BEFORE THE ILLINOIS POLLUTION CONTROL BOARD

IN THE MATTER OF:	)	
	)	
NATURAL GAS-FIRED, PEAK-LOAD	)	R01-10
ELECTRICAL POWER GENERATING	)	
FACILITIES (PEAKER PLANTS)	)	

WRITTEN TESTIMONY

TO: Ms. Dorothy M. Gunn
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Enclosed please find written testimony of Mr. Richard Trzupek in the above referenced matter. An original and nine copies are enclosed.

Respectfully submitted,

____

Richard Trzupek
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Dated: August 15, 2000

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Introduction

1. The purpose of this testimony is to address two areas of concern in regard to the peaker plant issue now before the Illinois Pollution Control Board ("the Board"). These areas are: 1) the overall environmental effect of peaker facilities, in the context of comprehensive environmental and energy policy, and 2) the health risk represented by air borne emissions from these facilities.

2. I am Richard Trzupek, currently employed as Air Quality Manager with Huff & Huff, Inc., an environmental consulting firm primarily serving industrial customers, including peaker plant developers and operators. I am a chemist with 18 years of experience in air quality management and am professionally qualified to comment on air pollution issues. A summary of my qualifications is attached as Exhibit A.

Assumptions

3. In preparing this testimony, I have made the following assumptions:

a) The peaker plants in question are powered by natural gas fired turbines between 25 MW and 250 MW in size.

b) The natural gas fired turbines used employ either dry low NOx control or water injection to achieve NOx emissions of 9 ppmvd or less, at 15 % oxygen, in simple cycle. This emission rate is equivalent to Best Available Control Technology (BACT) for these units.

c) That oil firing, for which some turbines is permitted as an emergency back up, will be rarely employed, owing to the reliability of natural gas supplies in the midwest. Emissions resulting from oil firing are not considered in this analysis.

d) The emissions of other pollutants from gas turbines quoted, as well as emissions from other power generation sources (units powered by coal, oil and jet fuel) have been derived from USEPA AP-42 data. The reader will note that emission rates for individual units will vary. For the sake of conducting reasonable comparison, broad assumptions have been made regarding these emissions rates. While these assumptions may not hold true in each individual case, it is my belief that they present a reasonable approximation of the general case, consistent with observed emissions inventory data. Assumed emissions rates are quoted in relevant exhibits.

Environmental Effects – Background

4. In considering the effect that peaker plants have on the environment, the Board should consider airborne emissions from these sources in the context of the midwest power market. That is to say that, on any given day, there will be a finite amount of electric power demand. This demand must be satisfied by some combination of regional energy resources. The extent of the role of peaker plants in meeting this demand will have a significant effect on air quality in the region, to the extent that these plants are preferentially built and utilized, or to the extent to which other sources of power are used to meet that demand.

5. The nation's electric grid is subdivided into several North American Electric Reliability Council (NERC) regions. Illinois is part of the Mid-America Interconnected Network (MAIN), a region which also includes most of Wisconsin as well as smaller parts of eastern Missouri and the Upper Peninsula of Michigan.

6. When considering electric demand, it is most useful to consider MAIN as a starting point. It is an over-simplification to say that power can be distributed freely throughout MAIN – the complexities of power transmission require a relatively even distribution of power relative to centers of demand – but the region does represent a semi-autonomous network within which power demand may be reasonably assessed.

7. It will also be noted that, to some extent, power may be exported from MAIN to the five regions surrounding it (MAPP, ECAR, SERCW, SPP and TVA). However, power export is physically limited by the capacity of interconnecting long transmission lines. (A simplified schematic of MAIN and connectivity to surrounding NERC regions, published by MAIN, is attached as Exhibit B). More importantly, power export to other regions will result in transportation costs which economically limit the practice to a small fraction of total power output. Because power export is a relatively insignificant source of demand, the practice has not been considered in this analysis. However, if the Board wishes to confirm this fact, I would suggest an examination of power sales records available through Federal Energy Regulatory Commission (FERC).

8. Within MAIN, according to its council's latest report, the forecast peak load level for the summer of 2002 has been estimated at 50,675 MW. A copy of MAIN's 2002 forecast summary is attached as Exhibit C.

9. Peak utility summer power generation capacity within MAIN, according to FERC data, is 50,260 MW. A summary of utility power generation sources in MAIN, taken from FERC reports, is attached as Exhibit D. This total does not include co-generation sources, nor does it include independent power producers (IPPs) who are the owners of many peaking facilities. The utility total of 50,260 MW capacity does,

however, include a great many utility peaking units, such as jet engines, older stationary turbines and internal combustion engines, which are rarely utilized.

10. In comparing peak demand to peak generation capacity, it is important to note that, in order to achieve stability of the grid, most power experts recommend that excess capacity of 20 to 30% is needed. If generation capacity were to exactly equal demand, it is very unlikely that power could be evenly and reliably distributed. Rather, as demand approaches capacity, local brown outs and black outs occur more frequently, as has been seen in the midwest in recent summers.

11. If a 25% "cushion" were the target, total generation capacity in MAIN should be about 63,000 MW. Exact requirements should, however, be discussed with an expert in the field, such as a representative of MAIN. For the purpose of evaluating the effect of peaker plants on the regional environment, I have assumed a peak demand of 50,675 MW and have not assumed any reserve generation. While this is an unrealistic picture, it serves to illustrate the relative effects of peaker plants and will, it is hoped, help to establish a methodology by which power plant emissions can be fairly evaluated in the context of electric demand.

Environmental Effects – Regional

12. Currently, utility based electric power in MAIN is generated by nine basic sources of energy: coal, light oil (#1 or #2 fuel oil), heavy oil (#6 fuel oil), natural gas, nuclear, hydro, wind and "other" (minor, unidentified sources). A breakdown of current generation capacity, by fuel type, within MAIN is as follows:

TABLE 1

MAIN Power Generation Capacity
(by fuel type)

Fuel Type	Summer Capacity (MW)	% of Total
Coal	27,936	55.6
Light Oil	1,612	3.2
Heavy Oil	406	0.8
Jet Fuel	369	0.7
Natural Gas	5,667	11.3
Other	32	0.1
Nuclear	13,283	26.4
Hydro	953	1.9
Wind	2	0.0
TOTAL:	***50,260***	

13. The air pollution potential of each of these sources of energy may now be considered. Using AP-42 factors, maximum emissions of three pollutants have been calculated: nitrogen oxides (NOx), sulfur dioxide (SO_2) and particulate matter (PM). There are, of course, other pollutants that may be examined, but these three are representative for the purposes of this analysis. Maximum potential emissions of these three pollutants have been calculated for the five month ozone season (May 1 through September 30). This period was chosen as that of most immediate environmental importance, given the EPA's focus on reducing ozone precursors during those months. Emissions potentials for MAIN utility sources are as follows:

TABLE 2

Maximum Emissions Potential
Current MAIN Utility Sources

Fuel Type	NOx Emissions (tons/season)	SO2 Emissions (tons/season)	PM Emissions (tons/season)
Coal	256,448	102,579	20,516
Light Oil	7,693	1,154	462
Heavy Oil	2,423	19,381	194
Jet Fuel	2,035	51	122
Natural Gas	8,739	437	1,020
Other	NA	NA	NA
Nuclear	NA	NA	NA
Hydro	NA	NA	NA
Wind	NA	NA	NA
TOTAL:	***277,337***	***123,602***	***22,313***

14. A comparison may now be made in which 10,000 MW of coal generation capacity is replaced by gas turbine generation capacity:

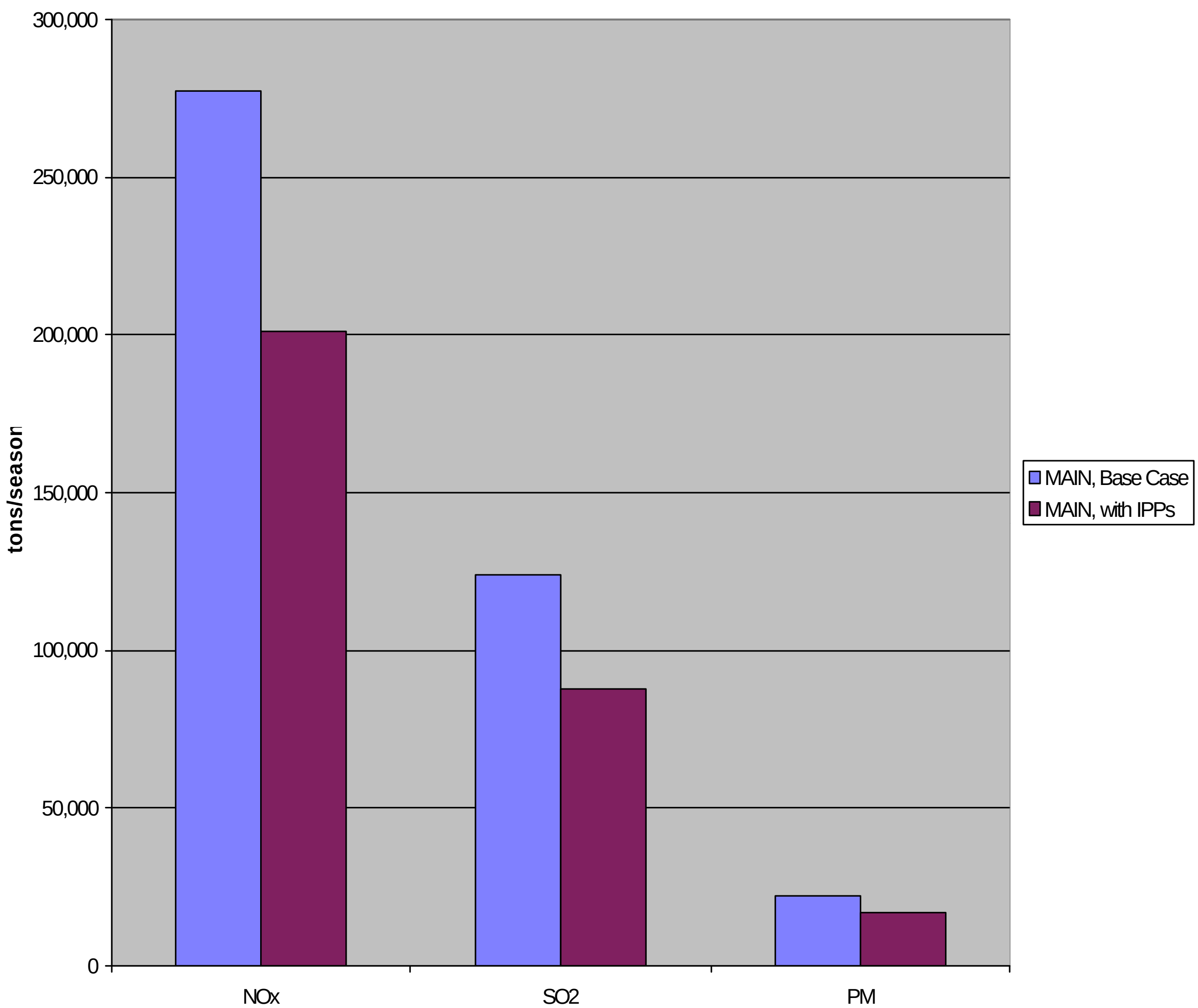
TABLE 3

Maximum Emissions Potential
MAIN Utility Sources,
With 10,000 MW Gas Turbine for Coal Replacement

Fuel Type	NOx Emissions (tons/season)	SO2 Emissions (tons/season)	PM Emissions (tons/season)
Coal	164,648	65,859	13,172
Light Oil	7,693	1,154	462
Heavy Oil	2,423	19,381	194
Jet Fuel	2,035	51	122
Natural Gas	24,162	1,208	2,819
Other	NA	NA	NA
Nuclear	NA	NA	NA
Hydro	NA	NA	NA
Wind	NA	NA	NA
TOTAL:	***200,960***	***87,653***	***16,768***

15. As would be expected, a comparison of Tables 2 and 3 shows a significant environmental benefit to the region by substituting natural gas for coal. In this example NOx emissions are reduced 27%, SO_2 by 29% and PM by 25%. Complete calculations and graphical presentations of this data are attached as Exhibit E. There would be further reductions in other air pollutants in this scenario, as well as substantial reductions in liquid and solid waste generation.

FIGURE 1
MAIN Emissions Comparison
Base Case, With and Without IPPs



16. While one may argue about the exact magnitude of emissions reductions as gas turbines take up more of the power generation load, it is undeniable that such reductions take place. There is, on a daily basis, a finite demand for power within MAIN. This demand must be met, by some means. In allowing the continued construction of gas turbine fired facilities, unencumbered by the burden of additional environmental rules that go beyond the strict and effective regulatory structure to which these facilities are already subject, the Board will allow the environment to continue to realize more and more of the benefits inherent to the ultra-clean nature of these units.

17. Peaker plants should not be viewed as adding to air pollution. Rather, they are an integral part of reducing pollution. Demand will always determine how much electricity is generated. Is it not in everyone's best interests that the cleanest generating units are available to meet as much of that demand as possible?

<u>Environmental Effects – Statewide</u>

18. In considering the environmental effects of peaking plants within the state of Illinois, the type of analysis described above will, of course, continue to hold true. However, impending NOx reduction regulations under development by the Illinois EPA, serve to further emphasize how important these facilities are to the state's economic and environmental health.

19. Illinois EPA's proposed Subpart W regulations will reduce statewide NOx emissions from Electric Generating Units (EGUs) to a little over 30,000 tons per ozone season. These rules will further accentuate how important peaker plants are in the context of providing clean power to the state and its citizens.

20. A rough approximation of current, utility based emissions of NOx, SO_2 and PM can be made through the use of FERC generation data and by assuming certain utilization rates. This example assumes an average summer day's generation rate of approximately 22,500 MW. Again, FERC data can be researched to further refine that assumption, if desired. Table 4, below, summarizes this data. (It should be noted that FERC does not list any hydro, wind or "other" power sources in its Illinois utility database).

TABLE 4

Illinois Utility Based Emissions, Base Case
Typical Summer Emissions

Fuel Type	Summer Capacity (MW)	Assumed Utilization	NOx Emissions (tons/season)	SO2 Emissions (tons/season)	PM Emissions (tons/season)
Coal	15,358	70%	98,691	39,476	7,895
Light Oil	363	30%	520	78	31
Heavy Oil	406	70%	1,696	13,567	136
Jet Fuel	369	10%	203	5	12
Natural Gas	3,953	70%	4,268	213	498
Other	0	0	NA	NA	NA
Nuclear	10,646	80%	NA	NA	NA
Hydro	0	0	NA	NA	NA
Wind	0	0	NA	NA	NA
		TOTAL:	***105,378***	***53,339***	***8,572***

21. The NOx reductions called for in Subpart W will be realized in the form of a trading program that will, in effect, place a "hard cap" on EGU NOx emissions. This cap will apply to EGUs over 25 MW, and will include both utility power generation sources as well as IPPs. Thus, a second level of control on utility emissions will be layered atop the "natural cap" implied by the demand factors described earlier. Given the existence of a hard NOx cap, power generators will not only have to meet demand, they will have to

do so without exceeding available NOx trading allocations. In this scenario, EGUs with low NOx emissions rates, such as gas turbines, are vitally important.

22. Under the trading program, the target NOx emission rate for most fossil-fired EGUs will be 0.15 lbs NOx/mm BTU heat input. In practice, lower heat input rates will probably be realized, but this target rate allows for a simple comparison. The following table assumes that coal and oil fired sources meet this target NOx emission rate. Natural gas fired sources, believed to consist primarily of gas fired turbines, are assumed to emit NOx at a rate of 0.06 lbs/mm BTU heat input. This rate corresponds to an average of 15 ppmvd NOx at 15% O_2, a conservative assumption given the current BACT rate for peakers of approximately 0.04 lbs/mm BTU.

TABLE 5

Illinois Utility Based Emissions, NOx SIP Case
Typical Summer Emissions – No IPPs

Fuel Type	Summer Capacity (MW)	Assumed Utilization	NOx Emissions (tons/season)	SO2 Emissions (tons/season)	PM Emissions (tons/season)
Coal	15,358	70%	29,607	39,476	7,895
Light Oil	363	30%	390	78	31
Heavy Oil	406	70%	1,017	13,567	136
Jet Fuel	369	10%	203	5	12
Natural Gas	3,953	70%	4,268	213	498
Nuclear	10,646	80%	NA	NA	NA
		TOTAL:	***35,486***	***53,339***	***8,572***

23. Table 5 details emissions considering only Illinois utility sources listed in FERC's database. This scenario meets the demand requirement of 22,500 MW in the state that was used to construct Table 4. It can be seen that utility NOx emissions are reduced over 65%, while emissions of SO_2 and PM remain unchanged.

24. The next scenario assumes that approximately 14,000 MW of IPP gas turbine generation capacity has been added to the state's EGU inventory. Utilization of all units is reduced by about half in order to match assumed 22,500 MW demand. These conditions result in the following ozone season emissions scenario:

TABLE 6

Illinois Utility Based Emissions, NOx SIP Case
Typical Summer Emissions – With IPPs

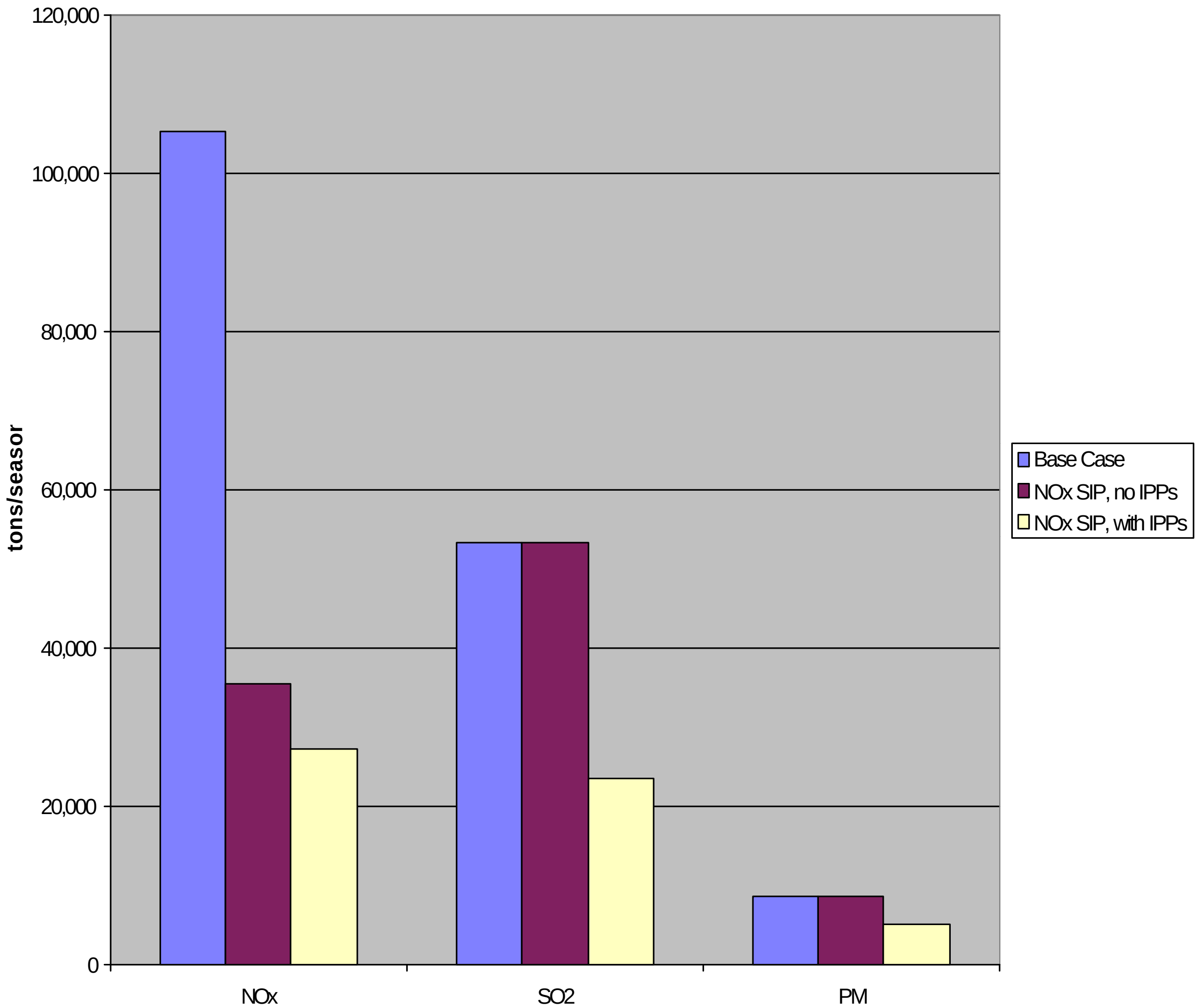
Fuel Type	Summer Capacity (MW)	Assumed Utilization	NOx Emissions (tons/season)	SO2 Emissions (tons/season)	PM Emissions (tons/season)
Coal	15,358	37%	15,544	20,725	4,145
Light Oil	363	16%	205	41	16
Heavy Oil	406	37%	534	7,122	71
Jet Fuel	369	5%	107	3	6
Natural Gas	21,953	37%	12,442	622	1,452
Nuclear	10,646	80%	NA	NA	NA
		TOTAL:	***28,832***	***28,513***	***5,691***

25. It will be seen that, under this scenario, NOx emissions drop 19% below the EGU targets listed in Table 5. Further more, there is also a drop of SO_2 emissions of over 45% and a PM emissions reduction of over 30%. The aforementioned reductions in liquid and solid waste reductions are also realized. Additional detail involved in these calculations are attached as Exhibit F.

26. It may be argued that the above scenario is unrealistic – that utilization of cheap coal fired power will never drop as low as 37%. That may or may not be true, depending to some extent on the added costs of NOx control imposed on coal fired sources. However, this example does illustrate a fact that can not be contested: that the presence and increased utilization of gas-fired turbine generation capacity will only

improve the state's environment. The limiting factors of demand and a hard NOx cap in the state guarantee this will be so.

FIGURE 2
Illinois Emissions Comparison
Base Case, With and Without IPPs



<u>Conclusions – Environmental</u>

27. The above analysis supports the conclusion that no additional environmental regulations are justified in regard to peaker plants specifically, or gas turbines in general. Extensive restrictions and requirements within the present environmental structure

(which the author assumes have been reviewed in detail by other industrial commentators as well as the Illinois EPA) are doing their job. These rules have resulted in a new generation of ultra-clean, efficient gas turbines , the proliferation of which is wholly consistent with the state's – and the country's – environmental goals.

28. If environmentally motivated impediments are placed in the way of these plants, impediments which either prevent their construction (a moratorium) or add additional costs of operation (by requiring additional and unnecessary controls), the net effect in the state and in the MAIN region will be to satisfy more of demand through the use of coal-fired sources. While coal technology has made massive strides toward becoming a cleaner fuel, it can not be as clean as natural gas. Therefore, restriction of gas-fired turbine construction will have the unintended consequence of making it more difficult for the state to meet both energy demand and air quality goals.

29. Finally, it has been emphasized throughout this section that the analyses presented above is not intended to be a definitive study. In contains data which may be refined and assumptions which may be modified. In presenting this methodology to the Board, my intent is illustrate the principles I feel are important, as well as to offer a means by which energy and environmental policy may be reconciled in the course of further study. For it is, undoubtedly, both energy and environmental policy that the Board will be examining in the course of these hearings. Any attempt to detach the two, will, I feel, result in serious damage to one, the other, or both.

Inhalation Risk Issues – Background

30. It is assumed that the issue of inhalation risk associated with peaking plants will have been addressed in detail by other industrial commentators and by the Illinois EPA. Accordingly, it is not my intention to delve into this matter in great detail.

31. Risk is an issue that has been sometimes raised in conjunction with these plants, to the alarm of some localities near which they may be located. On its face, to any disinterested observer with a technical background, raising the issue of inhalation risk in regard to natural gas fired sources is a ludicrous concept. If the combustion of natural gas represents an unacceptable level of inhalation risk, there are few industrial sources – and no combustion sources – that would not present a far greater danger.

32. It should be noted that USEPA is developing Maximum Achievable Control Technology (MACT) standards for many combustion sources, including gas turbines, as part of its efforts to fulfill the requirements of Title III of the Clean Air Act Amendments of 1990. It is my professional opinion that, with the possible exception of increased control of certain toxic metal emissions from coal combustion sources, the Agency will find no justification for any further controls of these sources beyond existing good combustion practices. In addition, it is also my professional opinion that very few, if any, natural gas turbine sources would emit toxic air pollutants in sufficient quantity (10 tons per year of a single Hazardous Air Pollutant (HAP) or 25 tons per year of a combination of HAPs) to trigger MACT requirements.

Inhalation Risk - Principles

33. In terms of toxic risk, it is maximum ground level exposure that is of primary importance to the surrounding community. This principle is poorly understood by many

individuals for whom a peaker plant proposal represents their first real experience in the complex science of risk assessment.

34. It is an indisputable fact that equivalent amounts of an air pollutant will result in much different exposures, and therefore risk, depending on the height at which that pollutant is first introduced into the atmosphere, the buoyancy of the exhaust gas stream (chiefly related to gas stream temperature and velocity) and the distance to potentially affected individuals. While I would judge neither to be at all dangerous, the average person faces far more risk from 5 tons of toxic emissions dispersed by trucks and automobiles on the expressway than he does from the same 5 tons of toxic emissions dispersed at 1000 degrees Fahrenheit from a gas turbine stack over 100 feet high. Furthermore, if such a study were undertaken, I strongly suspect that it could be shown that the average person attending a meeting to protest a gas turbine installation exposes himself or herself to far more toxic inhalation risk on the drive to and from the meeting than the gas turbine would ever represent to him or her.

35. In order to determine maximum ground level exposures, USEPA models are commonly used. ISCST3 is the model most often used for purposes of Prevention of Significant Deterioration (PSD) permitting. It is a well-established model whose accuracy in predicting maximum local concentration has been accepted by USEPA and most, if not all, state agencies.

<u>Inhalation Risk - Examples</u>

36. A few examples will serve to illustrate the irrelevance of the toxic risk issue with regard to gas turbine sources. Three pollutants have been chosen for comparative purposes. These are: NOx (a criteria pollutant), benzene (a HAP) and Polyaromatic

Hydrocarbons (PAH, a class of HAPs). There are many, many other examples which could be used, but I believe that these three will be sufficient to illustrate the principle.

37. Emissions from a typical turbine installation will first be considered. The proposed Grande Prairie Energy facility submitted a substantial amount of ISCST3 modeling data to the state and to the local community (Bartlett) in which it is to be located. This data was developed for Grande Prairie by Goodwin Environmental Consultants, Inc. of Springfield, Illinois and Diegan and Associates of Libertyville, Illinois. Grande Prairie is a planned 1500 MW gas turbine facility, consisting of a mix of simple cycle and combined cycle capacity. It is on the large end in the spectrum of gas turbine installations, so it will serve as a good “worst case” example.

38. NOx emissions from the built-out Grande Prairie facility result in a modeled maximum ground level NO_2 concentration of 0.28 $\mu g/M^3$. This concentration may now be compared to a few convenient points of reference: a) the National Ambient Air Quality Standard (NAAQS) for NO_2, which serves as USEPA’s definition of the maximum amount of this pollutant that can be present in a clean atmosphere; b) average NO_2 concentrations detected by ambient air monitors in the state of Illinois in 1998; and c) the PSD significance level, which is the concentration which officially causes alarm under the PSD regulations. The comparison is as follows:

TABLE 7

NOx Risk Comparison

Source	**NO_2 Concentration, (mg/cubic meter)**
NAAQS Standard	100
Illinois Average, 1998	42
PSD Significance Level	25
1500 MW Plant	0.28

39. It is clear, from Table 7, that the level of NOx exposure risk associated with this project is infinitesimal. People are exposed to far more NOx in their everyday lives than this admittedly large project will ever expose them to.

40. Benzene is considered next. In this case, the basis of comparison must be different, since different monitoring and regulatory programs apply. The points of reference used are: a) the average benzene concentration detected at the Northbrook monitoring station between June and August of 1998, representing typical summertime urban ambient air concentrations; b) the rural ambient air background average; and c) USEPA's Human Health Risk Based Criteria.

TABLE 8

Benzene Risk Comparison

Source	Benzene Concentration, (mg/cubic meter)
Northbrook Average, (June – August, 1998)	5.75
Rural Background Average	0.32
US EPA Risk Based Criteria	0.22
1500 MW Plant	0.00172

41. Finally, PAH's are considered. Urban and rural background averages provide available points of reference.

TABLE 9

PAH Risk Comparison

Source	PAH Concentration, (mg/cubic meter)
Urban Background Average	0.15
Rural Background Average	0.02
1500 MW Plant	0.00219

42. More comprehensive studies, using other pollutants and modeling different sizes and configurations of plants can be undertaken, but it is my belief that such efforts will inevitably lead to the same conclusions that can be drawn from the above data: gas turbines are among the least significant sources of inhalation risk to which the public is exposed on a day to day basis.

43. Finally, the issue of risk can also be considered by examining the different rates at which sources emit pollutants. In this context, as was the case in the environmental analysis presented in the first part of this testimony, gas turbines rate as among the best, if not the best, of all combustion sources. A comparison of published emission rates for gas turbines and diesel engines, for the three pollutants examined above, illustrates the point:

TABLE 10

Emission Rate Comparison

Source	Diesel Engines	Gas Turbines
NOx Emission Rate, (lbs/mm BTU)	1.9	0.04
Benzene Emission Rate, (lbs/mm BTU)	0.00078	0.000012
PAH Emission Rate, (lbs/mm BTU)	0.00021	0.0000022

44. This comparison is not meant to raise alarm about diesel engines emissions. The fact that we largely meet our air quality goals demonstrates that these common sources do not, for the most part, burden the environment. It is rather to illustrate one final time the insignificance of natural gas fired turbine emissions. A more complete presentation of risk data, including comparative charts, is attached as Exhibit G.

Conclusions

45. I hope that the above discussion serves some role in helping the Board to conclude what I firmly believe: that the influx of natural gas fired turbines in the state of Illinois, as in other states, represents valuable environmental progress. They produce virtually no solid waste, innocuous liquid waste streams and virtually the cleanest air emissions possible from a combustion process. These ultra-clean units have been developed, in large part, because of environmental concerns.

46. The fact that industry responded with this technology is proof that environmental regulations are doing their job. To impose additional rules on these units, or worse, to declare a moratorium on their construction, would be to send exactly the wrong signal to industry. Why develop clean, efficient technology if the response to such innovation is to call a halt to progress?

47. It is my belief that the communities that have accepted these facilities are playing an important part in continuing 30 years of environmental progress. Just as we made massive reductions in particulate, lead and sulfur dioxide emissions in the past, so now we are poised to make massive reductions in NOx emissions without sacrificing the reliability of the electrical grid. Communities who are part of this effort are helping Illinois to reach a brighter tomorrow, both economically and environmentally.

48. Communities which reject these projects – which they certainly may do through the use of local zoning ordinances – choose not play such a role. That is certainly their right, but it would be wrong for the Board or the legislature to provide them with a spurious environmental excuse for doing so.

49. Finally, I would like to conclude by paying a well-deserved compliment to the Illinois Environmental Protection Agency. Although they are too often the target of derision from both industry and the public alike, and although I frequently negotiate with them in an adversarial role, I have nothing but respect for the men and women who make up the Agency. As a consultant who has dealt with many state agencies in nearly twenty years of practice, I know of none who are able to fulfill their stewardship over the environment so well while, at the same time, recognizing the legitimany of the state's economic needs.

50. The state's environmental record is something Illinois can be proud of, a record Don Sutton, Chris Romaine and all of the men and women in the trenches at IEPA have played a large, unsung part in developing and maintaining. Gas turbine power represents a giant step in continuing that progress. I, for one, hope that Board does nothing to stifle it.

Exhibit A

Richard Trzupek Qualifications

Richard Trzupek
Qualifications Statement

Richard Trzupek is the Air Quality Manger of Huff & Huff, Inc. ("Huff & Huff"). Huff & Huff is an Illinois Corporation with its principal place of business located at 512 West Burlington, Suite 100, LaGrange, Illinois 60525. Huff & Huff is an environmental consulting firm specializing in air and water quality engineering, testing and regulation.

Richard Trzupek has a Bachelor's degree in Chemistry from Loyola University of Chicago, including courses of instruction in chemistry, physics, mathematics and engineering. He has been employed in the field of air quality management since 1982. He has been trained in the sampling and analytical techniques involved in USEPA air emissions test methods, including Methods 1, 2, 3, 4, 5, 5B, 5F, 6, 6C, 7, 7E, 8, 9, 10, 11, 12 and other federal and state air emissions test methods.

Mr. Trzupek has extensive experience in the field of air quality permitting and regulation as it applies to electric generating units, including gas turbines and peaking plants. He has provided consulting services in regard to power projects for, among others, People's Energy, Dominion Energy, Elwood Energy, Detroit Edison and Entergy.

Mr. Trzupek is a past Director of Air Quality for the Lake Michigan States Section of the Air and Waste Management Association (AWMA), the leading international organization for environmental professionals. He is also a contributing author to the Analytical Methods section of the "Odor and VOC Control Handbook" (McGraw Hill, 1998, Harold J. Rafson Editor) and is currently under contract to produce an air quality handbook for McGraw Hill.

He has written numerous articles about air quality issues for environmental publications and have lectured on air test methods and air quality issues for numerous organizations including, USEPA, AWMA, Executive Enterprises and the Graphic Arts Technical Foundation. Mr. Trzupek's current resume, including a summary of articles and presentations, is attached.

RICH TRZUPEK
Air Quality Manager
Huff & Huff, Inc.

Education:

Loyola University, Chicago, Illinois
Bachelors Degree in Chemistry

Experience:

Mr. Trzupek has been involved in the air quality field since 1982. He has worked with a wide variety of industries, including the petrochemical, utility, steel, graphic arts, metal finishing, synthetic organic chemical, consumer products, automobile and food processing industries.

He has served as an expert witness for a variety of testing and permitting issues, as well as providing other types of litigation support. His consulting experience not only includes air pollution, but involves analyzing the business, community and environmental concerns inherent to industrial projects. Mr. Trzupek is frequently called into projects during the conceptual stage to provide strategic advice and to facilitate communication between stakeholders.

He has testified before the Illinois Pollution Control Board and the Illinois Environmental Protection Agency. He has participated in the development of environmental rules, including: Illinois' VOM trading program, Illinois' NOx SIP rules, USEPA's air toxics program and the South Coast Air Quality Management District's VOM emissions program. He has also testified as an expert witness in environmental litigation and is a guest lecturer for Loyola Law School's Environmental Law program for the past four years.

Mr. Trzupek developed techniques used to measure emissions of Hazardous Air Pollutants from steel mill coke ovens. He was also the project manager for a research program used to develop a new measurement technique for the determination of Volatile Organic Compounds: USEPA's Method 204F.

He has been a frequent speaker for organizations such as USEPA's Emission Measurement Technical Information Center, the Air & Waste Management Association, the Chicago Bar Association, the Midwest Cogeneration Association and the Graphic Arts Technical Foundation. He is also the past Director of Air Quality for the Air & Waste Management Association (AWMA).

Mr. Trzupek was the Managing Principal at Air Solutions, Inc. from 1994 through 2000. Prior to that, he was a Senior Project Engineer at Mostardi-Platt Associates, (1991 – 1994) Manager of Air Quality Services at The Almega Corporation, (1985 – 1991)

Technical Representative for Dubois Chemical Company, (1983 – 1985) and a Compliance Specialist for Albun Inc., (1981 – 1983).

Publications and Presentations:

"Air Quality Management Guide", due for release in 2002 by McGraw Hill

"Analysis of Peaker Plant Air Emissions in Illinois", testimony presented to the Illinois Pollution Control, August 25, 2000.

"Recent Developments in NOx Regulation", presented at the Chicago Bar Association Clean Air Seminar, (April 2000), Chicago, IL

"VOC and Odor Control Handbook", Harold Rafson, Editor, McGraw Hill, 1998.

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