC	DNC	DNC	DNC
2	0	0	0.7	B	INC	INC
4	0	0	1.3	C	9.0	PASS
DNC	DNC	DNC	DNC	DNC	DNC	DNC

Health Effects of Ozone and Particle Pollution

Two types of air pollution dominate in the U.S.: ozone and particle pollution.[1] These two pollutants threaten the health and the lives of millions of Americans. Thanks to the Clean Air Act, the U.S. has far less of both pollutants now than in the past. Still, nearly 132 million people live in counties where monitors show unhealthy levels of one or both.

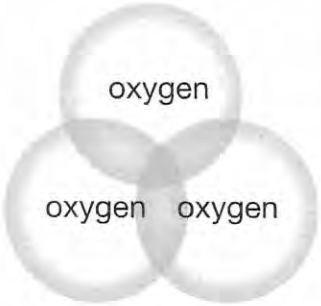
So what are ozone and particle pollution?

Ozone Pollution

It may be hard to imagine that pollution could be invisible, but ozone is. The most widespread pollutant in the U.S. is also one of the most dangerous.

Scientists have studied the effects of ozone on health for decades. Hundreds of research studies have confirmed that ozone harms people at levels currently found in the United States. In the last few years, we've learned that it can also be deadly.

What Is Ozone?



Ozone (O_3) is a gas molecule composed of three oxygen atoms. Often called "smog," ozone is harmful to breathe. Ozone aggressively attacks lung tissue by reacting chemically with it.

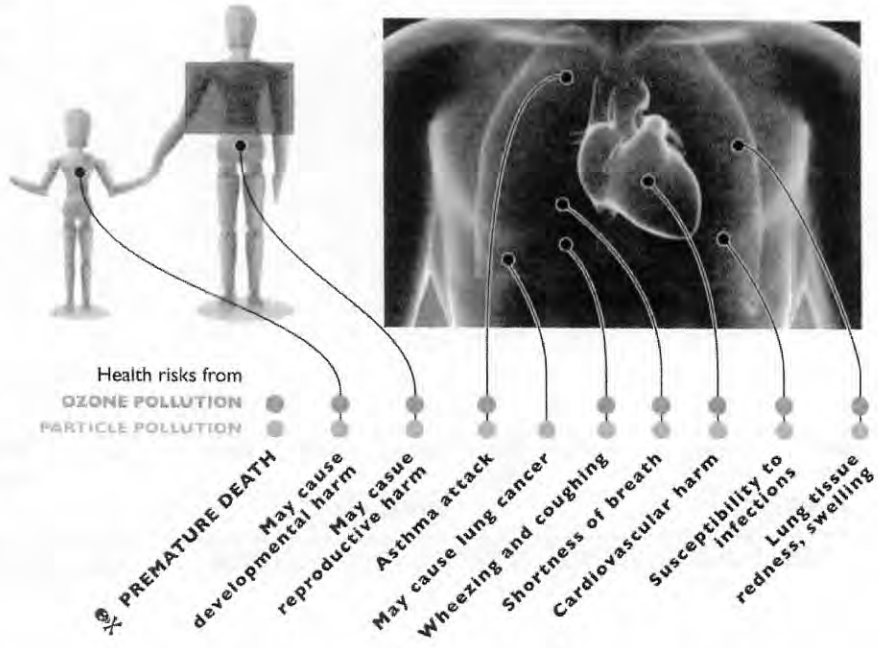
The ozone layer found high in the upper atmosphere (the stratosphere) shields us from much of the sun's ultraviolet radiation. However, ozone air pollution at ground level where we can breathe it (in the troposphere) causes serious health problems.

Where Does Ozone Come From?

Ozone develops in the atmosphere from gases that come out of tailpipes, smokestacks and many other sources. When these gases come in contact with sunlight, they react and form ozone smog.

The essential raw ingredients for ozone come from nitrogen oxides (NO_X), hydrocarbons, also called volatile organic compounds (VOCs) and carbon monoxide (CO). They are produced primarily when fossil fuels like gasoline, oil or coal are burned or when some chemicals, like solvents, evaporate. NO_X is emitted from power plants, motor vehicles and other sources of high-heat combustion. VOCs are emitted from motor vehicles, chemical plants, refineries, factories, gas stations,

Air pollution remains a major danger to the health of children and adults.



paint and other sources. CO is also primarily emitted from motor vehicles.[2]

If the ingredients are present under the right conditions, they react to form ozone. And because the reaction takes place in the atmosphere, the ozone often shows up downwind of the sources of the original gases. In addition, winds can carry ozone far from where it began.

You may have wondered why "ozone action day" warnings are sometimes followed by recommendations to avoid activities such as mowing your lawn or driving your car. Lawn mower exhaust and gasoline vapors are VOCs that could turn into ozone in the heat and sun.

Who is at risk from breathing ozone?

Anyone who spends time outdoors where ozone pollution levels are high may be at risk. Five groups of people are especially vulnerable to the effects of breathing ozone:

- children and teens;[3]
- anyone 65 and older;[4]
- people who work or exercise outdoors;[5]
- people with existing lung diseases, such as asthma and chronic obstructive pulmonary disease (also known as COPD, which includes emphysema and chronic bronchitis);[6] and
- people with cardiovascular disease.[7]

In addition, newer evidence suggests that other groups—including women, people who suffer from obesity and people with low incomes—may also face higher risk from ozone.[8] More research is needed to confirm these findings.

The impact on your health can depend on many factors, however. For example, the risks would be greater if ozone levels are higher, if you are breathing faster because you're working outdoors or if you spend more time outdoors.

Lifeguards in Galveston, Texas, provided evidence of the impact of even short-term exposure to ozone on healthy, active adults in a study published in 2008. Testing the breathing capacity of these outdoor workers several times a day, researchers found that many lifeguards had greater obstruction in their airways when ozone levels were high. Because of this research, Galveston became the first city in the nation to install an air quality warning flag system on the beach.[9]

How Ozone Pollution Harms Your Health

Premature death. Breathing ozone can shorten your life. Strong evidence exists of the deadly impact of ozone in large studies conducted in cities across the U.S., in Europe and in Asia. Researchers repeatedly found that the risk of premature death increased with higher levels of ozone.[10,11,12] Newer research has confirmed that ozone increased the risk of premature death even when other pollutants also exist.[13]

Even low levels of ozone may be deadly. A large study of 48 U.S. cities looked at the association between ozone and all-cause mortality during the summer months. Ozone concentrations by city in the summer months ranged from 16 percent to 80 percent lower than the U.S. Environmental Protection Agency (EPA) currently considers safe. Researchers found that ozone at those lower levels was associated with deaths from cardiovascular disease, strokes, and respiratory causes.[14]

Immediate breathing problems. Many areas in the United States produce enough ozone during the summer months to cause health problems that can be felt right away. Immediate problems—in addition to increased risk of premature death—include:

- shortness of breath, wheezing and coughing;
- asthma attacks;

- increased risk of respiratory infections;
- increased susceptibility to pulmonary inflammation; and
- increased need for people with lung diseases, like asthma or chronic obstructive pulmonary disease (COPD), to receive medical treatment and to go to the hospital.[15]

Cardiovascular effects. Inhaling ozone may affect the heart as well as the lungs. A 2006 study linked exposures to high ozone levels for as little as one hour to a particular type of cardiac arrhythmia that itself increases the risk of premature death and stroke.[16] A French study found that exposure to elevated ozone levels for one to two days increased the risk of heart attacks for middle-aged adults without heart disease.[17] Several studies around the world have found increased risk of hospital admissions or emergency department visits for cardiovascular disease.[18]

Long-term exposure risks. New studies warn of serious effects from breathing ozone over longer periods. With more long-term data, scientists are finding that long-term exposure—that is, for periods longer than eight hours, including days, months or years—may increase the risk of early death.

- Examining the records from a long-term national database, researchers found a higher risk of death from respiratory diseases associated with increases in ozone.[19]
- New York researchers looking at hospital records for children's asthma found that the risk of admission to hospitals for asthma increased with chronic exposure to ozone. Younger children and children from low-income families were more likely to need hospital admissions even during the same time periods than other children.[20]
- California researchers analyzing data from their long-term Southern California Children's Health Study found that some children with certain genes were more likely to develop asthma as adolescents in response to the variations in ozone levels in their communities.[21]
- Studies link lower birth weight and decreased lung function in newborns to ozone levels in their community.[22] This research provides increasing evidence that ozone may harm newborns.

Breathing other pollutants in the air may make your lungs more responsive to ozone—and breathing ozone may increase your body's response to other pollutants. For example, research warns that breathing sulfur dioxide and nitrogen oxide—two pollutants common in the eastern U.S.—can make the lungs react more strongly than to just breathing ozone alone. Breathing ozone may also increase the response to allergens in people with allergies. A large study published in 2009 found that children were more likely to suffer from hay fever and respiratory allergies when ozone and $PM_{2.5}$ levels were high.[23]

EPA finds ozone causes harm. The EPA released their most recent review of the current research on ozone pollution in February 2013.[24] The EPA had engaged a panel of expert scientists, the Clean Air Scientific Advisory Committee, to help them assess the evidence, in particular research published between 2006 and 2012. The EPA concluded that ozone pollution posed multiple, serious threats to health. Their findings are highlighted in the box below.

EPA Concludes Ozone Pollution Poses Serious Health Threats

- Causes respiratory harm (e.g. worsened asthma, worsened COPD, inflammation)
- Likely to cause early death (both short-term and long-term exposure)
- Likely to cause cardiovascular harm (e.g. heart attacks, strokes, heart disease, congestive heart failure)
- May cause harm to the central nervous system
- May cause reproductive and developmental harm

—U.S. Environmental Protection Agency, *Integrated Science Assessment for Ozone and Related Photochemical Oxidants*, 2013. EPA/600/R-10/076F.